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

Sanyo Logistics Center

PTS#

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

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

Engineer of Work:





KAMAL SWEIS RCE#48592
Provide Wet Signature and Stamp Above Line

Prepared For:

BADIEE DEVELOPMENT
1261 PROSPECT STREET STE.9
LA JOLLA, CA 92037
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Prepared By:

K&S ENGINEERING
7801 MISSION CENTER COURT SUITE 100
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Date:
10/04/2021

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: SANYO LOGISTICS CENTER

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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:
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

48592 — PE#

6/30/2022 — Expiration Date

KAMAL SWEIS

Print Name

K&S ENGINEERING

Company

10/04/21

Date



Project Name: SANYO LOGISTICS CENTER

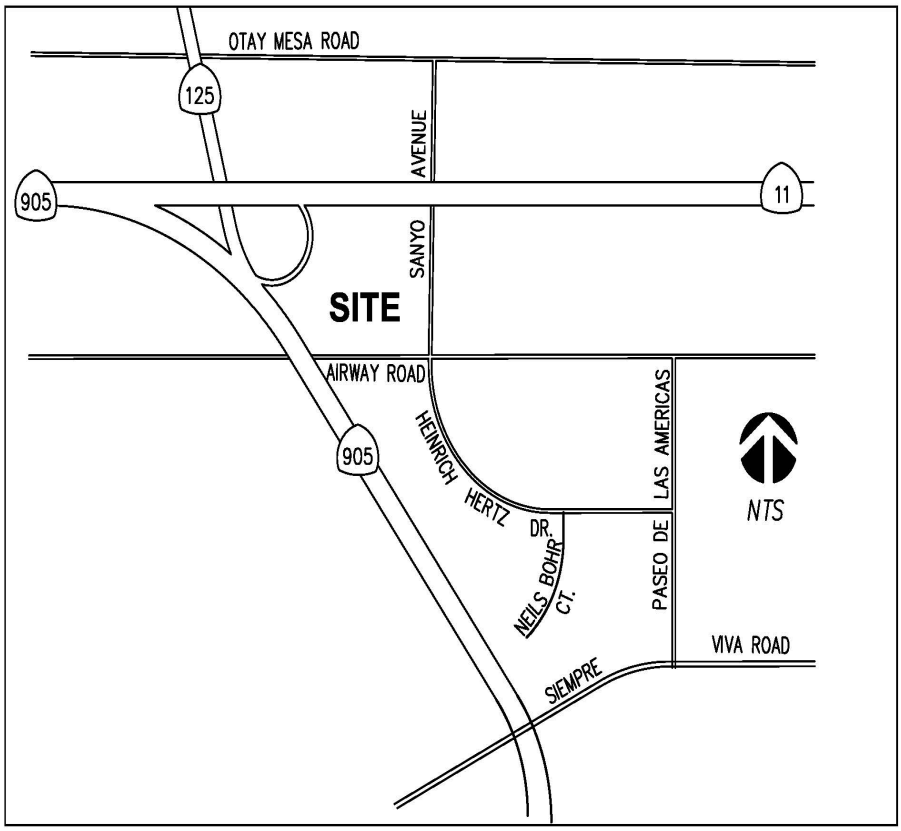
Submittal Record

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	07/02/21	☐ Preliminary Design/Planning/CEQA ☑ Final Design	Initial Submittal
2	10/04/21	☐ 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: SANYO LOGISTICS CENTER
Permit Application PTS#



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

Attach DS-560 form.

SD Development Services

FORM
DS-560
July 2021

Storm Water Requirements Applicability Checklist

Project Address:

AIRWAY ROAD AND SANYO AVENUE

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; proceed to 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, SWPPP required; skip questions 3-4 ○ No; proceed to 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, SWPPP required; skip question 4 ○ No; proceed to 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**, an 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 check "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 http://www.sandiego.gov/stormwater/regulations/index.shtml

CLEAR FORM

SD Development Services

PART D – PDP Exempt Requirements

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

- **If "yes" is checked for any questions in Part D**, continue to Part F and check the box labeled "PDP Exempt."
- **If "no" is 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, proceed to 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, proceed to next question

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 replaces 5,000 square feet or more of impervious surface. ○ Yes ◉ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces5,000 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

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SD Development Services

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 continue 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 (>5,000 sf of ground disturbance) located within the Los Peñasquitos 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: Construction 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

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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 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 shop 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** ○ Yes ◉ No

2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ○ Yes ◉ No

3. 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. ◉ Yes ○ No

Name of Owner or Agent BENNAM BADIEE

Title Managing Member

Signature

Date 9/30/21

CLEAR FORM

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Project Name: SANYO LOGISTICS CENTER

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: SANYO LOGISTICS CENTER		
Permit Application Number: PTS#		Date: 10/4/21
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: SANYO LOGISTICS CENTER

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:		

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: SANYO LOGISTICS CENTER

Site Information Checklist For PDPs	Form I-3B

Project Summary Information	
Project Name	SANYO LOGISTICS CENTER
Project Address	AIRWAY ROAD SAN DIEGO, CA 92154
Assessor's Parcel Number(s) (APN(s))	646-130-55-00
Permit Application Number	PTS#668005
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)	WATER TANKS Unit 911.12
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	14.85 Acres (647,024 Square Feet)
Area to be disturbed by the project (Project Footprint)	14.82 Acres (645,776 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	11.85 Acres (516,529 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	2.97 Acres (129,247 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	+80% %

Project Name: SANYO LOGISTICS CENTER

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

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

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

Description / Additional Information:

Existing Land Cover Includes (select all that apply):

- [x] Vegetative Cover
- [ ] Non-Vegetated Pervious Areas
- [ ] Impervious Areas

Description / Additional Information:

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

- [ ] NRCS Type A
- [ ] NRCS Type B
- [ ] NRCS Type C
- [x] NRCS Type D

Approximate Depth to Groundwater:

- [ ] Groundwater Depth < 5 feet
- [ ] 5 feet < Groundwater Depth < 10 feet
- [ ] 10 feet < Groundwater Depth < 20 feet
- [x] Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- [ ] Watercourses
- [ ] Seeps
- [ ] Springs
- [ ] Wetlands
- [x] None

Description / Additional Information:

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. The existing onsite drainage is natural and sheet flows from south to north.

2. Offsite drainage enters the site from the north from two drainage areas. One being Airway Road from Avenida De Las Americas to west of Sanyo Avenue with 9.9 CFS . The second drainage area comes from the Otay International Center detention basin located north of Airway Road with 19 CFS of detained flow. These two flows are then conveyed across the site to the project's point of compliance.

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 an industrial building with loading docks, parking, landscaping and one biofiltratrion BMP's for water quality, hydromodifocation and peak flow detention.

In addition, four Green Street bioswales are proposed to provide source control of stormwater, limit stormwater transport and pollutant conveyance to the public storm drain system on Sanyo Avenue and Airway Road and to provide environmentally enhanced roads.

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

Impervious features of the the project include one building, loading docks and vehicular parking as well as street widening of Airway Road and Sanyo Avenue.

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

The pervious features include landscaped islands, slopes, buffer and one biofiltration basin and street Urban Parkways per the Otay Mesa Community Plan.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

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:

The project proposes an underground system of storm drain pipes and inlets to convey the proposed project flows. Also offsite flows from the existing development on the north side of the site are intercepted by a proposed storm drain and bypassed across the project site through an underground system of pipes.

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):

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

Description/Additional Information:

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)

The runoff from the proposed site drains into an property then the flow surface flows to the Otay Mesa Creek to the US Mexico Border and into Mexico to the Tijuana River and into the Pacific Ocean.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations

ROUND WATER POTENTIAL BENEFICIAL USE:MUN, AGR, IND
INLAND SURFACE WATERS:
SPRING CANYON EXISTING BENIFICIAL USES: AGR, REC2, WARM,WILD
SPRING CANYON POTENTIAL BENIFICIAL USES: IND, REC1, WARM,WILD
COASTAL WATERS EXISTING BENEFICIAL USES: IND,NAV,REC1,REC2,COMM,BIOL,WILD,RARE,MAR,AQUA,MIGR,SPAWN,SHELL

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations

There are no areas of ASBS downstream project.

Provide distance from project outfall location to impaired or sensitive receiving waters

The site doesn't drain to it, project doesn't discharge to the ESA

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 is not in the proximity to the City's Multi-Habitat Planning Area.

Project Name: SANYO LOGISTICS CENTER

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)**
Tijuana River	utrophic	
	Indicator Bacteria	
	Low Dissolved Oxygen	
	Pesticides	
	Phosphorous	
	Sedimentation/Siltation	
	Selenium	
	Solids Surfactants (MBAS)	
	Synthetic Organics	
	Total Nitrogen as N 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	☐	☐	☐

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:

No upstream CCSYA drain into site, There is no CCYSA onsite. See Attachment 2b

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.

Project will have one point of compliance (POC-1) located on the southwest side of the site.

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)

N/A

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.

N/A

Project Name: SANYO LOGISTICS CENTER

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: SANYO LOGISTICS CENTER

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.			

Project Name: SANYO LOGISTICS CENTER

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: 1-1 There are no existing natural drainage pathways. 1-2 See attached landscape plan 1-3 No tree wells are proposed 1-4 No tree wells are proposed			

Project Name: SANYO LOGISTICS CENTER

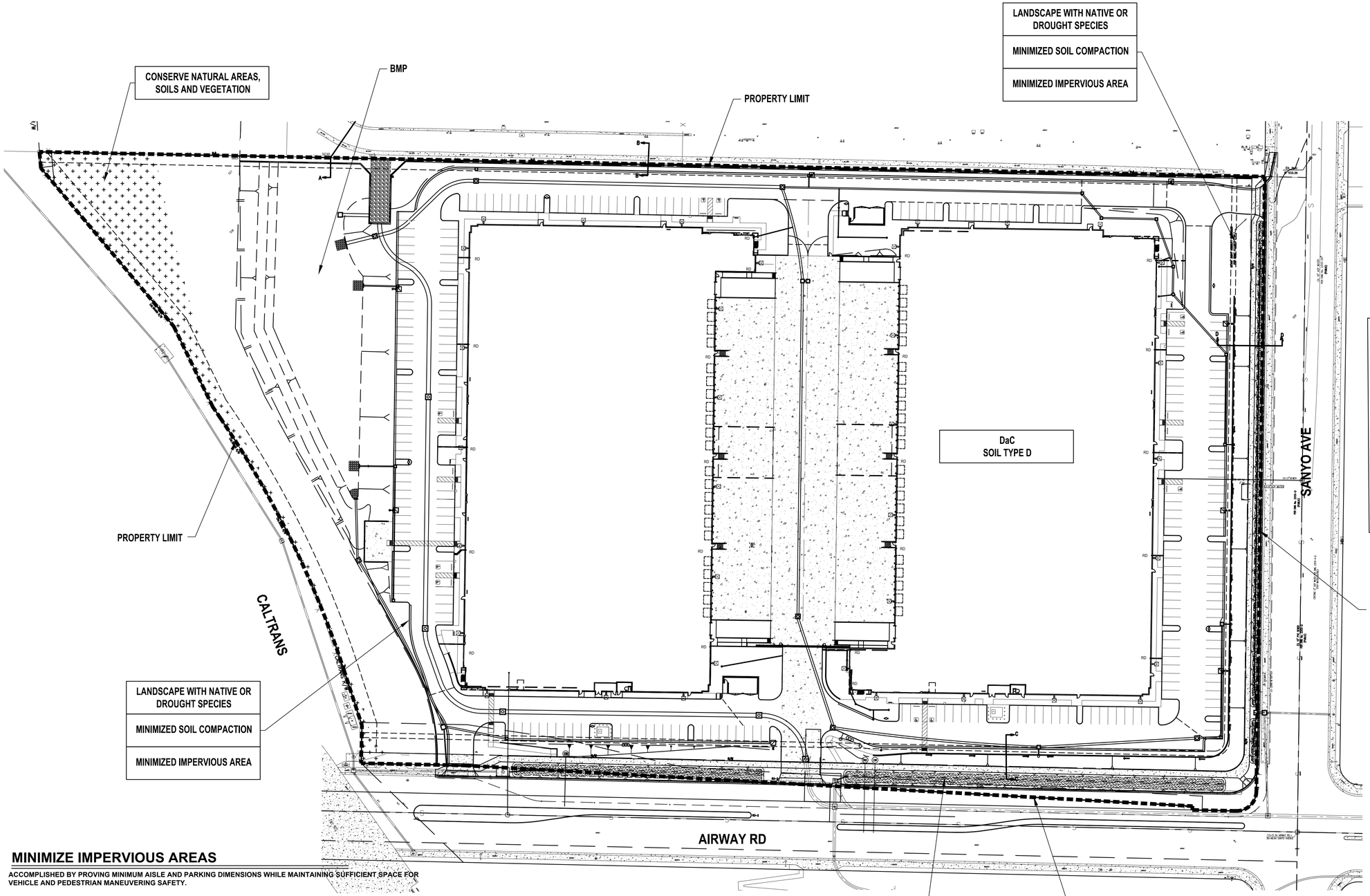
Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented: - A biofiltration basin BMP and undisturbed areas are proposed on the west side of the site - Four Green Street Bioswales for Sanyo Avenue and Airway Road			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented: - A biofiltration basin BMP and undisturbed areas are proposed on the west side of the site - Four Green Street Bioswales for Sanyo Avenue and Airway Road			
4.3.5 Impervious Area Dispersion	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.5 not implemented: - Four Green Street Bioswales for Sanyo Avenue and Airway Road will provide Impervious Area Dispersion			
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: SANYO LOGISTICS CENTER

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: Runoff collection is infeasible, green roof requires structural capacity that will make this project very costly and therefore unfeasible. Permeable pavement is unfeasible due to soil conditions (soil type D)			
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: No permeable pavement is being proposed for this project.			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvesting and reuse not feasible for project (See attachment 1c)			
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

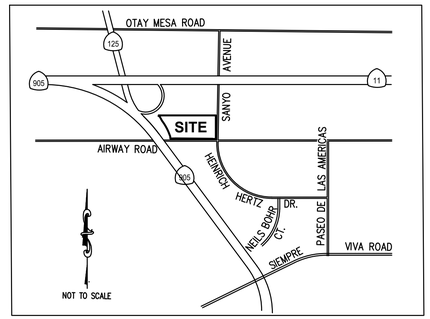
Project Name: SANYO LOGISTICS CENTER

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



LEGEND

ITEM	SYMBOL
BOUNDARY LIMIT	
IMPERVIOUS AREA	
PERVIOUS AREA	



VICINITY MAP

NO SCALE

0 25 50 100 150

GRAPHIC SCALE: 1" = 50'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

MINIMIZE IMPERVIOUS AREAS

ACCOMPLISHED BY PROVING MINIMUM AISLE AND PARKING DIMENSIONS WHILE MAINTAINING SUFFICIENT SPACE FOR VEHICLE AND PEDESTRIAN MANEUVERING SAFETY.

SOIL COMPACTION

MINIMIZE SOIL COMPACTION WHENEVER POSSIBLE BY: HAVING A MINIMUM 8" TOP SOIL LAYER AND BY SCARIFYING SUB-SOILS BELOW THE TOP SOIL LAYER WITHIN LANDSCAPE AREAS BY AT LEAST 4".

SITE DESIGN BMP EXHIBIT FORM I-5B

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO.48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA

LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES:

NATIVE PLANTS RESILIENT TO VARIABLE FLOW, TOLERANT TO SUMMER DROUGHT AND SATURATED SOIL CONDITIONS. IE: THINGRASS, YERBA MANZA, MARSH BACCAHRIS, CALIFORNIA FIELD SEDGE, SAN DIEGO SEDGE, RUSTY SEDGE, SALT GRASS, MEXICAN RUSH, CALIFORNIA GREY RUSH, CANYON PRINCE WILD RYE, NEVIN'S BARBERRY, DEERGRASS AND LOW BULLRUSH, FULLY VEGETATE BOTTOM OF BASIN. ALL PLANTING PER LANDSCAPE PLANS.

SITE DESIGN EXHIBIT FOR:

AIRWAY LOGISTICS CENTER

SHEET 1 OF 1

Project Name: SANYO LOGISTICS CENTER

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.

The project is proposing a multipurpose Biofiltration BMP for water quality, HMP and peak flow detention purposes.

(Continue on page 2 as necessary.)

Project Name: SANYO LOGISTICS CENTER

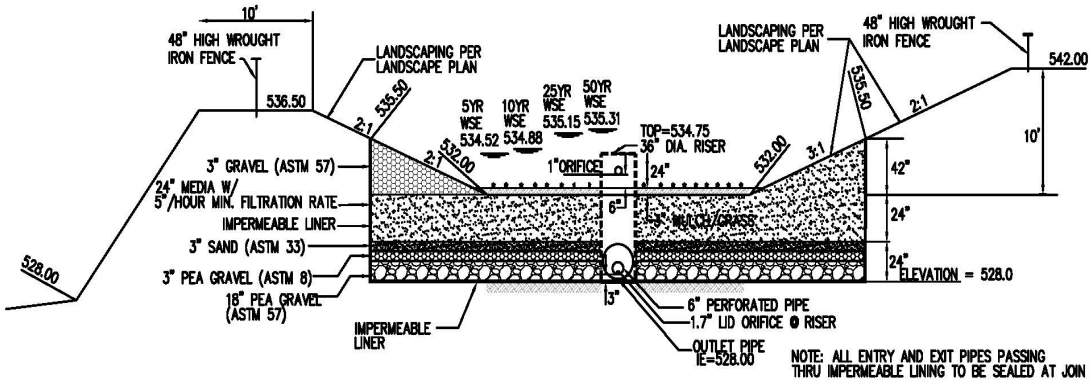
Form I-6 Page 2 of

(Continued from page 1)

Project Name: SANYO LOGISTICS CENTER

Form I-6 Page 3 of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No.	
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) X ☐ 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 X ☐ 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	K&S ENGINEERING 7801 MISSION CENTER COURT, SUITE 100 SAN DIEGO, CA 92108
Who will be the final owner of this BMP?	BADIEE DEVELOPMENT 261 PROSPECT STREET STE.9 LA JOLLA, CA 92037
Who will maintain this BMP into perpetuity?	BADIEE DEVELOPMENT 261 PROSPECT STREET STE.9 LA JOLLA, CA 92037
What is the funding mechanism for maintenance?	Private Income

Form I-6 Page 4 of (Copy as many as needed)
Structural BMP ID No. 1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT 2	AREA (TOP) FT 2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	24"	1.7"	22,498	29,977	4.5	20,574

BMP1 BIOFILTRATION BF-1 (PVT)
NOT TO SCALE

Project Name: SANYO LOGISTICS CENTER

Form I-6 Page 3 of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No.	
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	K&S ENGINEERING 7801 MISSION CENTER COURT, SUITE 100 SAN DIEGO, CA 92108
Who will be the final owner of this BMP?	BADIEE DEVELOPMENT 261 PROSPECT STREET STE.9 LA JOLLA, CA 92037
Who will maintain this BMP into perpetuity?	BADIEE DEVELOPMENT 261 PROSPECT STREET STE.9 LA JOLLA, CA 92037
What is the funding mechanism for maintenance?	Private Income

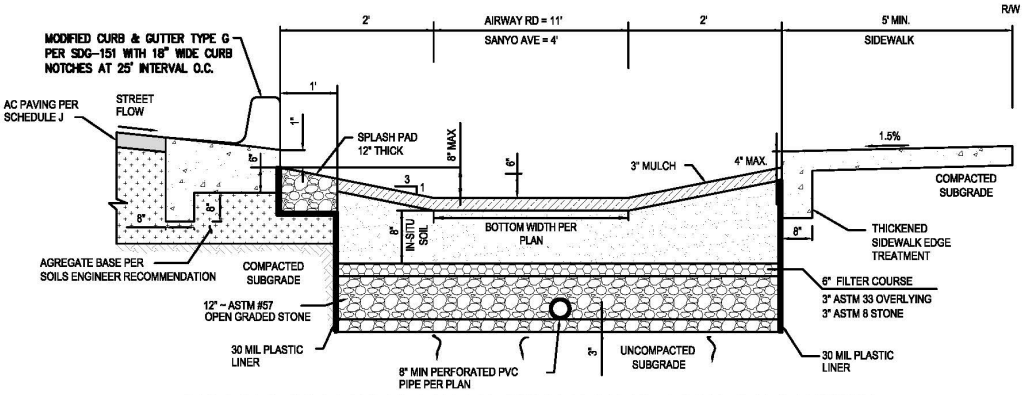
Form I-6 Page 4 of (Copy as many as needed)

Structural BMP ID No. 1

Construction Plan Sheet No.

Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Green Street Vegetated swale for treatment of the street widening of Sanyo Avenue and Airway Road



GREEN STREET VEGETATED SWALE ADJACENT TO ROADWAY
PER APPENDIX E (FT-1) AND APPENDIX J OF STORM WATER STANDARDS
(6" MAX. PONDING DEPTH)
NOT TO SCALE

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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: SANYO LOGISTICS CENTER

Indicate which Items are Included:

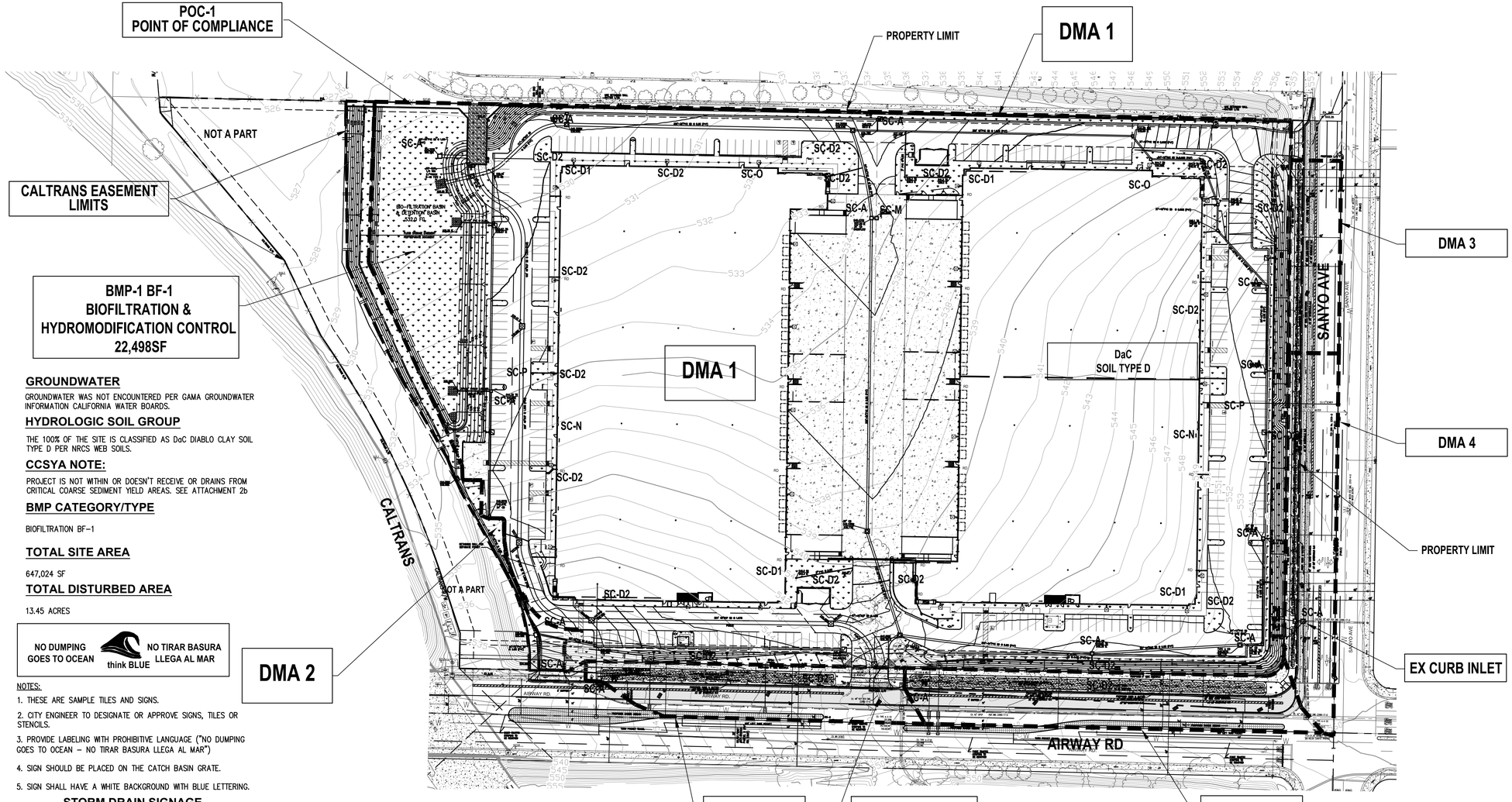
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included 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: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ 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: SANYO LOGISTICS CENTER

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)
- [ ] 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)



LEGEND

ITEM	SYMBOL
BOUNDARY LIMIT	
IMPERVIOUS AREA	
PERVIOUS AREA	
ONSITE STORM DRAIN INLETS, STENCILING/SIGNAGE "NO DUMPING! GOES TO OCEAN"	SC-A
FUTURE INDOOR & STRUCTURAL PEST CONTROL	SC-D1
REFUSE AREAS	SC-G
LOADING DOCKS	SC-M
FIRE SPRINKLER TEST WATER	SC-N
MISCELLANEOUS DRAIN OR WASH WATER	SC-O
PLAZAS, SIDEWALKS AND PARKING LOTS	SC-P
LARGE TRASH GENERATING FACILITIES	SC-6A

BIORETENTION SOIL MEDIA NOTE:

COMPOST SHALL BE CERTIFIED BY THE U.S. COMPOSTING COUNCIL'S SEAL OF TESTING ASSURANCE PROGRAM OR AN APPROVED EQUIVALENT PROGRAM. COMPOST SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

1. ORGANIC MATERIAL CONTENT SHALL BE 35% TO 75% BY DRY WEIGHT.
2. CARBON TO NITROGEN (C:N) RATIO SHALL BE BETWEEN 15:1 AND 40:1, PREFERABLY ABOVE 20:1 TO REDUCE THE POTENTIAL FOR NITROGEN LEACHING/WASHOUT.
3. PHYSICAL CONTAMINANTS (MANMADE INERT MATERIALS) SHALL NOT EXCEED 1% BY DRY WEIGHT.
4. PH SHALL BE BETWEEN 6.0 AND 7.5.
5. SOLUBLE SALT CONCENTRATION SHALL BE LESS THAN 10 DS/M (METHOD TMECC 4.10–A, USDA AND U.S. COMPOSTING COUNCIL).
6. MATURITY (SEED EMERGENCE AND SEEDLING VIGOR) SHALL BE GREATER THAN 80% RELATIVE TO POSITIVE CONTROL (METHOD TMECC 5.05–A, USDA AND U.S. COMPOSTING COUNCIL)
7. STABILITY (CARBON DIOXIDE EVOLUTION RATE) SHALL BE LESS THAN 2.5 MG CO2–C PER G COMPOST ORGANIC MATTER (OM) PER DAY OR LESS THAN 5 MG CO2–C PER G COMPOST CARBON PER DAY, WHICHEVER UNIT IS REPORTED. (METHOD TMECC 5.08–B, USDA AND U.S. COMPOSTING COUNCIL). ALTERNATIVELY A SOLVITA RATING OF 6 OR HIGHER IS ACCEPTABLE.
8. MOISTURE SHALL BE 25%–55% WET WEIGHT BASIS.
9. SELECT PATHOGENS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.32(A).
10. TRACE METALS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.13, TABLES 1 AND 3.
11. SHALL BE WITHIN GRADATION LIMITS IN TABLE F.3–2 (ASTM D 422 SIEVE ANALYSIS OR APPROVED EQUIVALENT).

Table F.3-2: Compost Gradation Limits

Sieve Size	Percent Passing (by weight)
16 mm (5/8")	99 to 100
6.3 mm (1/4")	40 to 95
2 mm	40 to 90

GROUNDWATER

GROUNDWATER WAS NOT ENCOUNTERED PER GAMA GROUNDWATER INFORMATION CALIFORNIA WATER BOARDS.

HYDROLOGIC SOIL GROUP

THE 100% OF THE SITE IS CLASSIFIED AS DaC DIABLO CLAY SOIL TYPE D PER NRCS WEB SOILS.

CCSYA NOTE:

PROJECT IS NOT WITHIN OR DOESN'T RECEIVE OR DRAINS FROM CRITICAL COARSE SEDIMENT YIELD AREAS. SEE ATTACHMENT 2b

BMP CATEGORY/TYPE

BIOFILTRATION BF–1

TOTAL SITE AREA

647,024 SF

TOTAL DISTURBED AREA

13.45 ACRES

NO DUMPING GOES TO OCEAN — think BLUE — NO TIRAR BASURA LLEGA AL MAR

NOTES:

1. THESE ARE SAMPLE TILES AND SIGNS.
2. CITY ENGINEER TO DESIGNATE OR APPROVE SIGNS, TILES OR STENCILS.
3. PROVIDE LABELING WITH PROHIBITIVE LANGUAGE ("NO DUMPING GOES TO OCEAN – NO TIRAR BASURA LLEGA AL MAR")
4. SIGN SHOULD BE PLACED ON THE CATCH BASIN GRATE.
5. SIGN SHALL HAVE A WHITE BACKGROUND WITH BLUE LETTERING.

STORM DRAIN SIGNAGE

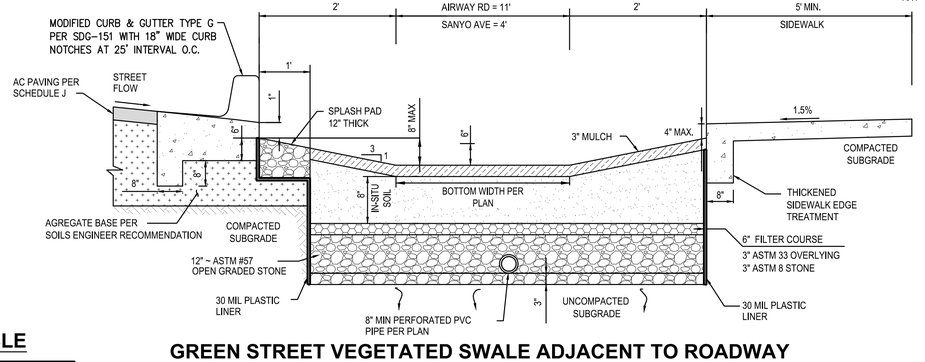
NOT TO SCALE

DRAINAGE MANAGEMENT AREAS

DMA	SURFACE (SQ. FT.) HARDSCAPE/ROOF	SURFACE (SQ. FT.) LANDSCAPE	TOTAL (SQ. FT.)	TYPE OF STRUCTURAL BMP
DMA 1	454,935	98,304	553,239	BMP# 1 BF–1 BIOFILTRATION & HYDROMODIFICATION CONTROL
DMA 2	0	15,564	15,564	SELF MITIGATING
DMA 3	9,423	1,771	11,194	GREEN STREET VEGETATED SWALE
DMA 4	18,027	3,095	21,122	GREEN STREET VEGETATED SWALE
DMA 5	19,437	6,248	25,685	GREEN STREET VEGETATED SWALE
DMA 6	14,707	4,265	18,972	GREEN STREET VEGETATED SWALE
		TOTAL	645,776	

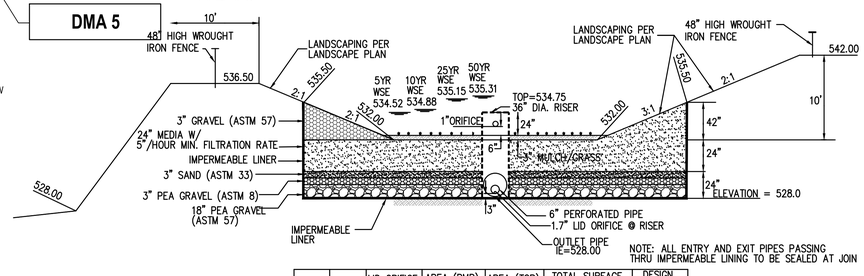
PROJECT AREA IMPERVIOUS/PERVIOUS TABLE

	IMPERVIOUS AREA (SQ.FT.)	PERVIOUS AREA (SQ.FT.)	TOTAL (SQ.FT.)
EXISTING	50,263	645,559	695,822
PROPOSED	516,529	129,247	645,776



GREEN STREET VEGETATED SWALE ADJACENT TO ROADWAY PER APPENDIX E (FT-1) AND APPENDIX J OF STORM WATER STANDARDS (6" MAX. PONDING DEPTH)

NOT TO SCALE



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT 2	AREA (TOP) FT 2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	24"	1.7"	22,498	29,977	4.5	20,574

BMP1 BIOFILTRATION BF-1 (PVT)

NOT TO SCALE

0 30 60 120 180

GRAPHIC SCALE: 1" = 60'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

DRAINAGE MANAGEMENT AREA (DMA) ATTACHMENT 1A

DMA SHEET FOR:

SANYO LOGISTICS CENTER

SHEET 1 OF 1

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

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?

[X] Toilet and urinal flushing
[X] 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]

Irrigation demand = 390 gal/acre x 14.85 acres = 5,791 gal = 7,774 CF

T&U demand = 5.5 gal/employee/day x 1.5 days x 8 employees x 1/7.48 gal / cf

= 8.8 cf

Total demand = 7,774+ 9 = 7,783cf

3. Calculate the DCV using worksheet B-2.1.

DCV = 20,574 (cubic feet)

[Provide a summary of calculations here]

SEE WORKSHEET B.5-1

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 ⇩ / [X] No ⇨	[ ] Yes ⇩ / [X] No ⇨	[X] 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.
[X] No, select alternate BMPs.

Project Name: SANYO LOGISTICS CENTER

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)
1	14.32	11.72	82	D	0.75	20574	1	Biofiltration	1
2	0.36	0.36	100	D	0.10	1568	Self Mitigating	-	2
3	0.26	0.22	84	D	0.77	334	Green Street		3
4	0.48	0.41	85	D	0.78	625	Green Street		4
5	0.59	0.45	76	D	0.77	690	Green Street		5
6	0.44	0.34	77	D	0.72	529	Green Street		6
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
6	16.45	13.5	0.82		0.65	24320	16.45		6

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

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:
Entire Site	Preliminary
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.

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.

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:
Entire Site	Preliminary
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).

Two infiltration tests were performed on the property. The factored test results were as follows:

A-1: 0.003 in/hr
A-2: 0.021 in/hr

The average rate of the two tests is 0.012 in/hr.

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.

The City of SAN DIEGO	Project Name	SANYO LOGISTICS CENTER	
	BMP ID	BMP 1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	553239	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	15906	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	27	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	24	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	0.025	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	0.15	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.2	inches
15	Total Depth Treated [Line 13 + Line 14]	22.35	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	23858	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	12810	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	11929	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	6448	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	12448	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	12448	sq. ft.
23	Provided BMP Footprint	28749	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	SANYO LOGISTICS CENTER	
	BMP ID	BMP 1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	553239	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	15906	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	0.058	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.029	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%	11.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.079	
10	Target volume retention [Line 9 x Line 4]	1257	cu. ft.

The City of SAN DIEGO	Project Name	SANYO LOGISTICS CENTER	
	BMP ID	BMP 1	
Volume Retention from Biofiltration with Partial Retention BMPs		**Worksheet B.5-3**	
1	Area draining to the BMP	553239	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	15906	cu. ft.
BMP Parameters			
5	Footprint of the BMP	28749	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	27	inches
7	Media retained pore space [50% of (Field Capacity-Wilting Point)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Porosity of aggregate storage	0.4	in/in
10	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	0.058	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]	0.029	in/hr.
Evapotranspiration: Average Annual Volume Retention			
13	Effective evapotranspiration depth [Line 6 x Line 7]	1.35	inches
14	Retained Pore Volume [(Line 13 x Line 5)/12]	3234	cu. ft.
15	Fraction of DCV retained in pore spaces [Line 14/Line 4]	0.20	
16	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	11.4	%
Infiltration: Average Annual Volume Retention			
17	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	41	hours
18	Equivalent DCV fraction from evapotranspiration (use Line 16 and Line 17 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.08	
19	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	2875	cu. ft.
20	Infiltration Storage Fraction of DCV [Line 19/Line 4]	0.18	
21	Total Equivalent Fraction of DCV [Line 18 + Line 20]	0.26	
22	Biofiltration BMP average annual capture [use Line 21 and 17 in Figure B.4-1]	31.87	%
23	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 22^3 - 0.000057 \times \text{Line } 22^2 + 0.0086 \times \text{Line } 22 - 0.014$	0.244	
24	Volume retention achieved by biofiltration BMP [Line 23 x Line 4]	3881	cu. ft.

Volume Retention = 3881 cubic feet

The City of SAN DIEGO	Project Name	SANYO LOGISTICS CENTER
	BMP ID	BMP 1

Volume Retention for No Infiltration Condition							Worksheet B.5-6
1	Area draining to the biofiltration BMP					553239	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.75	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					414929	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					12448	sq. ft.
5	Biofiltration BMP Footprint					28749	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.)						
7	Impervious area draining to the landscape area (sq. ft.)						
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]					28749	sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					2.31	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					1257	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-1646.67	cu. ft.
Site Design BMP							
	Identification	**Site Design Type**				**Credit**	
16	**1**						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.					0	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met				

CALCULATE ADJUSTED RUNOFF FACTOR FOR WATER QUALITY FOR **DMA 1**

Per Storm Water Standards Table B.1-1

Runoff factor for:

Concrete or asphalt= 0.90

Amended soils, mulched soils or landscape= 0.10

Weighted Runoff Factor Equation

Cw= [(C x impervious area)+ (C x pervious area)] / Total area

Where:

A imp=11.71 AC

A per= 2.61 AC

Total tributary area= 14.32 AC

Cw= [(0.90 x 11.71) + (0.10 x 2.61)] / 14.32= 0.75

Cw= 0.75

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

Worksheet B.2-1: DCV

Design Capture Volume DMA-3		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	0.26	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.77	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0.00	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	334	cubic-feet

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

Worksheet B.2-1: DCV

Design Capture Volume DMA-4		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	0.48	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.78	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0.00	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	625	cubic-feet

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

Worksheet B.2-1: DCV

Design Capture Volume DMA-5		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	0.59	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.70	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0.00	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	690	cubic-feet

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

Worksheet B.2-1: DCV

Design Capture Volume DMA-6		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.46	inches
2	Area tributary to BMP (s)	A=	0.44	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0.00	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0.00	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	529	cubic-feet

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

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows DMA 3		Worksheet B.6-1		
1	**DCV**	**DCV**	**8623**	**cubic-feet**
2	**DCV retained**	**$DCV_{retained}$**	**0**	**cubic-feet**
3	**DCV biofiltered**	**$DCV_{biofiltered}$**	**0**	**cubic-feet**
4	**DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)**	**$DCV_{flow-thru}$**	**334**	**cubic-feet**
5	**Adjustment factor (Line 4 / Line 1)**	**AF=**	**1**	**unitless**
6	**Design rainfall intensity**	**i=**	**0.20**	**in/hr.**
7	**Area tributary to BMP (s)**	**A=**	**0.26**	**acres**
8	**Area-weighted runoff factor (estimate using Appendix B.2)**	**C=**	**0.77**	**unitless**
9	**Calculate Flow Rate = AF x (C x i x A)**	**Q=**	**0.04004**	**cfs**

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

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

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows DMA 4		Worksheet B.6-1		
1	**DCV**	**DCV**	**16125**	**cubic-feet**
2	**DCV retained**	**$DCV_{retained}$**	**0**	**cubic-feet**
3	**DCV biofiltered**	**$DCV_{biofiltered}$**	**0**	**cubic-feet**
4	**DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)**	**$DCV_{flow-thru}$**	**625**	**cubic-feet**
5	**Adjustment factor (Line 4 / Line 1)**	**AF=**	**1**	**unitless**
6	**Design rainfall intensity**	**i=**	**0.20**	**in/hr.**
7	**Area tributary to BMP (s)**	**A=**	**0.48**	**acres**
8	**Area-weighted runoff factor (estimate using Appendix B.2)**	**C=**	**0.78**	**unitless**
9	**Calculate Flow Rate = AF x (C x i x A)**	**Q=**	**0.07488**	**cfs**

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

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

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows DMA 5		Worksheet B.6-1		
1	**DCV**	**DCV**	**17788**	**cubic-feet**
2	**DCV retained**	**$DCV_{retained}$**	**0**	**cubic-feet**
3	**DCV biofiltered**	**$DCV_{biofiltered}$**	**0**	**cubic-feet**
4	**DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)**	**$DCV_{flow-thru}$**	**690**	**cubic-feet**
5	**Adjustment factor (Line 4 / Line 1)**	**AF=**	**1**	**unitless**
6	**Design rainfall intensity**	**i=**	**0.20**	**in/hr.**
7	**Area tributary to BMP (s)**	**A=**	**0.59**	**acres**
8	**Area-weighted runoff factor (estimate using Appendix B.2)**	**C=**	**0.7**	**unitless**
9	**Calculate Flow Rate = AF x (C x i x A)**	**Q=**	**0.0826**	**cfs**

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

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

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows DMA 6		Worksheet B.6-1		
1	**DCV**	**DCV**	**13645**	**cubic-feet**
2	**DCV retained**	**$DCV_{retained}$**	**0**	**cubic-feet**
3	**DCV biofiltered**	**$DCV_{biofiltered}$**	**0**	**cubic-feet**
4	**DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)**	**$DCV_{flow-thru}$**	**529**	**cubic-feet**
5	**Adjustment factor (Line 4 / Line 1)**	**AF=**	**1**	**unitless**
6	**Design rainfall intensity**	**i=**	**0.20**	**in/hr.**
7	**Area tributary to BMP (s)**	**A=**	**0.44**	**acres**
8	**Area-weighted runoff factor (estimate using Appendix B.2)**	**C=**	**0.72**	**unitless**
9	**Calculate Flow Rate = AF x (C x i x A)**	**Q=**	**0.06336**	**cfs**

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

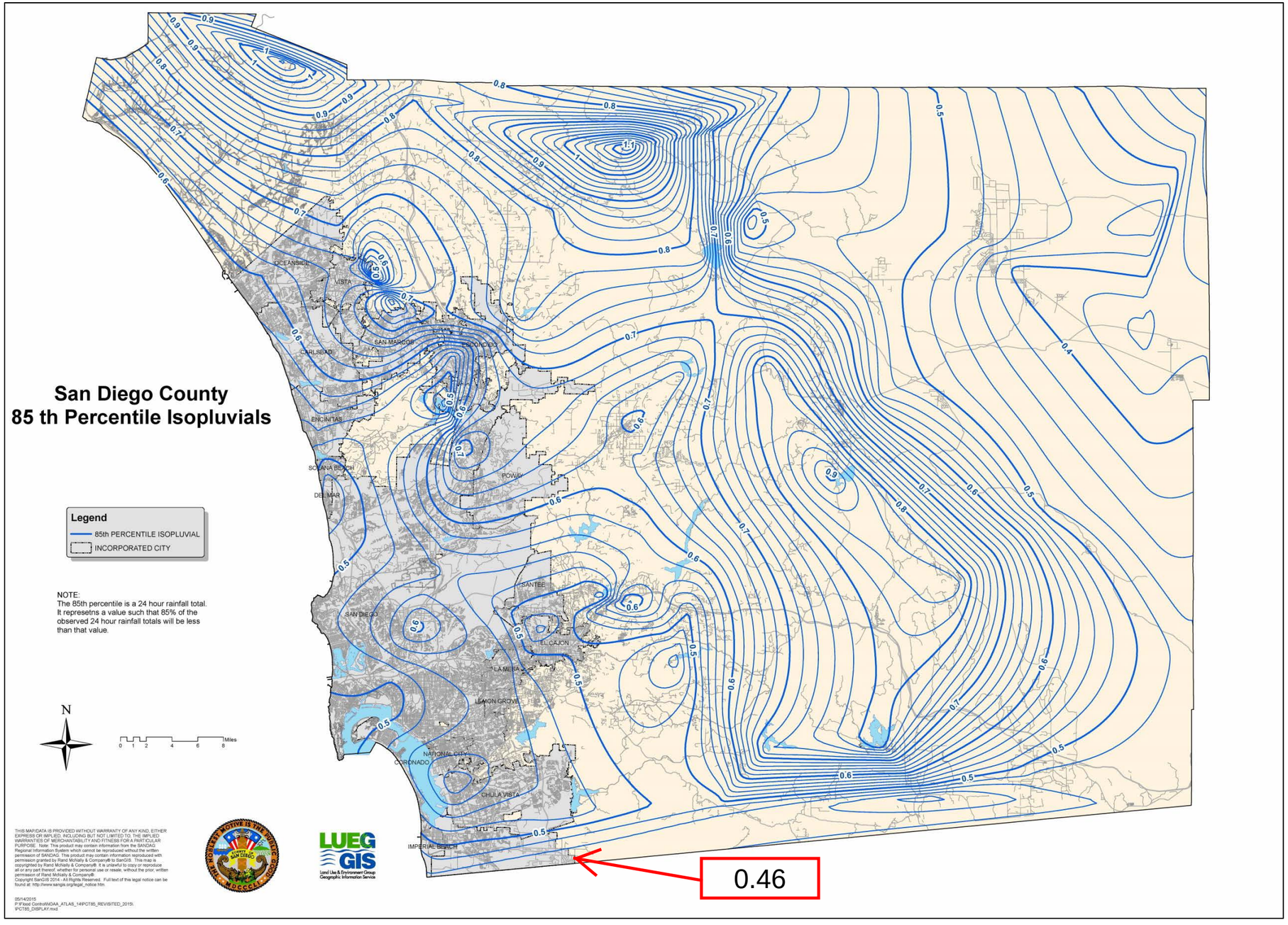


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

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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: SANYO LOGISTICS CENTER

Indicate which Items are Included:

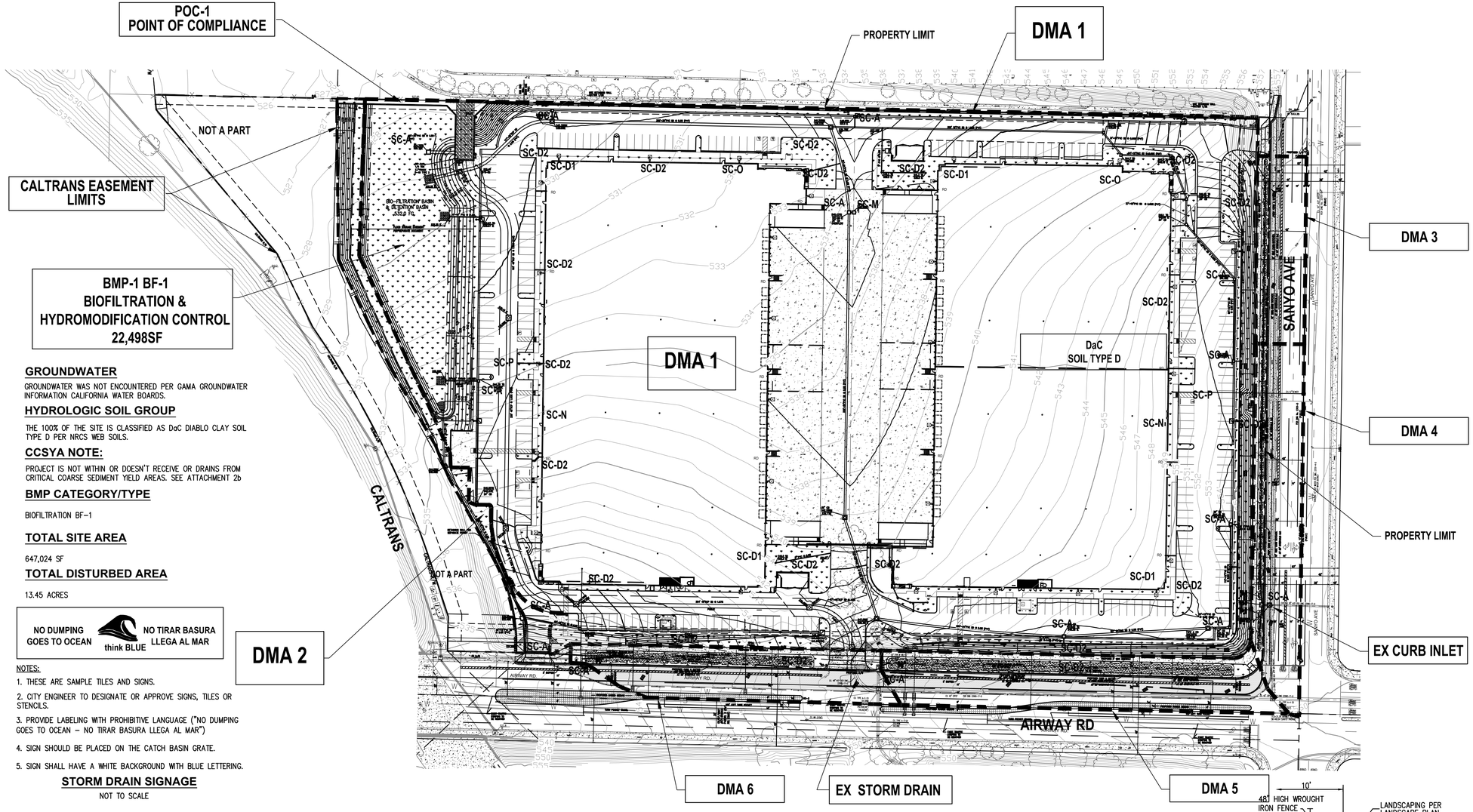
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 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: SANYO LOGISTICS CENTER

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)
- [ ] 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).



LEGEND

ITEM	SYMBOL
BOUNDARY LIMIT	
IMPERVIOUS AREA	
PERVIOUS AREA	
ONSITE STORM DRAIN INLETS, STENCILING/SIGNAGE "NO DUMPING! GOES TO OCEAN"	SC-A
FUTURE INDOOR & STRUCTURAL PEST CONTROL	SC-D1
REFUSE AREAS	SC-G
LOADING DOCKS	SC-M
FIRE SPRINKLER TEST WATER	SC-N
MISCELLANEOUS DRAIN OR WASH WATER	SC-O
PLAZAS, SIDEWALKS AND PARKING LOTS	SC-P
LARGE TRASH GENERATING FACILITIES	SC-6A

BIORETENTION SOIL MEDIA NOTE:

COMPOST SHALL BE CERTIFIED BY THE U.S. COMPOSTING COUNCIL'S SEAL OF TESTING ASSURANCE PROGRAM OR AN APPROVED EQUIVALENT PROGRAM. COMPOST SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

1. ORGANIC MATERIAL CONTENT SHALL BE 35% TO 75% BY DRY WEIGHT.
2. CARBON TO NITROGEN (C:N) RATIO SHALL BE BETWEEN 15:1 AND 40:1, PREFERABLY ABOVE 20:1 TO REDUCE THE POTENTIAL FOR NITROGEN LEACHING/WASHOUT.
3. PHYSICAL CONTAMINANTS (MANMADE INERT MATERIALS) SHALL NOT EXCEED 1% BY DRY WEIGHT.
4. PH SHALL BE BETWEEN 6.0 AND 7.5.
5. SOLUBLE SALT CONCENTRATION SHALL BE LESS THAN 10 DS/M (METHOD TMECC 4.10-A, USDA AND U.S. COMPOSTING COUNCIL).
6. MATURITY (SEED EMERGENCE AND SEEDLING VIGOR) SHALL BE GREATER THAN 80% RELATIVE TO POSITIVE CONTROL (METHOD TMECC 5.05-A, USDA AND U.S. COMPOSTING COUNCIL)
7. STABILITY (CARBON DIOXIDE EVOLUTION RATE) SHALL BE LESS THAN 2.5 MG CO2-C PER G COMPOST ORGANIC MATTER (OM) PER DAY OR LESS THAN 5 MG CO2-C PER G COMPOST CARBON PER DAY, WHICHEVER UNIT IS REPORTED. (METHOD TMECC 5.08-B, USDA AND U.S. COMPOSTING COUNCIL). ALTERNATIVELY A SOLVITA RATING OF 6 OR HIGHER IS ACCEPTABLE.
8. MOISTURE SHALL BE 25%-55% WET WEIGHT BASIS.
9. SELECT PATHOGENS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.32(A).
10. TRACE METALS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.13, TABLES 1 AND 3.
11. SHALL BE WITHIN GRADATION LIMITS IN TABLE F.3-2 (ASTM D 422 SIEVE ANALYSIS OR APPROVED EQUIVALENT).

Table F.3-2: Compost Gradation Limits

Sieve Size	Percent Passing (by weight)
16 mm (5/8")	99 to 100
6.3 mm (1/4")	40 to 95
2 mm	40 to 90

GROUNDWATER

GROUNDWATER WAS NOT ENCOUNTERED PER GAMA GROUNDWATER INFORMATION CALIFORNIA WATER BOARDS.

HYDROLOGIC SOIL GROUP

THE 100% OF THE SITE IS CLASSIFIED AS DaC DIABLO CLAY SOIL TYPE D PER NRCS WEB SOILS.

CCSYA NOTE:

PROJECT IS NOT WITHIN OR DOESN'T RECEIVE OR DRAINS FROM CRITICAL COARSE SEDIMENT YIELD AREAS. SEE ATTACHMENT 2b

BMP CATEGORY/TYPE

BIOFILTRATION BF-1

TOTAL SITE AREA

647,024 SF

TOTAL DISTURBED AREA

13.45 ACRES

NO DUMPING GOES TO OCEAN — think BLUE — NO TIRAR BASURA LLEGA AL MAR

NOTES:

1. THESE ARE SAMPLE TILES AND SIGNS.
2. CITY ENGINEER TO DESIGNATE OR APPROVE SIGNS, TILES OR STENCILS.
3. PROVIDE LABELING WITH PROHIBITIVE LANGUAGE ("NO DUMPING GOES TO OCEAN – NO TIRAR BASURA LLEGA AL MAR")
4. SIGN SHOULD BE PLACED ON THE CATCH BASIN GRATE.
5. SIGN SHALL HAVE A WHITE BACKGROUND WITH BLUE LETTERING.

STORM DRAIN SIGNAGE

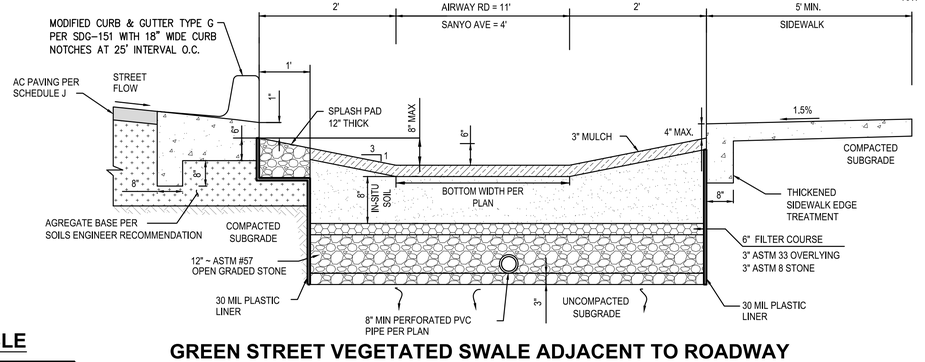
NOT TO SCALE

DRAINAGE MANAGEMENT AREAS

DMA	SURFACE (SQ. FT.) HARDSCAPE/ROOF	SURFACE (SQ. FT.) LANDSCAPE	TOTAL (SQ. FT.)	TYPE OF STRUCTURAL BMP
DMA 1	454,935	98,304	553,239	BMP# 1 BF-1 BIOFILTRATION & HYDROMODIFICATION CONTROL
DMA 2	0	15,564	15,564	SELF MITIGATING
DMA 3	9,423	1,771	11,194	GREEN STREET VEGETATED SWALE
DMA 4	18,027	3,095	21,122	GREEN STREET VEGETATED SWALE
DMA 5	19,437	6,248	25,685	GREEN STREET VEGETATED SWALE
DMA 6	14,707	4,265	18,972	GREEN STREET VEGETATED SWALE
		TOTAL	645,776	

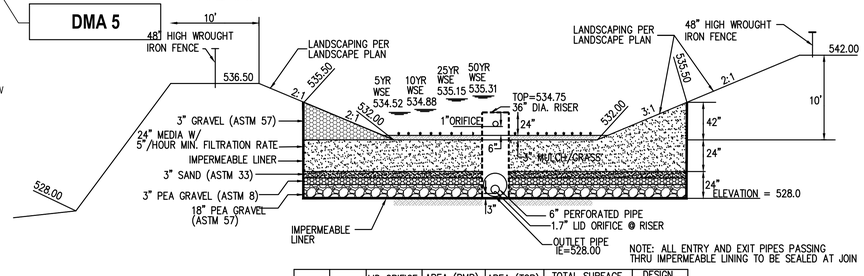
PROJECT AREA IMPERVIOUS/PERVIOUS TABLE

	IMPERVIOUS AREA (SQ.FT.)	PERVIOUS AREA (SQ.FT.)	TOTAL (SQ.FT.)
EXISTING	50,263	645,559	695,822
PROPOSED	516,529	129,247	645,776



GREEN STREET VEGETATED SWALE ADJACENT TO ROADWAY PER APPENDIX E (FT-1) AND APPENDIX J OF STORM WATER STANDARDS (6" MAX. PONDING DEPTH)

NOT TO SCALE



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT 2	AREA (TOP) FT 2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	24"	1.7"	22,498	29,977	4.5	20,574

BMP1 BIOFILTRATION BF-1 (PVT)

NOT TO SCALE

0 30 60 120 180

GRAPHIC SCALE: 1" = 60'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

HYDROMODIFICATION MANAGEMENT EXHIBIT ATTACHMENT 2A

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

HMP SHEET FOR:

SANYO LOGISTICS CENTER

SHEET 1 OF 1

K&S ENGINEERING, INC.
Planning Engineering Surveying

Drainage Study

For

Sanyo Logistics Center

PTS#

Prepared for:

Badiee Development Inc.
1261 Prospect Street Suite 9
La Jolla, CA 92037
Contact: Scott Merry (888) 815-8886

Prepared by:

K&S ENGINEERING, INC.
7801 Mission Center Court, Suite 100
San Diego, CA 92108
619.296.5565

October 4, 2021

K&S JN 20-002





10/4/2021

Kamal S. Sweis RCE 48592 — **Date**

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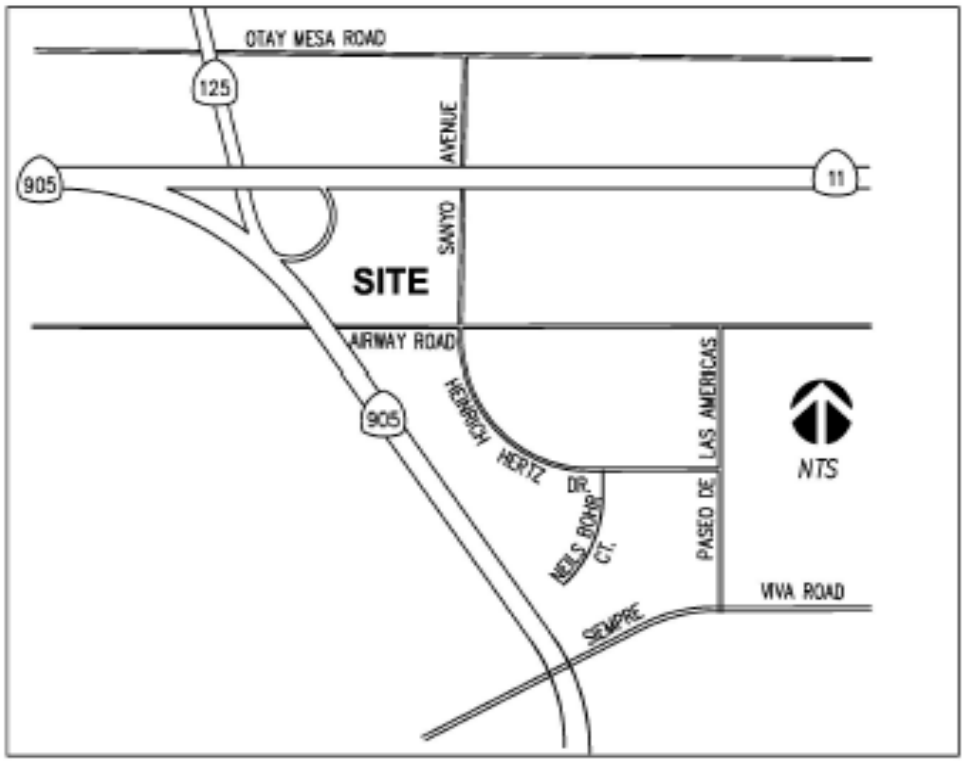
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1 VICINITY MAP



2 INTRODUCTION

The project consists of the development of the south half of the southwest quarter of the northwest quarter of section 36, Township 18 south, range 1 west, San Bernardino base and meridian, in the county of San Diego, State of California, according to United States government survey thereof.

The project consists of grading and drainage improvements for two industrial buildings with loading docks, parking, landscaping, storm drains and biofiltration BMP's for pollutant control and hydromodification purposes. Also, public road improvements include the widening of Airway Road and Sanyo Avenue to their ultimate ROW widths.

3 PURPOSE OF THIS MODEL

Continuous simulation hydrologic modeling was conducted on this project to demonstrate compliance with the performance standards for hydromodification management in San Diego.

The San Diego Hydrology Model (SDHM) distributed by Clear Creek Solutions, Inc. was used for hydromodification management on the subject driveway.

The inputs required to develop SDHM models include rainfall, watershed characteristics, and BMP configurations. The Lower Otay gauge from the Project Clean Water website was used for this study. Default SDHM 3.1 pervious and impervious soil parameters used are found in Appendix A of this report.

Per the NRCS web soil survey, the project site is situated upon Class D soils. Soils have been assumed to be compacted to represent the current existing developed condition of the site, while fully compacted in the post developed conditions

4 HMP MODELING

In current existing conditions, the existing site is undeveloped land. Table 4.1 below illustrates the pre-developed area and impervious percentage accordingly.

4.1 Summary of Predeveloped Condition

POC	DMA ID	Tributary Area, A (Ac)	Impervious Percentage, Ip
POC-1	DMA-1	14.83	2.4%

Runoff from the improved areas of the project site is drained to one onsite receiving LID BMPs. Once flows are routed via the proposed BMPs, onsite flows are then discharged to the existing discharge locations. Table 4.2 summarizes the post-developed area and impervious percentage accordingly.

4.2 Summary of Proposed Condition

POC	DMA ID	Tributary Area, A (Ac)	Impervious Percentage, Ip
POC-1	DMA-1	14.33	86%

One HMP Biofiltration basin is proposed within the project site and responsible for performing hydromodification and water quality requirements for the project site. Runoff is discharged to this dual purpose water quality and HMP biofiltration basins prior to draining to the receiving POC's.

In developed conditions, the Biofiltration basin 1 will have surface depth of 24-inches plus 3 inches of mulch. This Biofiltration basin will include a riser spillway structure set to an elevation of 24-inches from the surface invert of the basin.

Underneath the basin invert is located the proposed LID biofiltration portion of the drainage facility. This portion of the basin is comprised of an 24-inch layer of amended soil (a highly sandy, organic rich composite with an infiltration capacity of at least 5 inches/hr) and an 24-inch storage layer of gravel which includes the 6 inches of filter course layer and the 3 inches of dead storage below the LID orifice. The BMP will be lined to prevent infiltration into the underlying soil.

TABLE 3 – SUMMARY OF DEVELOPED DUAL PURPOSE BMP

BMP	Tributary Area (Ac)	DIMENSIONS					
		BMP Area, (ft^2)	LID Orifice (in)	Gravel Depth (in)	Depth to Top of Riser(ft)	Weir Perimeter Length (ft)	Total Surface Depth (ft)
1	14.83	22,498	1.7"	24"	2.25'	8'	9.42'

***Includes area under the slopes**

Water Quality BMP Sizing

The BMPs have been designed in accordance with City of San Diego Storm Water Standards Manual January 2018 Edition sizing criteria.

5. REFERENCES

1 – "Final Hydromodification Management Plan (HMP) prepared for the County of San Diego", March 2011, Brown and Caldwell.

2 - Order R9-20013-001, California Regional Water Quality Control Board San Diego Region (SDRWQCB).

3 - City of San Diego Storm Water Standards Manual January 2018 Edition

4 – San Diego Hydrology Model 3.1 User Manual – April 2017

APPENDIX A –
SDHM 3.1 PROJECT REPORT
CALCULATIONS AND CHARTS

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	20-002
Site Name:	Baidee Sanyo
Site Address:	Airway Road
City:	San Diego
Report Date:	8/21/2020
Gage:	LWR OTAY
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2019/04/19

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,Dirt,Flat	14.83
Pervious Total	14.83

Impervious Land Use	acre
IMPERVIOUS-FLAT	1.15
Impervious Total	1.15
Basin Total	15.98

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,Dirt,Flat	1.94
Pervious Total	1.94

Impervious Land Use	acre
IMPERVIOUS-FLAT	11.72
Impervious Total	11.72
Basin Total	13.66

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 1	Surface Biofilter 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofilter 1

Bottom Length:	256.00 ft.
Bottom Width:	88.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	2
Material type for second layer:	ESM
Material thickness of third layer:	2
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	1.7
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	300.387
Total Outflow (ac-ft.):	327.601
Percent Through Underdrain:	91.69
Discharge Structure	
Riser Height:	2 ft.
Riser Diameter:	36 in.
Orifice 1 Diameter:	1 in. Elevation:0.5 ft.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
532.00	0.6413	0.0000	0.0000	0.0000
532.09	0.6389	0.0132	0.0000	0.0000
532.17	0.6363	0.0265	0.0000	0.0000
532.26	0.6337	0.0399	0.0000	0.0000
532.34	0.6311	0.0533	0.0000	0.0000
532.43	0.6285	0.0668	0.0000	0.0000
532.51	0.6259	0.0804	0.0000	0.0000
532.60	0.6233	0.0940	0.0000	0.0000
532.68	0.6208	0.1076	0.0000	0.0000
532.77	0.6182	0.1214	0.0000	0.0000
532.85	0.6156	0.1352	0.0000	0.0000
532.94	0.6131	0.1490	0.0000	0.0000
533.02	0.6105	0.1629	0.0000	0.0000
533.11	0.6080	0.1769	0.0000	0.0000
533.19	0.6054	0.1910	0.0000	0.0000
533.28	0.6029	0.2051	0.0035	0.0000
533.36	0.6004	0.2192	0.0053	0.0000
533.45	0.5978	0.2335	0.0115	0.0000
533.53	0.5953	0.2477	0.0146	0.0000
533.62	0.5928	0.2621	0.0194	0.0000
533.70	0.5903	0.2765	0.0217	0.0000
533.79	0.5878	0.2910	0.0254	0.0000
533.87	0.5853	0.3055	0.0273	0.0000
533.96	0.5828	0.3201	0.0303	0.0000
534.04	0.5803	0.3348	0.0318	0.0000
534.13	0.5778	0.3495	0.0345	0.0000
534.21	0.5753	0.3643	0.0358	0.0000
534.30	0.5728	0.3849	0.0381	0.0000

534.38	0.5703	0.4055	0.0393	0.0000
534.47	0.5679	0.4262	0.0415	0.0000
534.55	0.5654	0.4471	0.0426	0.0000
534.64	0.5629	0.4680	0.0446	0.0000
534.73	0.5605	0.4890	0.0446	0.0000
534.81	0.5580	0.5100	0.0446	0.0000
534.90	0.5556	0.5312	0.0458	0.0000
534.98	0.5532	0.5525	0.0491	0.0000
535.07	0.5507	0.5738	0.0531	0.0000
535.15	0.5483	0.5953	0.0574	0.0000
535.24	0.5459	0.6168	0.0616	0.0000
535.32	0.5435	0.6384	0.0656	0.0000
535.41	0.5410	0.6602	0.0695	0.0000
535.49	0.5386	0.6820	0.0732	0.0000
535.58	0.5362	0.7038	0.0767	0.0000
535.66	0.5338	0.7258	0.0801	0.0000
535.75	0.5314	0.7479	0.0833	0.0000
535.83	0.5290	0.7701	0.0864	0.0000
535.92	0.5267	0.7923	0.0894	0.0000
536.00	0.5243	0.8147	0.0923	0.0000
536.09	0.5219	0.8371	0.0952	0.0000
536.17	0.5195	0.8597	0.0979	0.0000
536.25	0.5172	0.8801	0.1569	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
4.2500	0.6413	0.8801	0.0000	2.6074	0.0000
4.3352	0.6439	0.9348	0.0000	2.6074	0.0000
4.4203	0.6465	0.9898	0.0000	3.1554	0.0000
4.5055	0.6491	1.0449	0.0000	3.2664	0.0000
4.5907	0.6517	1.1003	0.0000	3.3775	0.0000
4.6758	0.6544	1.1560	0.0000	3.4885	0.0000
4.7610	0.6570	1.2118	0.0002	3.5995	0.0000
4.8462	0.6597	1.2679	0.0084	3.7105	0.0000
4.9313	0.6623	1.3242	0.0116	3.8216	0.0000
5.0165	0.6650	1.3807	0.0140	3.9326	0.0000
5.1016	0.6676	1.4374	0.0161	4.0436	0.0000
5.1868	0.6703	1.4944	0.0179	4.1547	0.0000
5.2720	0.6729	1.5516	0.0196	4.2657	0.0000
5.3571	0.6756	1.6090	0.0211	4.3767	0.0000
5.4423	0.6783	1.6667	0.0226	4.4878	0.0000
5.5275	0.6810	1.7245	0.0239	4.5988	0.0000
5.6126	0.6837	1.7826	0.0252	4.7098	0.0000
5.6978	0.6864	1.8410	0.0264	4.8208	0.0000
5.7830	0.6891	1.8996	0.0276	4.9319	0.0000
5.8681	0.6918	1.9584	0.0287	5.0429	0.0000
5.9533	0.6945	2.0174	0.0298	5.1539	0.0000
6.0385	0.6972	2.0766	0.0308	5.2650	0.0000
6.1236	0.6999	2.1361	0.0318	5.3760	0.0000
6.2088	0.7026	2.1959	0.0328	5.4870	0.0000
6.2940	0.7054	2.2558	0.3271	5.5981	0.0000
6.3791	0.7081	2.3160	1.5102	5.7091	0.0000
6.4643	0.7108	2.3764	3.1848	5.8201	0.0000
6.5495	0.7136	2.4371	5.2213	5.9311	0.0000
6.6346	0.7163	2.4980	7.5390	6.0422	0.0000
6.7198	0.7191	2.5591	10.068	6.1532	0.0000
6.8049	0.7218	2.6204	12.741	6.2642	0.0000
6.8901	0.7246	2.6820	15.486	6.3753	0.0000

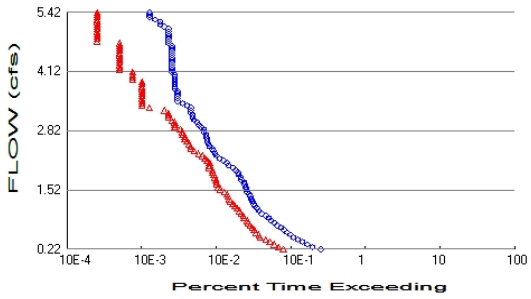
6.9753	0.7274	2.7439	18.233	6.4863	0.0000
7.0604	0.7301	2.8059	20.910	6.5973	0.0000
7.1456	0.7329	2.8682	23.449	6.7083	0.0000
7.2308	0.7357	2.9308	25.790	6.8194	0.0000
7.3159	0.7385	2.9935	27.882	6.9304	0.0000
7.4011	0.7413	3.0566	29.692	7.0414	0.0000
7.4863	0.7441	3.1198	31.208	7.1525	0.0000
7.5714	0.7469	3.1833	32.445	7.2635	0.0000
7.6566	0.7497	3.2470	33.451	7.3745	0.0000
7.7418	0.7525	3.3110	34.313	7.4856	0.0000
7.7500	0.7528	3.3172	35.644	7.4963	0.0000

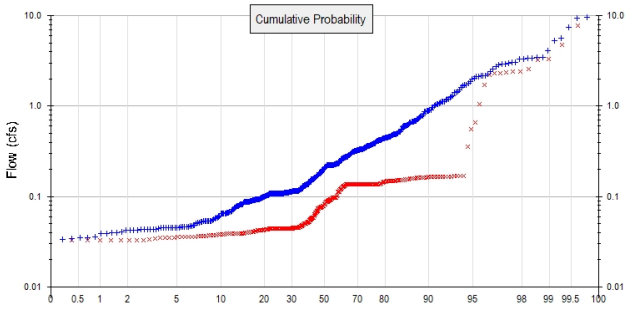
Surface Biofilter 1

Element Flows To:

Outlet 1	Outlet 2
	Biofilter 1

Analysis Results
POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 14.83
Total Impervious Area: 1.15

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.94
Total Impervious Area: 11.72

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	2.185128
5 year	3.392894
10 year	5.415984
25 year	9.452283

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.166204
5 year	2.311895
10 year	2.804759
25 year	5.043063

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.2185	1002	314	31	Pass
0.2710	765	270	35	Pass
0.3235	657	237	36	Pass
0.3760	561	207	36	Pass
0.4285	489	182	37	Pass
0.4810	430	154	35	Pass
0.5335	390	148	37	Pass
0.5860	356	134	37	Pass
0.6385	319	127	39	Pass
0.6910	291	121	41	Pass
0.7435	261	113	43	Pass
0.7960	237	107	45	Pass
0.8485	215	102	47	Pass
0.9010	199	92	46	Pass
0.9535	182	91	50	Pass
1.0060	159	85	53	Pass
1.0585	149	81	54	Pass
1.1110	138	75	54	Pass
1.1635	130	70	53	Pass
1.2160	126	66	52	Pass
1.2685	122	62	50	Pass
1.3210	118	60	50	Pass
1.3735	114	57	50	Pass
1.4260	109	55	50	Pass
1.4785	103	51	49	Pass
1.5310	100	45	45	Pass
1.5835	98	42	42	Pass
1.6360	96	40	41	Pass
1.6885	94	40	42	Pass
1.7410	86	39	45	Pass
1.7935	84	38	45	Pass
1.8460	79	37	46	Pass
1.8985	77	35	45	Pass
1.9510	72	35	48	Pass
2.0035	66	32	48	Pass
2.0560	58	32	55	Pass
2.1085	55	32	58	Pass
2.1610	49	30	61	Pass
2.2135	44	28	63	Pass
2.2660	40	26	65	Pass
2.3185	38	23	60	Pass
2.3710	36	20	55	Pass
2.4235	35	18	51	Pass
2.4760	32	18	56	Pass
2.5285	31	17	54	Pass
2.5810	30	16	53	Pass
2.6335	30	15	50	Pass
2.6860	29	15	51	Pass
2.7385	29	14	48	Pass
2.7910	27	14	51	Pass
2.8435	27	13	48	Pass
2.8960	25	11	44	Pass
2.9485	23	11	47	Pass

3.0010	22	11	50	Pass
3.0535	20	10	50	Pass
3.1060	19	9	47	Pass
3.1585	19	9	47	Pass
3.2110	18	9	50	Pass
3.2635	18	8	44	Pass
3.3160	18	5	27	Pass
3.3685	16	4	25	Pass
3.4210	14	4	28	Pass
3.4735	12	4	33	Pass
3.5260	12	4	33	Pass
3.5785	12	4	33	Pass
3.6310	12	4	33	Pass
3.6835	12	4	33	Pass
3.7360	11	4	36	Pass
3.7885	11	4	36	Pass
3.8410	11	4	36	Pass
3.8935	11	4	36	Pass
3.9460	11	3	27	Pass
3.9985	11	3	27	Pass
4.0510	11	3	27	Pass
4.1035	10	3	30	Pass
4.1560	10	2	20	Pass
4.2085	10	2	20	Pass
4.2610	10	2	20	Pass
4.3135	10	2	20	Pass
4.3660	10	2	20	Pass
4.4185	10	2	20	Pass
4.4710	10	2	20	Pass
4.5235	10	2	20	Pass
4.5760	10	2	20	Pass
4.6285	10	2	20	Pass
4.6810	10	2	20	Pass
4.7335	9	2	22	Pass
4.7860	9	1	11	Pass
4.8385	9	1	11	Pass
4.8910	9	1	11	Pass
4.9435	9	1	11	Pass
4.9960	9	1	11	Pass
5.0485	9	1	11	Pass
5.1010	8	1	12	Pass
5.1535	7	1	14	Pass
5.2060	7	1	14	Pass
5.2585	6	1	16	Pass
5.3110	5	1	20	Pass
5.3635	5	1	20	Pass
5.4160	5	1	20	Pass

Water Quality

Drawdown Time Results

Pond: Surface Biofilter 1

Days	Stage(feet)	Percent of Total Run Time
1	N/A	100.00
2	N/A	100.00
3	N/A	100.00
4	N/A	100.00
5	N/A	100.00

Maximum Stage: 2.000 Drawdown Time: Less than 1 day

Model Default Modifications

Total of 0 changes have been made.

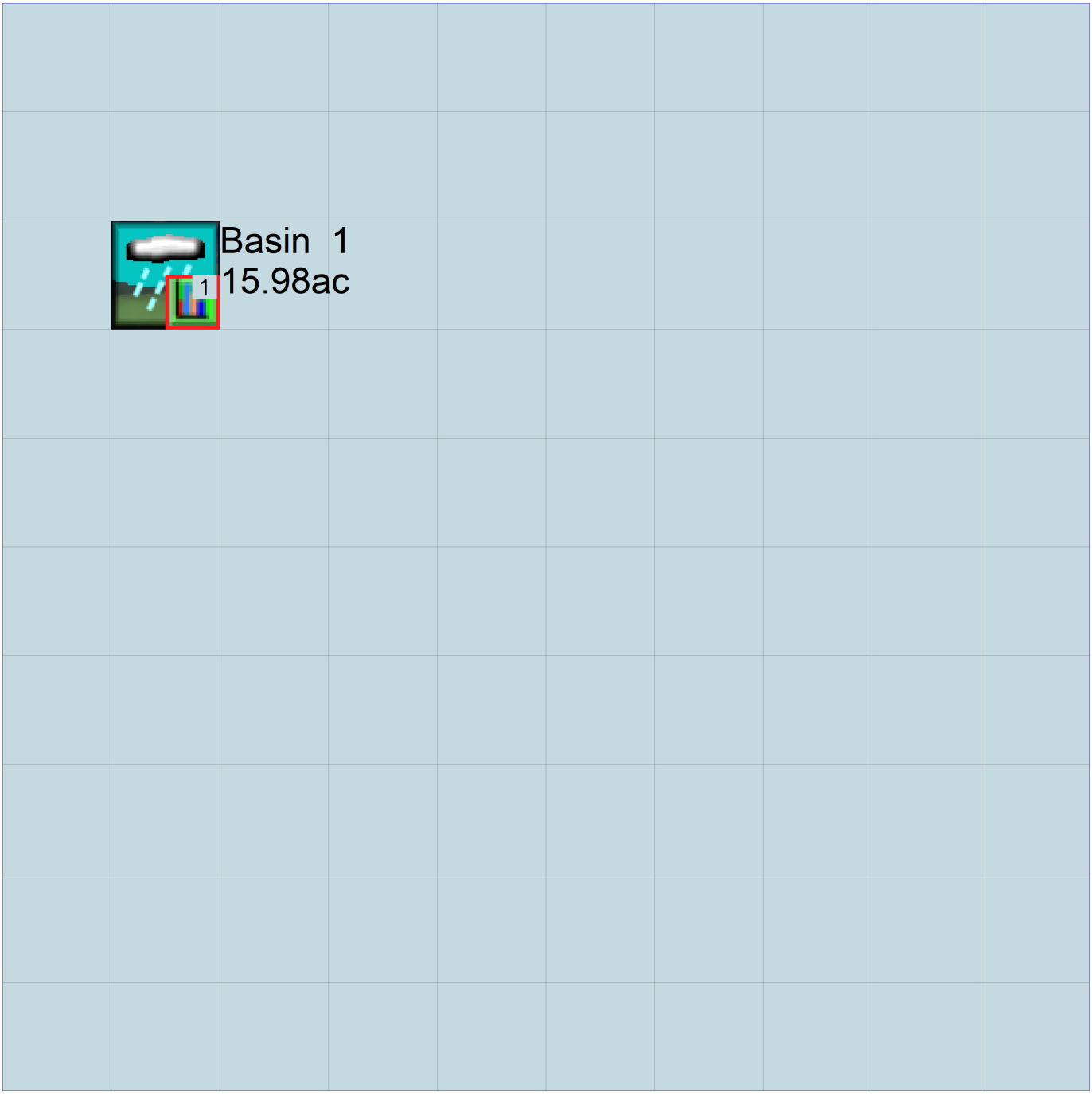
PERLND Changes

No PERLND changes have been made.

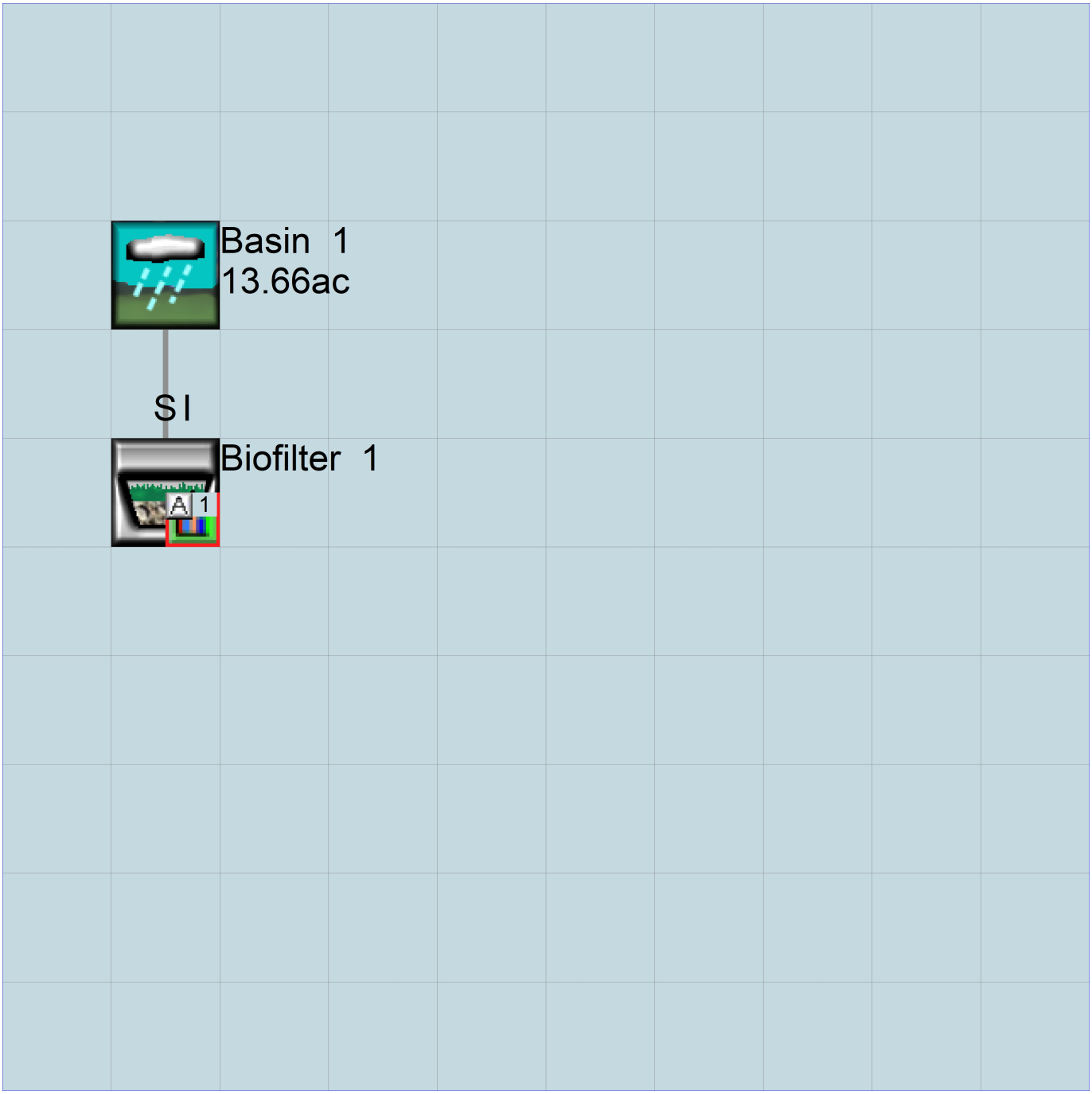
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   20-002.wdm
MESSU       25   Pre20-002.MES
            27   Pre20-002.L61
            28   Pre20-002.L62
            30   POC20-0021.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      31
      IMPLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
   31      D,Dirt,Flat            1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   31         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   31         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   31         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   31              0       2.8     0.025       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   31              0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   31              0       0.6     0.017         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   31       0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   31       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   31              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  31                      14.83     COPY   501     12
PERLND  31                      14.83     COPY   501     13
IMPLND   1                       1.15     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
```

```
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   20-002.wdm
MESSU       25   Mit20-002.MES
            27   Mit20-002.L61
            28   Mit20-002.L62
            30   POC20-0021.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      31
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface Biofilter  1        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out            ***
   31      D,Dirt,Flat            1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   31         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   31         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   31         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   31              0       2.8     0.025       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   31               0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   31              0       0.6     0.017         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   31       0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   31       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   31              0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO
```

```
  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1           100      0.05     0.011       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  31                       1.94     RCHRES   1      2
PERLND  31                       1.94     RCHRES   1      3
IMPLND   1                      11.72     RCHRES   1      5

******Routing******
PERLND  31                       1.94     COPY     1     12
IMPLND   1                      11.72     COPY     1     15
PERLND  31                       1.94     COPY     1     13
RCHRES   1                          1     RCHRES   2      8
RCHRES   2                          1     COPY   501     16
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface Biofilte-004    3    1    1    1   28    0    1
    2     Biofilter  1            1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------->      ***
    1              1      0.01       0.0     532.0       0.0       0.0
    2              2      0.05       0.0     532.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2           =  38901.88
*** Compute remaining available pore space
  GENER   2                               vpo2           =  v2m2
  GENER   2                               vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   51    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.641252  0.000000  0.000000
  0.085165  0.638896  0.013244  0.000000
  0.170330  0.636292  0.026548  0.000000
  0.255495  0.633693  0.039913  0.000000
  0.340659  0.631099  0.053338  0.000000
  0.425824  0.628509  0.066824  0.000000
  0.510989  0.625925  0.080372  0.000000
  0.596154  0.623346  0.093980  0.000000
  0.681319  0.620772  0.107650  0.000000
  0.766484  0.618203  0.121381  0.000000
  0.851648  0.615639  0.135173  0.000000
  0.936813  0.613080  0.149027  0.000000
  1.021978  0.610526  0.162943  0.000000
  1.107143  0.607977  0.176921  0.000000
  1.192308  0.605433  0.190960  0.000000
  1.277473  0.602894  0.205062  0.003520
  1.362637  0.600359  0.219226  0.005280
  1.447802  0.597830  0.233453  0.011523
  1.532967  0.595306  0.247742  0.014645
  1.618132  0.592787  0.262093  0.019377
  1.703297  0.590273  0.276508  0.021743
  1.788462  0.587764  0.290985  0.025418
  1.873626  0.585260  0.305526  0.027256
  1.958791  0.582761  0.320129  0.030297
  2.043956  0.580266  0.334796  0.031818
  2.129121  0.577777  0.349526  0.034457
  2.214286  0.575293  0.364320  0.035777
  2.299451  0.572814  0.384872  0.038141
  2.384615  0.570340  0.405513  0.039323
  2.469780  0.567871  0.426242  0.041485
  2.554945  0.565406  0.447060  0.042566
  2.640110  0.562947  0.467967  0.044571
  2.725275  0.560493  0.488963  0.044571
  2.810440  0.558044  0.510047  0.044571
  2.895604  0.555600  0.531222  0.045801
  2.980769  0.553160  0.552485  0.049073
  3.065934  0.550726  0.573838  0.053119
  3.151099  0.548297  0.595281  0.057364
  3.236264  0.545873  0.616814  0.061557
  3.321429  0.543454  0.638437  0.065601
  3.406593  0.541039  0.660151  0.069467
  3.491758  0.538630  0.681955  0.073156
  3.576923  0.536226  0.703850  0.076680
  3.662088  0.533827  0.725836  0.080054
  3.747253  0.531432  0.747912  0.083294
  3.832418  0.529043  0.770080  0.086414
  3.917582  0.526659  0.792340  0.089427
  4.002747  0.524280  0.814691  0.092345
  4.087912  0.521905  0.837134  0.095179
  4.173077  0.519536  0.859668  0.097944
  4.250000  0.517172  0.893064  0.156851
  END FTABLE  2
  FTABLE      1
   43    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.517172  0.000000  0.000000  0.000000  0.000000
  0.085165  0.643866  0.054723  0.000000  2.607409  0.000000
  0.170330  0.646484  0.109670  0.000000  3.155395  0.000000
  0.255495  0.649108  0.164839  0.000000  3.266425  0.000000
  0.340659  0.651736  0.220232  0.000000  3.377455  0.000000
  0.425824  0.654370  0.275849  0.000000  3.488485  0.000000
  0.510989  0.657008  0.331691  0.000222  3.599514  0.000000
  0.596154  0.659652  0.387757  0.008415  3.710544  0.000000
  0.681319  0.662300  0.444049  0.011555  3.821574  0.000000
  0.766484  0.664954  0.500567  0.014009  3.932604  0.000000
  0.851648  0.667612  0.557311  0.016092  4.043634  0.000000
  0.936813  0.670276  0.614281  0.017935  4.154663  0.000000
```

```
  1.021978  0.672944  0.671479  0.019606  4.265693  0.000000
  1.107143  0.675618  0.728904  0.021145  4.376723  0.000000
  1.192308  0.678296  0.786557  0.022579  4.487753  0.000000
  1.277473  0.680980  0.844438  0.023928  4.598783  0.000000
  1.362637  0.683668  0.902548  0.025204  4.709812  0.000000
  1.447802  0.686362  0.960888  0.026419  4.820842  0.000000
  1.532967  0.689060  1.019456  0.027580  4.931872  0.000000
  1.618132  0.691764  1.078255  0.028695  5.042902  0.000000
  1.703297  0.694472  1.137284  0.029768  5.153932  0.000000
  1.788462  0.697186  1.196545  0.030803  5.264961  0.000000
  1.873626  0.699904  1.256036  0.031805  5.375991  0.000000
  1.958791  0.702628  1.315759  0.032776  5.487021  0.000000
  2.043956  0.705356  1.375715  0.327143  5.598051  0.000000
  2.129121  0.708089  1.435902  1.510192  5.709081  0.000000
  2.214286  0.710828  1.496323  3.184843  5.820110  0.000000
  2.299451  0.713571  1.556978  5.221349  5.931140  0.000000
  2.384615  0.716320  1.617866  7.539030  6.042170  0.000000
  2.469780  0.719073  1.678988  10.06831  6.153200  0.000000
  2.554945  0.721832  1.740346  12.74074  6.264230  0.000000
  2.640110  0.724595  1.801938  15.48617  6.375259  0.000000
  2.725275  0.727363  1.863766  18.23301  6.486289  0.000000
  2.810440  0.730137  1.925830  20.91005  6.597319  0.000000
  2.895604  0.732915  1.988130  23.44935  6.708349  0.000000
  2.980769  0.735699  2.050667  25.78994  6.819379  0.000000
  3.065934  0.738487  2.113442  27.88213  6.930408  0.000000
  3.151099  0.741280  2.176454  29.69233  7.041438  0.000000
  3.236264  0.744079  2.239704  31.20834  7.152468  0.000000
  3.321429  0.746882  2.303193  32.44510  7.263498  0.000000
  3.406593  0.749690  2.366920  33.45076  7.374528  0.000000
  3.491758  0.752504  2.430887  34.31318  7.485557  0.000000
  3.500000  0.752776  2.437090  35.64410  7.496302  0.000000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1002 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1003 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
```

```
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2               RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

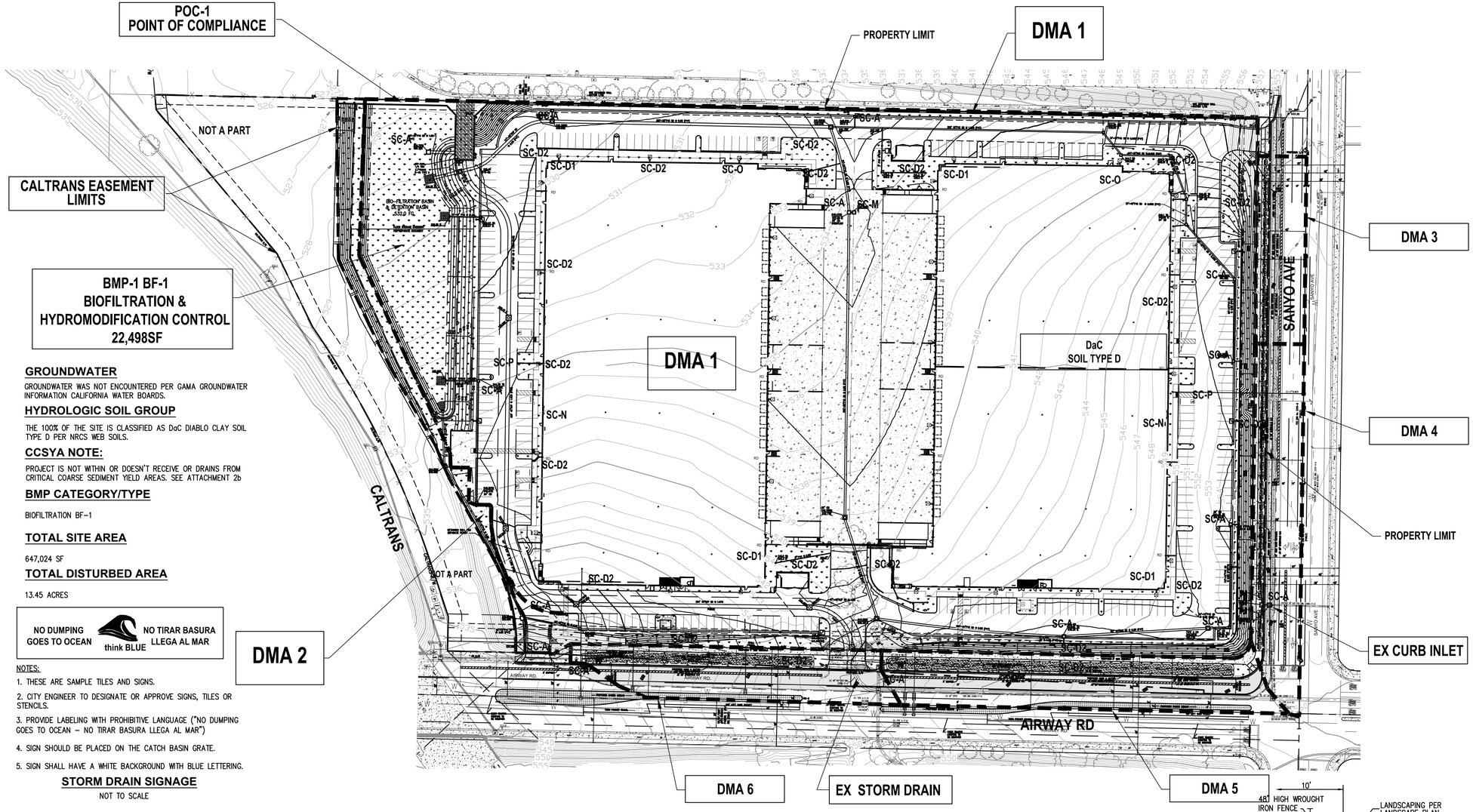
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APPENDIX B –
HMP EXHIBIT



LEGEND

ITEM	SYMBOL
BOUNDARY LIMIT	
IMPERVIOUS AREA	
PERVIOUS AREA	
ONSITE STORM DRAIN INLETS, STENCILING/SIGNAGE "NO DUMPING! GOES TO OCEAN"	SC-A
FUTURE INDOOR & STRUCTURAL PEST CONTROL	SC-D1
REFUSE AREAS	SC-G
LOADING DOCKS	SC-M
FIRE SPRINKLER TEST WATER	SC-N
MISCELLANEOUS DRAIN OR WASH WATER	SC-O
PLAZAS, SIDEWALKS AND PARKING LOTS	SC-P
LARGE TRASH GENERATING FACILITIES	SC-6A

BIORETENTION SOIL MEDIA NOTE:

COMPOST SHALL BE CERTIFIED BY THE U.S. COMPOSTING COUNCIL'S SEAL OF TESTING ASSURANCE PROGRAM OR AN APPROVED EQUIVALENT PROGRAM. COMPOST SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

1. ORGANIC MATERIAL CONTENT SHALL BE 35% TO 75% BY DRY WEIGHT.
2. CARBON TO NITROGEN (C:N) RATIO SHALL BE BETWEEN 15:1 AND 40:1, PREFERABLY ABOVE 20:1 TO REDUCE THE POTENTIAL FOR NITROGEN LEACHING/WASHOUT.
3. PHYSICAL CONTAMINANTS (MANMADE INERT MATERIALS) SHALL NOT EXCEED 1% BY DRY WEIGHT.
4. PH SHALL BE BETWEEN 6.0 AND 7.5.
5. SOLUBLE SALT CONCENTRATION SHALL BE LESS THAN 10 DS/M (METHOD TMECC 4.10-A, USDA AND U.S. COMPOSTING COUNCIL).
6. MATURITY (SEED EMERGENCE AND SEEDLING VIGOR) SHALL BE GREATER THAN 80% RELATIVE TO POSITIVE CONTROL (METHOD TMECC 5.05-A, USDA AND U.S. COMPOSTING COUNCIL)
7. STABILITY (CARBON DIOXIDE EVOLUTION RATE) SHALL BE LESS THAN 2.5 MG CO2-C PER G COMPOST ORGANIC MATTER (OM) PER DAY OR LESS THAN 5 MG CO2-C PER G COMPOST CARBON PER DAY, WHICHEVER UNIT IS REPORTED. (METHOD TMECC 5.08-B, USDA AND U.S. COMPOSTING COUNCIL). ALTERNATIVELY A SOLVITA RATING OF 6 OR HIGHER IS ACCEPTABLE.
8. MOISTURE SHALL BE 25%-55% WET WEIGHT BASIS.
9. SELECT PATHOGENS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.32(A).
10. TRACE METALS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.13, TABLES 1 AND 3.
11. SHALL BE WITHIN GRADATION LIMITS IN TABLE F.3-2 (ASTM D 422 SIEVE ANALYSIS OR APPROVED EQUIVALENT).

Table F.3-2: Compost Gradation Limits

Sieve Size	Percent Passing (by weight)
16 mm (5/8")	99 to 100
6.3 mm (1/4")	40 to 95
2 mm	40 to 90

GROUNDWATER

GROUNDWATER WAS NOT ENCOUNTERED PER GAMA GROUNDWATER INFORMATION CALIFORNIA WATER BOARDS.

HYDROLOGIC SOIL GROUP

THE 100% OF THE SITE IS CLASSIFIED AS DaC DIABLO CLAY SOIL TYPE D PER NRCS WEB SOILS.

CCSYA NOTE:

PROJECT IS NOT WITHIN OR DOESN'T RECEIVE OR DRAINS FROM CRITICAL COARSE SEDIMENT YIELD AREAS. SEE ATTACHMENT 2b

BMP CATEGORY/TYPE

BIOFILTRATION BF-1

TOTAL SITE AREA

647,024 SF

TOTAL DISTURBED AREA

13.45 ACRES

NO DUMPING GOES TO OCEAN — think BLUE — NO TIRAR BASURA LLEGA AL MAR

NOTES:

1. THESE ARE SAMPLE TILES AND SIGNS.
2. CITY ENGINEER TO DESIGNATE OR APPROVE SIGNS, TILES OR STENCILS.
3. PROVIDE LABELING WITH PROHIBITIVE LANGUAGE ("NO DUMPING GOES TO OCEAN – NO TIRAR BASURA LLEGA AL MAR")
4. SIGN SHOULD BE PLACED ON THE CATCH BASIN GRATE.
5. SIGN SHALL HAVE A WHITE BACKGROUND WITH BLUE LETTERING.

STORM DRAIN SIGNAGE

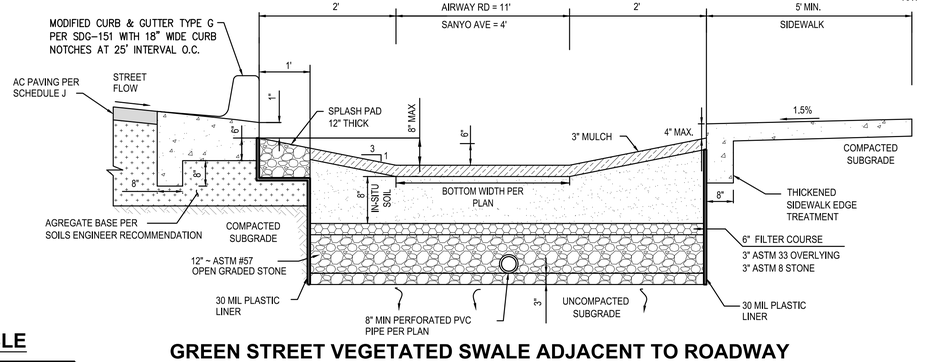
NOT TO SCALE

DRAINAGE MANAGEMENT AREAS

DMA	SURFACE (SQ. FT.) HARDSCAPE/ROOF	SURFACE (SQ. FT.) LANDSCAPE	TOTAL (SQ. FT.)	TYPE OF STRUCTURAL BMP
DMA 1	454,935	98,304	553,239	BMP# 1 BF-1 BIOFILTRATION & HYDROMODIFICATION CONTROL
DMA 2	0	15,564	15,564	SELF MITIGATING
DMA 3	9,423	1,771	11,194	GREEN STREET VEGETATED SWALE
DMA 4	18,027	3,095	21,122	GREEN STREET VEGETATED SWALE
DMA 5	19,437	6,248	25,685	GREEN STREET VEGETATED SWALE
DMA 6	14,707	4,265	18,972	GREEN STREET VEGETATED SWALE
		TOTAL	645,776	

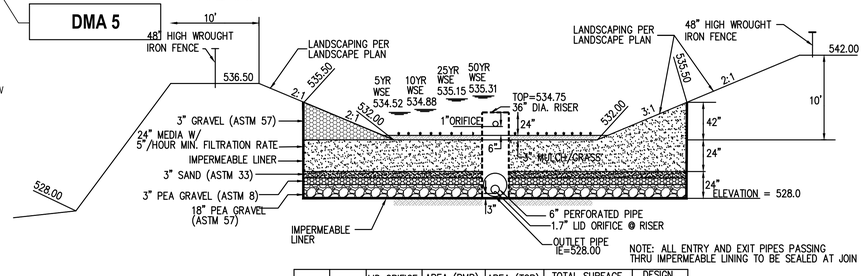
PROJECT AREA IMPERVIOUS/PERVIOUS TABLE

	IMPERVIOUS AREA (SQ.FT.)	PERVIOUS AREA (SQ.FT.)	TOTAL (SQ.FT.)
EXISTING	50,263	645,559	695,822
PROPOSED	516,529	129,247	645,776



GREEN STREET VEGETATED SWALE ADJACENT TO ROADWAY PER APPENDIX E (FT-1) AND APPENDIX J OF STORM WATER STANDARDS (6" MAX. PONDING DEPTH)

NOT TO SCALE



BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT 2	AREA (TOP) FT 2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	24"	1.7"	22,498	29,977	4.5	20,574

BMP1 BIOFILTRATION BF-1 (PVT)

NOT TO SCALE

0 30 60 120 180

GRAPHIC SCALE: 1" = 60'

IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

HYDROMODIFICATION MANAGEMENT EXHIBIT ATTACHMENT 2A

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

HMP SHEET FOR:

SANYO LOGISTICS CENTER

SHEET 1 OF 1

CCSYA

Site

Attachment 2b

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: SANYO LOGISTICS CENTER

Indicate which Items are Included:

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

Project Name: SANYO LOGISTICS CENTER

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.

Project Name: SANYO LOGISTICS CENTER

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

The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] Details and specifications for construction of structural BMP(s)
- [x] Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- [x] How to access the structural BMP(s) to inspect and perform maintenance
- [x] 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
- [x] Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- [x] 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.

GENERAL NOTES

1. APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK TO BE PERFORMED UNTIL A PERMIT HAS BEEN ISSUED.

2. UPON ISSUANCE OF A PERMIT, NO WORK WILL BE PERMITTED ON WEEKENDS OR HOLIDAYS UNLESS APPROVED BY TRAFFIC CONTROL PERMIT FROM THE DEVELOPMENT SERVICES DEPARTMENT.

3. THE APPROVAL OF THIS PLAN OR ISSUANCE OF A PERMIT BY THE CITY OF SAN DIEGO DOES NOT AUTHORIZE THE PERMIT HOLDER OR OWNER TO VIOLATE ANY FEDERAL, STATE OR CITY LAWS, ORDINANCES, REGULATIONS, OR POLICIES.

4. IMPORTANT NOTICE: SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT, TOLL FREE (800) 422-4133, TWO DAYS BEFORE YOU DIG.

5. CONTRACTOR SHALL BE RESPONSIBLE FOR POTHOLING AND LOCATING ALL EXISTING UTILITIES THAT CROSS THE PROPOSED TRENCH LINE WHILE MAINTAINING A 1 FOOT VERTICAL CLEARANCE.

6. "PUBLIC IMPROVEMENT SUBJECT TO DESUETUDE OR DAMAGE." IF REPAIR OR REPLACEMENT OF SUCH PUBLIC IMPROVEMENTS IS REQUIRED, CONTRACTOR SHALL OBTAIN THE REQUIRED PERMITS FOR WORK IN THE PUBLIC RIGHT-OF-WAY, SATISFACTORY TO THE PERMIT ISSUING AUTHORITY.

7. DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY THE CITY ENGINEER OR THE CHANGE IS REQUIRED BY THE RESIDENT ENGINEER.

8. CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNAL LOOPS, CONDUITS, AND LANE STRIPING DAMAGED DURING CONSTRUCTION.

9. PRIOR TO SITE DISTURBANCE, CONTRACTOR SHALL MAKE ARRANGEMENTS FOR A PRECONSTRUCTION MEETING WITH THE CITY OF SAN DIEGO, CONSTRUCTION MANAGEMENT AND FIELD SERVICES DIVISION (858) 627-3200.

10. CONTRACTOR SHALL ONLY PERFORM SITE SURVEY AND UTILITY MARK OUT SERVICES PRIOR TO THE PRECONSTRUCTION MEETING.

11. CONTRACTOR SHALL IMPLEMENT AN EROSION CONTROL PROGRAM DURING THE PROJECT CONSTRUCTION ACTIVITIES. THE PROGRAM SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS OF THE STATE WATER RESOURCE CONTROL BOARD.

12. CONTRACTOR SHALL HAVE EMERGENCY MATERIAL AND EQUIPMENT ON HAND FOR UNFORESEEN SITUATIONS, SUCH AS DAMAGE TO UNDERGROUND WATER, SEWER, AND STORM DRAIN FACILITIES WHERE FLOW MAY GENERATE EROSION AND SEDIMENT POLLUTION.

13. AN AS-GRADED GEOTECHNICAL REPORT AND SET OF THE REDLINE "AS-BUILT" GRADING PLANS SHALL BE SUBMITTED TO AREA 3 ON THE THIRD FLOOR OF DEVELOPMENT SERVICES WITHIN 30 CALENDAR DAYS OF THE COMPLETION OF GRADING. AN ADDITIONAL SET SHALL BE PROVIDED TO THE RESIDENT ENGINEER OF THE CONSTRUCTION MANAGEMENT & FIELD SERVICES DIVISION AT 9573 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123.

14. "AS-BUILT" DRAWINGS MUST BE SUBMITTED TO THE RESIDENT ENGINEER PRIOR TO ACCEPTANCE OF THIS PROJECT BY THE CITY OF SAN DIEGO.

15. MANHOLES AND PULL BOX COVER SHALL BE LABELED WITH NAME OF COMPANY.

16. CONTRACTOR SHALL PROVIDE RED-LINES DRAWINGS IN ACCORDANCE WITH 2-5.4 OF THE WHITEBOOK, "RED-LINES AND RECORD DOCUMENTS."

17. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 1 FOOT VERTICAL SEPARATION TO ALL UTILITIES UNLESS OTHERWISE SPECIFIED ON THE PLANS.

18. CONTRACTOR SHALL REMOVE AND REPLACE ALL UTILITY BOXES SERVING AS HANDHOLES THAT ARE NOT IN "AS-NEW" CONDITION IN PROPOSED SIDEWALK, DAMAGED BOXES, OR THOSE THAT ARE NOT IN COMPLIANCE WITH CURRENT CODE SHALL BE REMOVED AND REPLACED WITH NEW BOXES, INCLUDING WATER, SEWER, TRAFFIC SIGNALS, STREET LIGHTS, DRY UTILITIES-SDG&E, COX, ETC. ALL NEW METAL LIDS SHALL BE SLIP RESISTANT AND INSTALLED FLUSH WITH PROPOSED SIDEWALK GRADE. IF A SLIP RESISTANT METAL LID IS NOT COMMERCIALLY AVAILABLE FOR THAT USE, NEW BOXES AND LIDS SHALL BE INSTALLED.

19. THE AREA WHICH IS DEFINED AS A NON GRADING AREA AND WHICH IS NOT TO BE DISTURBED SHALL BE STAKED PRIOR TO START OF THE WORK. THE PERMIT APPLICANT AND ALL OF THEIR REPRESENTATIVES OR CONTRACTORS SHALL COMPLY WITH THE REQUIREMENTS FOR PROTECTION OF THIS AREA AS REQUIRED BY ANY APPLICABLE AGENCY. ISSUANCE OF THE CITY'S GRADING PERMIT SHALL NOT RELIEVE THE APPLICANT OR ANY OF THEIR REPRESENTATIVES OR CONTRACTORS FROM COMPLYING WITH ANY STATE OR FEDERAL REQUIREMENTS BY AGENCIES INCLUDING BUT NOT LIMITED TO CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CALIFORNIA DEPARTMENT OF FISH AND GAME. COMPLIANCE MAY INCLUDE OBTAINING PERMITS, OTHER AUTHORIZATIONS, OR COMPLIANCE WITH MANDATES BY ANY APPLICABLE STATE OR FEDERAL AGENCY.

20. PRIOR TO CONSTRUCTION, SURVEY MONUMENTS (HORIZONTAL AND VERTICAL) THAT ARE LOCATED IN THE CONSTRUCTION AREA SHALL BE TIED-OUT AND REFERENCED BY A LAND SURVEYOR.

21. UPON COMPLETION OF CONSTRUCTION, ALL DESTROYED SURVEY MONUMENTS ARE REQUIRED TO BE REPLACED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE PREPARED AND FILED WITH THE COUNTY SURVEYOR AS REQUIRED BY THE PROFESSIONAL LAND SURVEYOR ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA.

MONUMENT PRESERVATION CERTIFICATION

THE PERMITTEE SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ALL SURVEY MONUMENTS DESTROYED BY CONSTRUCTION. IF A VERTICAL CONTROL MONUMENT IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION SHALL BE NOTIFIED IN WRITING AT LEAST 7 DAYS PRIOR TO DEMOLITION/CONSTRUCTION.

☐ THE TYPE OF CONSTRUCTION WILL NOT AFFECT ANY SURVEY MONUMENTS (THIS LINE IS FOR PROJECTS THAT ARE PROPOSING NO DEMOLITION, TRENCHING, ASSOCIATED WITH A CIP, ETC)

NAME _____ DATE _____

PRIOR TO PERMIT ISSUANCE, THE PERMITTEE SHALL RETAIN THE SERVICE OF A PROFESSIONAL LAND SURVEYOR OR CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING WHO WILL BE RESPONSIBLE FOR MONUMENT PRESERVATION AND SHALL PROVIDE A CORNER RECORD OR RECORD OF SURVEY TO THE COUNTY SURVEYOR AS REQUIRED BY THE PROFESSIONAL LAND SURVEYORS ACT, IF APPLICABLE. (SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA)

I HAVE INSPECTED THE SITE AND DETERMINED THAT:

☐ NO SURVEY MONUMENTS WERE FOUND WITHIN THE LIMITS OF WORK
☐ SURVEY MONUMENTS EXISTING IN OR NEAR LIMITS OF WORK WILL BE PROTECTED IN PLACE
☐ SURVEY MONUMENTS HAVE BEEN TIED OUT AND A FINAL OR PARCEL MAP WILL BE FILED (NO CORNER RECORD OR RECORD OF SURVEY WILL BE REQUIRED)
☐ OTHER AGENCY SURVEY MONUMENT (CORNER RECORD OR RECORD OF SURVEY MAY NOT BE REQUIRED). AGENCY HAS BEEN NOTIFIED OF POSSIBLE MONUMENT DESTRUCTION AND A LETTER PROVIDED TO CITY
☐ A PRE-CONSTRUCTION CORNER RECORD (OR RECORD OF SURVEY) FOR SURVEY MONUMENTS FOUND WITHIN THE LIMITS OF WORK HAS BEEN FILED.

CORNER RECORD #_____ OR RECORD OF SURVEY #_____

DENNIS GOOD P.L.S. NO. 8084 EXP. 12-31-21 2021.03.18 DATE

LICENSED LAND SURVEYOR * DENNIS W. GOOD * LS 8084 * STATE OF CALIFORNIA

POST CONSTRUCTION CORNER RECORD (AS-BUILT ITEM)

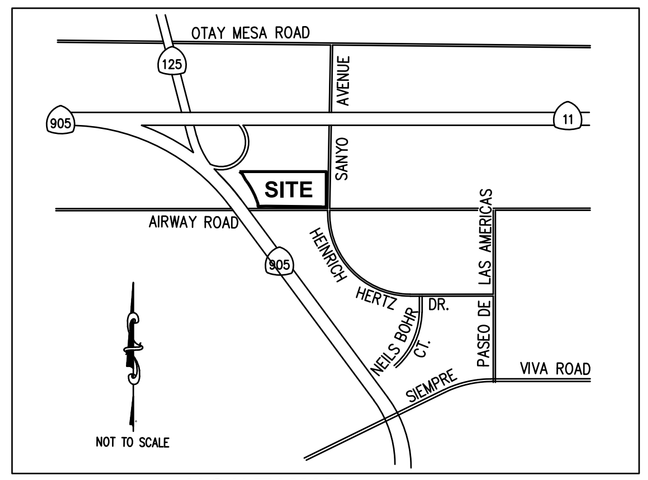
☐ POST CONSTRUCTION CORNER RECORD FOR SURVEY MONUMENTS DESTROYED DURING CONSTRUCTION AND REPLACED AFTER CONSTRUCTION.

CORNER RECORD #_____ OR RECORD OF SURVEY #_____

NAME P.L.S. / R.C.E. NO. XXXXX EXP. XX-XX-XX DATE

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

GRADING PLANS FOR:
SANYO LOGISTICS CENTER



VICINITY MAP
NOT TO SCALE

GRADING & GEOTECHNICAL SPECIFICATIONS

1. ALL GRADING SHALL BE CONDUCTED UNDER THE OBSERVATION AND TESTING BY A QUALIFIED PROFESSIONAL ENGINEER AND, IF REQUIRED, A QUALIFIED PROFESSIONAL GEOLOGIST. ALL GRADING MUST BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY ORDINANCE AND THE RECOMMENDATIONS AND SPECIFICATIONS SET FORTH IN THE PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT(S) ENTITLED:

TITLE: GEOTECHNICAL INVESTIGATION SANYO LOGISTICS CENTER SAN DIEGO CALIFORNIA DATED AUGUST 13, 2020 (PROJECT NO. G2501-42-01)
PREPARED BY: GEOCON INCORPORATED

THESE DOCUMENTS WILL BE FILED IN THE RECORDS SECTION OF DEVELOPMENT SERVICES UNDER THE PROJECT NUMBER INDICATED IN THE TITLE BLOCK OF THESE PLANS.

2. ALL FILL SOIL SHALL BE COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MOST RECENT VERSION OF A.S.T.M. D-1557 OR AN APPROVED ALTERNATIVE STANDARD.

3. AT THE COMPLETION OF THE GRADING OPERATIONS FOR THE EARTHWORK SHOWN ON THIS PLAN, AN AS-GRADED GEOTECHNICAL REPORT SHALL BE PREPARED IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE CITY OF SAN DIEGO GUIDELINES FOR GEOTECHNICAL REPORTS. THE FINAL "AS-GRADED" GEOTECHNICAL REPORT SHALL BE SUBMITTED IN ACCORDANCE WITH THE GENERAL NOTES ON THESE PLANS WITHIN 30 DAYS OF THE COMPLETION OF GRADING. WHERE GEOLOGIC INSPECTION IS INDICATED IN THE PERMIT, PLANS, SPECIFICATIONS, OR GEOTECHNICAL REPORT(S), THE FINAL "AS-GRADED" GEOTECHNICAL REPORT MUST ALSO BE REVIEWED AND SIGNED BY A QUALIFIED PROFESSIONAL GEOLOGIST.

4. THE COMPANY OR COMPANIES REPRESENTED BY THE INDIVIDUALS SIGNING ITEM NO. 5 OF THIS CERTIFICATE IS/ARE THE GEOTECHNICAL CONSULTANT(S) OF RECORD. IF THE GEOTECHNICAL CONSULTANT OF RECORD IS CHANGED FOR THE PROJECT, THE WORK SHALL BE STOPPED UNTIL THE REPLACEMENT HAS SUBMITTED AN ACCEPTABLE TRANSFER OF GEOTECHNICAL CONSULTANT OF RECORD DECLARATION PREPARED IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE CITY OF SAN DIEGO GUIDELINES FOR GEOTECHNICAL REPORTS. IT SHALL BE THE DUTY OF THE PERMITTEE TO NOTIFY THE RESIDENT ENGINEER AND THE GEOLOGY SECTION OF DEVELOPMENT SERVICES IN WRITING OF SUCH CHANGE PRIOR TO THE RECOMMENCEMENT OF GRADING.

5. THESE GRADING PLANS HAVE BEEN REVIEWED BY THE UNDERSIGNED AND FOUND TO BE IN CONFORMANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS CONTAINED IN THE REFERENCED GEOTECHNICAL REPORT(S) PREPARED FOR THIS PROJECT.

RODNEY C. MIKESEL 2533 G.E. DATE

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

RUPERT S. ADAMS C.E.G. DATE

PROFESSIONAL GEOLOGIST * RUPERT S. ADAMS NO. 2561 CERTIFIED ENGINEERING GEOLOGIST * STATE OF CALIFORNIA

GEOCON INCORPORATED
6960 FLANDERS DRIVE, SAN DIEGO, CA. 92121-2974
TELEPHONE 858 558-6900

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

K & S ENGINEERING, INC. 7801 MISSION CENTER COURT, SUITE 100 SAN DIEGO CA 92108
(619) 296-5565 TELEPHONE, (619) 296-5564 FAX
KSS@KS-ENGR.COM

REGISTERED PROFESSIONAL ENGINEER * KAMAL S. SWEIS * NO.48592 EXP 6-30-22 * CIVIL * STATE OF CALIFORNIA

KAMAL SWEIS R.C.E. NO. 48592 EXP. 6-30-22 DATE

DISCRETIONARY PERMIT

SDP APPROVAL NO. xxxxx

ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

OWNER/APPLICANT

SANYO LOGISTICS OWNER, LLC
1261 PROSPECT STREET, SUITE 9
LA JOLLA, CA 92037
TELEPHONE: (888) 815-8886

REFERENCE DRAWINGS

CITY OF SAN DIEGO STREET IMPROVEMENT: DWG# 24033-D, 23151-D & 22990-D
OTAY WATER DISTRICT DWG# 49-07

SITE ADDRESS

AIRWAY ROAD
SAN DIEGO, CA
92154

TOPOGRAPHY SOURCE

K&S ENGINEERING, INC.
AERIAL & FIELD SURVEY DATED 03/19/2020
7801 MISSION CENTER COURT, SUITE 100
SAN DIEGO, CA 92108
(619) 296-5565

BENCHMARK

SANYO AVENUE/ AIRWAY ROAD 560.576 NEBP TOP INLET (M.S.L.).

ASSESSORS PARCEL NUMBER

646-130-55-00

EXISTING LEGAL DESCRIPTION

SEE SHEET 2

SHEET INDEX

SHEET DESCRIPTION	SHEET #
TITLE SHEET	1
NOTES	2
PRECISE GRADING PLANS	3-7
PRIVATE UTILITY PLANS	8-11
POST CONSTRUCTION BMP PLAN	12
EROSION CONTROL PLANS	13-15

GRADING QUANTITIES

GRADED AREA 14.02 ACRES MAX. CUT DEPTH 10' [FT]
CUT QUANTITIES 19,380 CY MAX CUT SLOPE RATIO (2:1MAX) 2:1
FILL QUANTITIES 99,754 CY MAX. FILL DEPTH 3' [FT]
IMPORT 80,374 CY MAX FILL SLOPE RATIO (2:1MAX) 2:1

EARTHWORK QUANTIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY DUE TO SHRINKAGE, LOSSES DUE TO CLEARING OPERATIONS, COMPACTION, SETTLEMENT, ETC. CONTRACTOR SHOULD VERIFY QUANTITES PRIOR TO BIDDING.

CONSTRUCTION STORM WATER PROTECTION NOTES

1. TOTAL SITE DISTURBANCE AREA (ACRES) 14.02 ACRES
WATERSHED: TIJUANA
HYDRAULIC SUB AREA NAME AND NUMBER: WATERT TANKS 911.12

2. THE PROJECT SHALL COMPLY WITH THE REQUIREMENTS OF THE
☐ WPCP
THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NUMBER R9-2013-0001 AND SUBSEQUENT AMENDMENTS..

☒ SWPPP
THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NUMBER R9-2013-0001 AND CONSTRUCTION GENERAL PERMIT ORDER NUMBER 2009-009-DWQ AS AMENDED BY ORDER 2010-0014 DWQ AND 2012-0006-DWQ

TRADITIONAL: RISK LEVEL ☐ 1 ☐ 2 ☐ 3
LUP RISK LEVEL ☐ 1 ☐ 2 ☐ 3
WDID NO: IN PROCESS

3. CONSTRUCTION SITE PRIORITY
☐ ASBS ☒ HIGH ☐ MEDIUM ☐ LOW

DIGALERT
CALL BEFORE YOU DIG
1-800-227-2600
48 HOURS NOTICE REQUIRED

WORK TO BE DONE

THE PUBLIC IMPROVEMENTS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED ACCORDING TO THE FOLLOWING STANDARD SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PWPI010119-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2018 EDITION
PWPI010119-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION (WHITEBOOK), 2018 EDITION
PWPI010119-04	CITYWIDE COMPUTER AIDED DESIGN AND DRAFTING (CADD) STANDARDS, 2018 EDITION
PWPI030119-08	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (REVISION 4), 2014 EDITION
PWPI030119-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD SPECIFICATIONS, 2018 EDITION

STANDARD DRAWINGS:

DOCUMENT NO.	DESCRIPTION
PWPI010119-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2018 EDITION
PWPI030119-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD PLANS, 2018 EDITION

LEGEND

PROPOSED IMPROVEMENTS

IMPROVEMENT	STANDARD DWGS.	SYMBOL
CONTOUR	-	485
2:1 SLOPE (MAX.)	-	
DRAINAGE DITCH, (PRIVATE)	SDD-106	
CATCH BASIN (SIZE PER PLAN) (PRIVATE)	-	
STORM DRAIN INLET (SIZE PER PLAN) (PRIVATE)	-	
RIPRAP (PRIVATE)	SDD-104	
STORM DRAIN PIPE (SIZE PER PLAN) (PRIVATE)	-	
WING TYPE HEADWALL (PRIVATE)	D-34	
STRAIGHT HEADWALL (PRIVATE)	D-30	
RETAINING WALL (PER SEPARATE PERMIT) (PRIVATE)		
6" CURB (PRIVATE)	SDG-150	
6" CURB & GUTTER (G-1) (PRIVATE)	SDG-151	
DAYLIGHT	-	
10'X10' VISIBILITY TRIANGLE	-	
DIRECTION OF DRAINAGE GRADE BREAK & TOP, BOTTOM (OF SLOPE)	-	
CONC. CHANNEL (WEST P/L) (PRIVATE)		
CONC. CHANNEL (WEST P/L) (PRIVATE)		
FIRE SERVICE	OWD	F
STORMWATER EASEMENT (PRIVATE)		
CLEAN OUT TYPE B (PRIVATE)	D-10	
CLEAN OUT 36"X36" (PRIVATE)		
GRAVEL BAGS		
SILT FENCE		
STABILIZED CONSTRUCTION ENTRANCE		

EXISTING IMPROVEMENTS

IMPROVEMENT	STANDARD DWGS.	SYMBOL
PROPERTY LINE		
RIGHT OF WAY		
INDICATED SURVEY MONUMENT AS DESCRIBED TO BE DESTROYED & REPLACED AFTER CONSTRUCTION		
POWER POLES W/ OVERHEAD LINES		PP OH OH PP

ENGINEERING PERMIT NO: -- RETAINING WALL PROJ. NO: --
DISCRETIONARY PERMIT NO: -- BUILDING PROJ. NO: --

PRIVATE CONTRACT

CONSTRUCTION CHANGE TABLE

CHANGE	DATE	EFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.	PROJECT NO.

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

The City of SAN DIEGO
DEVELOPMENT SERVICES DEPARTMENT

STREET DATA TABLE

STREET NAME	CLASSIFICATION	SPEED (MPH)	ADT (VEHICLES)	R/W (FT)
AIRWAY ROAD	FOUR LANE COLLECTOR	35	N/A	120
				-

TITLE SHEET FOR:
SANYO LOGISTICS CENTER
SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF\

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 1 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. -
V.T.M. N/A

FOR CITY ENGINEER _____ DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

NAD83 COORDINATES
142-1785
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

-1-D

CONSTRUCTION BMP GENERAL NOTES

PRIOR TO ANY SOIL DISTURBANCE, TEMPORARY EROSION AND SEDIMENT CONTROLSHALL BE INSTALLED BY THE CONTRACTOR OR QUALIFIED PERSON(S) AS INDICATED BELOW:

1. ALL REQUIREMENTS OF THE CITY OF SAN DIEGO 'LAND DEVELOPMENT MANUAL, STORM WATER STANDARDS" MUST BE INCORPORATED INTO THE DESIGN AND CONSTRUCTION OF THE PROPOSED GRADING/IMPROVEMENTS CONSISTENT WITH THE APPROVED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND/OR WATER POLLUTION CONTROL PLAN (WPCP) FOR CONSTRUCTION LEVEL BMP'S AND, IF APPLICABLE, THE STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR POST CONSTRUCTION TREATMENT CONTROL BMP'S.

2. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL STORM DRAIN INLETS. INLET PROTECTION IN THE PUBLIC RIGHT OF WAY MAY BE TEMPORARILY REMOVED WHERE IT IS PRONE TO FLOODING PRIOR TO A RAIN EVENT AND REINSTALLED AFTER RAIN IS OVER.

3. ALL CONSTRUCTION BMPS SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN RAIN IS IMMINENT.

4. THE CONTRACTOR SHALL ONLY GRADE, INCLUDING CLEARING AND GRUBBING, AREAS FOR WHICH THE CONTRACTOR OR QUALIFIED PERSON CAN PROVIDE EROSION AND SEDIMENT CONTROL MEASURES.

5. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL SUB-CONTRACTORS AND SUPPLIERS ARE AWARE OF ALL STORM WATER QUALITY MEASURES AND IMPLEMENT SUCH MEASURES. FAILURE TO COMPLY WITH THE APPROVED SWPPP/WPCP WILL RESULT IN THE ISSUANCE OF CORRECTION NOTICES, CITATIONS, CIVIL PENALTIES AND/OR STOP WORK NOTICES.

6. THE CONTRACTOR OR QUALIFIED PERSON SHALL BE RESPONSIBLE FOR CLEANUP OF ALL SILT, DEBRIS AND MUD ON AFFECTED AND ADJACENT STREET(S) AND WITHIN STORM DRAIN SYSTEM DUE TO CONSTRUCTION VEHICLES/EQUIPMENT AND CONSTRUCTION ACTIVITY AT THE END OF EACH WORK DAY.

7. THE CONTRACTOR SHALL PROTECT NEW AND EXISTING STORM WATER CONVEYANCE SYSTEMS FROM SEDIMENTATION, CONCRETE RINSE, OR OTHER CONSTRUCTION RELATED DEBRIS AND DISCHARGES WITH THE APPROPRIATE BMPS THAT ARE ACCEPTABLE TO THE ENGINEER AND AS INDICATED IN THE SWPPP/WPCP

8. THE CONTRACTOR OR QUALIFIED PERSON SHALL CLEAR DEBRIS, SILT AND MUD FROM ALL DITCHES AND SWALES PRIOR TO AND AFTER EACH RAIN EVENT.

9. IF A NON-STORM WATER DISCHARGE LEAVES THE SITE, THE CONTRACTOR SHALL IMMEDIATELY STOP THE ACTIVITY AND REPAIR THE DAMAGES. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF THE DISCHARGE. AS SOON AS PRACTICAL, ANY AND ALL WASTE MATERIAL, SEDIMENT AND DEBRIS FROM EACH NON STORM WATER DISCHARGE SHALL BE REMOVED FROM THE STORM DRAIN CONVEYANCE SYSTEM AND PROPERLY DISPOSED OF BY THE CONTRACTOR.

10. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ON SITE AT CONVENIENT LOCATIONS TO FACILITATE RAPID DEPLOYMENT OF CONSTRUCTION BMPS WHEN RAIN IS IMMINENT.

11. THE CONTRACTOR SHALL RESTORE AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO WORKING ORDER YEAR ROUND.

12. THE CONTRACTOR SHALL INSTALL ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES DUE TO GRADING INACTIVITY OR UNFORESEEN CIRCUMSTANCES TO PREVENT NON-STORM WATER AND SEDIMENT-LADEN DISCHARGES.

13. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATERS CREATE A HAZARDOUS CONDITION.

14. ALL EROSION AND SEDIMENT CONTROL MEASURES PROVIDED PER THE APPROVED SWPPP/WPCP SHALL BE INSTALLED AND MAINTAINED. ALL EROSION AND SEDIMENT CONTROL FOR INTERIM CONDITIONS SHALL BE PROPERLY DOCUMENTED AND INSTALLED TO THE SATISFACTION OF THE RESIDENT ENGINEER.

15. UPON NOTIFICATION BY THE RESIDENT ENGINEER, THE CONTRACTOR SHALL ARRANGE FOR MEETINGS DURING OCTOBER 1ST TO APRIL 30TH FOR PROJECT TEAM (GENERAL CONTRACTOR, QUALIFIED PERSON, EROSION CONTROL SUBCONTRACTOR IF ANY, ENGINEER OF WORK, OWNER/DEVELOPER AND THE RESIDENT ENGINEER) TO EVALUATE THE ADEQUACY OF THE EROSION AND SEDIMENT CONTROL MEASURES AND OTHER BMPS RELATIVE TO ANTICIPATED CONSTRUCTION ACTIVITIES.

16. THE CONTRACTOR SHALL CONDUCT VISUAL INSPECTIONS DAILY AND MAINTAIN ALL BMPS AS NEEDED. VISUAL INSPECTIONS AND MAINTENANCE OF ALL BMPS SHALL BE CONDUCTED BEFORE, DURING AND AFTER EVERY RAIN EVENT AND EVERY 24 HOURS DURING ANY PROLONGED RAIN EVENT. THE CONTRACTOR SHALL MAINTAIN AND REPAIR ALL BMPS AS SOON AS POSSIBLE AS SAFETY ALLOWS.

17. CONSTRUCTION ENTRANCE AND EXIT AREA. TEMPORARY CONSTRUCTION ENTRANCE AND EXIT AREA SHALL BE ON LEVEL, STABILIZED GROUND. THE ENTRANCE AND EXIT AREA SHALL BE CONSTRUCTED BY OVERLAYING THE STABILIZED ACCESS AREA WITH 3 TO 6" DIAMETER STONES. THE AREA SHALL BE MINIMUM 50' LONG X 30' WIDE. IN LIEU OF STONE COVERED AREA, THE CONTRACTOR MAY CONSTRUCT RUMBLE RACKS OF STEEL PANELS WITH RIDGES MINIMUM 20' LONG X 30' WIDE CAPABLE OF PREVENTING THE MIGRATION OF CONSTRUCTION MATERIALS INTO THE TRAVELED WAYS.

18. PERFORMANCE STANDARDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING WATER POLLUTION CONTROL MEASURES BASED ON PERFORMANCE STANDARDS. PERFORMANCE STANDARDS SHALL INCLUDE:

A. NON-STORM WATER DISCHARGES FROM THE SITE SHALL NOT OCCUR TO THE MEP3. STORM WATER DISCHARGES SHALL BE FREE OF POLLUTANTS INCLUDING SEDIMENT TO THE MEP.

B. EROSION SHALL BE CONTROLLED BY ACCEPTABLE BMPS TO THE MEP. IF RILLS AND GULLIES APPEAR THEY SHALL BE REPAIRED AND ADDITIONAL BMPS INSTALLED TO PREVENT A REOCCURRENCE OF EROSION.

C. AN INACTIVE AREA SHALL BE PROTECTED TO PREVENT POLLUTANT DISCHARGES. A SITE OR PORTIONS OF A SITE SHALL BE CONSIDERED INACTIVE WHEN CONSTRUCTION ACTIVITIES HAVE CEASED FOR A PERIOD OF 14 OR MORE CONSECUTIVE DAYS.

GRADING NOTES

1. GRADING AS SHOWN ON THESE PLANS SHALL BE IN CONFORMANCE WITH CURRENT STANDARD SPECIFICATIONS AND CHAPTER 14, ARTICLE 2, DIVISION 1, OF THE SAN DIEGO MUNICIPAL CODE.

2. PLANT AND IRRIGATE ALL CUT AND FILL SLOPES AS REQUIRED BY ARTICLE 2, DIVISION 4, SECTION 142.0411 OF THE SAN DIEGO LAND DEVELOPMENT CODE AND ACCORDING TO SECTION IV OR THE LAND DEVELOPMENT MANUAL LANDSCAPE STANDARDS.

3. GRADED, DISTURBED, OR ERODED AREAS THAT WILL NOT BE PERMANENTLY PAVED, COVERED BY STRUCTURE, OR PLANTED FOR A PERIOD OVER 90 DAYS SHALL BE TEMPORARILY RE-VEGETATED WITH A NON-IRRIGATED HYDROSEED MIX, GROUND COVER, OR EQUIVALENT MATERIAL. SEE SHEET 15 FOR MIX AND SPECIFICATIONS.

GROUND WATER DISCHARGE NOTES

1. ALL GROUND WATER EXTRACTION AND SIMILAR WASTE DISCHARGES TO SURFACE WATERS NOT TRIBUTARY TO THE SAN DIEGO BAY ARE PROHIBITED UNTIL IT CAN BE DEMONSTRATED THAT THE OWNER HAS APPLIED AND OBTAINED AUTHORIZATION FROM THE STATE OF CALIFORNIA VIA AN OFFICIAL "ENROLLMENT LETTER" FROM THE REGIONAL WATER QUALITY CONTROL BOARD IN ACCORDANCE WITH THE TERMS, PROVISIONS AND CONDITIONS OF STATE ORDER NO R9-2015-0013 NPDES CAG919003.

2. THE ESTIMATED MAXIMUM DISCHARGE RATES MUST NOT EXCEED THE LIMITS SET IN THE OFFICIAL "ENROLLMENT LETTER" FROM THE REGIONAL BOARD UNLESS PRIOR NOTIFICATION AND SUBSEQUENT AUTHORIZATION HAS BEEN OBTAINED, AND DISCHARGE OPERATIONS MODIFIED TO ACCOMMODATE THE INCREASED RATES.

3. ALL GROUND WATER EXTRACTIONS AND SIMILAR WASTE DISCHARGES TO SURFACE WATERS TRIBUTARY TO THE SAN DIEGO BAY ARE PROHIBITED UNTIL IT CAN BE DEMONSTRATED THAT THE OWNER HAS APPLIED AND OBTAINED AUTHORIZATION FROM THE STATE OF CALIFORNIA VIA AN OFFICIAL "ENROLLMENT LETTER" FROM THE REGIONAL WATER QUALITY CONTROL BOARD IN ACCORDANCE WITH THE TERMS, PROVISIONS AND CONDITIONS OF STATE ORDER NO R9-2015-0013 NPDES NO. CAG919003.

MINIMUM POST-CONSTRUCTION MAINTENANCE PLAN

AT THE COMPLETION OF THE WORK SHOWN, THE FOLLOWING PLAN SHALL BE FOLLOWED TO ENSURE WATER QUALITY CONTROL IS MAINTAINED FOR THE LIFE OF THE PROJECT:

1. STABILIZATION: ALL PLANTED SLOPES AND OTHER VEGETATED AREAS SHALL BE INSPECTED PRIOR TO OCTOBER 1 OF EACH YEAR AND AFTER MAJOR RAINFALL EVENTS (MORE THAN ½ INCH) AND REPAIRED AN REPLANTED AS NEEDED UNTIL A NOTICE OF TERMINATION (NOT) IS FILLED.

2. STRUCTURAL PRACTICES: DESILTING BASINS, DIVERSION DITCHES, DOWNDRAINS, INLETS, OUTLET PROTECTION MEASURES, AND OTHER PERMANENT WATER QUALITY AND SEDIMENT AND EROSION CONTROLS SHALL BE INSPECTED PRIOR TO OCTOBER 1ST OF EACH YEAR AND AFTER MAJOR RAINFALL EVENTS (MORE THAN ½ INCH). REPAIRS AND REPLACEMENTS SHALL BE MADE AS NEEDED AND RECORDED IN THE MAINTENANCE LOG IN PERPETUITY.

3. OPERATION AND MAINTENANCE, FUNDING: POST-CONSTRUCTION MANAGEMENT MEASURES ARE THE RESPONSIBILITY OF THE DEVELOPER UNTIL THE TRANSFER OF RESPECTIVE SITES TO HOME BUILDERS, INDIVIDUAL OWNERS, HOMEOWNERS ASSOCIATIONS, SCHOOL DISTRICTS, OR LOCAL AGENCIES AND/OR GOVERNMENTS AT THAT TIME, THE NEW OWNERS SHALL ASSUME RESPONSIBILITY FOR THEIR RESPECTIVE PORTIONS OF THE DEVELOPMENT.

PERMANENT POST-CONSTRUCTION BMP NOTES

1. OPERATION AND MAINTENANCE SHALL BE SECURED BY AN EXECUTED AND RECORDED STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT (SWMDCMA), OR ANOTHER MECHANISM APPROVED BY THE CITY ENGINEER, THAT ASSURES ALL PERMANENT BMP'S WILL BE MAINTAINED IN PERPETUITY, PER THE LAND DEVELOPMENT MANUAL, STORM WATER STANDARDS.

2. ANY MODIFICATION(S) TO THE PERMANENT POST CONSTRUCTION BMP DEVICES/STRUCTURES SHOWN ON PLAN REQUIRES A CONSTRUCTION CHANGE TO BE PROCESSED AND APPROVED THROUGH DEVELOPMENT SERVICES DEPARTMENT BY THE ENGINEER OF WORK. APPROVAL OF THE CONSTRUCTION CHANGE IS REQUIRED PRIOR TO CONSTRUCTION OF THE PERMANENT BMP.

STORM WATER REQUIREMENTS

1. THIS PROJECT IS SUBJECT TO MUNICIPAL CODE SECTION 4303 AND ORDER NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100

2. ALL WORK RELATED TO POST-CONSTRUCTION STORMWATER QUALITY SHALL BE IN ACCORDANCE WITH THE STORM WATER QUALITY MANAGEMENT PLAN ENTITLED, SANYO LOGISTICS CENTER, BADIEE DEVELOPMENT, INC., AIRWAY ROAD, SAN DIEGO, PREPARED BY K & S ENGINEERING, INC., REPORT DATE,

3. POST-CONSTRUCTION BMPS ARE REQUIRED, SEE SHEET(S) 8.

PRIVATE WATER AND WASTEWATER

THE PRIVATE WATER/SEWER SYSTEM IS DESIGNED IN ACCORDANCE WITH THE CALIFORNIA PLUMBING CODE AND IS SHOWN ON THESE PLANS AS "INFORMATION ONLY". A SEPARATE PLUMBING PERMIT IS REQUIRED FOR CONSTRUCTION AND INSPECTION OF THE SYSTEM.
APPROVAL NO.:IN PROGRESS

PRIVATE NOTE

ALL ONSITE, PRIVATE IMPROVEMENTS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. THE CITY ENGINEER'S APPROVAL OF THIS DRAWING, IN NO WAY CONSTITUTES AN APPROVAL OF SAID PRIVATE IMPROVEMENTS. A SEPARATE PERMIT FOR SUCH IMPROVEMENTS MAY BE REQUIRED.

CURB RAMP NOTE

THE REQUIRED DETECTABLE WARNING (TRUNCATED DOMES) ON CURB RAMPS ARE TO COMPLY WITH THE CITY STANDARDS (SDG-130) AND SPECIFICATIONS. A 12" X 12" (MIN.) SAMPLE OF THE DETECTABLE WARNING, THE PRODUCTS' TEST REPORT AND A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTION MUST BE SUBMITTED TO THE DESIGNATED CITY RESIDENT ENGINEER FOR REVIEW PRIOR TO INSTALLATION. FAILURE TO COMPLY WITH THE STANDARDS, SPECIFICATIONS AND SAMPLE SUBMITTAL REVIEW PROCESS WILL RESULT IN THE REMOVAL OR REPLACEMENT OF THE DETECTABLE WARNING AND/OR CURB RAMP(S) AT CONTRACTOR AND/OR OWNER'S EXPENSE.

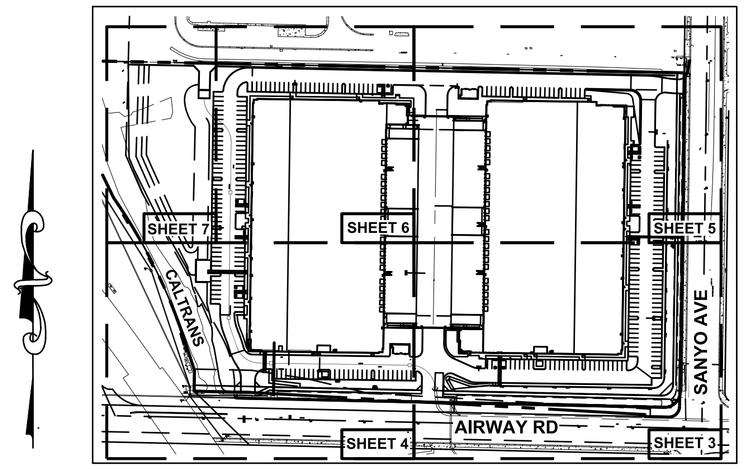
LEGAL DESCRIPTION

PARCEL 1:
THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 18 SOUTH, RANGE 1 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATES GOVERNMENT SURVEY THEREOF.

EXCEPTING THEREFROM ALL THAT PORTION LYING WESTERLY AND SOUTHWESTERLY OF THE NORTHEASTERLY LINE OF OTAY MESA ROAD, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWESTERLY CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 36; THENCE SOUTH 88°45'28" EAST, ALONG THE SOUTHERLY LINE OF SAID NORTHWEST QUARTER, A DISTANCE OF 237.68 FEET TO A POINT IN THE ARC OF A 1,960 FOOT RADIUS CURVE, CONCAVE NORTHEASTERLY, A RADIAL BEARS SOUTH 64°54'57" WEST TO SAID POINT; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 20°11'48", A DISTANCE OF 690.90 FEET TO THE NORTHERLY LINE OF THE SOUTH HALF OF SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER; THENCE NORTH 89°12'29" WEST ALONG SAID NORTHERLY
LINE, TO THE NORTHWEST CORNER OF SAID SOUTH HALF; THENCE SOUTHERLY ALONG THE WESTERLY LINE OF SAID SOUTH HALF, A DISTANCE OF 294.49 FEET; THENCE EASTERLY, AT RIGHT ANGLES TO THE LAST DESCRIBED LINE, A DISTANCE OF 20.00 FEET TO THE EASTERLY LINE OF HARVEST ROAD AS LOCATED AND ESTABLISHED ON THE DATE OF THIS INSTRUMENT, SAID POINT BEING ALSO A POINT IN THE ARC OF A 2,040.00 FOOT RADIUS CURVE, CONCAVE NORTHEASTERLY, A
RADIAL BEARS SOUTH 76°56'23" WEST TO SAID POINT; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 08°44'44", A DISTANCE OF 311.38 FEET TO THE BEGINNING OF A 20.00 FOOT RADIUS REVERSE CURVE, CONCAVE NORTHWESTERLY, A RADIAL BEARS NORTH 68°11'39" EAST TO SAID POINT; THENCE SOUTHEASTERLY AND SOUTHWESTERLY ALONG THE
ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 89°16'32", A DISTANCE OF 31.16 FEET TO A POINT IN THE ARC OF A COMPOUND 170.00 FOOT RADIUS CURVE, CONCAVE NORTHERLY, A RADIAL BEARS SOUTH 22°31'49" EAST TO SAID POINT; THENCE WESTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 23°46'21", A DISTANCE OF 70.53 FEET; THENCE TANGENT TO SAID CURVE, NORTH 88°45'28" WEST, 38.56 FEET TO THE WESTERLY LINE OF SAID SECTION 36; THENCE SOUTH 00°52'13" WEST, ALONG SAID WESTERLY LINE, RETURNING TO THE POINT OF BEGINNING. ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE STATE OF CALIFORNIA THROUGH DEED RECORDED MARCH 13, 2006 AS INSTRUMENT NO. 2006-0173299 OF OFFICIAL RECORDS.

PARCEL 2:
AN EASEMENT AND RIGHT OF WAY FOR INGRESS AND EGRESS, ROAD PURPOSES, SEWER, WATER, GAS, POWER AND TELEPHONE LINES AND APPURTENANCES THERETO TO BE USED IN COMMON WITH THE GRANTORS AND OTHERS OVER, UPON AND UNDER THE NORTHERLY 30 FEET OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 36, TOWNSHIP 18 SOUTH, RANGE 1 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.



KEY MAP
SCALE: 1" = 200'

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: SANYO LOGISTICS OWNER, LLC

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	INCLUDED IN O&M MANUAL	SHEET NUMBER(S)
SITE DESIGN ELEMENTS					N/A	
DESCRIPTION: N/A						
SOURCE CONTROL ELEMENTS						
DESCRIPTION:						
-STORM DRAIN STENCILING AND SIGNAGE	ONCE EVERY 6 MONTHS	ONCE A YEAR	REPAINT STORM DRAIN SIGNS	-	YES	8-D
POLLUTANT CONTROL BMP(S) DESCRIPTION: BIOFILTRATION						
-BIOFILTRATION	WEEKLY	MONTHLY OR WHEN NEEDED	CUT VEGETATION AND RE-SEED AS REQUIRED, REMOVE ACCUMULATED SEDIMENT WHEN INTERFERING W/ DRAINAGE FLOW	1	YES	8-D
HMP FACILITY DESCRIPTION: BIOFILTRATION						
-BIOFILTRATION	WEEKLY	MONTHLY OR WHEN NEEDED	CUT VEGETATION AND RE-SEED AS REQUIRED, REMOVE ACCUMULATED SEDIMENT WHEN INTERFERING W/ DRAINAGE FLOW	1	YES	8-D
HMP EXEMPT	NO					

AGREEMENT DATA

APPROVAL TYPE	DESCRIPTION	APPROVAL NO.	DOCUMENT NO.	SEE SHEET NUMBER(S)
EMRA	ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT-PVT.	-		
SWMDCMA	STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT	-		

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL S. SWEIS — NO. 48592 EXP 6-30-22 — CIVIL — STATE OF CALIFORNIA

PRIVATE CONTRACT

NOTES FOR:

SANYO LOGISTICS CENTER

SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF\

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 2 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. -
V.T.M. N/A

FOR CITY ENGINEER ____ DATE ____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

NAD83 COORDINATES
142-1785
LAMBERT COORDINATES

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

2-D

SEE SHEET 5

SEE SHEET 4

BUILDING 1

SLAB ON GRADE TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS.

STREET IMPROVEMENTS AND GREEN STREET PER IMPROVEMENT PLANS

SANYO AVENUE

AIRWAY ROAD

PROPOSED RAISED MEDIAN

EX. P/L

EX. R/W

R/W

EX. 42" CIPCP PER DWG 22990-17-D

EXISTING 18" ACP PER DWG 22990-17-D

EXISTING 16" PVC SEWER PER DWG. 23151-4-D PER CITY OF SAN DIEGO

EXISTING 12" ACP WATER PER DWG. 23151-4-D OTAY WATER DISTRICT

EX. 10" PVC SEWER PER DWG No. 23151-D (PUBLIC)

EX. CURB & GUTTER

EXISTING 18" PVC SEWER PER DWG. 23751-D CITY OF SAN DIEGO

EXISTING 12" ACP WATER PER DWG. 24033-14-D OTAY WATER DISTRICT

EXISTING 8" ACP PER DWG 22990-17-D

113+31.34 AIRWAY RD.= 36+46.64 SANYO AVENUE

CONSTRUCTION NOTES

(2) CONSTRUCT 6" CURB PER SDG-150
(3) CONSTRUCT TYPE G CURB AND GUTTER PER SDG-151
(4) CONSTRUCT CONCRETE SIDEWALK PER SDG-155
(5) PROPOSED RETAINING WALL PER SEPARATE PERMIT
(6) CONSTRUCT TYPE B BROW DITCH PER SDD-106
(7) LOADING DOCK PAVING TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
(8) MAIN DRIVE AISLE PAVING TO BE 4" A.C. OVER 13.5" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
(9) PARKING SPACES PAVING TO BE 3" A.C. OVER 8" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
(10) SITE CORNER VISIBILITY TRIANGLES PER SDMC 1-02SS1
(11) CONSTRUCT ADA ACCESS FROM PUBLIC SIDEWALK. SIDEWALK PER SDG-155
(12) DEEP FOOTING PER STRUCTURAL PLANS

0 10 20 40 60

GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRECISE GRADING PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 3 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

1782-6337
NAD83 COORDINATES
142-1777
LAMBERT COORDINATES

-3-D

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL S. SWEIS NO.48592 EXP 6-30-22 CIVIL STATE OF CALIFORNIA

SEE SHEET 7

SEE SHEET 6

SEE SHEET 3

CONSTRUCTION NOTES

1. CONSTRUCT CONCRETE DRIVEWAY PER IMPROVEMENT PLANS
2. CONSTRUCT 6" CURB PER SDG-150
3. CONSTRUCT TYPE G CURB AND GUTTER PER SDG-151
4. CONSTRUCT CONCRETE SIDEWALK PER SDG-155
5. PROPOSED RETAINING WALL PER SEPARATE PERMIT
7. LOADING DOCK PAVING TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
8. MAIN DRIVE AISLE PAVING TO BE 4" A.C. OVER 13.5" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
9. PARKING SPACES PAVING TO BE 3" A.C. OVER 8" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
10. SITE CORNER VISIBILITY TRIANGLES PER SDMC 1-02SS1
11. CONSTRUCT ADA ACCESS FROM PUBLIC SIDEWALK. SIDEWALK PER SDG-155
12. DEEP FOOTING PER STRUCTURAL PLANS
13. TRASH ENCLOSURE PER ARCHITECT PLANS

BUILDING 2

SLAB ON GRADE TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS.

PUBLIC STORM DRAIN EASEMENT PER SEPARATE DOC.

STREET IMPROVEMENTS AND GREEN STREET PER IMPROVEMENT PLANS

AIRWAY ROAD

CALTRANS R/W

EXIST. UTILITY EASEMENT TO STATE

DAYLIGHT LINE

EXIST. SLOPE ESMT. TO CITY OF S.D.

EXISTING 18" STEEL WATER PER CALTRANS 11-091824 -OTAY WATER DISTRICT

EXISTING 15" PVC SEWER PER DWG. 23151-D

EXISTING 12" ACP WATER PER DWG. 24033-13-D ABANDONED

EXISTING 18" STEEL WATER PER CALTRANS 11-091824

EXISTING 16" PVC SEWER PER DWG. 24033-13-D

EXISTING 12" ACP WATER PER DWG. 24033-13-D ABANDONED)

EXISTING 12" ACP WATER PER DWG. 24033-14-D

EX. 48" RCP PER DWG. 2299D-17-D

EX. SMH #19 537.68IN 525.24E

EX. MH (AT&T)

EX. TYPE A-5 CO 551.08RM 542.79E(48") 542.42E(48") 542.92(48")

EXIST. 12" PVC SEWER

EX. R/W

R/W

PATIO

RD

SLAB

GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRECISE GRADING PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 4 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. —

FOR CITY ENGINEER _____ DATE _____

V.T.M. N/A

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

1782-6337
NAD83 COORDINATES
142-1777
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

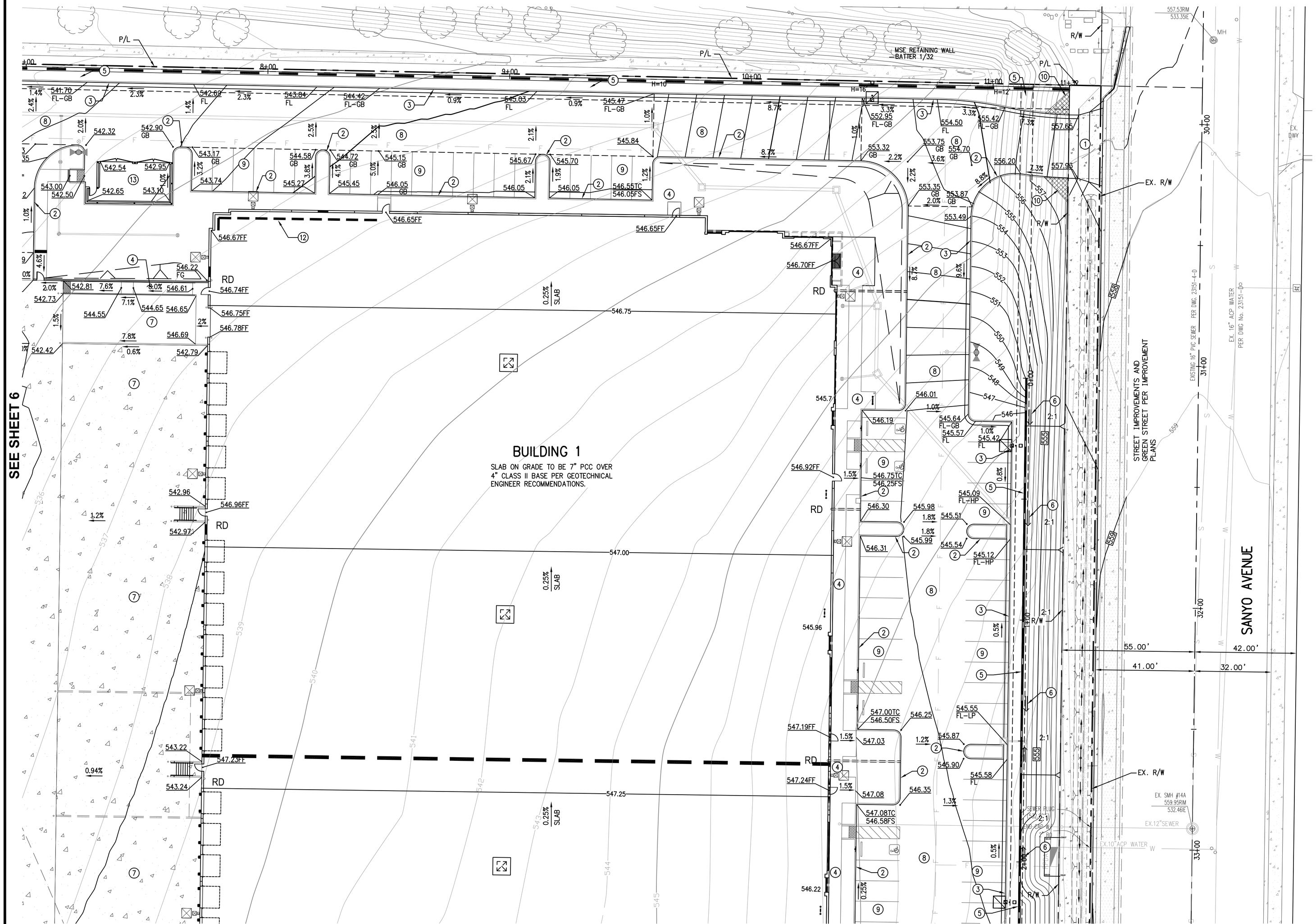
4-D

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO. 48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA



CONSTRUCTION NOTES

1. CONSTRUCT CONCRETE DRIVEWAY PER IMPROVEMENT PLANS
2. CONSTRUCT 6" CURB PER SDG-150
3. CONSTRUCT TYPE G CURB AND GUTTER PER SDG-151
4. CONSTRUCT CONCRETE SIDEWALK PER SDG-155
5. PROPOSED RETAINING WALL PER SEPARATE PERMIT
6. CONSTRUCT TYPE B BROW DITCH PER SDD-106
7. LOADING DOCK PAVING TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
8. MAIN DRIVE AISLE PAVING TO BE 4" A.C. OVER 13.5" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
9. PARKING SPACES PAVING TO BE 3" A.C. OVER 8" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS
10. SITE CORNER VISIBILITY TRIANGLES PER SDMC 1-02SS1
12. DEEP FOOTING PER STRUCTURAL PLANS
13. TRASH ENCLOSURE PER ARCHITECT PLANS

0 10 20 40 60

GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRECISE GRADING PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 5 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

1782-6337
NAD83 COORDINATES

142-1777
LAMBERT COORDINATES

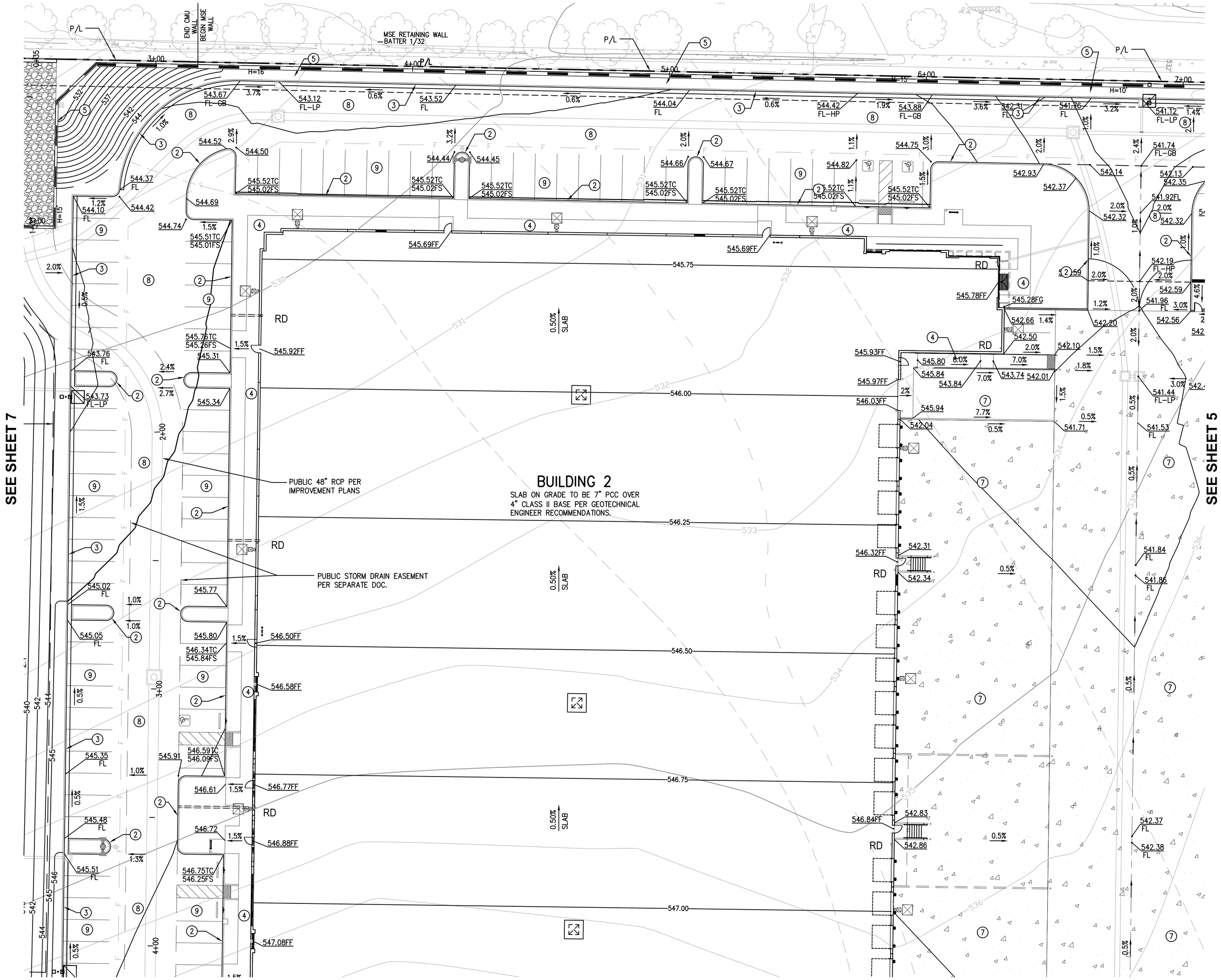
5-D

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO. 48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA



CONSTRUCTION NOTES

(2) CONSTRUCT 6" CURB PER SDG-150
(3) CONSTRUCT TYPE G CURB AND GUTTER PER SDG-151
(4) CONSTRUCT CONCRETE SIDEWALK PER SDG-155
(5) PROPOSED RETAINING WALL PER SEPARATE PERMIT
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(9) PARKING SPACES PAVING TO BE 3" A.C. OVER 8" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS

0 10 20 40 60
GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRECISE GRADING PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 6 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. —
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

1782-6337
NAD83 COORDINATES
142-1777
LAMBERT COORDINATES

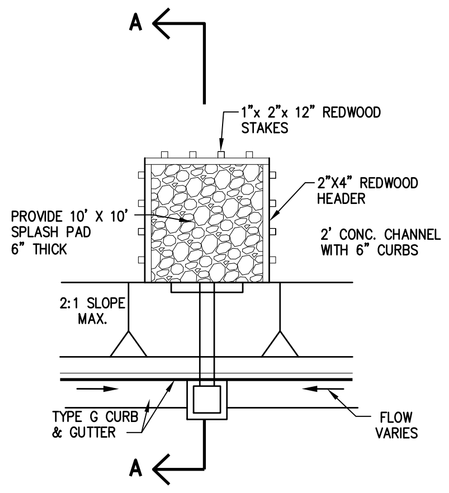
6-D

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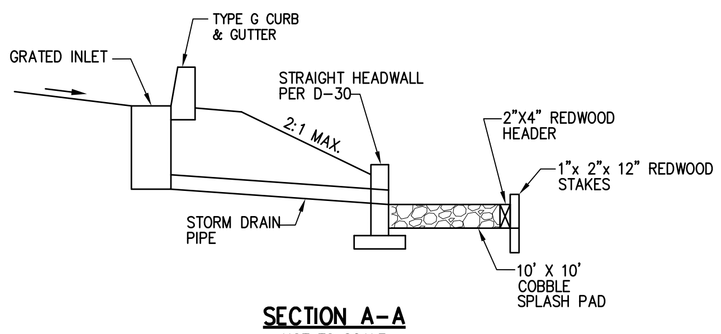
ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

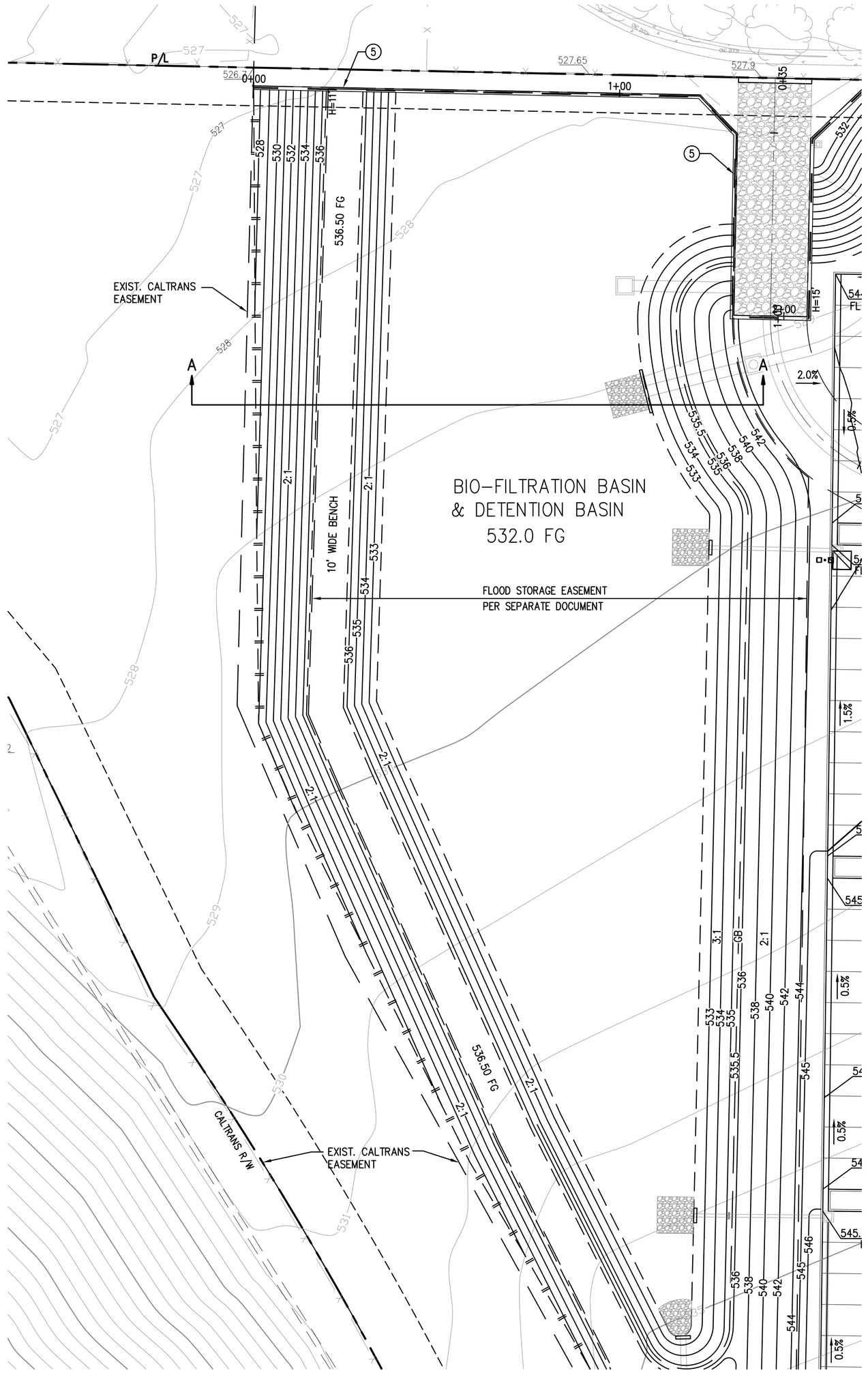
REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO. 48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA



SPLASH PAD DETAIL (PVT)
NOT TO SCALE

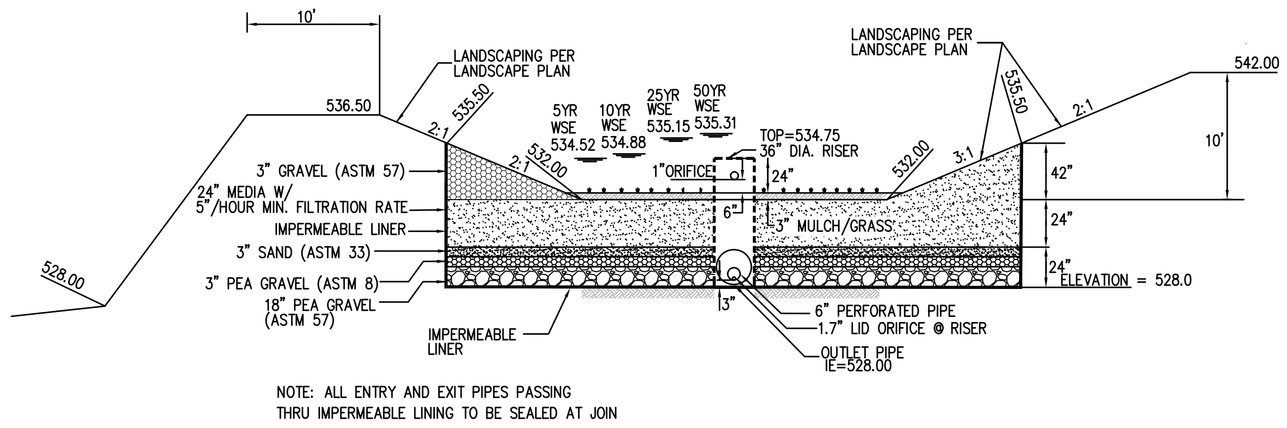


SECTION A-A
NOT TO SCALE



CONSTRUCTION NOTES

(5) PROPOSED RETAINING WALL PER SEPARATE PERMIT



NOTE: ALL ENTRY AND EXIT PIPES PASSING THRU IMPERMEABLE LINING TO BE SEALED AT JOIN

SECTION A-A
NOT TO SCALE

0 10 20 40 60
GRAPHIC SCALE: 1" = 20'

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER · KAMAL S. SWEIS · NO.48592 EXP 6-30-22 · CIVIL · STATE OF CALIFORNIA

PRIVATE CONTRACT

PRECISE GRADING PLAN FOR:

SANYO LOGISTICS CENTER

SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 7 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

–
NAD83 COORDINATES
142-1785
LAMBERT COORDINATES

7-D

SEE SHEET 10

SEE SHEET 9

BUILDING 1

SLAB ON GRADE TO BE 7" PCC OVER 4" CLASS II BASE PER GEOTECHNICAL ENGINEER RECOMMENDATIONS.

PATIO

AIRWAY RD.

SANYO AVE

EX. 10" PVC SEWER PER DWG No. 23151-D (PUBLIC)

EXISTING 16" PVC SEWER PER DWG. 23151-4-D PER CITY OF SAN DIEGO

EXISTING 12" ACP WATER PER DWG. 23151-4-D OTAY WATER DISTRICT

EXISTING 18" ACP PER DWG 22990-17-D

EX. 42" CIPCP PER DWG 22990-17-D

EXISTING 16" PVC SEWER PER DWG. 23151-D CITY OF SAN DIEGO

EXISTING 12" ACP WATER PER DWG. 24033-14-D OTAY WATER DISTRICT

EX. 18"ACP PER DWG 22990-17-D

EX. 24" CIPCP PER DWG 24033-14-D

EX. TYPE B INLET 550.88IM 545.14IE

EX. TYPE A-4 CO 550.48IM 542.99IE

EX. TYPE A-4 CO 559.49IM 545.51IE (OUT) 546.51IE (IN)

EX. SMH #18 560.0IM 531.20IE (OUT) 531.70IE (IN)

36" CB 544.48 TG 541.84 IE

24" CB 545.24 TG 541.28 IE

TYPE A CO 545.65TG 541.17IE

6" 6"PVC SD @ 0.5%

21'~12"PVC SD @ 0.5% (PVT)

112'~12"PVC SD @ 0.5% (PVT)

157' 24"PVC SD @ 0.5% (PVT)

2' WS 206'~24"PVC SD @ 0.5% (PVT)

6" 6"PVC SD @ 0.5% (PVT)

113+31.34 AIRWAY RD.= 36+46.64 SANYO AVENUE

CONSTRUCTION NOTES

20. INSTALL 9" SQUARE ATRIUM GRATE (NDS OR EQUAL)
21. INSTALL 24" X 24" PRECAST CONCRETE GRATED INLET
22. INSTALL 36" X 36" PRECAST CONCRETE GRATED INLET
23. CONSTRUCT TYPE A STORM DRAIN CLEANOUT PER D-09
24. INSTALL 3" X 12" STEEL PIPE FITTING (CURB-O-LET OR EQUAL)
25. ROOF DRAIN DOWNSPOUTS PER ARCHITECTURAL PLANS
26. INSTALL 6" PVC STORM DRAIN
27. CONSTRUCT TYPE B BROW DITCH PER SDD-106
28. FIRE MAIN PER SEPARATE PERMIT (PRIVATE)
29. FIRE HYDRANT PER SEPARATE PERMIT (PRIVATE)
30. FDC & PIV PER SEPARATE PERMIT (PRIVATE)
32. FIRE RISER PER SEPARATE PERMIT (PRIVATE)
34. DOMESTIC WATER SERVICE PER SEPARATE PLAN
35. IRRIGATION WATER SERVICE PER SEPARATE PLAN
36. INSTALL DOMESTIC WATER 2" SCH 40 PVC
40. INSTALL 6" ROUND ATRIUM GRATE INLET (NDS OR EQUAL)
41. INSTALL 12"X 12" PRECAST CONCRETE GRATED INLET

0 10 20 40 60

GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRIVATE UTILITY PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 8 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

1782-6337 NAD83 COORDINATES
142-1777 LAMBERT COORDINATES

-8-D

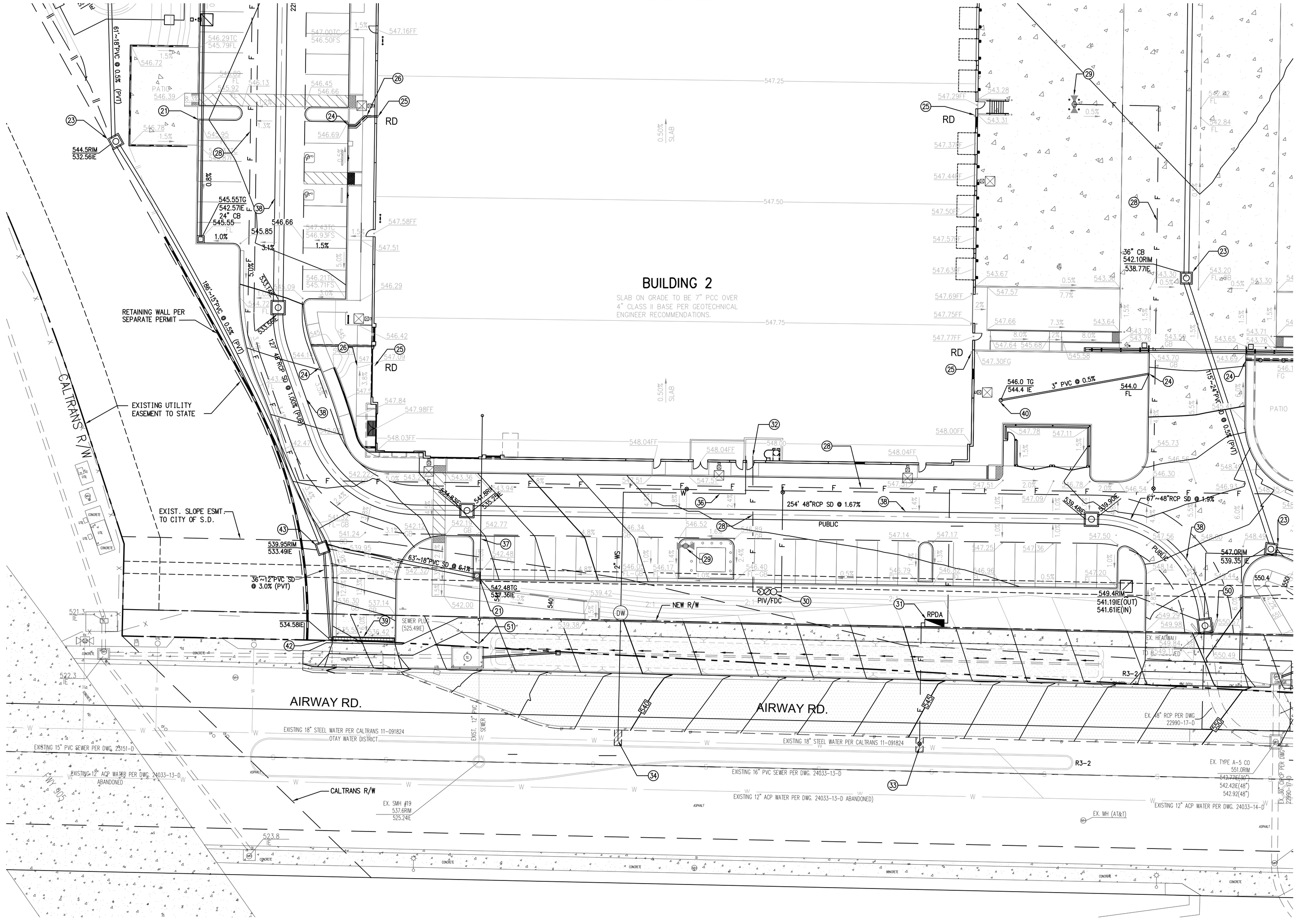
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(619) 296-5565 Fax: (619) 296-5564

ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER KAMAL S. SWEIS NO. 48592 EXP 6-30-22 CIVIL STATE OF CALIFORNIA

SEE SHEET 11



SEE SHEET 8

CONSTRUCTION NOTES

(21) INSTALL 24" X 24" PRECAST CONCRETE GRATED INLET
(23) CONSTRUCT TYPE A STORM DRAIN CLEANOUT PER D-09
(24) INSTALL 3" X 12" STEEL PIPE FITTING (CURB-O-LET OR EQUAL)
(25) ROOF DRAIN DOWNSPOUTS PER ARCHITECTURAL PLANS
(26) INSTALL 6" PVC STORM DRAIN
(28) FIRE MAIN PER SEPARATE PERMIT (PRIVATE)
(29) FIRE HYDRANT PER SEPARATE PERMIT (PRIVATE)
(30) FDC & PIV PER SEPARATE PERMIT (PRIVATE)
(31) RPDA PER SEPARATE PERMIT (PRIVATE)
(32) FIRE RISER PER SEPARATE PERMIT (PRIVATE)
(33) FIRE SERVICE PER SEPARATE PERMIT
(34) DOMESTIC WATER SERVICE PER SEPARATE PLAN
(36) INSTALL DOMESTIC WATER 2" SCH 40 PVC
(37) INSTALL SEWER LATERAL 6" PVC SCH 40
(38) PUBLIC STORM DRAIN PER SEPARATE PERMIT
(39) INSTALL 12" WIDE TRENCH DRAIN (ZURN Z717 OR EQUAL)
(42) INSTALL 12"X 12" PRECAST CONCRETE BOX SOLID COVER
(43) CONSTRUCT TYPE B CURB INLET PER SDD-116
(50) EXISTING HEADWALL TO BE REMOVED. INSTALL TYPE A-5 STORM DRAIN CLEANOUT PER D-09
(51) REMOVE EXIST. 12" END PLAG, INSTALL 12" X 6" REDUCER AND 6" C.O. AT PROPERTY LINE PER SDS-103. CONTRACTOR TO VERIFY EXIST. END PLUG ELEVATION ON FIELD BEFORE INSTALLATION.

0 10 20 40 60
GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRIVATE UTILITY PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 9 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

1782-6337 NAD83 COORDINATES
142-1777 LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

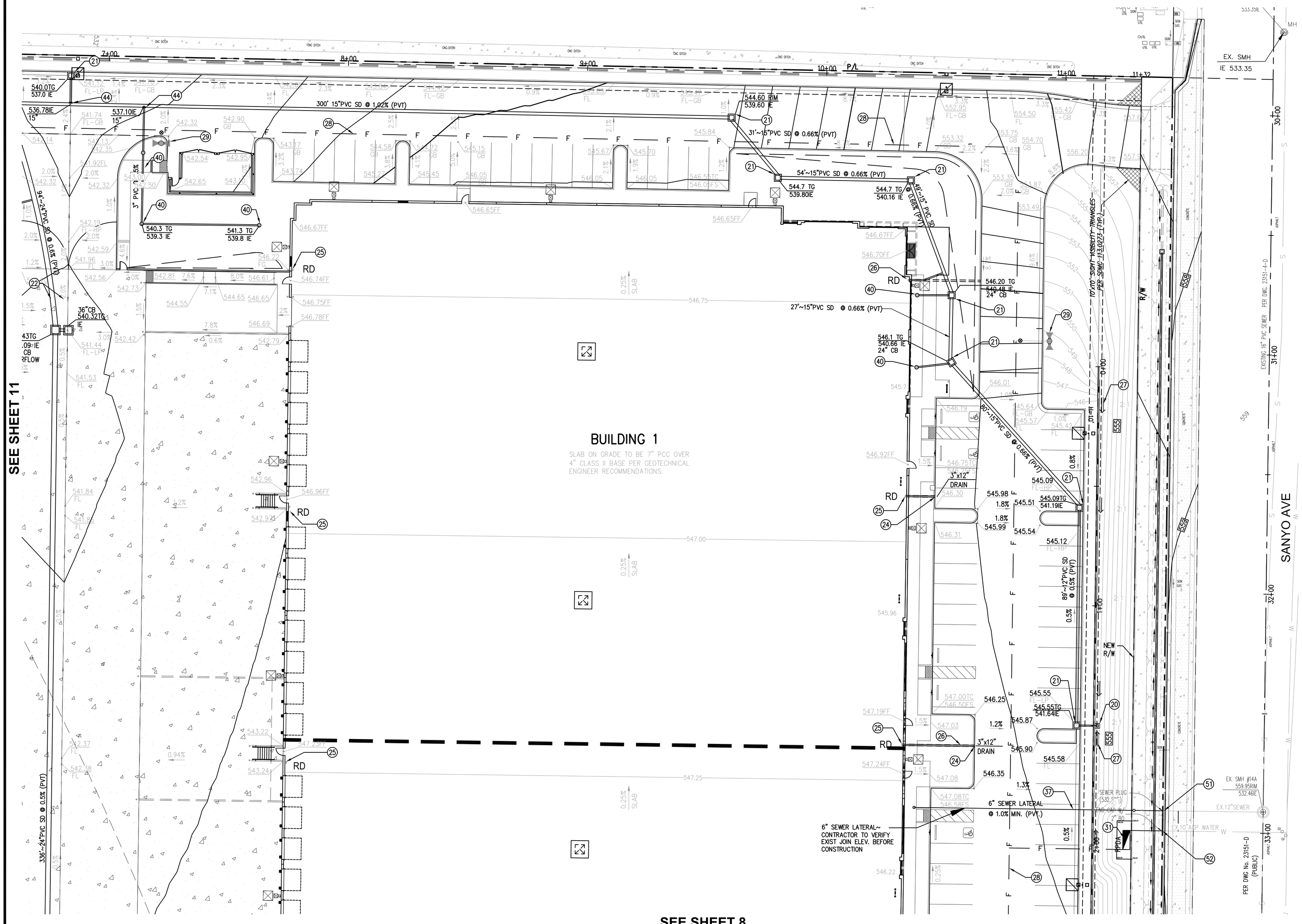
9-D

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

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KAMAL S. SWEIS
NO. 48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA



CONSTRUCTION NOTES

(20) INSTALL 9" SQUARE ATRIUM GRATE (NDS OR EQUAL)
(21) INSTALL 24" X 24" PRECAST CONCRETE GRATED INLET
(22) INSTALL 36" X 36" PRECAST CONCRETE GRATED INLET
(24) INSTALL 3" X 12" STEEL PIPE FITTING (CURB-O-LET OR EQUAL)
(25) ROOF DRAIN DOWNSPOUTS PER ARCHITECTURAL PLANS
(26) INSTALL 6" PVC STORM DRAIN
(27) CONSTRUCT TYPE B BROW DITCH PER SDD-106
(28) FIRE MAIN PER SEPARATE PERMIT (PRIVATE)
(29) FIRE HYDRANT PER SEPARATE PERMIT (PRIVATE)
(31) RPDA PER SEPARATE PERMIT (PRIVATE)
(37) INSTALL SEWER LATERAL 6" PVC SCH 40
(40) INSTALL 6" ROUND ATRIUM GRATE INLET (NDS OR EQUAL)
(44) INSTALL PIPE COLLAR PER D-62
(51) REMOVE EXIST. 12" END PLAG, INSTALL 12" X 6" REDUCER AND 6" C.O. AT PROPERTY LINE PER SDS-103. CONTRACTOR TO VERIFY EXIST. END PLUG ELEVATION ON FIELD BEFORE INSTALLATION.
(52) REMOVE EXISTING 10" END CAP, 2" BLOW OFF AND THRUST BLOCK. CONNECT TO EXISTING 10" ACP WATER WITH ACP TO PVC ADAPTER.

0 10 20 40 60
GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRIVATE UTILITY PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 10 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

FOR CITY ENGINEER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

1782-6337
NAD83 COORDINATES
142-1777
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

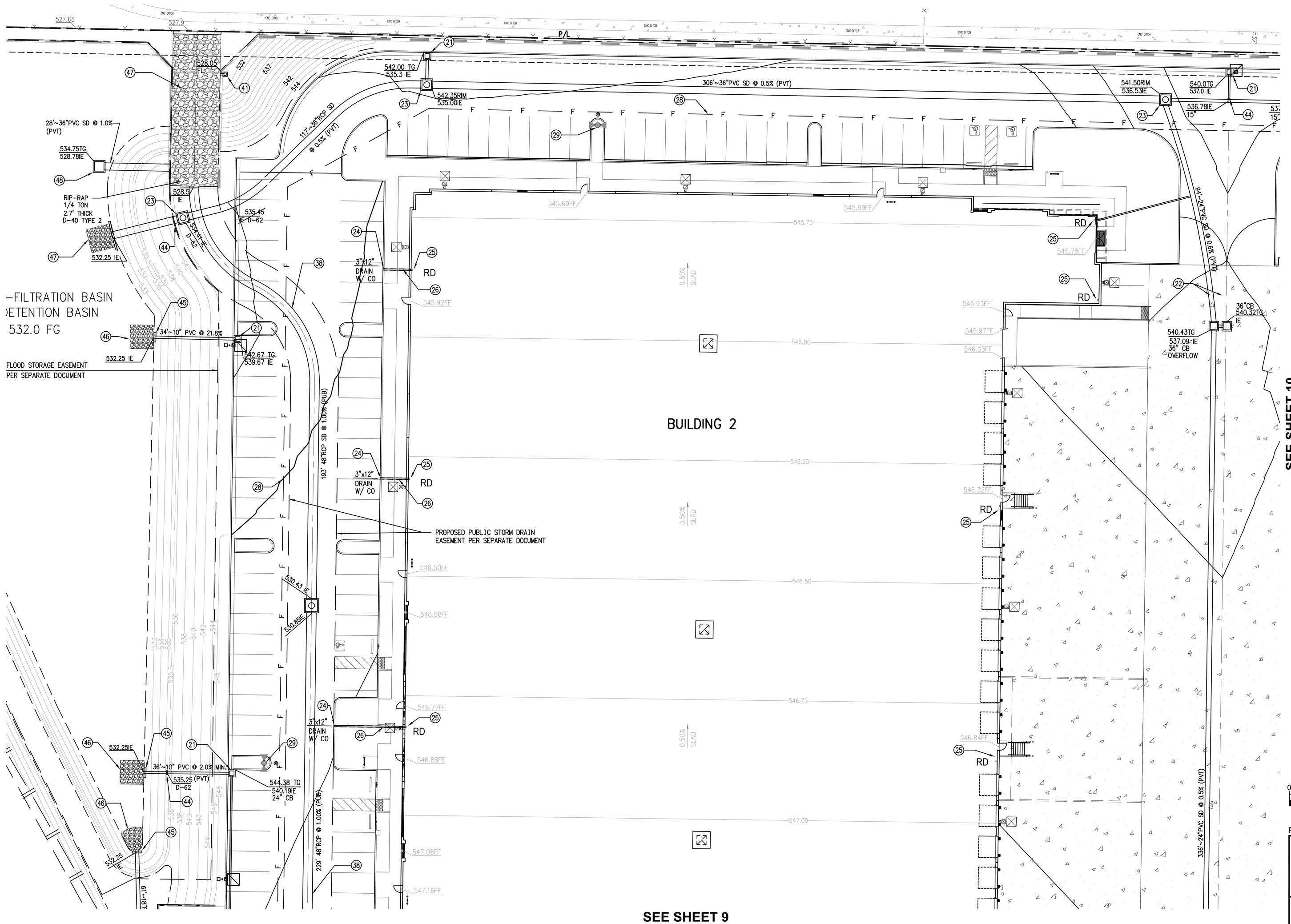
10-D

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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SWEIS
NO. 48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA



CONSTRUCTION NOTES

(21) INSTALL 24" X 24" PRECAST CONCRETE GRATED INLET
(22) INSTALL 36" X 36" PRECAST CONCRETE GRATED INLET
(23) CONSTRUCT TYPE A STORM DRAIN CLEANOUT PER D-09
(24) INSTALL 3" X 12" STEEL PIPE FITTING (CURB-O-LET OR EQUAL)
(25) ROOF DRAIN DOWNSPOUTS PER ARCHITECTURAL PLANS
(26) INSTALL 6" PVC STORM DRAIN
(28) FIRE MAIN PER SEPARATE PERMIT (PRIVATE)
(29) FIRE HYDRANT PER SEPARATE PERMIT (PRIVATE)
(38) PUBLIC STORM DRAIN PER SEPARATE PERMIT
(41) INSTALL 12"X 12" PRECAST CONCRETE GRATED INLET
(44) INSTALL PIPE COLLAR PER D-62
(45) CONSTRUCT STRAIGHT HEADWALL TYPE A PER D-30
(46) INSTALL SPLASH PAD PER DETAIL ON SHEET 7
(47) INSTALL RIP-RAP PER SDD-104
(48) INSTALL 36" CMP RISER STAGE STRUCTURE PER DETAIL ON SHEET 12

0 10 20 40 60
GRAPHIC SCALE: 1" = 20'

PRIVATE CONTRACT

PRIVATE UTILITY PLAN FOR:

SANYO LOGISTICS CENTER

E 1/2 NW 1/4 SE 1/4 SEC 34 T18S, R1W

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 11 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. –
V.T.M. N/A

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DESCRIPTION	BY	APPROVED	DATE	FILMED
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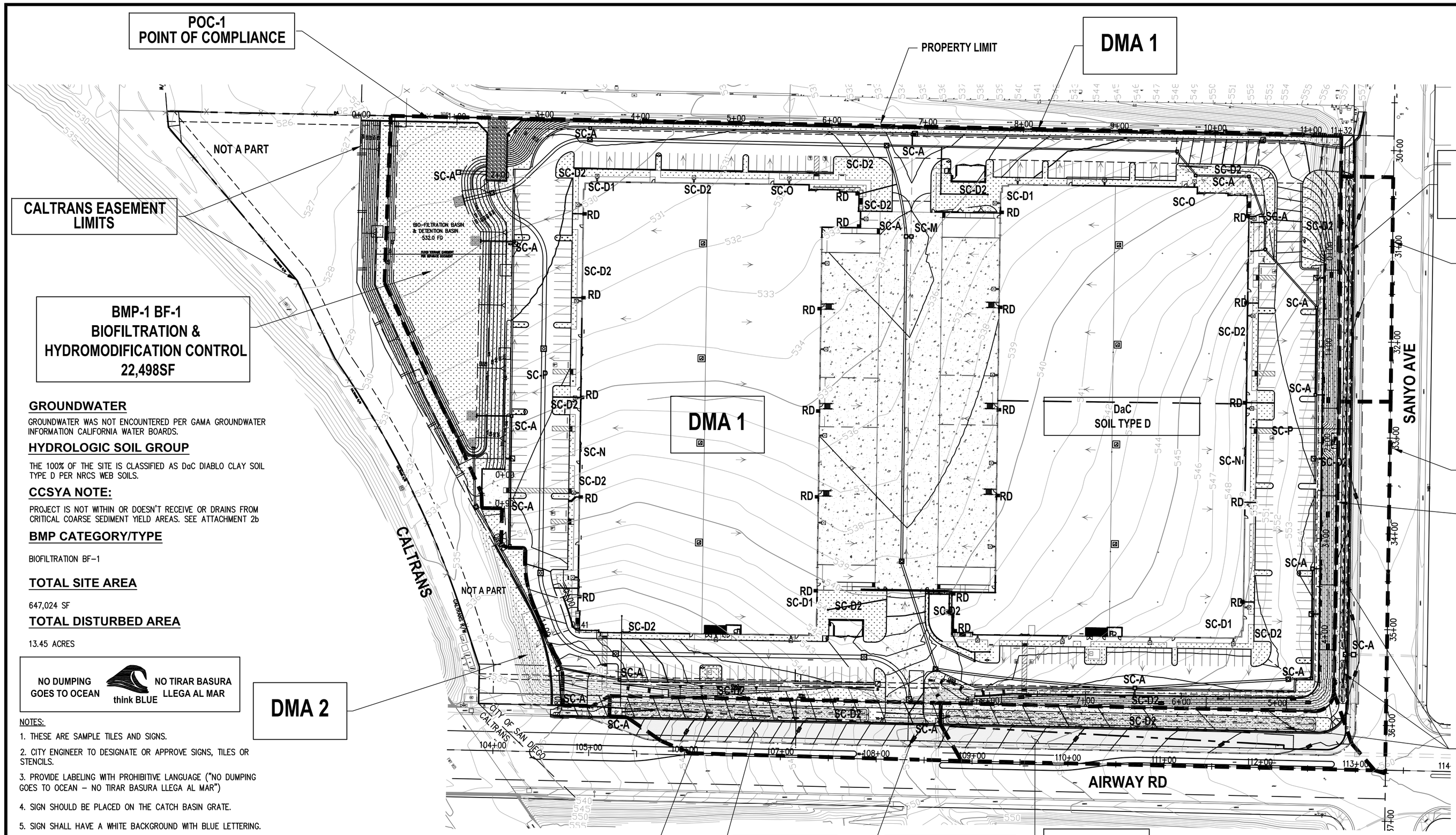
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LEGEND

ITEM	SYMBOL
BOUNDARY LIMIT	
IMPERVIOUS AREA	
PERVIOUS AREA	
ONSITE STORM DRAIN INLETS, STENCILING/SIGNAGE "NO DUMPING! GOES TO OCEAN"	SC-A
FUTURE INDOOR & STRUCTURAL PEST CONTROL	SC-D1
LANDSCAPE / OUTDOOR PESTICIDE USE	SC-D2
REFUSE AREAS	SC-G
LOADING DOCKS	SC-M
FIRE SPRINKLER TEST WATER	SC-N
MISCELLANEOUS DRAIN OR WASH WATER	SC-O
PLAZAS, SIDEWALKS AND PARKING LOTS	SC-P
LARGE TRASH GENERATING FACILITIES	SC-6A

GROUNDWATER

GROUNDWATER WAS NOT ENCOUNTERED PER GAMA GROUNDWATER INFORMATION CALIFORNIA WATER BOARDS.

HYDROLOGIC SOIL GROUP

THE 100% OF THE SITE IS CLASSIFIED AS DaC DIABLO CLAY SOIL TYPE D PER NRCS WEB SOILS.

CCSYA NOTE:

PROJECT IS NOT WITHIN OR DOESN'T RECEIVE OR DRAINS FROM CRITICAL COARSE SEDIMENT YIELD AREAS. SEE ATTACHMENT 2b

BMP CATEGORY/TYPE

BIOFILTRATION BF-1

TOTAL SITE AREA

647,024 SF

TOTAL DISTURBED AREA

13.45 ACRES

NO DUMPING GOES TO OCEAN — think BLUE — NO TIRAR BASURA LLEGA AL MAR

NOTES:

1. THESE ARE SAMPLE TILES AND SIGNS.
2. CITY ENGINEER TO DESIGNATE OR APPROVE SIGNS, TILES OR STENCILS.
3. PROVIDE LABELING WITH PROHIBITIVE LANGUAGE ("NO DUMPING GOES TO OCEAN – NO TIRAR BASURA LLEGA AL MAR")
4. SIGN SHOULD BE PLACED ON THE CATCH BASIN GRATE.
5. SIGN SHALL HAVE A WHITE BACKGROUND WITH BLUE LETTERING.

STORM DRAIN SIGNAGE

NOT TO SCALE

BIORETENTION SOIL MEDIA NOTE:

COMPOST SHALL BE CERTIFIED BY THE U.S. COMPOSTING COUNCIL'S SEAL OF TESTING ASSURANCE PROGRAM OR AN APPROVED EQUIVALENT PROGRAM. COMPOST SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

1. ORGANIC MATERIAL CONTENT SHALL BE 35% TO 75% BY DRY WEIGHT.
2. CARBON TO NITROGEN (C:N) RATIO SHALL BE BETWEEN 15:1 AND 40:1, PREFERABLY ABOVE 20:1 TO REDUCE THE POTENTIAL FOR NITROGEN LEACHING/WASHOUT.
3. PHYSICAL CONTAMINANTS (MANMADE INERT MATERIALS) SHALL NOT EXCEED 1% BY DRY WEIGHT.
4. PH SHALL BE BETWEEN 6.0 AND 7.5.
5. SOLUBLE SALT CONCENTRATION SHALL BE LESS THAN 10 DS/M (METHOD TMECC 4.10–A, USDA AND U.S. COMPOSTING COUNCIL).
6. MATURITY (SEED EMERGENCE AND SEEDLING VIGOR) SHALL BE GREATER THAN 80% RELATIVE TO POSITIVE CONTROL (METHOD TMECC 5.05–A, USDA AND U.S. COMPOSTING COUNCIL)
7. STABILITY (CARBON DIOXIDE EVOLUTION RATE) SHALL BE LESS THAN 2.5 MG CO2–C PER G COMPOST ORGANIC MATTER (OM) PER DAY OR LESS THAN 5 MG CO2–C PER G COMPOST CARBON PER DAY, WHICHEVER UNIT IS REPORTED. (METHOD TMECC 5.08–B, USDA AND U.S. COMPOSTING COUNCIL). ALTERNATIVELY A SOLVITA RATING OF 6 OR HIGHER IS ACCEPTABLE.
8. MOISTURE SHALL BE 25%–55% WET WEIGHT BASIS.
9. SELECT PATHOGENS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.32(A).
10. TRACE METALS SHALL PASS US EPA CLASS A STANDARD, 40 CFR SECTION 503.13, TABLES 1 AND 3.
11. SHALL BE WITHIN GRADATION LIMITS IN TABLE F.3–2 (ASTM D 422 SIEVE ANALYSIS OR APPROVED EQUIVALENT).

Table F.3-2: Compost Gradation Limits

Sieve Size	Percent Passing (by weight)
16 mm (5/8")	99 to 100
6.3 mm (1/4")	40 to 95
2 mm	40 to 90

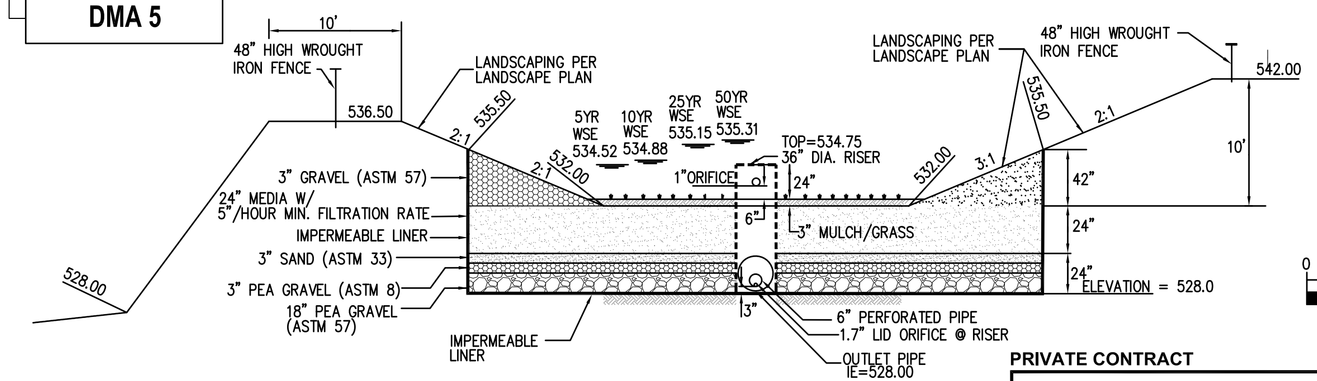
DRAINAGE MANAGEMENT AREAS

DMA	SURFACE (SQ. FT.) HARDSCAPE/ROOF	SURFACE (SQ. FT.) LANDSCAPE	TOTAL (SQ. FT.)	TYPE OF STRUCTURAL BMP
DMA 1	454,935	98,304	553,239	BMP# 1 BF–1 BIOFILTRATION & HYDROMODIFICATION CONTROL
DMA 2	0	15,564	15,564	SELF MITIGATING
DMA 3	9,423	1,771	11,194	GREEN STREET VEGETATED SWALE
DMA 4	18,027	3,095	21,122	GREEN STREET VEGETATED SWALE
DMA 5	19,437	6,248	25,685	GREEN STREET VEGETATED SWALE
DMA 6	14,707	4,265	18,972	GREEN STREET VEGETATED SWALE
TOTAL			645,776	

PROJECT AREA IMPERVIOUS/PERVIOUS TABLE

	IMPERVIOUS AREA (SQ.FT.)	PERVIOUS AREA (SQ.FT.)	TOTAL (SQ.FT.)
EXISTING	50,263	645,559	695,822
PROPOSED	516,529	129,247	645,776

FOR GREEN STREET DETAILS SEE IMPROVEMENT PLAN DWG#_____



NOTE: ALL ENTRY AND EXIT PIPES PASSING THRU IMPERMEABLE LINING TO BE SEALED AT JOIN

BMP	H (IN)	LID ORIFICE (IN)	AREA (BMP) FT 2	AREA (TOP) FT 2	TOTAL SURFACE DEPTH FT	DESIGN VOLUME CF
1	24"	1.7"	22,498	29,977	4.5	20,574

BMP1 BIOFILTRATION BF-1 (PVT)

NOT TO SCALE

PRIVATE CONTRACT

POST-CONSTRUCTION BMP PLAN FOR:

SANYO LOGISTICS CENTER

SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 12 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO.–
V.T.M. N/A

FOR CITY ENGINEER _____ DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS–BUILTS				

CONTRACTOR _____ DATE STARTED _____
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–
NAD83 COORDINATES
142–1785
LAMBERT COORDINATES

12-D

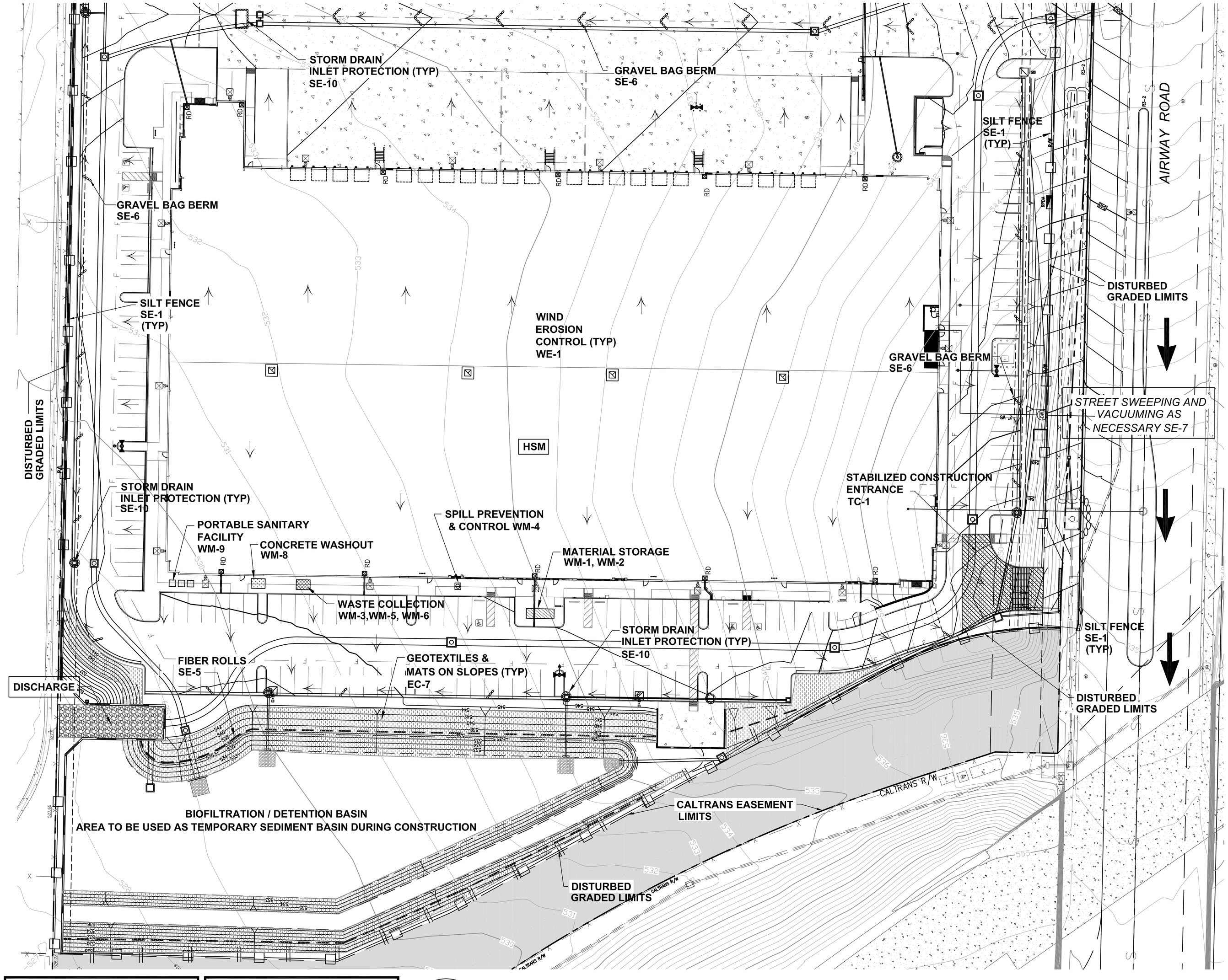
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ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER — KAMAL S. SWEIS — NO.48592 EXP 6-30-22 — CIVIL — STATE OF CALIFORNIA

SEE SHEET 9



EROSION CONTROL LEGEND

ITEM	'CASQA	SYMBOL
SILT FENCE	SE-1	
FIBER ROLL	SE-5	
GRAVEL BAG BERM	SE-6	
STREET SWEEPING & VACUUMING	SE-7	
STORM DRAIN INLET PROTECTION/ CURB INLET PROTECTION	SE-10	
STABILIZED CONSTRUCTION ENTRANCE W/ENTRANCE/EXIT TIRE WASH	TC-1	
MATERIAL DELIVERY & STORAGE, MATERIAL USE	WM-1,WM-2	
STOCKPILE WASTE, WASTE COLLECTION, HAZARDOUS WASTE	WM-3, WM-5, WM-6	
SPILL PREVENTION & CONTROL	WM-4	
CONCRETE WASHOUT	WM-8	
PORTABLE SANITARY FACILITY	WM-9	
SHEET FLOW	-	
HYDROSEED MIX (PAD STABILIZATION)	EC-4	HSM

* CASQA CALIFORNIA STORMWATER BMP HANDBOOK CONSTRUCTION

TEMPORARY EROSION CONTROL AND /OR FINAL STABILIZATION BMPS FOR DISTURBED SOIL AREAS

ONE OF THE FOLLOWING BMPS SHOULD BE APPLIED TO EXPOSED SOILS AREAS ON THE SITE WHILE INACTIVE.
EC-3 HYDRAULIC MULCH
EC-5 SOIL BINDERS
EC-8 WOOD MULCHING
EC-7 GEOTEXTILES AND MATS (BIODEGRADABLE)
EC-8 WOOD MULCHING

NOTE TO THE CONTRACTOR

-CONSTRUCTION SITE CONDITIONS MAY DICTATE THE LOCATION OF THE BMPs, A CERTIFIED PROFESSIONAL IN EROSION & SEDIMENT CONTROL OR SWPPP PRACTITIONER MAY DETERMINE CHANGES ACCORDINGLY. BMP DATA SHEET GUIDELINES WILL BE FOLLOWED REGARDLESS OF LOCATION.

WM-9 NOTE:

TEMPORARY PORTABLE SANITARY FACILITIES SHOULD BE LOCATED AWAY FROM DRAINAGE FACILITIES, WATERCOURSES AND TRAFFIC CIRCULATION. SWPPP PRACTITIONER MAY DETERMINE CHANGES ACCORDINGLY.

0 15 30 60 90

GRAPHIC SCALE: 1" = 30'

PRIVATE CONTRACT

EROSION CONTROL PLAN FOR:

SANYO LOGISTICS CENTER

SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF\

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 13 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO. -
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142-1785
LAMBERT COORDINATES

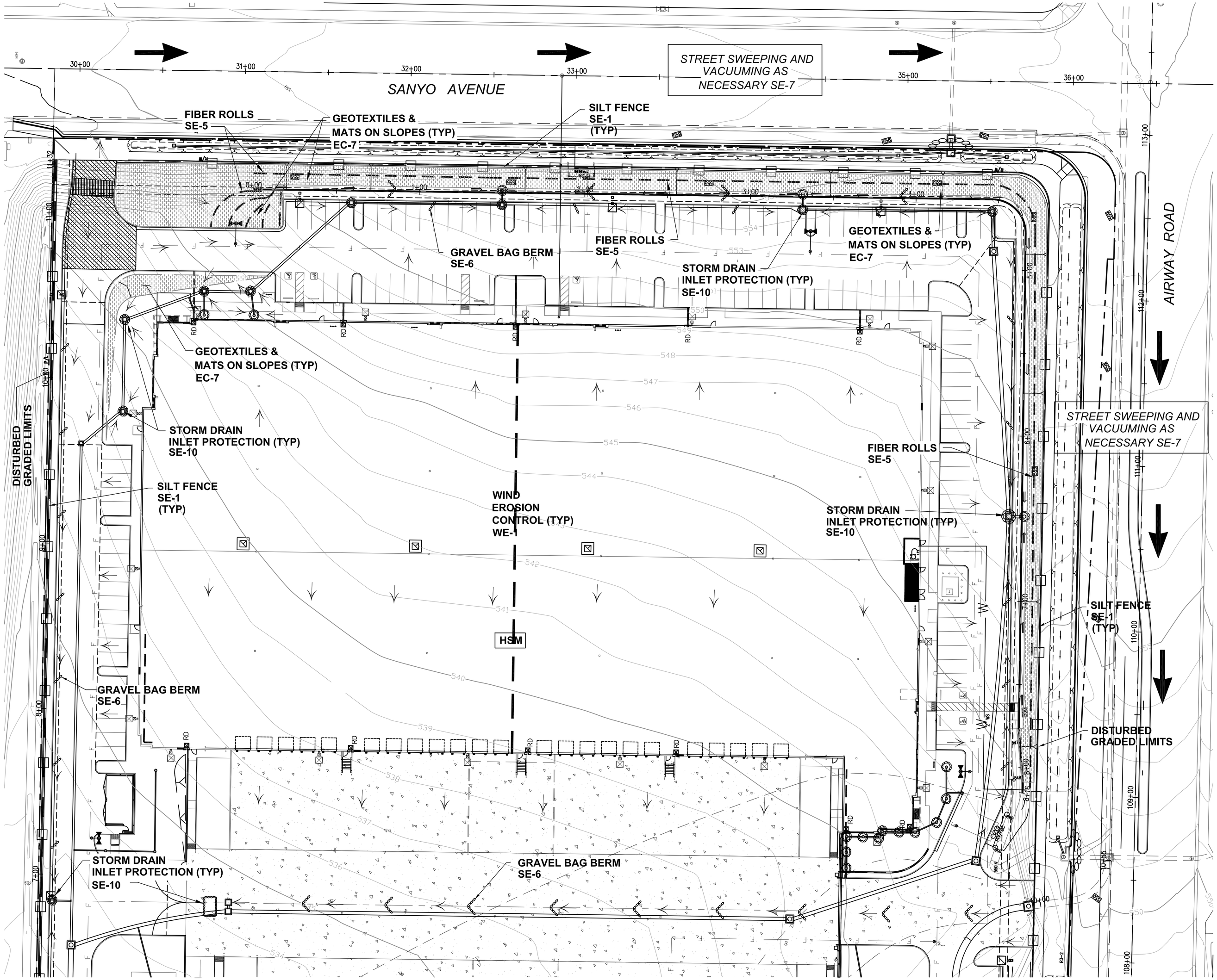
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ENGINEER OF WORK

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SANYO AVENUE
AIRWAY ROAD
STREET SWEEPING AND VACUUMING AS NECESSARY SE-7
STREET SWEEPING AND VACUUMING AS NECESSARY SE-7
FIBER ROLLS SE-5
GEOTEXTILES & MATS ON SLOPES (TYP) EC-7
SILT FENCE SE-1 (TYP)
GRAVEL BAG BERM SE-6
FIBER ROLLS SE-5
STORM DRAIN INLET PROTECTION (TYP) SE-10
GEOTEXTILES & MATS ON SLOPES (TYP) EC-7
GEOTEXTILES & MATS ON SLOPES (TYP) EC-7
STORM DRAIN INLET PROTECTION (TYP) SE-10
DISTURBED GRADED LIMITS
SILT FENCE SE-1 (TYP)
WIND EROSION CONTROL (TYP) WE-1
FIBER ROLLS SE-5
STORM DRAIN INLET PROTECTION (TYP) SE-10
HSM
SILT FENCE SE-1 (TYP)
GRAVEL BAG BERM SE-6
DISTURBED GRADED LIMITS
STORM DRAIN INLET PROTECTION (TYP) SE-10
GRAVEL BAG BERM SE-6
30+00
31+00
32+00
33+00
35+00
36+00
113+00
112+00
111+00
110+00
109+00
108+00
10+00
9+00
8+00
7+00
6+00
5+00
4+00
3+00
2+00
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0+00
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RD

HYDROSEED NOTE:

IN THE EVENT THAT THE CLEARED SITE REMAINS EMPTY FOR A PERIOD OF MORE THAN 14 DAYS, THE AREA SHALL BE HYDROSEEDED. THE HYDROSEED MIX SPECIFIED IS A NATIVE MIX AND WILL REQUIRE NO IRRIGATION AFTER IT HAS BEEN ESTABLISHED. IRRIGATION TO ESTABLISH SEED MIX WILL BE BY WATER TRUCK. HYDROSEED MIX CONSISTS OF:

ARTEMESIA CALIFORNIA (CALIFORNIA SAGEBRUSH)	4 LBS/ACRE
BACCHARIS EMERI (COYOTE BRUSH)	4 LBS/ACRE
BACCHARIS SAROTHROIDES (DESERT BROOM)	2 LBS/ACRE
ENCELIS CALIFORNIA (CALIFORNIA SUNFLOWER)	8 LBS/ACRE
ERIOGONUM FASCICULATUM (CALIFORNIA BUCKWHEAT)	20 LBS/ACRE
HETEROMELES ARBUTIFOLIA (TOYON)	5 LBS/ACRE
RHUS LAURINA (LAUREL SUMAC)	4 LBS/ACRE
SALVIA MELIFERA (BLACK SAGE)	4 LBS/ACRE

1. SOIL PREPARATION:
   A. WATER ALL PLANTING AREAS THOROUGHLY AND CONTINUOUSLY FOR THREE (3) CONSECUTIVE DAYS TO SATURATE UPPER LAYER OF SOIL PRIOR TO HYDROSEEDING OPERATION.

   B. ALLOW PLANTING AREA SOIL SURFACE TO DRY OUT FOR ONE DAY ONLY PRIOR TO THE HYDROSEEDING APPLICATION. CARE MUST BE TAKEN TO NOT ALLOW THE SOIL SURFACE TO BE SUPER SATURATED WITH WATER PRIOR TO THE HYDROSEEDING INSTALLATION. AT THE SAME TIME THE SOIL SURFACE SHOULD NOT BE BONE DRY. THERE SHOULD BE SOME RESIDUAL MOISTURE WITHIN THE FIRST 1/4 INCH OF SOIL SURFACE.

   C. BEGIN THE HYDROSEEDING OPERATION ON ALL AREAS AS SPECIFIED HEREIN.

2. PREPARATION OF HYDROSEEDING MIXTURE:
   A. THE SLURRY SHALL BE PREPARED AT THE SITE AND ITS COMPONENTS SHALL BE MIXED TO SUPPLY THE RATES OF APPLICATION AS PER SPECIFICATIONS.

   B. SLURRY PREPARATION SHALL BEGIN BY ADDING WATER TO THE LINK WHEN THE ENGINE IS AT ONE-HALF THROTTLE. WHEN THE WATER LEVEL HAS REACHED THE HEIGHT OF THE AGITATOR SHAFT AND GOOD RECIRCULATION HAS BEEN ESTABLISHED, THE FERTILIZER SHALL BE ADDED TO THE MIXTURE (THE TANK SHALL BE AT LEAST 1/3 FILED WITH WATER AT THIS TIME).

   C. THE ENGINE THROTTLE SHALL BE OPEN TO FULL SPEED WHEN THE TANK IS 1/2 FILLED WITH WATER. ALL ORGANIC AMENDMENTS, FIBER, AND CHEMICALS SHALL THEN BE ADDED BY THE TIME THE TANK IS 2-1/3 TO 3/4 FULL. AT THIS TIME THE SEED MIX SHALL ALSO BE ADDED.

   D. SPRAYING SHALL COMMENCE IMMEDIATELY WHEN THE TANK IS FULL AND THE SLURRY IS MIXED.

3. APPLICATION: THE OPERATOR SHALL SPRAY THE AREA WITH A UNIFORM VISIBLE COAT USING THE DARK COLOR OF THE CELLULOSE FIBER OR ORGANIC AMENDMENT AS VISUAL GUIDE. THE SLURRY SHALL BE APPLIED IN A DOWNWARD DRILLING MOTION VIA A FAN STREAM NOZZLE.

4. TIME LIMIT: THE HYDROMULCHING SLURRY COMPONENTS ARE NOT TO BE LEFT IN THE HYDROMULCHING MACHINE FOR MORE THAN TWO HOURS. IF SLURRY COMPONENTS ARE LEFT FOR MORE THAN TWO HOURS IN THE MACHINE, THE CONTRACTOR SHALL ADD 50 % MORE OF THE ORIGINALLY SPECIFIED SEED MIX TO ANY SLURRY MIX WHICH HAS NOT BEEN APPLIED WITHIN THE TWO HOURS AFTER MIXING. THE CONTRACTOR SHALL ADD 75 % MORE OF THE ORIGINAL SEED MIX TO ANY SLURRY MIXTURE WHICH HAS NOT BEEN APPLIED EIGHT HOURS AFTER MIXING. ANY MIXTURE NOT APPLIED AFTER EIGHT HOURS SHALL BE REJECTED AND DISPOSED OF OFF-SITE AT CONTRACTOR'S EXPENSE.

5. CLEAN UP:
   AS PROJECT PROGRESSES, CONTRACTOR SHALL MAINTAIN ALL AREAS IN A NEAT MANNER AND REMOVE UNSIGHTLY DEBRIS AS NECESSARY. AFTER COMPLETION OF PROJECT, CONTRACTOR SHALL REMOVE ALL DEBRIS AND CONTAINERS USED IN ACCOMPLISHING WORK. HE/SHE SHALL SWEEP AND CLEAN ALL SIDEWALKS, ASPHALT, AND CONCRETE AREAS ADJACENT TO PLANTINGS.

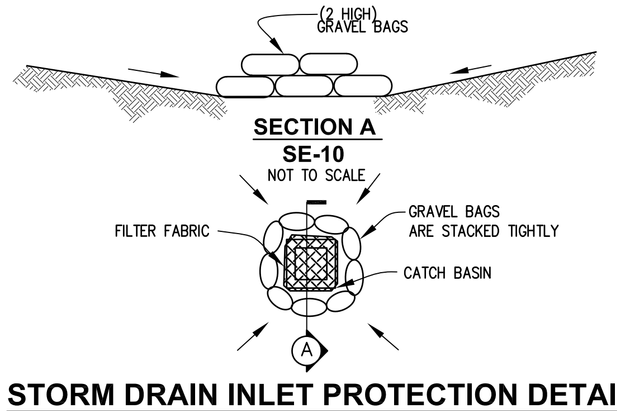
6. HYDROSEED MIX SHALL BE EARTHGUARD (2000#/AC) OR APPROVED EQUAL WITH A NATIVE MIX.

7. SEED MIXES SHALL BE SPECIFIED BY THE PURE LIVE SEED OF EACH SPECIES.

8. FIBER MULCH SHALL BE APPLIED AT A MINIMUM RATE OF 2,000#/ACRE EXCEPT WHEN USED IN CONJUNCTION WITH STRAW MULCH, WHEN IT SHALL BE APPLIED AT A MINIMUM OF 4,000#/ACRE.

9. A WETTING AGENT CONSISTING OF ALKYL POLYETHYLENE GLYCOL ETHER SHALL BE APPLIED AS PER MANUFACTURE'S RECOMMENDATIONS.

10. EQUIPMENT FOR THE APPLICATION OF SLURRY SHALL HAVE A BUILT-IN AGITATION SYSTEM TO SUSPEND AND HOMOGENEOUSLY MIX THE SLURRY. THE SLURRY MIX SHALL BE DYED GREEN. THE EQUIPMENT SHALL HAVE A PUMP CAPABLE TO OF APPLYING SLURRY UNIFORMLY.



SECTION A
SE-10
NOT TO SCALE

STORM DRAIN INLET PROTECTION DETAIL
SE-10
NOT TO SCALE

EROSION CONTROL NOTE

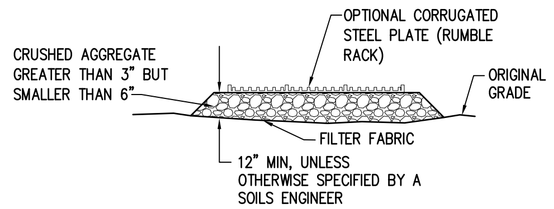
1. ALL GRADED, DISTURBED OR ERODED AREAS THAT WILL NOT BE PERMANENTLY PAVED OR COVERED BY STRUCTURES SHALL BE SHALL BE PERMANENTLY REVEGETATED AND IRRIGATED AS SHOWN ON TABLE 142-04F AND IN ACCORDANCE WITH THE STANDARDS IN THE SAN DIEGO MUNICIPAL CODE SECTION 142.0411. ALL REQUIRED REVEGETATION AND EROSION CONTROL SHALL BE COMPLETED WITHIN 90 CALENDAR DAYS OF THE COMPLETION OF GRADING DISTURBANCE.

INTERIM BINDER NOTE

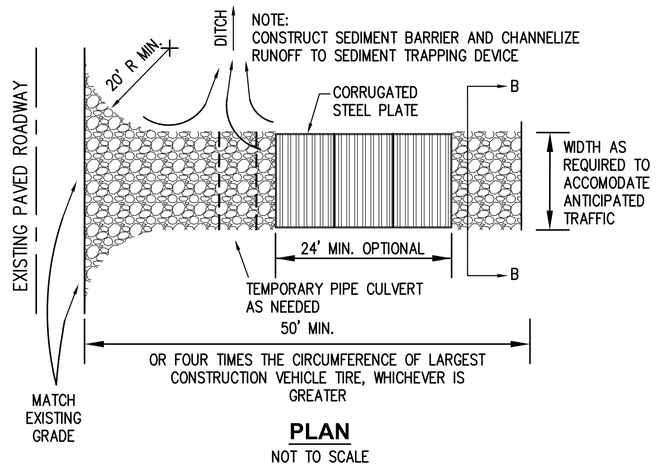
1. ALL GRADED, DISTURBED OR ERODED AREAS TO BE TREATED WITH A NON-IRRIGATED HYDROSEED MIX SHALL RECEIVE AN INTERIM BINDER/TAKIFIER AS NEEDED BETWEEN APRIL 2 AND AUGUST 31 FOR DUST-EROSION CONTROL WITH SUBSEQUENT APPLICATION OF HYDROSEED MIX DURING THE RAINY SEASON BETWEEN OCTOBER 1ST AND APRIL 1ST.

DESILTING BASIN NOTE

BIORETENTION BASINS SHALL BE EXCAVATED AND USED AS DESILTING BASINS DURING CONSTRUCTION PER CALTRANS OR CALIFORNIA STORM WATER BMP HANDBOOK. THE SILT SHALL BE COMPLETELY REMOVED AND BIORETENTION BASINS COMPLETED ONCE FINAL SITE STABILIZATION IS ACHIEVED, PRIOR TO OCCUPANCY AND/OR FINAL

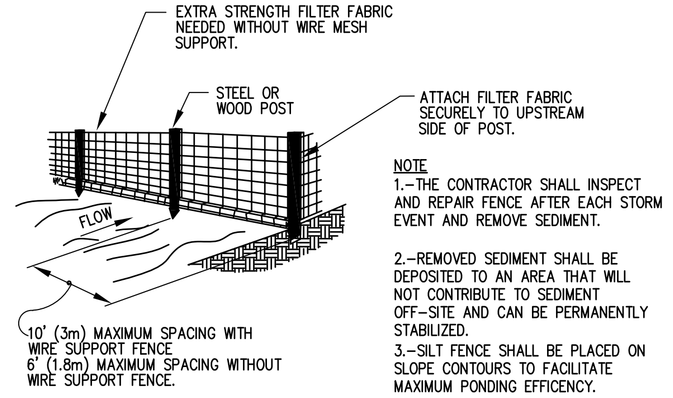


SECTION B-B
NOT TO SCALE



PLAN
NOT TO SCALE

STABILIZED CONSTRUCTION ENTRANCE/EXIT
TC-1
NOT TO SCALE



NOTE
1.-THE CONTRACTOR SHALL INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT.

2.-REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE TO SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.

3.-SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO FACILITATE MAXIMUM PONDING EFFICENCY.

SILTFENCE
SE-10
NOT TO SCALE

HYDROSEED PROCEDURES:

4.4-1 SEED MIXES SHALL BE SPECIFIED BY THE PURE LIVE SEED OF EACH SPECIES.

4.4-2 FIBER MULCH SHALL BE APPLIED AT A MINIMUM RATE OF 2,000 POUNDS PER ACRE EXCEPT WHEN USED IN CONJUNCTION WITH STRAW MULCH, WHEN IT SHALL BE APPLIED AT A MINIMUM RATE OF 400 POUNDS PER ACRE.

4.4-3 A WETTING AGENT CONSISTING OF 95 PERCENT ALKYL POLYETHYLENE GLYCOL ETHER SHALL BE APPLIED AS PER MANUFACTURERS RECOMMENDATIONS.

4.4-4 EQUIPMENT USED FOR THE APPLICATION OF SLURRY SHALL HAVE A BUILT-IN AGITATION SYSTEM TO SUSPEND AND HOMOGENEOUSLY MIX THE SLURRY. THE SLURRY MIX SHALL BE DYED GREEN. THE EQUIPMENT MUST HAVE A PUMP CAPABLE OF APPLYING SLURRY UNIFORMLY.

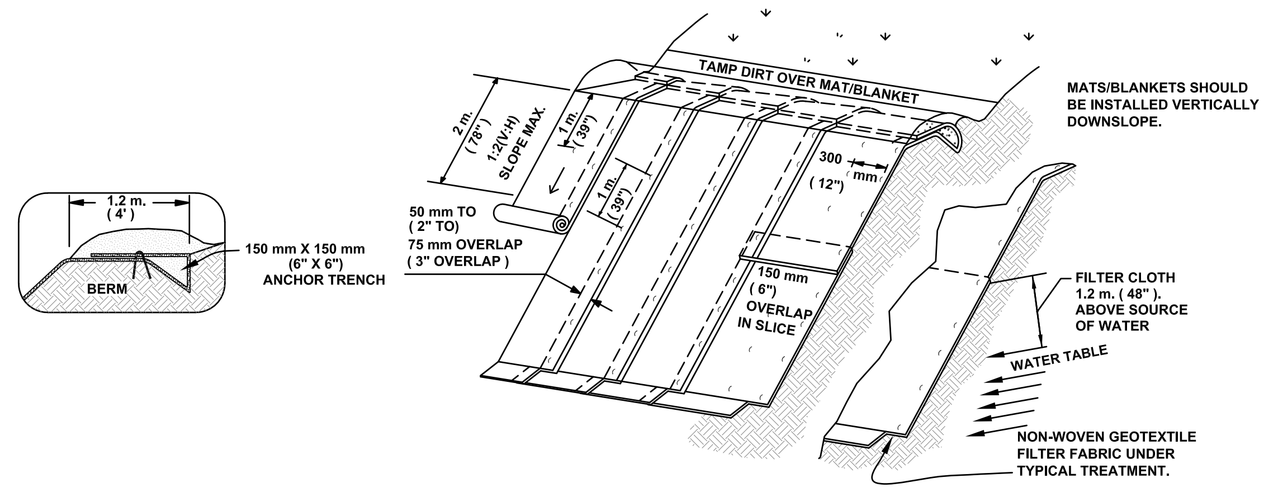
MAINTENANCE REQUIREMNETS

4.5-1 PERMANENTLY IRRIGATED SLOPES SHALL BE MAINTAINED FOR A PERIOD NO LESS THAN 90 DAYS.

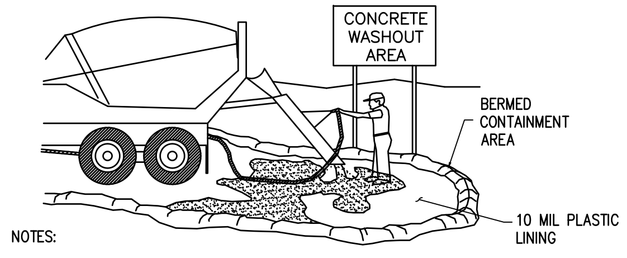
4.5-2 NONPERMANENTLY IRRIGATED AREAS SHALL BE MAINTAINED FOR A PERIOD NOT LESS THAN 25 MONTHS.

4.5-3 ALL REVEGETATED AREAS SHALL BE MAINTAINED BY THE PERMITTEE UNTIL FINAL APPROVAL BY THE CITY MANAGER. THE MAINTENANCE PERIOD BEGINS ON THE FIRST DAY FOLLOWING ACCEPTANCE AND MAY BE EXTENDED AT THE DETERMINATION OF THE CITY MANAGER.

4.5-4 PRIOR TO FINAL APPROVAL, THE CITY MANAGER MAY REQUIRE CORRECTIVE ACTION INCLUDING BUT NOT LIMITED TO, REPLANTING, THE PROVISION OR MODIFICATION OF IRRIGATION SYSTEMS, AND THE REPAIR OF ANY SOIL EROSION OR SLOPE SLIPPAGE.

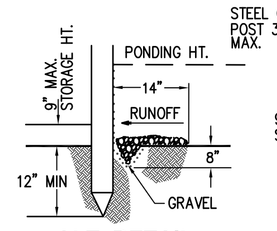


GEOTEXTILES, MATS AND EROSION CONTROL BLANKETS
N.T.S.

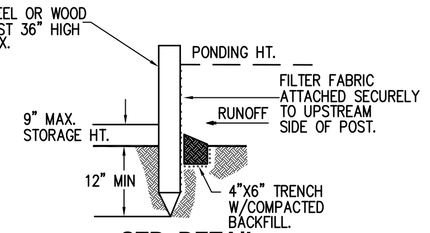


NOTES:
1. EXCESS AND WASTE CONCRETE SHALL NOT BE WASHED INTO THE STREET OR INTO A DRAINAGE SYSTEM.
2. FOR WASHOUT OF CONCRETE AND MORTAR PRODUCTS, A DESIGNATED CONTAINMENT FACILITY OF SUFFICIENT CAPACITY TO RETAIN LIQUID AND SOLID WASTE SHALL BE
3. PROVIDED ON SITE.
   SLURRY FROM CONCRETE AND ASPHALT SAW CUTTING SHALL BE VACUUMED OR CONTAINED, DRIED, PICKED UP AND DISPOSED OF PROPERLY.

CONCRETE WASTE MANAGEMENT
WM-8
NOT TO SCALE



ALT. DETAIL
SE1
TRENCH WITH GRAVEL
NOT TO SCALE



STD. DETAIL
SE-1
TRENCH WITH NATIVE BACKFILL
NOT TO SCALE

PRIVATE CONTRACT

EROSION CONTROL NOTES & DETAILS FOR:

SANYO LOGISTICS CENTER

SEC 36-18-1W*NWQ*14.74 AC M/L IN S H OF SWQ OF

CITY OF SAN DIEGO, CALIFORNIA
Development Services Department
SHEET 15 OF 15 SHEETS

I.O. NO. N/A
PROJECT NO.-

FOR CITY ENGINEER _____ DATE _____

V.T.M. N/A

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	KS			
AS-BUILTS				

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

-
NAD83 COORDINATES
142-1785
LAMBERT COORDINATES

15-D

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

ENGINEER OF WORK

KAMAL S. SWEIS RCE 48592 DATE

REGISTERED PROFESSIONAL ENGINEER · KAMAL S. SWEIS · NO.48592 EXP 6-30-22 · CIVIL · STATE OF CALIFORNIA

Attachment 5
Drainage Report

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

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K&S ENGINEERING, INC.
Planning Engineering Surveying

Drainage Study

For

Sanyo Logistics Center

PTS#

Prepared for:

Badiee Development Inc.
1261 Prospect Street Suite 9
La Jolla, CA 92037
Contact: Scott Merry (888) 815-8886

Prepared by:

K&S ENGINEERING, INC.
7801 Mission Center Court, Suite 100
San Diego, CA 92108
619.296.5565

October 4, 2021

K&S JN 20-002





10/4/2021

Kamal S. Sweis RCE 48592 — **Date**

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1 VICINITY MAP



2 INTRODUCTION

THE PROJECT SITE IS LOCATED AT THE NORHWEST CORNER OF THE INTERSECTION OF AIRWAY ROAD AND SANYO AVENUE IN OTAY MESA.

THE PROJECT CONSISTS OF GRADING AND DRAINAGE IMPROVEMENTS FOR TWO INDUSTRIAL BUILDINGS WITH LOADING DOCKS, PARKING, LANDSCAPING, STORM DRAINS AND ONE DETENTION BASIN FOR PEAK FLOW DETENTION PURPOSES.

THE SUBJECT REPORT REFLECTS THE PROPOSED CONCEPTUAL GRADING AND DRAINAGE AS SHOWN ON PRELIMINARY GRADING PLAN DRAWING PTS# 668005

3 PURPOSE OF THIS STUDY

THE PURPOSE OF THIS STUDY IS TO DETERMINE THE PROPOSED PEAK FLOWS PRODUCED BY THE PROPOSED DEVELOPMENT PROJECT FOR THE 5, 10, 25 AND 50 YEAR STORM EVENTS AS SHOWN ON THE GRADING PLAN FOR THE SANYO LOGISTICS CENTER AS WELL AS TO DETERMINE THE PROPOSED PIPE AND INLET SIZES.

MOREOVER, THE PROPOSED PROJECT IS NOT IN THE CLOSE VICINITY OF NAVIGABLE WATERS OR WETLAND. THE PROPOSED CONSTRUCTION AND ANY ASSOCIATED RUNOFF WILL NOT RESULT INTO NAVIGABLE WATERS AND THEREFORE EXEMPT FROM THE REGIONAL WATER QUALITY CONTROL BOARD UNDER FEDERAL CLEAN WATER ACT (CWA) SECTION 401 OR 404.

4 PROJECT INFORMATION

4.1 EXISTING CONDITION

THE EXISTING SITE CONSISTS OF ONE UNDEVELOPED LOT. WEIGHTED RUNOFF COEFFICIENT FOR THE EXISTING ONSITE LOT IS 0.45. THE EXISTING SITE CURRENTLY DRAINS TO ONE LOCATION. Q(50) AT NODE 14 IS 17.3 CFS.

4.2 PROPOSED CONDITION

THE PROPOSED LAND USE WILL BE INDUSTRIAL. A WEIGHTED RUNOFF COEFFICIENT OF 0.84 WAS USED TO DETERMINE THE PROPOSED ONSITE RUNOFF FLOWS. THE PROPOSED UNDETAINED Q(50) AT NODE 67 IS 39.4 CFS.

4.3 OFFSITE HYDROLOGY

OFFSITE DRAINAGE ENTERS THE SITE FROM THE NORTH FROM TWO SOURCES. ONE SOURCE FROM THE OTAY INTERNATIONAL CENTER WITH 19.0 CFS OF DETAINED FLOWS. THE SECOND SOURCE IS FROM AIRWAY AND SANYO AVENUE WITH 11.34 CFS. THE TOTAL CONFLUENCED OFFSITE FLOW IS 30.06 CFS.

4.4 DETENTION BASIN METHODOLOGY

SEE SECTION 8 FOR DETENTION BASIN CALCULATIONS. ONE DETENTION BASIN WAS DESIGNED FOR THIS PROJECT USING THE JANUARY 2017 CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL AND DRAINAGE REQUIREMENTS IN OTAY MESA NOTICE DATED AUGUST 7, 1997.

THE PURPOSE OF THIS BASIN IS TO TEMPORARILY STORE THE INCREASED RUNOFF AND RELEASE IT AT A RATE EQUAL OR LESS THAN THE EXISTING. HYDROGRAPHS WERE DETERMINED USING THE RATIONAL METHOD DESIGN STORM HYDROGRAPH METHOD. THE DETENTION BASIN SIZE WAS DETERMINED USING THE SINGLE HYDROGRAPH PROCEDURE AND BY ROUTING THE 5, 10, 25 AND 50-YEAR STORM EVENTS HYDROGRAPHS. THE OUTLET STRUCTURE HAS BEEN SIZED TO DRAIN THE BASIN WITHIN 96 HOURS.

4.5 SUMMARY

IN ORDER TO MITIGATE THE INCREASED RUNOFF FROM THE EXISTING TO THE PROPOSED CONDITION, A DETENTION BASIN IS PROPOSED IN COMPLIANCE WITH THE OTAY MESA COMUNITY PLAN. PROPOSED FLOWS AFTER ROUTING ARE SMALLER THAN THE EXISTING ONES. ALSO, ULTIMATE RATIONAL METHOD FLOWS WERE USED TO SIZE THE PERMANENT DRAINAGE STRUCTURES PROPOSED BY THIS DEVELOPMENT; THEREFORE, THE PROJECT WOULD NOT CREATE OR CONTRIBUTE RUNOFF WATER WHICH WOULD EXCEED THE CAPACITY OF ANY EXISTING OR PLANNED STORM WATER DRAINAGE SYSTEM, AND WILL NOT EXPOSE PEOPLE OR STRUCTURE TO A SIGNIFICANT RISK OF LOSS, INJURY OR DEATH INVOLVING FLOODING AS A RESULT OF THE FAILURE OF A LEVEE OR DAM.

THE PROJECT WILL MAINTAIN THE EXISTING DRAINAGE PATERN OF THE SITE AND WILL NOT RESULT IN ANY EROSION OR SILTATION. ALSO, THE PROJECT WILL NOT RESULT IN FLOODING ONSITE OR OFFSITE DUE TO THE INSTALLATION OF PEAK FLOW DETENTION BASINS. NO ADVERSE IMPACT WILL OCCUR TO THE DOWNSTREAM PROPERTIES AS RESULT OF THE PROPOSED DEVELOPMENT SINCE THE PROPOSED ARE BEING MITIGATED ON-SITE.

THE FOLLOWING TABLES SUMMARIZE THE EXISTING AND PROPOSED PEAK FLOW RATES FOR THE 5, 10, 25 & 50 -YEAR STORM EVENTS AT THE ULTIMATE POINT OF DISCHARGE AS WELL AS THE MAXIMUM PRE VELOCITY AND MITIGATED VELOCITY WITH RIP RAQP.PEAK RATIONAL METHOD FLOWS WERE USED TO SIZE ALL DRAINAGE STRUCTURES SUCH AS BROW DITCH, CURB INLETS AND STORM DRAIN PIPES AND DETENTION BASIN STRUCTURES.

ALSO, THE PROPOSED PROJECT IS REQUIRED TO OBTAIN APPROVAL FROM THE REGIONAL WATER QUALITY CONTROL BOARD UNDER FEDERAL CLEAN WATER ACT (CWA) SECTION 401 OR 404. A COMPLETE EXPLANATION MUST BE PROVIDED. PLEASE NOTE, IF THE PROPOSED PROJECT IS SUBJECT TO REGULATIONS AS SET FORTH IN CWA 401/404, APPROVAL FROM THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD MUST BE OBTAINED PRIOR TO PERMIT ISSUANCE.

PEAK FLOW TABLE (CFS) SUMMARY TABLE

STORM EVENT	EXISTING CONDITION (cfs)	PROPOSED CONDITION BEFORE DETENTION (cfs)	PROPOSED CONDITION AFTER DETENTION (cfs)	BASIN VOLUME REQUIRED (ft3)	DETENTION TIME (hrs)		
5-Yr	**11.3**	**27.4**	**2.6**	**44,991**	**13.0**		
10-Yr	**13.4**	**31.8**	**8.8**	**53,265**	**10.3**		
25-Yr	**14.9**	**34.8**	**14.6**	**59,102**	**9.0**		
50-Yr	**17.3**	**39.4**	**14.7**	**64,177**	**9.2**		

VELOCITY COMPARISON TABLE (CFS) SUMMARY TABLE

PRE VELOCITY (FPS)	POST VELOCITY (FPS)
10.1	**3.7**

5. DESIGN CRITERIA AND METHODOLOGY

THIS REPORT WAS PREPARED USING THE CITY OF SAN DIEGO TRANSPORTATION AND STORMWATER DESIGN MANUAL, JANUARY 2017 EDITION.

THE PROPOSED STORM FLOW WERE DETERMINED USING THE RATIONAL METHOD HYDROLOGY PROGRAM CIVILCADD/CIVILDESIGN WHICH IS BASED ON THE CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL DATED 1984. SEE SECTION 4 FOR HYDROLOGY DESIGN MODELS. THE PIPES WERE SIZED USING THE 50 YEAR STORM EVENT. ALSO, INLETS WERE SIZED USING ATTACHED PLATE 2.6-0658.

6. HYDROLOGY DESIGN MODELS

A. *DESIGN METHODS*

THE RATIONAL METHOD IS USED IN THIS HYDROLOGY STUDY; THE RATIONAL FORMULA IS AS FOLLOWS:

Q = CIA, WHERE : Q= PEAK DISCHARGE IN CUBIC FEET/SECOND *

C = RUNOFF COEFFICIENT (DIMENSIONLESS)

I = RAINFALL INTENSITY IN INCHES/HOUR

A = TRIBUTARY DRAINAGE AREA IN ACRES

*1 ACRE INCHES/HOUR = 1.008 CUBIC FEET/SEC

THE OVERLAND METHOD IS ALSO USED IN THIS HYDROLOGY STUDY;

THE URBAN AREAS OVERLAND FORMULA IS AS FOLLOWS:

$T=[1.8(1.1-C)(L)^{(.5)})]/[S(100)]^{.333}$

L = LENGTH OF WATERSHED

C = COEFFICIENT OF RUNOFF

T = TIME IN MINUTES

S = DIFFERENCE IN ELEVATION DIVIDED BY DE LENGTH OF WATERSHED

B. *DESIGN CRITERIA*

- FREQUENCY 50 YEAR STORM.
- RAIN FALL INTENSITY PER CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, JANUARY 2017.

C. *REFERENCES*

- CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, JANUARY 2017.
- COUNTY OF SAN DIEGO HYDROLOGY MANUAL, JUNE 2003
- HAND BOOK OF HYDRAULICS BY BRATER & KING, SIXTH EDITION.

7 HYDROLOGY CALCULATIONS

7.1 RATIONAL METHOD CALCULATIONS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 07/17/20

********* Hydrology Study Control Information **********

Program License Serial Number 6303

Rational hydrology study storm event year is 5.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 295.000(Ft.)
Highest elevation = 559.410(Ft.)
Lowest elevation = 557.380(Ft.)
Elevation difference = 2.030(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(295.000^.5)/(0.688^(1/3)]= 5.25
Rainfall intensity (I) = 3.069(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.458(CFS)
Total initial stream area = 0.500(Ac.)

++

Process from Point/Station 1.000 to Point/Station 2.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 5.25 min.

Rainfall intensity = 3.069(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.458(CFS) for 0.500(Ac.)
Total runoff = 2.915(CFS) Total area = 1.00(Ac.)

++
Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.880(Ft.)
Downstream point/station elevation = 545.510(Ft.)
Pipe length = 99.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.915(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.915(CFS)
Normal flow depth in pipe = 4.72(In.)
Flow top width inside pipe = 15.83(In.)
Critical Depth = 7.78(In.)
Pipe flow velocity = 7.89(Ft/s)
Travel time through pipe = 0.21 min.
Time of concentration (TC) = 5.46 min.

++
Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.000(Ac.)
Runoff from this stream = 2.915(CFS)
Time of concentration = 5.46 min.
Rainfall intensity = 3.007(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.915	5.46	3.007

Qmax(1) =
1.000 * 1.000 * 2.915) + = 2.915

Total of 1 streams to confluence:
Flow rates before confluence point:
2.915
Maximum flow rates at confluence using above data:
2.915
Area of streams before confluence:
1.000
Results of confluence:
Total flow rate = 2.915(CFS)
Time of concentration = 5.462 min.
Effective stream area after confluence = 1.000(Ac.)

++
Process from Point/Station 4.000 to Point/Station 5.000
**** INITIAL AREA EVALUATION ****
_____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 2.571(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 4.640(CFS)
Total initial stream area = 1.900(Ac.)

++
Process from Point/Station 5.000 to Point/Station 6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.640(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 4.640(CFS)
Normal flow depth in pipe = 8.40(In.)
Flow top width inside pipe = 17.96(In.)
Critical Depth = 9.93(In.)
Pipe flow velocity = 5.74(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.640(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 4.640(CFS)
Normal flow depth in pipe = 6.36(In.)
Flow top width inside pipe = 24.53(In.)
Critical Depth = 8.51(In.)
Pipe flow velocity = 6.10(Ft/s)
Travel time through pipe = 0.27 min.
Time of concentration (TC) = 7.75 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.900(Ac.)
Runoff from this stream = 4.640(CFS)
Time of concentration = 7.75 min.
Rainfall intensity = 2.514(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.915	5.46	3.007
2	4.640	7.75	2.514

Qmax(1) =
1.000 * 1.000 * 2.915) +
1.000 * 0.705 * 4.640) + = 6.184
Qmax(2) =
0.836 * 1.000 * 2.915) +
1.000 * 1.000 * 4.640) + = 7.078

Total of 2 streams to confluence:
Flow rates before confluence point:
2.915 4.640
Maximum flow rates at confluence using above data:
6.184 7.078
Area of streams before confluence:
1.000 1.900
Results of confluence:
Total flow rate = 7.078(CFS)
Time of concentration = 7.752 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 3.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.078(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 7.078(CFS)
Normal flow depth in pipe = 8.55(In.)
Flow top width inside pipe = 33.82(In.)
Critical Depth = 9.61(In.)
Pipe flow velocity = 5.04(Ft/s)
Travel time through pipe = 1.43 min.
Time of concentration (TC) = 9.18 min.

++
Process from Point/Station 3.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.900(Ac.)
Runoff from this stream = 7.078(CFS)
Time of concentration = 9.18 min.
Rainfall intensity = 2.311(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.078	9.18	2.311

Qmax(1) =
1.000 * 1.000 * 7.078) + = 7.078

Total of 1 streams to confluence:
Flow rates before confluence point:
7.078
Maximum flow rates at confluence using above data:
7.078
Area of streams before confluence:
2.900
Results of confluence:
Total flow rate = 7.078(CFS)
Time of concentration = 9.179 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 9.000 to Point/Station 0.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.115(In/Hr) for a 5.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.11(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.990(Ft.)
Pipe length = 76.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 10.43(In.)
Flow top width inside pipe = 28.57(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 12.53(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.10 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.990(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 46.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 17.95(In.)
Flow top width inside pipe = 29.41(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 6.19(Ft/s)
Travel time through pipe = 0.12 min.
Time of concentration (TC) = 11.22 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.22 min.
Rainfall intensity = 2.094(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.078	9.18	2.311
2	19.000	11.22	2.094

Qmax(1) =
1.000 * 1.000 * 7.078) +
1.000 * 0.818 * 19.000) + = 22.615
Qmax(2) =
0.906 * 1.000 * 7.078) +
1.000 * 1.000 * 19.000) + = 25.411

Total of 2 streams to confluence:
Flow rates before confluence point:
7.078 19.000
Maximum flow rates at confluence using above data:
22.615 25.411
Area of streams before confluence:
2.900 19.100
Results of confluence:
Total flow rate = 25.411(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.000(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 408.000(Ft.)
Highest elevation = 559.150(Ft.)
Lowest elevation = 550.000(Ft.)
Elevation difference = 9.150(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(408.000^.5)/(2.243^(1/3)]= 4.17
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.149(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.257(CFS)
Total initial stream area = 0.420(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** SUBAREA FLOW ADDITION ****
_____

User specified 'C' value of 0.950 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.149(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.449(CFS) for 0.150(Ac.)
Total runoff = 1.705(CFS) Total area = 0.57(Ac.)

++
Process from Point/Station 12.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 21.75(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.705(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.705(CFS)
Normal flow depth in pipe = 2.76(In.)
Flow top width inside pipe = 12.97(In.)
Critical Depth = 5.89(In.)
Pipe flow velocity = 9.94(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 12.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.705(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 3.137(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.078	9.18	2.311
2	19.000	11.22	2.094
3	1.705	5.04	3.137

Qmax(1) =
1.000 * 1.000 * 7.078) +
1.000 * 0.818 * 19.000) +
0.737 * 1.000 * 1.705) + = 23.871
Qmax(2) =
0.906 * 1.000 * 7.078) +
1.000 * 1.000 * 19.000) +
0.667 * 1.000 * 1.705) + = 26.550
Qmax(3) =
1.000 * 0.549 * 7.078) +
1.000 * 0.449 * 19.000) +
1.000 * 1.000 * 1.705) + = 14.114

Total of 3 streams to confluence:
Flow rates before confluence point:
7.078 19.000 1.705
Maximum flow rates at confluence using above data:
23.871 26.550 14.114

Area of streams before confluence:
2.900 19.100 0.570
Results of confluence:
Total flow rate = 26.550(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 7.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.550(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.550(CFS)
Normal flow depth in pipe = 17.03(In.)
Flow top width inside pipe = 45.93(In.)
Critical Depth = 18.26(In.)
Pipe flow velocity = 6.65(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.37 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation = 542.140(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 990.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 26.550(CFS)
Depth of flow = 0.412(Ft.), Average velocity = 1.952(Ft/s)
Channel flow top width = 65.970(Ft.)
Flow Velocity = 1.95(Ft/s)
Travel time = 8.45 min.
Time of concentration = 19.83 min.
Critical depth = 0.369(Ft.)

++
Process from Point/Station 13.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 22.570(Ac.)
Runoff from this stream = 26.550(CFS)
Time of concentration = 19.83 min.
Rainfall intensity = 1.575(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

```
1       26.550     19.83                1.575
Qmax(1) =
              1.000 *    1.000 *    26.550) + =      26.550

Total of 1 streams to confluence:
Flow rates before confluence point:
     26.550
Maximum flow rates at confluence using above data:
      26.550
Area of streams before confluence:
      22.570
Results of confluence:
Total flow rate =     26.550(CFS)
Time of concentration =    19.826 min.
Effective stream area after confluence =     22.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance  =   90.000(Ft.)
Highest elevation =  559.000(Ft.)
Lowest elevation =  551.000(Ft.)
Elevation difference =    8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.36 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  90.000^.5)/( 8.889^(1/3)]=   5.36
Rainfall intensity (I) =      3.037(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.547(CFS)
Total initial stream area =        0.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____________________________________________________________________________
Upstream point elevation =   551.000(Ft.)
Downstream point elevation =   525.920(Ft.)
Channel length thru subarea  =  1177.000(Ft.)
Channel base width           =    0.000(Ft.)
Slope or 'Z' of left channel bank =  80.000
Slope or 'Z' of right channel bank =  80.000
Estimated mean flow rate at midpoint of channel =     10.113(CFS)
Manning's 'N'    = 0.034
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     10.113(CFS)
Depth of flow =   0.273(Ft.), Average velocity =   1.692(Ft/s)
Channel flow top width =   43.727(Ft.)
Flow Velocity =    1.69(Ft/s)
Travel time  =   11.59 min.
Time of concentration =   16.95 min.
Critical depth =      0.250(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity =      1.707(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     10.757(CFS) for   14.000(Ac.)
Total runoff =     11.303(CFS)          Total area =       14.40(Ac.)
```

++
Process from Point/Station 16.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.400(Ac.)
Runoff from this stream = 11.303(CFS)
Time of concentration = 16.95 min.
Rainfall intensity = 1.707(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.550	19.83	1.575
2	11.303	16.95	1.707

Qmax(1) =
1.000 * 1.000 * 26.550) +
0.922 * 1.000 * 11.303) + = 36.974
Qmax(2) =
1.000 * 0.855 * 26.550) +
1.000 * 1.000 * 11.303) + = 33.999

Total of 2 streams to confluence:
Flow rates before confluence point:
26.550 11.303
Maximum flow rates at confluence using above data:
36.974 33.999
Area of streams before confluence:
22.570 14.400
Results of confluence:
Total flow rate = 36.974(CFS)
Time of concentration = 19.826 min.
Effective stream area after confluence = 36.970(Ac.)
End of computations, total study area = 36.970 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 07/17/20

********* Hydrology Study Control Information **********

Program License Serial Number 6303

Rational hydrology study storm event year is 10.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 295.000(Ft.)
Highest elevation = 559.410(Ft.)
Lowest elevation = 557.380(Ft.)
Elevation difference = 2.030(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(295.000^.5)/(0.688^(1/3)]= 5.25
Rainfall intensity (I) = 3.504(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.664(CFS)
Total initial stream area = 0.500(Ac.)

++

Process from Point/Station 1.000 to Point/Station 2.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]

Time of concentration = 5.25 min.
Rainfall intensity = 3.504(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.664(CFS) for 0.500(Ac.)
Total runoff = 3.329(CFS) Total area = 1.00(Ac.)

++
Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.880(Ft.)
Downstream point/station elevation = 545.510(Ft.)
Pipe length = 99.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.329(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.329(CFS)
Normal flow depth in pipe = 5.05(In.)
Flow top width inside pipe = 16.17(In.)
Critical Depth = 8.34(In.)
Pipe flow velocity = 8.20(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 5.45 min.

++
Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.000(Ac.)
Runoff from this stream = 3.329(CFS)
Time of concentration = 5.45 min.
Rainfall intensity = 3.438(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.329	5.45	3.438

Qmax(1) =
1.000 * 1.000 * 3.329) + = 3.329

Total of 1 streams to confluence:
Flow rates before confluence point:
3.329
Maximum flow rates at confluence using above data:
3.329
Area of streams before confluence:
1.000
Results of confluence:
Total flow rate = 3.329(CFS)
Time of concentration = 5.454 min.
Effective stream area after confluence = 1.000(Ac.)

++
Process from Point/Station 4.000 to Point/Station 5.000
**** INITIAL AREA EVALUATION ****
_____
Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 2.956(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 5.336(CFS)
Total initial stream area = 1.900(Ac.)

++
Process from Point/Station 5.000 to Point/Station 6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.336(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 5.336(CFS)
Normal flow depth in pipe = 9.12(In.)
Flow top width inside pipe = 18.00(In.)
Critical Depth = 10.67(In.)
Pipe flow velocity = 5.94(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.336(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 5.336(CFS)
Normal flow depth in pipe = 6.82(In.)
Flow top width inside pipe = 25.15(In.)
Critical Depth = 9.14(In.)
Pipe flow velocity = 6.36(Ft/s)
Travel time through pipe = 0.26 min.
Time of concentration (TC) = 7.74 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.900(Ac.)
Runoff from this stream = 5.336(CFS)
Time of concentration = 7.74 min.

Rainfall intensity = 2.896(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.329	5.45	3.438
2	5.336	7.74	2.896

Qmax(1) =
1.000 * 1.000 * 3.329) +
1.000 * 0.705 * 5.336) + = 7.089
Qmax(2) =
0.842 * 1.000 * 3.329) +
1.000 * 1.000 * 5.336) + = 8.140

Total of 2 streams to confluence:
Flow rates before confluence point:
3.329 5.336
Maximum flow rates at confluence using above data:
7.089 8.140
Area of streams before confluence:
1.000 1.900
Results of confluence:
Total flow rate = 8.140(CFS)
Time of concentration = 7.739 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 3.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.140(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 8.140(CFS)
Normal flow depth in pipe = 9.16(In.)
Flow top width inside pipe = 34.69(In.)
Critical Depth = 10.30(In.)
Pipe flow velocity = 5.25(Ft/s)
Travel time through pipe = 1.37 min.
Time of concentration (TC) = 9.11 min.

++
Process from Point/Station 3.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.900(Ac.)
Runoff from this stream = 8.140(CFS)
Time of concentration = 9.11 min.
Rainfall intensity = 2.680(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1 8.140 9.11 2.680
Qmax(1) =
1.000 * 1.000 * 8.140) + = 8.140

Total of 1 streams to confluence:
Flow rates before confluence point:
8.140
Maximum flow rates at confluence using above data:
8.140
Area of streams before confluence:
2.900
Results of confluence:
Total flow rate = 8.140(CFS)
Time of concentration = 9.109 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 9.000 to Point/Station 0.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.453(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.45(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.990(Ft.)
Pipe length = 76.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 10.43(In.)
Flow top width inside pipe = 28.57(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 12.53(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.10 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.990(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 46.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 17.95(In.)
Flow top width inside pipe = 29.41(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 6.19(Ft/s)
Travel time through pipe = 0.12 min.
Time of concentration (TC) = 11.22 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.22 min.
Rainfall intensity = 2.430(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.140	9.11	2.680
2	19.000	11.22	2.430

Qmax(1) =
1.000 * 1.000 * 8.140) +
1.000 * 0.811 * 19.000) + = 23.558
Qmax(2) =
0.907 * 1.000 * 8.140) +
1.000 * 1.000 * 19.000) + = 26.380

Total of 2 streams to confluence:
Flow rates before confluence point:
8.140 19.000
Maximum flow rates at confluence using above data:
23.558 26.380
Area of streams before confluence:
2.900 19.100
Results of confluence:
Total flow rate = 26.380(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.000(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 408.000(Ft.)
Highest elevation = 559.150(Ft.)
Lowest elevation = 550.000(Ft.)
Elevation difference = 9.150(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(408.000^.5)/(2.243^(1/3)]= 4.17
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.592(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.433(CFS)
Total initial stream area = 0.420(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.950 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.592(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.512(CFS) for 0.150(Ac.)
Total runoff = 1.945(CFS) Total area = 0.57(Ac.)

++
Process from Point/Station 12.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 21.75(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.945(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.945(CFS)
Normal flow depth in pipe = 2.94(In.)
Flow top width inside pipe = 13.31(In.)
Critical Depth = 6.30(In.)
Pipe flow velocity = 10.34(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 12.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.945(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 3.580(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.140	9.11	2.680
2	19.000	11.22	2.430
3	1.945	5.04	3.580

Qmax(1) =
1.000 * 1.000 * 8.140) +
1.000 * 0.811 * 19.000) +
0.749 * 1.000 * 1.945) + = 25.014
Qmax(2) =
0.907 * 1.000 * 8.140) +
1.000 * 1.000 * 19.000) +
0.679 * 1.000 * 1.945) + = 27.700
Qmax(3) =
1.000 * 0.553 * 8.140) +
1.000 * 0.449 * 19.000) +
1.000 * 1.000 * 1.945) + = 14.967

Total of 3 streams to confluence:
Flow rates before confluence point:
8.140 19.000 1.945
Maximum flow rates at confluence using above data:

25.014 27.700 14.967
Area of streams before confluence:
2.900 19.100 0.570
Results of confluence:
Total flow rate = 27.700(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 7.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.700(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.700(CFS)
Normal flow depth in pipe = 17.41(In.)
Flow top width inside pipe = 46.16(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 6.73(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.37 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation = 542.140(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 990.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 27.700(CFS)
Depth of flow = 0.419(Ft.), Average velocity = 1.973(Ft/s)
Channel flow top width = 67.028(Ft.)
Flow Velocity = 1.97(Ft/s)
Travel time = 8.36 min.
Time of concentration = 19.74 min.
Critical depth = 0.375(Ft.)

++
Process from Point/Station 13.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 22.570(Ac.)
Runoff from this stream = 27.700(CFS)
Time of concentration = 19.74 min.
Rainfall intensity = 1.853(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1 27.700 19.74 1.853
Qmax(1) =
1.000 * 1.000 * 27.700) + = 27.700

Total of 1 streams to confluence:
Flow rates before confluence point:
27.700
Maximum flow rates at confluence using above data:
27.700
Area of streams before confluence:
22.570
Results of confluence:
Total flow rate = 27.700(CFS)
Time of concentration = 19.735 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 559.000(Ft.)
Lowest elevation = 551.000(Ft.)
Elevation difference = 8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.36 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(90.000^.5)/(8.889^(1/3)]= 5.36
Rainfall intensity (I) = 3.469(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 0.624(CFS)
Total initial stream area = 0.400(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 551.000(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 1177.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Estimated mean flow rate at midpoint of channel = 11.551(CFS)
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 11.551(CFS)
Depth of flow = 0.287(Ft.), Average velocity = 1.750(Ft/s)
Channel flow top width = 45.963(Ft.)
Flow Velocity = 1.75(Ft/s)
Travel time = 11.21 min.
Time of concentration = 16.57 min.
Critical depth = 0.264(Ft.)
Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity = 2.021(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 12.731(CFS) for 14.000(Ac.)

Total runoff = 13.355(CFS) Total area = 14.40(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.400(Ac.)
Runoff from this stream = 13.355(CFS)
Time of concentration = 16.57 min.
Rainfall intensity = 2.021(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	27.700	19.74	1.853
2	13.355	16.57	2.021

Qmax(1) =
1.000 * 1.000 * 27.700) +
0.917 * 1.000 * 13.355) + = 39.944
Qmax(2) =
1.000 * 0.840 * 27.700) +
1.000 * 1.000 * 13.355) + = 36.613

Total of 2 streams to confluence:
Flow rates before confluence point:
27.700 13.355
Maximum flow rates at confluence using above data:
39.944 36.613
Area of streams before confluence:
22.570 14.400
Results of confluence:
Total flow rate = 39.944(CFS)
Time of concentration = 19.735 min.
Effective stream area after confluence = 36.970(Ac.)
End of computations, total study area = 36.970 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 07/17/20

********* Hydrology Study Control Information **********

Program License Serial Number 6303

Rational hydrology study storm event year is 25.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 295.000(Ft.)
Highest elevation = 559.410(Ft.)
Lowest elevation = 557.380(Ft.)
Elevation difference = 2.030(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(295.000^.5)/(0.688^(1/3)]= 5.25
Rainfall intensity (I) = 3.756(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.784(CFS)
Total initial stream area = 0.500(Ac.)

++

Process from Point/Station 1.000 to Point/Station 2.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 5.25 min.

Rainfall intensity = 3.756(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.784(CFS) for 0.500(Ac.)
Total runoff = 3.568(CFS) Total area = 1.00(Ac.)

++
Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.880(Ft.)
Downstream point/station elevation = 545.510(Ft.)
Pipe length = 99.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.568(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.568(CFS)
Normal flow depth in pipe = 5.23(In.)
Flow top width inside pipe = 16.35(In.)
Critical Depth = 8.65(In.)
Pipe flow velocity = 8.37(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 5.45 min.

++
Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.000(Ac.)
Runoff from this stream = 3.568(CFS)
Time of concentration = 5.45 min.
Rainfall intensity = 3.691(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.568	5.45	3.691

Qmax(1) =
1.000 * 1.000 * 3.568) + = 3.568

Total of 1 streams to confluence:
Flow rates before confluence point:
3.568
Maximum flow rates at confluence using above data:
3.568
Area of streams before confluence:
1.000
Results of confluence:
Total flow rate = 3.568(CFS)
Time of concentration = 5.450 min.
Effective stream area after confluence = 1.000(Ac.)

++
Process from Point/Station 4.000 to Point/Station 5.000
**** INITIAL AREA EVALUATION ****
_____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 3.206(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 5.787(CFS)
Total initial stream area = 1.900(Ac.)

++
Process from Point/Station 5.000 to Point/Station 6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.787(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 5.787(CFS)
Normal flow depth in pipe = 9.57(In.)
Flow top width inside pipe = 17.96(In.)
Critical Depth = 11.15(In.)
Pipe flow velocity = 6.06(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.787(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 5.787(CFS)
Normal flow depth in pipe = 7.10(In.)
Flow top width inside pipe = 25.50(In.)
Critical Depth = 9.54(In.)
Pipe flow velocity = 6.51(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 7.73 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.900(Ac.)
Runoff from this stream = 5.787(CFS)
Time of concentration = 7.73 min.
Rainfall intensity = 3.147(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.568	5.45	3.691
2	5.787	7.73	3.147

Qmax(1) =
1.000 * 1.000 * 3.568) +
1.000 * 0.705 * 5.787) + = 7.647
Qmax(2) =
0.853 * 1.000 * 3.568) +
1.000 * 1.000 * 5.787) + = 8.830

Total of 2 streams to confluence:
Flow rates before confluence point:
3.568 5.787
Maximum flow rates at confluence using above data:
7.647 8.830
Area of streams before confluence:
1.000 1.900
Results of confluence:
Total flow rate = 8.830(CFS)
Time of concentration = 7.732 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 3.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.830(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 8.830(CFS)
Normal flow depth in pipe = 9.54(In.)
Flow top width inside pipe = 35.19(In.)
Critical depth could not be calculated.
Pipe flow velocity = 5.37(Ft/s)
Travel time through pipe = 1.34 min.
Time of concentration (TC) = 9.07 min.

++
Process from Point/Station 3.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.900(Ac.)
Runoff from this stream = 8.830(CFS)
Time of concentration = 9.07 min.
Rainfall intensity = 2.934(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.830	9.07	2.934

Qmax(1) =
1.000 * 1.000 * 8.830) + = 8.830

Total of 1 streams to confluence:
Flow rates before confluence point:
8.830
Maximum flow rates at confluence using above data:
8.830
Area of streams before confluence:
2.900
Results of confluence:
Total flow rate = 8.830(CFS)
Time of concentration = 9.070 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 9.000 to Point/Station 0.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.699(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.70(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.990(Ft.)
Pipe length = 76.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 10.43(In.)
Flow top width inside pipe = 28.57(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 12.53(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.10 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.990(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 46.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 17.95(In.)
Flow top width inside pipe = 29.41(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 6.19(Ft/s)
Travel time through pipe = 0.12 min.
Time of concentration (TC) = 11.22 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.22 min.
Rainfall intensity = 2.675(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.830	9.07	2.934
2	19.000	11.22	2.675

Qmax(1) =
1.000 * 1.000 * 8.830) +
1.000 * 0.808 * 19.000) + = 24.182
Qmax(2) =
0.912 * 1.000 * 8.830) +
1.000 * 1.000 * 19.000) + = 27.050

Total of 2 streams to confluence:
Flow rates before confluence point:
8.830 19.000
Maximum flow rates at confluence using above data:
24.182 27.050
Area of streams before confluence:
2.900 19.100
Results of confluence:
Total flow rate = 27.050(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.000(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 408.000(Ft.)
Highest elevation = 559.150(Ft.)
Lowest elevation = 550.000(Ft.)
Elevation difference = 9.150(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(408.000^.5)/(2.243^(1/3)]= 4.17
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.845(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.534(CFS)
Total initial stream area = 0.420(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** SUBAREA FLOW ADDITION ****
_____

User specified 'C' value of 0.950 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.845(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.548(CFS) for 0.150(Ac.)
Total runoff = 2.082(CFS) Total area = 0.57(Ac.)

++
Process from Point/Station 12.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 21.75(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.082(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.082(CFS)
Normal flow depth in pipe = 3.04(In.)
Flow top width inside pipe = 13.49(In.)
Critical Depth = 6.53(In.)
Pipe flow velocity = 10.55(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 5.03 min.

++
Process from Point/Station 12.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 2.082(CFS)
Time of concentration = 5.03 min.
Rainfall intensity = 3.833(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.830	9.07	2.934
2	19.000	11.22	2.675
3	2.082	5.03	3.833

Qmax(1) =
1.000 * 1.000 * 8.830) +
1.000 * 0.808 * 19.000) +
0.766 * 1.000 * 2.082) + = 25.776
Qmax(2) =
0.912 * 1.000 * 8.830) +
1.000 * 1.000 * 19.000) +
0.698 * 1.000 * 2.082) + = 28.503
Qmax(3) =
1.000 * 0.555 * 8.830) +
1.000 * 0.448 * 19.000) +
1.000 * 1.000 * 2.082) + = 15.504

Total of 3 streams to confluence:
Flow rates before confluence point:
8.830 19.000 2.082
Maximum flow rates at confluence using above data:
25.776 28.503 15.504

Area of streams before confluence:
2.900 19.100 0.570
Results of confluence:
Total flow rate = 28.503(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 7.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.503(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.503(CFS)
Normal flow depth in pipe = 17.68(In.)
Flow top width inside pipe = 46.31(In.)
Critical Depth = 18.98(In.)
Pipe flow velocity = 6.78(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.37 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation = 542.140(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 990.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 28.503(CFS)
Depth of flow = 0.423(Ft.), Average velocity = 1.987(Ft/s)
Channel flow top width = 67.750(Ft.)
Flow Velocity = 1.99(Ft/s)
Travel time = 8.30 min.
Time of concentration = 19.67 min.
Critical depth = 0.379(Ft.)

++
Process from Point/Station 13.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 22.570(Ac.)
Runoff from this stream = 28.503(CFS)
Time of concentration = 19.67 min.
Rainfall intensity = 2.078(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1 28.503 19.67 2.078
Qmax(1) =
1.000 * 1.000 * 28.503) + = 28.503

Total of 1 streams to confluence:
Flow rates before confluence point:
28.503
Maximum flow rates at confluence using above data:
28.503
Area of streams before confluence:
22.570
Results of confluence:
Total flow rate = 28.503(CFS)
Time of concentration = 19.675 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 559.000(Ft.)
Lowest elevation = 551.000(Ft.)
Elevation difference = 8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.36 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(90.000^.5)/(8.889^(1/3)]= 5.36
Rainfall intensity (I) = 3.721(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 0.670(CFS)
Total initial stream area = 0.400(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 551.000(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 1177.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Estimated mean flow rate at midpoint of channel = 12.391(CFS)
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 12.391(CFS)
Depth of flow = 0.295(Ft.), Average velocity = 1.781(Ft/s)
Channel flow top width = 47.188(Ft.)
Flow Velocity = 1.78(Ft/s)
Travel time = 11.02 min.
Time of concentration = 16.37 min.
Critical depth = 0.271(Ft.)
Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity = 2.265(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 14.270(CFS) for 14.000(Ac.)
Total runoff = 14.940(CFS) Total area = 14.40(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.400(Ac.)
Runoff from this stream = 14.940(CFS)
Time of concentration = 16.37 min.
Rainfall intensity = 2.265(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	28.503	19.67	2.078
2	14.940	16.37	2.265

Qmax(1) =
1.000 * 1.000 * 28.503) +
0.917 * 1.000 * 14.940) + = 42.210
Qmax(2) =
1.000 * 0.832 * 28.503) +
1.000 * 1.000 * 14.940) + = 38.663

Total of 2 streams to confluence:
Flow rates before confluence point:
28.503 14.940
Maximum flow rates at confluence using above data:
42.210 38.663
Area of streams before confluence:
22.570 14.400
Results of confluence:
Total flow rate = 42.210(CFS)
Time of concentration = 19.675 min.
Effective stream area after confluence = 36.970(Ac.)
End of computations, total study area = 36.970 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 07/10/20

********* Hydrology Study Control Information **********

Program License Serial Number 6303

Rational hydrology study storm event year is 50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 295.000(Ft.)
Highest elevation = 559.410(Ft.)
Lowest elevation = 557.380(Ft.)
Elevation difference = 2.030(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(295.000^.5)/(0.688^(1/3)]= 5.25
Rainfall intensity (I) = 4.173(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.982(CFS)
Total initial stream area = 0.500(Ac.)

++

Process from Point/Station 1.000 to Point/Station 2.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 5.25 min.

Rainfall intensity = 4.173(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.982(CFS) for 0.500(Ac.)
Total runoff = 3.964(CFS) Total area = 1.00(Ac.)

++
Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.880(Ft.)
Downstream point/station elevation = 545.510(Ft.)
Pipe length = 99.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.964(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.964(CFS)
Normal flow depth in pipe = 5.53(In.)
Flow top width inside pipe = 16.60(In.)
Critical Depth = 9.14(In.)
Pipe flow velocity = 8.62(Ft/s)
Travel time through pipe = 0.19 min.
Time of concentration (TC) = 5.44 min.

++
Process from Point/Station 2.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.000(Ac.)
Runoff from this stream = 3.964(CFS)
Time of concentration = 5.44 min.
Rainfall intensity = 4.107(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.964	5.44	4.107

Qmax(1) =
1.000 * 1.000 * 3.964) + = 3.964

Total of 1 streams to confluence:
Flow rates before confluence point:
3.964
Maximum flow rates at confluence using above data:
3.964
Area of streams before confluence:
1.000
Results of confluence:
Total flow rate = 3.964(CFS)
Time of concentration = 5.444 min.
Effective stream area after confluence = 1.000(Ac.)

++
Process from Point/Station 4.000 to Point/Station 5.000
**** INITIAL AREA EVALUATION ****
_____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 3.602(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 6.501(CFS)
Total initial stream area = 1.900(Ac.)

++
Process from Point/Station 5.000 to Point/Station 6.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.501(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 6.501(CFS)
Normal flow depth in pipe = 10.28(In.)
Flow top width inside pipe = 17.82(In.)
Critical Depth = 11.83(In.)
Pipe flow velocity = 6.23(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.501(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 6.501(CFS)
Normal flow depth in pipe = 7.54(In.)
Flow top width inside pipe = 26.02(In.)
Critical Depth = 10.13(In.)
Pipe flow velocity = 6.73(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 7.72 min.

++
Process from Point/Station 6.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.900(Ac.)
Runoff from this stream = 6.501(CFS)
Time of concentration = 7.72 min.
Rainfall intensity = 3.542(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.964	5.44	4.107
2	6.501	7.72	3.542

Qmax(1) =
1.000 * 1.000 * 3.964) +
1.000 * 0.705 * 6.501) + = 8.547
Qmax(2) =
0.862 * 1.000 * 3.964) +
1.000 * 1.000 * 6.501) + = 9.919

Total of 2 streams to confluence:
Flow rates before confluence point:
3.964 6.501
Maximum flow rates at confluence using above data:
8.547 9.919
Area of streams before confluence:
1.000 1.900
Results of confluence:
Total flow rate = 9.919(CFS)
Time of concentration = 7.722 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 3.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 9.919(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 9.919(CFS)
Normal flow depth in pipe = 10.11(In.)
Flow top width inside pipe = 35.92(In.)
Critical Depth = 11.42(In.)
Pipe flow velocity = 5.56(Ft/s)
Travel time through pipe = 1.29 min.
Time of concentration (TC) = 9.02 min.

++
Process from Point/Station 3.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.900(Ac.)
Runoff from this stream = 9.919(CFS)
Time of concentration = 9.02 min.
Rainfall intensity = 3.326(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.919	9.02	3.326

Qmax(1) =
1.000 * 1.000 * 9.919) + = 9.919

Total of 1 streams to confluence:
Flow rates before confluence point:
9.919
Maximum flow rates at confluence using above data:
9.919
Area of streams before confluence:
2.900
Results of confluence:
Total flow rate = 9.919(CFS)
Time of concentration = 9.015 min.
Effective stream area after confluence = 2.900(Ac.)

++
Process from Point/Station 9.000 to Point/Station 0.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 3.071(In/Hr) for a 50.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 3.07(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.990(Ft.)
Pipe length = 76.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 10.43(In.)
Flow top width inside pipe = 28.57(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 12.53(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.10 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.990(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 46.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 17.95(In.)
Flow top width inside pipe = 29.41(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 6.19(Ft/s)
Travel time through pipe = 0.12 min.
Time of concentration (TC) = 11.22 min.

++
Process from Point/Station 10.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.22 min.
Rainfall intensity = 3.046(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.919	9.02	3.326
2	19.000	11.22	3.046

Qmax(1) =
1.000 * 1.000 * 9.919) +
1.000 * 0.803 * 19.000) + = 25.179
Qmax(2) =
0.916 * 1.000 * 9.919) +
1.000 * 1.000 * 19.000) + = 28.085

Total of 2 streams to confluence:
Flow rates before confluence point:
9.919 19.000
Maximum flow rates at confluence using above data:
25.179 28.085
Area of streams before confluence:
2.900 19.100
Results of confluence:
Total flow rate = 28.085(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.000(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 408.000(Ft.)
Highest elevation = 559.150(Ft.)
Lowest elevation = 550.000(Ft.)
Elevation difference = 9.150(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(408.000^.5)/(2.243^(1/3)]= 4.17
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.265(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 1.702(CFS)
Total initial stream area = 0.420(Ac.)

++
Process from Point/Station 11.000 to Point/Station 12.000
**** SUBAREA FLOW ADDITION ****
_____

User specified 'C' value of 0.950 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 4.265(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 0.608(CFS) for 0.150(Ac.)
Total runoff = 2.310(CFS) Total area = 0.57(Ac.)

++
Process from Point/Station 12.000 to Point/Station 7.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 21.75(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.310(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.310(CFS)
Normal flow depth in pipe = 3.20(In.)
Flow top width inside pipe = 13.76(In.)
Critical Depth = 6.89(In.)
Pipe flow velocity = 10.88(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 5.03 min.

++
Process from Point/Station 12.000 to Point/Station 7.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 2.310(CFS)
Time of concentration = 5.03 min.
Rainfall intensity = 4.253(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.919	9.02	3.326
2	19.000	11.22	3.046
3	2.310	5.03	4.253

Qmax(1) =
1.000 * 1.000 * 9.919) +
1.000 * 0.803 * 19.000) +
0.782 * 1.000 * 2.310) + = 26.985
Qmax(2) =
0.916 * 1.000 * 9.919) +
1.000 * 1.000 * 19.000) +
0.716 * 1.000 * 2.310) + = 29.739
Qmax(3) =
1.000 * 0.558 * 9.919) +
1.000 * 0.448 * 19.000) +
1.000 * 1.000 * 2.310) + = 16.367

Total of 3 streams to confluence:
Flow rates before confluence point:
9.919 19.000 2.310
Maximum flow rates at confluence using above data:
26.985 29.739 16.367

Area of streams before confluence:
2.900 19.100 0.570
Results of confluence:
Total flow rate = 29.739(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 7.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 29.739(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 29.739(CFS)
Normal flow depth in pipe = 18.09(In.)
Flow top width inside pipe = 46.52(In.)
Critical Depth = 19.39(In.)
Pipe flow velocity = 6.86(Ft/s)
Travel time through pipe = 0.14 min.
Time of concentration (TC) = 11.37 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation = 542.140(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 990.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 29.739(CFS)
Depth of flow = 0.430(Ft.), Average velocity = 2.008(Ft/s)
Channel flow top width = 68.837(Ft.)
Flow Velocity = 2.01(Ft/s)
Travel time = 8.22 min.
Time of concentration = 19.59 min.
Critical depth = 0.387(Ft.)

++
Process from Point/Station 13.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 22.570(Ac.)
Runoff from this stream = 29.739(CFS)
Time of concentration = 19.59 min.
Rainfall intensity = 2.408(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1 29.739 19.59 2.408
Qmax(1) =
1.000 * 1.000 * 29.739) + = 29.739

Total of 1 streams to confluence:
Flow rates before confluence point:
29.739
Maximum flow rates at confluence using above data:
29.739
Area of streams before confluence:
22.570
Results of confluence:
Total flow rate = 29.739(CFS)
Time of concentration = 19.586 min.
Effective stream area after confluence = 22.570(Ac.)

++
Process from Point/Station 15.000 to Point/Station 16.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 559.000(Ft.)
Lowest elevation = 551.000(Ft.)
Elevation difference = 8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.36 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(90.000^.5)/(8.889^(1/3)]= 5.36
Rainfall intensity (I) = 4.136(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 0.745(CFS)
Total initial stream area = 0.400(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 551.000(Ft.)
Downstream point elevation = 525.920(Ft.)
Channel length thru subarea = 1177.000(Ft.)
Channel base width = 0.000(Ft.)
Slope or 'Z' of left channel bank = 80.000
Slope or 'Z' of right channel bank = 80.000
Estimated mean flow rate at midpoint of channel = 13.774(CFS)
Manning's 'N' = 0.034
Maximum depth of channel = 0.500(Ft.)
Flow(q) thru subarea = 13.774(CFS)
Depth of flow = 0.307(Ft.), Average velocity = 1.828(Ft/s)
Channel flow top width = 49.098(Ft.)
Flow Velocity = 1.83(Ft/s)
Travel time = 10.73 min.
Time of concentration = 16.09 min.
Critical depth = 0.283(Ft.)
Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity = 2.628(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff = 16.556(CFS) for 14.000(Ac.)
Total runoff = 17.301(CFS) Total area = 14.40(Ac.)

++
Process from Point/Station 16.000 to Point/Station 14.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 14.400(Ac.)
Runoff from this stream = 17.301(CFS)
Time of concentration = 16.09 min.
Rainfall intensity = 2.628(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	29.739	19.59	2.408
2	17.301	16.09	2.628

Qmax(1) =
1.000 * 1.000 * 29.739) +
0.916 * 1.000 * 17.301) + = 45.593
Qmax(2) =
1.000 * 0.821 * 29.739) +
1.000 * 1.000 * 17.301) + = 41.728

Total of 2 streams to confluence:
Flow rates before confluence point:
29.739 17.301
Maximum flow rates at confluence using above data:
45.593 41.728
Area of streams before confluence:
22.570 14.400
Results of confluence:
Total flow rate = 45.593(CFS)
Time of concentration = 19.586 min.
Effective stream area after confluence = 36.970(Ac.)
End of computations, total study area = 36.970 (Ac.)

J.N. 20-002
SANYO LOGISTICS CENTER
PROPOSED CONDITION
5 YEAR STORM

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 06/28/21

********* Hydrology Study Control Information **********

Program License Serial Number 4035

Rational hydrology study storm event year is 5.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 2.571(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 4.640(CFS)
Total initial stream area = 1.900(Ac.)

++

Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.640(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 4.640(CFS)
Normal flow depth in pipe = 8.40(In.)
Flow top width inside pipe = 17.96(In.)
Critical Depth = 9.93(In.)

Pipe flow velocity = 5.74(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.640(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 4.640(CFS)
Normal flow depth in pipe = 6.36(In.)
Flow top width inside pipe = 24.53(In.)
Critical Depth = 8.51(In.)
Pipe flow velocity = 6.10(Ft/s)
Travel time through pipe = 0.27 min.
Time of concentration (TC) = 7.75 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.900(Ac.)
Runoff from this stream = 4.640(CFS)
Time of concentration = 7.75 min.
Rainfall intensity = 2.514(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	4.640	7.75	2.514

Qmax(1) =
1.000 * 1.000 * 4.640) + = 4.640

Total of 1 streams to confluence:
Flow rates before confluence point:
4.640
Maximum flow rates at confluence using above data:
4.640
Area of streams before confluence:
1.900
Results of confluence:
Total flow rate = 4.640(CFS)
Time of concentration = 7.752 min.
Effective stream area after confluence = 1.900(Ac.)

++
Process from Point/Station 55.000 to Point/Station 300.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 203.000(Ft.)
Highest elevation = 559.500(Ft.)
Lowest elevation = 557.580(Ft.)
Elevation difference = 1.920(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 6.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]

TC = [1.8*(1.1-0.8400)*(203.000^.5)/(0.946^(1/3)]= 6.79
Rainfall intensity (I) = 2.687(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 0.609(CFS)
Total initial stream area = 0.270(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 553.420(Ft.)
Downstream point/station elevation = 551.000(Ft.)
Pipe length = 484.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.609(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 0.609(CFS)
Normal flow depth in pipe = 3.49(In.)
Flow top width inside pipe = 14.23(In.)
Critical Depth = 3.47(In.)
Pipe flow velocity = 2.54(Ft/s)
Travel time through pipe = 3.18 min.
Time of concentration (TC) = 9.97 min.

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.97 min.
Rainfall intensity = 2.219(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.671(CFS) for 0.360(Ac.)
Total runoff = 1.280(CFS) Total area = 0.63(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.97 min.
Rainfall intensity = 2.219(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.261(CFS) for 0.140(Ac.)
Total runoff = 1.541(CFS) Total area = 0.77(Ac.)

++
Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 551.000(Ft.)
Downstream point/station elevation = 549.500(Ft.)
Pipe length = 6.30(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.541(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.541(CFS)
Normal flow depth in pipe = 2.14(In.)
Flow top width inside pipe = 11.66(In.)
Critical Depth = 5.58(In.)
Pipe flow velocity = 12.99(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 9.98 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 549.500(Ft.)
Downstream point/station elevation = 548.890(Ft.)
Pipe length = 3.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.541(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.541(CFS)
Normal flow depth in pipe = 2.31(In.)
Flow top width inside pipe = 12.04(In.)
Critical Depth = 5.58(In.)
Pipe flow velocity = 11.64(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 9.99 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****
_____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 9.99 min.
Rainfall intensity = 2.217(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.053(CFS) for 0.500(Ac.)
Total runoff = 2.595(CFS) Total area = 1.27(Ac.)

++
Process from Point/Station 56.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.890(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 101.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.595(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.595(CFS)
Normal flow depth in pipe = 4.88(In.)
Flow top width inside pipe = 16.00(In.)
Critical Depth = 7.33(In.)
Pipe flow velocity = 6.70(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 10.24 min.

++
Process from Point/Station 56.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.270(Ac.)
Runoff from this stream = 2.595(CFS)
Time of concentration = 10.24 min.
Rainfall intensity = 2.191(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1 4.640 7.75 2.514
2 2.595 10.24 2.191
Qmax(1) =
1.000 * 1.000 * 4.640) +
1.000 * 0.757 * 2.595) + = 6.605
Qmax(2) =
0.871 * 1.000 * 4.640) +
1.000 * 1.000 * 2.595) + = 6.638

Total of 2 streams to confluence:
Flow rates before confluence point:
4.640 2.595
Maximum flow rates at confluence using above data:
6.605 6.638
Area of streams before confluence:
1.900 1.270
Results of confluence:
Total flow rate = 6.638(CFS)
Time of concentration = 10.238 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 4.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.638(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 6.638(CFS)
Normal flow depth in pipe = 8.29(In.)
Flow top width inside pipe = 33.43(In.)
Critical Depth = 9.29(In.)
Pipe flow velocity = 4.94(Ft/s)
Travel time through pipe = 1.45 min.
Time of concentration (TC) = 11.69 min.

++
Process from Point/Station 4.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 3.170(Ac.)
Runoff from this stream = 6.638(CFS)
Time of concentration = 11.69 min.
Rainfall intensity = 2.052(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.638	11.69	2.052

Qmax(1) =
1.000 * 1.000 * 6.638) + = 6.638

Total of 1 main streams to confluence:
Flow rates before confluence point:
6.638
Maximum flow rates at confluence using above data:
6.638
Area of streams before confluence:
3.170

Results of confluence:
Total flow rate = 6.638(CFS)
Time of concentration = 11.692 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 107.000 to Point/Station 107.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.115(In/Hr) for a 5.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.11(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 107.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 126.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 11.67(In.)
Flow top width inside pipe = 29.25(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 10.76(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 11.20 min.

++
Process from Point/Station 107.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.20 min.
Rainfall intensity = 2.097(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.638	11.69	2.052
2	19.000	11.20	2.097

Qmax(1) =
1.000 * 1.000 * 6.638) +
0.979 * 1.000 * 19.000) + = 25.238
Qmax(2) =
1.000 * 0.958 * 6.638) +
1.000 * 1.000 * 19.000) + = 25.356

Total of 2 main streams to confluence:
Flow rates before confluence point:
6.638 19.000
Maximum flow rates at confluence using above data:
25.238 25.356

Area of streams before confluence:
3.170 19.100

Results of confluence:
Total flow rate = 25.356(CFS)
Time of concentration = 11.195 min.
Effective stream area after confluence = 22.270(Ac.)

++
Process from Point/Station 60.000 to Point/Station 61.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 400.000(Ft.)
Highest elevation = 559.700(Ft.)
Lowest elevation = 551.370(Ft.)
Elevation difference = 8.330(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.33 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(400.000^.5)/(2.083^(1/3)]= 7.33
Rainfall intensity (I) = 2.586(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.238(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 61.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.500(Ft.)
Downstream point/station elevation = 545.140(Ft.)
Pipe length = 12.42(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.238(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.238(CFS)
Normal flow depth in pipe = 3.21(In.)
Flow top width inside pipe = 13.78(In.)
Critical Depth = 4.99(In.)
Pipe flow velocity = 5.81(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 7.37 min.

++
Process from Point/Station 303.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 22.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.238(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 1.238(CFS)
Normal flow depth in pipe = 2.03(In.)
Flow top width inside pipe = 15.09(In.)
Critical Depth = 4.34(In.)
Pipe flow velocity = 8.58(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 7.41 min.

++
Process from Point/Station 303.000 to Point/Station 108.000

**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.238(CFS)
Time of concentration = 7.41 min.
Rainfall intensity = 2.572(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.638	11.69	2.052
2	19.000	11.20	2.097
3	1.238	7.41	2.572

Qmax(1) =
1.000 * 1.000 * 6.638) +
0.979 * 1.000 * 19.000) +
0.798 * 1.000 * 1.238) + = 26.226

Qmax(2) =
1.000 * 0.958 * 6.638) +
1.000 * 1.000 * 19.000) +
0.815 * 1.000 * 1.238) + = 26.365

Qmax(3) =
1.000 * 0.634 * 6.638) +
1.000 * 0.662 * 19.000) +
1.000 * 1.000 * 1.238) + = 18.016

Total of 3 main streams to confluence:
Flow rates before confluence point:
6.638 19.000 1.238
Maximum flow rates at confluence using above data:
26.226 26.365 18.016
Area of streams before confluence:
3.170 19.100 0.570

Results of confluence:
Total flow rate = 26.365(CFS)
Time of concentration = 11.195 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 108.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 16.97(In.)
Flow top width inside pipe = 45.89(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 6.64(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.34 min.

++
Process from Point/Station 109.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 541.190(Ft.)
Downstream point/station elevation = 539.900(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 11.79(In.)
Flow top width inside pipe = 41.32(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 11.00(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.45 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 539.480(Ft.)
Downstream point/station elevation = 535.250(Ft.)
Pipe length = 254.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 12.23(In.)
Flow top width inside pipe = 41.84(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 10.45(Ft/s)
Travel time through pipe = 0.41 min.
Time of concentration (TC) = 11.85 min.

++
Process from Point/Station 14.000 to Point/Station 15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.830(Ft.)
Downstream point/station elevation = 533.560(Ft.)
Pipe length = 127.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 13.92(In.)
Flow top width inside pipe = 43.56(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 8.71(Ft/s)
Travel time through pipe = 0.24 min.
Time of concentration (TC) = 12.09 min.

++
Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.140(Ft.)
Downstream point/station elevation = 530.850(Ft.)
Pipe length = 227.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 13.90(In.)
Flow top width inside pipe = 43.54(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 8.74(Ft/s)
Travel time through pipe = 0.43 min.
Time of concentration (TC) = 12.53 min.

++
Process from Point/Station 16.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 530.490(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 193.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.365(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 26.365(CFS)
Normal flow depth in pipe = 13.82(In.)
Flow top width inside pipe = 43.46(In.)
Critical Depth = 18.23(In.)
Pipe flow velocity = 8.81(Ft/s)
Travel time through pipe = 0.37 min.
Time of concentration (TC) = 12.89 min.

++
Process from Point/Station 16.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 22.840(Ac.)
Runoff from this stream = 26.365(CFS)
Time of concentration = 12.89 min.
Rainfall intensity = 1.956(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.365	12.89	1.956

Qmax(1) =
1.000 * 1.000 * 26.365) + = 26.365

Total of 1 main streams to confluence:
Flow rates before confluence point:
26.365
Maximum flow rates at confluence using above data:
26.365
Area of streams before confluence:
22.840

Results of confluence:
Total flow rate = 26.365(CFS)
Time of concentration = 12.893 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 52.000 to Point/Station 53.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 81.000(Ft.)
Highest elevation = 544.910(Ft.)
Lowest elevation = 544.480(Ft.)
Elevation difference = 0.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(81.000^.5)/(0.531^(1/3)]= 5.20

Rainfall intensity (I) = 3.085(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.244(CFS)
Total initial stream area = 0.480(Ac.)

++
Process from Point/Station 52.000 to Point/Station 53.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.20 min.
Rainfall intensity = 3.085(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.130(CFS) for 0.050(Ac.)
Total runoff = 1.373(CFS) Total area = 0.53(Ac.)

++
Process from Point/Station 53.000 to Point/Station 54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.840(Ft.)
Downstream point/station elevation = 541.280(Ft.)
Pipe length = 112.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.373(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 1.373(CFS)
Normal flow depth in pipe = 6.32(In.)
Flow top width inside pipe = 11.98(In.)
Critical Depth = 5.95(In.)
Pipe flow velocity = 3.28(Ft/s)
Travel time through pipe = 0.57 min.
Time of concentration (TC) = 5.77 min.

++
Process from Point/Station 53.000 to Point/Station 54.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.77 min.
Rainfall intensity = 2.922(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.104(CFS) for 0.450(Ac.)
Total runoff = 2.478(CFS) Total area = 0.98(Ac.)

++
Process from Point/Station 54.000 to Point/Station 57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.280(Ft.)
Downstream point/station elevation = 540.380(Ft.)
Pipe length = 180.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.478(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 2.478(CFS)
Normal flow depth in pipe = 6.39(In.)
Flow top width inside pipe = 21.21(In.)
Critical Depth = 6.56(In.)
Pipe flow velocity = 3.70(Ft/s)
Travel time through pipe = 0.81 min.
Time of concentration (TC) = 6.58 min.

++

```
Process from Point/Station        54.000 to Point/Station        57.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.58 min.
Rainfall intensity =      2.731(In/Hr) for a      5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =      1.216(CFS) for     0.530(Ac.)
Total runoff =      3.693(CFS)           Total area =          1.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        54.000 to Point/Station        57.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.58 min.
Rainfall intensity =      2.731(In/Hr) for a      5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =      0.229(CFS) for     0.100(Ac.)
Total runoff =      3.923(CFS)           Total area =          1.61(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        57.000 to Point/Station        58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =    540.300(Ft.)
Downstream point/station elevation =    539.350(Ft.)
Pipe length  =    206.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.923(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =      3.923(CFS)
Normal flow depth in pipe =     8.27(In.)
Flow top width inside pipe =    22.81(In.)
Critical Depth =     8.32(In.)
Pipe flow velocity =      4.09(Ft/s)
Travel time through pipe =     0.84 min.
Time of concentration (TC) =      7.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        58.000 to Point/Station        62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =    539.350(Ft.)
Downstream point/station elevation =    538.770(Ft.)
Pipe length  =    115.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.923(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =      3.923(CFS)
Normal flow depth in pipe =     8.07(In.)
Flow top width inside pipe =    22.68(In.)
Critical Depth =     8.32(In.)
Pipe flow velocity =      4.22(Ft/s)
Travel time through pipe =     0.45 min.
Time of concentration (TC) =      7.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        62.000 to Point/Station        63.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =    538.770(Ft.)
Downstream point/station elevation =    537.030(Ft.)
Pipe length  =    347.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.923(CFS)
```

Given pipe size = 24.00(In.)
Calculated individual pipe flow = 3.923(CFS)
Normal flow depth in pipe = 8.09(In.)
Flow top width inside pipe = 22.69(In.)
Critical Depth = 8.32(In.)
Pipe flow velocity = 4.21(Ft/s)
Travel time through pipe = 1.37 min.
Time of concentration (TC) = 9.25 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.25 min.
Rainfall intensity = 2.303(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 9.149(CFS) for 4.730(Ac.)
Total runoff = 13.072(CFS) Total area = 6.34(Ac.)

++
Process from Point/Station 63.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 537.030(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 84.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.072(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 13.072(CFS)
Normal flow depth in pipe = 15.00(In.)
Flow top width inside pipe = 23.24(In.)
Critical Depth = 15.62(In.)
Pipe flow velocity = 6.33(Ft/s)
Travel time through pipe = 0.22 min.
Time of concentration (TC) = 9.47 min.

++
Process from Point/Station 63.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 6.340(Ac.)
Runoff from this stream = 13.072(CFS)
Time of concentration = 9.47 min.
Rainfall intensity = 2.276(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	13.072	9.47	2.276

Qmax(1) =
1.000 * 1.000 * 13.072) + = 13.072

Total of 1 streams to confluence:
Flow rates before confluence point:
13.072
Maximum flow rates at confluence using above data:
13.072
Area of streams before confluence:
6.340
Results of confluence:

Total flow rate = 13.072(CFS)
Time of concentration = 9.470 min.
Effective stream area after confluence = 6.340(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 544.890(Ft.)
Lowest elevation = 544.050(Ft.)
Elevation difference = 0.840(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(90.000^.5)/(0.933^(1/3)]= 4.54
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.149(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.164(CFS)
Total initial stream area = 0.440(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.149(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.450(CFS) for 0.170(Ac.)
Total runoff = 1.614(CFS) Total area = 0.61(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.149(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.212(CFS) for 0.080(Ac.)
Total runoff = 1.825(CFS) Total area = 0.69(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.640(Ft.)
Downstream point/station elevation = 541.190(Ft.)
Pipe length = 89.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.825(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 1.825(CFS)
Normal flow depth in pipe = 7.55(In.)
Flow top width inside pipe = 11.59(In.)
Critical Depth = 6.91(In.)
Pipe flow velocity = 3.51(Ft/s)
Travel time through pipe = 0.42 min.
Time of concentration (TC) = 5.42 min.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       201.000 to Point/Station       202.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.42 min.
Rainfall intensity =       3.018(In/Hr) for a       5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       1.420(CFS) for     0.560(Ac.)
Total runoff =       3.245(CFS)           Total area =          1.25(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       201.000 to Point/Station       202.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.42 min.
Rainfall intensity =       3.018(In/Hr) for a       5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.685(CFS) for     0.270(Ac.)
Total runoff =       3.930(CFS)           Total area =          1.52(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       202.000 to Point/Station       203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    541.190(Ft.)
Downstream point/station elevation =    539.600(Ft.)
Pipe length  =    242.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.930(CFS)
Given pipe size =      15.00(In.)
Calculated individual pipe flow  =      3.930(CFS)
Normal flow depth in pipe =     9.70(In.)
Flow top width inside pipe =    14.34(In.)
Critical Depth =     9.62(In.)
Pipe flow velocity =       4.68(Ft/s)
Travel time through pipe =     0.86 min.
Time of concentration (TC) =      6.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       203.000 to Point/Station        64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    539.600(Ft.)
Downstream point/station elevation =    536.480(Ft.)
Pipe length  =    300.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.930(CFS)
Given pipe size =      15.00(In.)
Calculated individual pipe flow  =      3.930(CFS)
Normal flow depth in pipe =     8.34(In.)
Flow top width inside pipe =    14.90(In.)
Critical Depth =     9.62(In.)
Pipe flow velocity =       5.60(Ft/s)
Travel time through pipe =     0.89 min.
Time of concentration (TC) =      7.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       203.000 to Point/Station        64.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       7.18 min.
Rainfall intensity =       2.614(In/Hr) for a       5.0 year storm
```

Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.603(CFS) for 0.730(Ac.)
Total runoff = 5.532(CFS) Total area = 2.25(Ac.)

++
Process from Point/Station 203.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 2.250(Ac.)
Runoff from this stream = 5.532(CFS)
Time of concentration = 7.18 min.
Rainfall intensity = 2.614(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	13.072	9.47	2.276
2	5.532	7.18	2.614

Qmax(1) =
1.000 * 1.000 * 13.072) +
0.871 * 1.000 * 5.532) + = 17.890
Qmax(2) =
1.000 * 0.758 * 13.072) +
1.000 * 1.000 * 5.532) + = 15.437

Total of 2 streams to confluence:
Flow rates before confluence point:
13.072 5.532
Maximum flow rates at confluence using above data:
17.890 15.437
Area of streams before confluence:
6.340 2.250
Results of confluence:
Total flow rate = 17.890(CFS)
Time of concentration = 9.470 min.
Effective stream area after confluence = 8.590(Ac.)

++
Process from Point/Station 64.000 to Point/Station 65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 536.480(Ft.)
Downstream point/station elevation = 534.950(Ft.)
Pipe length = 306.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 17.890(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 17.890(CFS)
Normal flow depth in pipe = 15.38(In.)
Flow top width inside pipe = 35.62(In.)
Critical Depth = 16.23(In.)
Pipe flow velocity = 6.21(Ft/s)
Travel time through pipe = 0.82 min.
Time of concentration (TC) = 10.29 min.

++
Process from Point/Station 64.000 to Point/Station 65.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.29 min.
Rainfall intensity = 2.185(In/Hr) for a 5.0 year storm

Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.697(CFS) for 0.380(Ac.)
Total runoff = 18.587(CFS) Total area = 8.97(Ac.)

++
Process from Point/Station 65.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.950(Ft.)
Downstream point/station elevation = 534.360(Ft.)
Pipe length = 117.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 18.587(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 18.587(CFS)
Normal flow depth in pipe = 15.67(In.)
Flow top width inside pipe = 35.70(In.)
Critical Depth = 16.57(In.)
Pipe flow velocity = 6.30(Ft/s)
Travel time through pipe = 0.31 min.
Time of concentration (TC) = 10.60 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.360(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 28.16(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 18.587(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 18.587(CFS)
Normal flow depth in pipe = 7.76(In.)
Flow top width inside pipe = 29.60(In.)
Critical Depth = 16.57(In.)
Pipe flow velocity = 16.60(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 10.63 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.970(Ac.)
Runoff from this stream = 18.587(CFS)
Time of concentration = 10.63 min.
Rainfall intensity = 2.151(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.587	10.63	2.151

Qmax(1) =
1.000 * 1.000 * 18.587) + = 18.587

Total of 1 streams to confluence:
Flow rates before confluence point:
18.587
Maximum flow rates at confluence using above data:
18.587
Area of streams before confluence:
8.970

```
Results of confluence:
Total flow rate =       18.587(CFS)
Time of concentration =     10.629 min.
Effective stream area after confluence =        8.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       400.000 to Point/Station       401.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =  284.000(Ft.)
Highest elevation =  546.430(Ft.)
Lowest elevation =  541.360(Ft.)
Elevation difference =     5.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      6.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 284.000^.5)/( 1.785^(1/3)]=    6.50
Rainfall intensity (I) =       2.748(In/Hr) for a      5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        0.877(CFS)
Total initial stream area =          0.380(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    537.360(Ft.)
Downstream point/station elevation =    533.490(Ft.)
Pipe length  =     63.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      0.877(CFS)
Given pipe size =      18.00(In.)
Calculated individual pipe flow  =      0.877(CFS)
Normal flow depth in pipe =     2.26(In.)
Flow top width inside pipe =    11.94(In.)
Critical Depth =     4.18(In.)
Pipe flow velocity =       6.83(Ft/s)
Travel time through pipe =     0.15 min.
Time of concentration (TC) =      6.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.66 min.
Rainfall intensity =       2.715(In/Hr) for a      5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.890(CFS) for     0.390(Ac.)
Total runoff =       1.767(CFS)           Total area =          0.77(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.66 min.
Rainfall intensity =       2.715(In/Hr) for a      5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.342(CFS) for     0.150(Ac.)
Total runoff =       2.109(CFS)           Total area =          0.92(Ac.)
```

++
Process from Point/Station 71.000 to Point/Station 72.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.490(Ft.)
Downstream point/station elevation = 532.560(Ft.)
Pipe length = 186.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.109(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.109(CFS)
Normal flow depth in pipe = 4.96(In.)
Flow top width inside pipe = 27.12(In.)
Critical depth could not be calculated.
Pipe flow velocity = 3.30(Ft/s)
Travel time through pipe = 0.94 min.
Time of concentration (TC) = 7.60 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 532.560(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 61.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.109(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.109(CFS)
Normal flow depth in pipe = 4.95(In.)
Flow top width inside pipe = 27.07(In.)
Critical depth could not be calculated.
Pipe flow velocity = 3.31(Ft/s)
Travel time through pipe = 0.31 min.
Time of concentration (TC) = 7.90 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.90 min.
Rainfall intensity = 2.490(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 4.476(CFS) for 2.140(Ac.)
Total runoff = 6.585(CFS) Total area = 3.06(Ac.)

++
Process from Point/Station 72.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 3.060(Ac.)
Runoff from this stream = 6.585(CFS)
Time of concentration = 7.90 min.
Rainfall intensity = 2.490(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.587	10.63	2.151
2	6.585	7.90	2.490

Qmax(1) =
1.000 * 1.000 * 18.587) +

```
              0.864 *     1.000 *      6.585) + =        24.275
Qmax(2) =
              1.000 *     0.743 *     18.587) +
              1.000 *     1.000 *      6.585) + =        20.405

Total of 2 streams to confluence:
Flow rates before confluence point:
        18.587         6.585
Maximum flow rates at confluence using above data:
         24.275         20.405
Area of streams before confluence:
          8.970          3.060
Results of confluence:
Total flow rate =       24.275(CFS)
Time of concentration =      10.629 min.
Effective stream area after confluence =       12.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   155.000(Ft.)
Highest elevation =   545.810(Ft.)
Lowest elevation =   544.380(Ft.)
Elevation difference =      1.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.99 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 155.000^.5)/( 0.923^(1/3)]=    5.99
Rainfall intensity (I) =        2.867(In/Hr) for a       5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =         1.228(CFS)
Total initial stream area =          0.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.99 min.
Rainfall intensity =        2.867(In/Hr) for a       5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =        0.891(CFS) for      0.370(Ac.)
Total runoff =        2.119(CFS)            Total area =          0.88(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         80.000 to Point/Station         67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =     540.190(Ft.)
Downstream point/station elevation =     532.250(Ft.)
Pipe length   =      40.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       2.119(CFS)
Given pipe size =       12.00(In.)
Calculated individual pipe flow   =       2.119(CFS)
Normal flow depth in pipe =      2.96(In.)
Flow top width inside pipe =     10.35(In.)
Critical Depth =      7.46(In.)
Pipe flow velocity =       14.05(Ft/s)
Travel time through pipe =      0.05 min.
Time of concentration (TC) =       6.03 min.
```

++
Process from Point/Station 80.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.880(Ac.)
Runoff from this stream = 2.119(CFS)
Time of concentration = 6.03 min.
Rainfall intensity = 2.856(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.587	10.63	2.151
2	6.585	7.90	2.490
3	2.119	6.03	2.856

Qmax(1) =
1.000 * 1.000 * 18.587) +
0.864 * 1.000 * 6.585) +
0.753 * 1.000 * 2.119) + = 25.871
Qmax(2) =
1.000 * 0.743 * 18.587) +
1.000 * 1.000 * 6.585) +
0.872 * 1.000 * 2.119) + = 22.253
Qmax(3) =
1.000 * 0.568 * 18.587) +
1.000 * 0.763 * 6.585) +
1.000 * 1.000 * 2.119) + = 17.695

Total of 3 streams to confluence:
Flow rates before confluence point:
18.587 6.585 2.119
Maximum flow rates at confluence using above data:
25.871 22.253 17.695
Area of streams before confluence:
8.970 3.060 0.880
Results of confluence:
Total flow rate = 25.871(CFS)
Time of concentration = 10.629 min.
Effective stream area after confluence = 12.910(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 102.000(Ft.)
Highest elevation = 544.650(Ft.)
Lowest elevation = 542.670(Ft.)
Elevation difference = 1.980(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 3.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(102.000^.5)/(1.941^(1/3)]= 3.79
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.149(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.508(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.149(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.714(CFS) for 0.270(Ac.)
Total runoff = 2.222(CFS) Total area = 0.84(Ac.)

++
Process from Point/Station 403.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.670(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 34.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.222(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 2.222(CFS)
Normal flow depth in pipe = 2.96(In.)
Flow top width inside pipe = 10.35(In.)
Critical Depth = 7.65(In.)
Pipe flow velocity = 14.74(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 403.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 4
Stream flow area = 0.840(Ac.)
Runoff from this stream = 2.222(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 3.137(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.587	10.63	2.151
2	6.585	7.90	2.490
3	2.119	6.03	2.856
4	2.222	5.04	3.137

Qmax(1) =
1.000 * 1.000 * 18.587) +
0.864 * 1.000 * 6.585) +
0.753 * 1.000 * 2.119) +
0.686 * 1.000 * 2.222) + = 27.395
Qmax(2) =
1.000 * 0.743 * 18.587) +
1.000 * 1.000 * 6.585) +
0.872 * 1.000 * 2.119) +
0.794 * 1.000 * 2.222) + = 24.017
Qmax(3) =
1.000 * 0.568 * 18.587) +
1.000 * 0.763 * 6.585) +
1.000 * 1.000 * 2.119) +
0.910 * 1.000 * 2.222) + = 19.719
Qmax(4) =
1.000 * 0.474 * 18.587) +
1.000 * 0.638 * 6.585) +
1.000 * 0.835 * 2.119) +
1.000 * 1.000 * 2.222) + = 17.002

Total of 4 streams to confluence:
Flow rates before confluence point:
18.587 6.585 2.119 2.222
Maximum flow rates at confluence using above data:
27.395 24.017 19.719 17.002
Area of streams before confluence:
8.970 3.060 0.880 0.840
Results of confluence:
Total flow rate = 27.395(CFS)
Time of concentration = 10.629 min.
Effective stream area after confluence = 13.750(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 528.710(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 27.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.395(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 27.395(CFS)
Normal flow depth in pipe = 17.27(In.)
Flow top width inside pipe = 35.97(In.)
Critical Depth = 20.31(In.)
Pipe flow velocity = 8.17(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 10.68 min.

++
Process from Point/Station 67.000 to Point/Station 68.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.68 min.
Rainfall intensity = 2.145(In/Hr) for a 5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.090(CFS) for 0.050(Ac.)
Total runoff = 27.485(CFS) Total area = 13.80(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 13.800(Ac.)
Runoff from this stream = 27.485(CFS)
Time of concentration = 10.68 min.
Rainfall intensity = 2.145(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.365	12.89	1.956
2	27.485	10.68	2.145

Qmax(1) =
1.000 * 1.000 * 26.365) +
0.912 * 1.000 * 27.485) + = 51.431
Qmax(2) =
1.000 * 0.829 * 26.365) +
1.000 * 1.000 * 27.485) + = 49.333

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
        26.365        27.485
Maximum flow rates at confluence using above data:
         51.431         49.333
Area of streams before confluence:
         22.840         13.800


Results of confluence:
Total flow rate =       51.431(CFS)
Time of concentration =      12.893 min.
Effective stream area after confluence   =       36.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         92.000 to Point/Station         93.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   170.000(Ft.)
Highest elevation =   545.270(Ft.)
Lowest elevation =   533.000(Ft.)
Elevation difference =     12.270(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       3.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 170.000^.5)/(    7.218^(1/3)]=     3.16
Setting time of concentration to 5 minutes
Rainfall intensity (I) =        3.149(In/Hr) for a       5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        0.476(CFS)
Total initial stream area =          0.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         303.000 to Point/Station         70.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   319.000(Ft.)
Highest elevation =   550.000(Ft.)
Lowest elevation =   537.600(Ft.)
Elevation difference =     12.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 319.000^.5)/( 3.887^(1/3)]=     5.32
Rainfall intensity (I) =        3.050(In/Hr) for a       5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.101(CFS)
Total initial stream area =          0.430(Ac.)
End of computations, total study area =             37.250 (Ac.)
```

JN 20-002
SANYO LOGISTICS CENTER
PROPOSED CONDITION
10 YEAR STORM

```
San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4
Rational method hydrology   program based on
San Diego County Flood Control Division 1985 hydrology manual
            Rational Hydrology Study          Date: 06/28/21
--------------------------------------------------------------------------
 *********    Hydrology Study Control Information **********

--------------------------------------------------------------------------


Program License Serial Number 4035

--------------------------------------------------------------------------
Rational hydrology study storm event year is      10.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)   =   1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station          1.000 to Point/Station          2.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                          ]
Initial subarea flow distance   = 1408.000(Ft.)
Highest elevation =   595.900(Ft.)
Lowest elevation =   560.000(Ft.)
Elevation difference =    35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/( 2.550^(1/3)]=    7.42
Rainfall intensity (I) =        2.956(In/Hr) for a     10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =        5.336(CFS)
Total initial stream area =          1.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station          2.000 to Point/Station          3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    549.300(Ft.)
Downstream point/station elevation =    549.080(Ft.)
Pipe length   =     22.25(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       5.336(CFS)
Given pipe size =       18.00(In.)
Calculated individual pipe flow   =       5.336(CFS)
Normal flow depth in pipe =      9.12(In.)
Flow top width inside pipe =     18.00(In.)
Critical Depth =    10.67(In.)
Pipe flow velocity =        5.94(Ft/s)
```

Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.336(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 5.336(CFS)
Normal flow depth in pipe = 6.82(In.)
Flow top width inside pipe = 25.15(In.)
Critical Depth = 9.14(In.)
Pipe flow velocity = 6.36(Ft/s)
Travel time through pipe = 0.26 min.
Time of concentration (TC) = 7.74 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.900(Ac.)
Runoff from this stream = 5.336(CFS)
Time of concentration = 7.74 min.
Rainfall intensity = 2.896(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.336	7.74	2.896

Qmax(1) =
1.000 * 1.000 * 5.336) + = 5.336

Total of 1 streams to confluence:
Flow rates before confluence point:
5.336
Maximum flow rates at confluence using above data:
5.336
Area of streams before confluence:
1.900
Results of confluence:
Total flow rate = 5.336(CFS)
Time of concentration = 7.739 min.
Effective stream area after confluence = 1.900(Ac.)

++
Process from Point/Station 55.000 to Point/Station 300.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 203.000(Ft.)
Highest elevation = 559.500(Ft.)
Lowest elevation = 557.580(Ft.)
Elevation difference = 1.920(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 6.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(203.000^.5)/(0.946^(1/3)]= 6.79

Rainfall intensity (I) = 3.084(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 0.700(CFS)
Total initial stream area = 0.270(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 553.420(Ft.)
Downstream point/station elevation = 551.000(Ft.)
Pipe length = 484.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.700(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 0.700(CFS)
Normal flow depth in pipe = 3.73(In.)
Flow top width inside pipe = 14.59(In.)
Critical Depth = 3.73(In.)
Pipe flow velocity = 2.64(Ft/s)
Travel time through pipe = 3.05 min.
Time of concentration (TC) = 9.85 min.

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.85 min.
Rainfall intensity = 2.584(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.781(CFS) for 0.360(Ac.)
Total runoff = 1.481(CFS) Total area = 0.63(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.85 min.
Rainfall intensity = 2.584(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.304(CFS) for 0.140(Ac.)
Total runoff = 1.785(CFS) Total area = 0.77(Ac.)

++
Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 551.000(Ft.)
Downstream point/station elevation = 549.500(Ft.)
Pipe length = 6.30(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.785(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.785(CFS)
Normal flow depth in pipe = 2.30(In.)
Flow top width inside pipe = 12.02(In.)
Critical Depth = 6.03(In.)
Pipe flow velocity = 13.57(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 9.85 min.

++

Process from Point/Station 302.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 549.500(Ft.)
Downstream point/station elevation = 548.890(Ft.)
Pipe length = 3.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.785(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.785(CFS)
Normal flow depth in pipe = 2.48(In.)
Flow top width inside pipe = 12.40(In.)
Critical Depth = 6.03(In.)
Pipe flow velocity = 12.16(Ft/s)
Travel time through pipe = 0.00 min.
Time of concentration (TC) = 9.86 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 9.86 min.
Rainfall intensity = 2.582(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.227(CFS) for 0.500(Ac.)
Total runoff = 3.011(CFS) Total area = 1.27(Ac.)

++
Process from Point/Station 56.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 548.890(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 101.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.011(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.011(CFS)
Normal flow depth in pipe = 5.27(In.)
Flow top width inside pipe = 16.38(In.)
Critical Depth = 7.92(In.)
Pipe flow velocity = 6.99(Ft/s)
Travel time through pipe = 0.24 min.
Time of concentration (TC) = 10.10 min.

++
Process from Point/Station 56.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.270(Ac.)
Runoff from this stream = 3.011(CFS)
Time of concentration = 10.10 min.
Rainfall intensity = 2.553(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.336	7.74	2.896

```
2          3.011       10.10                2.553
Qmax(1) =
              1.000 *     1.000 *       5.336) +
              1.000 *     0.766 *       3.011) + =          7.643
Qmax(2) =
              0.882 *     1.000 *       5.336) +
              1.000 *     1.000 *       3.011) + =          7.715

Total of 2 streams to confluence:
Flow rates before confluence point:
         5.336          3.011
Maximum flow rates at confluence using above data:
         7.643          7.715
Area of streams before confluence:
         1.900          1.270
Results of confluence:
Total flow rate =         7.715(CFS)
Time of concentration =      10.101 min.
Effective stream area after confluence =         3.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station          4.000 to Point/Station        108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =     545.510(Ft.)
Downstream point/station elevation =     542.920(Ft.)
Pipe length   =     431.22(Ft.)     Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       7.715(CFS)
Given pipe size =       42.00(In.)
Calculated individual pipe flow   =       7.715(CFS)
Normal flow depth in pipe =      8.92(In.)
Flow top width inside pipe =     34.36(In.)
Critical depth could not be calculated.
Pipe flow velocity =         5.17(Ft/s)
Travel time through pipe =      1.39 min.
Time of concentration (TC) =      11.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station          4.000 to Point/Station        108.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =         3.170(Ac.)
Runoff from this stream =         7.715(CFS)
Time of concentration =     11.49 min.
Rainfall intensity =       2.404(In/Hr)
Summary of stream data:

Stream     Flow rate        TC               Rainfall Intensity
 No.         (CFS)         (min)                    (In/Hr)


1          7.715       11.49                2.404
Qmax(1) =
              1.000 *     1.000 *       7.715) + =          7.715

Total of 1 main streams to confluence:
Flow rates before confluence point:
         7.715
Maximum flow rates at confluence using above data:
         7.715
Area of streams before confluence:
         3.170
```

Results of confluence:
Total flow rate = 7.715(CFS)
Time of concentration = 11.492 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 107.000 to Point/Station 107.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.453(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.45(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 107.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 126.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 11.67(In.)
Flow top width inside pipe = 29.25(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 10.76(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 11.20 min.

++
Process from Point/Station 107.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.20 min.
Rainfall intensity = 2.433(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.715	11.49	2.404
2	19.000	11.20	2.433

Qmax(1) =
1.000 * 1.000 * 7.715) +
0.988 * 1.000 * 19.000) + = 26.484
Qmax(2) =
1.000 * 0.974 * 7.715) +
1.000 * 1.000 * 19.000) + = 26.516

Total of 2 main streams to confluence:
Flow rates before confluence point:
7.715 19.000
Maximum flow rates at confluence using above data:
26.484 26.516
Area of streams before confluence:

3.170 19.100

Results of confluence:
Total flow rate = 26.516(CFS)
Time of concentration = 11.195 min.
Effective stream area after confluence = 22.270(Ac.)

++
Process from Point/Station 60.000 to Point/Station 61.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 400.000(Ft.)
Highest elevation = 559.700(Ft.)
Lowest elevation = 551.370(Ft.)
Elevation difference = 8.330(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.33 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(400.000^.5)/(2.083^(1/3)]= 7.33
Rainfall intensity (I) = 2.973(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.423(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 61.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.500(Ft.)
Downstream point/station elevation = 545.140(Ft.)
Pipe length = 12.42(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.423(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.423(CFS)
Normal flow depth in pipe = 3.43(In.)
Flow top width inside pipe = 14.14(In.)
Critical Depth = 5.36(In.)
Pipe flow velocity = 6.05(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 7.36 min.

++
Process from Point/Station 303.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 22.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.423(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 1.423(CFS)
Normal flow depth in pipe = 2.17(In.)
Flow top width inside pipe = 15.55(In.)
Critical Depth = 4.64(In.)
Pipe flow velocity = 8.95(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 7.40 min.

++
Process from Point/Station 303.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.423(CFS)
Time of concentration = 7.40 min.
Rainfall intensity = 2.958(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.715	11.49	2.404
2	19.000	11.20	2.433
3	1.423	7.40	2.958

Qmax(1) =
1.000 * 1.000 * 7.715) +
0.988 * 1.000 * 19.000) +
0.813 * 1.000 * 1.423) + = 27.641
Qmax(2) =
1.000 * 0.974 * 7.715) +
1.000 * 1.000 * 19.000) +
0.823 * 1.000 * 1.423) + = 27.687
Qmax(3) =
1.000 * 0.644 * 7.715) +
1.000 * 0.661 * 19.000) +
1.000 * 1.000 * 1.423) + = 18.962

Total of 3 main streams to confluence:
Flow rates before confluence point:
7.715 19.000 1.423
Maximum flow rates at confluence using above data:
27.641 27.687 18.962
Area of streams before confluence:
3.170 19.100 0.570

Results of confluence:
Total flow rate = 27.687(CFS)
Time of concentration = 11.195 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 108.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.687(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.687(CFS)
Normal flow depth in pipe = 17.41(In.)
Flow top width inside pipe = 46.16(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 6.73(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.34 min.

++
Process from Point/Station 109.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
Upstream point/station elevation = 541.190(Ft.)

Downstream point/station elevation = 539.900(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.687(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.687(CFS)
Normal flow depth in pipe = 12.08(In.)
Flow top width inside pipe = 41.66(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 11.16(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.44 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 539.480(Ft.)
Downstream point/station elevation = 535.250(Ft.)
Pipe length = 254.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.687(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.687(CFS)
Normal flow depth in pipe = 12.54(In.)
Flow top width inside pipe = 42.17(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 10.60(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 11.84 min.

++
Process from Point/Station 14.000 to Point/Station 15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.830(Ft.)
Downstream point/station elevation = 533.560(Ft.)
Pipe length = 127.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.687(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.687(CFS)
Normal flow depth in pipe = 14.29(In.)
Flow top width inside pipe = 43.89(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 8.83(Ft/s)
Travel time through pipe = 0.24 min.
Time of concentration (TC) = 12.08 min.

++
Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.140(Ft.)
Downstream point/station elevation = 530.850(Ft.)
Pipe length = 227.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 27.687(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 27.687(CFS)
Normal flow depth in pipe = 14.25(In.)
Flow top width inside pipe = 43.86(In.)
Critical Depth = 18.68(In.)
Pipe flow velocity = 8.86(Ft/s)
Travel time through pipe = 0.43 min.
Time of concentration (TC) = 12.51 min.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        16.000 to Point/Station        68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    530.490(Ft.)
Downstream point/station elevation =    528.500(Ft.)
Pipe length  =    193.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     27.687(CFS)
Given pipe size =       48.00(In.)
Calculated individual pipe flow  =     27.687(CFS)
Normal flow depth in pipe =    14.17(In.)
Flow top width inside pipe =    43.79(In.)
Critical Depth =    18.68(In.)
Pipe flow velocity =        8.93(Ft/s)
Travel time through pipe =     0.36 min.
Time of concentration (TC) =     12.87 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        16.000 to Point/Station        68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       22.840(Ac.)
Runoff from this stream =       27.687(CFS)
Time of concentration =    12.87 min.
Rainfall intensity =       2.279(In/Hr)
Summary of stream data:

Stream    Flow rate        TC              Rainfall Intensity
 No.        (CFS)        (min)                    (In/Hr)


1         27.687       12.87                2.279
Qmax(1) =
              1.000 *     1.000 *     27.687) + =        27.687

Total of 1 main streams to confluence:
Flow rates before confluence point:
       27.687
Maximum flow rates at confluence using above data:
        27.687
Area of streams before confluence:
        22.840


Results of confluence:
Total flow rate =       27.687(CFS)
Time of concentration =     12.869 min.
Effective stream area after confluence  =       22.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        52.000 to Point/Station        53.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =    81.000(Ft.)
Highest elevation =   544.910(Ft.)
Lowest elevation =   544.480(Ft.)
Elevation difference =      0.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(   81.000^.5)/( 0.531^(1/3)]=    5.20
Rainfall intensity (I) =        3.521(In/Hr) for a      10.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.420(CFS)
Total initial stream area =          0.480(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        52.000 to Point/Station        53.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.20 min.
Rainfall intensity =       3.521(In/Hr) for a      10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.148(CFS) for     0.050(Ac.)
Total runoff =       1.568(CFS)           Total area =          0.53(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        53.000 to Point/Station        54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    541.840(Ft.)
Downstream point/station elevation =    541.280(Ft.)
Pipe length   =    112.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       1.568(CFS)
Given pipe size =       12.00(In.)
Calculated individual pipe flow   =       1.568(CFS)
Normal flow depth in pipe =      6.86(In.)
Flow top width inside pipe =     11.88(In.)
Critical Depth =      6.38(In.)
Pipe flow velocity =        3.38(Ft/s)
Travel time through pipe =      0.55 min.
Time of concentration (TC) =       5.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        53.000 to Point/Station        54.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.75 min.
Rainfall intensity =       3.347(In/Hr) for a      10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       1.265(CFS) for     0.450(Ac.)
Total runoff =       2.833(CFS)           Total area =          0.98(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        54.000 to Point/Station        57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    541.280(Ft.)
Downstream point/station elevation =    540.380(Ft.)
Pipe length   =    180.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       2.833(CFS)
Given pipe size =       24.00(In.)
Calculated individual pipe flow   =       2.833(CFS)
Normal flow depth in pipe =      6.84(In.)
Flow top width inside pipe =     21.67(In.)
Critical Depth =      7.03(In.)
Pipe flow velocity =        3.84(Ft/s)
Travel time through pipe =      0.78 min.
Time of concentration (TC) =       6.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        54.000 to Point/Station        57.000
```

**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.53 min.
Rainfall intensity = 3.143(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.399(CFS) for 0.530(Ac.)
Total runoff = 4.232(CFS) Total area = 1.51(Ac.)

++
Process from Point/Station 54.000 to Point/Station 57.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.53 min.
Rainfall intensity = 3.143(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.264(CFS) for 0.100(Ac.)
Total runoff = 4.496(CFS) Total area = 1.61(Ac.)

++
Process from Point/Station 57.000 to Point/Station 58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 540.300(Ft.)
Downstream point/station elevation = 539.350(Ft.)
Pipe length = 206.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.496(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 4.496(CFS)
Normal flow depth in pipe = 8.89(In.)
Flow top width inside pipe = 23.18(In.)
Critical Depth = 8.94(In.)
Pipe flow velocity = 4.25(Ft/s)
Travel time through pipe = 0.81 min.
Time of concentration (TC) = 7.34 min.

++
Process from Point/Station 58.000 to Point/Station 62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.350(Ft.)
Downstream point/station elevation = 538.770(Ft.)
Pipe length = 115.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.496(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 4.496(CFS)
Normal flow depth in pipe = 8.68(In.)
Flow top width inside pipe = 23.07(In.)
Critical Depth = 8.94(In.)
Pipe flow velocity = 4.39(Ft/s)
Travel time through pipe = 0.44 min.
Time of concentration (TC) = 7.78 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 538.770(Ft.)
Downstream point/station elevation = 537.030(Ft.)
Pipe length = 347.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.496(CFS)
Given pipe size = 24.00(In.)

Calculated individual pipe flow = 4.496(CFS)
Normal flow depth in pipe = 8.70(In.)
Flow top width inside pipe = 23.07(In.)
Critical Depth = 8.94(In.)
Pipe flow velocity = 4.38(Ft/s)
Travel time through pipe = 1.32 min.
Time of concentration (TC) = 9.10 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.10 min.
Rainfall intensity = 2.681(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 10.653(CFS) for 4.730(Ac.)
Total runoff = 15.149(CFS) Total area = 6.34(Ac.)

++
Process from Point/Station 63.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 537.030(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 84.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 15.149(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 15.149(CFS)
Normal flow depth in pipe = 16.64(In.)
Flow top width inside pipe = 22.13(In.)
Critical Depth = 16.84(In.)
Pipe flow velocity = 6.51(Ft/s)
Travel time through pipe = 0.22 min.
Time of concentration (TC) = 9.32 min.

++
Process from Point/Station 63.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 6.340(Ac.)
Runoff from this stream = 15.149(CFS)
Time of concentration = 9.32 min.
Rainfall intensity = 2.652(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	15.149	9.32	2.652

Qmax(1) =
1.000 * 1.000 * 15.149) + = 15.149

Total of 1 streams to confluence:
Flow rates before confluence point:
15.149
Maximum flow rates at confluence using above data:
15.149
Area of streams before confluence:
6.340
Results of confluence:
Total flow rate = 15.149(CFS)

Time of concentration = 9.317 min.
Effective stream area after confluence = 6.340(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 544.890(Ft.)
Lowest elevation = 544.050(Ft.)
Elevation difference = 0.840(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(90.000^.5)/(0.933^(1/3)]= 4.54
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.592(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.328(CFS)
Total initial stream area = 0.440(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.592(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.513(CFS) for 0.170(Ac.)
Total runoff = 1.841(CFS) Total area = 0.61(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.592(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.241(CFS) for 0.080(Ac.)
Total runoff = 2.082(CFS) Total area = 0.69(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.640(Ft.)
Downstream point/station elevation = 541.190(Ft.)
Pipe length = 89.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.082(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 2.082(CFS)
Normal flow depth in pipe = 8.29(In.)
Flow top width inside pipe = 11.10(In.)
Critical Depth = 7.40(In.)
Pipe flow velocity = 3.60(Ft/s)
Travel time through pipe = 0.41 min.
Time of concentration (TC) = 5.41 min.

++

Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.41 min.
Rainfall intensity = 3.451(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.624(CFS) for 0.560(Ac.)
Total runoff = 3.706(CFS) Total area = 1.25(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.41 min.
Rainfall intensity = 3.451(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.783(CFS) for 0.270(Ac.)
Total runoff = 4.489(CFS) Total area = 1.52(Ac.)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 541.190(Ft.)
Downstream point/station elevation = 539.600(Ft.)
Pipe length = 242.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.489(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 4.489(CFS)
Normal flow depth in pipe = 10.69(In.)
Flow top width inside pipe = 13.58(In.)
Critical Depth = 10.30(In.)
Pipe flow velocity = 4.80(Ft/s)
Travel time through pipe = 0.84 min.
Time of concentration (TC) = 6.25 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.600(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 300.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.489(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 4.489(CFS)
Normal flow depth in pipe = 9.08(In.)
Flow top width inside pipe = 14.66(In.)
Critical Depth = 10.30(In.)
Pipe flow velocity = 5.77(Ft/s)
Travel time through pipe = 0.87 min.
Time of concentration (TC) = 7.12 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.12 min.
Rainfall intensity = 3.015(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840

```
Subarea runoff =        1.849(CFS) for     0.730(Ac.)
Total runoff =        6.337(CFS)           Total area =          2.25(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       203.000 to Point/Station        64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =        2.250(Ac.)
Runoff from this stream =        6.337(CFS)
Time of concentration =     7.12 min.
Rainfall intensity =       3.015(In/Hr)
Summary of stream data:

Stream    Flow rate       TC              Rainfall Intensity
 No.        (CFS)        (min)                   (In/Hr)


1         15.149       9.32                2.652
2          6.337       7.12                3.015
Qmax(1) =
              1.000 *     1.000 *     15.149) +
              0.880 *     1.000 *      6.337) + =       20.724
Qmax(2) =
              1.000 *     0.764 *     15.149) +
              1.000 *     1.000 *      6.337) + =       17.912

Total of 2 streams to confluence:
Flow rates before confluence point:
       15.149         6.337
Maximum flow rates at confluence using above data:
        20.724        17.912
Area of streams before confluence:
         6.340         2.250
Results of confluence:
Total flow rate =       20.724(CFS)
Time of concentration =       9.317 min.
Effective stream area after confluence =        8.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station        65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =     536.480(Ft.)
Downstream point/station elevation =     534.950(Ft.)
Pipe length   =     306.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =      20.724(CFS)
Given pipe size =       36.00(In.)
Calculated individual pipe flow   =      20.724(CFS)
Normal flow depth in pipe =     16.70(In.)
Flow top width inside pipe =     35.91(In.)
Critical Depth =     17.52(In.)
Pipe flow velocity =        6.46(Ft/s)
Travel time through pipe =      0.79 min.
Time of concentration (TC) =      10.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station        65.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =      10.11 min.
Rainfall intensity =        2.552(In/Hr) for a      10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
```

Subarea runoff = 0.815(CFS) for 0.380(Ac.)
Total runoff = 21.538(CFS) Total area = 8.97(Ac.)

++
Process from Point/Station 65.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.950(Ft.)
Downstream point/station elevation = 534.360(Ft.)
Pipe length = 117.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 21.538(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 21.538(CFS)
Normal flow depth in pipe = 17.04(In.)
Flow top width inside pipe = 35.95(In.)
Critical Depth = 17.92(In.)
Pipe flow velocity = 6.54(Ft/s)
Travel time through pipe = 0.30 min.
Time of concentration (TC) = 10.41 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.360(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 28.16(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 21.538(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 21.538(CFS)
Normal flow depth in pipe = 8.35(In.)
Flow top width inside pipe = 30.39(In.)
Critical Depth = 17.92(In.)
Pipe flow velocity = 17.33(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 10.43 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.970(Ac.)
Runoff from this stream = 21.538(CFS)
Time of concentration = 10.43 min.
Rainfall intensity = 2.515(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.538	10.43	2.515

Qmax(1) =
1.000 * 1.000 * 21.538) + = 21.538

Total of 1 streams to confluence:
Flow rates before confluence point:
21.538
Maximum flow rates at confluence using above data:
21.538
Area of streams before confluence:
8.970
Results of confluence:

Total flow rate = 21.538(CFS)
Time of concentration = 10.432 min.
Effective stream area after confluence = 8.970(Ac.)

++
Process from Point/Station 400.000 to Point/Station 401.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 284.000(Ft.)
Highest elevation = 546.430(Ft.)
Lowest elevation = 541.360(Ft.)
Elevation difference = 5.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 6.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(284.000^.5)/(1.785^(1/3)]= 6.50
Rainfall intensity (I) = 3.151(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.006(CFS)
Total initial stream area = 0.380(Ac.)

++
Process from Point/Station 401.000 to Point/Station 71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 537.360(Ft.)
Downstream point/station elevation = 533.490(Ft.)
Pipe length = 63.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.006(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.006(CFS)
Normal flow depth in pipe = 2.42(In.)
Flow top width inside pipe = 12.27(In.)
Critical depth could not be calculated.
Pipe flow velocity = 7.11(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 6.65 min.

++
Process from Point/Station 401.000 to Point/Station 71.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.65 min.
Rainfall intensity = 3.117(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.021(CFS) for 0.390(Ac.)
Total runoff = 2.027(CFS) Total area = 0.77(Ac.)

++
Process from Point/Station 401.000 to Point/Station 71.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.65 min.
Rainfall intensity = 3.117(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.393(CFS) for 0.150(Ac.)
Total runoff = 2.420(CFS) Total area = 0.92(Ac.)

++

Process from Point/Station 71.000 to Point/Station 72.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 533.490(Ft.)
Downstream point/station elevation = 532.560(Ft.)
Pipe length = 186.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.420(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.420(CFS)
Normal flow depth in pipe = 5.30(In.)
Flow top width inside pipe = 27.90(In.)
Critical Depth = 5.55(In.)
Pipe flow velocity = 3.43(Ft/s)
Travel time through pipe = 0.90 min.
Time of concentration (TC) = 7.55 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 532.560(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 61.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.420(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.420(CFS)
Normal flow depth in pipe = 5.29(In.)
Flow top width inside pipe = 27.86(In.)
Critical Depth = 5.55(In.)
Pipe flow velocity = 3.46(Ft/s)
Travel time through pipe = 0.29 min.
Time of concentration (TC) = 7.85 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.85 min.
Rainfall intensity = 2.877(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 5.172(CFS) for 2.140(Ac.)
Total runoff = 7.592(CFS) Total area = 3.06(Ac.)

++
Process from Point/Station 72.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 3.060(Ac.)
Runoff from this stream = 7.592(CFS)
Time of concentration = 7.85 min.
Rainfall intensity = 2.877(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.538	10.43	2.515
2	7.592	7.85	2.877

Qmax(1) =
1.000 * 1.000 * 21.538) +
0.874 * 1.000 * 7.592) + = 28.174

```
Qmax(2) =
             1.000 *     0.752 *     21.538) +
             1.000 *     1.000 *      7.592) + =        23.790

Total of 2 streams to confluence:
Flow rates before confluence point:
       21.538         7.592
Maximum flow rates at confluence using above data:
        28.174         23.790
Area of streams before confluence:
         8.970         3.060
Results of confluence:
Total flow rate =       28.174(CFS)
Time of concentration =      10.432 min.
Effective stream area after confluence =       12.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   155.000(Ft.)
Highest elevation =   545.810(Ft.)
Lowest elevation =   544.380(Ft.)
Elevation difference =      1.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.99 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 155.000^.5)/( 0.923^(1/3)]=    5.99
Rainfall intensity (I) =        3.282(In/Hr) for a     10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.406(CFS)
Total initial stream area =          0.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.99 min.
Rainfall intensity =        3.282(In/Hr) for a     10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =        1.020(CFS) for     0.370(Ac.)
Total runoff =        2.426(CFS)           Total area =          0.88(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         80.000 to Point/Station         67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    540.190(Ft.)
Downstream point/station elevation =    532.250(Ft.)
Pipe length   =     40.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =      2.426(CFS)
Given pipe size =       12.00(In.)
Calculated individual pipe flow   =       2.426(CFS)
Normal flow depth in pipe =      3.17(In.)
Flow top width inside pipe =     10.58(In.)
Critical Depth =      8.00(In.)
Pipe flow velocity =       14.61(Ft/s)
Travel time through pipe =      0.05 min.
Time of concentration (TC) =       6.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Process from Point/Station 80.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.880(Ac.)
Runoff from this stream = 2.426(CFS)
Time of concentration = 6.03 min.
Rainfall intensity = 3.270(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.538	10.43	2.515
2	7.592	7.85	2.877
3	2.426	6.03	3.270

Qmax(1) =
1.000 * 1.000 * 21.538) +
0.874 * 1.000 * 7.592) +
0.769 * 1.000 * 2.426) + = 30.040
Qmax(2) =
1.000 * 0.752 * 21.538) +
1.000 * 1.000 * 7.592) +
0.880 * 1.000 * 2.426) + = 25.925
Qmax(3) =
1.000 * 0.578 * 21.538) +
1.000 * 0.769 * 7.592) +
1.000 * 1.000 * 2.426) + = 20.713

Total of 3 streams to confluence:
Flow rates before confluence point:
21.538 7.592 2.426
Maximum flow rates at confluence using above data:
30.040 25.925 20.713
Area of streams before confluence:
8.970 3.060 0.880
Results of confluence:
Total flow rate = 30.040(CFS)
Time of concentration = 10.432 min.
Effective stream area after confluence = 12.910(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 102.000(Ft.)
Highest elevation = 544.650(Ft.)
Lowest elevation = 542.670(Ft.)
Elevation difference = 1.980(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 3.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(102.000^.5)/(1.941^(1/3)]= 3.79
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.592(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.720(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.592(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.815(CFS) for 0.270(Ac.)
Total runoff = 2.535(CFS) Total area = 0.84(Ac.)

++
Process from Point/Station 403.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 539.670(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 34.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.535(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 2.535(CFS)
Normal flow depth in pipe = 3.16(In.)
Flow top width inside pipe = 10.57(In.)
Critical Depth = 8.18(In.)
Pipe flow velocity = 15.31(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 403.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 4
Stream flow area = 0.840(Ac.)
Runoff from this stream = 2.535(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 3.579(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.538	10.43	2.515
2	7.592	7.85	2.877
3	2.426	6.03	3.270
4	2.535	5.04	3.579

Qmax(1) =
1.000 * 1.000 * 21.538) +
0.874 * 1.000 * 7.592) +
0.769 * 1.000 * 2.426) +
0.703 * 1.000 * 2.535) + = 31.821
Qmax(2) =
1.000 * 0.752 * 21.538) +
1.000 * 1.000 * 7.592) +
0.880 * 1.000 * 2.426) +
0.804 * 1.000 * 2.535) + = 27.963
Qmax(3) =
1.000 * 0.578 * 21.538) +
1.000 * 0.769 * 7.592) +
1.000 * 1.000 * 2.426) +
0.914 * 1.000 * 2.535) + = 23.029
Qmax(4) =
1.000 * 0.483 * 21.538) +
1.000 * 0.642 * 7.592) +
1.000 * 0.835 * 2.426) +
1.000 * 1.000 * 2.535) + = 19.834

Total of 4 streams to confluence:

Flow rates before confluence point:
21.538 7.592 2.426 2.535
Maximum flow rates at confluence using above data:
31.821 27.963 23.029 19.834
Area of streams before confluence:
8.970 3.060 0.880 0.840
Results of confluence:
Total flow rate = 31.821(CFS)
Time of concentration = 10.432 min.
Effective stream area after confluence = 13.750(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 528.710(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 27.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 31.821(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 31.821(CFS)
Normal flow depth in pipe = 18.87(In.)
Flow top width inside pipe = 35.96(In.)
Critical Depth = 21.97(In.)
Pipe flow velocity = 8.49(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 10.49 min.

++
Process from Point/Station 67.000 to Point/Station 68.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.49 min.
Rainfall intensity = 2.509(In/Hr) for a 10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.105(CFS) for 0.050(Ac.)
Total runoff = 31.927(CFS) Total area = 13.80(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 13.800(Ac.)
Runoff from this stream = 31.927(CFS)
Time of concentration = 10.49 min.
Rainfall intensity = 2.509(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	27.687	12.87	2.279
2	31.927	10.49	2.509

Qmax(1) =
1.000 * 1.000 * 27.687) +
0.909 * 1.000 * 31.927) + = 56.693
Qmax(2) =
1.000 * 0.815 * 27.687) +
1.000 * 1.000 * 31.927) + = 54.485

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
       27.687       31.927
Maximum flow rates at confluence using above data:
       56.693       54.485
Area of streams before confluence:
       22.840       13.800


Results of confluence:
Total flow rate =       56.693(CFS)
Time of concentration =      12.869 min.
Effective stream area after confluence   =       36.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         92.000 to Point/Station         93.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   170.000(Ft.)
Highest elevation =   545.270(Ft.)
Lowest elevation =   533.000(Ft.)
Elevation difference =     12.270(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       3.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 170.000^.5)/(    7.218^(1/3)]=     3.16
Setting time of concentration to 5 minutes
Rainfall intensity (I) =        3.592(In/Hr) for a      10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        0.543(CFS)
Total initial stream area =          0.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         303.000 to Point/Station         70.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   319.000(Ft.)
Highest elevation =   550.000(Ft.)
Lowest elevation =   537.600(Ft.)
Elevation difference =     12.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 319.000^.5)/( 3.887^(1/3)]=     5.32
Rainfall intensity (I) =        3.483(In/Hr) for a      10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.258(CFS)
Total initial stream area =          0.430(Ac.)
End of computations, total study area =             37.250 (Ac.)
```

JN 20-002
SANYO LOGISTICS CENTER
PROPOSED CONDITION
25 YEAR STORM

San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4
Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 06/28/21

********* Hydrology Study Control Information **********

Program License Serial Number 4035

Rational hydrology study storm event year is 25.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Initial subarea flow distance = 1408.000(Ft.)
Highest elevation = 595.900(Ft.)
Lowest elevation = 560.000(Ft.)
Elevation difference = 35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/(2.550^(1/3)]= 7.42
Rainfall intensity (I) = 3.206(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 5.787(CFS)
Total initial stream area = 1.900(Ac.)

++

Process from Point/Station 2.000 to Point/Station 3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 549.300(Ft.)
Downstream point/station elevation = 549.080(Ft.)
Pipe length = 22.25(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.787(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 5.787(CFS)
Normal flow depth in pipe = 9.57(In.)
Flow top width inside pipe = 17.96(In.)
Critical Depth = 11.15(In.)
Pipe flow velocity = 6.06(Ft/s)

Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.787(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 5.787(CFS)
Normal flow depth in pipe = 7.10(In.)
Flow top width inside pipe = 25.50(In.)
Critical Depth = 9.54(In.)
Pipe flow velocity = 6.51(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 7.73 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.900(Ac.)
Runoff from this stream = 5.787(CFS)
Time of concentration = 7.73 min.
Rainfall intensity = 3.147(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.787	7.73	3.147

Qmax(1) =
1.000 * 1.000 * 5.787) + = 5.787

Total of 1 streams to confluence:
Flow rates before confluence point:
5.787
Maximum flow rates at confluence using above data:
5.787
Area of streams before confluence:
1.900
Results of confluence:
Total flow rate = 5.787(CFS)
Time of concentration = 7.732 min.
Effective stream area after confluence = 1.900(Ac.)

++
Process from Point/Station 55.000 to Point/Station 300.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 203.000(Ft.)
Highest elevation = 559.500(Ft.)
Lowest elevation = 557.580(Ft.)
Elevation difference = 1.920(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 6.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(203.000^.5)/(0.946^(1/3)]= 6.79

Rainfall intensity (I) = 3.335(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 0.756(CFS)
Total initial stream area = 0.270(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 553.420(Ft.)
Downstream point/station elevation = 551.000(Ft.)
Pipe length = 484.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.756(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 0.756(CFS)
Normal flow depth in pipe = 3.88(In.)
Flow top width inside pipe = 14.80(In.)
Critical Depth = 3.87(In.)
Pipe flow velocity = 2.70(Ft/s)
Travel time through pipe = 2.99 min.
Time of concentration (TC) = 9.78 min.

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.78 min.
Rainfall intensity = 2.840(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.859(CFS) for 0.360(Ac.)
Total runoff = 1.615(CFS) Total area = 0.63(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.78 min.
Rainfall intensity = 2.840(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.334(CFS) for 0.140(Ac.)
Total runoff = 1.949(CFS) Total area = 0.77(Ac.)

++
Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 551.000(Ft.)
Downstream point/station elevation = 549.500(Ft.)
Pipe length = 6.30(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.949(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.949(CFS)
Normal flow depth in pipe = 2.40(In.)
Flow top width inside pipe = 12.23(In.)
Critical Depth = 6.31(In.)
Pipe flow velocity = 13.93(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 9.79 min.

++

Process from Point/Station 302.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 549.500(Ft.)
Downstream point/station elevation = 548.890(Ft.)
Pipe length = 3.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.949(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.949(CFS)
Normal flow depth in pipe = 2.59(In.)
Flow top width inside pipe = 12.63(In.)
Critical Depth = 6.31(In.)
Pipe flow velocity = 12.49(Ft/s)
Travel time through pipe = 0.00 min.
Time of concentration (TC) = 9.79 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 9.79 min.
Rainfall intensity = 2.838(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.348(CFS) for 0.500(Ac.)
Total runoff = 3.297(CFS) Total area = 1.27(Ac.)

++
Process from Point/Station 56.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 548.890(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 101.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.297(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.297(CFS)
Normal flow depth in pipe = 5.52(In.)
Flow top width inside pipe = 16.60(In.)
Critical Depth = 8.30(In.)
Pipe flow velocity = 7.17(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 10.03 min.

++
Process from Point/Station 56.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.270(Ac.)
Runoff from this stream = 3.297(CFS)
Time of concentration = 10.03 min.
Rainfall intensity = 2.809(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.787	7.73	3.147

2 3.297 10.03 2.809
Qmax(1) =
1.000 * 1.000 * 5.787) +
1.000 * 0.771 * 3.297) + = 8.330
Qmax(2) =
0.893 * 1.000 * 5.787) +
1.000 * 1.000 * 3.297) + = 8.463

Total of 2 streams to confluence:
Flow rates before confluence point:
5.787 3.297
Maximum flow rates at confluence using above data:
8.330 8.463
Area of streams before confluence:
1.900 1.270
Results of confluence:
Total flow rate = 8.463(CFS)
Time of concentration = 10.026 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 4.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.510(Ft.)
Downstream point/station elevation = 542.920(Ft.)
Pipe length = 431.22(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.463(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 8.463(CFS)
Normal flow depth in pipe = 9.34(In.)
Flow top width inside pipe = 34.93(In.)
Critical Depth = 10.53(In.)
Pipe flow velocity = 5.31(Ft/s)
Travel time through pipe = 1.35 min.
Time of concentration (TC) = 11.38 min.

++
Process from Point/Station 4.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 3.170(Ac.)
Runoff from this stream = 8.463(CFS)
Time of concentration = 11.38 min.
Rainfall intensity = 2.659(In/Hr)
Summary of stream data:

Stream Flow rate TC Rainfall Intensity
No. (CFS) (min) (In/Hr)

1 8.463 11.38 2.659
Qmax(1) =
1.000 * 1.000 * 8.463) + = 8.463

Total of 1 main streams to confluence:
Flow rates before confluence point:
8.463
Maximum flow rates at confluence using above data:
8.463
Area of streams before confluence:
3.170

Results of confluence:
Total flow rate = 8.463(CFS)
Time of concentration = 11.380 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 107.000 to Point/Station 107.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 2.699(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 2.70(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 107.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 126.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 11.67(In.)
Flow top width inside pipe = 29.25(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 10.76(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 11.20 min.

++
Process from Point/Station 107.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.20 min.
Rainfall intensity = 2.678(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.463	11.38	2.659
2	19.000	11.20	2.678

Qmax(1) =
1.000 * 1.000 * 8.463) +
0.993 * 1.000 * 19.000) + = 27.328
Qmax(2) =
1.000 * 0.984 * 8.463) +
1.000 * 1.000 * 19.000) + = 27.325

Total of 2 main streams to confluence:
Flow rates before confluence point:
8.463 19.000
Maximum flow rates at confluence using above data:
27.328 27.325
Area of streams before confluence:

3.170 19.100

Results of confluence:
Total flow rate = 27.328(CFS)
Time of concentration = 11.380 min.
Effective stream area after confluence = 22.270(Ac.)

++
Process from Point/Station 60.000 to Point/Station 61.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 400.000(Ft.)
Highest elevation = 559.700(Ft.)
Lowest elevation = 551.370(Ft.)
Elevation difference = 8.330(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 7.33 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(400.000^.5)/(2.083^(1/3)]= 7.33
Rainfall intensity (I) = 3.223(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.543(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 61.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.500(Ft.)
Downstream point/station elevation = 545.140(Ft.)
Pipe length = 12.42(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.543(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.543(CFS)
Normal flow depth in pipe = 3.57(In.)
Flow top width inside pipe = 14.36(In.)
Critical Depth = 5.58(In.)
Pipe flow velocity = 6.20(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 7.36 min.

++
Process from Point/Station 303.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.140(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 22.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.543(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 1.543(CFS)
Normal flow depth in pipe = 2.26(In.)
Flow top width inside pipe = 15.83(In.)
Critical Depth = 4.83(In.)
Pipe flow velocity = 9.18(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 7.40 min.

++
Process from Point/Station 303.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.543(CFS)
Time of concentration = 7.40 min.
Rainfall intensity = 3.209(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.463	11.38	2.659
2	19.000	11.20	2.678
3	1.543	7.40	3.209

Qmax(1) =
1.000 * 1.000 * 8.463) +
0.993 * 1.000 * 19.000) +
0.829 * 1.000 * 1.543) + = 28.607
Qmax(2) =
1.000 * 0.984 * 8.463) +
1.000 * 1.000 * 19.000) +
0.835 * 1.000 * 1.543) + = 28.613
Qmax(3) =
1.000 * 0.651 * 8.463) +
1.000 * 0.661 * 19.000) +
1.000 * 1.000 * 1.543) + = 19.612

Total of 3 main streams to confluence:
Flow rates before confluence point:
8.463 19.000 1.543
Maximum flow rates at confluence using above data:
28.607 28.613 19.612
Area of streams before confluence:
3.170 19.100 0.570

Results of confluence:
Total flow rate = 28.613(CFS)
Time of concentration = 11.195 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 108.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 17.72(In.)
Flow top width inside pipe = 46.33(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 6.79(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 11.34 min.

++
Process from Point/Station 109.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
Upstream point/station elevation = 541.190(Ft.)

Downstream point/station elevation = 539.900(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 12.29(In.)
Flow top width inside pipe = 41.90(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 11.27(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.44 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 539.480(Ft.)
Downstream point/station elevation = 535.250(Ft.)
Pipe length = 254.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 12.75(In.)
Flow top width inside pipe = 42.40(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 10.70(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 11.84 min.

++
Process from Point/Station 14.000 to Point/Station 15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.830(Ft.)
Downstream point/station elevation = 533.560(Ft.)
Pipe length = 127.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 14.53(In.)
Flow top width inside pipe = 44.11(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 8.92(Ft/s)
Travel time through pipe = 0.24 min.
Time of concentration (TC) = 12.07 min.

++
Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.140(Ft.)
Downstream point/station elevation = 530.850(Ft.)
Pipe length = 227.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 14.50(In.)
Flow top width inside pipe = 44.08(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 8.94(Ft/s)
Travel time through pipe = 0.42 min.
Time of concentration (TC) = 12.50 min.

++
Process from Point/Station 16.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 530.490(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 193.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 28.613(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 28.613(CFS)
Normal flow depth in pipe = 14.41(In.)
Flow top width inside pipe = 44.00(In.)
Critical Depth = 19.01(In.)
Pipe flow velocity = 9.01(Ft/s)
Travel time through pipe = 0.36 min.
Time of concentration (TC) = 12.85 min.

++
Process from Point/Station 16.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 22.840(Ac.)
Runoff from this stream = 28.613(CFS)
Time of concentration = 12.85 min.
Rainfall intensity = 2.522(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	28.613	12.85	2.522

Qmax(1) =
1.000 * 1.000 * 28.613) + = 28.613

Total of 1 main streams to confluence:
Flow rates before confluence point:
28.613
Maximum flow rates at confluence using above data:
28.613
Area of streams before confluence:
22.840

Results of confluence:
Total flow rate = 28.613(CFS)
Time of concentration = 12.854 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 52.000 to Point/Station 53.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 81.000(Ft.)
Highest elevation = 544.910(Ft.)
Lowest elevation = 544.480(Ft.)
Elevation difference = 0.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(81.000^.5)/(0.531^(1/3)]= 5.20
Rainfall intensity (I) = 3.773(In/Hr) for a 25.0 year storm

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.521(CFS)
Total initial stream area =          0.480(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        52.000 to Point/Station        53.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =      5.20 min.
Rainfall intensity =      3.773(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.158(CFS) for     0.050(Ac.)
Total runoff =       1.680(CFS)           Total area =          0.53(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        53.000 to Point/Station        54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    541.840(Ft.)
Downstream point/station elevation =    541.280(Ft.)
Pipe length  =   112.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      1.680(CFS)
Given pipe size =      12.00(In.)
Calculated individual pipe flow  =      1.680(CFS)
Normal flow depth in pipe =     7.17(In.)
Flow top width inside pipe =    11.77(In.)
Critical Depth =     6.61(In.)
Pipe flow velocity =       3.43(Ft/s)
Travel time through pipe =     0.54 min.
Time of concentration (TC) =      5.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        53.000 to Point/Station        54.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =      5.75 min.
Rainfall intensity =      3.601(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       1.361(CFS) for     0.450(Ac.)
Total runoff =       3.041(CFS)           Total area =          0.98(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        54.000 to Point/Station        57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    541.280(Ft.)
Downstream point/station elevation =    540.380(Ft.)
Pipe length  =   180.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.041(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =      3.041(CFS)
Normal flow depth in pipe =     7.09(In.)
Flow top width inside pipe =    21.90(In.)
Critical Depth =     7.29(In.)
Pipe flow velocity =       3.92(Ft/s)
Travel time through pipe =     0.77 min.
Time of concentration (TC) =      6.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        54.000 to Point/Station        57.000
```

**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.51 min.
Rainfall intensity = 3.400(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.514(CFS) for 0.530(Ac.)
Total runoff = 4.555(CFS) Total area = 1.51(Ac.)

++
Process from Point/Station 54.000 to Point/Station 57.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.51 min.
Rainfall intensity = 3.400(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.286(CFS) for 0.100(Ac.)
Total runoff = 4.840(CFS) Total area = 1.61(Ac.)

++
Process from Point/Station 57.000 to Point/Station 58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 540.300(Ft.)
Downstream point/station elevation = 539.350(Ft.)
Pipe length = 206.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.840(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 4.840(CFS)
Normal flow depth in pipe = 9.26(In.)
Flow top width inside pipe = 23.36(In.)
Critical Depth = 9.28(In.)
Pipe flow velocity = 4.33(Ft/s)
Travel time through pipe = 0.79 min.
Time of concentration (TC) = 7.30 min.

++
Process from Point/Station 58.000 to Point/Station 62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.350(Ft.)
Downstream point/station elevation = 538.770(Ft.)
Pipe length = 115.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.840(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 4.840(CFS)
Normal flow depth in pipe = 9.04(In.)
Flow top width inside pipe = 23.26(In.)
Critical Depth = 9.28(In.)
Pipe flow velocity = 4.48(Ft/s)
Travel time through pipe = 0.43 min.
Time of concentration (TC) = 7.73 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 538.770(Ft.)
Downstream point/station elevation = 537.030(Ft.)
Pipe length = 347.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.840(CFS)
Given pipe size = 24.00(In.)

Calculated individual pipe flow = 4.840(CFS)
Normal flow depth in pipe = 9.05(In.)
Flow top width inside pipe = 23.26(In.)
Critical Depth = 9.28(In.)
Pipe flow velocity = 4.47(Ft/s)
Travel time through pipe = 1.30 min.
Time of concentration (TC) = 9.03 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.03 min.
Rainfall intensity = 2.940(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 11.682(CFS) for 4.730(Ac.)
Total runoff = 16.523(CFS) Total area = 6.34(Ac.)

++
Process from Point/Station 63.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 537.030(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 84.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.523(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 16.523(CFS)
Normal flow depth in pipe = 17.84(In.)
Flow top width inside pipe = 20.97(In.)
Critical Depth = 17.59(In.)
Pipe flow velocity = 6.60(Ft/s)
Travel time through pipe = 0.21 min.
Time of concentration (TC) = 9.24 min.

++
Process from Point/Station 63.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 6.340(Ac.)
Runoff from this stream = 16.523(CFS)
Time of concentration = 9.24 min.
Rainfall intensity = 2.911(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	16.523	9.24	2.911

Qmax(1) =
1.000 * 1.000 * 16.523) + = 16.523

Total of 1 streams to confluence:
Flow rates before confluence point:
16.523
Maximum flow rates at confluence using above data:
16.523
Area of streams before confluence:
6.340
Results of confluence:
Total flow rate = 16.523(CFS)

```
Time of concentration =       9.239 min.
Effective stream area after confluence =        6.340(Ac.)


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Process from Point/Station        52.000 to Point/Station        201.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =    90.000(Ft.)
Highest elevation =   544.890(Ft.)
Lowest elevation =   544.050(Ft.)
Elevation difference =      0.840(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       4.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(   90.000^.5)/(    0.933^(1/3)]=    4.54
Setting time of concentration to 5 minutes
Rainfall intensity (I) =        3.845(In/Hr) for a     25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.421(CFS)
Total initial stream area =          0.440(Ac.)


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Process from Point/Station        52.000 to Point/Station        201.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.00 min.
Rainfall intensity =        3.845(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =        0.549(CFS) for     0.170(Ac.)
Total runoff =        1.970(CFS)           Total area =          0.61(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        52.000 to Point/Station        201.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.00 min.
Rainfall intensity =        3.845(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =        0.258(CFS) for     0.080(Ac.)
Total runoff =        2.229(CFS)           Total area =          0.69(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        201.000 to Point/Station        202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    541.640(Ft.)
Downstream point/station elevation =    541.190(Ft.)
Pipe length   =     89.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =      2.229(CFS)
Given pipe size =       12.00(In.)
Calculated individual pipe flow   =      2.229(CFS)
Normal flow depth in pipe =      8.73(In.)
Flow top width inside pipe =     10.69(In.)
Critical Depth =      7.66(In.)
Pipe flow velocity =        3.64(Ft/s)
Travel time through pipe =      0.41 min.
Time of concentration (TC) =       5.41 min.


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Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.41 min.
Rainfall intensity = 3.705(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.743(CFS) for 0.560(Ac.)
Total runoff = 3.971(CFS) Total area = 1.25(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.41 min.
Rainfall intensity = 3.705(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.840(CFS) for 0.270(Ac.)
Total runoff = 4.812(CFS) Total area = 1.52(Ac.)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 541.190(Ft.)
Downstream point/station elevation = 539.600(Ft.)
Pipe length = 242.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.812(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 4.812(CFS)
Normal flow depth in pipe = 11.32(In.)
Flow top width inside pipe = 12.91(In.)
Critical Depth = 10.68(In.)
Pipe flow velocity = 4.84(Ft/s)
Travel time through pipe = 0.83 min.
Time of concentration (TC) = 6.24 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.600(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 300.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.812(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 4.812(CFS)
Normal flow depth in pipe = 9.52(In.)
Flow top width inside pipe = 14.45(In.)
Critical Depth = 10.68(In.)
Pipe flow velocity = 5.86(Ft/s)
Travel time through pipe = 0.85 min.
Time of concentration (TC) = 7.09 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.09 min.
Rainfall intensity = 3.271(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840

Subarea runoff = 2.005(CFS) for 0.730(Ac.)
Total runoff = 6.817(CFS) Total area = 2.25(Ac.)

++
Process from Point/Station 203.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 2.250(Ac.)
Runoff from this stream = 6.817(CFS)
Time of concentration = 7.09 min.
Rainfall intensity = 3.271(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	16.523	9.24	2.911
2	6.817	7.09	3.271

Qmax(1) =
1.000 * 1.000 * 16.523) +
0.890 * 1.000 * 6.817) + = 22.589
Qmax(2) =
1.000 * 0.768 * 16.523) +
1.000 * 1.000 * 6.817) + = 19.504

Total of 2 streams to confluence:
Flow rates before confluence point:
16.523 6.817
Maximum flow rates at confluence using above data:
22.589 19.504
Area of streams before confluence:
6.340 2.250

Results of confluence:
Total flow rate = 22.589(CFS)
Time of concentration = 9.239 min.
Effective stream area after confluence = 8.590(Ac.)

++
Process from Point/Station 64.000 to Point/Station 65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 536.480(Ft.)
Downstream point/station elevation = 534.950(Ft.)
Pipe length = 306.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 22.589(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 22.589(CFS)
Normal flow depth in pipe = 17.55(In.)
Flow top width inside pipe = 35.99(In.)
Critical Depth = 18.37(In.)
Pipe flow velocity = 6.60(Ft/s)
Travel time through pipe = 0.77 min.
Time of concentration (TC) = 10.01 min.

++
Process from Point/Station 64.000 to Point/Station 65.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.01 min.
Rainfall intensity = 2.811(In/Hr) for a 25.0 year storm

Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.897(CFS) for 0.380(Ac.)
Total runoff = 23.487(CFS) Total area = 8.97(Ac.)

++
Process from Point/Station 65.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.950(Ft.)
Downstream point/station elevation = 534.360(Ft.)
Pipe length = 117.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 23.487(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 23.487(CFS)
Normal flow depth in pipe = 17.91(In.)
Flow top width inside pipe = 36.00(In.)
Critical Depth = 18.73(In.)
Pipe flow velocity = 6.69(Ft/s)
Travel time through pipe = 0.29 min.
Time of concentration (TC) = 10.30 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.360(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 28.16(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 23.487(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 23.487(CFS)
Normal flow depth in pipe = 8.72(In.)
Flow top width inside pipe = 30.85(In.)
Critical Depth = 18.73(In.)
Pipe flow velocity = 17.77(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 10.33 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.970(Ac.)
Runoff from this stream = 23.487(CFS)
Time of concentration = 10.33 min.
Rainfall intensity = 2.773(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.487	10.33	2.773

Qmax(1) =
1.000 * 1.000 * 23.487) + = 23.487

Total of 1 streams to confluence:
Flow rates before confluence point:
23.487
Maximum flow rates at confluence using above data:
23.487
Area of streams before confluence:
8.970

```
Results of confluence:
Total flow rate =       23.487(CFS)
Time of concentration =     10.330 min.
Effective stream area after confluence =        8.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       400.000 to Point/Station       401.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =  284.000(Ft.)
Highest elevation =  546.430(Ft.)
Lowest elevation =  541.360(Ft.)
Elevation difference =     5.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      6.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 284.000^.5)/( 1.785^(1/3)]=    6.50
Rainfall intensity (I) =       3.402(In/Hr) for a     25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.086(CFS)
Total initial stream area =          0.380(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =    537.360(Ft.)
Downstream point/station elevation =    533.490(Ft.)
Pipe length  =     63.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      1.086(CFS)
Given pipe size =      18.00(In.)
Calculated individual pipe flow  =      1.086(CFS)
Normal flow depth in pipe =     2.51(In.)
Flow top width inside pipe =    12.46(In.)
Critical Depth =     4.67(In.)
Pipe flow velocity =       7.27(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =      6.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.65 min.
Rainfall intensity =       3.368(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       1.103(CFS) for     0.390(Ac.)
Total runoff =       2.189(CFS)          Total area =          0.77(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =      6.65 min.
Rainfall intensity =       3.368(In/Hr) for a     25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =       0.424(CFS) for     0.150(Ac.)
Total runoff =       2.614(CFS)          Total area =          0.92(Ac.)
```

++
Process from Point/Station 71.000 to Point/Station 72.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.490(Ft.)
Downstream point/station elevation = 532.560(Ft.)
Pipe length = 186.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.614(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.614(CFS)
Normal flow depth in pipe = 5.50(In.)
Flow top width inside pipe = 28.34(In.)
Critical depth could not be calculated.
Pipe flow velocity = 3.51(Ft/s)
Travel time through pipe = 0.88 min.
Time of concentration (TC) = 7.53 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 532.560(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 61.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.614(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.614(CFS)
Normal flow depth in pipe = 5.48(In.)
Flow top width inside pipe = 28.30(In.)
Critical depth could not be calculated.
Pipe flow velocity = 3.54(Ft/s)
Travel time through pipe = 0.29 min.
Time of concentration (TC) = 7.82 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.82 min.
Rainfall intensity = 3.132(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 5.631(CFS) for 2.140(Ac.)
Total runoff = 8.245(CFS) Total area = 3.06(Ac.)

++
Process from Point/Station 72.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 3.060(Ac.)
Runoff from this stream = 8.245(CFS)
Time of concentration = 7.82 min.
Rainfall intensity = 3.132(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.487	10.33	2.773
2	8.245	7.82	3.132

Qmax(1) =
1.000 * 1.000 * 23.487) +

```
              0.885 *     1.000 *      8.245) + =        30.786
Qmax(2) =
              1.000 *     0.757 *     23.487) +
              1.000 *     1.000 *      8.245) + =        26.015

Total of 2 streams to confluence:
Flow rates before confluence point:
        23.487          8.245
Maximum flow rates at confluence using above data:
         30.786          26.015
Area of streams before confluence:
          8.970          3.060
Results of confluence:
Total flow rate =       30.786(CFS)
Time of concentration =      10.330 min.
Effective stream area after confluence =       12.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   155.000(Ft.)
Highest elevation =   545.810(Ft.)
Lowest elevation =   544.380(Ft.)
Elevation difference =      1.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.99 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 155.000^.5)/( 0.923^(1/3)]=    5.99
Rainfall intensity (I) =        3.534(In/Hr) for a      25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =        1.514(CFS)
Total initial stream area =          0.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         91.000 to Point/Station         80.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =       5.99 min.
Rainfall intensity =        3.534(In/Hr) for a      25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =        1.098(CFS) for      0.370(Ac.)
Total runoff =        2.612(CFS)            Total area =          0.88(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         80.000 to Point/Station         67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =     540.190(Ft.)
Downstream point/station elevation =     532.250(Ft.)
Pipe length   =      40.00(Ft.)    Manning's N = 0.013
No. of pipes = 1   Required pipe flow   =       2.612(CFS)
Given pipe size =       12.00(In.)
Calculated individual pipe flow   =       2.612(CFS)
Normal flow depth in pipe =      3.29(In.)
Flow top width inside pipe =     10.71(In.)
Critical Depth =      8.32(In.)
Pipe flow velocity =       14.93(Ft/s)
Travel time through pipe =      0.04 min.
Time of concentration (TC) =       6.03 min.
```

++
Process from Point/Station 80.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.880(Ac.)
Runoff from this stream = 2.612(CFS)
Time of concentration = 6.03 min.
Rainfall intensity = 3.522(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.487	10.33	2.773
2	8.245	7.82	3.132
3	2.612	6.03	3.522

Qmax(1) =
1.000 * 1.000 * 23.487) +
0.885 * 1.000 * 8.245) +
0.787 * 1.000 * 2.612) + = 32.842
Qmax(2) =
1.000 * 0.757 * 23.487) +
1.000 * 1.000 * 8.245) +
0.889 * 1.000 * 2.612) + = 28.338
Qmax(3) =
1.000 * 0.584 * 23.487) +
1.000 * 0.772 * 8.245) +
1.000 * 1.000 * 2.612) + = 22.683

Total of 3 streams to confluence:
Flow rates before confluence point:
23.487 8.245 2.612
Maximum flow rates at confluence using above data:
32.842 28.338 22.683
Area of streams before confluence:
8.970 3.060 0.880
Results of confluence:
Total flow rate = 32.842(CFS)
Time of concentration = 10.330 min.
Effective stream area after confluence = 12.910(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 102.000(Ft.)
Highest elevation = 544.650(Ft.)
Lowest elevation = 542.670(Ft.)
Elevation difference = 1.980(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 3.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(102.000^.5)/(1.941^(1/3)]= 3.79
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 3.845(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.841(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 3.845(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.872(CFS) for 0.270(Ac.)
Total runoff = 2.713(CFS) Total area = 0.84(Ac.)

++
Process from Point/Station 403.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.670(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 34.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.713(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 2.713(CFS)
Normal flow depth in pipe = 3.28(In.)
Flow top width inside pipe = 10.69(In.)
Critical Depth = 8.47(In.)
Pipe flow velocity = 15.61(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 403.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 4
Stream flow area = 0.840(Ac.)
Runoff from this stream = 2.713(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 3.832(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.487	10.33	2.773
2	8.245	7.82	3.132
3	2.612	6.03	3.522
4	2.713	5.04	3.832

Qmax(1) =
1.000 * 1.000 * 23.487) +
0.885 * 1.000 * 8.245) +
0.787 * 1.000 * 2.612) +
0.724 * 1.000 * 2.713) + = 34.806
Qmax(2) =
1.000 * 0.757 * 23.487) +
1.000 * 1.000 * 8.245) +
0.889 * 1.000 * 2.612) +
0.817 * 1.000 * 2.713) + = 30.556
Qmax(3) =
1.000 * 0.584 * 23.487) +
1.000 * 0.772 * 8.245) +
1.000 * 1.000 * 2.612) +
0.919 * 1.000 * 2.713) + = 25.177
Qmax(4) =
1.000 * 0.488 * 23.487) +
1.000 * 0.644 * 8.245) +
1.000 * 0.835 * 2.612) +
1.000 * 1.000 * 2.713) + = 21.659

Total of 4 streams to confluence:
Flow rates before confluence point:
23.487 8.245 2.612 2.713
Maximum flow rates at confluence using above data:
34.806 30.556 25.177 21.659
Area of streams before confluence:
8.970 3.060 0.880 0.840
Results of confluence:
Total flow rate = 34.806(CFS)
Time of concentration = 10.330 min.
Effective stream area after confluence = 13.750(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 528.710(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 27.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 34.806(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 34.806(CFS)
Normal flow depth in pipe = 19.92(In.)
Flow top width inside pipe = 35.79(In.)
Critical Depth = 23.01(In.)
Pipe flow velocity = 8.67(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 10.38 min.

++
Process from Point/Station 67.000 to Point/Station 68.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.38 min.
Rainfall intensity = 2.767(In/Hr) for a 25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.116(CFS) for 0.050(Ac.)
Total runoff = 34.922(CFS) Total area = 13.80(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 13.800(Ac.)
Runoff from this stream = 34.922(CFS)
Time of concentration = 10.38 min.
Rainfall intensity = 2.767(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	28.613	12.85	2.522
2	34.922	10.38	2.767

Qmax(1) =
1.000 * 1.000 * 28.613) +
0.912 * 1.000 * 34.922) + = 60.447
Qmax(2) =
1.000 * 0.808 * 28.613) +
1.000 * 1.000 * 34.922) + = 58.032

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
        28.613        34.922
Maximum flow rates at confluence using above data:
         60.447         58.032
Area of streams before confluence:
         22.840         13.800


Results of confluence:
Total flow rate =       60.447(CFS)
Time of concentration =      12.854 min.
Effective stream area after confluence   =       36.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         92.000 to Point/Station         93.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   170.000(Ft.)
Highest elevation =   545.270(Ft.)
Lowest elevation =   533.000(Ft.)
Elevation difference =     12.270(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       3.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 170.000^.5)/(    7.218^(1/3)]=     3.16
Setting time of concentration to 5 minutes
Rainfall intensity (I) =        3.845(In/Hr) for a      25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =         0.581(CFS)
Total initial stream area =          0.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station         303.000 to Point/Station         70.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance   =   319.000(Ft.)
Highest elevation =   550.000(Ft.)
Lowest elevation =   537.600(Ft.)
Elevation difference =     12.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 319.000^.5)/( 3.887^(1/3)]=     5.32
Rainfall intensity (I) =        3.735(In/Hr) for a      25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =         1.349(CFS)
Total initial stream area =          0.430(Ac.)
End of computations, total study area =             37.250 (Ac.)
```

J.N. 20-004
SANYO LOGISTICS
PROPOSED CONDITION
50 YEAR STORM

```
San Diego County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4
Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
            Rational Hydrology Study        Date: 06/28/21
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4035

------------------------------------------------------------------------
Rational hydrology study storm event year is    50.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Initial subarea flow distance  = 1408.000(Ft.)
Highest elevation =  595.900(Ft.)
Lowest elevation =  560.000(Ft.)
Elevation difference =   35.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     7.42 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(1408.000^.5)/( 2.550^(1/3)]=   7.42
Rainfall intensity (I) =      3.602(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      6.501(CFS)
Total initial stream area =        1.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   549.300(Ft.)
Downstream point/station elevation =   549.080(Ft.)
Pipe length  =    22.25(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.501(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     6.501(CFS)
Normal flow depth in pipe =   10.28(In.)
Flow top width inside pipe =   17.82(In.)
```

Critical Depth = 11.83(In.)
Pipe flow velocity = 6.23(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 7.48 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 547.820(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 99.56(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.501(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 6.501(CFS)
Normal flow depth in pipe = 7.54(In.)
Flow top width inside pipe = 26.02(In.)
Critical Depth = 10.13(In.)
Pipe flow velocity = 6.73(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 7.72 min.

++
Process from Point/Station 3.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.900(Ac.)
Runoff from this stream = 6.501(CFS)
Time of concentration = 7.72 min.
Rainfall intensity = 3.542(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.501	7.72	3.542

Qmax(1) =
1.000 * 1.000 * 6.501) + = 6.501

Total of 1 streams to confluence:
Flow rates before confluence point:
6.501
Maximum flow rates at confluence using above data:
6.501
Area of streams before confluence:
1.900
Results of confluence:
Total flow rate = 6.501(CFS)
Time of concentration = 7.722 min.
Effective stream area after confluence = 1.900(Ac.)

++
Process from Point/Station 55.000 to Point/Station 300.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 203.000(Ft.)
Highest elevation = 559.500(Ft.)
Lowest elevation = 557.580(Ft.)
Elevation difference = 1.920(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 6.79 min.

TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(203.000^.5)/(0.946^(1/3)]= 6.79
Rainfall intensity (I) = 3.735(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 0.847(CFS)
Total initial stream area = 0.270(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 553.420(Ft.)
Downstream point/station elevation = 551.000(Ft.)
Pipe length = 484.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.847(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 0.847(CFS)
Normal flow depth in pipe = 4.10(In.)
Flow top width inside pipe = 15.10(In.)
Critical Depth = 4.11(In.)
Pipe flow velocity = 2.79(Ft/s)
Travel time through pipe = 2.89 min.
Time of concentration (TC) = 9.68 min.

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.68 min.
Rainfall intensity = 3.232(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.977(CFS) for 0.360(Ac.)
Total runoff = 1.825(CFS) Total area = 0.63(Ac.)

++
Process from Point/Station 300.000 to Point/Station 301.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.68 min.
Rainfall intensity = 3.232(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.380(CFS) for 0.140(Ac.)
Total runoff = 2.205(CFS) Total area = 0.77(Ac.)

++
Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 551.000(Ft.)
Downstream point/station elevation = 549.500(Ft.)
Pipe length = 6.30(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.205(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.205(CFS)
Normal flow depth in pipe = 2.54(In.)
Flow top width inside pipe = 12.54(In.)
Critical Depth = 6.72(In.)
Pipe flow velocity = 14.45(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 9.69 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 549.500(Ft.)
Downstream point/station elevation = 548.890(Ft.)
Pipe length = 3.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.205(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.205(CFS)
Normal flow depth in pipe = 2.74(In.)
Flow top width inside pipe = 12.94(In.)
Critical Depth = 6.72(In.)
Pipe flow velocity = 12.95(Ft/s)
Travel time through pipe = 0.00 min.
Time of concentration (TC) = 9.69 min.

++
Process from Point/Station 302.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****
_____
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
Time of concentration = 9.69 min.
Rainfall intensity = 3.230(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff = 1.534(CFS) for 0.500(Ac.)
Total runoff = 3.739(CFS) Total area = 1.27(Ac.)

++
Process from Point/Station 56.000 to Point/Station 4.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 548.890(Ft.)
Downstream point/station elevation = 546.510(Ft.)
Pipe length = 101.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.739(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.739(CFS)
Normal flow depth in pipe = 5.89(In.)
Flow top width inside pipe = 16.89(In.)
Critical Depth = 8.87(In.)
Pipe flow velocity = 7.43(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 9.92 min.

++
Process from Point/Station 56.000 to Point/Station 4.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 1.270(Ac.)
Runoff from this stream = 3.739(CFS)
Time of concentration = 9.92 min.
Rainfall intensity = 3.201(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

```
1       6.501     7.72                3.542
2       3.739     9.92                3.201
Qmax(1) =
            1.000 *   1.000 *    6.501) +
            1.000 *   0.778 *    3.739) + =      9.411
Qmax(2) =
            0.904 *   1.000 *    6.501) +
            1.000 *   1.000 *    3.739) + =      9.613

Total of 2 streams to confluence:
Flow rates before confluence point:
      6.501      3.739
Maximum flow rates at confluence using above data:
       9.411      9.613
Area of streams before confluence:
       1.900      1.270
Results of confluence:
Total flow rate =      9.613(CFS)
Time of concentration =      9.920 min.
Effective stream area after confluence =      3.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   545.510(Ft.)
Downstream point/station elevation =   542.920(Ft.)
Pipe length  =   431.22(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.613(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =     9.613(CFS)
Normal flow depth in pipe =    9.96(In.)
Flow top width inside pipe =   35.73(In.)
Critical Depth =   11.22(In.)
Pipe flow velocity =      5.51(Ft/s)
Travel time through pipe =    1.30 min.
Time of concentration (TC) =    11.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station      108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.170(Ac.)
Runoff from this stream =      9.613(CFS)
Time of concentration =   11.22 min.
Rainfall intensity =     3.046(In/Hr)
Summary of stream data:

Stream   Flow rate      TC          Rainfall Intensity
 No.       (CFS)       (min)             (In/Hr)


1       9.613     11.22                3.046
Qmax(1) =
            1.000 *   1.000 *    9.613) + =      9.613

Total of 1 main streams to confluence:
Flow rates before confluence point:
      9.613
Maximum flow rates at confluence using above data:
       9.613
Area of streams before confluence:
```

3.170

Results of confluence:
Total flow rate = 9.613(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 3.170(Ac.)

++
Process from Point/Station 107.000 to Point/Station 107.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_____
User specified 'C' value of 0.450 given for subarea
Rainfall intensity (I) = 3.071(In/Hr) for a 50.0 year storm
User specified values are as follows:
TC = 11.00 min. Rain intensity = 3.07(In/Hr)
Total area = 19.100(Ac.) Total runoff = 19.000(CFS)

++
Process from Point/Station 107.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 545.410(Ft.)
Downstream point/station elevation = 542.770(Ft.)
Pipe length = 126.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.000(CFS)
Given pipe size = 30.00(In.)
Calculated individual pipe flow = 19.000(CFS)
Normal flow depth in pipe = 11.67(In.)
Flow top width inside pipe = 29.25(In.)
Critical Depth = 17.74(In.)
Pipe flow velocity = 10.76(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 11.20 min.

++
Process from Point/Station 107.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 19.100(Ac.)
Runoff from this stream = 19.000(CFS)
Time of concentration = 11.20 min.
Rainfall intensity = 3.049(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.613	11.22	3.046
2	19.000	11.20	3.049

Qmax(1) =
1.000 * 1.000 * 9.613) +
0.999 * 1.000 * 19.000) + = 28.593
Qmax(2) =
1.000 * 0.997 * 9.613) +
1.000 * 1.000 * 19.000) + = 28.588

Total of 2 main streams to confluence:
Flow rates before confluence point:
9.613 19.000
Maximum flow rates at confluence using above data:

```
      28.593       28.588
Area of streams before confluence:
       3.170       19.100


Results of confluence:
Total flow rate =      28.593(CFS)
Time of concentration =     11.225 min.
Effective stream area after confluence  =      22.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       61.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =  400.000(Ft.)
Highest elevation =  559.700(Ft.)
Lowest elevation =  551.370(Ft.)
Elevation difference =     8.330(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      7.33 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 400.000^.5)/( 2.083^(1/3)]=   7.33
Rainfall intensity (I) =      3.619(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =       1.733(CFS)
Total initial stream area =         0.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station      303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   545.500(Ft.)
Downstream point/station elevation =   545.140(Ft.)
Pipe length  =    12.42(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.733(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.733(CFS)
Normal flow depth in pipe =    3.79(In.)
Flow top width inside pipe =   14.67(In.)
Critical Depth =    5.93(In.)
Pipe flow velocity =       6.41(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =      7.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   545.140(Ft.)
Downstream point/station elevation =   542.770(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.733(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =     1.733(CFS)
Normal flow depth in pipe =    2.39(In.)
Flow top width inside pipe =   16.23(In.)
Critical Depth =    5.13(In.)
Pipe flow velocity =       9.51(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =      7.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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Process from Point/Station 303.000 to Point/Station 108.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area = 0.570(Ac.)
Runoff from this stream = 1.733(CFS)
Time of concentration = 7.40 min.
Rainfall intensity = 3.605(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.613	11.22	3.046
2	19.000	11.20	3.049
3	1.733	7.40	3.605

Qmax(1) =
1.000 * 1.000 * 9.613) +
0.999 * 1.000 * 19.000) +
0.845 * 1.000 * 1.733) + = 30.058
Qmax(2) =
1.000 * 0.997 * 9.613) +
1.000 * 1.000 * 19.000) +
0.846 * 1.000 * 1.733) + = 30.054
Qmax(3) =
1.000 * 0.659 * 9.613) +
1.000 * 0.661 * 19.000) +
1.000 * 1.000 * 1.733) + = 20.631

Total of 3 main streams to confluence:
Flow rates before confluence point:
9.613 19.000 1.733
Maximum flow rates at confluence using above data:
30.058 30.054 20.631
Area of streams before confluence:
3.170 19.100 0.570

Results of confluence:
Total flow rate = 30.058(CFS)
Time of concentration = 11.225 min.
Effective stream area after confluence = 22.840(Ac.)

++
Process from Point/Station 108.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 542.420(Ft.)
Downstream point/station elevation = 542.140(Ft.)
Pipe length = 59.60(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 30.058(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 30.058(CFS)
Normal flow depth in pipe = 18.19(In.)
Flow top width inside pipe = 46.57(In.)
Critical Depth = 19.50(In.)
Pipe flow velocity = 6.88(Ft/s)
Travel time through pipe = 0.14 min.
Time of concentration (TC) = 11.37 min.

++
Process from Point/Station 109.000 to Point/Station 13.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 541.190(Ft.)
Downstream point/station elevation = 539.900(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 30.058(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 30.058(CFS)
Normal flow depth in pipe = 12.60(In.)
Flow top width inside pipe = 42.24(In.)
Critical Depth = 19.50(In.)
Pipe flow velocity = 11.43(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 11.47 min.

++
Process from Point/Station 13.000 to Point/Station 14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.480(Ft.)
Downstream point/station elevation = 535.250(Ft.)
Pipe length = 254.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 30.058(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 30.058(CFS)
Normal flow depth in pipe = 13.07(In.)
Flow top width inside pipe = 42.73(In.)
Critical Depth = 19.50(In.)
Pipe flow velocity = 10.85(Ft/s)
Travel time through pipe = 0.39 min.
Time of concentration (TC) = 11.86 min.

++
Process from Point/Station 14.000 to Point/Station 15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 534.830(Ft.)
Downstream point/station elevation = 533.560(Ft.)
Pipe length = 127.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 30.058(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 30.058(CFS)
Normal flow depth in pipe = 14.91(In.)
Flow top width inside pipe = 44.42(In.)
Critical Depth = 19.50(In.)
Pipe flow velocity = 9.04(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 12.09 min.

++
Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 533.140(Ft.)
Downstream point/station elevation = 530.850(Ft.)
Pipe length = 227.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 30.058(CFS)
Given pipe size = 48.00(In.)
Calculated individual pipe flow = 30.058(CFS)
Normal flow depth in pipe = 14.87(In.)
Flow top width inside pipe = 44.39(In.)
Critical Depth = 19.50(In.)
Pipe flow velocity = 9.07(Ft/s)
Travel time through pipe = 0.42 min.
Time of concentration (TC) = 12.51 min.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =   530.490(Ft.)
Downstream point/station elevation =   528.500(Ft.)
Pipe length  =   193.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.058(CFS)
Given pipe size =     48.00(In.)
Calculated individual pipe flow  =    30.058(CFS)
Normal flow depth in pipe =   14.79(In.)
Flow top width inside pipe =   44.32(In.)
Critical Depth =   19.50(In.)
Pipe flow velocity =      9.14(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    12.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       68.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.840(Ac.)
Runoff from this stream =     30.058(CFS)
Time of concentration =   12.86 min.
Rainfall intensity =     2.884(In/Hr)
Summary of stream data:

Stream   Flow rate      TC          Rainfall Intensity
 No.       (CFS)       (min)              (In/Hr)


1       30.058     12.86                  2.884
Qmax(1) =
              1.000 *    1.000 *    30.058) + =      30.058

Total of 1 main streams to confluence:
Flow rates before confluence point:
      30.058
Maximum flow rates at confluence using above data:
       30.058
Area of streams before confluence:
       22.840


Results of confluence:
Total flow rate =     30.058(CFS)
Time of concentration =    12.860 min.
Effective stream area after confluence  =     22.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       53.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =   81.000(Ft.)
Highest elevation =  544.910(Ft.)
Lowest elevation =  544.480(Ft.)
Elevation difference =    0.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
```

TC = [1.8*(1.1-0.8400)*(81.000^.5)/(0.531^(1/3)]= 5.20
Rainfall intensity (I) = 4.191(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.690(CFS)
Total initial stream area = 0.480(Ac.)

++
Process from Point/Station 52.000 to Point/Station 53.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.20 min.
Rainfall intensity = 4.191(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.176(CFS) for 0.050(Ac.)
Total runoff = 1.866(CFS) Total area = 0.53(Ac.)

++
Process from Point/Station 53.000 to Point/Station 54.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.840(Ft.)
Downstream point/station elevation = 541.280(Ft.)
Pipe length = 112.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.866(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 1.866(CFS)
Normal flow depth in pipe = 7.69(In.)
Flow top width inside pipe = 11.52(In.)
Critical Depth = 6.98(In.)
Pipe flow velocity = 3.51(Ft/s)
Travel time through pipe = 0.53 min.
Time of concentration (TC) = 5.73 min.

++
Process from Point/Station 53.000 to Point/Station 54.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.73 min.
Rainfall intensity = 4.016(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.518(CFS) for 0.450(Ac.)
Total runoff = 3.384(CFS) Total area = 0.98(Ac.)

++
Process from Point/Station 54.000 to Point/Station 57.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.280(Ft.)
Downstream point/station elevation = 540.380(Ft.)
Pipe length = 180.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.384(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 3.384(CFS)
Normal flow depth in pipe = 7.49(In.)
Flow top width inside pipe = 22.24(In.)
Critical Depth = 7.71(In.)
Pipe flow velocity = 4.04(Ft/s)
Travel time through pipe = 0.74 min.
Time of concentration (TC) = 6.48 min.

++
Process from Point/Station 54.000 to Point/Station 57.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.48 min.
Rainfall intensity = 3.811(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.697(CFS) for 0.530(Ac.)
Total runoff = 5.080(CFS) Total area = 1.51(Ac.)

++
Process from Point/Station 54.000 to Point/Station 57.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 6.48 min.
Rainfall intensity = 3.811(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.320(CFS) for 0.100(Ac.)
Total runoff = 5.401(CFS) Total area = 1.61(Ac.)

++
Process from Point/Station 57.000 to Point/Station 58.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 540.300(Ft.)
Downstream point/station elevation = 539.350(Ft.)
Pipe length = 206.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.401(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 5.401(CFS)
Normal flow depth in pipe = 9.82(In.)
Flow top width inside pipe = 23.60(In.)
Critical Depth = 9.84(In.)
Pipe flow velocity = 4.46(Ft/s)
Travel time through pipe = 0.77 min.
Time of concentration (TC) = 7.25 min.

++
Process from Point/Station 58.000 to Point/Station 62.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 539.350(Ft.)
Downstream point/station elevation = 538.770(Ft.)
Pipe length = 115.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.401(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 5.401(CFS)
Normal flow depth in pipe = 9.59(In.)
Flow top width inside pipe = 23.51(In.)
Critical Depth = 9.84(In.)
Pipe flow velocity = 4.61(Ft/s)
Travel time through pipe = 0.42 min.
Time of concentration (TC) = 7.66 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 538.770(Ft.)
Downstream point/station elevation = 537.030(Ft.)
Pipe length = 347.00(Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 5.401(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 5.401(CFS)
Normal flow depth in pipe = 9.60(In.)
Flow top width inside pipe = 23.51(In.)
Critical Depth = 9.84(In.)
Pipe flow velocity = 4.60(Ft/s)
Travel time through pipe = 1.26 min.
Time of concentration (TC) = 8.92 min.

++
Process from Point/Station 62.000 to Point/Station 63.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 8.92 min.
Rainfall intensity = 3.340(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 13.272(CFS) for 4.730(Ac.)
Total runoff = 18.673(CFS) Total area = 6.34(Ac.)

++
Process from Point/Station 63.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 537.030(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 84.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 18.673(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 18.673(CFS)
Normal flow depth in pipe = 20.16(In.)
Flow top width inside pipe = 17.60(In.)
Critical Depth = 18.66(In.)
Pipe flow velocity = 6.63(Ft/s)
Travel time through pipe = 0.21 min.
Time of concentration (TC) = 9.13 min.

++
Process from Point/Station 63.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 6.340(Ac.)
Runoff from this stream = 18.673(CFS)
Time of concentration = 9.13 min.
Rainfall intensity = 3.309(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.673	9.13	3.309

Qmax(1) =
1.000 * 1.000 * 18.673) + = 18.673

Total of 1 streams to confluence:
Flow rates before confluence point:
18.673
Maximum flow rates at confluence using above data:
18.673
Area of streams before confluence:
6.340

Results of confluence:
Total flow rate = 18.673(CFS)
Time of concentration = 9.130 min.
Effective stream area after confluence = 6.340(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 90.000(Ft.)
Highest elevation = 544.890(Ft.)
Lowest elevation = 544.050(Ft.)
Elevation difference = 0.840(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 4.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(90.000^.5)/(0.933^(1/3)]= 4.54
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.265(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 1.576(CFS)
Total initial stream area = 0.440(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 4.265(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.609(CFS) for 0.170(Ac.)
Total runoff = 2.185(CFS) Total area = 0.61(Ac.)

++
Process from Point/Station 52.000 to Point/Station 201.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 4.265(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.287(CFS) for 0.080(Ac.)
Total runoff = 2.472(CFS) Total area = 0.69(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 541.640(Ft.)
Downstream point/station elevation = 541.190(Ft.)
Pipe length = 89.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.472(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 2.472(CFS)
Normal flow depth in pipe = 9.59(In.)
Flow top width inside pipe = 9.62(In.)
Critical Depth = 8.08(In.)
Pipe flow velocity = 3.68(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 5.40 min.

++
Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.40 min.
Rainfall intensity = 4.121(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.939(CFS) for 0.560(Ac.)
Total runoff = 4.411(CFS) Total area = 1.25(Ac.)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.40 min.
Rainfall intensity = 4.121(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.935(CFS) for 0.270(Ac.)
Total runoff = 5.345(CFS) Total area = 1.52(Ac.)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 541.190(Ft.)
Downstream point/station elevation = 539.600(Ft.)
Pipe length = 242.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.345(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 5.345(CFS)
Normal flow depth in pipe = 15.00(In.)
Flow top width inside pipe = 0.00(In.)
Critical Depth = 11.24(In.)
Pipe flow velocity = 4.27(Ft/s)
Travel time through pipe = 0.95 min.
Time of concentration (TC) = 6.35 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.600(Ft.)
Downstream point/station elevation = 536.480(Ft.)
Pipe length = 300.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.345(CFS)
Given pipe size = 15.00(In.)
Calculated individual pipe flow = 5.345(CFS)
Normal flow depth in pipe = 10.25(In.)
Flow top width inside pipe = 13.95(In.)
Critical Depth = 11.24(In.)
Pipe flow velocity = 5.98(Ft/s)
Travel time through pipe = 0.84 min.
Time of concentration (TC) = 7.19 min.

++
Process from Point/Station 203.000 to Point/Station 64.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.19 min.

Rainfall intensity = 3.649(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 2.238(CFS) for 0.730(Ac.)
Total runoff = 7.583(CFS) Total area = 2.25(Ac.)

++
Process from Point/Station 203.000 to Point/Station 64.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 2.250(Ac.)
Runoff from this stream = 7.583(CFS)
Time of concentration = 7.19 min.
Rainfall intensity = 3.649(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	18.673	9.13	3.309
2	7.583	7.19	3.649

Qmax(1) =
1.000 * 1.000 * 18.673) +
0.907 * 1.000 * 7.583) + = 25.549
Qmax(2) =
1.000 * 0.787 * 18.673) +
1.000 * 1.000 * 7.583) + = 22.278

Total of 2 streams to confluence:
Flow rates before confluence point:
18.673 7.583
Maximum flow rates at confluence using above data:
25.549 22.278
Area of streams before confluence:
6.340 2.250
Results of confluence:
Total flow rate = 25.549(CFS)
Time of concentration = 9.130 min.
Effective stream area after confluence = 8.590(Ac.)

++
Process from Point/Station 64.000 to Point/Station 65.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 536.480(Ft.)
Downstream point/station elevation = 534.950(Ft.)
Pipe length = 306.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 25.549(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 25.549(CFS)
Normal flow depth in pipe = 18.89(In.)
Flow top width inside pipe = 35.96(In.)
Critical Depth = 19.57(In.)
Pipe flow velocity = 6.81(Ft/s)
Travel time through pipe = 0.75 min.
Time of concentration (TC) = 9.88 min.

++
Process from Point/Station 64.000 to Point/Station 65.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 9.88 min.

Rainfall intensity = 3.206(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 1.023(CFS) for 0.380(Ac.)
Total runoff = 26.573(CFS) Total area = 8.97(Ac.)

++
Process from Point/Station 65.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.950(Ft.)
Downstream point/station elevation = 534.360(Ft.)
Pipe length = 117.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.573(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 26.573(CFS)
Normal flow depth in pipe = 19.29(In.)
Flow top width inside pipe = 35.91(In.)
Critical Depth = 20.00(In.)
Pipe flow velocity = 6.89(Ft/s)
Travel time through pipe = 0.28 min.
Time of concentration (TC) = 10.16 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 534.360(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 28.16(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.573(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 26.573(CFS)
Normal flow depth in pipe = 9.28(In.)
Flow top width inside pipe = 31.49(In.)
Critical Depth = 20.00(In.)
Pipe flow velocity = 18.42(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 10.19 min.

++
Process from Point/Station 304.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 1
Stream flow area = 8.970(Ac.)
Runoff from this stream = 26.573(CFS)
Time of concentration = 10.19 min.
Rainfall intensity = 3.167(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.573	10.19	3.167

Qmax(1) =
1.000 * 1.000 * 26.573) + = 26.573

Total of 1 streams to confluence:
Flow rates before confluence point:
26.573
Maximum flow rates at confluence using above data:
26.573
Area of streams before confluence:

```
      8.970
Results of confluence:
Total flow rate =     26.573(CFS)
Time of concentration =    10.187 min.
Effective stream area after confluence =      8.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
 Initial subarea flow distance  =  284.000(Ft.)
Highest elevation =  546.430(Ft.)
Lowest elevation =  541.360(Ft.)
Elevation difference =    5.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 284.000^.5)/( 1.785^(1/3)]=   6.50
Rainfall intensity (I) =      3.805(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =      1.215(CFS)
Total initial stream area =        0.380(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =   537.360(Ft.)
Downstream point/station elevation =   533.490(Ft.)
Pipe length  =    63.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.215(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     1.215(CFS)
Normal flow depth in pipe =    2.65(In.)
Flow top width inside pipe =   12.75(In.)
Critical Depth =    4.94(In.)
Pipe flow velocity =      7.52(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     6.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =     6.64 min.
Rainfall intensity =      3.771(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =      1.235(CFS) for    0.390(Ac.)
Total runoff =      2.450(CFS)  Total area =        0.77(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station       71.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =     6.64 min.
Rainfall intensity =      3.771(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =      0.475(CFS) for    0.150(Ac.)
Total runoff =      2.925(CFS)  Total area =        0.92(Ac.)
```

++
Process from Point/Station 71.000 to Point/Station 72.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 533.490(Ft.)
Downstream point/station elevation = 532.560(Ft.)
Pipe length = 186.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.925(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.925(CFS)
Normal flow depth in pipe = 5.81(In.)
Flow top width inside pipe = 29.01(In.)
Critical Depth = 6.10(In.)
Pipe flow velocity = 3.64(Ft/s)
Travel time through pipe = 0.85 min.
Time of concentration (TC) = 7.49 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 532.560(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 61.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.925(CFS)
Given pipe size = 42.00(In.)
Calculated individual pipe flow = 2.925(CFS)
Normal flow depth in pipe = 5.79(In.)
Flow top width inside pipe = 28.96(In.)
Critical Depth = 6.10(In.)
Pipe flow velocity = 3.66(Ft/s)
Travel time through pipe = 0.28 min.
Time of concentration (TC) = 7.77 min.

++
Process from Point/Station 72.000 to Point/Station 67.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 7.77 min.
Rainfall intensity = 3.533(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 6.350(CFS) for 2.140(Ac.)
Total runoff = 9.276(CFS) Total area = 3.06(Ac.)

++
Process from Point/Station 72.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 3.060(Ac.)
Runoff from this stream = 9.276(CFS)
Time of concentration = 7.77 min.
Rainfall intensity = 3.533(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.573	10.19	3.167
2	9.276	7.77	3.533

Qmax(1) =

```
            1.000 *    1.000 *    26.573) +
            0.896 *    1.000 *     9.276) + =      34.887
Qmax(2) =
            1.000 *    0.763 *    26.573) +
            1.000 *    1.000 *     9.276) + =      29.547

Total of 2 streams to confluence:
Flow rates before confluence point:
     26.573       9.276
Maximum flow rates at confluence using above data:
      34.887       29.547
Area of streams before confluence:
       8.970        3.060
Results of confluence:
Total flow rate =     34.887(CFS)
Time of concentration =    10.187 min.
Effective stream area after confluence =     12.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.000 to Point/Station       80.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
 Initial subarea flow distance  =  155.000(Ft.)
Highest elevation =  545.810(Ft.)
Lowest elevation =  544.380(Ft.)
Elevation difference =    1.430(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.99 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 155.000^.5)/( 0.923^(1/3)]=   5.99
Rainfall intensity (I) =     3.942(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =      1.689(CFS)
Total initial stream area =       0.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       91.000 to Point/Station       80.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Time of concentration =     5.99 min.
Rainfall intensity =      3.942(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff =      1.225(CFS) for    0.370(Ac.)
Total runoff =      2.914(CFS)  Total area =       0.88(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________________
Upstream point/station elevation =   540.190(Ft.)
Downstream point/station elevation =   532.250(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.914(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     2.914(CFS)
Normal flow depth in pipe =    3.48(In.)
Flow top width inside pipe =   10.89(In.)
Critical Depth =    8.78(In.)
Pipe flow velocity =     15.40(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.03 min.
```

++
Process from Point/Station 80.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 1 in normal stream number 3
Stream flow area = 0.880(Ac.)
Runoff from this stream = 2.914(CFS)
Time of concentration = 6.03 min.
Rainfall intensity = 3.930(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.573	10.19	3.167
2	9.276	7.77	3.533
3	2.914	6.03	3.930

Qmax(1) =
1.000 * 1.000 * 26.573) +
0.896 * 1.000 * 9.276) +
0.806 * 1.000 * 2.914) + = 37.235
Qmax(2) =
1.000 * 0.763 * 26.573) +
1.000 * 1.000 * 9.276) +
0.899 * 1.000 * 2.914) + = 32.166
Qmax(3) =
1.000 * 0.592 * 26.573) +
1.000 * 0.776 * 9.276) +
1.000 * 1.000 * 2.914) + = 25.833

Total of 3 streams to confluence:
Flow rates before confluence point:
26.573 9.276 2.914
Maximum flow rates at confluence using above data:
37.235 32.166 25.833
Area of streams before confluence:
8.970 3.060 0.880
Results of confluence:
Total flow rate = 37.235(CFS)
Time of concentration = 10.187 min.
Effective stream area after confluence = 12.910(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance = 102.000(Ft.)
Highest elevation = 544.650(Ft.)
Lowest elevation = 542.670(Ft.)
Elevation difference = 1.980(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 3.79 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*(102.000^.5)/(1.941^(1/3)]= 3.79
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.265(In/Hr) for a 50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff = 2.042(CFS)
Total initial stream area = 0.570(Ac.)

++
Process from Point/Station 402.000 to Point/Station 403.000

**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.840 given for subarea
Time of concentration = 5.00 min.
Rainfall intensity = 4.265(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.967(CFS) for 0.270(Ac.)
Total runoff = 3.010(CFS) Total area = 0.84(Ac.)

++
Process from Point/Station 403.000 to Point/Station 67.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 539.670(Ft.)
Downstream point/station elevation = 532.250(Ft.)
Pipe length = 34.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.010(CFS)
Given pipe size = 12.00(In.)
Calculated individual pipe flow = 3.010(CFS)
Normal flow depth in pipe = 3.45(In.)
Flow top width inside pipe = 10.87(In.)
Critical Depth = 8.93(In.)
Pipe flow velocity = 16.08(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 5.04 min.

++
Process from Point/Station 403.000 to Point/Station 67.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 4
Stream flow area = 0.840(Ac.)
Runoff from this stream = 3.010(CFS)
Time of concentration = 5.04 min.
Rainfall intensity = 4.252(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	26.573	10.19	3.167
2	9.276	7.77	3.533
3	2.914	6.03	3.930
4	3.010	5.04	4.252

Qmax(1) =
1.000 * 1.000 * 26.573) +
0.896 * 1.000 * 9.276) +
0.806 * 1.000 * 2.914) +
0.745 * 1.000 * 3.010) + = 39.477
Qmax(2) =
1.000 * 0.763 * 26.573) +
1.000 * 1.000 * 9.276) +
0.899 * 1.000 * 2.914) +
0.831 * 1.000 * 3.010) + = 34.667
Qmax(3) =
1.000 * 0.592 * 26.573) +
1.000 * 0.776 * 9.276) +
1.000 * 1.000 * 2.914) +
0.924 * 1.000 * 3.010) + = 28.615
Qmax(4) =
1.000 * 0.494 * 26.573) +
1.000 * 0.648 * 9.276) +
1.000 * 0.835 * 2.914) +
1.000 * 1.000 * 3.010) + = 24.587

Total of 4 streams to confluence:
Flow rates before confluence point:
 26.573 9.276 2.914 3.010
Maximum flow rates at confluence using above data:
 39.477 34.667 28.615 24.587
Area of streams before confluence:
 8.970 3.060 0.880 0.840
Results of confluence:
Total flow rate = 39.477(CFS)
Time of concentration = 10.187 min.
Effective stream area after confluence = 13.750(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____
Upstream point/station elevation = 528.710(Ft.)
Downstream point/station elevation = 528.500(Ft.)
Pipe length = 27.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 39.477(CFS)
Given pipe size = 36.00(In.)
Calculated individual pipe flow = 39.477(CFS)
Normal flow depth in pipe = 21.59(In.)
Flow top width inside pipe = 35.28(In.)
Critical Depth = 24.55(In.)
Pipe flow velocity = 8.92(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 10.24 min.

++
Process from Point/Station 67.000 to Point/Station 68.000
**** SUBAREA FLOW ADDITION ****
_____
User specified 'C' value of 0.840 given for subarea
Time of concentration = 10.24 min.
Rainfall intensity = 3.160(In/Hr) for a 50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.840
Subarea runoff = 0.133(CFS) for 0.050(Ac.)
Total runoff = 39.609(CFS) Total area = 13.80(Ac.)

++
Process from Point/Station 67.000 to Point/Station 68.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 13.800(Ac.)
Runoff from this stream = 39.609(CFS)
Time of concentration = 10.24 min.
Rainfall intensity = 3.160(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	30.058	12.86	2.884
2	39.609	10.24	3.160

Qmax(1) =
 1.000 * 1.000 * 30.058) +
 0.912 * 1.000 * 39.609) + = 66.199
Qmax(2) =
 1.000 * 0.796 * 30.058) +

```
              1.000 *    1.000 *    39.609) + =      63.538

Total of 2 main streams to confluence:
Flow rates before confluence point:
      30.058      39.609
Maximum flow rates at confluence using above data:
       66.199       63.538
Area of streams before confluence:
       22.840       13.800

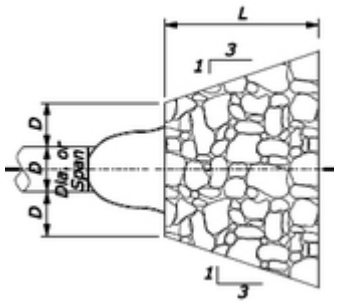

Results of confluence:
Total flow rate =      66.199(CFS)
Time of concentration =     12.860 min.
Effective stream area after confluence  =     36.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       92.000 to Point/Station       93.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =  170.000(Ft.)
Highest elevation =  545.270(Ft.)
Lowest elevation =  533.000(Ft.)
Elevation difference =   12.270(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      3.16 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 170.000^.5)/(   7.218^(1/3)]=   3.16
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =       0.645(CFS)
Total initial stream area =        0.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station       70.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
User specified 'C' value of 0.840 given for subarea
Initial subarea flow distance  =  319.000(Ft.)
Highest elevation =  550.000(Ft.)
Lowest elevation =  537.600(Ft.)
Elevation difference =   12.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      5.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8400)*( 319.000^.5)/( 3.887^(1/3)]=   5.32
Rainfall intensity (I) =      4.151(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.840
Subarea runoff =       1.499(CFS)
Total initial stream area =        0.430(Ac.)
End of computations, total study area =          37.250 (Ac.)
```

HEC-14 Riprap Apron

HEC-14 Riprap Apron



Units: English

RSP class: Caltrans (new)

Input	
Pipe flow Q (cfs):	30
Pipe diameter D (in):	48
Pipe slope S (%):	0.5
Mannings n:	.05
Tailwater depth TW (ft):	0.0
Riprap specific gravity:	2.65

Results	
Normal depth h_n (in):	48.000
Average velocity V (ft/s):	2.387
Froude number Fr:	0.000
Mean rock size D_{50} (in):	2.177
Mean rock weight W (lb):	0.839
Riprap class:	Class I
Class D_{50} (in):	6.923
Riprap thickness T (ft):	2.019
Riprap length L (ft):	16.000

Revised: 04 Mar 2018.

8. DETENTION BASIN CALCULATIONS

RATIONAL METHOD HYDROGRAPH PROGRAM COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 5/9/2021

HYDROGRAPH FILE NAME 5 YEAR HYDROGRAPH

TIME OF CONCENTRATION 11 MIN.

6 HOUR RAINFALL 1.3 INCHES

BASIN AREA 13.75 ACRES

RUNOFF COEFFICIENT 0.84

PEAK DISCHARGE 27.22 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 11	DISCHARGE (CFS) = 0.9
TIME (MIN) = 22	DISCHARGE (CFS) = 0.9
TIME (MIN) = 33	DISCHARGE (CFS) = 1
TIME (MIN) = 44	DISCHARGE (CFS) = 1
TIME (MIN) = 55	DISCHARGE (CFS) = 1
TIME (MIN) = 66	DISCHARGE (CFS) = 1
TIME (MIN) = 77	DISCHARGE (CFS) = 1.1
TIME (MIN) = 88	DISCHARGE (CFS) = 1.1
TIME (MIN) = 99	DISCHARGE (CFS) = 1.2
TIME (MIN) = 110	DISCHARGE (CFS) = 1.2
TIME (MIN) = 121	DISCHARGE (CFS) = 1.3
TIME (MIN) = 132	DISCHARGE (CFS) = 1.4
TIME (MIN) = 143	DISCHARGE (CFS) = 1.5
TIME (MIN) = 154	DISCHARGE (CFS) = 1.6
TIME (MIN) = 165	DISCHARGE (CFS) = 1.7
TIME (MIN) = 176	DISCHARGE (CFS) = 1.9
TIME (MIN) = 187	DISCHARGE (CFS) = 2.1
TIME (MIN) = 198	DISCHARGE (CFS) = 2.3
TIME (MIN) = 209	DISCHARGE (CFS) = 2.8
TIME (MIN) = 220	DISCHARGE (CFS) = 3.2
TIME (MIN) = 231	DISCHARGE (CFS) = 4.7
TIME (MIN) = 242	DISCHARGE (CFS) = 3.2
TIME (MIN) = 253	DISCHARGE (CFS) = 27.22
TIME (MIN) = 264	DISCHARGE (CFS) = 3.8
TIME (MIN) = 275	DISCHARGE (CFS) = 2.5
TIME (MIN) = 286	DISCHARGE (CFS) = 2
TIME (MIN) = 297	DISCHARGE (CFS) = 1.7
TIME (MIN) = 308	DISCHARGE (CFS) = 1.4
TIME (MIN) = 319	DISCHARGE (CFS) = 1.3
TIME (MIN) = 330	DISCHARGE (CFS) = 1.2
TIME (MIN) = 341	DISCHARGE (CFS) = 1.1
TIME (MIN) = 352	DISCHARGE (CFS) = 1
TIME (MIN) = 363	DISCHARGE (CFS) = 0.9
TIME (MIN) = 374	DISCHARGE (CFS) = 0

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RUN DATE 5/9/2021

HYDROGRAPH FILE NAME 10 YEAR HYDROGRAPH

TIME OF CONCENTRATION 11 MIN.
6 HOUR RAINFALL 1.52 INCHES
BASIN AREA 13.75 ACRES
RUNOFF COEFFICIENT 0.84
PEAK DISCHARGE 31.6 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 11	DISCHARGE (CFS) = 1
TIME (MIN) = 22	DISCHARGE (CFS) = 1.1
TIME (MIN) = 33	DISCHARGE (CFS) = 1.1
TIME (MIN) = 44	DISCHARGE (CFS) = 1.1
TIME (MIN) = 55	DISCHARGE (CFS) = 1.2
TIME (MIN) = 66	DISCHARGE (CFS) = 1.2
TIME (MIN) = 77	DISCHARGE (CFS) = 1.3
TIME (MIN) = 88	DISCHARGE (CFS) = 1.3
TIME (MIN) = 99	DISCHARGE (CFS) = 1.4
TIME (MIN) = 110	DISCHARGE (CFS) = 1.5
TIME (MIN) = 121	DISCHARGE (CFS) = 1.6
TIME (MIN) = 132	DISCHARGE (CFS) = 1.6
TIME (MIN) = 143	DISCHARGE (CFS) = 1.8
TIME (MIN) = 154	DISCHARGE (CFS) = 1.8
TIME (MIN) = 165	DISCHARGE (CFS) = 2
TIME (MIN) = 176	DISCHARGE (CFS) = 2.2
TIME (MIN) = 187	DISCHARGE (CFS) = 2.5
TIME (MIN) = 198	DISCHARGE (CFS) = 2.7
TIME (MIN) = 209	DISCHARGE (CFS) = 3.3
TIME (MIN) = 220	DISCHARGE (CFS) = 3.8
TIME (MIN) = 231	DISCHARGE (CFS) = 5.5
TIME (MIN) = 242	DISCHARGE (CFS) = 4
TIME (MIN) = 253	DISCHARGE (CFS) = 31.6
TIME (MIN) = 264	DISCHARGE (CFS) = 4.4
TIME (MIN) = 275	DISCHARGE (CFS) = 3
TIME (MIN) = 286	DISCHARGE (CFS) = 2.3
TIME (MIN) = 297	DISCHARGE (CFS) = 1.9
TIME (MIN) = 308	DISCHARGE (CFS) = 1.7
TIME (MIN) = 319	DISCHARGE (CFS) = 1.5
TIME (MIN) = 330	DISCHARGE (CFS) = 1.4
TIME (MIN) = 341	DISCHARGE (CFS) = 1.3
TIME (MIN) = 352	DISCHARGE (CFS) = 1.2
TIME (MIN) = 363	DISCHARGE (CFS) = 1.1
TIME (MIN) = 374	DISCHARGE (CFS) = 0

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RUN DATE 5/9/2021

HYDROGRAPH FILE NAME 25 YEAR HYDROGRAPH

TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 1.84 INCHES
BASIN AREA 13.75 ACRES
RUNOFF COEFFICIENT 0.84
PEAK DISCHARGE 34.65 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 1.3
TIME (MIN) = 20	DISCHARGE (CFS) = 1.3
TIME (MIN) = 30	DISCHARGE (CFS) = 1.3
TIME (MIN) = 40	DISCHARGE (CFS) = 1.4
TIME (MIN) = 50	DISCHARGE (CFS) = 1.4
TIME (MIN) = 60	DISCHARGE (CFS) = 1.5
TIME (MIN) = 70	DISCHARGE (CFS) = 1.5
TIME (MIN) = 80	DISCHARGE (CFS) = 1.6
TIME (MIN) = 90	DISCHARGE (CFS) = 1.7
TIME (MIN) = 100	DISCHARGE (CFS) = 1.7
TIME (MIN) = 110	DISCHARGE (CFS) = 1.8
TIME (MIN) = 120	DISCHARGE (CFS) = 1.9
TIME (MIN) = 130	DISCHARGE (CFS) = 2
TIME (MIN) = 140	DISCHARGE (CFS) = 2.1
TIME (MIN) = 150	DISCHARGE (CFS) = 2.3
TIME (MIN) = 160	DISCHARGE (CFS) = 2.4
TIME (MIN) = 170	DISCHARGE (CFS) = 2.6
TIME (MIN) = 180	DISCHARGE (CFS) = 2.8
TIME (MIN) = 190	DISCHARGE (CFS) = 3.2
TIME (MIN) = 200	DISCHARGE (CFS) = 3.5
TIME (MIN) = 210	DISCHARGE (CFS) = 4.2
TIME (MIN) = 220	DISCHARGE (CFS) = 4.8
TIME (MIN) = 230	DISCHARGE (CFS) = 7.1
TIME (MIN) = 240	DISCHARGE (CFS) = 11.1
TIME (MIN) = 250	DISCHARGE (CFS) = 34.65
TIME (MIN) = 260	DISCHARGE (CFS) = 5.7
TIME (MIN) = 270	DISCHARGE (CFS) = 3.8
TIME (MIN) = 280	DISCHARGE (CFS) = 3
TIME (MIN) = 290	DISCHARGE (CFS) = 2.5
TIME (MIN) = 300	DISCHARGE (CFS) = 2.2
TIME (MIN) = 310	DISCHARGE (CFS) = 1.9
TIME (MIN) = 320	DISCHARGE (CFS) = 1.8
TIME (MIN) = 330	DISCHARGE (CFS) = 1.6
TIME (MIN) = 340	DISCHARGE (CFS) = 1.5
TIME (MIN) = 350	DISCHARGE (CFS) = 1.4
TIME (MIN) = 360	DISCHARGE (CFS) = 1.3
TIME (MIN) = 370	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 5/9/2021

HYDROGRAPH FILE NAME 50 YEAR HYDROGRAPH

TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.09 INCHES
BASIN AREA 13.75 ACRES
RUNOFF COEFFICIENT 0.84
PEAK DISCHARGE 39.24 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 1.4
TIME (MIN) = 20	DISCHARGE (CFS) = 1.5
TIME (MIN) = 30	DISCHARGE (CFS) = 1.5
TIME (MIN) = 40	DISCHARGE (CFS) = 1.6
TIME (MIN) = 50	DISCHARGE (CFS) = 1.6
TIME (MIN) = 60	DISCHARGE (CFS) = 1.7
TIME (MIN) = 70	DISCHARGE (CFS) = 1.7
TIME (MIN) = 80	DISCHARGE (CFS) = 1.8
TIME (MIN) = 90	DISCHARGE (CFS) = 1.9
TIME (MIN) = 100	DISCHARGE (CFS) = 1.9
TIME (MIN) = 110	DISCHARGE (CFS) = 2.1
TIME (MIN) = 120	DISCHARGE (CFS) = 2.1
TIME (MIN) = 130	DISCHARGE (CFS) = 2.3
TIME (MIN) = 140	DISCHARGE (CFS) = 2.4
TIME (MIN) = 150	DISCHARGE (CFS) = 2.6
TIME (MIN) = 160	DISCHARGE (CFS) = 2.7
TIME (MIN) = 170	DISCHARGE (CFS) = 3
TIME (MIN) = 180	DISCHARGE (CFS) = 3.2
TIME (MIN) = 190	DISCHARGE (CFS) = 3.6
TIME (MIN) = 200	DISCHARGE (CFS) = 3.9
TIME (MIN) = 210	DISCHARGE (CFS) = 4.8
TIME (MIN) = 220	DISCHARGE (CFS) = 5.5
TIME (MIN) = 230	DISCHARGE (CFS) = 8.1
TIME (MIN) = 240	DISCHARGE (CFS) = 12.8
TIME (MIN) = 250	DISCHARGE (CFS) = 39.24
TIME (MIN) = 260	DISCHARGE (CFS) = 6.5
TIME (MIN) = 270	DISCHARGE (CFS) = 4.3
TIME (MIN) = 280	DISCHARGE (CFS) = 3.4
TIME (MIN) = 290	DISCHARGE (CFS) = 2.8
TIME (MIN) = 300	DISCHARGE (CFS) = 2.5
TIME (MIN) = 310	DISCHARGE (CFS) = 2.2
TIME (MIN) = 320	DISCHARGE (CFS) = 2
TIME (MIN) = 330	DISCHARGE (CFS) = 1.8
TIME (MIN) = 340	DISCHARGE (CFS) = 1.7
TIME (MIN) = 350	DISCHARGE (CFS) = 1.6
TIME (MIN) = 360	DISCHARGE (CFS) = 1.5
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

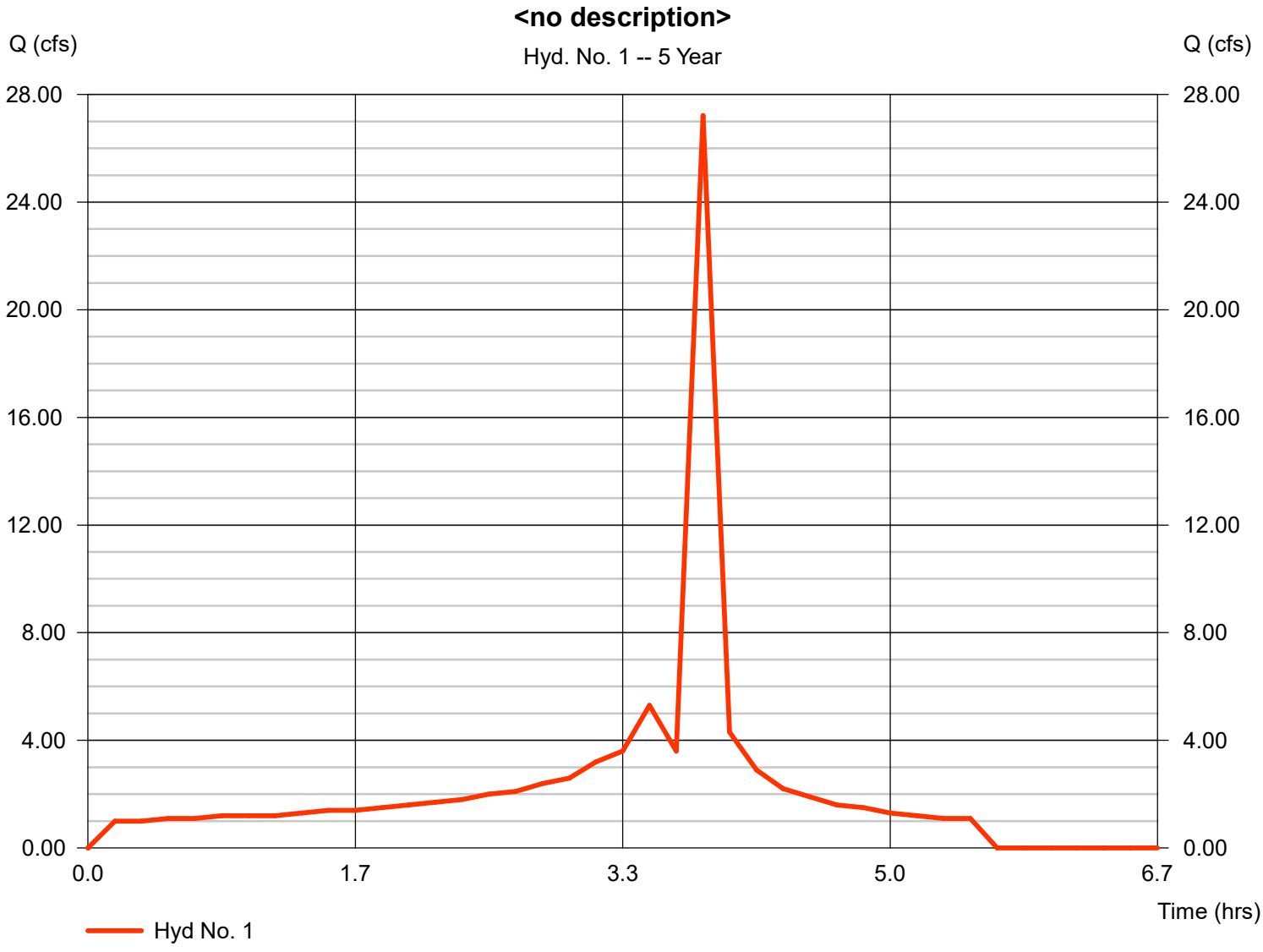
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	27.22	10	230	53,772	----	------	------	<no description>
2	Reservoir	2.621	10	250	50,752	1	534.49	43,445	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	=	Manual	Peak discharge	=	27.22 cfs
Storm frequency	=	5 yrs	Time to peak	=	3.83 hrs
Time interval	=	10 min	Hyd. volume	=	53,772 cuft



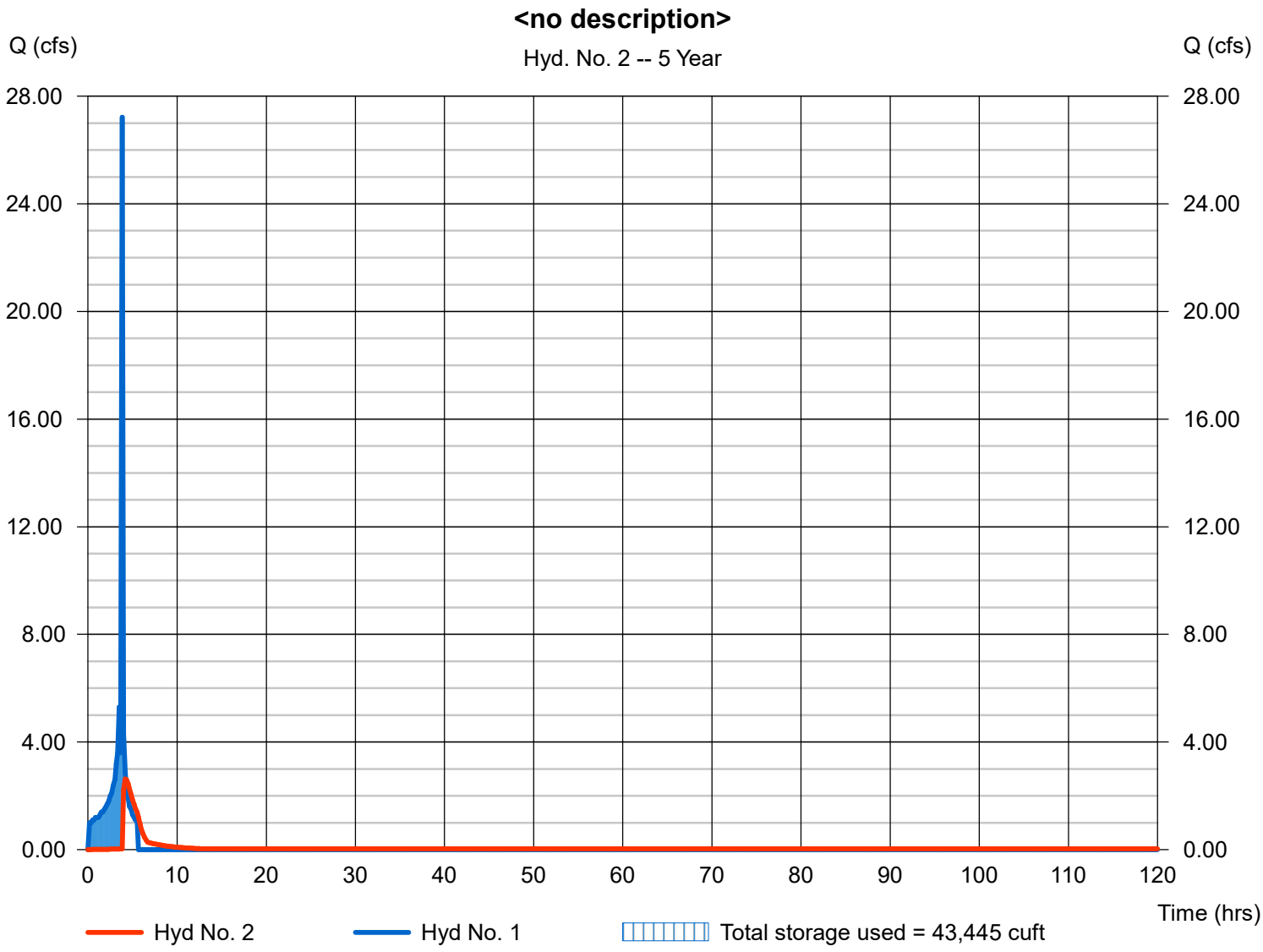
Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	2.621 cfs
Storm frequency	=	5 yrs	Time to peak	=	4.17 hrs
Time interval	=	10 min	Hyd. volume	=	50,752 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	534.49 ft
Reservoir name	=	<New Pond>	Max. Storage	=	43,445 cuft

Storage Indication method used.



Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 532.75 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	532.75	23,443	0	0
0.25	533.00	23,856	5,912	5,912
1.25	534.00	25,565	24,711	30,623
2.25	535.00	27,279	26,422	57,045
2.75	535.50	28,120	13,850	70,895
3.25	536.00	28,824	14,236	85,131
3.75	536.50	29,641	14,616	99,747

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	1.00	0.00	0.00
Span (in)	= 36.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 528.00	532.75	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 2.90	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.75	0.00	0.00	0.00
Crest El. (ft)	= 534.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	532.75	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.03	591	532.78	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.001
0.05	1,182	532.80	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.003
0.08	1,774	532.83	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.005
0.10	2,365	532.85	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.006
0.13	2,956	532.88	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.008
0.15	3,547	532.90	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.009
0.18	4,139	532.93	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.010
0.20	4,730	532.95	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.010
0.23	5,321	532.98	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.011
0.25	5,912	533.00	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.012
0.35	8,383	533.10	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
0.45	10,854	533.20	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.017
0.55	13,326	533.30	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.65	15,797	533.40	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.020
0.75	18,268	533.50	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.022
0.85	20,739	533.60	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.024
0.95	23,210	533.70	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.025
1.05	25,681	533.80	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.026
1.15	28,152	533.90	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.028
1.25	30,623	534.00	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.029
1.35	33,265	534.10	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.030
1.45	35,907	534.20	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
1.55	38,549	534.30	61.35 ic	0.03 ic	---	---	0.25	---	---	---	---	---	0.283
1.65	41,192	534.40	61.35 ic	0.03 ic	---	---	1.30	---	---	---	---	---	1.338
1.75	43,834	534.50	61.35 ic	0.03 ic	---	---	2.81	---	---	---	---	---	2.842
1.85	46,476	534.60	61.35 ic	0.04 ic	---	---	4.65	---	---	---	---	---	4.687
1.95	49,118	534.70	61.35 ic	0.04 ic	---	---	6.78	---	---	---	---	---	6.818
2.05	51,760	534.80	61.35 ic	0.04 ic	---	---	9.16	---	---	---	---	---	9.201
2.15	54,403	534.90	61.35 ic	0.04 ic	---	---	11.77	---	---	---	---	---	11.81
2.25	57,045	535.00	61.35 ic	0.04 ic	---	---	14.60	---	---	---	---	---	14.64
2.30	58,430	535.05	61.35 ic	0.04 ic	---	---	16.08	---	---	---	---	---	16.12
2.35	59,815	535.10	61.35 ic	0.04 ic	---	---	17.61	---	---	---	---	---	17.65
2.40	61,200	535.15	61.35 ic	0.04 ic	---	---	14.53 ic	---	---	---	---	---	14.57
2.45	62,585	535.20	61.35 ic	0.04 ic	---	---	14.92 ic	---	---	---	---	---	14.96
2.50	63,970	535.25	61.35 ic	0.04 ic	---	---	15.31 ic	---	---	---	---	---	15.35
2.55	65,355	535.30	61.35 ic	0.04 ic	---	---	15.69 ic	---	---	---	---	---	15.73

Continues on next page...

<New Pond>

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.60	66,740	535.35	61.35 ic	0.04 ic	---	---	16.06 ic	---	---	---	---	---	16.10
2.65	68,125	535.40	61.35 ic	0.04 ic	---	---	16.42 ic	---	---	---	---	---	16.46
2.70	69,510	535.45	61.35 ic	0.04 ic	---	---	16.77 ic	---	---	---	---	---	16.81
2.75	70,895	535.50	61.35 ic	0.04 ic	---	---	17.12 ic	---	---	---	---	---	17.16
2.80	72,318	535.55	61.35 ic	0.04 ic	---	---	17.46 ic	---	---	---	---	---	17.50
2.85	73,742	535.60	61.35 ic	0.04 ic	---	---	17.79 ic	---	---	---	---	---	17.83
2.90	75,165	535.65	61.35 ic	0.04 ic	---	---	18.12 ic	---	---	---	---	---	18.16
2.95	76,589	535.70	61.35 ic	0.04 ic	---	---	18.44 ic	---	---	---	---	---	18.48
3.00	78,013	535.75	61.35 ic	0.05 ic	---	---	18.75 ic	---	---	---	---	---	18.80
3.05	79,436	535.80	61.35 ic	0.05 ic	---	---	19.06 ic	---	---	---	---	---	19.11
3.10	80,860	535.85	61.35 ic	0.05 ic	---	---	19.37 ic	---	---	---	---	---	19.41
3.15	82,283	535.90	61.35 ic	0.05 ic	---	---	19.67 ic	---	---	---	---	---	19.71
3.20	83,707	535.95	61.35 ic	0.05 ic	---	---	19.96 ic	---	---	---	---	---	20.01
3.25	85,131	536.00	61.35 ic	0.05 ic	---	---	20.25 ic	---	---	---	---	---	20.30
3.30	86,592	536.05	61.35 ic	0.05 ic	---	---	20.54 ic	---	---	---	---	---	20.59
3.35	88,054	536.10	61.35 ic	0.05 ic	---	---	20.83 ic	---	---	---	---	---	20.87
3.40	89,516	536.15	61.35 ic	0.05 ic	---	---	21.10 ic	---	---	---	---	---	21.15
3.45	90,977	536.20	61.35 ic	0.05 ic	---	---	21.38 ic	---	---	---	---	---	21.43
3.50	92,439	536.25	61.35 ic	0.05 ic	---	---	21.65 ic	---	---	---	---	---	21.70
3.55	93,900	536.30	61.35 ic	0.05 ic	---	---	21.92 ic	---	---	---	---	---	21.97
3.60	95,362	536.35	61.35 ic	0.05 ic	---	---	22.19 ic	---	---	---	---	---	22.24
3.65	96,824	536.40	61.35 ic	0.05 ic	---	---	22.45 ic	---	---	---	---	---	22.50
3.70	98,285	536.45	61.35 ic	0.05 ic	---	---	22.71 ic	---	---	---	---	---	22.76
3.75	99,747	536.50	61.35 ic	0.05 ic	---	---	22.97 ic	---	---	---	---	---	23.02

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

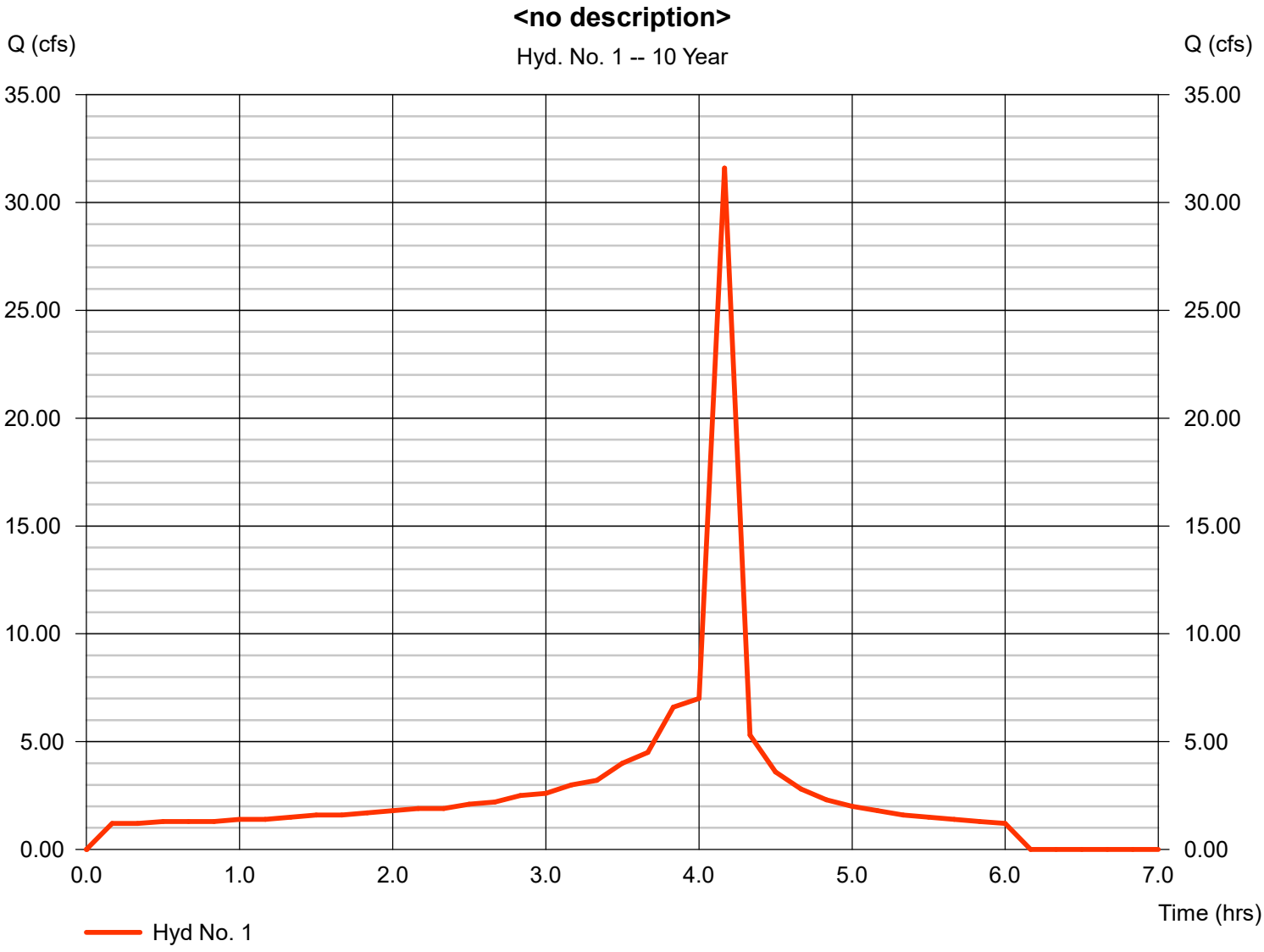
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	31.60	10	250	69,120	----	------	------	<no description>
2	Reservoir	8.789	10	260	66,084	1	534.82	51,304	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 31.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 4.17 hrs
Time interval	= 10 min	Hyd. volume	= 69,120 cuft



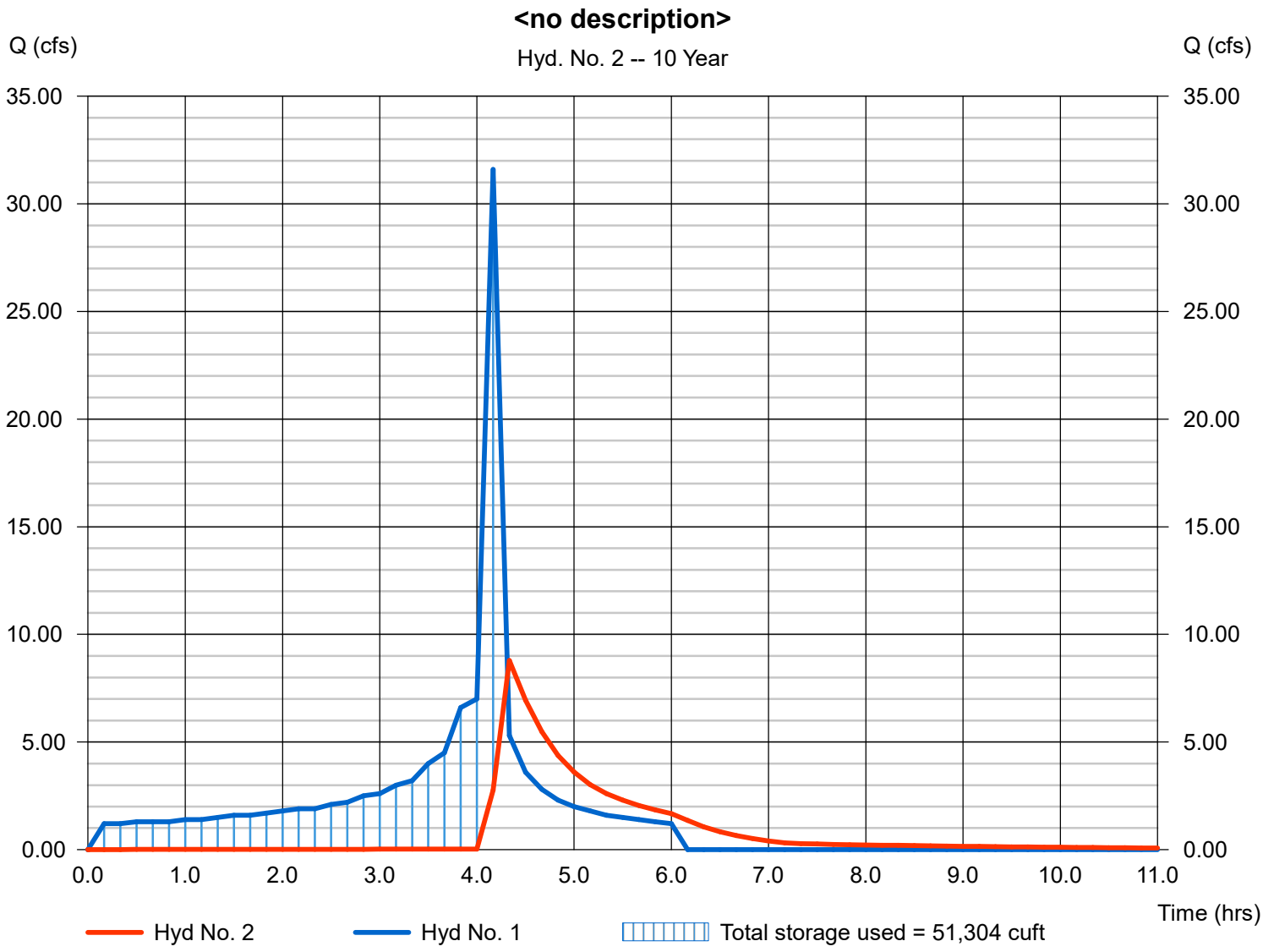
Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	8.789 cfs
Storm frequency	=	10 yrs	Time to peak	=	4.33 hrs
Time interval	=	10 min	Hyd. volume	=	66,084 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	534.82 ft
Reservoir name	=	<New Pond>	Max. Storage	=	51,304 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

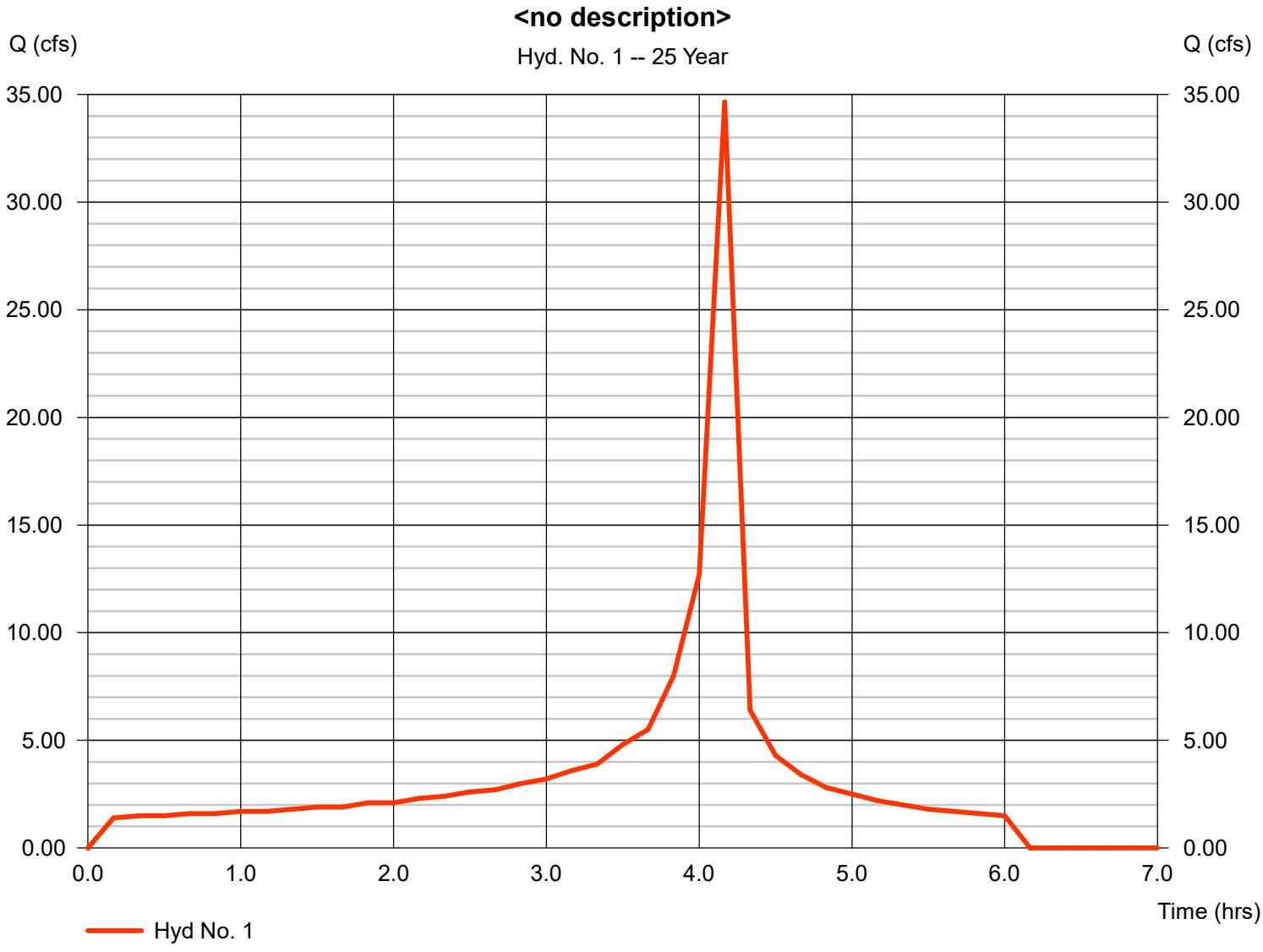
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	34.65	10	250	84,210	----	------	------	<no description>
2	Reservoir	14.63	10	260	81,171	1	535.09	57,039	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	=	Manual	Peak discharge	=	34.65 cfs
Storm frequency	=	25 yrs	Time to peak	=	4.17 hrs
Time interval	=	10 min	Hyd. volume	=	84,210 cuft



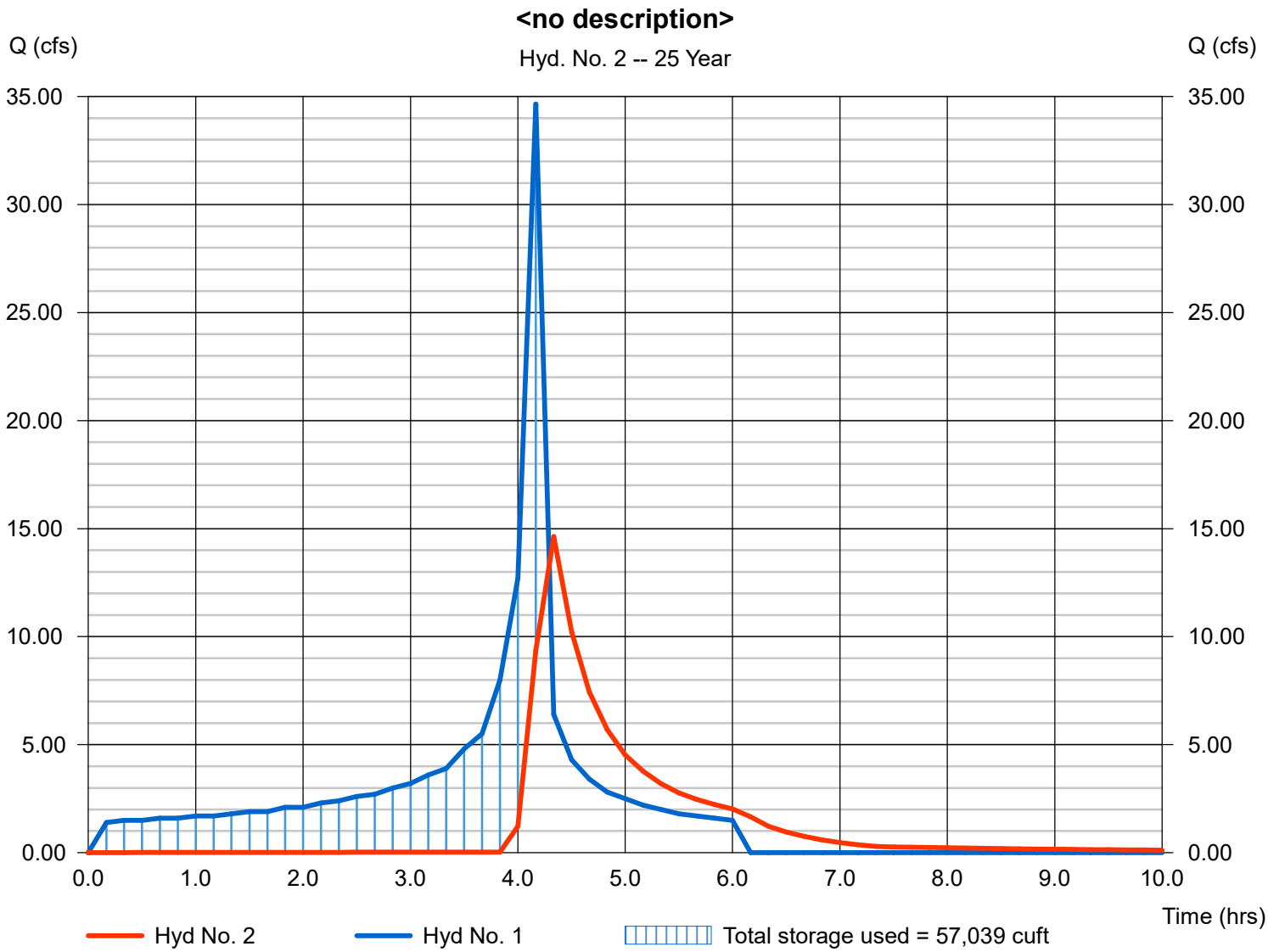
Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	14.63 cfs
Storm frequency	=	25 yrs	Time to peak	=	4.33 hrs
Time interval	=	10 min	Hyd. volume	=	81,171 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	535.09 ft
Reservoir name	=	<New Pond>	Max. Storage	=	57,039 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

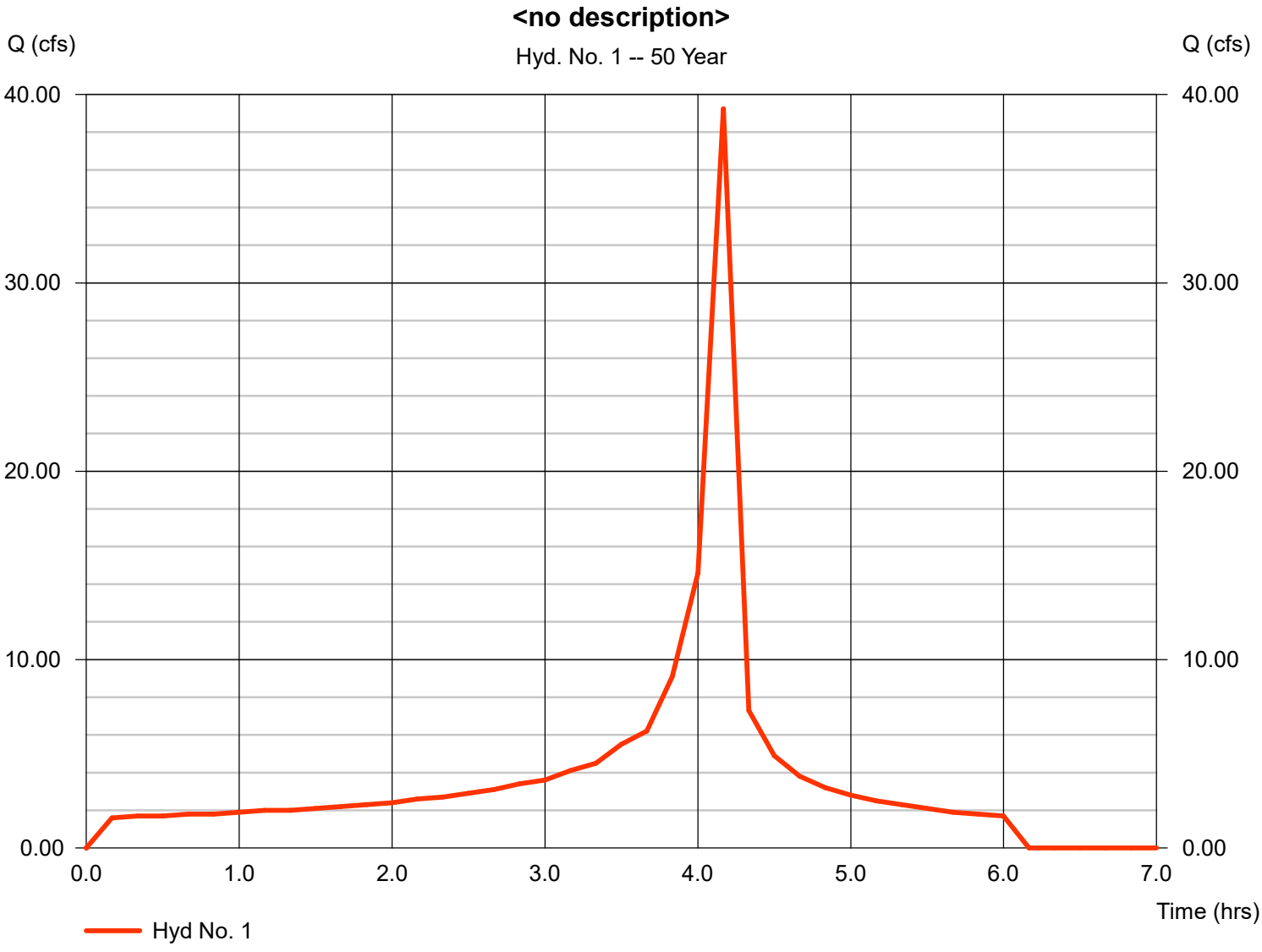
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	39.24	10	250	95,604	----	------	------	<no description>
2	Reservoir	14.69	10	260	92,564	1	535.25	61,621	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	=	Manual	Peak discharge	=	39.24 cfs
Storm frequency	=	50 yrs	Time to peak	=	4.17 hrs
Time interval	=	10 min	Hyd. volume	=	95,604 cuft



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	27.22	10	230	53,772	----	------	------	<no description>
2	Reservoir	2.621	10	250	50,752	1	534.49	43,445	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 27.22 cfs
Storm frequency	= 5 yrs	Time to peak	= 3.83 hrs
Time interval	= 10 min	Hyd. volume	= 53,772 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Outflow (cfs)
0.17	1.000
0.33	1.000
0.50	1.100
0.67	1.100
0.83	1.200
1.00	1.200
1.17	1.200
1.33	1.300
1.50	1.400
1.67	1.400
1.83	1.500
2.00	1.600
2.17	1.700
2.33	1.800
2.50	2.000
2.67	2.100
2.83	2.400
3.00	2.600
3.17	3.200
3.33	3.600
3.50	5.300
3.67	3.600
3.83	27.22 <<
4.00	4.300
4.17	2.900
4.33	2.200
4.50	1.900
4.67	1.600
4.83	1.500
5.00	1.300
5.17	1.200
5.33	1.100
5.50	1.100

...End

Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 2.621 cfs
Storm frequency	= 5 yrs	Time to peak	= 4.17 hrs
Time interval	= 10 min	Hyd. volume	= 50,752 cuft
Inflow hyd. No.	= 1 - <no description>	Reservoir name	= <New Pond>
Max. Elevation	= 534.49 ft	Max. Storage	= 43,445 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
3.83	27.22 <<	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
4.00	4.300	534.46	61.35	0.034	-----	-----	2.184	-----	-----	-----	-----	2.217
4.17	2.900	534.49 <<	61.35	0.034	-----	-----	2.586	-----	-----	-----	-----	2.621 <<
4.33	2.200	534.48	61.35	0.034	-----	-----	2.566	-----	-----	-----	-----	2.600
4.50	1.900	534.47	61.35	0.034	-----	-----	2.406	-----	-----	-----	-----	2.440
4.67	1.600	534.46	61.35	0.034	-----	-----	2.205	-----	-----	-----	-----	2.238
4.83	1.500	534.45	61.35	0.034	-----	-----	2.004	-----	-----	-----	-----	2.038
5.00	1.300	534.43	61.35	0.034	-----	-----	1.818	-----	-----	-----	-----	1.852
5.17	1.200	534.42	61.35	0.034	-----	-----	1.642	-----	-----	-----	-----	1.676
5.33	1.100	534.41	61.35	0.033	-----	-----	1.489	-----	-----	-----	-----	1.523
5.50	1.100	534.40	61.35	0.033	-----	-----	1.366	-----	-----	-----	-----	1.399
5.67	0.000	534.39	61.35	0.033	-----	-----	1.168	-----	-----	-----	-----	1.201
5.83	0.000	534.36	61.35	0.033	-----	-----	0.911	-----	-----	-----	-----	0.944
6.00	0.000	534.34	61.35	0.033	-----	-----	0.709	-----	-----	-----	-----	0.742
6.17	0.000	534.33	61.35	0.033	-----	-----	0.551	-----	-----	-----	-----	0.583
6.33	0.000	534.32	61.35	0.032	-----	-----	0.426	-----	-----	-----	-----	0.459
6.50	0.000	534.31	61.35	0.032	-----	-----	0.328	-----	-----	-----	-----	0.361
6.67	0.000	534.30	61.35	0.032	-----	-----	0.251	-----	-----	-----	-----	0.283
6.83	0.000	534.29	61.35	0.032	-----	-----	0.235	-----	-----	-----	-----	0.267
7.00	0.000	534.29	61.35	0.032	-----	-----	0.220	-----	-----	-----	-----	0.252
7.17	0.000	534.28	61.35	0.032	-----	-----	0.206	-----	-----	-----	-----	0.238
7.33	0.000	534.28	61.35	0.032	-----	-----	0.193	-----	-----	-----	-----	0.225
7.50	0.000	534.27	61.35	0.032	-----	-----	0.181	-----	-----	-----	-----	0.213
7.67	0.000	534.27	61.35	0.032	-----	-----	0.169	-----	-----	-----	-----	0.201
7.83	0.000	534.26	61.35	0.032	-----	-----	0.158	-----	-----	-----	-----	0.190
8.00	0.000	534.26	61.35	0.032	-----	-----	0.147	-----	-----	-----	-----	0.179
8.17	0.000	534.25	61.35	0.032	-----	-----	0.137	-----	-----	-----	-----	0.169
8.33	0.000	534.25	61.35	0.032	-----	-----	0.128	-----	-----	-----	-----	0.160
8.50	0.000	534.25	61.35	0.032	-----	-----	0.119	-----	-----	-----	-----	0.151
8.67	0.000	534.24	61.35	0.032	-----	-----	0.111	-----	-----	-----	-----	0.142
8.83	0.000	534.24	61.35	0.032	-----	-----	0.103	-----	-----	-----	-----	0.135
9.00	0.000	534.24	61.35	0.032	-----	-----	0.096	-----	-----	-----	-----	0.127
9.17	0.000	534.24	61.35	0.032	-----	-----	0.089	-----	-----	-----	-----	0.120
9.33	0.000	534.23	61.35	0.032	-----	-----	0.082	-----	-----	-----	-----	0.113
9.50	0.000	534.23	61.35	0.031	-----	-----	0.076	-----	-----	-----	-----	0.107
9.67	0.000	534.23	61.35	0.031	-----	-----	0.070	-----	-----	-----	-----	0.101
9.83	0.000	534.23	61.35	0.031	-----	-----	0.064	-----	-----	-----	-----	0.095
10.00	0.000	534.22	61.35	0.031	-----	-----	0.059	-----	-----	-----	-----	0.090
10.17	0.000	534.22	61.35	0.031	-----	-----	0.054	-----	-----	-----	-----	0.085
10.33	0.000	534.22	61.35	0.031	-----	-----	0.049	-----	-----	-----	-----	0.080
10.50	0.000	534.22	61.35	0.031	-----	-----	0.045	-----	-----	-----	-----	0.076
10.67	0.000	534.22	61.35	0.031	-----	-----	0.040	-----	-----	-----	-----	0.072

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
10.83	0.000	534.21	61.35	0.031	-----	-----	0.036	-----	-----	-----	-----	0.068
11.00	0.000	534.21	61.35	0.031	-----	-----	0.033	-----	-----	-----	-----	0.064
11.17	0.000	534.21	61.35	0.031	-----	-----	0.029	-----	-----	-----	-----	0.060
11.33	0.000	534.21	61.35	0.031	-----	-----	0.026	-----	-----	-----	-----	0.057
11.50	0.000	534.21	61.35	0.031	-----	-----	0.023	-----	-----	-----	-----	0.054
11.67	0.000	534.21	61.35	0.031	-----	-----	0.020	-----	-----	-----	-----	0.051
11.83	0.000	534.21	61.35	0.031	-----	-----	0.017	-----	-----	-----	-----	0.048
12.00	0.000	534.21	61.35	0.031	-----	-----	0.014	-----	-----	-----	-----	0.045
12.17	0.000	534.20	61.35	0.031	-----	-----	0.012	-----	-----	-----	-----	0.043
12.33	0.000	534.20	61.35	0.031	-----	-----	0.009	-----	-----	-----	-----	0.040
12.50	0.000	534.20	61.35	0.031	-----	-----	0.007	-----	-----	-----	-----	0.038
12.67	0.000	534.20	61.35	0.031	-----	-----	0.005	-----	-----	-----	-----	0.036
12.83	0.000	534.20	61.35	0.031	-----	-----	0.003	-----	-----	-----	-----	0.034
13.00	0.000	534.20	61.35	0.031	-----	-----	0.001	-----	-----	-----	-----	0.032
13.17	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
13.33	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
13.50	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
13.67	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
13.83	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.00	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.17	0.000	534.20	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.33	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.50	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.67	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
14.83	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.00	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.17	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.33	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.50	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.67	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
15.83	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.00	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.17	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.33	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.50	0.000	534.19	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.67	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
16.83	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.00	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.17	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.33	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.50	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.67	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
17.83	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.00	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.17	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.33	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.50	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.67	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
18.83	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.00	0.000	534.18	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.17	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.33	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.50	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.67	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
19.83	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
20.00	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.17	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
20.33	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
20.50	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
20.67	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
20.83	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.00	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.17	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.33	0.000	534.17	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.50	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.67	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
21.83	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.00	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.17	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.33	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.50	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.67	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
22.83	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.00	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.17	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.33	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.50	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.67	0.000	534.16	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
23.83	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.00	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.17	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.33	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.50	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.67	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
24.83	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.00	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.17	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.33	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.50	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.67	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
25.83	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.00	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.17	0.000	534.15	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.33	0.000	534.14	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.50	0.000	534.14	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.67	0.000	534.14	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
26.83	0.000	534.14	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
27.00	0.000	534.14	61.35	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
27.17	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
27.33	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
27.50	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
27.67	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
27.83	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.00	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.17	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.33	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.50	0.000	534.14	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.67	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
28.83	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
29.00	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
29.17	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
29.33	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
29.50	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
29.67	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
29.83	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.00	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.17	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.33	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.50	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.67	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
30.83	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.00	0.000	534.13	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.17	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.33	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.50	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.67	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
31.83	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.00	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.17	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.33	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.50	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.67	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
32.83	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.00	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.17	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.33	0.000	534.12	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.50	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.67	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
33.83	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.00	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.17	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.33	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.50	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.67	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
34.83	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.00	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.17	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.33	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.50	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.67	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
35.83	0.000	534.11	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.00	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.17	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.33	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.50	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.67	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
36.83	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.00	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.17	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.33	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.50	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.67	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
37.83	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
38.00	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
38.17	0.000	534.10	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
38.33	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
38.50	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
38.67	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
38.83	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.00	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.17	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.33	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.50	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.67	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
39.83	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.00	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.17	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.33	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.50	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.67	0.000	534.09	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
40.83	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.00	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.17	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.33	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.50	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.67	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
41.83	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.00	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.17	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.33	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.50	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.67	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
42.83	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.00	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.17	0.000	534.08	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.33	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.50	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.67	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
43.83	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.00	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.17	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.33	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.50	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.67	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
44.83	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.00	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.17	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.33	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.50	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.67	0.000	534.07	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
45.83	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.00	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.17	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.33	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.50	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.67	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
46.83	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.00	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.17	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.33	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.50	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.67	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
47.83	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
48.00	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
48.17	0.000	534.06	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
48.33	0.000	534.05	61.35	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
48.50	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
48.67	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
48.83	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.00	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.17	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.33	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.50	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.67	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
49.83	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.00	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.17	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.33	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.50	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.67	0.000	534.05	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
50.83	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.00	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.17	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.33	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.50	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.67	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
51.83	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.00	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.17	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.33	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.50	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.67	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
52.83	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.00	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.17	0.000	534.04	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.33	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.50	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.67	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
53.83	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.00	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.17	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.33	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.50	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.67	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
54.83	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.00	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.17	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.33	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.50	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.67	0.000	534.03	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
55.83	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.00	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.17	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.33	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.50	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.67	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
56.83	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
57.00	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
57.17	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
57.33	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
57.50	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
57.67	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
57.83	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.00	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.17	0.000	534.02	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.33	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.50	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.67	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
58.83	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.00	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.17	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.33	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.50	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.67	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
59.83	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.00	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.17	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.33	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.50	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.67	0.000	534.01	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
60.83	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.00	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.17	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.33	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.50	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.67	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
61.83	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.00	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.17	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.33	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.50	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.67	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
62.83	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.00	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.17	0.000	534.00	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.33	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.50	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.67	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
63.83	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.00	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.17	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.33	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.50	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.67	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
64.83	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.00	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.17	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.33	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.50	0.000	533.99	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.67	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
65.83	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
66.00	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
66.17	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
66.33	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
66.50	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
66.67	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
66.83	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.00	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.17	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.33	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.50	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.67	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
67.83	0.000	533.98	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.00	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.17	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.33	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.50	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.67	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
68.83	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
69.00	0.000	533.97	61.35	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
69.17	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
69.33	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
69.50	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
69.67	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
69.83	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.00	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.17	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.33	0.000	533.97	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.50	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.67	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
70.83	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.00	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.17	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.33	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.50	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.67	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
71.83	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.00	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.17	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.33	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.50	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.67	0.000	533.96	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
72.83	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.00	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.17	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.33	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.50	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.67	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
73.83	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.00	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.17	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.33	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.50	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.67	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
74.83	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.00	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.17	0.000	533.95	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.33	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.50	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.67	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
75.83	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
76.00	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
76.17	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
76.33	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
76.50	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
76.67	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
76.83	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.00	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.17	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.33	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.50	0.000	533.94	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.67	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
77.83	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.00	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.17	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.33	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.50	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.67	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
78.83	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.00	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.17	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.33	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.50	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.67	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
79.83	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.00	0.000	533.93	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.17	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.33	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.50	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.67	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
80.83	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.00	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.17	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.33	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.50	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.67	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
81.83	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.00	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.17	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.33	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.50	0.000	533.92	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.67	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
82.83	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.00	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.17	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.33	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.50	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.67	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
83.83	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.00	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.17	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.33	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.50	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.67	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
84.83	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
85.00	0.000	533.91	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
85.17	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
85.33	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
85.50	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
85.67	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
85.83	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.00	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.17	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.33	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.50	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.67	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
86.83	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.00	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.17	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.33	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.50	0.000	533.90	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.67	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
87.83	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.00	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.17	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.33	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.50	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.67	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
88.83	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
89.00	0.000	533.89	61.35	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
89.17	0.000	533.89	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
89.33	0.000	533.89	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
89.50	0.000	533.89	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
89.67	0.000	533.89	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
89.83	0.000	533.89	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.00	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.17	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.33	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.50	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.67	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
90.83	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.00	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.17	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.33	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.50	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.67	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
91.83	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.00	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.17	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.33	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.50	0.000	533.88	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.67	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
92.83	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.00	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.17	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.33	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.50	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.67	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
93.83	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
94.00	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
94.17	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
94.33	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
94.50	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
94.67	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
94.83	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.00	0.000	533.87	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.17	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.33	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.50	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.67	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
95.83	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.00	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.17	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.33	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.50	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.67	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
96.83	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.00	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.17	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.33	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.50	0.000	533.86	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.67	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
97.83	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.00	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.17	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.33	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.50	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.67	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
98.83	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.00	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.17	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.33	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.50	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.67	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
99.83	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.00	0.000	533.85	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.17	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.33	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.50	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.67	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
100.83	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.00	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.17	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.33	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.50	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.67	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
101.83	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.00	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.17	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.33	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.50	0.000	533.84	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.67	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
102.83	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.00	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.17	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.33	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.50	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.67	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
103.83	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
104.00	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
104.17	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
104.33	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
104.50	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
104.67	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
104.83	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.00	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.17	0.000	533.83	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.33	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.50	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.67	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
105.83	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.00	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.17	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.33	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.50	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.67	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
106.83	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.00	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.17	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.33	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.50	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.67	0.000	533.82	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
107.83	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.00	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.17	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.33	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.50	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.67	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
108.83	0.000	533.81	61.35	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
109.00	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
109.17	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
109.33	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
109.50	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
109.67	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
109.83	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.00	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.17	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.33	0.000	533.81	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.50	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.67	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
110.83	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.00	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.17	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.33	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.50	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.67	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
111.83	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.00	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.17	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.33	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.50	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.67	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
112.83	0.000	533.80	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
113.00	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
113.17	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
113.33	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026

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<no description>

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
113.50	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
113.67	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
113.83	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
114.00	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
114.17	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
114.33	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
114.50	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026
114.67	0.000	533.79	61.35	0.026	-----	-----	-----	-----	-----	-----	-----	0.026

...End

Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 532.75 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	532.75	23,443	0	0
0.25	533.00	23,856	5,912	5,912
1.25	534.00	25,565	24,711	30,623
2.25	535.00	27,279	26,422	57,045
2.75	535.50	28,120	13,850	70,895
3.25	536.00	28,824	14,236	85,131
3.75	536.50	29,641	14,616	99,747

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	1.00	0.00	0.00
Span (in)	= 36.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 528.00	532.75	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 2.90	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.75	0.00	0.00	0.00
Crest El. (ft)	= 534.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	532.75	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.03	591	532.78	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.001
0.05	1,182	532.80	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.003
0.08	1,774	532.83	61.35 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.005
0.10	2,365	532.85	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.006
0.13	2,956	532.88	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.008
0.15	3,547	532.90	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.009
0.18	4,139	532.93	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.010
0.20	4,730	532.95	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.010
0.23	5,321	532.98	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.011
0.25	5,912	533.00	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.012
0.35	8,383	533.10	61.35 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
0.45	10,854	533.20	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.017
0.55	13,326	533.30	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
0.65	15,797	533.40	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.020
0.75	18,268	533.50	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.022
0.85	20,739	533.60	61.35 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.024
0.95	23,210	533.70	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.025
1.05	25,681	533.80	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.026
1.15	28,152	533.90	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.028
1.25	30,623	534.00	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.029
1.35	33,265	534.10	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.030
1.45	35,907	534.20	61.35 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.031
1.55	38,549	534.30	61.35 ic	0.03 ic	---	---	0.25	---	---	---	---	---	0.283
1.65	41,192	534.40	61.35 ic	0.03 ic	---	---	1.30	---	---	---	---	---	1.338
1.75	43,834	534.50	61.35 ic	0.03 ic	---	---	2.81	---	---	---	---	---	2.842
1.85	46,476	534.60	61.35 ic	0.04 ic	---	---	4.65	---	---	---	---	---	4.687
1.95	49,118	534.70	61.35 ic	0.04 ic	---	---	6.78	---	---	---	---	---	6.818
2.05	51,760	534.80	61.35 ic	0.04 ic	---	---	9.16	---	---	---	---	---	9.201
2.15	54,403	534.90	61.35 ic	0.04 ic	---	---	11.77	---	---	---	---	---	11.81
2.25	57,045	535.00	61.35 ic	0.04 ic	---	---	14.60	---	---	---	---	---	14.64
2.30	58,430	535.05	61.35 ic	0.04 ic	---	---	16.08	---	---	---	---	---	16.12
2.35	59,815	535.10	61.35 ic	0.04 ic	---	---	17.61	---	---	---	---	---	17.65
2.40	61,200	535.15	61.35 ic	0.04 ic	---	---	14.53 ic	---	---	---	---	---	14.57
2.45	62,585	535.20	61.35 ic	0.04 ic	---	---	14.92 ic	---	---	---	---	---	14.96
2.50	63,970	535.25	61.35 ic	0.04 ic	---	---	15.31 ic	---	---	---	---	---	15.35
2.55	65,355	535.30	61.35 ic	0.04 ic	---	---	15.69 ic	---	---	---	---	---	15.73

Continues on next page...

<New Pond>

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.60	66,740	535.35	61.35 ic	0.04 ic	---	---	16.06 ic	---	---	---	---	---	16.10
2.65	68,125	535.40	61.35 ic	0.04 ic	---	---	16.42 ic	---	---	---	---	---	16.46
2.70	69,510	535.45	61.35 ic	0.04 ic	---	---	16.77 ic	---	---	---	---	---	16.81
2.75	70,895	535.50	61.35 ic	0.04 ic	---	---	17.12 ic	---	---	---	---	---	17.16
2.80	72,318	535.55	61.35 ic	0.04 ic	---	---	17.46 ic	---	---	---	---	---	17.50
2.85	73,742	535.60	61.35 ic	0.04 ic	---	---	17.79 ic	---	---	---	---	---	17.83
2.90	75,165	535.65	61.35 ic	0.04 ic	---	---	18.12 ic	---	---	---	---	---	18.16
2.95	76,589	535.70	61.35 ic	0.04 ic	---	---	18.44 ic	---	---	---	---	---	18.48
3.00	78,013	535.75	61.35 ic	0.05 ic	---	---	18.75 ic	---	---	---	---	---	18.80
3.05	79,436	535.80	61.35 ic	0.05 ic	---	---	19.06 ic	---	---	---	---	---	19.11
3.10	80,860	535.85	61.35 ic	0.05 ic	---	---	19.37 ic	---	---	---	---	---	19.41
3.15	82,283	535.90	61.35 ic	0.05 ic	---	---	19.67 ic	---	---	---	---	---	19.71
3.20	83,707	535.95	61.35 ic	0.05 ic	---	---	19.96 ic	---	---	---	---	---	20.01
3.25	85,131	536.00	61.35 ic	0.05 ic	---	---	20.25 ic	---	---	---	---	---	20.30
3.30	86,592	536.05	61.35 ic	0.05 ic	---	---	20.54 ic	---	---	---	---	---	20.59
3.35	88,054	536.10	61.35 ic	0.05 ic	---	---	20.83 ic	---	---	---	---	---	20.87
3.40	89,516	536.15	61.35 ic	0.05 ic	---	---	21.10 ic	---	---	---	---	---	21.15
3.45	90,977	536.20	61.35 ic	0.05 ic	---	---	21.38 ic	---	---	---	---	---	21.43
3.50	92,439	536.25	61.35 ic	0.05 ic	---	---	21.65 ic	---	---	---	---	---	21.70
3.55	93,900	536.30	61.35 ic	0.05 ic	---	---	21.92 ic	---	---	---	---	---	21.97
3.60	95,362	536.35	61.35 ic	0.05 ic	---	---	22.19 ic	---	---	---	---	---	22.24
3.65	96,824	536.40	61.35 ic	0.05 ic	---	---	22.45 ic	---	---	---	---	---	22.50
3.70	98,285	536.45	61.35 ic	0.05 ic	---	---	22.71 ic	---	---	---	---	---	22.76
3.75	99,747	536.50	61.35 ic	0.05 ic	---	---	22.97 ic	---	---	---	---	---	23.02

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	31.60	10	250	69,120	----	------	------	<no description>
2	Reservoir	8.789	10	260	66,084	1	534.82	51,304	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 31.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 4.17 hrs
Time interval	= 10 min	Hyd. volume	= 69,120 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Outflow (cfs)
0.17	1.200
0.33	1.200
0.50	1.300
0.67	1.300
0.83	1.300
1.00	1.400
1.17	1.400
1.33	1.500
1.50	1.600
1.67	1.600
1.83	1.700
2.00	1.800
2.17	1.900
2.33	1.900
2.50	2.100
2.67	2.200
2.83	2.500
3.00	2.600
3.17	3.000
3.33	3.200
3.50	4.000
3.67	4.500
3.83	6.600
4.00	7.000
4.17	31.60 <<
4.33	5.300
4.50	3.600
4.67	2.800
4.83	2.300
5.00	2.000
5.17	1.800
5.33	1.600
5.50	1.500
5.67	1.400
5.83	1.300
6.00	1.200

...End

Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 8.789 cfs
Storm frequency	= 10 yrs	Time to peak	= 4.33 hrs
Time interval	= 10 min	Hyd. volume	= 66,084 cuft
Inflow hyd. No.	= 1 - <no description>	Reservoir name	= <New Pond>
Max. Elevation	= 534.82 ft	Max. Storage	= 51,304 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.17	31.60 <<	534.49	61.35	0.034	-----	-----	2.731	-----	-----	-----	-----	2.766
4.33	5.300	534.78 <<	61.35	0.037	-----	-----	8.752	-----	-----	-----	-----	8.789 <<
4.50	3.600	534.71	61.35	0.036	-----	-----	6.905	-----	-----	-----	-----	6.941
4.67	2.800	534.64	61.35	0.036	-----	-----	5.437	-----	-----	-----	-----	5.473
4.83	2.300	534.58	61.35	0.035	-----	-----	4.337	-----	-----	-----	-----	4.373
5.00	2.000	534.54	61.35	0.035	-----	-----	3.568	-----	-----	-----	-----	3.603
5.17	1.800	534.51	61.35	0.034	-----	-----	2.979	-----	-----	-----	-----	3.013
5.33	1.600	534.48	61.35	0.034	-----	-----	2.569	-----	-----	-----	-----	2.603
5.50	1.500	534.46	61.35	0.034	-----	-----	2.262	-----	-----	-----	-----	2.296
5.67	1.400	534.45	61.35	0.034	-----	-----	2.016	-----	-----	-----	-----	2.049
5.83	1.300	534.43	61.35	0.034	-----	-----	1.811	-----	-----	-----	-----	1.845
6.00	1.200	534.42	61.35	0.034	-----	-----	1.638	-----	-----	-----	-----	1.672
6.17	0.000	534.40	61.35	0.033	-----	-----	1.326	-----	-----	-----	-----	1.359
6.33	0.000	534.37	61.35	0.033	-----	-----	1.030	-----	-----	-----	-----	1.063
6.50	0.000	534.35	61.35	0.033	-----	-----	0.803	-----	-----	-----	-----	0.835
6.67	0.000	534.34	61.35	0.033	-----	-----	0.624	-----	-----	-----	-----	0.657
6.83	0.000	534.32	61.35	0.032	-----	-----	0.484	-----	-----	-----	-----	0.516
7.00	0.000	534.31	61.35	0.032	-----	-----	0.374	-----	-----	-----	-----	0.406
7.17	0.000	534.30	61.35	0.032	-----	-----	0.287	-----	-----	-----	-----	0.319
7.33	0.000	534.30	61.35	0.032	-----	-----	0.242	-----	-----	-----	-----	0.275
7.50	0.000	534.29	61.35	0.032	-----	-----	0.227	-----	-----	-----	-----	0.259
7.67	0.000	534.28	61.35	0.032	-----	-----	0.213	-----	-----	-----	-----	0.245
7.83	0.000	534.28	61.35	0.032	-----	-----	0.199	-----	-----	-----	-----	0.231
8.00	0.000	534.27	61.35	0.032	-----	-----	0.186	-----	-----	-----	-----	0.218
8.17	0.000	534.27	61.35	0.032	-----	-----	0.174	-----	-----	-----	-----	0.206
8.33	0.000	534.27	61.35	0.032	-----	-----	0.163	-----	-----	-----	-----	0.195
8.50	0.000	534.26	61.35	0.032	-----	-----	0.152	-----	-----	-----	-----	0.184
8.67	0.000	534.26	61.35	0.032	-----	-----	0.142	-----	-----	-----	-----	0.174
8.83	0.000	534.25	61.35	0.032	-----	-----	0.132	-----	-----	-----	-----	0.164
9.00	0.000	534.25	61.35	0.032	-----	-----	0.123	-----	-----	-----	-----	0.155
9.17	0.000	534.25	61.35	0.032	-----	-----	0.115	-----	-----	-----	-----	0.146
9.33	0.000	534.24	61.35	0.032	-----	-----	0.107	-----	-----	-----	-----	0.138
9.50	0.000	534.24	61.35	0.032	-----	-----	0.099	-----	-----	-----	-----	0.131
9.67	0.000	534.24	61.35	0.032	-----	-----	0.092	-----	-----	-----	-----	0.123
9.83	0.000	534.23	61.35	0.032	-----	-----	0.085	-----	-----	-----	-----	0.116
10.00	0.000	534.23	61.35	0.032	-----	-----	0.078	-----	-----	-----	-----	0.110
10.17	0.000	534.23	61.35	0.031	-----	-----	0.072	-----	-----	-----	-----	0.104
10.33	0.000	534.23	61.35	0.031	-----	-----	0.067	-----	-----	-----	-----	0.098
10.50	0.000	534.22	61.35	0.031	-----	-----	0.061	-----	-----	-----	-----	0.093

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	34.65	10	250	84,210	----	------	------	<no description>
2	Reservoir	14.63	10	260	81,171	1	535.09	57,039	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 34.65 cfs
Storm frequency	= 25 yrs	Time to peak	= 4.17 hrs
Time interval	= 10 min	Hyd. volume	= 84,210 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Outflow (cfs)
0.17	1.400
0.33	1.500
0.50	1.500
0.67	1.600
0.83	1.600
1.00	1.700
1.17	1.700
1.33	1.800
1.50	1.900
1.67	1.900
1.83	2.100
2.00	2.100
2.17	2.300
2.33	2.400
2.50	2.600
2.67	2.700
2.83	3.000
3.00	3.200
3.17	3.600
3.33	3.900
3.50	4.800
3.67	5.500
3.83	8.000
4.00	12.70
4.17	34.65 <<
4.33	6.400
4.50	4.300
4.67	3.400
4.83	2.800
5.00	2.500
5.17	2.200
5.33	2.000
5.50	1.800
5.67	1.700
5.83	1.600
6.00	1.500

...End

Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 14.63 cfs
Storm frequency	= 25 yrs	Time to peak	= 4.33 hrs
Time interval	= 10 min	Hyd. volume	= 81,171 cuft
Inflow hyd. No.	= 1 - <no description>	Reservoir name	= <New Pond>
Max. Elevation	= 535.09 ft	Max. Storage	= 57,039 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.00	12.70	534.39	61.35	0.033	-----	-----	1.184	-----	-----	-----	-----	1.217
4.17	34.65 <<	534.81	61.35	0.037	-----	-----	9.323	-----	-----	-----	-----	9.360
4.33	6.400	535.00 <<	61.35	0.039	-----	-----	14.59	-----	-----	-----	-----	14.63 <<
4.50	4.300	534.84	61.35	0.038	-----	-----	10.18	-----	-----	-----	-----	10.22
4.67	3.400	534.73	61.35	0.037	-----	-----	7.401	-----	-----	-----	-----	7.437
4.83	2.800	534.65	61.35	0.036	-----	-----	5.658	-----	-----	-----	-----	5.695
5.00	2.500	534.59	61.35	0.035	-----	-----	4.493	-----	-----	-----	-----	4.528
5.17	2.200	534.55	61.35	0.035	-----	-----	3.739	-----	-----	-----	-----	3.774
5.33	2.000	534.52	61.35	0.035	-----	-----	3.160	-----	-----	-----	-----	3.194
5.50	1.800	534.49	61.35	0.034	-----	-----	2.727	-----	-----	-----	-----	2.761
5.67	1.700	534.47	61.35	0.034	-----	-----	2.432	-----	-----	-----	-----	2.466
5.83	1.600	534.46	61.35	0.034	-----	-----	2.194	-----	-----	-----	-----	2.228
6.00	1.500	534.45	61.35	0.034	-----	-----	1.996	-----	-----	-----	-----	2.030
6.17	0.000	534.42	61.35	0.034	-----	-----	1.623	-----	-----	-----	-----	1.657
6.33	0.000	534.39	61.35	0.033	-----	-----	1.184	-----	-----	-----	-----	1.217
6.50	0.000	534.36	61.35	0.033	-----	-----	0.924	-----	-----	-----	-----	0.957
6.67	0.000	534.34	61.35	0.033	-----	-----	0.720	-----	-----	-----	-----	0.752
6.83	0.000	534.33	61.35	0.033	-----	-----	0.559	-----	-----	-----	-----	0.591
7.00	0.000	534.32	61.35	0.032	-----	-----	0.432	-----	-----	-----	-----	0.465
7.17	0.000	534.31	61.35	0.032	-----	-----	0.333	-----	-----	-----	-----	0.365
7.33	0.000	534.30	61.35	0.032	-----	-----	0.255	-----	-----	-----	-----	0.287
7.50	0.000	534.29	61.35	0.032	-----	-----	0.236	-----	-----	-----	-----	0.268
7.67	0.000	534.29	61.35	0.032	-----	-----	0.221	-----	-----	-----	-----	0.253
7.83	0.000	534.28	61.35	0.032	-----	-----	0.207	-----	-----	-----	-----	0.239
8.00	0.000	534.28	61.35	0.032	-----	-----	0.194	-----	-----	-----	-----	0.226
8.17	0.000	534.27	61.35	0.032	-----	-----	0.181	-----	-----	-----	-----	0.213
8.33	0.000	534.27	61.35	0.032	-----	-----	0.170	-----	-----	-----	-----	0.201
8.50	0.000	534.26	61.35	0.032	-----	-----	0.158	-----	-----	-----	-----	0.190
8.67	0.000	534.26	61.35	0.032	-----	-----	0.148	-----	-----	-----	-----	0.180
8.83	0.000	534.25	61.35	0.032	-----	-----	0.138	-----	-----	-----	-----	0.170
9.00	0.000	534.25	61.35	0.032	-----	-----	0.129	-----	-----	-----	-----	0.160
9.17	0.000	534.25	61.35	0.032	-----	-----	0.120	-----	-----	-----	-----	0.151

...End

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	39.24	10	250	95,604	----	------	------	<no description>
2	Reservoir	14.69	10	260	92,564	1	535.25	61,621	<no description>

Hydrograph Report

Hyd. No. 1

<no description>

Hydrograph type	= Manual	Peak discharge	= 39.24 cfs
Storm frequency	= 50 yrs	Time to peak	= 4.17 hrs
Time interval	= 10 min	Hyd. volume	= 95,604 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Outflow (cfs)
0.17	1.600
0.33	1.700
0.50	1.700
0.67	1.800
0.83	1.800
1.00	1.900
1.17	2.000
1.33	2.000
1.50	2.100
1.67	2.200
1.83	2.300
2.00	2.400
2.17	2.600
2.33	2.700
2.50	2.900
2.67	3.100
2.83	3.400
3.00	3.600
3.17	4.100
3.33	4.500
3.50	5.500
3.67	6.200
3.83	9.100
4.00	14.60
4.17	39.24 <<
4.33	7.300
4.50	4.900
4.67	3.800
4.83	3.200
5.00	2.800
5.17	2.500
5.33	2.300
5.50	2.100
5.67	1.900
5.83	1.800
6.00	1.700

...End

Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 14.69 cfs
Storm frequency	= 50 yrs	Time to peak	= 4.33 hrs
Time interval	= 10 min	Hyd. volume	= 92,564 cuft
Inflow hyd. No.	= 1 - <no description>	Reservoir name	= <New Pond>
Max. Elevation	= 535.25 ft	Max. Storage	= 61,621 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
3.83	9.100	534.34	61.35	0.033	-----	-----	0.651	-----	-----	-----	-----	0.684
4.00	14.60	534.56	61.35	0.035	-----	-----	3.830	-----	-----	-----	-----	3.865
4.17	39.24 <<	534.97	61.35	0.039	-----	-----	13.67	-----	-----	-----	-----	13.71
4.33	7.300	535.00 <<	61.35	0.039	-----	-----	14.65	-----	-----	-----	-----	14.69 <<
4.50	4.900	534.98	61.35	0.039	-----	-----	14.15	-----	-----	-----	-----	14.18
4.67	3.800	534.81	61.35	0.037	-----	-----	9.509	-----	-----	-----	-----	9.547
4.83	3.200	534.71	61.35	0.036	-----	-----	6.911	-----	-----	-----	-----	6.948
5.00	2.800	534.63	61.35	0.036	-----	-----	5.363	-----	-----	-----	-----	5.398
5.17	2.500	534.58	61.35	0.035	-----	-----	4.332	-----	-----	-----	-----	4.367
5.33	2.300	534.55	61.35	0.035	-----	-----	3.651	-----	-----	-----	-----	3.686
5.50	2.100	534.52	61.35	0.034	-----	-----	3.137	-----	-----	-----	-----	3.171
5.67	1.900	534.50	61.35	0.034	-----	-----	2.743	-----	-----	-----	-----	2.778
5.83	1.800	534.48	61.35	0.034	-----	-----	2.473	-----	-----	-----	-----	2.507
6.00	1.700	534.46	61.35	0.034	-----	-----	2.252	-----	-----	-----	-----	2.286
6.17	0.000	534.44	61.35	0.034	-----	-----	1.833	-----	-----	-----	-----	1.867
6.33	0.000	534.40	61.35	0.033	-----	-----	1.293	-----	-----	-----	-----	1.327
6.50	0.000	534.37	61.35	0.033	-----	-----	1.010	-----	-----	-----	-----	1.043
6.67	0.000	534.35	61.35	0.033	-----	-----	0.787	-----	-----	-----	-----	0.820
6.83	0.000	534.33	61.35	0.033	-----	-----	0.612	-----	-----	-----	-----	0.644
7.00	0.000	534.32	61.35	0.032	-----	-----	0.474	-----	-----	-----	-----	0.507
7.17	0.000	534.31	61.35	0.032	-----	-----	0.366	-----	-----	-----	-----	0.398
7.33	0.000	534.30	61.35	0.032	-----	-----	0.281	-----	-----	-----	-----	0.313
7.50	0.000	534.30	61.35	0.032	-----	-----	0.241	-----	-----	-----	-----	0.273
7.67	0.000	534.29	61.35	0.032	-----	-----	0.226	-----	-----	-----	-----	0.258
7.83	0.000	534.28	61.35	0.032	-----	-----	0.212	-----	-----	-----	-----	0.244
8.00	0.000	534.28	61.35	0.032	-----	-----	0.198	-----	-----	-----	-----	0.230
8.17	0.000	534.27	61.35	0.032	-----	-----	0.185	-----	-----	-----	-----	0.217
8.33	0.000	534.27	61.35	0.032	-----	-----	0.173	-----	-----	-----	-----	0.205
8.50	0.000	534.26	61.35	0.032	-----	-----	0.162	-----	-----	-----	-----	0.194
8.67	0.000	534.26	61.35	0.032	-----	-----	0.151	-----	-----	-----	-----	0.183
8.83	0.000	534.26	61.35	0.032	-----	-----	0.141	-----	-----	-----	-----	0.173
9.00	0.000	534.25	61.35	0.032	-----	-----	0.132	-----	-----	-----	-----	0.163
9.17	0.000	534.25	61.35	0.032	-----	-----	0.123	-----	-----	-----	-----	0.154

...End

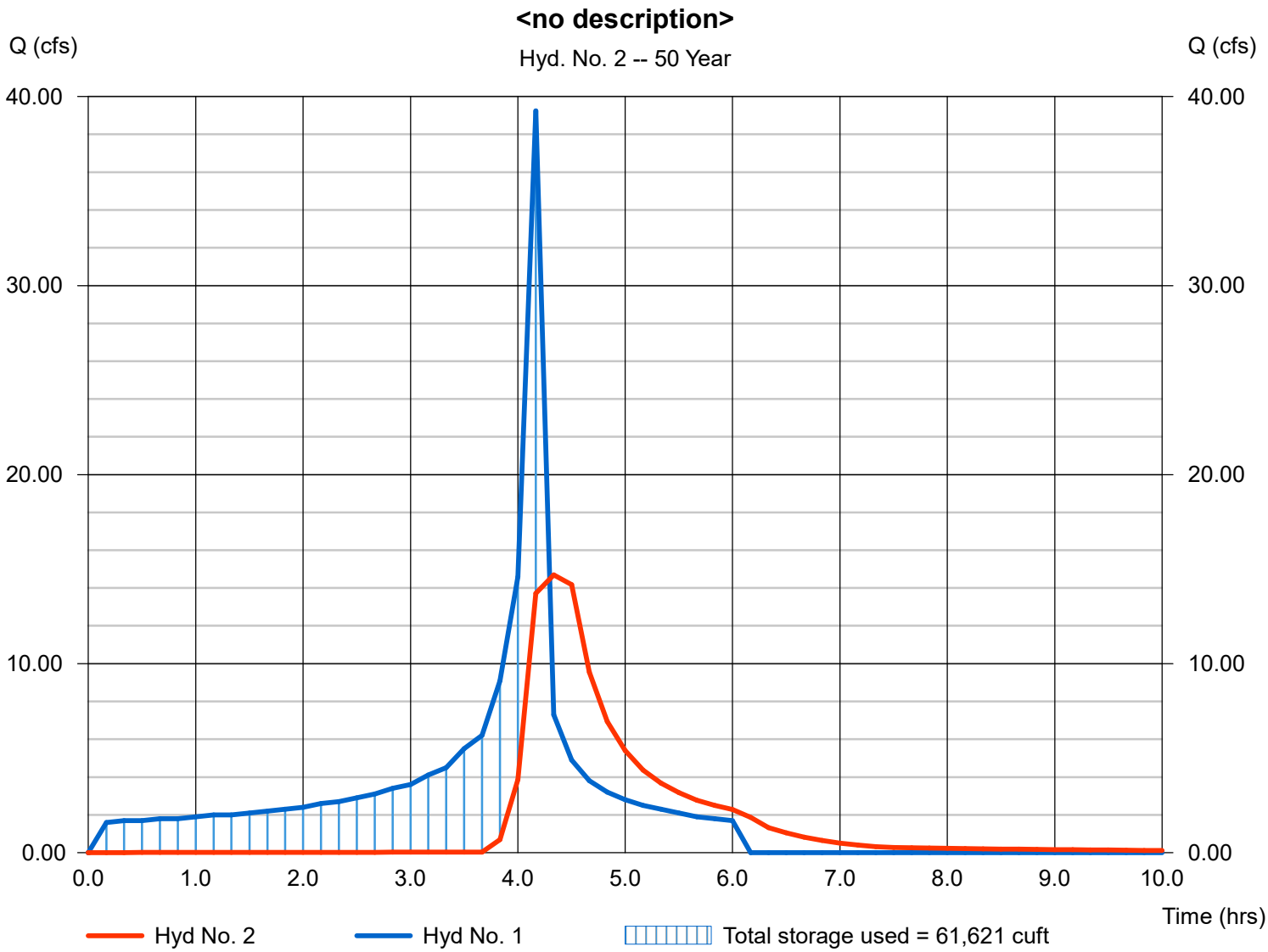
Hydrograph Report

Hyd. No. 2

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	14.69 cfs
Storm frequency	=	50 yrs	Time to peak	=	4.33 hrs
Time interval	=	10 min	Hyd. volume	=	92,564 cuft
Inflow hyd. No.	=	1 - <no description>	Max. Elevation	=	535.25 ft
Reservoir name	=	<New Pond>	Max. Storage	=	61,621 cuft

Storage Indication method used.



APPENDIX A – TABLES AND CHARTS

ENGINEERING & DEVELOPMENT department

NOTICE

CITY OF SAN DIEGO • 1222 FIRST AVENUE, SAN DIEGO, CALIFORNIA 92101

DATE: August 7, 1987

TO: All Private Engineers

FROM: Subdivision Engineer

SUBJECT: DRAINAGE REQUIREMENTS FOR DEVELOPMENTS IN OTAY MESA

In order to minimize the effects of increased storm water runoff in Mexico, due to development of property in Otay Mesa, all property in Otay Mesa that is within the water shed that drains into Mexico, shall be developed with the following requirements:

1. Each property owner shall provide storm water detention facilities so that there will be no increase in the rate of runoff due to development of the property.

2. The detention facilities shall be designed so that the rate of runoff from the property will not be greater after development than it was before development for a 5 year, 10 year, 25 year and 50 year storm.

3. All drainage facilities crossing four-lane major or higher classification streets shall be designed for a Q_{100} (existing). Other facilities, except the major channel referred to in paragraph 5, may be designed for Q_{50} (existing).

4. The Drainage Design Manual shall be used as guidelines for design of drainage facilities and computing design discharges.

5. The City Engineer's Office, Flood Control Section, is preparing a preliminary plan for the main north-south channel from Otay Mesa Road near La Media to the Mexican Border. The preliminary design will include the design "Q" (Q_{100} existing), the invert grade, and the water surface elevation at the major road crossings.

C. R. LOCHHEAD
Subdivision Engineer

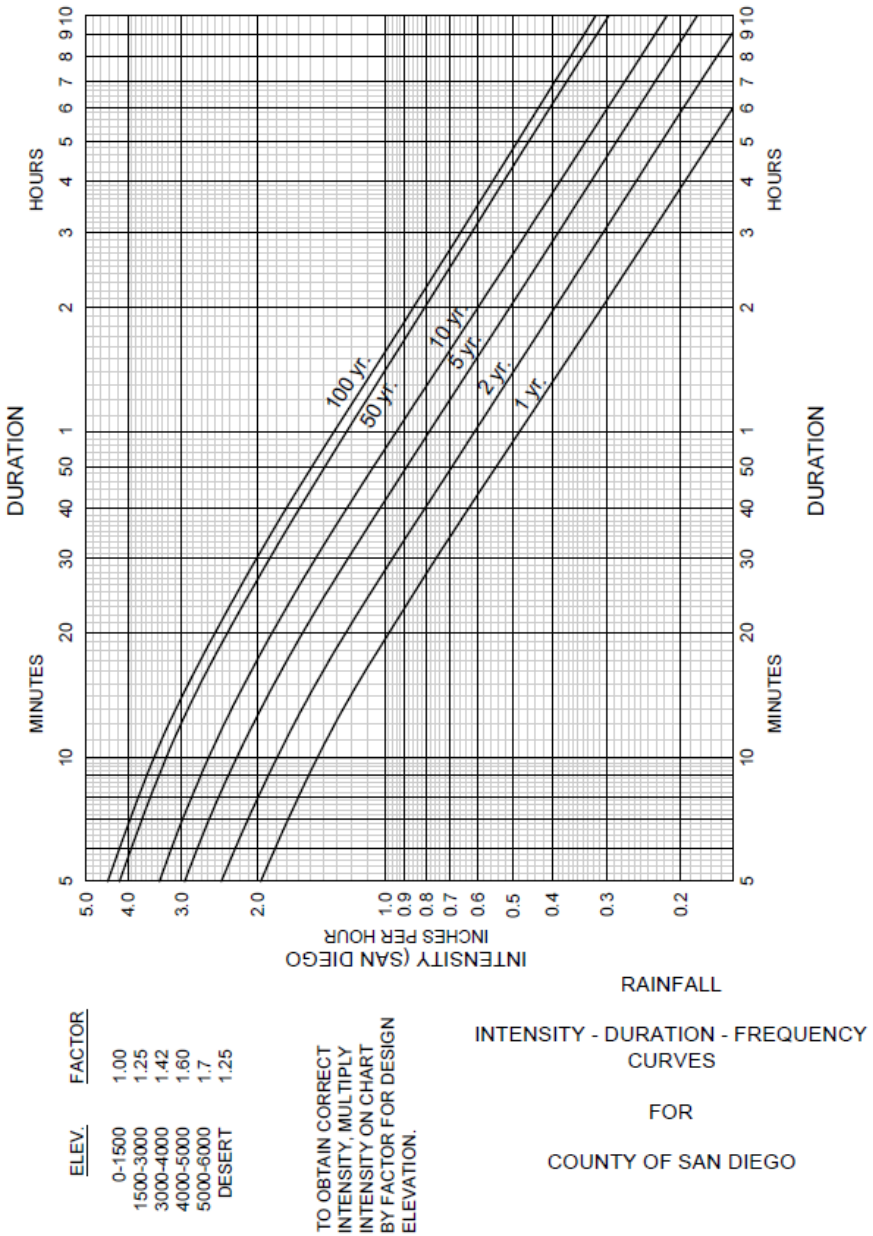


Figure A-1. Intensity-Duration-Frequency Design Chart

Ernest F. Brater and Horace Williams King

HANDBOOK OF HYDRAULICS

For the Solution of Hydraulic Engineering Problems

Table 7-14. Values of K' for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{8/3} s^{1/2}$$

D = depth of water d = diameter of channel

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00007	.00031	.00074	.00138	.00222	.00328	.00455	.00604	.00775
.1	.00967	.0118	.0142	.0167	.0195	.0225	.0257	.0291	.0327	.0366
.2	.0406	.0448	.0492	.0537	.0585	.0634	.0686	.0738	.0793	.0849
.3	.0907	.0966	.1027	.1089	.1153	.1218	.1284	.1352	.1420	.1490
.4	.1561	.1633	.1705	.1779	.1854	.1929	.2005	.2082	.2160	.2238
.5	.232	.239	.247	.255	.263	.271	.279	.287	.295	.303
.6	.311	.319	.327	.335	.343	.350	.358	.366	.373	.380
.7	.388	.395	.402	.409	.416	.422	.429	.435	.441	.447
.8	.453	.458	.463	.468	.473	.477	.481	.485	.488	.491
.9	.494	.496	.497	.498	.498	.498	.496	.494	.489	.483
1.0	.463									

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

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

Appendix C

Manning Roughness Coefficients

The Manning roughness coefficient (n) is used to represent flow resistance in open-channel hydraulic computations. This Appendix offers a compilation of Manning roughness coefficients that may be used in the hydraulic design and evaluation of drainage facilities.

These values serve only as a basic guide. The procedure for selecting appropriate values for Manning roughness coefficient, especially in natural channel systems, is subjective and requires judgment and skill that is primarily developed through experience. For work where very accurate determination of water surface profile is necessary, the design engineer should consult the governing Agency to obtain data regarding roughness coefficient values applicable to specific streams. The design engineer may also examine Flood Insurance Study data, or one of several references for more specific information on determining roughness coefficient.

Table C-1. Average Manning Roughness Coefficients for Pavement and Gutters [1]

Material	Manning Roughness Coefficient (n)
Concrete Gutter [2]	0.015
Concrete Pavement Float Finish Broom Finish	 0.014 0.016
Concrete Gutter with Asphalt Pavement Smooth Finish Rough Texture	 0.013 0.015
Asphalt Pavement Smooth Finish Rough Texture	 0.013 0.016

Based on FHWA HEC-22.

[1] Based on materials and workmanship required by standard specifications.

[2] Increase roughness coefficient in gutters with mild slopes where sediment might accumulate by 0.020.

Table C-2. Average Manning Roughness Coefficients for Closed Conduits [1]

Conduit	Manning Roughness Coefficient (n)
Reinforced Concrete Pipe (RCP)	0.013
Corrugated Metal Pipe and Pipe Arch	
2-3/8 x ½ inch Corrugations	
Unlined	0.024
Half Lined	
Full Flow	0.018
d/D>=0.60	0.016
d/D<0.60	0.013
Fully Lined	0.013
3x1 inch Corrugations	0.027
6x2 inch Corrugations	0.032
Spiral Rib Pipe	0.013
Helically Wound Pipe	
18-inch	0.015
24-inch	0.017
30-inch	0.019
36-inch	0.021
42-inch	0.022
48-inch	0.023
Plastic Pipe (HPDE and PVC)	
Smooth	0.013
Corrugated	0.024
Vitrified Clay Pipe	0.014
Cast-Iron Pipe (Uncoated)	0.013
Steel Pipe	0.011
Brick	0.017
Cast-In-Place Concrete Pipe	
Rough Wood Forms	0.017
Smooth Wood or Steel Forms	0.014

[1] Based on materials and workmanship required by standard specifications.

Table C-3. Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[1]

Lining Type	Design Flow Depth		
	0 – 0.5 ft	0.5 – 2.0 ft	> 2.0 ft
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Chapter 7, Section 7.6.17)		

[1] Based on materials and workmanship required by standard specifications.

Table C-4. Average Manning Roughness Coefficients for Larger Open Channels

Channel	Manning Roughness Coefficient(n)
Unlined Channels Clay Loam Sand	 0.023 0.020
Lined Channels Grass Lined (well maintained) Grass Lined (not maintained)	 0.035 0.045
Wetland-Bottom Channels (New Channel)	0.023
Wetland-Bottom Channels (Mature Channel)	See Table A–5
Riprap-Lined Channels	See Chapter 7, Section 7.6.17
Concrete (Poured)	0.014
Air Blown Mortar (Gunite or Shotcrete)[1]	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018

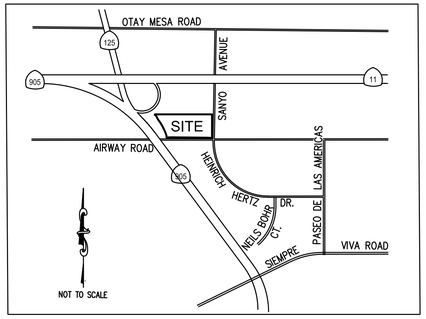
[1] For air blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.
Note: For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

Table C-5. Average Manning Roughness Coefficients for Natural Channels

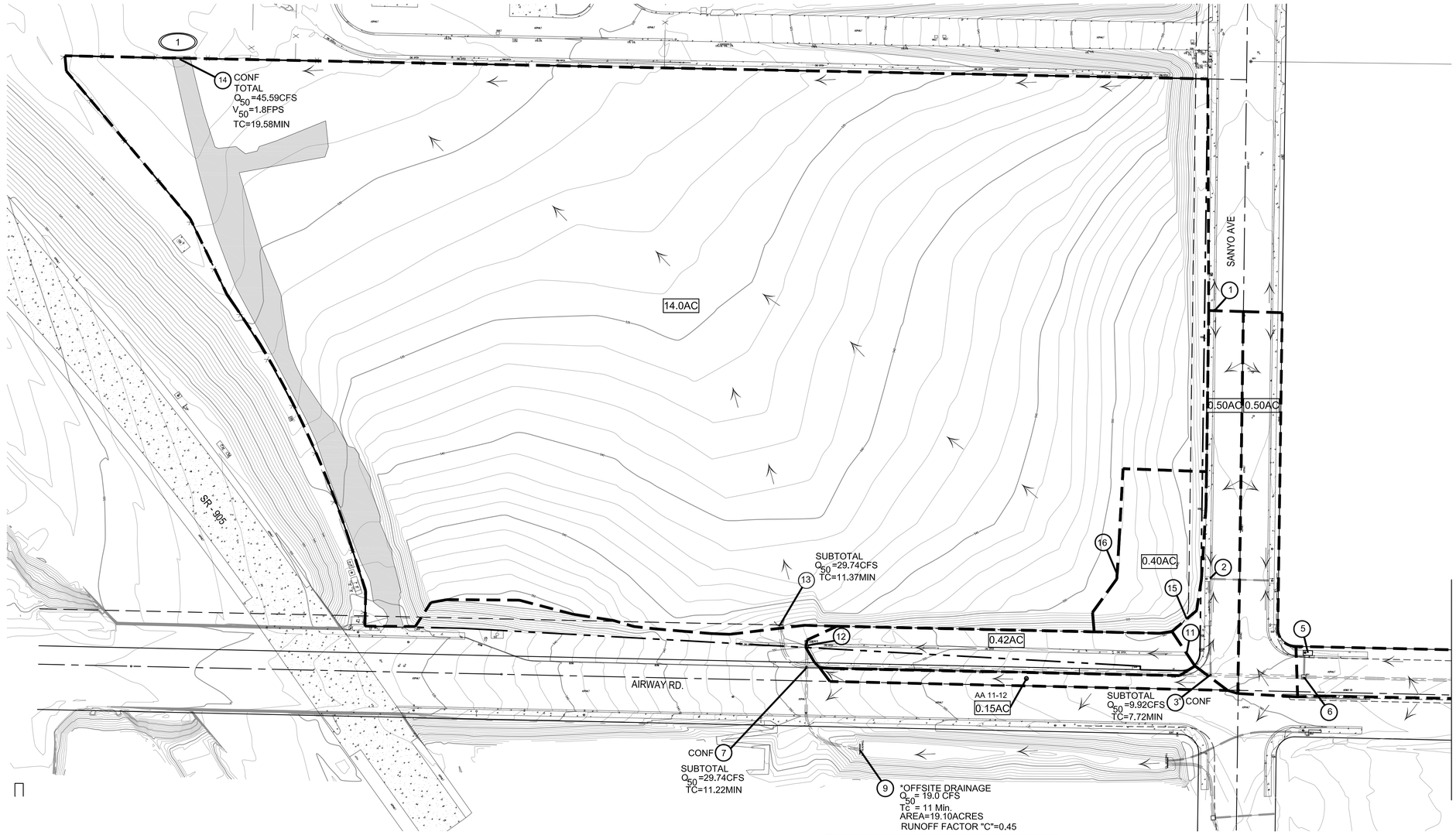
Channel	Manning Roughness Coefficient (n)
Minor Streams (Surface Width at Flood Stage < 100 ft)	
Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase all above values by:	0.015
Irregular Section, with Pools, Slight Channel Meander	
Channels (A) through (E) above, Increase all Values by:	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	0.050
(A) Bottom, Gravel, Cobbles and Few Boulders	0.060
(B) Bottom, Cobbles with Large Boulders	
Flood Plains (Adjacent to Natural Streams)	
Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium-to-Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

APPENDIX B – DRAINAGE EXHIBIT

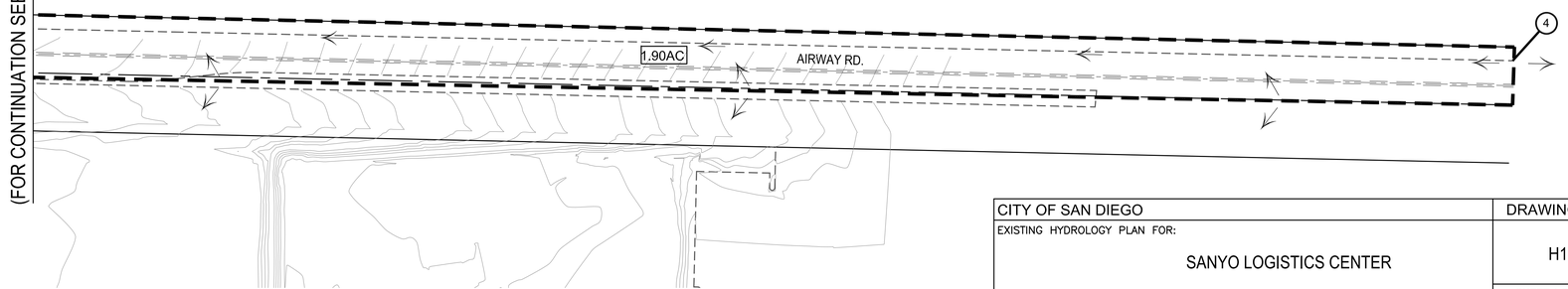
EXISTING HYDROLOGY MAP
FOR
SANYO LOGISTICS CENTER



VICINITY MAP
NOT TO SCALE



*SEE APPROVED DRAINAGE / DETENTION STUDY FOR OTAY INTERNATIONAL CENTER AREA OF "B" STREET AND AIRWAY ROAD PREPARED BY RICK ENGINEERING DATED AUGUST 15, 1988



LEGEND

FEATURE	SYMBOL
NODE NUMBER	(1)
HYDROLOGIC AREA	1.90AC
SUBAREA BOUNDARY	
DIRECTION OF FLOW	
POINT OF COMPLIANCE	(1)

0 30 60 120 180
GRAPHIC SCALE: 1" = 60'

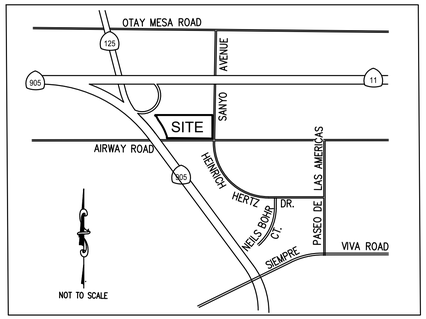
IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

K&S ENGINEERING, INC.
Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SHEETS
NO.48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA

CITY OF SAN DIEGO	DRAWING NO.
EXISTING HYDROLOGY PLAN FOR: SANYO LOGISTICS CENTER	H1
	SHEET 1 OF 2

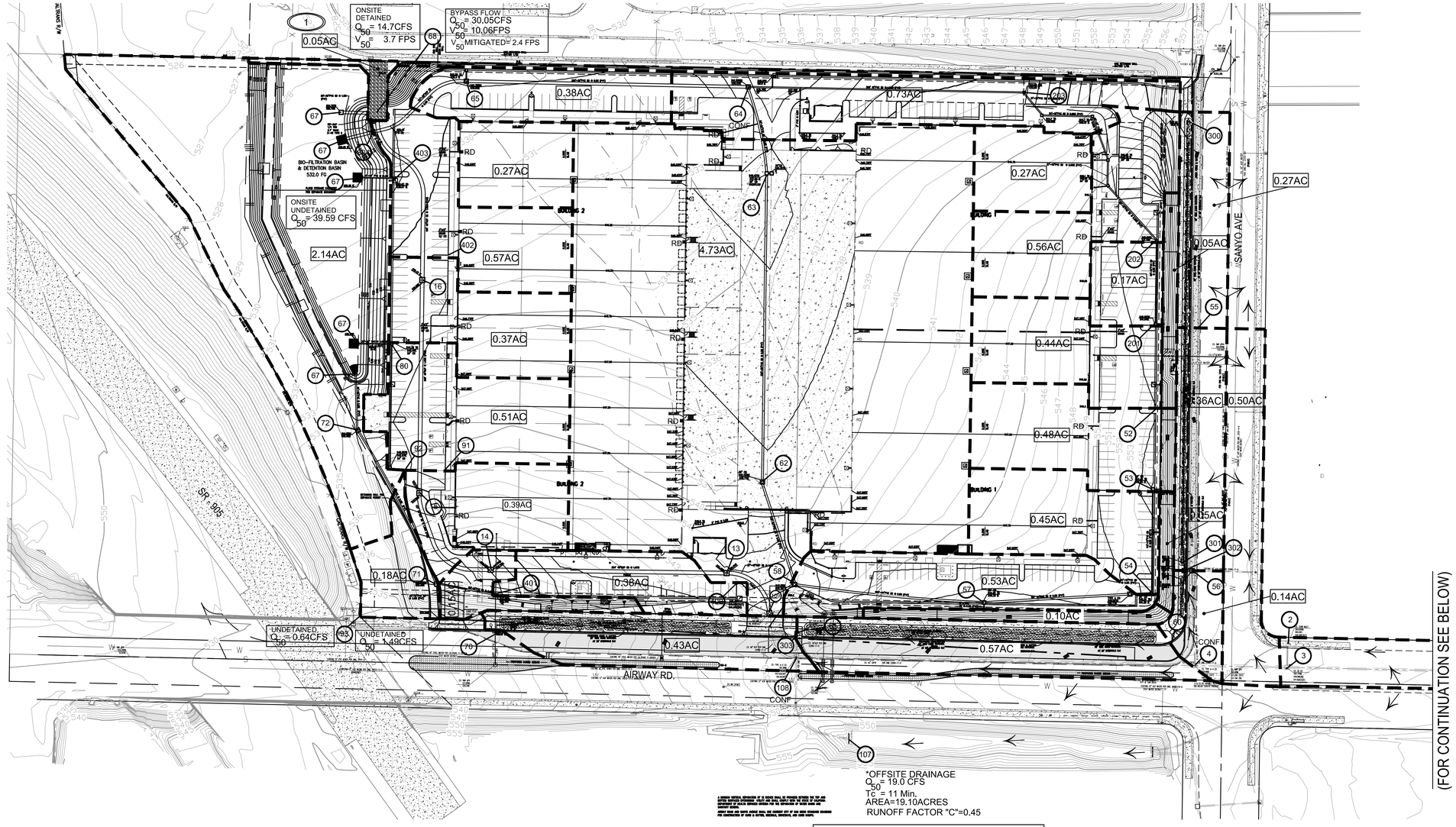
PROPOSED HYDROLOGY MAP
FOR
SANYO LOGISTICS CENTER



VICINITY MAP
NOT TO SCALE

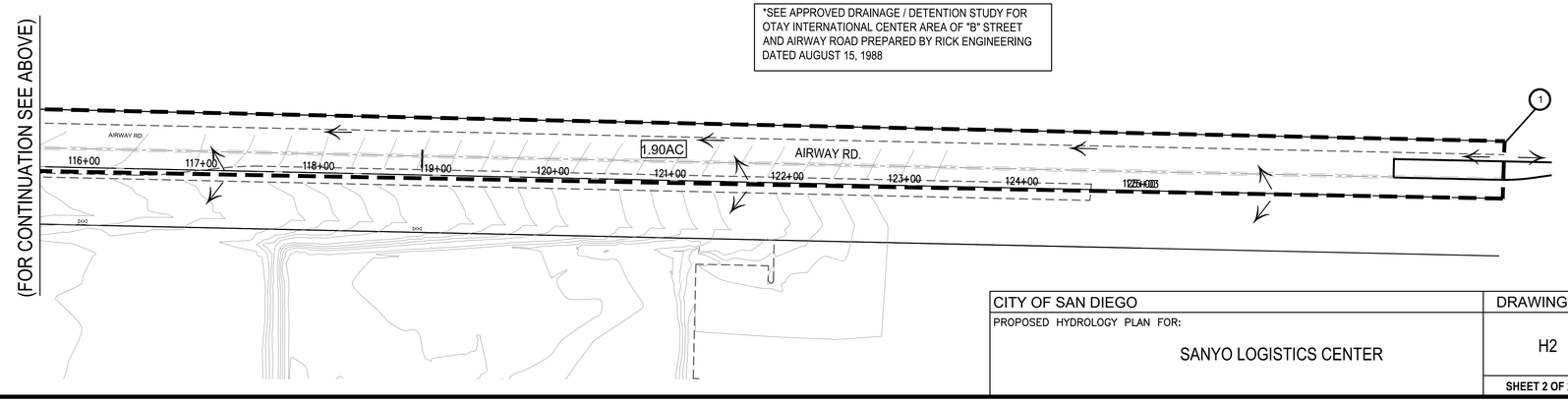
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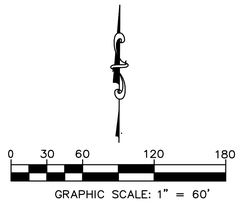
FEATURE	SYMBOL
NODE NUMBER	(1)
HYDROLOGIC AREA	1.90AC
SUBAREA BOUNDARY	
DIRECTION OF FLOW	
POINT OF COMPLIANCE	(1)
ROOF DRAIN	RD
STREET RUNOFF	
BYPASS STORM DRAIN PIPE	



*OFFSITE DRAINAGE
Q_{50}= 19.0 CFS
Tc = 11 Min.
AREA=19.10ACRES
RUNOFF FACTOR "C"=0.45

*SEE APPROVED DRAINAGE / DETENTION STUDY FOR OTAY INTERNATIONAL CENTER AREA OF "B" STREET AND AIRWAY ROAD PREPARED BY RICK ENGINEERING DATED AUGUST 15, 1988





IF PLAN SIZE IS LESS THAN 24"x36", THIS IS A REDUCED COPY. SCALE PLAN ACCORDINGLY.

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Planning . Engineering . Surveying
7801 Mission Center Court, Suite 100 San Diego, CA 92108
(619) 296-5565 Fax: (619) 296-5564

REGISTERED PROFESSIONAL ENGINEER
KAMAL S. SNEIS
NO.48592
EXP 6-30-22
CIVIL
STATE OF CALIFORNIA

CITY OF SAN DIEGO	DRAWING NO.
PROPOSED HYDROLOGY PLAN FOR: SANYO LOGISTICS CENTER	H2
	SHEET 2 OF 2

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.

GEOTECHNICAL INVESTIGATION

SANYO LOGISTICS CENTER
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

BADIEE DEVELOPMENT INC.
LA JOLLA, CALIFORNIA

AUGUST 13, 2020
PROJECT NO. G2501-42-01

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G2501-42-01
August 13, 2020

Badiee Development Inc.
1261 Prospect Street, Suite 9
La Jolla, California 92037

Attention: Mr. Scott Merry

Subject: GEOTECHNICAL INVESTIGATION
SANYO LOGISTICS CENTER
SAN DIEGO, CALIFORNIA

Dear Mr. Merry:

In accordance with your request, we have prepared this geotechnical investigation report for the proposed industrial warehouse buildings at the subject site. The site is underlain by Tertiary-age Otay Formation mantled by topsoil and undocumented fill.

This report is based on observations made during our field investigation performed on January 29, 2020, and laboratory testing. Based on the results of this study, we opine that the subject site is suitable for construction of the proposed warehouse buildings. The accompanying report presents the results of our study and conclusions and recommendations regarding geotechnical aspects of site development.

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

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

Rupert S. Adams
CEG 2561

RCM:RSA:dmc

(e-mail) Addressee

6960 Flanders Drive ■ San Diego, California 92121-2974 ■ Telephone 858.558.6900 ■ Fax 858.558.6159

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APPENDIX D
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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for two proposed industrial warehouse buildings located northwest of the intersection of Airway Road and Sanyo Avenue, in San Diego, California (see Vicinity Map, Figure 1). The purpose of our investigation was to evaluate subsurface soil and geologic conditions at the site, and provide conclusions and recommendations pertaining to the geotechnical aspects of developing the property as proposed.

The scope of our investigation included a site reconnaissance, excavation and logging of 15 test pits, performing two infiltration tests in areas of proposed storm water basins or other storm water management devices, and reviewing published and unpublished geologic literature and reports (see List of References). Appendix A presents a discussion of our field investigation. We performed laboratory tests on soil samples obtained from the exploratory test pits to evaluate pertinent physical properties for engineering analyses. The results of laboratory testing are presented in Appendix B.

Site geologic conditions are depicted on Figure 2 (Geologic Map). A CAD file of the preliminary grading plan prepared by K & S Engineering was utilized as a base map to plot geologic contacts and trench locations.

The conclusions and recommendations presented herein are based on our analysis of the data obtained during the investigation, and our experience with similar soil and geologic conditions on this and adjacent properties.

2. SITE AND PROJECT DESCRIPTION

The property consists of an undeveloped, approximately 15-acre rectangular parcel located northwest of the intersection of Airway Road and Sanyo Avenue, in the Otay Mesa area of San Diego, California (see Figure 1). Site topography is gently to moderately sloping with elevations ranging from approximately 527 feet to 561 feet above mean sea level (MSL).

The proposed improvements include two single-story industrial warehouse buildings with associated utilities, paving, storm water management devices, and landscape improvements. The buildings will be approximately 103,000 to 132,000 square feet. Retaining walls are planned along the north and east sides of the property and at the southeast corner. Loading docks and paved driveways and parking lots will be constructed. A storm water BMP basin is planned at the northwest corner. Proposed cuts and fills are approximately 9 and 16 feet, respectively. Slopes are planned along Airway Road and Sanyo Road, and for the BMP basin.

The locations and descriptions of the site and proposed development are based on our site reconnaissance and recent field investigations, and our understanding of site development as shown on the preliminary grading plan by K&S Engineering. If project details vary significantly from those described, Geocon Incorporated should be contacted to review the changes and provide additional analyses and/or revisions to this report, if warranted.

3. SOIL AND GEOLOGIC CONDITIONS

Based on the results of the field investigation, the site is underlain by Tertiary-age Otay Formation mantled by topsoil. Undocumented fill up to approximately 2 feet was encountered in some of the trenches. The geologic units are described below. Mapped geologic conditions are depicted on the *Geologic Map* (Figure 2), and on the *Geologic Cross Section* (Figure 3). Exploratory test pit logs are presented in Appendix A, Figures A-1 through A-15.

3.1 Undocumented Fill (Unmapped)

Undocumented fill between 1 and 2 feet thick was encountered in trenches located generally along the perimeter of the property. The undocumented fill is comprised of loose silty to clayey sand. The undocumented fill is unsuitable for support of structural fill or other improvements in its present condition and will require removal and recompaction during grading. Trash and debris present on the property will require exporting.

3.2 Topsoil (Unmapped)

Topsoil was encountered ranging from 1.5- to 5-feet thick across the site. The topsoil consists of moist to wet, sandy to silty clay. Remedial grading in the form of removal and recompaction will be required in areas receiving improvements. In addition, topsoil will likely exhibit “high” expansion characteristics and will require burial at depths of at least 5 feet below finish grade.

3.3 Otay Formation (To)

The Otay Formation underlies the undocumented fill and topsoil, and is composed of medium dense to dense, silty, fine to medium grained sandstone. The sandy unit of the Otay Formation typically possess low to moderate expansion, good shear strength characteristics, and is generally suitable for support of structural loads and/or fills in its present condition. The Otay Formation also provides a source of capping material for structural improvements.

4. GROUNDWATER

We did not encounter groundwater or seepage during our site investigation. However, it is not uncommon for shallow seepage conditions to develop where none previously existed when sites are

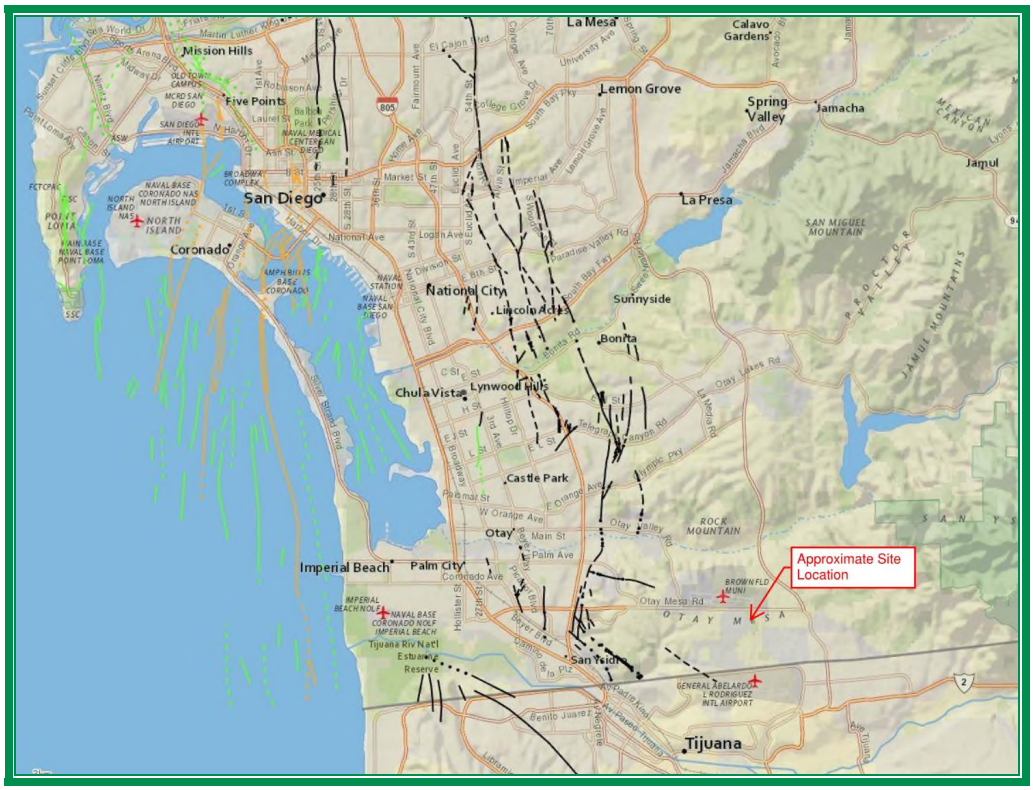
irrigated or infiltration is implemented. Seepage is dependent on seasonal precipitation, irrigation, land use, among other factors, and varies as a result. Proper surface drainage will be important to future performance of the project.

5. GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

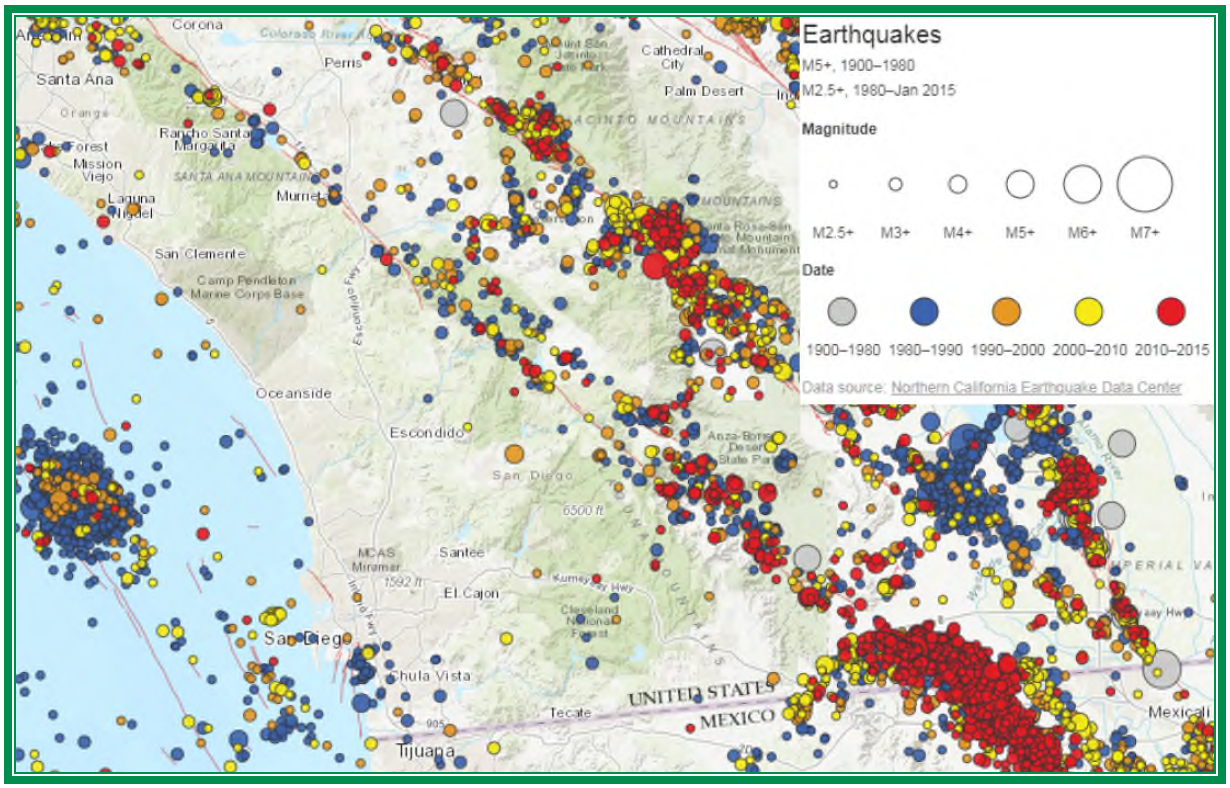
A review of the referenced geologic materials and our knowledge of the general area indicates that the site is not underlain by active, potentially active, or inactive faults. An active fault is defined by the California Geological Survey (CGS) as a fault showing evidence for activity within the last 11,000 years. The closest active fault is Newport Inglewood-Rose Canyon Fault zone, located approximately 11 miles west of the site. The site is not located within a State of California Earthquake Fault Zone.

The United States Geological Survey (USGS) has developed a program to evaluate the approximate location of faulting in the area of properties. The following figure shows the location of the existing faulting in the San Diego County and Southern California region. The faults are shown as solid, dashed and dotted traces representing well constrained, moderately constrained and inferred faults, respectively. The fault line colors represent faults with ages less than 150 years (red), 15,000 years (orange), 130,000 years (green), 750,000 years (blue) and 1.6 million years (black).



Faults in the San Diego Area

The San Diego County and Southern California region is seismically active. The following figure presents the occurrence of earthquakes with a magnitude greater than 2.5 from the period of 1900 through 2015 according to the Bay Area Earthquake Alliance website.



Earthquakes in Southern California

Considerations important in seismic design include the frequency and duration of motion and the soil conditions underlying the site. Seismic design of structures should be evaluated in accordance with the California Building Code (CBC) guidelines currently adopted by the local agency.

5.2 Ground Rupture

The risk associated with ground rupture hazard is very low due to the absence of active faults at the subject site.

5.3 Storm Surge, Tsunamis, and Seiches

The site is not located near the ocean, therefore the potential of storm surges affecting the site is considered low.

The County of San Diego (2010) maps zones of possible tsunami inundation for coastal areas throughout the county. The site is not included within one of these high-risk hazard areas. Therefore, we consider the risk of a tsunami hazard at the site to be low.

The site is not located near a lake or embayment, therefore we consider the potential for seiches to impact the site low.

5.4 Flooding

According to maps produced by the Federal Emergency Management Agency (FEMA), the site is zoned as "Zone X – Minimal Flood Hazard." Based on our review of FEMA flood maps, the risk of site flooding is considered low.

5.5 Liquefaction and Seismically Induced Settlement

Soil liquefaction occurs within relatively loose, cohesionless sand located below the water table that is subjected to ground accelerations from earthquakes. Due to the dense nature of the soils underlying the site, proposed grading, and the lack of permanent, shallow groundwater, there is a very low risk of liquefaction occurring at the site.

5.6 Landslides

The site is relatively flat and lacks sloped topography necessary for landslides to form. Additionally, published geologic maps do not show landslides on or adjacent to the site. Therefore, we consider the potential for a landsliding on or adjacent to the site very low.

5.7 Geologic Hazard Category

Review of the 2008 City of San Diego Seismic Safety Study, Geologic Hazards and Faults, Sheet 4, indicates the site is mapped as Geologic Hazard Category 53. Category 53 is described as "Level or sloping terrain, unfavorable geologic structure, low to moderate risk."

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were observed that would preclude the development of the property as presently proposed provided that the recommendations of this report are followed.

6.1.2 The site is underlain by compressible surficial deposits consisting of undocumented fill and topsoil, overlying Tertiary-age Otay Formation. Undocumented fill has a thickness of 2 feet or less. Topsoil was found to be approximately from 1.5- to 5-feet thick. Thicker deposits may be encountered in unexplored areas of the site. Additionally, some trash and debris has been dumped at the site.

6.1.3 Undocumented fill and topsoil will require removal and recompaction prior to placement of structural fill and construction of proposed improvements. Trash and debris should be disposed of at a suitable offsite facility. The underlying Otay Formation is suitable for support of structural improvements.

6.1.4 To reduce the potential for soil heave impacting foundations and site improvements, we recommend selective grading consisting of mining the Otay Formation for use as a pad capping material, in combination with burial of the expansive topsoil in mined areas.

6.1.5 We did not encounter groundwater during our subsurface exploration, and groundwater should not be a constraint to project development. However, seepage within surficial soils and formational materials may be encountered during grading operations, especially during the rainy seasons.

6.1.6 Except for possible strong seismic shaking, no significant geologic hazards were observed or are known to exist on the site that would adversely affect the site. No special seismic design considerations, other than those recommended herein, are required.

6.1.7 Proper drainage should be maintained in order to preserve the engineering properties of the fill in both the building pads and slope areas. Recommendations for site drainage are provided herein.

6.1.8 Based on the results of our field infiltration testing and laboratory testing, we opine full or partial infiltration on the property is infeasible as discussed in Appendix C.

6.1.9 Provided the recommendations of this report are followed, it is our opinion that the proposed development will not destabilize or result in settlement of adjacent properties and City right-of-way.

6.1.10 Subsurface conditions observed may be extrapolated to reflect general soil/geologic conditions; however, some variations in subsurface conditions between trench locations should be anticipated.

6.2 Soil and Excavation Characteristics

6.2.1 In general, special shoring requirements may not be necessary if temporary excavations will be less than 4 feet in height. It is the responsibility of the contractor and their competent person to ensure all excavations, temporary slopes and trenches are properly constructed and maintained in accordance with applicable OSHA guidelines, in order to maintain safety and the stability of the excavations and adjacent improvements. These excavations should not be allowed to become saturated or to dry out. Surcharge loads should not be permitted to a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 15 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 15 feet from an existing surface improvement should be shored in accordance with applicable OSHA codes and regulations.

6.2.2 Excavation of existing undocumented fill and surficial deposits should be possible with moderate to heavy effort using conventional heavy-duty equipment. We expect excavation of the Otay Formation will require moderate to heavy effort. We expect that cemented zones may be encountered within the Otay Formation requiring very heavy effort to excavate.

6.2.3 The soil encountered in the field investigation is considered to be both “non-expansive” (expansion index [EI] of 20 or less) and “expansive” (EI of greater than 20) as defined by 2019 California Building Code (CBC) Section 1803.5.3. Table 6.2 presents soil classifications based on the expansion index. We expect a majority of the soil encountered in the upper three to six feet below existing site grades to possess a “high” to “very high” expansion potential (EI of 91 or greater). Soils below this depth are expected to be “very low” to “medium” expansive (EI of 90 or less)

TABLE 6.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	ASTM D 4829 Expansion Classification	2019 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

6.2.4 We performed laboratory tests on samples of the site materials to evaluate the percentage of water-soluble sulfate content. Appendix B presents results of the laboratory water-soluble sulfate content tests. The test results indicate the on-site materials at the locations tested possess "S0" sulfate exposure to concrete structures as defined by 2019 CBC Section 1904 and ACI 318-14 Chapter 19. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

6.2.5 Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements susceptible to corrosion are planned.

6.3 Grading Recommendations

6.3.1 Grading should be performed in accordance with the recommendations provided in this report, the Recommended Grading Specifications contained in Appendix D and the City of San Diego's Grading Ordinance. Geocon Incorporated should observe the grading operations on a full-time basis and provide testing during the fill placement.

6.3.2 Prior to commencing grading, a preconstruction conference should be held at the site with the county inspector, developer, grading and underground contractors, civil engineer, and geotechnical engineer in attendance. Special soil handling and/or the grading plans can be discussed at that time.

6.3.3 Site preparation should begin with the removal of deleterious material, construction debris, and vegetation. The depth of vegetation removal should be such that material exposed in cut areas or soil to be used as fill is relatively free of organic matter. Material generated during

stripping and/or site demolition should be exported from the site. Asphalt and concrete should not be mixed with the fill soil unless approved by the Geotechnical Engineer.

6.3.4 Abandoned foundations and buried utilities (if encountered) should be removed and the resultant depressions and/or trenches backfilled with properly compacted material as part of the remedial grading.

6.3.5 We recommend undocumented fill and topsoil be removed and replaced as compacted fill throughout the site. Trash and debris may be encountered in the undocumented fill. Trash and debris, if encountered, should be removed from the fill and exported from the site.

6.3.6 Based on the grading plan, cuts and fills from existing grade of up to 9- and 15-feet, respectively, are planned to reach proposed finish grades. We recommend select grading occur to provide a 5-foot-thick cap of *low*- to *medium*-expansive soil. To obtain select capping material, we recommend mining the underlying *very low*- to *medium*-expansive, Otay Formation, which is suitable for site capping, in combination with burial of the expansive topsoil in mined areas, as described below.

6.3.7 Within structural improvement areas (building pads, retaining walls, parking lots, etc.) we recommend grading to provide a select pad cap that extends at least 5-feet below pad grade and to a minimum of at least 3-feet below bottom of footing elevation, whichever is deeper. Pad-cap elevation should be adjusted for loading dock ramps and wall footings, which are typically lower than the building pad grade.

6.3.8 Mined areas should be selected so as to not create a fill differential greater than 15 feet within the building pad, if possible.

6.3.9 Within the building pad, the remedial excavation should extend to a horizontal distance beyond the building pad limits of 5 feet or to a distance equal to the depth of the excavation, whichever is greater. Excavations outside of the building pad should extend to at least 5 feet beyond the structural improvement limits.

6.3.10 The bottom of the excavations (including mining excavations) should be sloped one percent to the adjacent street or deepest fill. Prior to fill soil being placed, the existing ground surface should be scarified, moisture conditioned as necessary, and compacted to a depth of at least 12 inches. A representative of Geocon should be on-site during removals to evaluate the limits of the remedial grading.

6.3.11 The site should then be brought to final subgrade elevations with fill compacted in layers. In general, soil native to the site is suitable for use from a geotechnical engineering standpoint as fill if relatively free from vegetation, debris and other deleterious material. Layers of fill should be no thicker than will allow for adequate bonding and compaction. Fill, including backfill and scarified ground surfaces, should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content in accordance with ASTM Test Procedure D 1557. Fill materials placed below optimum moisture content may require additional moisture conditioning prior to placing additional fill.

6.3.12 Import fill (if necessary) should consist of the characteristics presented in Table 6.3. Geocon Incorporated should be notified of the import soil source and should perform laboratory testing of import soil prior to its arrival at the site to determine its suitability as fill material.

TABLE 6.3
SUMMARY OF IMPORT FILL RECOMMENDATIONS

Soil Characteristic	Values
Expansion Potential	"Very Low" to "Low" (Expansion Index of 50 or less)
Particle Size	Maximum Dimension Less Than 3 Inches
	Generally Free of Debris

6.4 Slopes

6.4.1 Slope stability analyses were performed for proposed new 2:1 slopes for maximum proposed slope height 15 feet. The analysis was performed using simplified Janbu analysis. The analyses indicates new slopes excavated in and constructed with on-site materials have calculated factors of safety in excess of 1.5 under static conditions for both deep-seated failure and shallow sloughing conditions. A summary of slope stability analyses is presented on Figures 4 and 5.

6.4.2 It is recommended that all slope excavations be observed during grading by an engineering geologist to verify that soil and geologic conditions do not differ significantly from those anticipated.

6.4.3 The outer 15 feet (or a distance equal to the height of the slope, whichever is less) of fill slopes should be composed of properly compacted granular *soil* fill to reduce the potential for surficial sloughing. All slopes should be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not to exceed 4 feet and should be track-walked such

that the fill soils are uniformly compacted to at least 90 percent relative compaction to the face of the finished sloped.

6.4.4 All slopes should be landscaped with drought-tolerant vegetation, having variable root depths and requiring minimal landscape irrigation. In addition, all slopes should be drained and properly maintained to reduce erosion.

6.5 Subdrains

6.5.1 Except for retaining wall drains and drains required for the BMP basin, subdrains are not required for the project.

6.6 Seismic Design Criteria

6.6.1 Table 6.6.1 summarizes site-specific design criteria obtained from the 2019 California Building Code (CBC; Based on the 2018 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. We used the computer program *U.S. Seismic Design Maps*, provided by the Structural Engineers Association of California (SEAOC) to calculate the seismic design parameters. The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2019 CBC and Table 20.3-1 of ASCE 7-16. The values presented herein are for the risk-targeted maximum considered earthquake (MCE_R). Sites designated as Site Class D, E and F may require additional analyses if requested by the project structural engineer and client.

TABLE 6.6.1
2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	C	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	0.681g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.257g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.228	Table 1613.2.3(1)
Site Coefficient, F_V	1.5	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	0.836g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.386g	Section 1613.2.3 (Eqn 16-37)

Parameter	Value	2019 CBC Reference
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.557g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.257g	Section 1613.2.4 (Eqn 16-39)

*****Using the code-based values presented in this table, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed by the project structural engineer. Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis should be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions which indicates that the ground motion hazard analysis may be waived provided the exceptions are followed.

6.6.2 Table 6.6.2 presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

TABLE 6.6.2
ASCE 7-16 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.295g	Figure 22-7
Site Coefficient, F_{PGA}	1.2	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.354g	Section 11.8.3 (Eqn 11.8-1)

6.6.3 Conformance to the criteria in Tables 6.6.1 and 6.6.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

6.6.4 The project structural engineer and architect should evaluate the appropriate Risk Category and Seismic Design Category for the planned structures. The values presented herein assume a Risk Category of II and resulting in a Seismic Design Category D. Table 6.6.3 presents a summary of the risk categories.

TABLE 6.6.3
ASCE 7-16 RISK CATEGORIES

Risk Category	Building Use	Examples
I	Low risk to Human Life at Failure	Barn, Storage Shelter
II	Nominal Risk to Human Life at Failure (Buildings Not Designated as I, III or IV)	Residential, Commercial and Industrial Buildings
III	Substantial Risk to Human Life at Failure	Theaters, Lecture Halls, Dining Halls, Schools, Prisons, Small Healthcare Facilities, Infrastructure Plants, Storage for Explosives/Toxins
IV	Essential Facilities	Hazardous Material Facilities, Hospitals, Fire and Rescue, Emergency Shelters, Police Stations, Power Stations, Aviation Control Facilities, National Defense, Water Storage

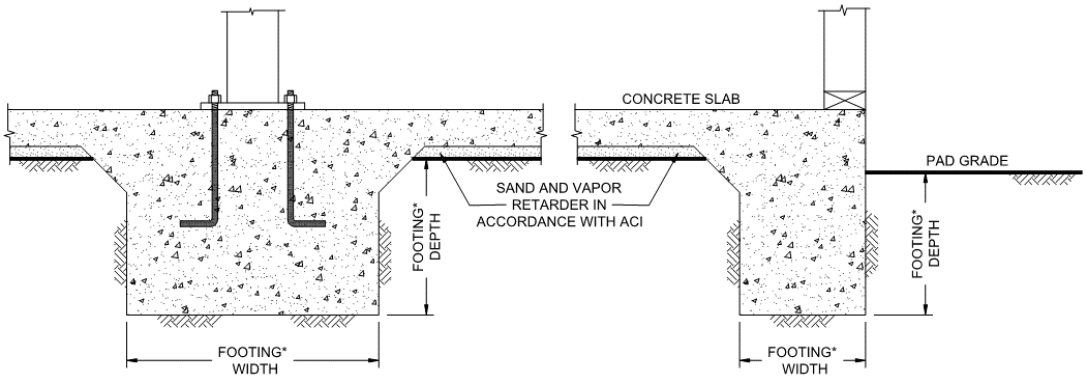
6.7 Shallow Foundations

6.7.1 The proposed structure can be supported on a shallow foundation system founded in compacted fill provided the grading recommendations provided in Section 6.3 are followed. Foundations for the structure should consist of continuous strip footings and/or isolated spread footings. Table 6.7 provides a summary of the foundation design recommendations.

TABLE 6.7
SUMMARY OF FOUNDATION RECOMMENDATIONS

Parameter	Value
Minimum Continuous Foundation Width	12 inches
Minimum Isolated Foundation Width	24 inches
Minimum Foundation Depth	24 Inches Below Lowest Adjacent Grade
Minimum Steel Reinforcement	4 No. 5 Bars, 2 at the Top and 2 at the Bottom
Allowable Bearing Capacity	2,000 psf
Bearing Capacity Increase	500 psf per Foot of Depth
	300 psf per Foot of Width
Maximum Allowable Bearing Capacity	3,500 psf
Estimated Total Settlement	1 Inch
Estimated Differential Settlement	½ Inch in 40 Feet
Footing Size Used for Settlement	9-Foot Square
Design Expansion Index	90 or less

6.7.2 The foundations should be embedded in accordance with the recommendations herein and the Wall/Column Footing Dimension Detail. The embedment depths should be measured from the lowest adjacent pad grade for both interior and exterior footings. Footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.



Wall/Column Footing Dimension Detail

6.7.3 The bearing capacity values presented herein are for dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces.

6.7.4 Where buildings or other improvements are planned near the top of a slope steeper than 3:1 (horizontal:vertical), special foundations and/or design considerations are recommended due to the tendency for lateral soil movement to occur.

- For fill slopes less than 20 feet high, building footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.

- When located next to a descending 3:1 (horizontal:vertical) fill slope or steeper, the foundations should be extended to a depth where the minimum horizontal distance is equal to H/3 (where H equals the vertical distance from the top of the fill slope to the base of the fill soil) with a minimum of 7 feet but need not exceed 40 feet. The horizontal distance is measured from the outer, deepest edge of the footing to the face of the slope. An acceptable alternative to deepening the footings would be the use of a post-tensioned slab and foundation system or increased footing and slab reinforcement. Specific design parameters or recommendations for either of these alternatives can be provided once the building location and fill slope geometry have been determined.

- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures that would permit some lateral soil movement without causing extensive distress. Geocon Incorporated should be consulted for specific recommendations.

6.7.5 We should observe the foundation excavations prior to the placement of reinforcing steel and concrete to check that the exposed soil conditions are similar to those expected and that they have been extended to the appropriate bearing strata. Foundation modifications may be required if unexpected soil conditions are encountered.

6.7.6 Geocon Incorporated should be consulted to provide additional design parameters as required by the structural engineer.

6.8 Interior Concrete Slabs-on-Grade

6.8.1 Interior concrete slabs-on-grade for the structure should be at least 5 inches thick. As a minimum, reinforcement for slabs-on-grade should consist of No. 3 reinforcing bars placed at 18 inches on center in both horizontal directions mid-point in the slab. If the slabs will be subjected to forklift or other heavy loads, consideration should be given to increasing the slab thickness and reinforcement. The structural engineer should provide slab thickness and reinforcing for slabs intended to take heavy loads.

6.8.2 A vapor retarder should underlie slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). In addition, the membrane should be installed in a manner that prevents puncture in accordance with manufacturer's recommendations and ASTM requirements. The project architect or developer should specify the type of vapor retarder used based on the type of floor covering that will be installed and if the structure will possess a humidity controlled environment.

6.8.3 The project foundation engineer, architect, and/or developer should determine the thickness of bedding sand below the slab. In general, 3 to 4 inches of sand bedding is typically used. Geocon should be contacted to provide recommendations if the bedding sand is thicker than 6 inches.

6.8.4 The foundation design engineer should provide appropriate concrete mix design criteria and curing measures to assure proper curing of the slab by reducing the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation design engineer present the concrete mix design and proper curing methods on the foundation plan. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plan.

6.8.5 To control the location and spread of concrete shrinkage cracks, crack control joints should be provided. The crack control joints should be created while the concrete is still fresh using a grooving tool, or shortly thereafter using saw cuts. The structural engineer should take into consideration criteria of the American Concrete Institute when establishing crack control spacing patterns.\

6.8.6 The concrete slab-on-grade recommendations are based on soil support characteristics only. The project structural engineer should evaluate the structural requirements of the concrete slabs for supporting equipment and storage loads.

6.9 Conventional Retaining Wall Recommendations

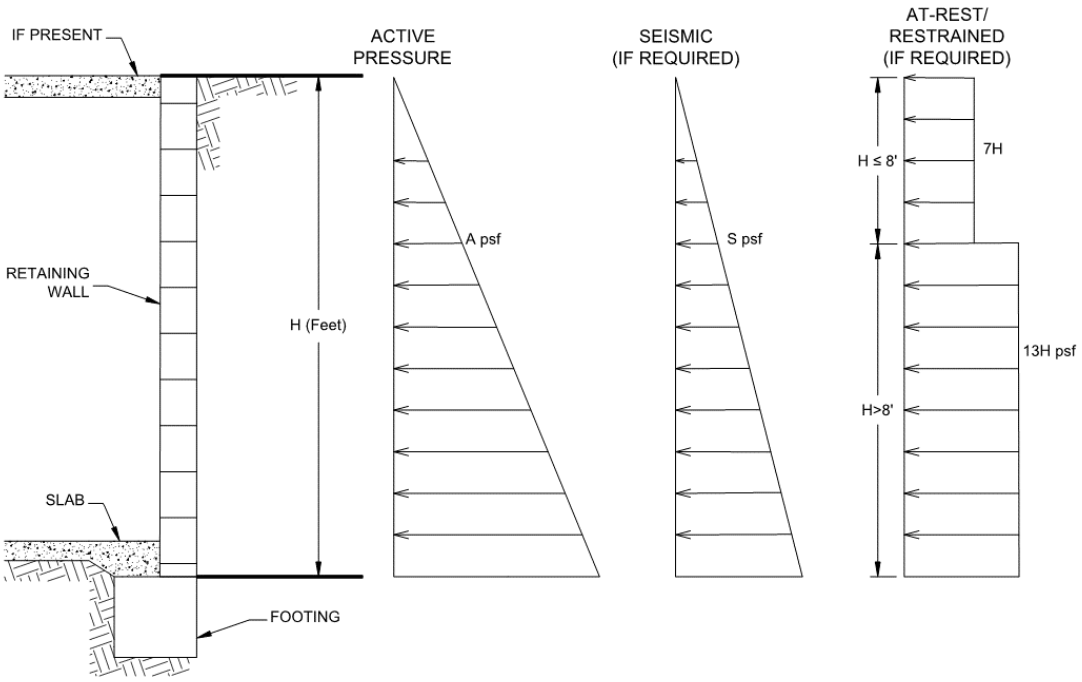
6.9.1 Retaining walls should be designed using the values presented in Table 6.9.1. Soil with an expansion index (EI) greater than 50 should not be used as backfill material behind retaining walls. Geocon Incorporated should be consulted to provide additional design parameters as required by the structural engineer

TABLE 6.9.1
RETAINING WALL DESIGN RECOMMENDATIONS

Parameter	Value	
	EI≤50	EI≤90
Active Soil Pressure, A (Fluid Density, Level Backfill)	35 pcf	45 pcf
Active Soil Pressure, A (Fluid Density, 2:1 Sloping Backfill)	50 psf	60 pcf
Seismic Pressure, S	13H psf	
At-Rest/Restrained Walls Additional Uniform Pressure (0 to 8 Feet High)	7H psf	
At-Rest/Restrained Walls Additional Uniform Pressure (8+ Feet High)	13H psf	
Expected Expansion Index for the Subject Property	EI≤90	

H equals the height of the retaining portion of the wall.

6.9.2 The project retaining walls should be designed as shown in the Retaining Wall Loading Diagram.



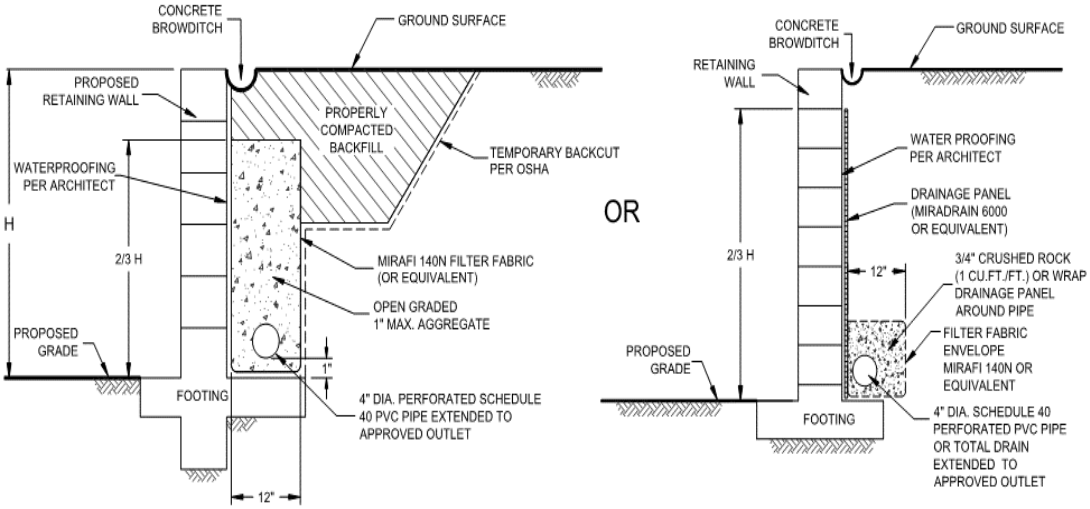
Retaining Wall Loading Diagram

6.9.3 Unrestrained walls are those that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall) at the top of the wall. Where walls are restrained from movement at the top (at-rest condition), an additional uniform pressure of 7H psf should be added to the active soil pressure for walls 8 feet or less. For walls greater than 8 feet tall, an additional uniform pressure of 13H psf should be applied to the wall starting at 8 feet from the top of the wall to the base of the wall. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to 2 feet of fill soil should be added.

6.9.4 The structural engineer should determine the Seismic Design Category for the project in accordance with Section 1613.2.5 of the 2019 CBC or Section 11.6 of ASCE 7-16. For structures assigned to Seismic Design Category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 1803.5.12 of the 2019 CBC. The seismic load is dependent on the retained height where H is the height of the wall, in feet, and the calculated loads result in pounds per square foot (psf) exerted at the base of the wall and zero at the top of the wall. A seismic load of 13H psf should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.354g calculated from ASCE 7-16 Section 11.8.3 and applied a pseudo-static coefficient of 0.3.

6.9.5 Retaining walls should be designed to ensure stability against overturning sliding, and excessive foundation pressure. Where a keyway is extended below the wall base with the intent to engage passive pressure and enhance sliding stability, it is not necessary to consider active pressure on the keyway.

6.9.6 Drainage openings through the base of the wall (weep holes) should not be used where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted granular (EI of 50 or less) free-draining backfill material with no hydrostatic forces or imposed surcharge load. The retaining wall should be properly drained as shown in the Typical Retaining Wall Drainage Detail. If conditions different than those described are expected, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.



Typical Retaining Wall Drainage Detail

6.9.7 The retaining walls may be designed using either the active and restrained (at-rest) loading condition or the active and seismic loading condition as suggested by the structural engineer. Typically, it appears the design of the restrained condition for retaining wall loading may be adequate for the seismic design of the retaining walls. However, the active earth pressure combined with the seismic design load should be reviewed and also considered in the design of the retaining walls.

6.9.8 In general, wall foundations having a minimum embedment depth and width of 1 foot should be designed in accordance with Table 6.9.2. The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore,

retaining wall foundations should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.

TABLE 6.9.2
SUMMARY OF RETAINING WALL FOUNDATION RECOMMENDATIONS

Parameter	Value
Minimum Retaining Wall Foundation Width	12 inches
Minimum Retaining Wall Foundation Depth	12 Inches
Minimum Steel Reinforcement	Per Structural Engineer
Bearing Capacity	2,000 psf
Bearing Capacity Increase	500 psf per additional foot of footing depth
	300 psf per additional foot of footing width
Maximum Bearing Capacity	4,000 psf
Estimated Total Settlement	1 Inch
Estimated Differential Settlement	½ Inch in 40 Feet

6.9.9 The recommendations presented herein are generally applicable to the design of rigid concrete or masonry retaining walls. In the event that other types of walls (such as mechanically stabilized earth [MSE] walls, soil nail walls, or soldier pile walls) are planned, Geocon Incorporated should be consulted for additional recommendations.

6.9.10 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

6.9.11 Soil contemplated for use as retaining wall backfill, including import materials, should be identified in the field prior to backfill. At that time, Geocon Incorporated should obtain samples for laboratory testing to evaluate its suitability. Modified lateral earth pressures may be necessary if the backfill soil does not meet the required expansion index or shear strength. City or regional standard wall designs, if used, are based on a specific active lateral earth pressure and/or soil friction angle. In this regard, on-site soil to be used as backfill may or may not meet the values for standard wall designs. Geocon Incorporated should be consulted to assess the suitability of the on-site soil for use as wall backfill if standard wall designs will be used.

6.10 Lateral Loading

6.10.1 Table 6.10 should be used to help design the proposed structures and improvements to resist lateral loads for the design of footings or shear keys. The allowable passive pressure assumes a horizontal surface extending at least 5 feet, or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance. Where walls are planned adjacent to and/or on descending slopes, a passive pressure of 150 pcf should be used in design.

TABLE 6.10
SUMMARY OF LATERAL LOAD DESIGN RECOMMENDATIONS

Parameter	Value
Passive Pressure Fluid Density	300 pcf
Passive Pressure Fluid Density Adjacent to and/or on Descending Slopes	150 pcf
Coefficient of Friction (Concrete and Soil)	0.35
Coefficient of Friction (Along Vapor Barrier)	0.2 to 0.25*

* Per manufacturer's recommendations.

6.10.2 The passive and frictional resistant loads can be combined for design purposes. The lateral passive pressures may be increased by one-third when considering transient loads due to wind or seismic forces.

6.11 Preliminary Pavement Recommendations

6.11.1 Preliminary pavement recommendations for the streets and parking areas are provided below. The final pavement sections should be based on the R-Value of the subgrade soil encountered at final subgrade elevation. For pavement design we used an R-Value of 5 based on laboratory testing of a sample of soil taken during our field investigation. Preliminary flexible pavement sections for varying traffic indices are presented in Table 6.11.1. The project civil engineer or traffic engineer should determine the appropriate Traffic Index (TI) or traffic loading expected on the project for the various pavement areas that will be constructed.

TABLE 6.11.1
PRELIMINARY ASPHALT CONCRETE PAVEMENT SECTIONS

Traffic Index	Asphalt Concrete (inches)	Class 2 Base (inches)
4.5	3	8
5	3	10
5.5	3	12
6	4	11.5
6.5	4	13.5
7	5	14.5
7.5	5	15.5
8	6	15.5

6.11.2 Prior to placing base materials, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned as necessary, and recompacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM D 1557. Similarly, the base material should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Asphalt concrete should be compacted to a density of at least 95 percent of the laboratory Hveem density in accordance with ASTM D 2726.

6.11.3 A rigid Portland cement concrete (PCC) pavement section should be placed in roadway aprons and cross gutters. We calculated the rigid pavement section in general conformance with the procedure recommended by the American Concrete Institute report ACI 330R-08 Guide for Design and Construction of Concrete Parking Lots using the parameters presented in Table 6.11.2.

TABLE 6.11.2
RIGID PAVEMENT DESIGN PARAMETERS

Design Parameter	Design Value
Modulus of subgrade reaction, k	75 pci
Modulus of rupture for concrete, M_R	500 psi
Concrete Compressive Strength	3,000 psi
Traffic Category, TC	A and C
Average daily truck traffic, ADTT	10 and 300

6.11.4 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 6.11.3.

TABLE 6.11.3
RIGID VEHICULAR PAVEMENT RECOMMENDATIONS

Location	Portland Cement Concrete (inches)	Class 2 Base (inches)
Automobile Parking Stalls (TC=A)	6.0	4
Driveways (TC=C)	8.0	4

6.11.5 The PCC vehicular pavement should be placed over subgrade soil that is compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content.

6.11.6 The rigid pavement should also be designed and constructed incorporating the parameters presented in Table 6.11.4.

TABLE 6.11.4
ADDITIONAL RIGID PAVEMENT RECOMMENDATIONS

Subject	Value
Thickened Edge	1.2 Times Slab Thickness
	Minimum Increase of 2 Inches
	4 Feet Wide
Crack Control Joint Spacing	30 Times Slab Thickness
	Max. Spacing of 12 feet for 5.5-Inch-Thick
	Max. Spacing of 15 Feet for Slabs 6 Inches and Thicker
Crack Control Joint Depth	Per ACI 330R-08
	1 Inch Using Early-Entry Saws on Slabs Less Than 9 Inches Thick
Crack Control Joint Width	¼-Inch for Sealed Joints
	⅜-Inch is Common for Sealed Joints
	$^{1}/_{10}$- to $^{1}/_{8}$-Inch is Common for Unsealed Joints

6.11.7 Reinforcing steel will not be necessary within the concrete for geotechnical purposes with the possible exception of dowels at construction joints as discussed herein.

6.11.8 To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab.

Crack-control joints should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials. The depth of the crack-control joints should be determined by the referenced ACI report.

6.11.9 To provide load transfer between adjacent pavement slab sections, a butt-type construction joint should be constructed. The butt-type joint should be thickened by at least 20 percent at the edge and taper back at least 4 feet from the face of the slab. As an alternative to the butt-type construction joint, dowelling can be used between construction joints for pavements of 7 inches or thicker. As discussed in the referenced ACI guide, dowels should consist of smooth, 1-inch-diameter reinforcing steel 14 inches long embedded a minimum of 6 inches into the slab on either side of the construction joint. Dowels should be located at the midpoint of the slab, spaced at 12 inches on center and lubricated to allow joint movement while still transferring loads. In addition, tie bars should be installed as recommended in Section 3.8.3 of the referenced ACI guide. The structural engineer should provide other alternative recommendations for load transfer.

6.11.10 Concrete curb/gutter should be placed on soil subgrade compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Cross-gutters that receives vehicular should be placed on subgrade soil compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Base materials should not be placed below the curb/gutter, or cross-gutters so water is not able to migrate from the adjacent parkways to the pavement sections. Where flatwork is located directly adjacent to the curb/gutter, the concrete flatwork should be structurally connected to the curbs to help reduce the potential for offsets between the curbs and the flatwork.

6.12 Exterior Concrete Flatwork

6.12.1 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations presented in Table 6.12. The recommended steel reinforcement would help reduce the potential for cracking.

TABLE 6.12
MINIMUM CONCRETE FLATWORK RECOMMENDATIONS

Expansion Index, EI	Minimum Steel Reinforcement* Options	Minimum Thickness
EI $\leq$ 90	6x6-W2.9/W2.9 (6x6-6/6) welded wire mesh	4 Inches
	No. 3 Bars 18 inches on center, Both Directions	
EI $\leq$ 130	4x4-W4.0/W4.0 (4x4-4/4) welded wire mesh	
	No. 4 Bars 12 inches on center, Both Directions	

* In excess of 8 feet square.

6.12.2 Even with the incorporation of the recommendations of this report, the exterior concrete flatwork has a potential to experience some uplift due to expansive soil beneath grade. The steel reinforcement should overlap continuously in flatwork to reduce the potential for vertical offsets within flatwork. Additionally, flatwork should be structurally connected to the curbs, where possible, to reduce the potential for offsets between the curbs and the flatwork.

6.12.3 Concrete flatwork should be provided with crack control joints to reduce and/or control shrinkage cracking. Crack control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing. Subgrade soil for exterior slabs not subjected to vehicle loads should be compacted in accordance with criteria presented in the grading section prior to concrete placement. Subgrade soil should be properly compacted, and the moisture content of subgrade soil should be verified prior to placing concrete. Base materials will not be required below concrete improvements.

6.12.4 Where exterior flatwork abuts the structure at entrant or exit points, the exterior slab should be dowelled into the structure's foundation stemwall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

6.12.5 The recommendations presented herein are intended to reduce the potential for cracking of exterior slabs as a result of differential movement. However, even with the incorporation of the recommendations presented herein, slabs-on-grade will still crack. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack control joints and proper concrete placement and curing. Crack control joints

should be spaced at intervals no greater than 12 feet. Literature provided by the Portland Concrete Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction, and curing practices, and should be incorporated into project construction.

6.13 Slope Maintenance

6.13.1 Slopes that are steeper than 3:1 (horizontal:vertical) may, under conditions which are both difficult to prevent and predict, be susceptible to near surface (surficial) slope instability. The instability is typically limited to the outer three feet of a portion of the slope and usually does not directly impact the improvements on the pad areas above or below the slope. The occurrence of surficial instability is more prevalent on fill slopes and is generally preceded by a period of heavy rainfall, excessive irrigation, or the migration of subsurface seepage. The disturbance and/or loosening of the surficial soils, as might result from root growth, soil expansion, or excavation for irrigation lines and slope planting, may also be a significant contributing factor to surficial instability. It is, therefore, recommended that, to the maximum extent practical: (a) disturbed/loosened surficial soils be either removed or properly recompacted, (b) irrigation systems be periodically inspected and maintained to eliminate leaks and excessive irrigation, and (c) surface drains on and adjacent to slopes be periodically maintained to preclude ponding or erosion. Although the incorporation of the above recommendations should reduce the potential for surficial slope instability, it will not eliminate the possibility, and, therefore, it may be necessary to rebuild or repair a portion of the project's slopes in the future.

6.14 Storm Water Management

6.14.1 If storm water management devices are not properly designed and constructed, there is a risk for distress to improvements and property located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water being detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff into the subsurface occurs, downstream improvements may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

6.14.2 We performed an infiltration study on the property. A summary of our study and storm water management recommendations are provided in Appendix C. Based on the results of our study, full and partial infiltration is considered infeasible due to slow infiltration

characteristics of the on-site soil. Basins should utilize a liner to prevent infiltration from causing adverse settlement and heave, and migrating to utilities, and foundations.

6.15 Site Drainage and Moisture Protection

6.15.1 Adequate site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2019 CBC 1803.3 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed structure.

6.15.2 In the case of basement walls or building walls retaining landscaping areas, a water-proofing system should be used on the wall and joints, and a Miradrain drainage panel (or similar) should be placed over the waterproofing. The project architect or civil engineer should provide detailed specifications on the plans for all waterproofing and drainage.

6.15.3 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

6.15.4 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that subdrains to collect excess irrigation water and transmit it to drainage structures, or impervious above-grade planter boxes be used. In addition, where landscaping is planned adjacent to the pavement, we recommend construction of a cutoff wall along the edge of the pavement that extends at least 6 inches below the bottom of the base material.

6.16 Grading and Foundation Plan Review

6.16.1 Geocon Incorporated should review the grading plans and foundation plans for the project prior to final design submittal to evaluate whether additional analyses and/or recommendations are required.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.



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N

NO SCALE

VICINITY MAP

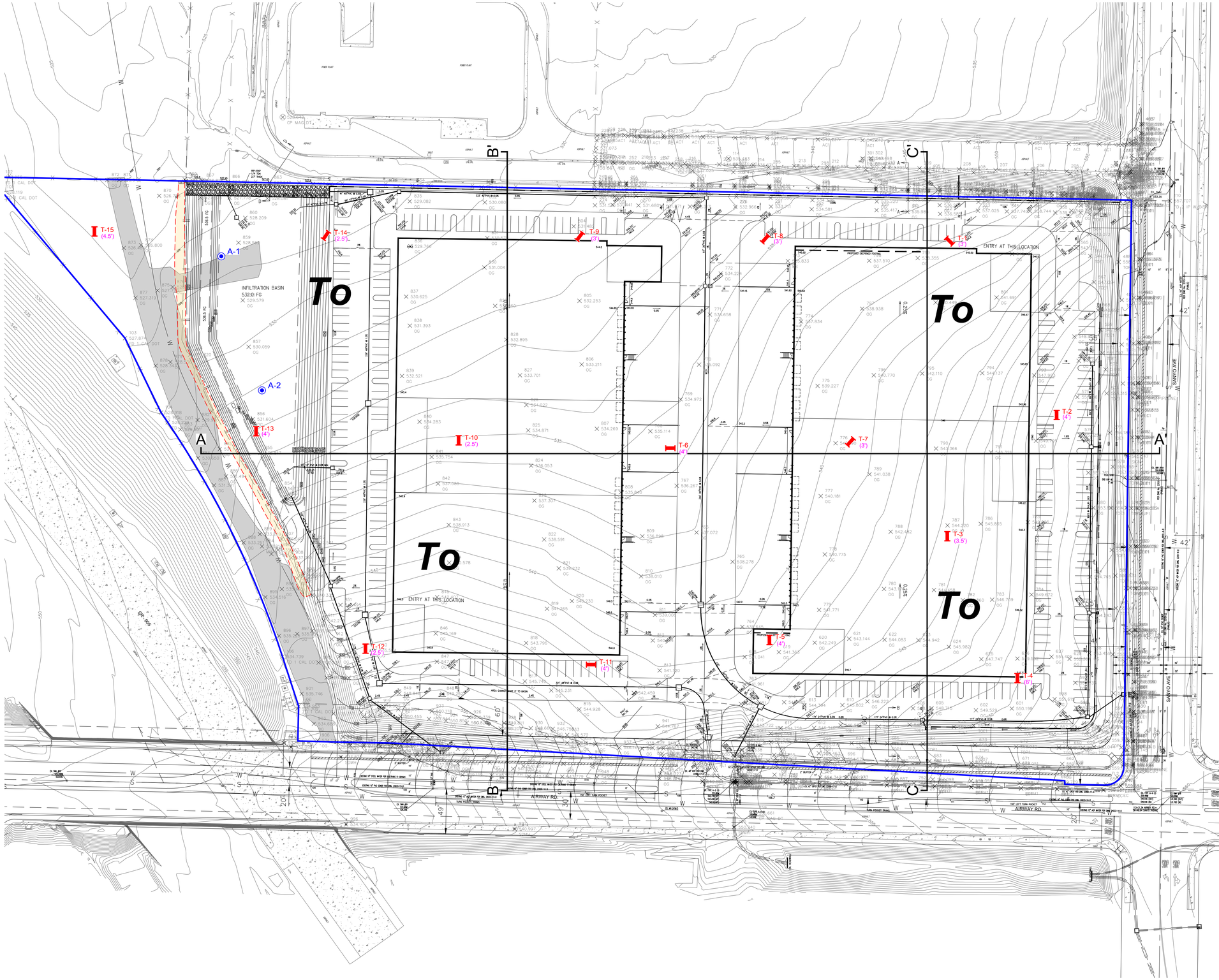
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DATE 08 - 13 - 2020	PROJECT NO. G2501 - 42 - 01	FIG. 1

Plotted:08/13/2020 10:27AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2501-42-01 (Airway Rd & Sanyo Ave)\DETAILS\G2501-42-01 VicinityMap.dwg



GRAPHIC SCALE

0' 25' 50' 75' 100' 150' 200'

SCALE 1"=50' (on 36x24)

GEOCON LEGEND

To.....OTAY FORMATION

T-15.....APPROX. LOCATION OF EXPLORATORY TRENCH

(6').....APPROX. THICKNESS OF COMPRESSIBLE SURFICIAL DEPOSIT

A-2.....APPROX. LOCATION OF INFILTRATION TEST

C C'.....APPROX. LOCATION OF GEOLOGIC CROSS SECTION

.....APPROX. LATERAL EXTENT OF REMOVALS BEYOND TOE OF PROPOSED FILL SLOPE

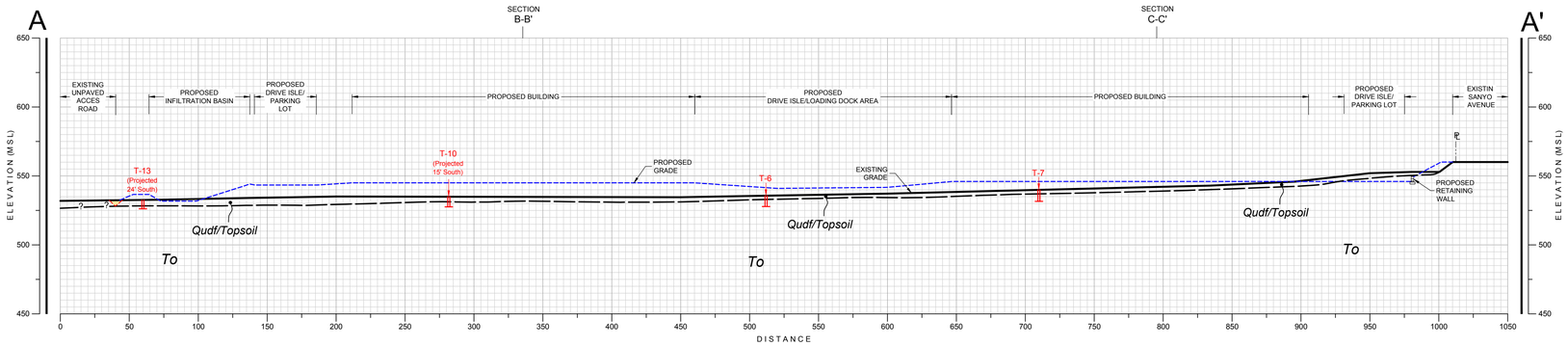
GEOLOGIC MAP

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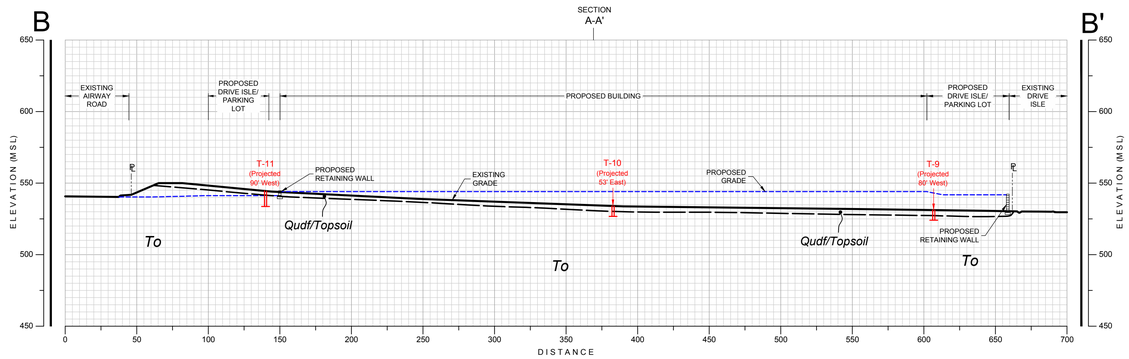
SCALE	1" = 50'	DATE	08 - 13 - 2020
PROJECT NO.	G2501 - 42 - 01	FIGURE	2
SHEET	1 OF 1		

Plotted:08/13/2020 10:32AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2501-42-01 (Airway Rd & Sanyo Ave)\SHEETS\G2501-42-01 Geo Map 20.dwg



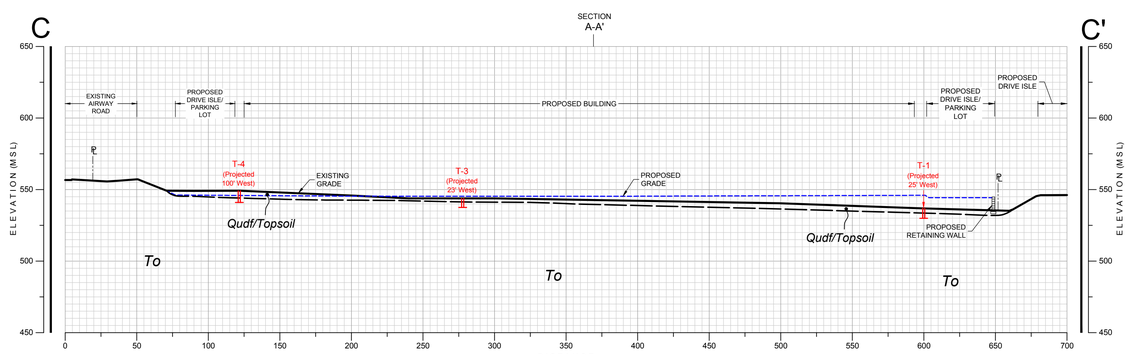
GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION B-B'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION C-C'

SCALE: 1" = 50' (Vert. = Horiz.)

GEOCON LEGEND

- Qudf .....UNDOCUMENTED FILL
- To.....OTAY FORMATION
- .....APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)
- T-11 .....APPROX. LOCATION OF EXPLORATORY TRENCH
- .....APPROX. LATERAL EXTENT OF REMOVALS BEYOND TOE OF PROPOSED FILL SLOPE

GEOLOGIC CROSS SECTION

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SCALE	1" = 50'
DATE	08 - 13 - 2020
PROJECT NO.	G2501 - 42 - 01
FIGURE	3
SHEET	1 OF 1

Plotted:08/13/2020 10:33AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2501-42-01 (Airway Rd & Sanyo Ave)\SHEETS\G2501-42-01 XSection 20.dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	15 feet
SLOPE INCLINATION	2 : 1	(Horizontal : Vertical)	
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	130 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	32 degrees
APPARENT COHESION	C	=	300 pounds per square foot
NO SEEPAGE FORCES			

ANALYSIS :

$\lambda_{c\phi}$	=	$\frac{\gamma_t H \tan\phi}{C}$	EQUATION (3-3), REFERENCE 1
FS	=	$\frac{NcfC}{\gamma_t H}$	EQUATION (3-2), REFERENCE 1
$\lambda_{c\phi}$	=	3.8	CALCULATED USING EQ. (3-3)
Ncf	=	14	DETERMINED USING FIGURE 10, REFERENCE 2
FS	=	2.2	FACTOR OF SAFETY CALCULATED USING EQ. (3-2)

REFERENCES :

1.....Janbu, N., Stability Analysis of Slopes with Dimensionless Parameters, Harvard Soil Mechanics, Series No. 46, 1954

2.....Janbu, N., Discussion of J.M. Bell, Dimensionless Parameters for Homogeneous Earth Slopes, Journal of Soil Mechanics and Foundation Design, No. SM6, November 1967.

SLOPE STABILITY ANALYSIS - FILL SLOPES

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Plotted:08/13/2020 10:30AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2501-42-01 (Airway Rd & Sanyo Ave)\DETAILS\Slope Stability Analyses-Fill (SSA-F).dwg

ASSUMED CONDITIONS :

SLOPE HEIGHT	H	=	Infinite
DEPTH OF SATURATION	Z	=	5 feet
SLOPE INCLINATION	2 : 1		(Horizontal : Vertical)
SLOPE ANGLE	i	=	26.6 degrees
UNIT WEIGHT OF WATER	γ_w	=	62.4 pounds per cubic foot
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	130 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	30 degrees
APPARENT COHESION	C	=	300 pounds per square foot

SLOPE SATURATED TO VERTICAL DEPTH Z BELOW SLOPE FACE

SEEPAGE FORCES PARALLEL TO SLOPE FACE

ANALYSIS :

$$FS = \frac{C + (\gamma_t - \gamma_w)\ Z\ cos^2\ i\ tan\ \phi}{\gamma_t\ Z\ sin\ i\ cos\ i} = 1.8$$

REFERENCES :

1.....Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage*, Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62

2.....Skempton, A. W., and F.A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81

SURFICIAL SLOPE STABILITY ANALYSIS

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Plotted:08/13/2020 10:29AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G2501-42-01 (Airway Rd & Sanyo Ave)\DETAILS\Slope Stability Analyses-Surficial (SSAS).dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

We performed our field investigation on January 29, 2020. Our investigation consisted of a site reconnaissance, and logging of 15 exploratory test pits. The exploratory test pits were excavated to depths between 4.5- and 10.5-feet. We also performed 2 infiltration tests on March 9, 2020, which were excavated using hand tools. The approximate locations of the exploratory test pits and infiltration tests are shown on Figure 2.

The soil conditions encountered in the trenches were visually examined, classified, and logged in general conformance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). Exploratory test pit logs are presented on Figures A-1 through A-15. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 1 ELEV. (MSL.) 538' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CH	**TOPSOIL** Soft, moist, dark gray, Silty CLAY			
2	T1-1							
4	T1-2			SM	**OTAY FORMATION (To)** Medium dense, damp, light brown, Silty, fine to coarse SANDSTONE; weathered in upper 2 feet -Becomes dense			
6					TRENCH TERMINATED AT 6 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-1,
Log of Trench T 1, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH T 2** ELEV. (MSL.) **550'** DATE COMPLETED **01-29-2020** EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	T2-1			SM	**UNDOCUMENTED FILL (Qudf)** Loose, moist, grayish brown, Silty, fine to coarse SAND; trace clay			
				CL/CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty to Sandy CLAY			
2								
4				SM	**OTAY FORMATION (To)** Medium dense to dense, damp, light gray to white, Silty, fine to medium SANDSTONE; weathered			
					TRENCH TERMINATED AT 5.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-2,
Log of Trench T 2, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 3 ELEV. (MSL.) 544' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CH	**TOPSOIL** Soft, moist, dark gray, Silty CLAY			
2								
4				SM	**OTAY FORMATION (To)** Medium dense to dense, damp, light brown, Silty, fine to medium SAND			
6					TRENCH TERMINATED AT 6 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-3,
Log of Trench T 3, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 4 ELEV. (MSL.) 550' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, moist, light to brown, Silty, fine to medium SAND			
				CH	**TOPSOIL** Soft, moist, dark gray, Silty CLAY			
2	T4-1							
4								
6	T4-2			SM	**OTAY FORMATION (To)** Dense, damp, light tan brown and light gray to white, Silty, fine to coarse SANDSTONE			
8								
					TRENCH TERMINATED AT 8.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-4,
Log of Trench T 4, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 5 ELEV. (MSL.) 541' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, moist, light grayish brown, Silty, fine to medium SAND			
				CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty CLAY			
2	T5-1							
4				SM	**OTAY FORMATION (To)** Medium dense to dense, damp, light brown and light grayish white, Silty, fine to coarse SANDSTONE			
	T5-2							
6					TRENCH TERMINATED AT 6 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-5,
Log of Trench T 5, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 6 ELEV. (MSL.) 536' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CH	**TOPSOIL** Soft, moist, dark gray, Silty CLAY			
2								
4	T6-1			SM	**OTAY FORMATION (To)** Medium dense to dense, moist, light brown, Silty, fine to medium SANDSTONE; weathered			
6								
					TRENCH TERMINATED AT 6.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-6,
Log of Trench T 6, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

TRENCH T 7

ELEV. (MSL.) **540'** DATE COMPLETED **01-29-2020**

EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty CLAY			
2								
	T7-1			SM	**OTAY FORMATION (To)** Medium dense, damp, light brown and light gray, Silty, fine to coarse SAND; weathered			
4								
6								
					TRENCH TERMINATED AT 7 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-7,
Log of Trench T 7, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED)

... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 8 ELEV. (MSL.) 535' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, moist, dark gray, Silty, fine to medium SAND			
				CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty CLAY -Becomes grayish brown to olive brown			
2								
				SM	**OTAY FORMATION (To)** Medium dense to dense, damp, light tan brown, Silty, fine to coarse SANDSTONE; weathered			
4								
					TRENCH TERMINATED AT 4.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-8,
Log of Trench T 8, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 9 ELEV. (MSL.) 531' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CH	**TOPSOIL** Soft, wet, dark grayish brown to dark brown, Silty CLAY			
2	T9-1							
4	T9-2			SM	**OTAY FORMATION (To)** Medium dense, moist, brown to light brown, Silty, fine to medium SANDSTONE; weathered -Becomes dense, light brown and gray			
6					TRENCH TERMINATED AT 6 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-9,
Log of Trench T 9, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 10 ELEV. (MSL.) 535' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	T10-1			CL/CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty to Sandy CLAY			
2				SM	**OTAY FORMATION (To)** Medium dense, damp, light brown to white, Silty, fine to medium SAND; weathered			
4								
6					TRENCH TERMINATED AT 6.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-10,
Log of Trench T 10, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. G2501-42-01

TRENCH T 11

ELEV. (MSL.) **543'** DATE COMPLETED **01-29-2020**

EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, damp, light grayish brown, Silty, fine to medium SAND			
				CH	**TOPSOIL** Soft, moist, dark gray, Silty CLAY			
2								
4				SM	**OTAY FORMATION (To)** Medium dense, damp, light brown to white, Silty, fine to coarse SAND; weathered			
6								
8					-Becomes dense, light gray to white			
10					-Hard trenching below 10 feet			
					TRENCH TERMINATED AT 10.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-11,
Log of Trench T 11, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 12 ELEV. (MSL.) 545' DATE COMPLETED 01-29-2020 EQUIPMENT JD 310L RUBBEN TIRE BACKHOE BY: N.G. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, moist, dark brown, Silty, fine to coarse SAND			
	T12-1			CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY; few caliche staining			
2								
				SM	**OTAY FORMATION (To)** Dense, damp, light tan brown, Silty, fine to coarse SANDSTONE; weathered			
	T12-2							
4								
					TRENCH TERMINATED AT 5.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-12,
Log of Trench T 12, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 13 ELEV. (MSL.) **532'** DATE COMPLETED **01-29-2020** EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**UNDOCUMENTED FILL (Qudf)** Loose, damp, light brown, Silty, fine to medium SAND			
2				CL/CH	**TOPSOIL** Soft, moist, dark grayish brown, Silty to Sandy CLAY -Excavates with caliche staining			
4				SM	**OTAY FORMATION (To)** Medium dense, damp, light brown to brown, Silty, fine to medium SAND; weathered -Becomes dense, light brown to white			
6					TRENCH TERMINATED AT 6 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-13,
Log of Trench T 13, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. G2501-42-01

TRENCH T 14

ELEV. (MSL.) **529'** DATE COMPLETED **01-29-2020**

EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL/CH	**TOPSOIL** Soft, moist, dark brown to dark grayish brown, Silty, to Sandy CLAY			
2					-Excavates with caliche staining			
				SM	**OTAY FORMATION (To)** Medium dense, moist, tan brown, Silty, fine to medium SAND; weathered			
4	T14-1							
6					-Becomes medium dense to dense; light brown			
8	T14-2				-Becomes dense			
					TRENCH TERMINATED AT 9.5 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-14,
Log of Trench T 14, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

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PROJECT NO. G2501-42-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 15 ELEV. (MSL.) **527'** DATE COMPLETED **01-29-2020** EQUIPMENT **JD 310L RUBBEN TIRE BACKHOE** BY: **N.G. BORJA**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	T15-1			SM/SC	**UNDOCUMENTED FILL (Qudf)** Medium dense, damp, light grayish brown, Silty to Clayey, fine to medium SAND			
2				CL/CH	**TOPSOIL** Soft to firm, dark grayish brown, Silty to Sandy CLAY			
4				SM	**OTAY FORMATION (To)** Dense, damp, light gray and light brown, Silty, fine to medium SANDSTONE			
6								
8					TRENCH TERMINATED AT 8 FEET No groundwater encountered Backfilled on 01-29-2020			

Figure A-15,
Log of Trench T 15, Page 1 of 1

G2501-42-01.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED)

... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for *in-situ* dry density and moisture content, maximum dry density and optimum moisture content, expansion potential, soluble sulfate content, chloride content, and resistance value (R-Value). The results of these tests are summarized on Tables B-I through B-V.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS ASTM D 1557-02

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T12-1	Dark brown, Sandy CLAY	107.8	17.9
T12-2	Light brown, Silty, SAND	104.6	18.7

TABLE B-II
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS ASTM D 4829-03

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index	Expansion Classification
	Before Test (%)	After Test (%)			
T1-1	15.0	34.7	91.9	109	High
T5-1	14.5	37.2	92.5	150	Very High
T9-1	14.2	36.2	93.7	130	High
T9-2	17.6	39.1	87.5	115	High
T12-2	15.6	25.6	90.5	4	Very Low

TABLE B-III
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Sulfate Exposure
T1-1	0.0004	S0
T9-1	0.0003	S0
T9-2	0.001	S0

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE CHLORIDE ION CONTENT TEST RESULTS
AASHTO TEST NO. T 291

Sample No.	Chloride Ion Content ppm (%)
T1-1	12.6 (0.013)
T12-2	30.1 (0.030)

TABLE B-V
SUMMARY OF LABORATORY RESISTANCE VALUE (R-VALUE) TEST RESULTS
ASTM D 2844

Sample No.	Depth (feet)	Description (Geologic Unit)	R-Value
T4-1	2-4	Dark gray, Silty CLAY (topsoil)	<5

APPENDIX C

APPENDIX C

STORM WATER MANAGEMENT

We understand storm water management devices are being proposed in accordance with the current Storm Water Standards (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties and improvements may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table C-1 presents the descriptions of the hydrologic soil groups. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property is underlain by undocumented fill, topsoil, and the Otay Formation. Table C-2 presents the information from the USDA website for the subject property.

TABLE C-2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group
Diablo Clay, 2 to 9 percent slopes	DaC	100	D

Infiltration Testing

We performed two infiltration tests at the locations shown on Figure 2. The tests were performed in 5- to 6-inch-diameter, hand-auger borings. Table C-3 presents the results of the testing. The calculation sheets are also attached.

We used the guidelines presented in the Riverside County Low Impact Development BMP Design Handbook. Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is equivalent to the infiltration rate. Therefore, the Ksat value determined from our testing is assumed to be the unfactored infiltration rate.

TABLE C-3
UNFACTORED, FIELD-SATURATED, INFILTRATION TEST RESULTS

Test No.	Depth (inches)	Geologic Unit	Field Infiltration Rate, I (in/hr)	Factored* Field Infiltration Rate, I (in/hr)
A-1	53	To	0.005	0.003
A-2	61	To	0.042	0.021

* Factor of Safety of 2.0 for feasibility determination.

STORM WATER MANAGEMENT CONCLUSIONS

Soil Types

Undocumented Fill (Qudf) – We encountered undocumented fill at existing grade on some portions of the site. The undocumented fill within structural improvement areas will be fully removed and replaced with compacted fill. Water that is allowed to migrate into the undocumented fill will cause settlement. Therefore, full and partial infiltration should be considered infeasible within undocumented fill.

Topsoil (Unmapped) – We encountered topsoil varying between 1.5 to 5 feet thick across the site. Topsoil within structural improvement areas will be removed and replaced with compacted fill. Water that is allowed to migrate into the topsoil may cause soil movement (heave or settlement). Therefore, full and partial infiltration should be considered infeasible within topsoil.

Otay Formation (To) – Underlying undocumented fill and topsoil, we encountered Otay Formation, generally described as medium dense to dense, silty, fine to medium grained sandstone. Infiltration into Otay Formation is not feasible due to low infiltration characteristics.

Groundwater Elevation

Groundwater was not encountered in our test pits to a depth of 10.5 feet below the existing ground surface. Infiltration should not impact groundwater.

Existing Utilities

No known utilities cross the site. Infiltration due to utility concerns would be feasible.

Soil or Groundwater Contamination

We are unaware of contaminated soil or groundwater on the property. Therefore, full and partial infiltration associated with this risk is considered feasible.

Slopes

There are no existing slopes that would be impacted by infiltration.

Infiltration Rates

Our test results indicated very slow infiltration rates. The rates were between 0.003 and 0.021 in/hr. The average rate is 0.012 in/hr with a factored rate for feasibility determination of 0.006 in/hr. The infiltration rates are not high enough to support full or partial infiltration.

Storm Water Management Devices

Liners and subdrains should be incorporated into the design and construction of the planned storm water devices. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride**,** PVC) to prevent water migration. The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations. Liners should be installed on the side walls of the proposed basins in accordance with a partial infiltration design.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet Form D.5-1) that helps the project civil engineer estimate the factor of safety based on several factors. Table C-4 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE C-4
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., Infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Table C-5 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE C-5
FACTOR OF SAFETY WORKSHEET D.5-1 DESIGN VALUES[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	2	0.50
Predominant Soil Texture	0.25	3	0.75
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.0

[1] The project civil engineer should complete Worksheet D.5-1 using the data on this table. Additional information is required to evaluate the design factor of safety.

CONCLUSIONS

Our results indicate the site has relatively slow infiltration characteristics within the Otay Formation. Because of the site conditions, it is our opinion that there is a potential for lateral water migration. Undocumented fill and topsoil also exists on the property and has a high potential for adverse settlement or expansion when wetted. It is our opinion that full or partial infiltration is infeasible on this site. Our evaluation included the soil and geologic conditions, estimated settlement and volume change of the underlying soil, slope stability, utility considerations, groundwater mounding, retaining walls, foundations and existing groundwater elevations.

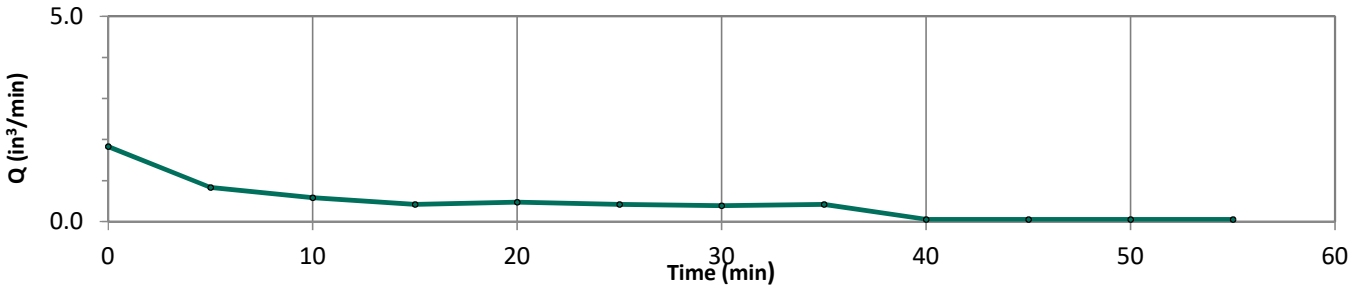
TEST NO.: **A-1**

GEOLOGIC UNIT: **To**

EXCAVATION ELEVATION (MSL, FT): **529**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	6
BOREHOLE DEPTH (FT):	4.4
TEST/BOTTOM ELEVATION (MSL, FT):	525
MEASURED HEAD HEIGHT (IN):	6.0
CALCULATED HEAD HEIGHT (IN):	5.2
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.055**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.005**
FACTORED INFILTRATION RATE (IN/HR):	**0.003**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	6.220	172.25	34.449
3	5.00	0.330	9.14	1.828
4	5.00	0.150	4.15	0.831
5	5.00	0.105	2.91	0.582
6	5.00	0.075	2.08	0.415
7	5.00	0.085	2.35	0.471
8	5.00	0.075	2.08	0.415
9	5.00	0.070	1.94	0.388
10	5.00	0.075	2.08	0.415
11	5.00	0.010	0.28	0.055
12	5.00	0.010	0.28	0.055
13	5.00	0.010	0.28	0.055
14	5.00	0.010	0.28	0.055

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PHONE 858 558-6900 - FAX 858 558-6159

AARDVARK PERMEAMETER TEST RESULTS

SANYO LOGISTICS CENTER

PROJECT NO.: G2501-42-01

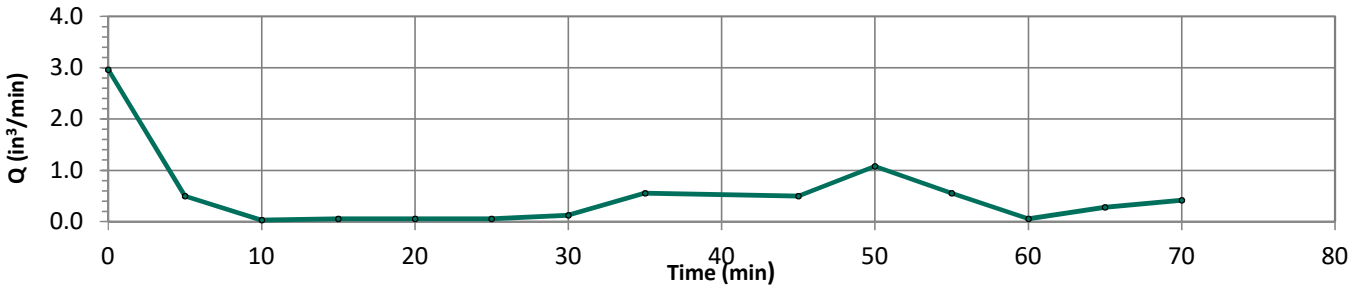
TEST NO.: **A-2**

GEOLOGIC UNIT: **To**

EXCAVATION ELEVATION (MSL, FT): **531**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	5
BOREHOLE DEPTH (FT):	5.1
TEST/BOTTOM ELEVATION (MSL, FT):	526
MEASURED HEAD HEIGHT (IN):	4.3
CALCULATED HEAD HEIGHT (IN):	5.4
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.325**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.042**
FACTORED INFILTRATION RATE (IN/HR):	**0.021**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	2.735	75.74	15.148
3	5.00	0.535	14.82	2.963
4	5.00	0.090	2.49	0.498
5	5.00	0.005	0.14	0.028
6	5.00	0.010	0.28	0.055
7	5.00	0.010	0.28	0.055
8	5.00	0.010	0.28	0.055
9	10.00	0.045	1.25	0.125
10	5.00	0.100	2.77	0.554
11	5.00	0.090	2.49	0.498
12	5.00	0.195	5.40	1.080
13	5.00	0.100	2.77	0.554
14	5.00	0.010	0.28	0.055
15	5.00	0.050	1.38	0.277
16	5.00	0.075	2.08	0.415

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AARDVARK PERMEAMETER TEST RESULTS

SANYO LOGISTICS CENTER

PROJECT NO.: G2501-42-01

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:
Entire Site	Preliminary
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.

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.

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:
Entire Site		Preliminary
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).

Two infiltration tests were performed on the property. The factored test results were as follows:

A-1: 0.003 in/hr
A-2: 0.021 in/hr

The average rate of the two tests is 0.012 in/hr.

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.

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

SANYO LOGISTICS CENTER
SAN DIEGO, CALIFORNIA

PROJECT NO. G2501-42-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9

and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition.

4. CLEARING AND PREPARING AREAS TO BE FILLED

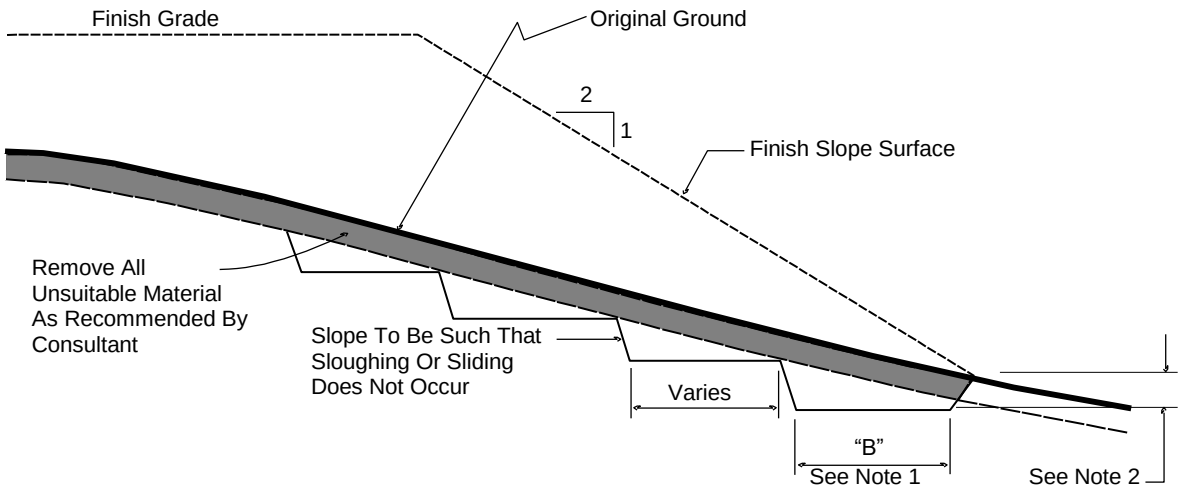
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES:

(1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection

variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

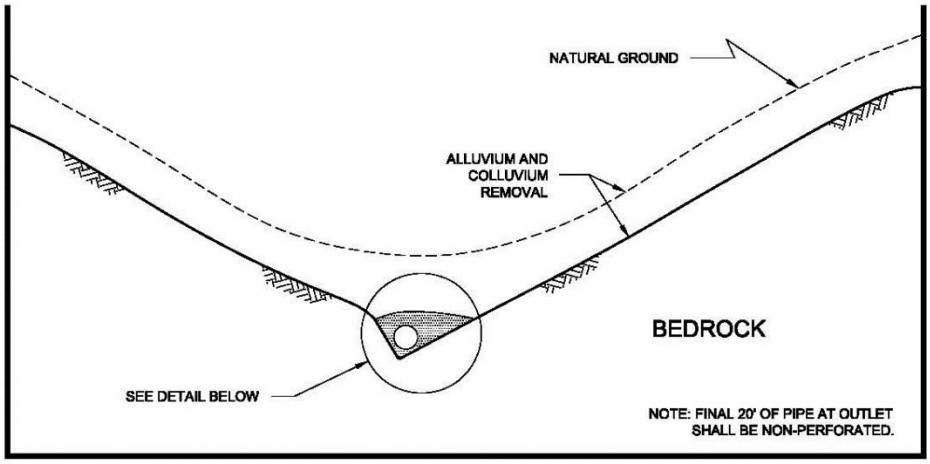
6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

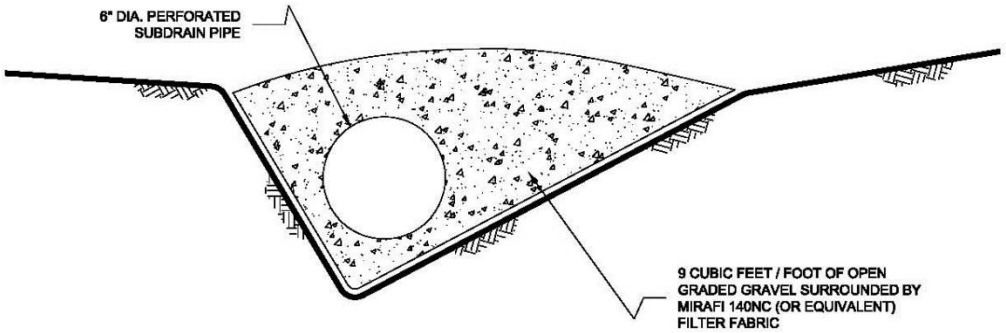
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL





NOTES:

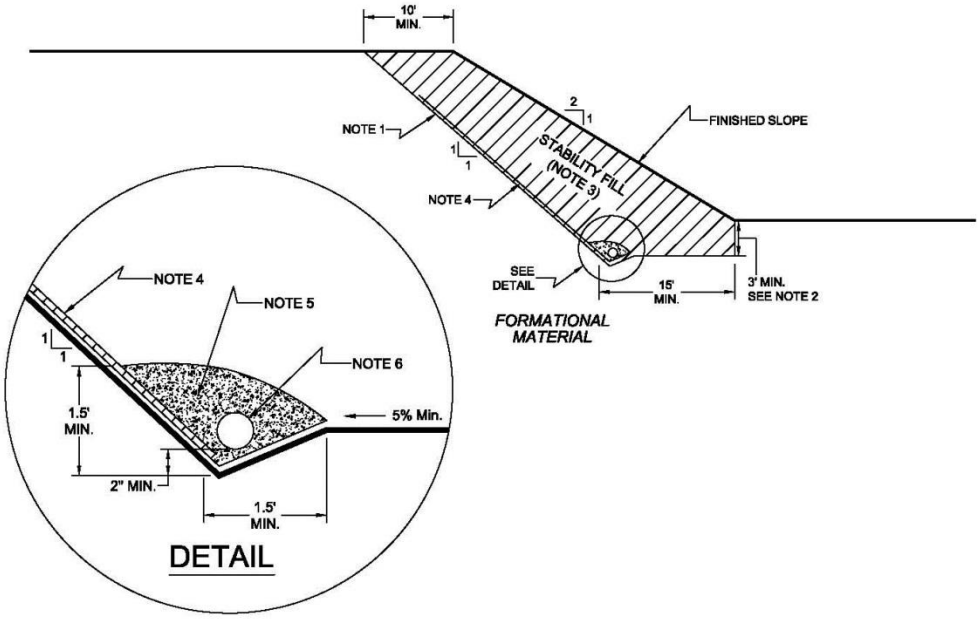
1.....6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS
IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

2.....6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS
LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

NO SCALE

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or lager) pipes.

TYPICAL STABILITY FILL DETAIL



NOTES:

1.....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).

2.....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.

3.....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.

4.....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.

5.....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).

6.....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

NO SCALE

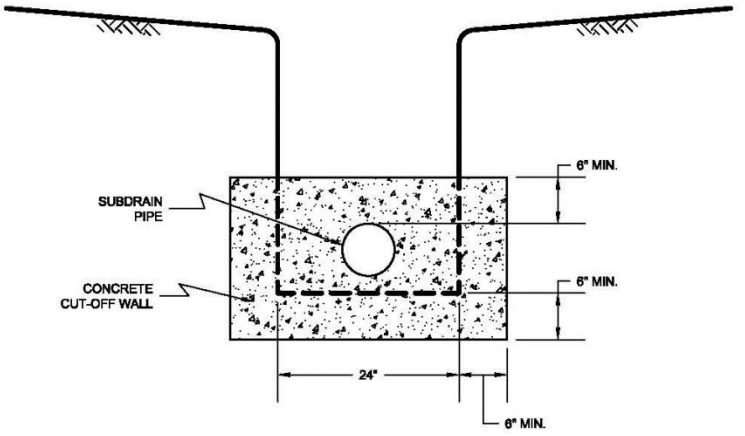
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.

7.4 *Rock* fill or *soil-rock* fill areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock* fill drains should be constructed using the same requirements as canyon subdrains.

7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

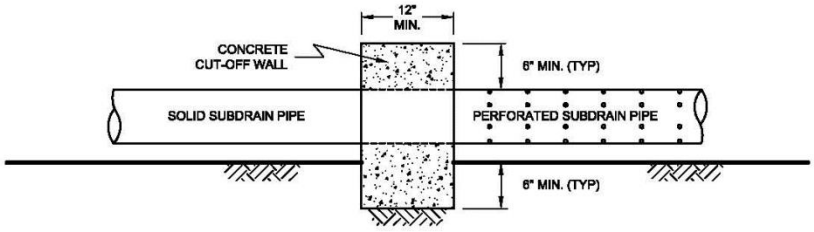
TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



NO SCALE

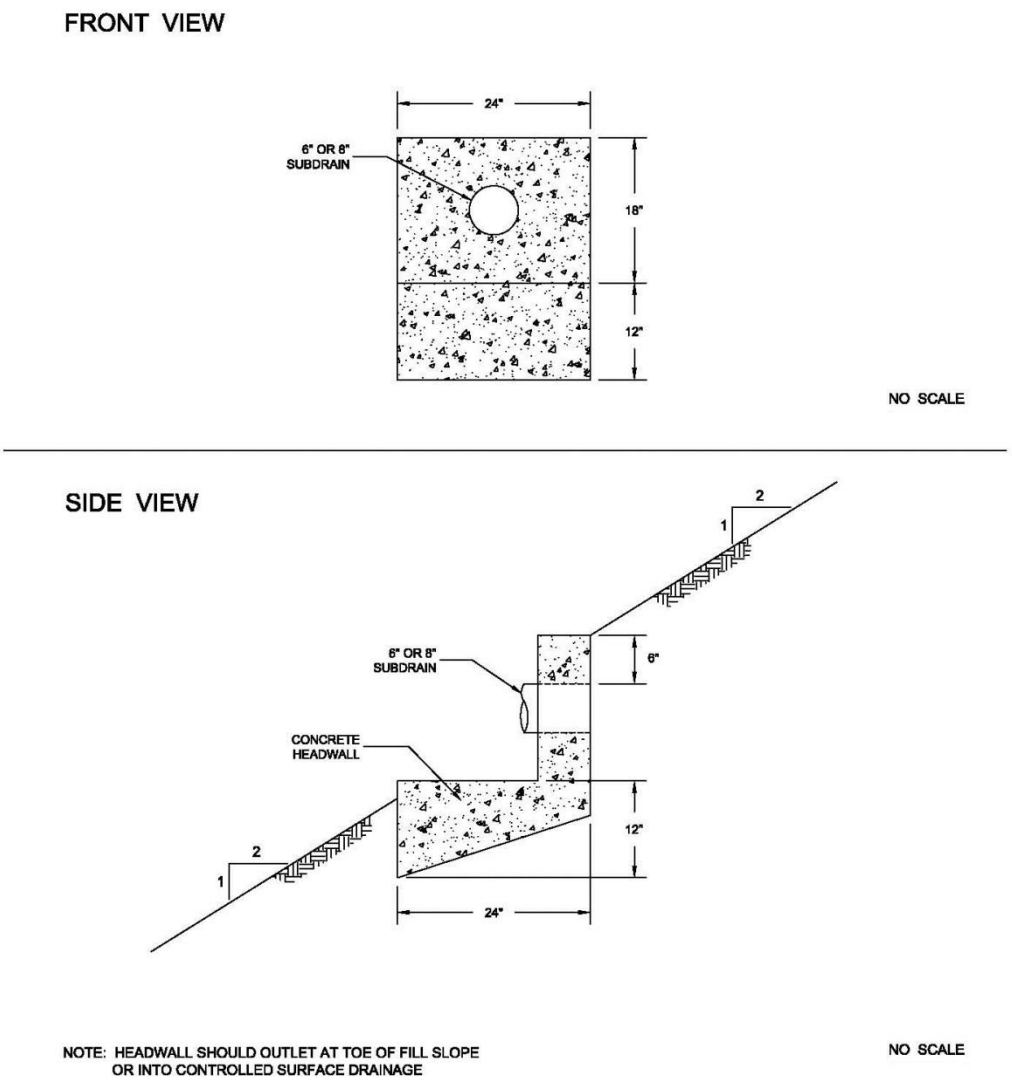
SIDE VIEW



NO SCALE

7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

TYPICAL HEADWALL DETAIL



7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an "as-built" map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

8. OBSERVATION AND TESTING

8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.

8.6 Testing procedures shall conform to the following Standards as appropriate:

8.6.1 Soil and Soil-Rock Fills:

8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method.*

8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

8.6.1.4. Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

9. PROTECTION OF WORK

9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

10. CERTIFICATIONS AND FINAL REPORTS

10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

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2. City of San Diego (2008), *Seismic Safety Study, Geologic Hazards and Faults*, Grid Tile 4, dated April 3, 2008;

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4. FEMA (2012), *Flood Map Service Center*, FEMA website, https://msc.fema.gov/portal/home, flood map number 06073C2200G, effective May 16, 2012, accessed July 29, 2020;

5. Legg (2003), *Evaluation of Tsunami Risk to Southern California Coastal Cities, The 2002 NEHRP Professional Fellowship Report*, dated January, 2003;

6. Jennings, C. W., 1994, California Division of Mines and Geology, *Fault Activity Map of California and Adjacent Areas*, California Geologic Data Map Series Map No. 6.

7. SEAOC (2019), *OSHPD Seismic Design Maps:* Structural Engineers Association of California website, http://seismicmaps.org/, accessed July 29, 2020;

8. Todd, V.R., 2004, *Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, California*, USGS Regional Map Series Map No. 1, Scale 1:100,000.

9. USGS (2019), *Quaternary Fault and Fold Database of the United States*: U.S. Geological Survey website, https://www.usgs.gov/natural-hazards/earthquake-hazards/faults, accessed July 31, 2020;

10. Unpublished reports and maps on file with Geocon Incorporated.

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