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

Plaza La Media - North

PTS No. 334235

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

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

Engineer of Work:

REGISTERED PROFESSIONAL ENGINEER
WAYNE W. CHANG
No. 46548
Exp. 6/30/19
CIVIL
STATE OF CALIFORNIA

Wayne W. Chang, PE 46548, Exp. 6/30/2019
Provide Wet Signature and Stamp Above Line

Prepared For:

La Media & Airway, LLC an Arizona LLC
2700 W. Sahara Avenue
Las Vegas, NV 89102
(619) 233-2214

Prepared By:

Chang Consultants
P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

Date:

February 28, 2019

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: Plaza La Media - North

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- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
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- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

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

46548 — PE#

6/30/2019 — Expiration Date

Wayne W. Chang — Print Name

Chang Consultants — Company

February 28, 2019 — Date

REGISTERED PROFESSIONAL ENGINEER
WAYNE W. CHANG
No. 46548
Exp. 6/30/19
CIVIL
STATE OF CALIFORNIA

Engineer's Stamp

Project Name: Plaza La Media – North

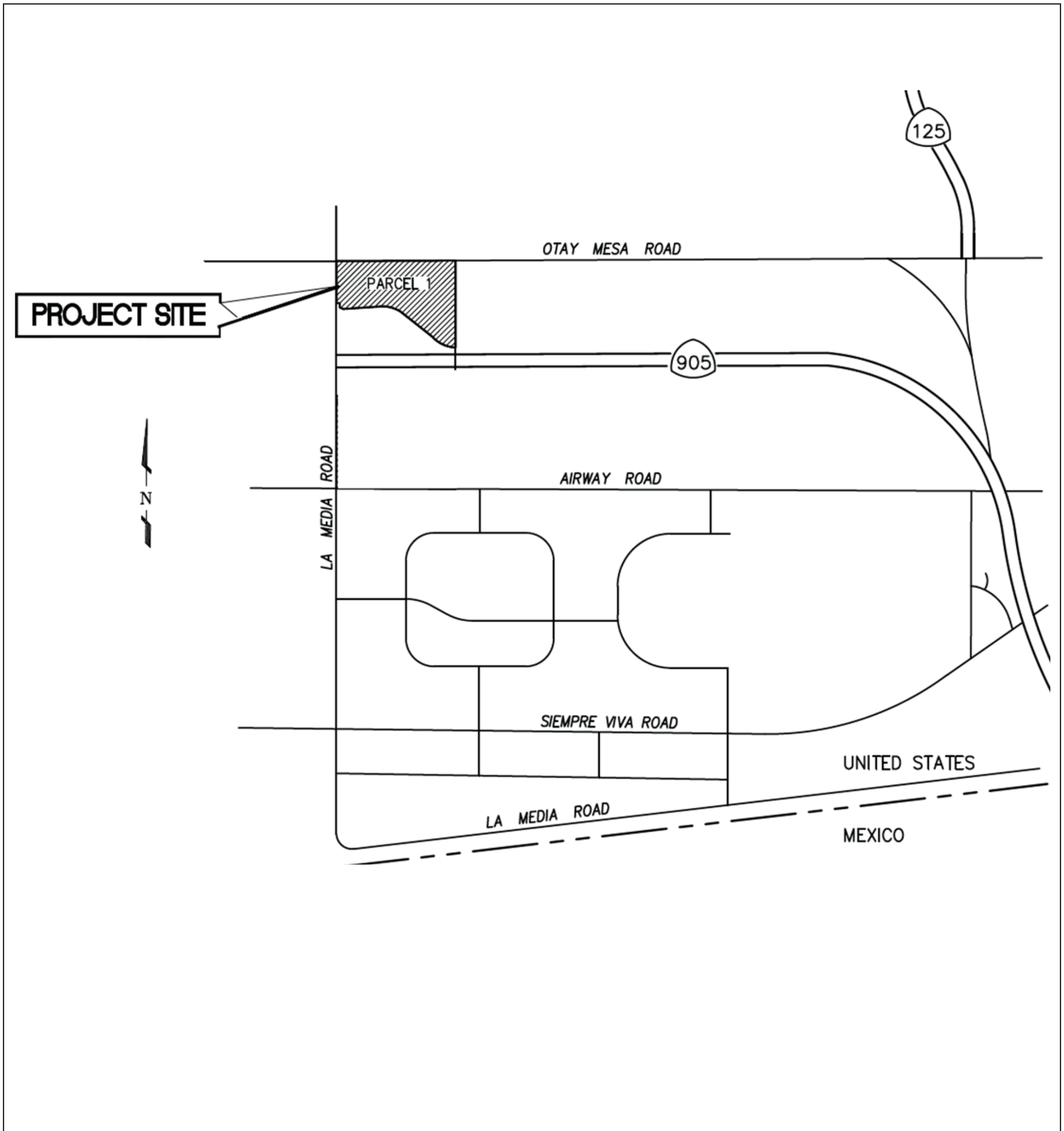
Submittal Record

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	12/12/2016	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	**Initial Submittal**
2	9/07/2017	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	Second Submittal
3	7/30/2018	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	Third Submittal
4	2/28/2019	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	Fourth Submittal

Project Vicinity Map

Project Name: Plaza La Media - North
Permit Application PTS No. 334235



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

Attach DS-560 form.

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

Storm Water Requirements Applicability Checklist

FORM DS-560

OCTOBER 2016

Project Address: Southeast of Intersection of Otay Mesa Rd. & La Media Rd.

Project Number *(for City Use Only)*:

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 Water Resources Control Board.

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

PART A: Determine Construction Phase Storm Water Requirements.

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

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

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

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

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

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

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

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

☐ Yes; no document required

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

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

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

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

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

PART B: Determine Construction Site Priority

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

Complete PART B and continued to Section 2

1. ☐ **ASBS**

a. Projects located in the ASBS watershed.

2. ☒ **High Priority**

a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**

a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**

a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

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

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

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

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

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

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

PART D: PDP Exempt Requirements.

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

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

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

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

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

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

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

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

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

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

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

1. **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☒ Yes ☐ No
2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No
3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. ☒ Yes ☐ No
4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ☐ Yes ☒ No
5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ☒ Yes ☐ No
6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ☒ Yes ☐ No

7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ Yes ☒ No

8. **New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☒ Yes ☐ No

9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☒ No

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☒ No

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

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

Anne Marie Berg	Vice President
Name of Owner or Agent *(Please Print)*	Title
Signature	Date

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Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Plaza La Media - North		
Permit Application Number: PTS No. 334235		Date: February 28, 2019
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: Plaza La Media – North

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: A small area at the northwest corner of the site contains CCSYA on the San Diego County Regional Watershed Management Area Analysis (WMAA). However, this area is within a Caltrans drainage easement containing existing parallel culverts and will not be disturbed by the project. Furthermore, the Storm Water Section determined that the on-site CCSYA is an erroneous mapping issue.		

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.

N/A. The project is not exempt.

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Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Plaza La Media - North
Project Address	Southeast of intersection of Otay Mesa Road and La Media Road, San Diego, CA 92154
Assessor's Parcel Number(s) (APN(s))	646-121-34
Permit Application Number	PTS No, 334235
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 Subarea (911.12)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	17.61 Acres (767,092 Square Feet)
Area to be disturbed by the project (Project Footprint)	17.24 Acres (750,862 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	12.05 Acres (524,807 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	5.19 Acres (226,055 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	> 100 %

Form I-3B Page 2 of 11
Description of Existing Site Condition and Drainage Patterns
Current Status of the Site (select all that apply): ☐Existing development ☑Previously graded but not built out ☐Agricultural or other non-impervious use ☐Vacant, undeveloped/natural Description / Additional Information: The current site is undeveloped, but the ground surface has been previously disturbed.
Existing Land Cover Includes (select all that apply): ☑Vegetative Cover ☐Non-Vegetated Pervious Areas ☐Impervious Areas Description / Additional Information: The existing site is pervious with naturally occuring vegetation.
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐NRCS Type A ☐NRCS Type B ☑NRCS Type C ☑NRCS Type D
Approximate Depth to Groundwater: ☐Groundwater Depth < 5 feet ☐5 feet < Groundwater Depth < 10 feet ☐10 feet < Groundwater Depth < 20 feet ☑Groundwater Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☐Watercourses ☐Seeps ☐Springs ☐Wetlands ☑None Description / Additional Information: There are no on-site natural hydrologic features. A small manmade earthen drainage swale exists along Otay Mesa Road, and Caltrans box culverts exist along the westerly boundary.

Project Name: Plaza La Media - North

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
Under existing conditions, the on-site storm runoff flows in two directions. The majority of the on-site runoff sheet flows in a southwest direction over the gently-sloping ground surface. The runoff is conveyed to a storm drain at the southwest corner of the site that connects to existing Caltrans box culverts along the westerly property boundary. Storm runoff from a smaller on-site area along the northerly boundary is conveyed by a small natural swale to a storm drain at the northwest corner. The storm drain also connects to the existing Caltrans box culverts. A portion of the runoff within the south half of Otay Mesa Road flows onto the site from small spillways along the roadway (under 2 acres). This runoff combines with the on-site runoff and is collected by the Caltrans box culverts. The drainage report in Attachment 5 shows that the overall drainage area covers 20.93 acres. The overall proposed condition 100-year runoff is 45 cfs, while the existing condition runoff is 66 cfs. The proposed condition runoff will be attenuated at or below existing levels by on-site detention basins incorporated into the project.

Project Name: Plaza La Media – North

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: TThe project will construct commercial/retail development on the 17.61 acre corner lot. The potential tenants include major retail, small shops, a grocery store, drive-through restaurants, and a gas station. A parking lot will be constructed within the site.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): The primary impervious features will include the buildings, parking lot, walkways, and drive aisles.
List/describe proposed pervious features of the project (e.g., landscape areas): The pervious features include proposed biofiltration basins and landscaping spread throughout the commercial development.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The existing site consists of a gently sloping ground surface. The site will require some regrading to accommodate the commercial/retail development.

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 overall existing condition on-site drainage patterns will be maintained by the project since the majority of the on-site and tributary off-site runoff will continue to be conveyed to the Caltrans box culverts along the westerly project boundary. The project runoff will enter the Caltrans culverts through the existing storm drains at the northwest and southwest corners of the site. The on-site runoff will be collected and conveyed by proposed private drainage facilities (inlets, pipes, curb and gutter, parking lots, etc.). The runoff will be treated by a series of biofiltration basins before entering the Caltrans culverts. The off-site runoff from Otay Mesa Road will be conveyed through the site to the culverts without commingling with untreated on-site runoff. There is a small area of project runoff along the easterly boundary that will be conveyed to the adjacent site to the east. The runoff includes a portion of the project's access driveway that is on the adjacent site. A temporary biofiltration basin will be constructed on the adjacent site to treat runoff from this area. When the adjacent site is developed in the future, the biofiltration basin will be replaced with a permanent structural BMP constructed by the adjacent project.

Form I-3B Page 6 of 11
Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply): ☑Onsite storm drain inlets ☑Interior floor drains and elevator shaft sump pumps ☐Interior parking garages ☑Need for future indoor & structural pest control ☑Landscape/outdoor pesticide use ☐Pools, spas, ponds, decorative fountains, and other water features ☑Food service ☑Refuse areas ☐Industrial processes ☐Outdoor storage of equipment or materials ☐Vehicle and equipment cleaning ☐Vehicle/equipment repair and maintenance ☑Fuel dispensing areas ☑Loading docks ☑Fire sprinkler test water ☑Miscellaneous drain or wash water ☑Plazas, sidewalks, and parking lots Description/Additional Information: The project will have a private on-site drainage system, as needed, to convey flow to the biofiltration basins. Pest control will be used for indoor and outdoor areas, as needed. Refuse storage will be designated. Fire sprinklers will be installed in the commercial/retail buildings per code. The buildings will generate miscellaneous drain and wash water.

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)
Under existing and proposed conditions, storm runoff is conveyed to the existing Caltrans box culverts along the westerly property boundary. The culverts continue approximately 1,000 feet south of the site and discharge into an earthen channel on the east side of La Media Road just south of Interstate 905. The channel continues south over 750 feet towards Airway Road. The runoff is conveyed through culverts near the intersection of La Media Road and Airway Road to a small, unnamed natural stream. The natural stream continues south approximately one-mile to Mexico, enters the Tijuana River, which ultimately flows to the Pacific Ocean.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations
The existing beneficial uses from the 2011 "Water Quality Control Plan for the San Diego Basin" (Water Tanks Hydrologic Subarea 911.12) for inland surface waters include AGR, REC2, WARM and WILD, while potential beneficial uses are IND and REC1. The potential groundwater beneficial uses are MUN, AGR, and IND.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations
There are no ASBS receiving waters downstream of the project.
Provide distance from project outfall location to impaired or sensitive receiving waters
The project outfalls into the Tijuana River, which enters the US about 4.8 miles southwest of the site. The river is impaired for eutrophic, indicator bacteria, low dissolved oxygen, pesticides, phosphorus, sedimentation/siltation, selenium, solids, sufactants, synthetic organics, total nitrogen as N, toxicity, trace elements, and trash per the 2010 303(d) list.
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 has been previously disturbed from a review of aerial photographs. There are no MHPA or enviromentally sensitive lands impacted by the project.

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	See prior page for complete list.	TMDLs req'd, but not completed.
		The highest priority pollutants
		are sedimentation/siltation
		and turbidity (wet weather).

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: A small area at the northwest corner of the site is identified as containing critical coarse sediment yield areas on the San Diego County Regional Watershed Management Area Analysis (WMAA). However, this area is within a Caltrans drainage easement containing existing parallel culverts, so has been disturbed by prior construction. Therefore, a naturally occuring CCSYA does not exist at the site. Furthermore, it has been determined that the CCSYA located on the project can be considered an erroneous mapping issue verified by the Storm Water Section. No further evaluation of CCSYA is needed.

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.

The project has a primary POC as follows. The project runoff will be conveyed by proposed storm drain systems to the Caltrans box culverts along the westerly project boundary. The Caltrans culverts discharge into a natural channel approximately 1,000 feet south of the site. The culvert outlet into the natural channel is the point of compliance for the project. This is identified as POC 1.

The project will also have two temporary discharge locations onto the adjacent undeveloped lot east of the site. These are temporary POCs and identified as POC 2 and 3.

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:

A geomorphic assessment was performed for the natural channel below POC 1. The assessment is included in Chang Consultants' approved May 14, 2012 report, "Hydromodification Screening for the Sunroad 80 Project" (see Attachment 2c). The assessment covers POC 1 associated with this project.

Discussion / Additional Information: (optional)

See above.

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: Plaza La Media – North

<table>
<tr><th>Source Control BMP Checklist for PDPs</th><th colspan="3">Form I-4B</th></tr>
<tr><td colspan="4">Source Control BMPs</td></tr>
<tr><td colspan="4">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.</td></tr>
<tr><td>Source Control Requirement</td><td colspan="3">Applied?</td></tr>
<tr><td>4.2.1 Prevention of Illicit Discharges into the MS4</td><td>☑ Yes</td><td>☐ No</td><td>☐ N/A</td></tr>
<tr><td colspan="4">Discussion / justification if 4.2.1 not implemented:
N/A</td></tr>
<tr><td>4.2.2 Storm Drain Stenciling or Signage</td><td>☑ Yes</td><td>☐ No</td><td>☐ N/A</td></tr>
<tr><td colspan="4">Discussion / justification if 4.2.2 not implemented:
N/A</td></tr>
<tr><td>4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal</td><td>☐ Yes</td><td>☐ No</td><td>☑ N/A</td></tr>
<tr><td colspan="4">Discussion / justification if 4.2.3 not implemented:
N/A</td></tr>
<tr><td>4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal</td><td>☐ Yes</td><td>☐ No</td><td>☑ N/A</td></tr>
<tr><td colspan="4">Discussion / justification if 4.2.4 not implemented:
N/A</td></tr>
<tr><td>4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal</td><td>☑ Yes</td><td>☐ No</td><td>☐ N/A</td></tr>
<tr><td colspan="4">Discussion / justification if 4.2.5 not implemented:
N/A</td></tr>
</table>

Project Name: Plaza La Media – North

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. N/A			

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: N/A			
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: Biofiltration basins will treat the project runoff, so street trees are not used.			

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: N/A			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented: N/A			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: N/A			
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: Plaza La Media – North

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: N/A			
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: N/A			
4.3.8 Harvest and Use Precipitation	☐ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvest and use is considered to be infeasible per Form I-7 from the City "Storm Water Standards, Part 1: BMP Design Manual - Appendices." The harvest and use assessment is included in 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

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:
See Attachment 1a and 4 for plan sheets showing BMPs.

Project Name: Plaza La Media - North

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 must meet pollutant control requirements. The City of San Diego's 2016 and 2018 "Storm Water Standards" outline steps in selecting structural BMPs. Harvest and use is considered first. Per Attachment 1c, harvest and use is not feasible for the project. Infiltration is considered next and is infeasible based on a determination by the project's geotechnical engineer, Geocon, Inc. Geocon's testing showed infiltration rates ranging from approximately 0.002 to 0.01 inches per hour as well as highly expansive clay with very low permeability characteristics in the upper 10 feet. Their opinion is that there is a high probability for lateral water migration because of presence of interlayered permeable sands beds within the very old paralic deposits. Based on the results of the field infiltration tests, full or partial infiltration should be considered infeasible. Geocon has also completed Worksheet C.4-1 (Form I-8A) and indicated that full and partial infiltration are not feasible. Biofiltration is the third BMP in the hierarchy. The project adopts this BMP by incorporating biofiltration basins at various locations throughout the site. Each biofiltration basin sizing shall be in accordance with current pollutant control and flow control requirements per the 2018 "Storm Water Standards.". The biofiltration basin areas contain overflow catch basins set approximately 12 inches above the basin floors to convey the flow rates in excess of the water quality flows (Continue on page 2 as necessary.)	

Project Name: Plaza La Media - North

Form I-6 Page 2 of 2
(Continued from page 1)

Project Name: Plaza La Media – North

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Bilfiltration Basins No. 1 through 7, 9, 12, and 13	
Construction Plan Sheet No. C7 and C8	
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	TBD during final engineering
Who will be the final owner of this BMP?	La Media & Airway, LLC an Arizona limited liability company, unless sold to others.
Who will maintain this BMP into perpetuity?	Owner and their management company will employ maintenance staff.
What is the funding mechanism for maintenance?	Owner will include BMP maintenance in the yearly operations budget.

Project Name: Plaza La Media - North

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. Bilfiltration Basins No. 1 through 7, 9, 12, and 13
Construction Plan Sheet No. C7 and C8
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):
Ten biofiltration basins are the proposed pollutant and flow control BMPs for the project. Each basin is sized for the impervious and pervious area within its tributary drainage area. Since this is a preliminary SWQMP, all ten are combined in one Form I-6. During final engineering, a separate Form I-6 will be provided for each structural BMP.

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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: Plaza La Media - North

Indicate which Items are Included:

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

Project Name: Plaza La Media – North

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

The DMA Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography and impervious areas
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ 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)
- ☑ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☑ Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)

Project Name: Plaza La Media - North

Attachment 1b

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 & 16	1.88	1.12	59.7	D	0.58	1,811	BMP 1	Biofiltration	1
2 & 15	2.78	2.24	80.7	D	0.75	3,459	BMP 2	Biofiltration	1
3 & 14	1.73	1.40	81.2	D	0.75	2,159	BMP 3	Biofiltration	1
4	0.31	0.14	45.4	D	0.46	238	BMP 4	Biofiltration	1
5	0.24	0.15	63.1	D	0.60	238	BMP 5	Biofiltration	1
6	6.70	4.96	74.1	D	0.69	7,746	BMP 6	Biofiltration	1
7	1.58	1.16	73.3	D	0.69	1,817	BMP 7	Biofiltration	1
8, 9 & 10	1.07	0.60	55.8	D	0.55	979	BMP 9	Biofiltration	1
12	0.26	0.18	69.9	D	0.66	290	BMP 12	Biofiltration	2
13	0.70	0.50	72.0	D	0.68	786	BMP 13	Biofiltration	3
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
15	17.24	12.46	72.3		0.68	19,523	17.24		3

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

The 15 DMAs in the Summary are DMAs tributary to the biofiltration BMPs. In addition, DMA 11 is a self-mitigating area and DMAs 17 to 20 meet the green street exemption (see Attachment 1a).

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Attachment 1c

<table>
<tr><th colspan="2">Harvest and Use Feasibility Checklist</th><th>Worksheet B.3-1 : Form I-7</th></tr>
<tr><td colspan="3">1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☐ Toilet and urinal flushing
☐ Landscape irrigation
☐ Other:___________</td></tr>
<tr><td colspan="3">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]</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.
DCV = _______________ (cubic feet)
[Provide a summary of calculations here]</td></tr>
<tr><td>3a. Is the 36-hour demand greater than or equal to the DCV?
Yes / No ⇨
⇩</td><td>3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?
☐ Yes / No ⇨
⇩</td><td>3c. Is the 36-hour demand less than 0.25DCV?
Yes
⇩</td></tr>
<tr><td>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.</td><td>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.</td><td>Harvest and use is considered to be infeasible.</td></tr>
<tr><td colspan="3">Is harvest and use feasible based on further evaluation?
Yes, refer to Appendix E to select and size harvest and use BMPs.
No, select alternate BMPs.</td></tr>
</table>

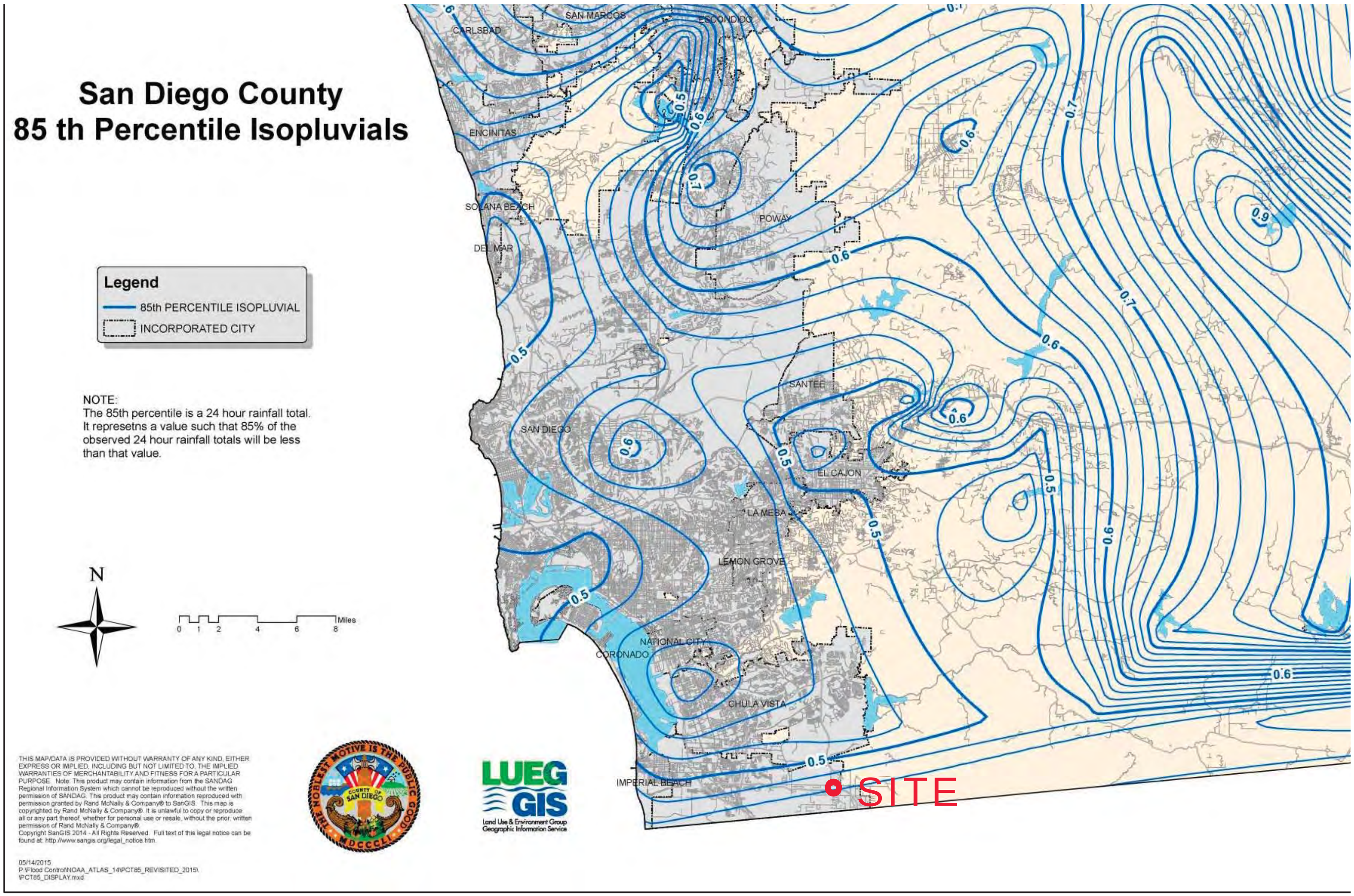


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

Table B.3-1: Toilet and Urinal Water Usage per Resident or Employee

Land Use Type	Toilet User Unit of Normalization	Per Capita Use per Day		Visitor Factor[4]	Water Efficiency Factor	Total Use per Resident or Employee
		Toilet Flushing[1,2]	Urinals[3]			
Residential	Resident	18.5	NA	NA	0.5	9.3
Office	Employee (non-visitor)	9.0	2.27	1.1	0.5	7 (avg)
Retail	Employee (non-visitor)	9.0	2.11	1.4	0.5	
Schools	Employee (non-student)	6.7	3.5	6.4	0.5	33
Various Industrial Uses (excludes process water)	Employee (non-visitor)	9.0	2	1	0.5	5.5

[1]Based on American Waterworks Association Research Foundation, 1999. Residential End Uses of Water. Denver, CO: AWWARF

[2]Based on use of 3.45 gallons per flush and average number of per employee flushes per subsector, Table D-1 for MWD (Pacific Institute, 2003)

[3]Based on use of 1.6 gallons per flush, Table D-4 and average number of per employee flushes per subsector, Appendix D (Pacific Institute, 2003)

[4]Multiplied by the demand for toilet and urinal flushing for the project to account for visitors. Based on proportion of annual use allocated to visitors and others (includes students for schools; about 5 students per employee) for each subsector in Table D-1 and D-4 (Pacific Institute, 2003)

[5]Accounts for requirements to use ultra-low flush toilets in new development projects; assumed that requirements will reduce toilet and urinal flushing demand by half on average compared to literature estimates. Ultra low flush toilets are required in all new construction in California as of January 1, 1992. Ultra low flush toilets must use no more than 1.6 gallons per flush and Ultra low flush urinals must use no more than 1 gallon per flush. Note: If zero flush urinals are being used, adjust accordingly.

B.3.2.2 General Requirements for Irrigation Demand Calculations

The following guidelines should be followed for computing harvested water demand from landscape irrigation:

- If reclaimed water is planned for use for landscape irrigation, then the demand for harvested storm water should be reduced by the amount of reclaimed water that is available during the wet season.
- Irrigation rates should be based on the irrigation demand exerted by the types of landscaping that are proposed for the project, with consideration for water conservation requirements.
- Irrigation rates should be estimated to reflect the average wet season rates (defined as October through April) accounting for the effect of storm events in offsetting harvested water demand. In the absence of a detailed demand study, it should be assumed that irrigation demand is not present during days with greater than 0.1 inches of rain and the subsequent 3-day period. This irrigation shutdown period is consistent with standard practice in land application of wastewater and is applicable to storm water to prevent irrigation from resulting in dry weather runoff. Based on a statistical analysis of San Diego County rainfall patterns, approximately 30 percent of wet season days would not have a demand for irrigation.

estimates can be used to calculate the drawdown of harvest and use systems for the purpose of LID BMP sizing calculations.

Table B.3-3: Planning Level Irrigation Demand by Plant Factor and Landscape Type

General Landscape Type	36-Hour Planning Level Irrigation Demand (gallons per irrigated acre per 36 hour period)
Hydrozone – Low Plant Water Use	390
Hydrozone – Moderate Plant Water Use	1,470
Hydrozone – High Plant Water Use	2,640
Special Landscape Area	2,640

B.3.2.3 Calculating Other Harvested Water Demands

Calculations of other harvested water demands should be based on the knowledge of land uses, industrial processes, and other factors that are project-specific. Demand should be calculated based on the following guidelines:

- Demand calculations should represent actual demand that is anticipated during the wet season (October through April).
- Sources of demand should only be included if they are reliably and consistently present during the wet season.
- Where demands are substantial but irregular, a more detailed analysis should be conducted based on a statistical analysis of anticipated demand and precipitation patterns.

Attachment 1d

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:
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.		

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td colspan="4">Criteria 2: Geologic/Geotechnical Screening</td></tr>
<tr><td>2A</td><td colspan="3">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.</td></tr>
<tr><td>2A-1</td><td>Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>2A-2</td><td>Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>2A-3</td><td>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?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>2B</td><td colspan="3">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.</td></tr>
<tr><td>2B-1</td><td>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?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>2B-2</td><td>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?</td><td>☐Yes</td><td>☐No</td></tr>
</table>

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

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td>2C</td><td>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.</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>Criteria 2 Result</td><td>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?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td colspan="4">Summarize findings and basis; provide references to related reports or exhibits.</td></tr>
<tr><th colspan="2">Part 1 Result – Full Infiltration Geotechnical Screening [12]</th><th colspan="2">Result</th></tr>
<tr><td colspan="2">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.</td><td colspan="2">☐Full infiltration Condition

☐Complete Part 2</td></tr>
</table>

[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:
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).		

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

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td>Criteria 4 Result</td><td>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?</td><td>☐ Yes</td><td>☐ No</td></tr>
<tr><td colspan="4">Summarize findings and basis; provide references to related reports or exhibits.</td></tr>
<tr><th colspan="2">Part 2 – Partial Infiltration Geotechnical Screening Result[13]</th><th colspan="2">Result</th></tr>
<tr><td colspan="2">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.</td><td colspan="2">☐ Partial Infiltration Condition

☐ No Infiltration Condition</td></tr>
</table>

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

Attachment 1e

POLLUTANT CONTROL BMP DESIGN

Pollutant control BMPs were selected to treat the project's pollutants of concern identified on Form I-3B. A series of ten biofiltration basins (see the Attachment 1a DMA Exhibit and Attachment 2a Hydromodification Management Exhibit) are proposed because they have a high pollutant removal efficiency for the project's pollutants of concern. The biofiltration basins shall contain overflow catch basins (or other approved outlets) set approximately 12" above the basin floor to convey the flow rates in excess of the water quality flows.

The biofiltration basin sizing has been performed in accordance with the City's 2018 *Storm Water Standards, Part 1: BMP Design Manual: Appendices*. The design capture volume (DCV) to each biofiltration basin was determined first (see attached tables). The design capture volume is the 24-hour, 85th percentile storm volume at the site, which is determined by multiplying the 24-hour, 85th percentile precipitation by the average runoff factor and tributary area. The 24-hour, 85th percentile precipitation is 0.46 inches (see Attachment 1c). The average runoff factor was determined from the pervious and impervious areas from the DMA Plan. The average runoff factor is the total impervious area and porous pavement area multiplied by a runoff factor of 0.9 plus the pervious area multiplied by a runoff factor of 0.1 divided by the total area, i.e., C = [(impervious and porous pavement area × 0.9) + (pervious area × 0.1)] ÷ total area.

After the DCV is determined for the ten DMAs, each biofiltration basin is sized using the *BMP Design Manual*'s Worksheet B.5-1. The sizing of each basin using the worksheet is attached. Note that DMAs 8, 9, and 10 flow to a single temporary biofiltration BMP.

The biofiltration sizing is then compared against the hydromodification sizing in Attachment 2, and the most conservative sizing is used.

The runoff in DMAs 8, 9, and 10 will flow onto the Sunroad site easterly of the project. Portions of these DMAs are on Sunroad's property since they cover a common driveway entrance that will serve both sites. The project applicant has engaged with Sunroad with the goal of identifying off-site treatment and detention on the Sunroad property. When the Sunroad property develops, its site plan will account for the collection, treatment, and conveyance of the runoff directed onto its site. It is anticipated that the DMA 8, 9, and 10 runoff can be served by a single temporary biofiltration basin on the Sunroad property until Sunroad develops.

DMA 11 covers perimeter landscaping on the south and east sides of the project, and is self-mitigating.

There are some loading docks that will be covered with roofs to allow treatment of runoff from the footprint of these areas. The loading docks correspond to DMAs 14, 15, and 16 that combine with runoff from DMAs 3, 2, and 1, respectively.

DMA 22 flows into a Modular Wetland System Linear. This DMA covers 0.07 acres. The flow-based flow rate is Q=1.5CIA=1.5(0.95)(0.2)(0.07)=0.02 cfs, which can be treated by a MWS-L-4-4.

GREEN STREETS

Otay Mesa Road and La Media Road are being improved (widening, curb, gutter, and sidewalk) along the project site. These public street improvements will satisfy water quality requirements by meeting the "green street" standards. In pursuing a green street approach, the project will be exempt from Priority Development Project (PDP) designation, per PDP Exemption Category 2 as stated in Appendix J of the City of San Diego's 2018 *Storm Water Standards*.

The street improvements will follow the City of San Diego *Storm Water Standards* to satisfy the following storm water requirements:

- Conform to the green streets approach as outlined in Appendix J.2 of the City of San Diego *Storm Water Standards,* and
- Qualify for a PDP exemption consistent with the requirements of the City of San Diego *Storm Water Standards*, and the 2013 MS4 Permit (Order No. R9-2013-0001, as amended by Order Nos. R9-2015- 0001 and R92015-0100)

More information pertaining to the storm water requirements at federal, regional, and municipal levels are provided next.

<u>Federal Requirements</u>

The project is subject to National Pollutant Discharge Elimination System (NPDES) requirements. NPDES requirements are contained in Section 402(p) of the Federal Clean Water Act, which established a framework for regulating storm water discharges from municipal, industrial, and construction activities. These requirements are implemented through permits issued by the State Water Resources Control Board (SWRCB), the local Regional Water Quality Control Board, and/or the governing municipality in which the project is located. The project is located in the City of San Diego, within the jurisdiction of the California Regional Water Quality Control Board for the San Diego Region – Region 9 (herein referred to as the "SDRWQCB"), and as such is subject to the Municipal Separate Storm Sewer System (MS4) requirements stipulated by the Regional Water Quality Control Board.

<u>Regional Requirements</u>

In January 2007, the SDRWQCB reissued the Municipal Storm Water NPDES permit (Order R9-2007-0001) to San Diego area municipal Committees (hereafter referred to as "2007 MS4 Permit"). The reissued permit identifies storm water requirements for new developments and redevelopments. The 2007 MS4 Permit was subsequently superseded by a new Municipal Permit that was adopted by the SDRWQCB on May 8, 2013 (Order No. R9-2013-0001) and was amended by adoption of Order No. R9-2015-0001 on February 11, 2015, and as amended by adoption of Order No. R9-2015-0100 on November 18, 2015 (hereafter referred to as "2013 MS4 Permit") and went into effect February 16, 2016.

It has been recognized by the SDRWQCB that structural best management plan (BMP) implementation for pollutant control purposes will not always be feasible for these projects. The following excerpt taken from Provision E.3.b.(3) of the 2013 MS4 Permit is applicable for this project:

(3) <u>Priority Development Project Exemptions</u>

Each Committee has the discretion to exempt the following projects from being defined as Priority Development Projects:

(a) New or retrofit paved sidewalks, bicycle lanes, or trails that meet the following Criteria:

(i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable area; OR
(ii) Designed and constructed to be hydraulically disconnected from paved streets or roads; OR
(iii) Designed and constructed with permeable pavements or surfaces in accordance with USEPA Green Streets guidance.

(b) Retrofitting of redevelopment of existing paved alleys, streets or roads that are designed and constructed in accordance with the USEPA Green Streets guidance.

The 2013 MS4 Permit will encourage the retrofit of those types of projects mentioned in the provision by incorporating elements from the guidance document titled, "Managing Wet Weather with Green Infrastructure – Municipal Handbook: Green Streets," (herein referred to as the "Green Streets Municipal Handbook") by USEPA, dated 2008.

The Green Streets Municipal Handbook was published to provide planners and engineers with resources regarding green streets elements, and effective implementation strategies. The Green Streets Municipal Handbook describes successful green street strategies implemented at the national level and provides the groundwork for planners and engineers to consider alternative strategies for storm water management. This document is cited as a resource in the 2013 MS4 Permit, and the City of San Diego *Storm Water Standards*.

<u>Municipality Requirements</u>

The City of San Diego published the January 2016, *Storm Water Standards,* to provide technical guidance for storm water management strategies and BMP design in conformance with the requirements stipulated by the 2013 MS4 Permit.

Appendix J.2 of the Storm Water Standards contains technical guidance for "PDP Exemption Category 2" regarding the use of green street strategies outlined in the USEPA Green Streets Municipal Handbook. PDP Exemption Category 2 is defined as an exemption for projects that are "retrofitting or redevelopment of existing paved alleys, streets or roads that meet certain criteria (Refer to Appendix J.2)." The suite of green street elements provided in Appendix J.2 of the *Storm Water Standards* are reflective of the strategies presented in the Green Streets Municipal Handbook and thus are consistent with Provision E.3.b.(3).(b) of the 2013 MS4 Permit.

Green Street Elements

The project proposes widening of Otay Mesa Road and La Media Road along the site. New curb, gutter, and sidewalk will also be installed. A landscape buffer will be provided between the curb and sidewalk.

The project will use the following green street elements from *Storm Water Standards* Appendix J.2:

- Vegetated Swales – the landscape buffers can contain vegetated swales.
- Sidewalk Planters – the landscape buffers can contain sidewalk planters.
- Permeable Surfaces – the landscape buffers be permeable surfaces.

These elements will be incorporated along the entire landscape buffer areas within the public right-of-way. The project's maintenance company will be responsible for ongoing maintenance of the landscape buffers. Since the project proposes a retail center, maintenance of these areas can be readily included in the overall site maintenance. As this project is exempt from PDP requirements, green streets elements are not considered BMPs, thus tracking of greens streets elements will not be required by the SDRWQCB. However, maintenance activities are necessary to ensure BMP's are functioning as designed and will provide storm water quality control (or management) prior to discharging to the MS4. See attached form.

Worksheet B.2-1: DCV

Design Capture Volume		Worksheet B.2-1		
1	85^{th} percentile 24-hr storm depth from Figure B.1-1	d=		inches
2	Area tributary to BMP (s)	A=		acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=		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=		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=		cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=		cubic-feet

See attached sheets and DMA Plan for DCV at each biofiltration basin based on this worksheet.

Worksheet B.5-1: Sizing Method for Pollutant Removal Criteria

See attached sheets and DMA Exhibit for sizing of each biofiltration basin using this worksheet.

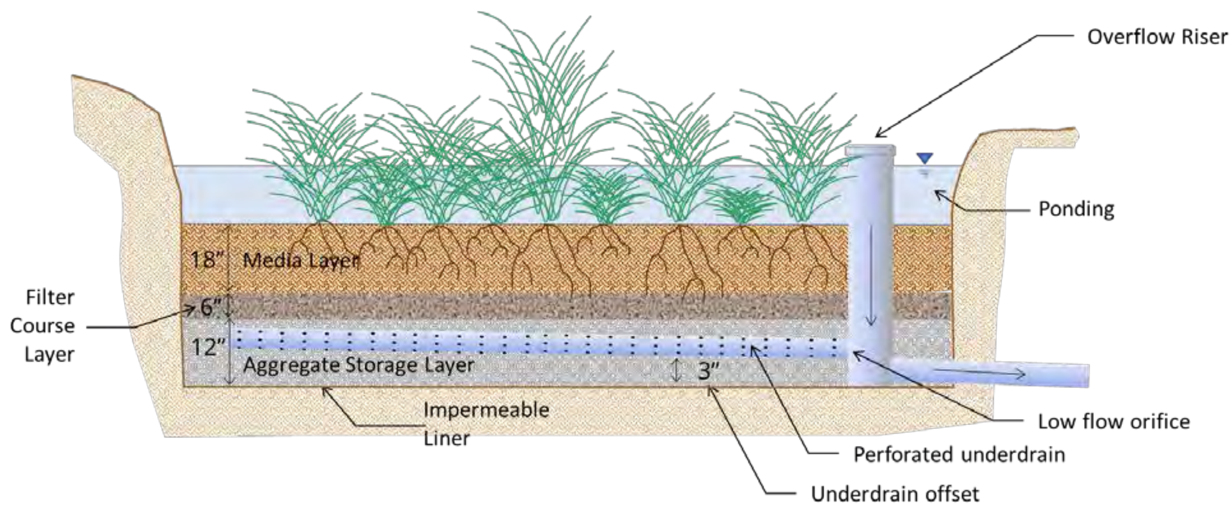
	Sizing Method for Pollutant Removal Criteria	Worksheet B.5-1	
1	Area draining to the BMP		sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		
3	85th percentile 24-hour rainfall depth		inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]		cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]		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		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		inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area		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.)		in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]		inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]		inches
15	Total Depth Treated [Line 13 + Line 14]		inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]		cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12		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]		cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12		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)		
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]		sq. ft.
22	Footprint of the BMP = Maximum (Minimum (Line 17, Line 19), Line 21)		sq. ft.
23	Provided BMP Footprint		sq. ft.
24	Is Line 23 ≥ Line 22? If Yes, then footprint criterion is met. If No, increase the footprint of the BMP.	☐ Yes	☐ No

G.2.4 Sizing Factors for Biofiltration

Table G.2-5 presents sizing factors for calculating the required surface area (A) for a biofiltration BMP (formerly known as flow-through planter and/or biofiltration BMP with impermeable liner). The BMPs consist of four layers:

- **Ponding layer**: 12-inches active storage, [minimum] 2-inches of freeboard above overflow relief
- **Growing medium**: 18-inches of soil [bioretention soil media]
- **Filter Course**: 6-inches
- **Storage layer**: 12-inches of gravel at 40 percent porosity. The underdrain offset shall be 3-inches.
- **Overflow structure:** San Diego Regional Standard Drawing Type I Catch Basin (D-29). For the purposes of hydromodification flow control other type of overflow structures are allowed.

This BMP includes an impermeable liner to prevent infiltration into underlying soils.



Biofiltration BMP Example Illustration

How to use the sizing factors for flow control BMP Sizing:

Obtain sizing factors from Table G.2-5 based on the project's lower flow threshold fraction of Q_2, hydrologic soil group, post-project slope, and rain gauge (rainfall basin). Multiply the area tributary to the structural BMP (A, square feet) by the area weighted runoff factor (C, unitless) (see Table G.2-1) by the sizing factors to determine the required surface area (A, square feet). Select a low flow orifice for the underdrain that will discharge the lower flow threshold flow at the overflow riser elevation. The civil engineer shall provide the necessary surface area of the BMP and the underdrain and orifice detail on the plans.

Additional steps to use this BMP as a combined pollutant control and flow control BMP:

The BMP sized using the sizing factors in Table G.2-5 meets both pollutant control and flow control requirements except for surface drawdown requirements. Applicant must perform surface drawdown calculations and if needed develop a vector management plan (Refer to Section 6.3.7) or revise the BMP design to meet the drawdown requirements. If changes are made to the BMP design applicants must perform site specific continuous simulation modeling (Refer to Appendix G).

Table G.2-5: Sizing Factors for Hydromodification Flow Control Biofiltration BMPs Designed Using Sizing Factor Method

Lower Flow Threshold	Soil Group	Slope	Rain Gauge	A
$0.1Q_2$	A	Flat	Lindbergh	0.320
$0.1Q_2$	A	Moderate	Lindbergh	0.300
$0.1Q_2$	A	Steep	Lindbergh	0.285
$0.1Q_2$	B	Flat	Lindbergh	0.105
$0.1Q_2$	B	Moderate	Lindbergh	0.100
$0.1Q_2$	B	Steep	Lindbergh	0.095
$0.1Q_2$	C	Flat	Lindbergh	0.055
$0.1Q_2$	C	Moderate	Lindbergh	0.050
$0.1Q_2$	C	Steep	Lindbergh	0.050
$0.1Q_2$	D	Flat	Lindbergh	0.050
$0.1Q_2$	D	Moderate	Lindbergh	0.050
$0.1Q_2$	D	Steep	Lindbergh	0.050
$0.1Q_2$	A	Flat	Oceanside	0.150
$0.1Q_2$	A	Moderate	Oceanside	0.140
$0.1Q_2$	A	Steep	Oceanside	0.135
$0.1Q_2$	B	Flat	Oceanside	0.085
$0.1Q_2$	B	Moderate	Oceanside	0.085
$0.1Q_2$	B	Steep	Oceanside	0.085
$0.1Q_2$	C	Flat	Oceanside	0.075
$0.1Q_2$	C	Moderate	Oceanside	0.075
$0.1Q_2$	C	Steep	Oceanside	0.075
$0.1Q_2$	D	Flat	Oceanside	0.070
$0.1Q_2$	D	Moderate	Oceanside	0.070
$0.1Q_2$	D	Steep	Oceanside	0.070
$0.1Q_2$	A	Flat	L Wohlford	0.285
$0.1Q_2$	A	Moderate	L Wohlford	0.275

BIOFILTRATION BASIN SIZING FOR POLLUTANT CONTROL

Design Capture Volume (Worksheet B.2-1. DCV, cf)

Biofiltration Basin 1		Biofiltration Basin 2		Biofiltration Basin 3	
85th %, in	0.46	85th %, in	0.46	85th %, in	0.46
Area, ac	1.88	Area, ac	2.78	Area, ac	1.71
C	0.58	C	0.75	C	0.75
DCV, cf	1,811	DCV, cf	3,459	DCV, cf	2,142
Landscaping, sf	32,892	Landscaping, sf	23,303	Landscaping, sf	14,049
Imperv., Porous Pvmnt., sf	48,825	Imperv., Porous Pvmnt., sf	97,676	Imperv., Porous Pvmnt., sf	60,528
Total, sf	81,717	Total, sf	120,979	Total, sf	74,577

Basin Sizing (Worksheet B.5-1)

Biofiltration Basin 1		Biofiltration Basin 2		Biofiltration Basin 3	
Row No. on Worksheet	**Value**	**Row No. on Worksheet**	**Value**	**Row No. on Worksheet**	**Value**
1	81,717	1	120,979	1	74,577
2	0.58	2	0.75	2	0.75
3	0.46	3	0.46	3	0.46
4	1,811	4	3,459	4	2,142
5	12	5	12	5	12
6	18	6	18	6	18
7	12	7	12	7	12
8	3	8	3	8	3
9	0.2	9	0.2	9	0.2
10	0.4	10	0.4	10	0.4
11	0	11	0	11	0
12	6	12	6	12	6
13	0	13	0	13	0
14	21.6	14	21.6	14	21.6
15	21.6	15	21.6	15	21.6
16	2,716	16	5,189	16	3,213
17	1,509	17	2,883	17	1,785
18	1,358	18	2,594	18	1,607
19	754	19	1,441	19	893
20	0.03	20	0.03	20	0.03
21	1,417	21	2,707	21	1,676
22	1,417	22	2,707	22	1,676
23	2,415	23	4,923	23	3,121
24	Yes	24	Yes	24	Yes

Note:
The C value for each biofiltration basin is determined by:

C = {(impervious/porous pavement area x 0.9) + (pervious area x 0.1)} / (total area)

BIOFILTRATION BASIN SIZING FOR POLLUTANT CONTROL

Design Capture Volume (Worksheet B.2-1. DCV, cf)

Biofiltration Basin 4		Biofiltration Basin 5		Biofiltration Basin 6	
85th %, in	0.46	85th %, in	0.46	85th %, in	0.46
Area, ac	0.29	Area, ac	0.22	Area, ac	6.71
C	0.49	C	0.63	C	0.69
DCV, cf	237	DCV, cf	230	DCV, cf	7,749
Landscaping, sf	6,508	Landscaping, sf	3,259	Landscaping, sf	76,337
Imperv., Porous Pvmnt., sf	6,134	Imperv., Porous Pvmnt., sf	6,312	Imperv., Porous Pvmnt., sf	216,125
Total, sf	12,642	Total, sf	9,571	Total, sf	292,462

Basin Sizing (Worksheet B.5-1)

Biofiltration Basin 4		Biofiltration Basin 5		Biofiltration Basin 6	
Row No. on Worksheet	**Value**	**Row No. on Worksheet**	**Value**	**Row No. on Worksheet**	**Value**
1	12,642	1	9,571	1	292,462
2	0.49	2	0.63	2	0.69
3	0.46	3	0.46	3	0.46
4	237	4	230	4	7,749
5	12	5	12	5	12
6	18	6	18	6	18
7	12	7	12	7	12
8	3	8	3	8	3
9	0.2	9	0.2	9	0.2
10	0.4	10	0.4	10	0.4
11	0	11	0	11	0
12	6	12	6	12	6
13	0	13	0	13	0
14	21.6	14	21.6	14	21.6
15	21.6	15	21.6	15	21.6
16	355	16	345	16	11,623
17	197	17	192	17	6,457
18	177	18	173	18	5,812
19	99	19	96	19	3,229
20	0.03	20	0.03	20	0.03
21	185	21	180	21	6,064
22	185	22	180	22	6,064
23	298	23	318	23	10,878
24	Yes	24	Yes	24	Yes

BIOFILTRATION BASIN SIZING FOR POLLUTANT CONTROL

Design Capture Volume (Worksheet B.2-1. DCV, cf)

Biofiltration Basin 7		Biofiltration Basin 9		Biofiltration Basin 12	
85th %, in	0.46	85th %, in	0.46	85th %, in	0.46
Area, ac	1.58	Area, ac	1.14	Area, ac	0.26
C	0.69	C	0.55	C	0.66
DCV, cf	1,817	DCV, cf	1,050	DCV, cf	290

Landscaping, sf	18,397	Landscaping, sf	21,575	Landscaping, sf	3,449
Imperv., Porous Pvmnt., sf	50,625	Imperv., Porous Pvmnt., sf	28,041	Imperv., Porous Pvmnt., sf	8,028
Total, sf	69,022	Total, sf	49,616	Total, sf	11,477

Basin Sizing (Worksheet B.5-1)

Biofiltration Basin 7		Biofiltration Basin 9		Biofiltration Basin 12	
Row No. on Worksheet	**Value**	**Row No. on Worksheet**	**Value**	**Row No. on Worksheet**	**Value**
1	69,022	1	49,616	1	11,477
2	0.69	2	0.55	2	0.66
3	0.46	3	0.46	3	0.46
4	1,817	4	1,050	4	290
5	12	5	12	5	12
6	18	6	18	6	18
7	12	7	12	7	12
8	3	8	3	8	3
9	0.2	9	0.2	9	0.2
10	0.4	10	0.4	10	0.4
11	0	11	0	11	0
12	6	12	6	12	6
13	0	13	0	13	0
14	21.6	14	21.6	14	21.6
15	21.6	15	21.6	15	21.6
16	2,726	16	1,575	16	435
17	1,514	17	875	17	242
18	1,363	18	788	18	218
19	757	19	438	19	121
20	0.03	20	0.03	20	0.03
21	1,422	21	822	21	227
22	1,422	22	822	22	227
23	2,623	23	1,408	23	352
24	Yes	24	Yes	24	Yes

BIOFILTRATION BASIN SIZING FOR POLLUTANT CONTROL

Design Capture Volume (Worksheet B.2-1. DCV, cf)

Biofiltration Basin 13

85th %, in	0.46
Area, ac	0.70
C	0.70
DCV, cf	816

Landscaping, sf	7,510
Imperv., Porous Pvmnt., sf	22,818
Total, sf	30,328

Basin Sizing (Worksheet B.5-1)

Biofiltration Basin 13

Row No. on Worksheet	Value
1	30,328
2	0.70
3	0.46
4	816
5	12
6	18
7	12
8	3
9	0.2
10	0.4
11	0
12	6
13	0
14	21.6
15	21.6
16	1,224
17	680
18	612
19	340
20	0.03
21	639
22	639
23	1,035
24	Yes

BMP Applicability and Selection for Green Street Exemption				Form J-1
Project Identification				
Project Name: Plaza La Media - North				
Permit Application Number: PTS No. 334235				Date: February 28, 2019
Project Characterization and Selection Synopsis				
The purpose of this form is to guide the selection of BMPs, given project specific constraints to meet the Green Streets exemption as defined in Appendix J.2 of the BMP Design Manual. In order to qualify for a PDP exemption, the project must incorporate all applicable Green Street BMP elements described in Appendix J.2, based on the applicability guidance provided in Appendix J.2. Complete the sections below providing detailed justification for each selection.				
Step 1: Does this project include retrofitting or redevelopment of an existing alley, street, or roadway criteria? Exemptions do not apply for projects that construct new alleys, streets, or roadways. See Appendix J for additional guidance on distinguishing between redevelopment of a street and new development. ☒ Yes ☐ No (if No is selected, the Green Street exemption is not applicable)				
Provide a brief overview of the project, key details, and site-specific opportunities and constraints: Project will widen the existing Otay Mesa Road and La Media Road along the site along with new curb, gutter, and sidewalk. A landscape buffer will be constructed between the curb and sidewalk, which allows green street elements to be used.				
Step 2: Complete the BMP-specific applicability checklists on the following pages and attach them to this form. Complete forms for all BMPs, including those that were used and those that were not used.				
Step 3: Summarize the BMP(s) that were selected through the guidance process (Select all that apply):				
BMP Type	Applicable?	Used?	Summary of justification for Inclusion or Finding of Non-applicability	
Vegetated Swales	☒	☒	Will use in landscape buffer.	
Sidewalk Planters	☒	☒	Will use in landscape buffer.	
Curb Extensions	☐	☐	Not feasible in collector streets.	
Permeable Surfaces	☒	☒	Will use in landscape buffer.	
Green Gutters	☐	☐	Not feasible in collector streets.	
Rain Gardens	☐	☐	Not feasible in public right-of-way.	
Trees	☒	☒	Will use in landscape buffer.	
Other__________	☐	☐	N/A.	

Form J-1 Page 2 of 8: Vegetated Swale			
Brief Description: Vegetated Swales are shallow, open channels that are designed to remove storm water pollutants by physically straining/filtering runoff through vegetation in the channel.			
Site Type (Check all that apply):	Street Type	Rating[26]	Present in Project?
	Residential Streets	⦿	☐
	Commercial Street/ Business District	○	☒
	Collector Street	⦿	☒
	Arterial and Boulevard	⦿	☐
	Alleys	○	☐
	Parking Areas	⦿	☐
Key Opportunities for Vegetated Swales (Check all that apply):	Parkway strips		☒
	Medians		☒
	Long, mostly continuous space		☒
	Other (must justify below)		☐
Site-Specific Factors (Check all that apply):	Favorable Conditions for Vegetated Swales		
	Slope > 1% and <3%		☒
	Conveying run-on to a site		☐
	Infiltration is partially feasible or not feasible		☒
	Long continuous segments available		☒
	More parkway width		☐
	Unfavorable Conditions for Vegetated Swales		
	Available width is < 8 feet		☒
	Frequent driveway interruption		☐
	ROW width too limited		☐
Summary of Findings:			
Were Vegetated Swales determined to be applicable as part of the Green Streets BMP plan? ☒ Yes ☐ No		If yes, were they used? ☐ Yes ☐ No	
Provide discussion/justifications for selections and decisions above: Swales can be incorporated in the long landscape buffers between the curbs and sidewalks.			

[26] ● High applicability within this category, however may still be limited by site-specific factors
⦿ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

Form J-1 Page 3 of 8: Sidewalk Planters

Brief Description: A planter imbedded in the sidewalk designed to manage storm water runoff from the adjacent roadway and sidewalk.

Site Type (Check all that apply):	Street Type	Rating[27]	Present in Project?
	Residential Streets	◉	☐
	Commercial Street/ Business District	◉	☒
	Collector Street	●	☒
	Arterial and Boulevard	●	☐
	Alleys	○	☐
	Parking Areas	◉	☐
Key Opportunities for Sidewalk Planters (Check all that apply):	Parkway strips		☒
	Medians		☒
	Between driveways		☐
	Other (must justify below)		☐
Site-Specific Factors (Check all that apply):	Favorable Conditions for Sidewalk Planters		
	Slope <4%		☒
	Wide sidewalks		☐
	More parkway width		☐
	Unfavorable Conditions for Sidewalk Planters		
	Conflicts with car egress		☐
	ROW width too limited		☐

Summary of Findings:

Were Sidewalk Planters determined to be applicable as part of the Green Streets BMP plan?	If yes, were they used?
☒ Yes ☐ No	☒ Yes ☐ No

Provide discussion/justifications for selections and decisions above:

Planters can be incorporated in the linear landscape buffers between the curbs and sidewalks.

[27] ● High applicability within this category, however may still be limited by site-specific factors
◉ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

<table>
<tr><th colspan="4">Form J-1 Page 4 of 8: Curb Extensions</th></tr>
<tr><td colspan="4"><u>Brief Description</u>: Curb extensions expand the edge of the sidewalk into the roadway or parking area and allow storm water runoff to collect and infiltrate through a detention area of porous media.</td></tr>
<tr><td rowspan="7">Site Type (Check all that apply):</td><td>Street Type</td><td>Rating[28]</td><td>Present in Project?</td></tr>
<tr><td>Residential Streets</td><td>●</td><td>☐</td></tr>
<tr><td>Commercial Street/ Business District</td><td>●</td><td>☒</td></tr>
<tr><td>Collector Street</td><td>⦿</td><td>☒</td></tr>
<tr><td>Arterial and Boulevard</td><td>⦿</td><td>☐</td></tr>
<tr><td>Alleys</td><td>○</td><td>☐</td></tr>
<tr><td>Parking Areas</td><td>⦿</td><td>☐</td></tr>
<tr><td rowspan="3">Key Opportunities for Curb Extensions (Check all that apply):</td><td colspan="2">Intersections</td><td>☐</td></tr>
<tr><td colspan="2">Parking area</td><td>☐</td></tr>
<tr><td colspan="2">Other (must justify below)</td><td>☐</td></tr>
<tr><td rowspan="6">Site-Specific Factors (Check all that apply):</td><td colspan="3">Favorable Conditions for Curb Extensions</td></tr>
<tr><td colspan="2">Slope <4%</td><td>☒</td></tr>
<tr><td colspan="2">Traffic calming needed</td><td>☐</td></tr>
<tr><td colspan="3">Unfavorable Conditions for Curb Extensions</td></tr>
<tr><td colspan="2">Conflicts with bike lanes</td><td>☒</td></tr>
<tr><td colspan="2">Site distance issues at intersection</td><td>☒</td></tr>
<tr><td colspan="4">Summary of Findings:</td></tr>
<tr><td colspan="2">Were Curb Extensions determined to be applicable as part of the Green Streets BMP plan?
☐ Yes ☒ No</td><td colspan="2">If yes, were they used?
☐ Yes ☐ No</td></tr>
<tr><td colspan="4">Provide discussion/justifications for selections and decisions above:

These are not feasible because they would interfere with traffic on the adjacent collector streets.</td></tr>
</table>

[28] ● High applicability within this category, however may still be limited by site-specific factors

⦿ Generally applicable in this category; largely dependent on site-specific factors

○ Limited applicability within this category; may still be applicable in some cases; should be considered

Form J-1 Page 5 of 8: Permeable Surfaces			
Brief Description: Permeable surfaces are pavement that allows for percolation through void spaces into subsurface layers.			
Site Type (Check all that apply):	Street Type	Rating[29]	Present in Project?
	Residential Streets	●	☐
	Commercial Street/ Business District	●	☒
	Collector Street	⦿	☒
	Arterial and Boulevard	⦿	☐
	Alleys	●	☐
	Parking Areas	⦿	☐
Key Opportunities for Permeable Surfaces (Check all that apply):	Sidewalks		☐
	Parking strips		☐
	Shoulders		☐
	Low traffic roadways		☐
	Other (must justify below)		☒
Site-Specific Factors (Check all that apply):	Favorable Conditions for Permeable Surfaces		
	Slope < 2-3%		☒
	Conveying limited run-on to a site		☒
	Low traffic area		☒
	Unfavorable Conditions for Permeable Surfaces		
	High traffic area		☐
	Run-on has high sediment load		☐
Summary of Findings:			
Were Permeable Surfaces determined to be applicable as part of the Green Streets BMP plan? ☒ Yes ☐ No	If yes, were they used? ☒ Yes ☐ No		
Provide discussion/justifications for selections and decisions above: Per meeting with City staff, the landscape buffers can be considered as permeable surfaces.			

[29] ● High applicability within this category, however may still be limited by site-specific factors
⦿ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

Form J-1 Page 6 of 8: Green Gutters			
Brief Description: Green Gutters are shallow and narrow strips of landscaping in a typical curb and gutter location with a lower elevation than the street gutter elevation to allow capture of storm water from the sidewalk and street.			
Site Type (Check all that apply):	Street Type	Rating[30]	Present in Project?
	Residential Streets	○	☐
	Commercial Street/ Business District	◉	☒
	Collector Street	●	☒
	Arterial and Boulevard	●	☐
	Alleys	◉	☐
	Parking Areas	○	☐
Key Opportunities for Green Gutters (Check all that apply):	Parkway strips		☐
	Medians		☐
	Long, mostly continuous space		☐
	Other (must justify below)		☐
Site-Specific Factors (Check all that apply):	Favorable Conditions for Green Gutters		
	Slope > 1% and <3%		☒
	Conveying run-on to a site		☐
	Infiltration is partially feasible or not feasible		☐
	Long continuous segments available		☒
	Narrower spaces (as little as 2 to 3 feet)		☐
	Unfavorable Conditions for Green Gutters		
	Frequent driveway interruption		☐
	ROW width too limited		☐
Summary of Findings:			
Were Green Gutters determined to be applicable as part of the Green Streets BMP plan? ☐ Yes ☒ No	If yes, were they used? ☐ Yes ☐ No		
Provide discussion/justifications for selections and decisions above: Not practicable in public gutter of collector streets.			

[30] ● High applicability within this category, however may still be limited by site-specific factors
◉ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

Form J-1 Page 7 of 8: Rain Gardens			
Brief Description: Rain Gardens are shallow detention basins with vegetation that temporarily store water to allow for infiltration of the stored volume. Rain Gardens could be a bioretention or a biofiltration with partial retention or a biofiltration BMP.			
Site Type (Check all that apply):	Street Type	Rating[31]	Present in Project?
	Residential Streets	◉	☐
	Commercial Street/ Business District	◉	☒
	Collector Street	◉	☒
	Arterial and Boulevard	◉	☐
	Alleys	○	☐
	Parking Areas	●	☐
Key Opportunities for Rain Gardens (Check all that apply):	Irregularly shaped areas in ROW		☐
	Broad and flat areas		☐
	Other (must justify below)		☐
Site-Specific Factors (Check all that apply):	Favorable Conditions for Rain Gardens		
	Slope <2%		☒
	Infiltration is partially feasible or not feasible		☒
	Large area available		
	Unfavorable Conditions for Rain Gardens		
	Slope > 2%		☐
	ROW too limited		☒
Summary of Findings:			
Were Rain Gardens determined to be applicable as part of the Green Streets BMP plan? ☐ Yes ☒ No	If yes, were they used? ☐ Yes ☐ No		
Provide discussion/justifications for selections and decisions above: Not practical given right-of-way constraints.			

[31] ● High applicability within this category, however may still be limited by site-specific factors
◉ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

Form J-1 Page 8 of 8: Trees			
Brief Description: Trees planted in the sidewalk right-of-way provide rainfall interception and infiltration benefits and typically supplements other storm water management tools.			
Site Type (Check all that apply):	Street Type	Rating[32]	Present in Project?
	Residential Streets	●	☐
	Commercial Street/ Business District	⦿	☒
	Collector Street	⦿	☒
	Arterial and Boulevard	⦿	☐
	Alleys	⦿	☐
	Parking Areas	●	☐
Key Opportunities for Trees (Check all that apply):	Parkway strips		☒
	Medians		☒
	Irregularly shaped areas		☐
	Extra ROW on back side of sidewalk		☐
	Other (must justify below)		☐
Site-Specific Factors (Check all that apply):	Favorable Conditions for Trees		
	Located outside of clear zone		☒
	Infiltration is feasible		☒
	ROW not limiting		
	Unfavorable Conditions for Trees		
	Limited space for root growth		☐
	Clear zone issues		☐
Summary of Findings:			
Were Trees determined to be applicable as part of the Green Streets BMP plan? ☒ Yes ☐ No	If yes, were they used? ☒ Yes ☐ No		
Provide discussion/justifications for selections and decisions above: Trees can be incorporated in the linear landscape buffers between the curbs and sidewalks.			

[32] ● High applicability within this category, however may still be limited by site-specific factors
⦿ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

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.

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Project Name: Plaza La Media - North

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: Plaza La Media - North

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

The Hydromodification Management Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ 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
- ☑ Existing topography
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ 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)
- ☑ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).

Attachment 2a is included in
map pocket at back of report.

Attachment 2b

The CCSYA at the northwest corner of the site is in an area that has been disturbed for the Caltrans box culvert construction. Therefore, a naturally occurring CCSYA does not exist as mapped. In addition, the City Storm Water Section verified that the CCSYA shown is considered an erroneous mapping issue, so no further evaluation of CCSYA is needed.

Attachment 2c

A geomorphic assessment was performed for the prior preliminary SWQMP submittals. The current preliminary SWQMP submittal is based on the 2018 *BMP Design Manual* update with new lower sizing factors for $0.1Q_2$. As a result, the assessment is not included in this SWQMP. It can be included again during final engineering, if needed.

Attachment 2d

FLOW CONTROL FACILITY DESIGN AND STRUCTURAL BMP DRAWDOWN CALCULATIONS

The biofiltration basin sizing must meet both the pollutant control (from Attachment 1e) and hydromodification sizing requirements, i.e., it must be designed for the larger of the two sizing results. Hydromodification sizing was performed using the County of San Diego's BMP Sizing Spreadsheet (attached). The DMA Plan shows ten biofiltration basins. The project is in the Lindbergh rain gauge, Soil Group D (see attached Geocon letter). The BMP Sizing Spreadsheet (version 3 based on the 2018 *BMP Design Manual*) results are attached. Comparison of the pollutant control and hydromodification results for each biofiltration basin reveals that hydromodification sizing governs in all cases. The sizes on the plans meet or exceed the hydromodification requirements.

BMP Sizing Spreadsheet V3.0

Project Name:	Plaza La Media - North
Project Applicant:	La Media & Airway, LLC
Jurisdiction:	City of San Diego
Parcel (APN):	646-121-34
Hydrologic Unit:	Tijuana
Rain Gauge:	Lindbergh
Total Project Area (sf):	750,862
Channel Susceptibility:	High

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 1	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	44,589	D	Flat	Roofs	1.0	0.05	2229
Pervious	32,892	D	Flat	Pervious Concrete	0.1	0.05	164
Porous Paving	4,236	D	Flat	Landscape	0.1	0.05	21
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	81,717					Minimum BMP Size	2415
						Proposed BMP Size*	2415

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

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

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

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

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

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 1	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	1.024	0.044	**0.63**
Pervious	Lindbergh	D	Flat	0.429	0.755	0.032	**0.46**
Porous Paving	Lindbergh	D	Flat	0.429	0.097	0.004	**0.06**

3.75	**0.080**	**1.15**	**1.21**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.075	**0.081**	**1.15**	**1.210**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	8.9

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 2	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	95,953	D	Flat	Roofs	1.0	0.05	4798
Pervious	23,303	D	Flat	Pervious Concrete	0.1	0.05	117
Porous Paving	1,723	D	Flat	Landscape	0.1	0.05	9
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	120,979					Minimum BMP Size	4923
						Proposed BMP Size*	4923

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 2	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	2.203	0.094	**1.35**
Pervious	Lindbergh	D	Flat	0.429	0.535	0.023	**0.33**
Porous Paving	Lindbergh	D	Flat	0.429	0.040	0.002	**0.02**

3.75	**0.119**	**1.70**	**1.47**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.111	**0.119**	**1.70**	**1.470**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	12.3

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 3	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	60,528	D	Flat	Roofs	1.0	0.05	3026
Pervious	14,049	D	Flat	Landscape	0.1	0.05	70
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	74,577					Minimum BMP Size	3097
						Proposed BMP Size*	3097

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 3	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	1.390	0.060	**0.85**
Pervious	Lindbergh	D	Flat	0.429	0.323	0.014	**0.20**

3.75	**0.073**	**1.05**	**1.15**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.068	**0.073**	**1.04**	**1.150**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	12.7

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 4	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	5,181	D	Flat	Roofs	1.0	0.05	259
Pervious	6,508	D	Flat	Pervious Concrete	0.1	0.05	33
Porous Paving	953	D	Flat	Landscape	0.1	0.05	5
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	12,642					Minimum BMP Size	296
						Proposed BMP Size*	296

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 4	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - %Q_2 (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	0.119	0.005	**0.07**
Pervious	Lindbergh	D	Flat	0.429	0.149	0.006	**0.09**
Porous Paving	Lindbergh	D	Flat	0.429	0.022	0.001	**0.01**

3.75	**0.012**	**0.18**	**0.48**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.012	**0.013**	**0.18**	**0.480**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	7.0

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 5	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	5,774	D	Flat	Roofs	1.0	0.05	289
Pervious	3,259	D	Flat	Pervious Concrete	0.1	0.05	16
Porous Paving	538	D	Flat	Landscape	0.1	0.05	3
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	9,571					Minimum BMP Size	308
						Proposed BMP Size*	308

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 5	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	0.133	0.006	**0.08**
Pervious	Lindbergh	D	Flat	0.429	0.075	0.003	**0.05**
Porous Paving	Lindbergh	D	Flat	0.429	0.012	0.001	**0.01**

3.75	**0.009**	**0.13**	**0.41**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.009	**0.009**	**0.13**	**0.410**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	9.9

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 6	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	209,304	D	Flat	Roofs	1.0	0.05	10465
Pervious	76,337	D	Flat	Pervious Concrete	0.1	0.05	382
Porous Paving	6,821	D	Flat	Landscape	0.1	0.05	34
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	292,462					Minimum BMP Size	10881
						Proposed BMP Size*	10881

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 6	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - %Q_2 (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	4.805	0.206	**2.94**
Pervious	Lindbergh	D	Flat	0.429	1.752	0.075	**1.07**
Porous Paving	Lindbergh	D	Flat	0.429	0.157	0.007	**0.10**

3.75	**0.288**	**4.11**	**2.29**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.269	**0.289**	**4.12**	**2.290**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	11.2

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 7	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	50,625	D	Flat	Roofs	1.0	0.05	2531
Pervious	18,397	D	Flat	Landscape	0.1	0.05	92
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	69,022					Minimum BMP Size	2623
						Proposed BMP Size*	2623

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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

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

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

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 7	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	1.162	0.050	**0.71**
Pervious	Lindbergh	D	Flat	0.429	0.422	0.018	**0.26**

3.75	**0.068**	**0.97**	**1.11**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.063	**0.068**	**0.97**	**1.110**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	11.5

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 9	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	28,041	D	Flat	Roofs	1.0	0.05	1402
Pervious	21,575	D	Flat	Landscape	0.1	0.05	108
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	49,616					Minimum BMP Size	1510
						Proposed BMP Size*	1510

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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

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Designated Staff have final review and approval authority over the project design.

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 9	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	0.644	0.028	**0.39**
Pervious	Lindbergh	D	Flat	0.429	0.495	0.021	**0.30**

3.75	**0.049**	**0.70**	**0.94**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.045	**0.049**	**0.69**	**0.940**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	9.3

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 12	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	6,544	D	Flat	Roofs	1.0	0.05	327
Pervious	3,449	D	Flat	Pervious Concrete	0.1	0.05	17
Porous Paving	1,484	D	Flat	Landscape	0.1	0.05	7
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	11,477					Minimum BMP Size	352
						Proposed BMP Size*	352

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 12	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	0.150	0.006	**0.09**
Pervious	Lindbergh	D	Flat	0.429	0.079	0.003	**0.05**
Porous Paving	Lindbergh	D	Flat	0.429	0.034	0.001	**0.02**

3.75	**0.011**	**0.16**	**0.45**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.010	**0.011**	**0.16**	**0.450**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	9.4

BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 13	BMP Type:	Biofiltration
BMP Native Soil Type:	N/A - Impervious Liner	BMP Infiltration Rate (in/hr):	N/A

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
Impervious	20,632	D	Flat	Roofs	1.0	0.05	1032
Pervious	7,510	D	Flat	Pervious Concrete	0.1	0.05	38
Porous Paving	2,186	D	Flat	Landscape	0.1	0.05	11
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	30,328					Minimum BMP Size	1080
						Proposed BMP Size*	1080

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

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

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

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
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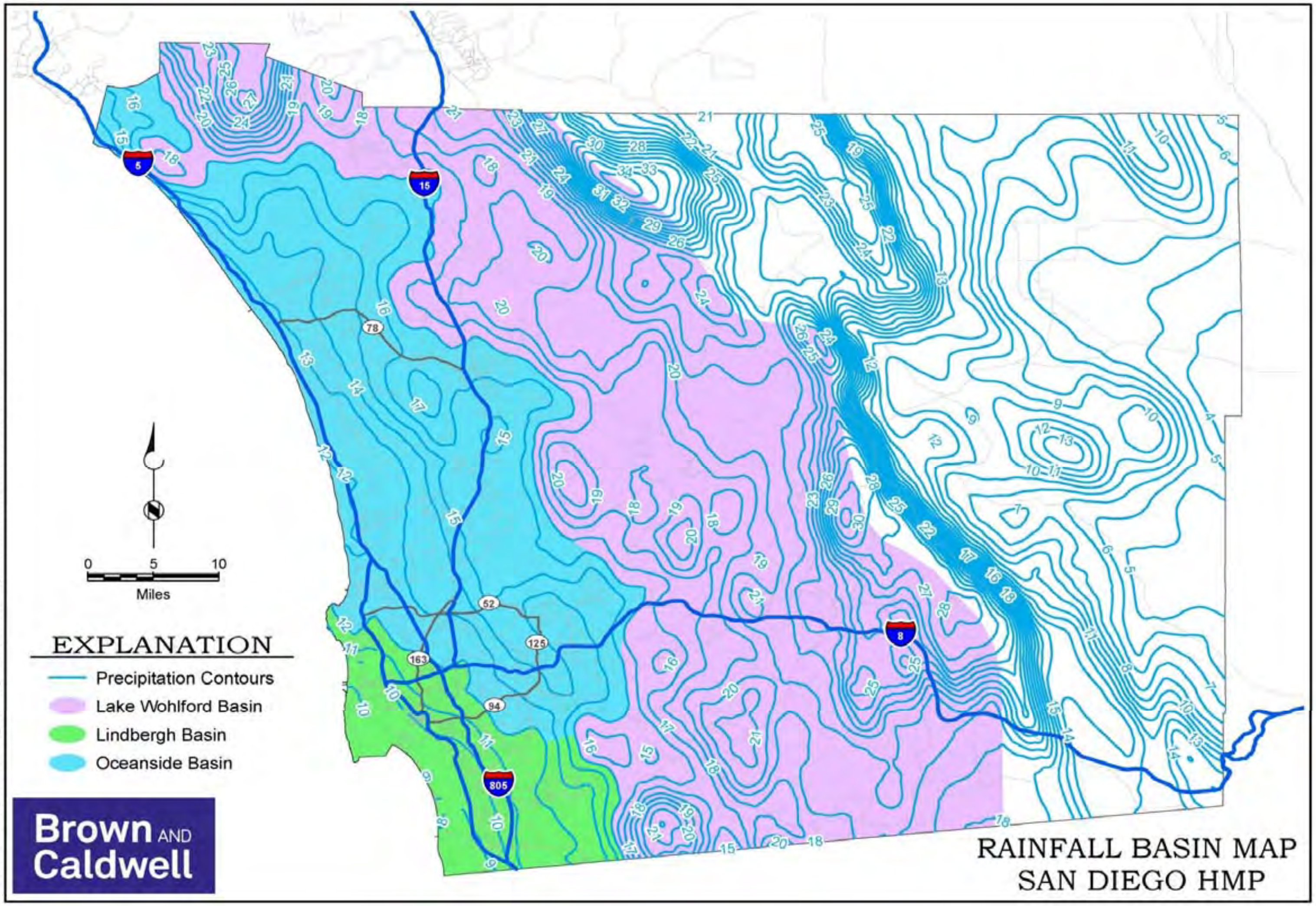
BMP Sizing Spreadsheet V3.0			
Project Name:	Plaza La Media - North	Hydrologic Unit:	Tijuana
Project Applicant:	La Media & Airway, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	750,862
Parcel (APN):	646-121-34	Low Flow Threshold:	0.1Q2
BMP Name	BMP 13	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - %Q_2 (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Impervious	Lindbergh	D	Flat	0.429	0.474	0.020	**0.29**
Pervious	Lindbergh	D	Flat	0.429	0.172	0.007	**0.11**
Porous Paving	Lindbergh	D	Flat	0.429	0.050	0.002	**0.03**

3.75	**0.030**	**0.43**	**0.74**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.028	**0.030**	**0.43**	**0.740**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	10.7



File Name: P:\Projects\San Diego County\139942 - HMP Implementation Assistance\GIS\HMF GIS\Basins.mxd

0.1Q_2	C	Steep	6	Oceanside	0.07
0.1Q_2	D	Flat	3	Oceanside	0.07
0.1Q_2	D	Moderate	3	Oceanside	0.07
0.1Q_2	D	Steep	3	Oceanside	0.07
0.1Q_2	A	Flat	18	Lake Wohlford	0.11
0.1Q_2	A	Moderate	18	Lake Wohlford	0.11
0.1Q_2	A	Steep	18	Lake Wohlford	0.105
0.1Q_2	B	Flat	18	Lake Wohlford	0.09
0.1Q_2	B	Moderate	18	Lake Wohlford	0.085
0.1Q_2	B	Steep	18	Lake Wohlford	0.085
0.1Q_2	C	Flat	6	Lake Wohlford	0.065
0.1Q_2	C	Moderate	6	Lake Wohlford	0.065
0.1Q_2	C	Steep	6	Lake Wohlford	0.065
0.1Q_2	D	Flat	3	Lake Wohlford	0.06
0.1Q_2	D	Moderate	3	Lake Wohlford	0.06
0.1Q_2	D	Steep	3	Lake Wohlford	0.06

Table G.2-5: Sizing Factors for Hydromodification Flow Control Biofiltration BMPs Designed Using Sizing Factor Method

Lower Flow Threshold	Soil Group	Slope	Rain Gauge	A
0.1Q2	A	Flat	Lindbergh	0.32
0.1Q2	A	Moderate	Lindbergh	0.3
0.1Q2	A	Steep	Lindbergh	0.285
0.1Q2	B	Flat	Lindbergh	0.105
0.1Q2	B	Moderate	Lindbergh	0.1
0.1Q2	B	Steep	Lindbergh	0.095
0.1Q2	C	Flat	Lindbergh	0.055
0.1Q2	C	Moderate	Lindbergh	0.05
0.1Q2	C	Steep	Lindbergh	0.05
0.1Q2	D	Flat	Lindbergh	0.05
0.1Q2	D	Moderate	Lindbergh	0.05
0.1Q2	D	Steep	Lindbergh	0.05
0.1Q2	A	Flat	Oceanside	0.15
0.1Q2	A	Moderate	Oceanside	0.14
0.1Q2	A	Steep	Oceanside	0.135

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: Plaza La Media – North

Indicate which Items are Included:

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

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).

This is a Preliminary SWQMP. Attachment 3 will be provided in the Final SWQMP.

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: Plaza La Media - North

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)
- [ ] 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
- [ ] 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)
- [x] Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- [ ] Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- [ ] Recommended equipment to perform maintenance
- [ ] When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- [ ] Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- [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.

This is a Preliminary WQMP. The preliminary structural BMPs and above checked items are shown on the Vesting Tentative Map (see sheet C7 and C8 in the map pocket at the back of this report. The remaining checked items will be included on the final engineering plans.

Attachment 5
Drainage Report

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

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PRELIMINARY DRAINAGE REPORT
FOR
PLAZA LA MEDIA - NORTH

February 28, 2019

Wayne W. Chang, MS, PE 46548

Chang Consultants

Civil Engineering ◦ Hydrology ◦ Hydraulics ◦ Sedimentation

P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

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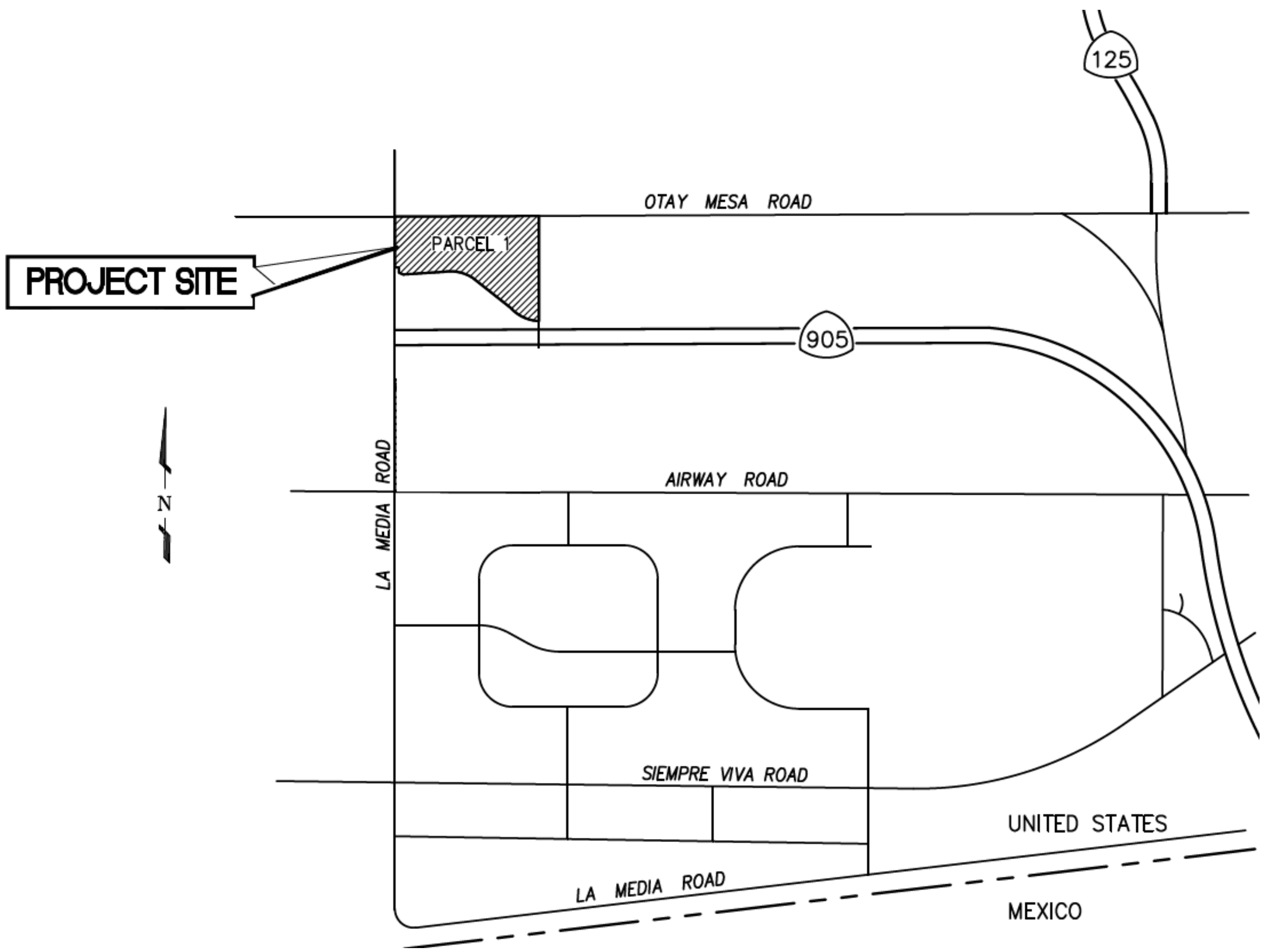
APPENDIX

MAP POCKET

INTRODUCTION

La Media & Airway, LLC an Arizona limited liability corporation is proposing to develop a 17.91-acre commercial site located southeast of the intersection of Otay Mesa Road and La Media Road in the city of San Diego (see the Vicinity Map). The site is bounded by Otay Mesa Road to the north, La Media Road to the west, Interstate 905 to the south, and an undeveloped Sunroad parcel to the east. The site is currently undeveloped, gently sloping, and supports natural low-lying vegetation. The potential commercial/retail tenants include major retail, small shops, a grocery store, drive-through restaurants, and a gas station. A parking lot will be constructed within the site.



Vicinity Map

Under existing conditions, the on-site storm runoff flows in two directions. The majority of the on-site runoff (combined with off-site runoff from the undeveloped area to the east) sheet flows in a southwest direction over the gently-sloping ground surface. The runoff is conveyed to a storm drain at the southwest corner of the site that connects to existing Caltrans box culverts along the westerly property boundary.

Storm runoff from a smaller on-site area along the northerly boundary is conveyed by a small natural swale to a storm drain at the northwest corner. The storm drain also connects to the existing Caltrans box culverts.

A portion of the existing runoff within the south half of Otay Mesa Road flows onto the site from small spillways along the roadway. This off-site runoff combines with the on-site runoff and is collected by the Caltrans box culverts.

After development, the overall existing condition on-site drainage patterns will be maintained by the project since the majority of the on-site and tributary off-site runoff will continue to be conveyed to the Caltrans culverts along the westerly project boundary. The project runoff will enter the Caltrans culverts through the existing storm drain near the southwest corner of the site as well as at two new connection points midway along the site. The on-site runoff will be collected and conveyed by proposed private drainage facilities (inlets, pipes, curb and gutter, parking lots, etc.). The runoff will be treated by a series of biofiltration basins before entering the Caltrans culverts.

Otay Mesa Road will be widened and improved with curb, gutter, and sidewalk along the site. The off-site runoff from the tributary portion of Otay Mesa Road will be conveyed by a proposed storm drain system in the street into the Caltrans culverts near the northwest corner of the site. The street improvements will meet the green street requirements.

There is a small area of project runoff along the easterly boundary that will be conveyed to the adjacent Sunroad site to the east. The runoff includes a portion of the project's access driveway that is on the Sunroad parcel. The project applicant has coordinated with Sunroad to identify an off-site treatment BMP for this runoff. As a result, the project proposes a temporary biofiltration basin on the adjacent undeveloped Sunroad site. Once the Sunroad site is developed, it will include a BMP to treat the small area of run-on from this project site.

Under existing conditions, storm runoff from the undeveloped Sunroad site sheet flows westerly onto the project site. This off-site area covers approximately 31.05 acres. The combined on- and off-site runoff enters the Caltrans culverts. After development, the off-site area runoff will be redirected to an existing culvert to the south. The project will detain the runoff to avoid impacting the culvert to the south. A temporary detention basin will be constructed on the adjacent Sunroad site. When the Sunroad site develops, it will replace the temporary basin will a permanent solution.

This preliminary drainage report has been prepared in support of Kettler Leweck Engineering’s grading and drainage plan for the project entitlement. This report provides hydrologic analyses in order to determine preliminary flow rates and demonstrate feasibility as well as compliance with drainage regulations.

HYDROLOGIC RESULTS

The overall proposed condition study area covers 20.94 acres, so the City of San Diego's 2017 *Drainage Design Manual's* rational method procedure was the basis for the existing and proposed condition hydrologic analyses. The *Manual* states that "the underground storm drain system shall be based upon a 50-year frequency storm," and "the combination of storm drain system capacity and overflow (streets and gutter) will be able to carry the 100-year frequency storm. . . ." Both 50- and 100-year analyses are included. The project's storm runoff flows into Mexico. The City requires 5-, 10-, 25-, and 50-year analyses to also be performed for projects in the Otay area that flow into Mexico.

The CivilDesign Rational Method Hydrology Program is based on the City criteria and was used for the analyses. The rational method input parameters are summarized below and the supporting data is included in Appendix A:

- Intensity-Duration-Frequency: The City's 100-year Intensity-Duration-Frequency curve from the *Drainage Design Manual* was used.

- Drainage area: The existing condition drainage basins were delineated from the 1-foot contour interval base topographic mapping prepared for the project, and the proposed condition drainage basins were delineated using Kettler Leweck Engineering's entitlement grading plan. The project's base mapping does not cover the off-site area along Otay Mesa Road east of the site. For this area, 1-foot contour interval mapping was obtained from the Sunroad project. The overall existing condition drainage basin boundary was set equal to the overall proposed condition boundary to allow a comparison of results. The drainage basin boundaries and grading are shown on the Rational Method Work Maps in the map pocket.

- Hydrologic soil groups: The soil group within the site is entirely 'D' according to City criteria.

- Runoff coefficients: Under existing conditions, the site is undeveloped, so a rural land use was assumed (C=0.45).

  The proposed condition on-site runoff coefficients were determined by delineating the pervious and impervious areas within the study area. The delineation is included in the accompanying SWQMP and shows that the overall impervious and pervious areas in the on-site study limits are 11.72 and 5.14 acres, respectively, i.e., the overall site is just under 70 percent impervious. For this impervious percentage, the formula given in Note 2 of Table A-1 from the *Drainage Design Manual* yields C=0.74. This C value was assigned to all of the proposed condition on-site drainage subareas for the entitlement-level analysis in this report. Furthermore, the proposed condition off-site street areas along Otay Mesa Road are mostly impervious, so these areas were assigned with an industrial land use.

- Flow lengths and elevations: The flow lengths and elevations were obtained from the topographic mapping and grading plan.

The 5- to 100-year rational method results are included in Appendix A and summarized in Table 1. The table provides the existing and proposed condition flow rates to the two receiving locations. The results show that the overall unmitigated runoff to the Caltrans culvert will decrease under all five storm events, and the overall study area runoff decreases as well. This occurs because the project will detain the 31.05 acres of off-site runoff from the east as discussed in the Introduction.

The project proposes a temporary detention basin on the adjacent Sunroad site to capture and slowly release storm runoff from the 31.05 acre off-site area. The basin has been sized to store the entire tributary 100-year storm volume. Storing the entire 100-year storm volume will essentially eliminate the outflow from the basin and avoid increasing the flow rate to the existing receiving storm drain to the south during all events between the 5- to 100-year. The 100-year flow volume at the basin is determined by multiplying the 100-year, 6-hour precipitation (2.5 inches) by the tributary area (31.05 acres) and runoff coefficient (0.45 for the primarily natural, undeveloped area). Based on these values, the volume is 126,800 cubic feet [$(2.5/12) \times (31.05 \times 43{,}560) \times 0.45 = 126{,}800$]. The temporary detention basin has been designed to store this entire volume as well as the small contribution from the on-site area. Therefore, the basin can mitigate for the 5-, 10-, 25-, 50-, and 100-year flows directed towards the southerly culvert.

CONCLUSION

This preliminary drainage report shows that the project flows are of a magnitude that can be conveyed by typical drainage facilities. The project will not increase the 100-year flow rate entering the Caltrans culverts because storm runoff from the off-site area to the east will be detained and directed to a southerly culvert. The temporary detention basin will mitigate the off-site area flows.

There is a minor amount of flow that will be discharged onto the Sunroad property east of the site. This flow will be treated by a temporary biofiltration basin and conveyed through the Sunroad site. The drainage facilities and BMP will be further coordinated with Sunroad during final engineering to verify the preferred location and method of the discharge and treatment as well as integration with Sunroad's ultimate development/timing of their site.

The slope of the project's proposed drainage system is governed by the existing Caltrans box culverts and the adjacent ground elevations. The Caltrans box culverts receive most of the project runoff and these are large facilities whose elevations cannot be changed. The existing topography at the site and surrounding area is very level and not much higher than the box culverts. These constraints require portions of the proposed storm drain systems to slope at less than 0.5 percent. For instance, the Caltrans culvert inverts and existing elevations along Otay Mesa Road allow a maximum pipe slope of 0.36 percent in the main line. Since the Caltrans culverts and Otay Mesa Road are existing major improvements, altering them is not practically feasible. Similarly, portions of the on-site storm drain are at 0.30 percent due to the Caltrans culverts and site grading constraints. Section 4.2.1 of the 2017 *Drainage Design Manual,* specifies a 0.5 percent minimum pipe gradient, but states that “flatter grades may be approved where no other practical solution is available.” This applies to the proposed pipe segments with slopes less than 0.5 percent.

An August 7, 1987 notice from the City of San Diego provides drainage requirements for Otay Mesa development projects (see attachment after this report text). The notice specifies that detention facilities shall be designed for the 5-, 10-, 25-, and 50-year storms. The project will not increase the flow rate to the Caltrans culverts, so detention is not required for these flows. On the other hand, the project will temporarily redirect the easterly off-site runoff. The conceptual detention volume analysis in this report was used to size a detention basin with enough volume to store the entire 100-year runoff. Since the detention basin can store the 100-year runoff, it will also store the smaller 5-, 10-, 25-, and 50-year runoff.

Discharge Location	5-Year Flow Rate, cfs		10-Year Flow Rate, cfs		25-Year Flow Rate, cfs		50-Year Flow Rate, cfs		100-Year Flow Rate, cfs	
	Exist.	**Prop.**	**Exist.**	**Prop.**	**Exist.**	**Prop.**	**Exist.**	**Prop.**	**Exist.**	**Prop.**
To Caltrans Culvert[1]	39	28	47	33	52	36	61	42	66	44
To East[2]	0	0.9	0	1.1	0	1.1	0	1.2	0	1.3
Total	39	29	47	34	52	37	61	43	66	45

[1]Existing condition flow rates are from Nodes 16 and 24. Proposed condition flow rates are from Nodes 96, 102, 112, and 136.
[2]Proposed condition flow rates are from Nodes 202 and 212.

Table 1. Comparison of Rational Method Results

Reproduction of 1987 NOTICE from Engineering and Development Department

NOTICE

Date: August 7, 1987

To: All Private Engineers

From: Subdivision Engineer

Subject: Drainage requirements for development 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 Q100 (existing). Other facilities, except the major channel referred to in paragraph 5, may be designed for Q50 (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" (Q100 existing), the invert grade, and the water surface elevation at the major road crossings.

C.R. Lockhead
Subdivision Engineer

APPENDIX A

RATIONAL METHOD RESULTS

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).

ELEV.	FACTOR
0-1500	1.00
1500-3000	1.25
3000-4000	1.42
4000-5000	1.60
5000-6000	1.7
DESERT	1.25

TO OBTAIN CORRECT INTENSITY, MULTIPLY INTENSITY ON CHART BY FACTOR FOR DESIGN ELEVATION.

RAINFALL
INTENSITY - DURATION - FREQUENCY
CURVES
FOR
COUNTY OF SAN DIEGO

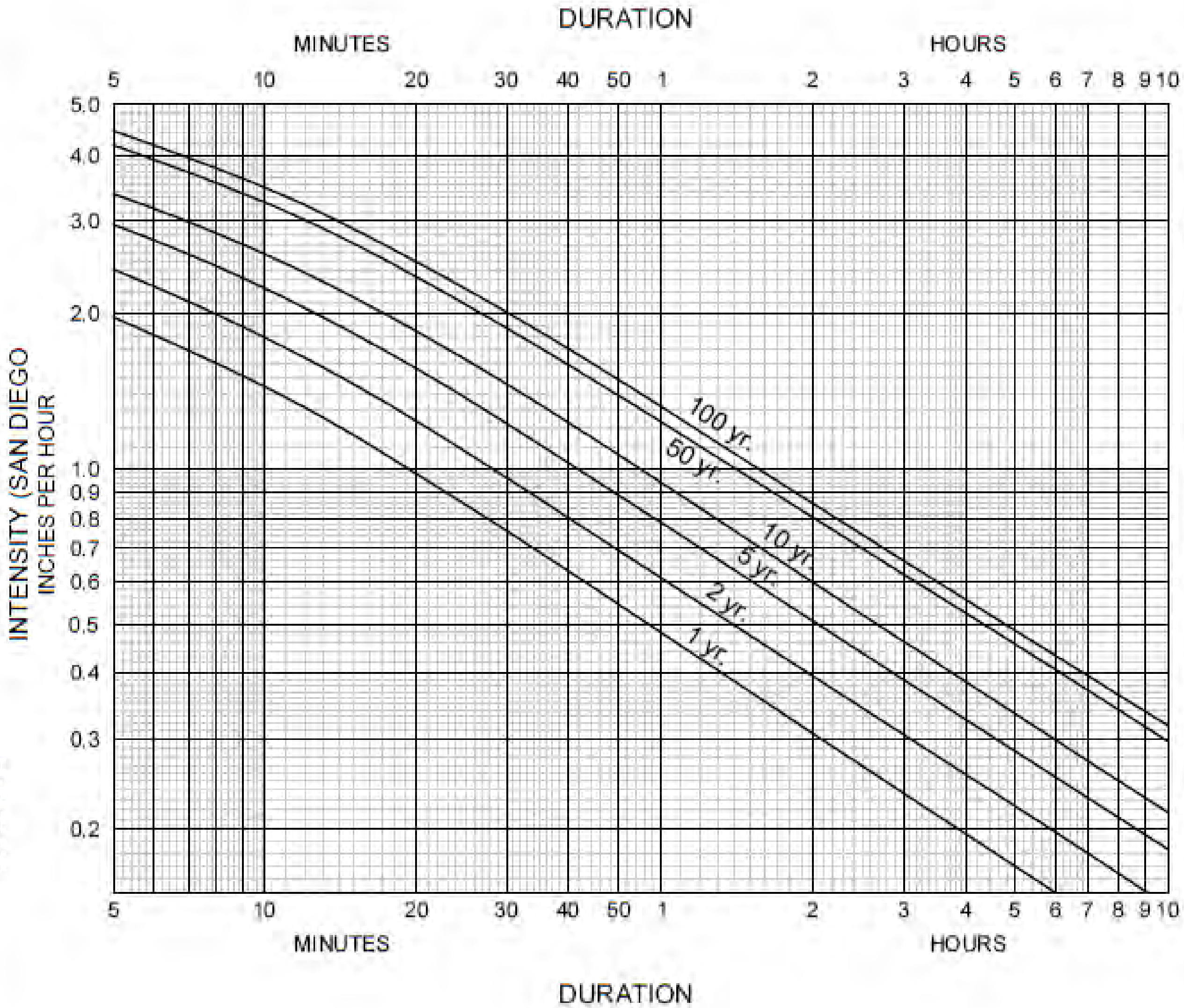


Figure A-1. Intensity-Duration-Frequency Design Chart

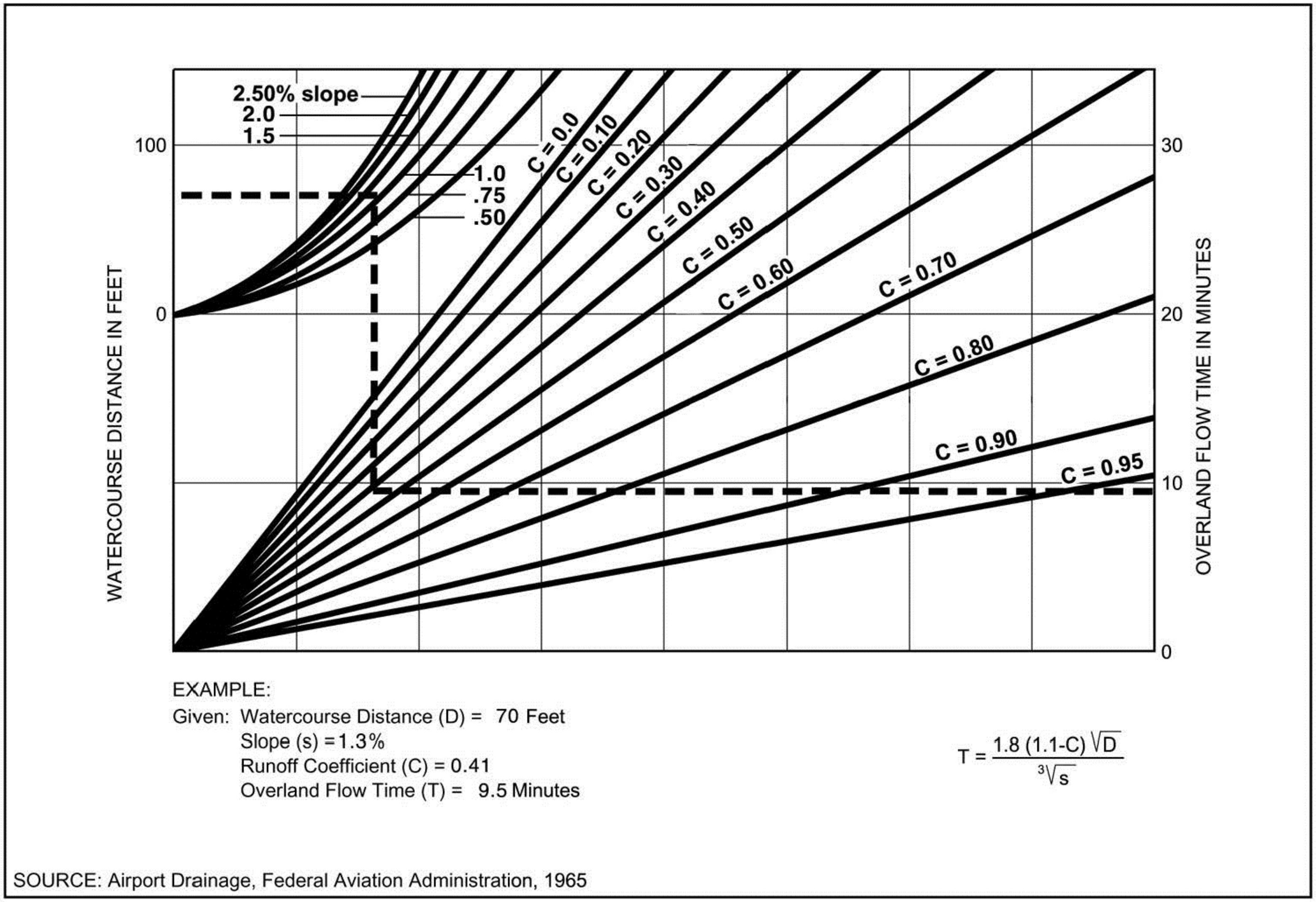
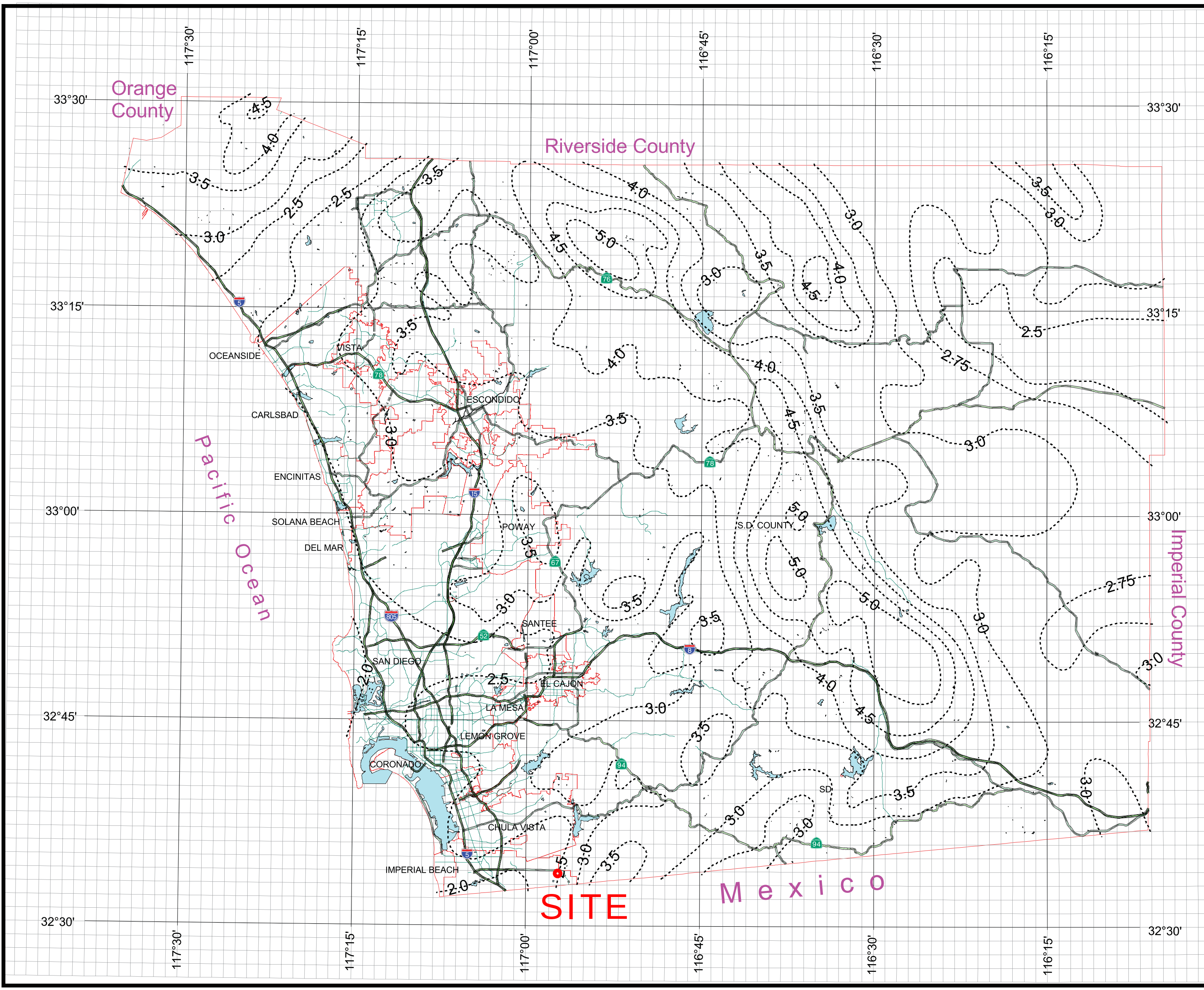


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6=2.5"

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

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: 07/26/18

Plaza La Media - North
Preliminary Hydrology
Existing Conditions
5-Year Flow Rate

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

Program License Serial Number 4028

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 10.000 to Point/Station 12.000
**** 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 = 910.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 489.000(Ft.)
Elevation difference = 25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(910.000^.5)/(2.747^(1/3)]= 5.82
Rainfall intensity (I) = 2.910(In/Hr) for a 5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950

```
Subarea runoff =      2.378(CFS)
Total initial stream area =       0.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       14.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   489.000(Ft.)
End of street segment elevation =   485.000(Ft.)
Length of street segment  =   819.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  20.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      4.078(CFS)
Depth of flow =   0.313(Ft.), Average velocity =   1.660(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.674(Ft.)
Flow velocity =   1.66(Ft/s)
Travel time =    8.22 min.     TC =   14.04  min.
 Adding area flow to street
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      1.876(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.038(CFS) for    1.230(Ac.)
Total runoff =      3.416(CFS)   Total area =        2.09(Ac.)
Street flow at end of street =      3.416(CFS)
Half street flow at end of street =      3.416(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   1.588(Ft/s)
Flow width (from curb towards crown)=  14.666(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.000(Ft.)
Downstream point elevation =   479.700(Ft.)
```

```
Channel length thru subarea  =  1121.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =     42.896(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     42.896(CFS)
Depth of flow =   1.026(Ft.), Average velocity =   2.380(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =   20.000(Ft.)
Flow Velocity =    2.38(Ft/s)
Travel time  =    7.85 min.
Time of concentration =   21.89 min.
Critical depth =      0.648(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      1.494(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     32.473(CFS) for   48.310(Ac.)
Total runoff =     35.889(CFS)   Total area =       50.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** 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  =  192.000(Ft.)
Highest elevation =  485.600(Ft.)
Lowest elevation =  484.500(Ft.)
Elevation difference =    1.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 192.000^.5)/(   0.573^(1/3)]=   4.50
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 =      2.543(CFS)
Total initial stream area =        0.850(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   482.000(Ft.)
Downstream point elevation =   478.800(Ft.)
Channel length thru subarea  =   591.000(Ft.)
Channel base width    =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      3.635(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      3.635(CFS)
Depth of flow =   0.675(Ft.), Average velocity =   1.607(Ft/s)
Channel flow top width =    4.701(Ft.)
Flow Velocity =    1.61(Ft/s)
Travel time  =    6.13 min.
Time of concentration =   11.13 min.
Critical depth =      0.406(Ft.)
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.103(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      0.691(CFS) for    0.730(Ac.)
Total runoff =      3.234(CFS)   Total area =       1.58(Ac.)
End of computations, total study area =          51.980 (Ac.)
```

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: 07/26/18

Plaza La Media - North
Preliminary Hydrology
Existing Conditions
10-Year Flow Rate

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

Program License Serial Number 4028

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 10.000 to Point/Station 12.000
**** 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 = 910.000(Ft.)
Highest elevation = 514.000(Ft.)
Lowest elevation = 489.000(Ft.)
Elevation difference = 25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 5.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(910.000^.5)/(2.747^(1/3)]= 5.82
Rainfall intensity (I) = 3.329(In/Hr) for a 10.0 year storm

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      2.720(CFS)
Total initial stream area =       0.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   489.000(Ft.)
End of street segment elevation =   485.000(Ft.)
Length of street segment  =   819.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  20.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      4.665(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   1.717(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.485(Ft.)
Flow velocity =   1.72(Ft/s)
Travel time =    7.95 min.     TC =   13.77  min.
 Adding area flow to street
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.208(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.222(CFS) for    1.230(Ac.)
Total runoff =      3.942(CFS)   Total area =        2.09(Ac.)
Street flow at end of street =      3.942(CFS)
Half street flow at end of street =      3.942(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   1.646(Ft/s)
Flow width (from curb towards crown)=  15.476(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.000(Ft.)
```

```
Downstream point elevation =   479.700(Ft.)
Channel length thru subarea  =  1121.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =     49.506(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     49.506(CFS)
Depth of flow =   1.107(Ft.), Average velocity =   2.520(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =   20.000(Ft.)
Flow Velocity =    2.52(Ft/s)
Travel time  =    7.41 min.
Time of concentration =   21.18 min.
Critical depth =      0.703(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      1.786(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     38.834(CFS) for   48.310(Ac.)
Total runoff =     42.777(CFS)   Total area =       50.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** 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  =  192.000(Ft.)
Highest elevation =  485.600(Ft.)
Lowest elevation =  484.500(Ft.)
Elevation difference =    1.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 192.000^.5)/(   0.573^(1/3)]=   4.50
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 =      2.901(CFS)
Total initial stream area =       0.850(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   482.000(Ft.)
Downstream point elevation =   478.800(Ft.)
Channel length thru subarea  =   591.000(Ft.)
Channel base width    =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      4.147(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      4.147(CFS)
Depth of flow =   0.722(Ft.), Average velocity =   1.666(Ft/s)
Channel flow top width =    4.890(Ft.)
Flow Velocity =    1.67(Ft/s)
Travel time  =    5.91 min.
Time of concentration =   10.91 min.
Critical depth =      0.438(Ft.)
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.463(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      0.809(CFS) for    0.730(Ac.)
Total runoff =      3.710(CFS)   Total area =        1.58(Ac.)
End of computations, total study area =          51.980 (Ac.)
```

```
           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: 07/26/18
------------------------------------------------------------------------
```

Plaza La Media - North
Preliminary Hydrology
Existing Conditions
25-Year Flow Rate

```
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
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       10.000 to Point/Station       12.000
**** 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  =  910.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =   25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 910.000^.5)/( 2.747^(1/3)]=   5.82
Rainfall intensity (I) =      3.581(In/Hr) for a    25.0 year storm
```

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      2.926(CFS)
Total initial stream area =       0.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   489.000(Ft.)
End of street segment elevation =   485.000(Ft.)
Length of street segment  =   819.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  20.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.018(CFS)
Depth of flow =   0.339(Ft.), Average velocity =   1.748(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.942(Ft.)
Flow velocity =   1.75(Ft/s)
Travel time =    7.81 min.     TC =   13.62  min.
 Adding area flow to street
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.459(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.361(CFS) for    1.230(Ac.)
Total runoff =      4.287(CFS)   Total area =       2.09(Ac.)
Street flow at end of street =      4.287(CFS)
Half street flow at end of street =      4.287(CFS)
Depth of flow =   0.319(Ft.), Average velocity =   1.681(Ft/s)
Flow width (from curb towards crown)=  15.970(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.000(Ft.)
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```
Downstream point elevation =   479.700(Ft.)
Channel length thru subarea  =  1121.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =     53.832(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     53.832(CFS)
Depth of flow =   1.158(Ft.), Average velocity =   2.606(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =   20.000(Ft.)
Flow Velocity =    2.61(Ft/s)
Travel time  =    7.17 min.
Time of concentration =   20.79 min.
Critical depth =      0.734(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.023(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     43.970(CFS) for   48.310(Ac.)
Total runoff =     48.257(CFS)   Total area =       50.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** 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  =  192.000(Ft.)
Highest elevation =  485.600(Ft.)
Lowest elevation =  484.500(Ft.)
Elevation difference =    1.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 192.000^.5)/(   0.573^(1/3)]=   4.50
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 =      3.105(CFS)
Total initial stream area =        0.850(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   482.000(Ft.)
Downstream point elevation =   478.800(Ft.)
Channel length thru subarea  =   591.000(Ft.)
Channel base width    =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      4.438(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      4.438(CFS)
Depth of flow =   0.748(Ft.), Average velocity =   1.697(Ft/s)
Channel flow top width =    4.992(Ft.)
Flow Velocity =    1.70(Ft/s)
Travel time  =    5.80 min.
Time of concentration =   10.80 min.
Critical depth =      0.457(Ft.)
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.720(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      0.893(CFS) for    0.730(Ac.)
Total runoff =      3.998(CFS)   Total area =        1.58(Ac.)
End of computations, total study area =          51.980 (Ac.)
```

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            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: 07/26/18
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Plaza La Media - North
Preliminary Hydrology
Existing Conditions
50-Year Flow Rate

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

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
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      10.000 to Point/Station      12.000
**** 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  =  910.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =   25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 910.000^.5)/( 2.747^(1/3)]=   5.82
Rainfall intensity (I) =      3.991(In/Hr) for a    50.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      3.261(CFS)
Total initial stream area =        0.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       14.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   489.000(Ft.)
End of street segment elevation =   485.000(Ft.)
Length of street segment  =   819.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  20.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.592(CFS)
Depth of flow =   0.353(Ft.), Average velocity =   1.796(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.644(Ft.)
Flow velocity =   1.80(Ft/s)
Travel time =    7.60 min.     TC =   13.41  min.
 Adding area flow to street
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.835(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.569(CFS) for    1.230(Ac.)
Total runoff =      4.830(CFS)   Total area =        2.09(Ac.)
Street flow at end of street =      4.830(CFS)
Half street flow at end of street =      4.830(CFS)
Depth of flow =   0.334(Ft.), Average velocity =   1.732(Ft/s)
Flow width (from curb towards crown)=  16.700(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.000(Ft.)
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Downstream point elevation =   479.700(Ft.)
Channel length thru subarea  =  1121.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =     60.648(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     60.648(CFS)
Depth of flow =   1.235(Ft.), Average velocity =   2.733(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =   20.000(Ft.)
Flow Velocity =    2.73(Ft/s)
Travel time  =    6.84 min.
Time of concentration =   20.25 min.
Critical depth =      0.781(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.371(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     51.547(CFS) for   48.310(Ac.)
Total runoff =     56.376(CFS)   Total area =       50.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      22.000
**** 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  =  192.000(Ft.)
Highest elevation =  485.600(Ft.)
Lowest elevation =  484.500(Ft.)
Elevation difference =    1.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 192.000^.5)/(   0.573^(1/3)]=   4.50
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 =      3.444(CFS)
Total initial stream area =       0.850(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      22.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   482.000(Ft.)
Downstream point elevation =   478.800(Ft.)
Channel length thru subarea  =   591.000(Ft.)
Channel base width    =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      4.923(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      4.923(CFS)
Depth of flow =   0.788(Ft.), Average velocity =   1.746(Ft/s)
Channel flow top width =    5.154(Ft.)
Flow Velocity =    1.75(Ft/s)
Travel time  =    5.64 min.
Time of concentration =   10.64 min.
Critical depth =      0.484(Ft.)
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      3.112(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.022(CFS) for    0.730(Ac.)
Total runoff =      4.466(CFS)   Total area =       1.58(Ac.)
End of computations, total study area =         51.980 (Ac.)
```

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          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: 09/07/17
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Plaza La Media - North
Preliminary Hydrology
Existing Conditions
100-Year Flow Rate

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

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
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      10.000 to Point/Station      12.000
**** 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  =  910.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =   25.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     5.82 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 910.000^.5)/( 2.747^(1/3)]=   5.82
Rainfall intensity (I) =      4.131(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
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Subarea runoff =      3.375(CFS)
Total initial stream area =       0.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   489.000(Ft.)
End of street segment elevation =   485.000(Ft.)
Length of street segment  =   819.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  20.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.788(CFS)
Depth of flow =   0.357(Ft.), Average velocity =   1.812(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.874(Ft.)
Flow velocity =   1.81(Ft/s)
Travel time =    7.53 min.     TC =   13.35  min.
 Adding area flow to street
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      3.036(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.681(CFS) for    1.230(Ac.)
Total runoff =      5.056(CFS)   Total area =        2.09(Ac.)
Street flow at end of street =      5.056(CFS)
Half street flow at end of street =      5.056(CFS)
Depth of flow =   0.340(Ft.), Average velocity =   1.752(Ft/s)
Flow width (from curb towards crown)=  16.989(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.000(Ft.)
Downstream point elevation =   479.700(Ft.)
```

```
Channel length thru subarea  =  1121.000(Ft.)
Channel base width    =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =     63.485(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     63.485(CFS)
Depth of flow =   1.265(Ft.), Average velocity =   2.784(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =   20.000(Ft.)
Flow Velocity =    2.78(Ft/s)
Travel time  =    6.71 min.
Time of concentration =   20.06 min.
Critical depth =      0.805(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      2.577(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     56.021(CFS) for   48.310(Ac.)
Total runoff =     61.077(CFS)   Total area =       50.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** 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  =  192.000(Ft.)
Highest elevation =  485.600(Ft.)
Lowest elevation =  484.500(Ft.)
Elevation difference =    1.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.50 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 192.000^.5)/(   0.573^(1/3)]=   4.50
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      3.544(CFS)
Total initial stream area =        0.850(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   482.000(Ft.)
Downstream point elevation =   478.800(Ft.)
Channel length thru subarea  =   591.000(Ft.)
Channel base width    =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      5.066(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      5.066(CFS)
Depth of flow =   0.800(Ft.), Average velocity =   1.759(Ft/s)
Channel flow top width =    5.200(Ft.)
Flow Velocity =    1.76(Ft/s)
Travel time  =    5.60 min.
Time of concentration =   10.60 min.
Critical depth =      0.492(Ft.)
 Adding area flow to channel
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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Rainfall intensity =      3.304(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.085(CFS) for    0.730(Ac.)
Total runoff =      4.629(CFS)   Total area =       1.58(Ac.)
End of computations, total study area =         51.980 (Ac.)
```

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          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: 07/26/18
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Plaza La Media - North
Preliminary Hydrology
Proposed Conditions
5-Year Flow Rate

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

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
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      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  222.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =    2.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.41 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 222.000^.5)/( 1.081^(1/3)]=   9.41
Rainfall intensity (I) =      2.284(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.470(CFS)
Total initial stream area =       0.870(Ac.)
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Process from Point/Station      13.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =     9.41 min.
Rainfall intensity =      2.284(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.845(CFS) for    0.500(Ac.)
Total runoff =      2.315(CFS)   Total area =       1.37(Ac.)


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Process from Point/Station      12.000 to Point/Station      14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.300(Ft.)
Downstream point elevation =   484.900(Ft.)
Channel length thru subarea  =    80.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.501(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.501(CFS)
Depth of flow =   0.183(Ft.), Average velocity =   0.665(Ft/s)
Channel flow top width =   21.099(Ft.)
Flow Velocity =    0.66(Ft/s)
Travel time  =    2.01 min.
Time of concentration =   11.41 min.
Critical depth =      0.078(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.077(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.338(CFS) for    0.220(Ac.)
Total runoff =      2.653(CFS)   Total area =       1.59(Ac.)


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Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   311.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.653(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.653(CFS)
Normal flow depth in pipe =    9.82(In.)
Flow top width inside pipe =   14.26(In.)
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Critical Depth =    7.84(In.)
Pipe flow velocity =      3.12(Ft/s)
Travel time through pipe =    1.66 min.
Time of concentration (TC) =    13.08 min.


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Process from Point/Station      14.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.590(Ac.)
Runoff from this stream =      2.653(CFS)
Time of concentration =   13.08 min.
Rainfall intensity =     1.943(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  522.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    15.67 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 522.000^.5)/( 0.843^(1/3)]=  15.67
Rainfall intensity (I) =      1.776(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.588(CFS)
Total initial stream area =        2.730(Ac.)


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Process from Point/Station      22.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   484.300(Ft.)
Downstream point elevation =   484.000(Ft.)
Channel length thru subarea  =    62.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.588(CFS)
Depth of flow =   0.244(Ft.), Average velocity =   0.785(Ft/s)
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Channel flow top width =   19.464(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    1.32 min.
Time of concentration =   16.99 min.
Critical depth =      0.106(Ft.)


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Process from Point/Station       22.000 to Point/Station       24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.730(Ac.)
Runoff from this stream =      3.588(CFS)
Time of concentration =   16.99 min.
Rainfall intensity =     1.705(In/Hr)


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Process from Point/Station       30.000 to Point/Station       32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  187.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.500(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 187.000^.5)/( 0.909^(1/3)]=   9.15
Rainfall intensity (I) =      2.315(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.565(CFS)
Total initial stream area =        0.330(Ac.)


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Process from Point/Station       32.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   486.500(Ft.)
Downstream point elevation =   484.100(Ft.)
Channel length thru subarea  =   367.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.565(CFS)
Depth of flow =   0.074(Ft.), Average velocity =   0.420(Ft/s)
Channel flow top width =   18.444(Ft.)
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Flow Velocity =    0.42(Ft/s)
Travel time  =   14.58 min.
Time of concentration =   23.72 min.
Critical depth =      0.031(Ft.)


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Process from Point/Station      32.000 to Point/Station      24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.565(CFS)
Time of concentration =   23.72 min.
Rainfall intensity =     1.429(In/Hr)
Summary of stream data:

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


1        3.588     16.99            1.705
2        0.565     23.72            1.429
Qmax(1) =
        1.000 *    1.000 *     3.588) +
        1.000 *    0.716 *     0.565) + =       3.993
Qmax(2) =
        0.838 *    1.000 *     3.588) +
        1.000 *    1.000 *     0.565) + =       3.573

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.588       0.565
Maximum flow rates at confluence using above data:
        3.993        3.573
Area of streams before confluence:
        2.730        0.330
Results of confluence:
Total flow rate =      3.993(CFS)
Time of concentration =    16.990 min.
Effective stream area after confluence =      3.060(Ac.)


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Process from Point/Station      24.000 to Point/Station      24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.99 min.
Rainfall intensity =      1.705(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.543(CFS) for    0.430(Ac.)
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Total runoff =      4.536(CFS)   Total area =        3.49(Ac.)


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Process from Point/Station       24.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.100(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.536(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.536(CFS)
Normal flow depth in pipe =   12.52(In.)
Flow top width inside pipe =   16.57(In.)
Critical Depth =    9.80(In.)
Pipe flow velocity =      3.46(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    17.88 min.


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Process from Point/Station       24.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.490(Ac.)
Runoff from this stream =      4.536(CFS)
Time of concentration =   17.88 min.
Rainfall intensity =     1.661(In/Hr)
Summary of stream data:

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


1        2.653     13.08            1.943
2        4.536     17.88            1.661
Qmax(1) =
        1.000 *    1.000 *     2.653) +
        1.000 *    0.731 *     4.536) + =       5.970
Qmax(2) =
        0.855 *    1.000 *     2.653) +
        1.000 *    1.000 *     4.536) + =       6.804

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.653       4.536
Maximum flow rates at confluence using above data:
        5.970        6.804
Area of streams before confluence:
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        1.590        3.490


Results of confluence:
Total flow rate =      6.804(CFS)
Time of concentration =    17.882 min.
Effective stream area after confluence  =      5.080(Ac.)


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Process from Point/Station       16.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.600(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   161.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.804(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.804(CFS)
Normal flow depth in pipe =   13.83(In.)
Flow top width inside pipe =   19.92(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      4.05(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =    18.54 min.


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Process from Point/Station       36.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.54 min.
Rainfall intensity =      1.631(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.845(CFS) for    0.700(Ac.)
Total runoff =      7.649(CFS)   Total area =       5.78(Ac.)


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Process from Point/Station       34.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.500(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.649(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.649(CFS)
Normal flow depth in pipe =   15.00(In.)
Flow top width inside pipe =   18.97(In.)
Critical Depth =   12.29(In.)
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Pipe flow velocity =      4.16(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =    19.31 min.


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Process from Point/Station      40.000 to Point/Station      38.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    19.31 min.
Rainfall intensity =      1.597(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.307(CFS) for    0.260(Ac.)
Total runoff =      7.956(CFS)   Total area =       6.04(Ac.)


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Process from Point/Station      38.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.500(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.956(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.956(CFS)
Normal flow depth in pipe =   15.30(In.)
Flow top width inside pipe =   18.67(In.)
Critical Depth =   12.55(In.)
Pipe flow velocity =      4.24(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =    19.91 min.


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Process from Point/Station      38.000 to Point/Station      42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.040(Ac.)
Runoff from this stream =      7.956(CFS)
Time of concentration =   19.91 min.
Rainfall intensity =     1.571(In/Hr)


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Process from Point/Station      50.000 to Point/Station      52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  455.000(Ft.)
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Highest elevation =  488.400(Ft.)
Lowest elevation =  485.500(Ft.)
Elevation difference =    2.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    16.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 455.000^.5)/( 0.637^(1/3)]=  16.06
Rainfall intensity (I) =      1.754(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.531(CFS)
Total initial stream area =        2.720(Ac.)


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Process from Point/Station       52.000 to Point/Station       54.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   483.800(Ft.)
Downstream point elevation =   483.000(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.836(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.836(CFS)
Depth of flow =   0.238(Ft.), Average velocity =   0.778(Ft/s)
Channel flow top width =   21.429(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    3.51 min.
Time of concentration =   19.58 min.
Critical depth =      0.104(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.585(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.551(CFS) for    0.470(Ac.)
Total runoff =      4.083(CFS)   Total area =       3.19(Ac.)


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Process from Point/Station       54.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.000(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.083(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.083(CFS)
Normal flow depth in pipe =   11.23(In.)
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```
Flow top width inside pipe =   13.02(In.)
Critical Depth =    9.81(In.)
Pipe flow velocity =      4.15(Ft/s)
Travel time through pipe =    0.83 min.
Time of concentration (TC) =    20.41 min.


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Process from Point/Station       54.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.190(Ac.)
Runoff from this stream =      4.083(CFS)
Time of concentration =   20.41 min.
Rainfall intensity =     1.551(In/Hr)
Summary of stream data:

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



1        7.956     19.91            1.571
2        4.083     20.41            1.551
Qmax(1) =
        1.000 *    1.000 *     7.956) +
        1.000 *    0.976 *     4.083) + =      11.939
Qmax(2) =
        0.987 *    1.000 *     7.956) +
        1.000 *    1.000 *     4.083) + =      11.936

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.956       4.083
Maximum flow rates at confluence using above data:
       11.939       11.936
Area of streams before confluence:
        6.040        3.190
Results of confluence:
Total flow rate =     11.939(CFS)
Time of concentration =    19.911 min.
Effective stream area after confluence =      9.230(Ac.)


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Process from Point/Station       42.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.939(CFS)
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Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.939(CFS)
Normal flow depth in pipe =   18.70(In.)
Flow top width inside pipe =   19.91(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =      4.55(Ft/s)
Travel time through pipe =    1.19 min.
Time of concentration (TC) =    21.10 min.


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Process from Point/Station       42.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.230(Ac.)
Runoff from this stream =     11.939(CFS)
Time of concentration =   21.10 min.
Rainfall intensity =     1.523(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       70.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  264.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  490.700(Ft.)
Elevation difference =    2.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    11.02 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 264.000^.5)/( 0.871^(1/3)]=  11.02
Rainfall intensity (I) =      2.112(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.032(CFS)
Total initial stream area =       1.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       74.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.300(Ft.)
Downstream point elevation =   487.300(Ft.)
Channel length thru subarea  =   180.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
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Estimated mean flow rate at midpoint of channel =      2.431(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.431(CFS)
Depth of flow =   0.174(Ft.), Average velocity =   0.679(Ft/s)
Channel flow top width =   21.047(Ft.)
Flow Velocity =    0.68(Ft/s)
Travel time  =    4.42 min.
Time of concentration =   15.44 min.
Critical depth =      0.077(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.789(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.675(CFS) for    0.510(Ac.)
Total runoff =      2.707(CFS)   Total area =        1.81(Ac.)


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Process from Point/Station       74.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   483.300(Ft.)
Downstream point/station elevation =   482.400(Ft.)
Pipe length  =   179.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.707(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.707(CFS)
Normal flow depth in pipe =    8.30(In.)
Flow top width inside pipe =   14.92(In.)
Critical Depth =    7.92(In.)
Pipe flow velocity =      3.89(Ft/s)
Travel time through pipe =    0.77 min.
Time of concentration (TC) =    16.21 min.


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Process from Point/Station       77.000 to Point/Station       76.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.21 min.
Rainfall intensity =      1.746(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.065(CFS) for    0.050(Ac.)
Total runoff =      2.772(CFS)   Total area =        1.86(Ac.)


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Process from Point/Station       76.000 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =   482.400(Ft.)
Downstream point/station elevation =   481.300(Ft.)
Pipe length  =   241.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.772(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.772(CFS)
Normal flow depth in pipe =    8.68(In.)
Flow top width inside pipe =   14.81(In.)
Critical Depth =    8.03(In.)
Pipe flow velocity =      3.77(Ft/s)
Travel time through pipe =    1.07 min.
Time of concentration (TC) =    17.28 min.


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Process from Point/Station       79.000 to Point/Station       78.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    17.28 min.
Rainfall intensity =      1.691(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.038(CFS) for    0.030(Ac.)
Total runoff =      2.810(CFS)   Total area =        1.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.300(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.810(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.810(CFS)
Normal flow depth in pipe =    8.30(In.)
Flow top width inside pipe =   14.92(In.)
Critical Depth =    8.07(In.)
Pipe flow velocity =      4.03(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =    18.04 min.


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Process from Point/Station       78.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.890(Ac.)
Runoff from this stream =      2.810(CFS)
Time of concentration =   18.04 min.
```

```
Rainfall intensity =     1.654(In/Hr)


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Process from Point/Station      82.000 to Point/Station      84.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  814.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  487.800(Ft.)
Elevation difference =    5.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    21.47 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 814.000^.5)/( 0.639^(1/3)]=  21.47
Rainfall intensity (I) =      1.510(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.050(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      84.000 to Point/Station      86.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.500(Ft.)
Downstream point elevation =   484.500(Ft.)
Channel length thru subarea  =   216.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.329(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.329(CFS)
Depth of flow =   0.222(Ft.), Average velocity =   0.725(Ft/s)
Channel flow top width =   21.333(Ft.)
Flow Velocity =    0.72(Ft/s)
Travel time  =    4.97 min.
Time of concentration =   26.43 min.
Critical depth =      0.095(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.344(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.497(CFS) for    0.500(Ac.)
Total runoff =      3.547(CFS)   Total area =       3.23(Ac.)


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Process from Point/Station      86.000 to Point/Station      80.000
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```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.547(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.547(CFS)
Normal flow depth in pipe =    9.20(In.)
Flow top width inside pipe =   14.61(In.)
Critical Depth =    9.13(In.)
Pipe flow velocity =      4.50(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    26.55 min.


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Process from Point/Station       86.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.230(Ac.)
Runoff from this stream =      3.547(CFS)
Time of concentration =   26.55 min.
Rainfall intensity =     1.341(In/Hr)
Summary of stream data:

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


1        2.810     18.04            1.654
2        3.547     26.55            1.341
Qmax(1) =
        1.000 *    1.000 *     2.810) +
        1.000 *    0.679 *     3.547) + =       5.220
Qmax(2) =
        0.811 *    1.000 *     2.810) +
        1.000 *    1.000 *     3.547) + =       5.825

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.810       3.547
Maximum flow rates at confluence using above data:
        5.220        5.825
Area of streams before confluence:
        1.890        3.230
Results of confluence:
Total flow rate =      5.825(CFS)
Time of concentration =    26.552 min.
Effective stream area after confluence =      5.120(Ac.)
```

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Process from Point/Station       80.000 to Point/Station       88.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.300(Ft.)
Downstream point/station elevation =   478.300(Ft.)
Pipe length  =   398.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.825(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.825(CFS)
Normal flow depth in pipe =   11.98(In.)
Flow top width inside pipe =   16.99(In.)
Critical Depth =   11.18(In.)
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    1.42 min.
Time of concentration (TC) =    27.98 min.


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Process from Point/Station       89.000 to Point/Station       88.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    27.98 min.
Rainfall intensity =      1.300(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.029(CFS) for    0.030(Ac.)
Total runoff =      5.854(CFS)   Total area =       5.15(Ac.)


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Process from Point/Station       88.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.300(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   264.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.854(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.854(CFS)
Normal flow depth in pipe =   12.12(In.)
Flow top width inside pipe =   16.89(In.)
Critical Depth =   11.21(In.)
Pipe flow velocity =      4.63(Ft/s)
Travel time through pipe =    0.95 min.
Time of concentration (TC) =    28.93 min.


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Process from Point/Station       88.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.150(Ac.)
Runoff from this stream =      5.854(CFS)
Time of concentration =   28.93 min.
Rainfall intensity =     1.275(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      90.000 to Point/Station      92.000
**** INITIAL AREA EVALUATION ****
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```
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  389.000(Ft.)
Highest elevation =  488.500(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    3.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.77 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 389.000^.5)/( 1.003^(1/3)]=  12.77
Rainfall intensity (I) =      1.966(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.138(CFS)
Total initial stream area =        1.470(Ac.)


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Process from Point/Station      92.000 to Point/Station      94.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

```
Upstream point elevation =   482.700(Ft.)
Downstream point elevation =   482.000(Ft.)
Channel length thru subarea  =   133.000(Ft.)
Channel base width    =   40.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.313(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.313(CFS)
Depth of flow =   0.100(Ft.), Average velocity =   0.576(Ft/s)
Channel flow top width =   40.598(Ft.)
Flow Velocity =    0.58(Ft/s)
Travel time  =    3.85 min.
Time of concentration =   16.62 min.
Critical depth =      0.047(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.725(In/Hr) for a     5.0 year storm
```

```
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.306(CFS) for    0.240(Ac.)
Total runoff =      2.444(CFS)   Total area =       1.71(Ac.)


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Process from Point/Station      94.000 to Point/Station      60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.444(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.444(CFS)
Normal flow depth in pipe =    7.00(In.)
Flow top width inside pipe =   11.83(In.)
Critical Depth =    8.03(In.)
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    16.90 min.


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Process from Point/Station      94.000 to Point/Station      66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.710(Ac.)
Runoff from this stream =      2.444(CFS)
Time of concentration =   16.90 min.
Rainfall intensity =     1.710(In/Hr)
Summary of stream data:

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



1       11.939     21.10            1.523
2        5.854     28.93            1.275
3        2.444     16.90            1.710
Qmax(1) =
        1.000 *    1.000 *    11.939) +
        1.000 *    0.730 *     5.854) +
        0.891 *    1.000 *     2.444) + =      18.388
Qmax(2) =
        0.837 *    1.000 *    11.939) +
        1.000 *    1.000 *     5.854) +
        0.746 *    1.000 *     2.444) + =      17.668
Qmax(3) =
        1.000 *    0.801 *    11.939) +
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```
         1.000 *    0.584 *     5.854) +
         1.000 *    1.000 *     2.444) + =      15.429

Total of 3 main streams to confluence:
Flow rates before confluence point:
      11.939       5.854       2.444
Maximum flow rates at confluence using above data:
       18.388       17.668       15.429
Area of streams before confluence:
        9.230        5.150        1.710


Results of confluence:
Total flow rate =     18.388(CFS)
Time of concentration =    21.103 min.
Effective stream area after confluence  =     16.090(Ac.)


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Process from Point/Station       60.000 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   477.000(Ft.)
Downstream point/station elevation =   476.680(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.388(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    18.388(CFS)
Normal flow depth in pipe =   20.67(In.)
Flow top width inside pipe =   27.77(In.)
Critical Depth =   17.41(In.)
Pipe flow velocity =      5.10(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    21.45 min.


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Process from Point/Station       60.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     16.090(Ac.)
Runoff from this stream =     18.388(CFS)
Time of concentration =   21.45 min.
Rainfall intensity =     1.510(In/Hr)


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Process from Point/Station       98.000 to Point/Station       96.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
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```
Initial subarea flow distance  =  539.000(Ft.)
Highest elevation =  489.300(Ft.)
Lowest elevation =  482.700(Ft.)
Elevation difference =    6.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 539.000^.5)/( 1.224^(1/3)]=  14.06
Rainfall intensity (I) =      1.874(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.290(CFS)
Total initial stream area =       0.930(Ac.)


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Process from Point/Station       98.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.290(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     1.874(In/Hr)
Summary of stream data:

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



1       18.388     21.45            1.510
2        1.290     14.06            1.874
Qmax(1) =
        1.000 *    1.000 *    18.388) +
        0.806 *    1.000 *     1.290) + =      19.427
Qmax(2) =
        1.000 *    0.656 *    18.388) +
        1.000 *    1.000 *     1.290) + =      13.343

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.388       1.290
Maximum flow rates at confluence using above data:
       19.427       13.343
Area of streams before confluence:
       16.090        0.930
Results of confluence:
Total flow rate =     19.427(CFS)
Time of concentration =    21.452 min.
Effective stream area after confluence =     17.020(Ac.)


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Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  191.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 191.000^.5)/( 1.309^(1/3)]=   8.19
Rainfall intensity (I) =      2.446(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.543(CFS)
Total initial stream area =        0.300(Ac.)


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Process from Point/Station      110.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 147.000^.5)/( 1.701^(1/3)]=   6.58
Rainfall intensity (I) =      2.731(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.485(CFS)
Total initial stream area =        0.240(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** 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  =  229.000(Ft.)
Highest elevation =  487.100(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.97 min.
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```
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 229.000^.5)/(   1.092^(1/3)]=   3.97
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 =      1.915(CFS)
Total initial stream area =       0.640(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.000(Ft.)
Downstream point/station elevation =   479.800(Ft.)
Pipe length  =   254.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.915(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.915(CFS)
Normal flow depth in pipe =    7.98(In.)
Flow top width inside pipe =   11.33(In.)
Critical Depth =    7.08(In.)
Pipe flow velocity =      3.45(Ft/s)
Travel time through pipe =    1.23 min.
Time of concentration (TC) =     6.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      124.000
**** 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 =     6.23 min.
Rainfall intensity =      2.809(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.841(CFS) for    0.690(Ac.)
Total runoff =      3.756(CFS)   Total area =       1.33(Ac.)


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Process from Point/Station      124.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.800(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.756(CFS)
Nearest computed pipe diameter  =     18.00(In.)
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Calculated individual pipe flow  =     3.756(CFS)
Normal flow depth in pipe =   10.22(In.)
Flow top width inside pipe =   17.83(In.)
Critical Depth =    8.89(In.)
Pipe flow velocity =      3.63(Ft/s)
Travel time through pipe =    0.96 min.
Time of concentration (TC) =     7.18 min.


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Process from Point/Station      130.000 to Point/Station      128.000
**** 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 =     7.18 min.
Rainfall intensity =      2.612(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.489(CFS) for    0.600(Ac.)
Total runoff =      5.245(CFS)   Total area =       1.93(Ac.)


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Process from Point/Station      128.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.400(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.245(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.245(CFS)
Normal flow depth in pipe =   12.46(In.)
Flow top width inside pipe =   16.62(In.)
Critical Depth =   10.59(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =     7.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      132.000
**** 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                       ]
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```
Time of concentration =     7.98 min.
Rainfall intensity =      2.479(In/Hr) for a     5.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.378(CFS) for    1.010(Ac.)
Total runoff =      7.624(CFS)   Total area =        2.94(Ac.)


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Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.400(Ft.)
Downstream point/station elevation =   476.700(Ft.)
Pipe length  =   455.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.624(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.624(CFS)
Normal flow depth in pipe =   14.04(In.)
Flow top width inside pipe =   19.77(In.)
Critical Depth =   12.27(In.)
Pipe flow velocity =      4.46(Ft/s)
Travel time through pipe =    1.70 min.
Time of concentration (TC) =     9.68 min.


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Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =      7.624(CFS)
Time of concentration =    9.68 min.
Rainfall intensity =     2.252(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  179.000(Ft.)
Highest elevation =  489.000(Ft.)
Lowest elevation =  457.000(Ft.)
Elevation difference =   32.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 179.000^.5)/(  17.877^(1/3)]=   3.32
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 = 0.740
Subarea runoff =      0.606(CFS)
Total initial stream area =        0.260(Ac.)


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Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.000(Ft.)
Elevation difference =    2.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 215.000^.5)/( 1.023^(1/3)]=   9.43
Rainfall intensity (I) =      2.281(In/Hr) for a     5.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.304(CFS)
Total initial stream area =        0.180(Ac.)
End of computations, total study area =         20.940 (Ac.)
```

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          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: 07/26/18
------------------------------------------------------------------------
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Plaza La Media - North
Preliminary Hydrology
Proposed Conditions
10-Year Flow Rate
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------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
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


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Process from Point/Station      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  222.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =    2.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.41 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 222.000^.5)/( 1.081^(1/3)]=   9.41
Rainfall intensity (I) =      2.640(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.700(CFS)
Total initial stream area =        0.870(Ac.)
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Process from Point/Station      13.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =     9.41 min.
Rainfall intensity =      2.640(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.977(CFS) for    0.500(Ac.)
Total runoff =      2.676(CFS)   Total area =       1.37(Ac.)


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Process from Point/Station      12.000 to Point/Station      14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.300(Ft.)
Downstream point elevation =   484.900(Ft.)
Channel length thru subarea  =    80.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.891(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.891(CFS)
Depth of flow =   0.200(Ft.), Average velocity =   0.703(Ft/s)
Channel flow top width =   21.198(Ft.)
Flow Velocity =    0.70(Ft/s)
Travel time  =    1.90 min.
Time of concentration =   11.30 min.
Critical depth =      0.086(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.422(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.394(CFS) for    0.220(Ac.)
Total runoff =      3.071(CFS)   Total area =       1.59(Ac.)


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Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   311.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.071(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.071(CFS)
Normal flow depth in pipe =   10.96(In.)
Flow top width inside pipe =   13.31(In.)
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Critical Depth =    8.46(In.)
Pipe flow velocity =      3.20(Ft/s)
Travel time through pipe =    1.62 min.
Time of concentration (TC) =    12.93 min.


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Process from Point/Station      14.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.590(Ac.)
Runoff from this stream =      3.071(CFS)
Time of concentration =   12.93 min.
Rainfall intensity =     2.275(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  522.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    15.67 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 522.000^.5)/( 0.843^(1/3)]=  15.67
Rainfall intensity (I) =      2.076(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.194(CFS)
Total initial stream area =        2.730(Ac.)


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Process from Point/Station      22.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   484.300(Ft.)
Downstream point elevation =   484.000(Ft.)
Channel length thru subarea  =    62.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.194(CFS)
Depth of flow =   0.268(Ft.), Average velocity =   0.833(Ft/s)
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Channel flow top width =   19.607(Ft.)
Flow Velocity =    0.83(Ft/s)
Travel time  =    1.24 min.
Time of concentration =   16.91 min.
Critical depth =      0.118(Ft.)


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Process from Point/Station       22.000 to Point/Station       24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.730(Ac.)
Runoff from this stream =      4.194(CFS)
Time of concentration =   16.91 min.
Rainfall intensity =     2.001(In/Hr)


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Process from Point/Station       30.000 to Point/Station       32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  187.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.500(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 187.000^.5)/( 0.909^(1/3)]=   9.15
Rainfall intensity (I) =      2.675(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.653(CFS)
Total initial stream area =        0.330(Ac.)


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Process from Point/Station       32.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   486.500(Ft.)
Downstream point elevation =   484.100(Ft.)
Channel length thru subarea  =   367.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.653(CFS)
Depth of flow =   0.081(Ft.), Average velocity =   0.444(Ft/s)
Channel flow top width =   18.484(Ft.)
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Flow Velocity =    0.44(Ft/s)
Travel time  =   13.77 min.
Time of concentration =   22.92 min.
Critical depth =      0.034(Ft.)


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Process from Point/Station       32.000 to Point/Station       24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.653(CFS)
Time of concentration =   22.92 min.
Rainfall intensity =     1.713(In/Hr)
Summary of stream data:

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


1        4.194     16.91            2.001
2        0.653     22.92            1.713
Qmax(1) =
        1.000 *    1.000 *     4.194) +
        1.000 *    0.738 *     0.653) + =       4.676
Qmax(2) =
        0.856 *    1.000 *     4.194) +
        1.000 *    1.000 *     0.653) + =       4.245

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.194       0.653
Maximum flow rates at confluence using above data:
        4.676        4.245
Area of streams before confluence:
        2.730        0.330
Results of confluence:
Total flow rate =      4.676(CFS)
Time of concentration =    16.914 min.
Effective stream area after confluence =      3.060(Ac.)


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Process from Point/Station       24.000 to Point/Station       24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.91 min.
Rainfall intensity =      2.001(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.637(CFS) for    0.430(Ac.)
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Total runoff =      5.313(CFS)   Total area =        3.49(Ac.)


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Process from Point/Station      24.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.100(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.313(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.313(CFS)
Normal flow depth in pipe =   14.34(In.)
Flow top width inside pipe =   14.48(In.)
Critical Depth =   10.65(In.)
Pipe flow velocity =      3.52(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    17.79 min.


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Process from Point/Station      24.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.490(Ac.)
Runoff from this stream =      5.313(CFS)
Time of concentration =   17.79 min.
Rainfall intensity =     1.952(In/Hr)
Summary of stream data:

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


1        3.071     12.93            2.275
2        5.313     17.79            1.952
Qmax(1) =
        1.000 *    1.000 *     3.071) +
        1.000 *    0.727 *     5.313) + =       6.931
Qmax(2) =
        0.858 *    1.000 *     3.071) +
        1.000 *    1.000 *     5.313) + =       7.947

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.071       5.313
Maximum flow rates at confluence using above data:
        6.931        7.947
Area of streams before confluence:
```

```
        1.590        3.490


Results of confluence:
Total flow rate =      7.947(CFS)
Time of concentration =    17.789 min.
Effective stream area after confluence  =      5.080(Ac.)


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Process from Point/Station       16.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.600(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   161.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.947(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.947(CFS)
Normal flow depth in pipe =   15.56(In.)
Flow top width inside pipe =   18.40(In.)
Critical Depth =   12.55(In.)
Pipe flow velocity =      4.15(Ft/s)
Travel time through pipe =    0.65 min.
Time of concentration (TC) =    18.44 min.


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Process from Point/Station       36.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.44 min.
Rainfall intensity =      1.917(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.993(CFS) for    0.700(Ac.)
Total runoff =      8.940(CFS)   Total area =       5.78(Ac.)


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Process from Point/Station       34.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.500(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.940(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.940(CFS)
Normal flow depth in pipe =   17.30(In.)
Flow top width inside pipe =   16.01(In.)
Critical Depth =   13.34(In.)
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Pipe flow velocity =      4.22(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =    19.19 min.


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Process from Point/Station       40.000 to Point/Station       38.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    19.19 min.
Rainfall intensity =      1.879(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.362(CFS) for    0.260(Ac.)
Total runoff =      9.302(CFS)   Total area =       6.04(Ac.)


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Process from Point/Station       38.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.500(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.302(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.302(CFS)
Normal flow depth in pipe =   17.86(In.)
Flow top width inside pipe =   14.98(In.)
Critical Depth =   13.60(In.)
Pipe flow velocity =      4.27(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =    19.79 min.


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Process from Point/Station       38.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.040(Ac.)
Runoff from this stream =      9.302(CFS)
Time of concentration =   19.79 min.
Rainfall intensity =     1.850(In/Hr)


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Process from Point/Station       50.000 to Point/Station       52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  455.000(Ft.)
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Highest elevation =  488.400(Ft.)
Lowest elevation =  485.500(Ft.)
Elevation difference =    2.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    16.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 455.000^.5)/( 0.637^(1/3)]=  16.06
Rainfall intensity (I) =      2.052(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.129(CFS)
Total initial stream area =       2.720(Ac.)


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Process from Point/Station      52.000 to Point/Station      54.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   483.800(Ft.)
Downstream point elevation =   483.000(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      4.486(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.486(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   0.826(Ft/s)
Channel flow top width =   21.568(Ft.)
Flow Velocity =    0.83(Ft/s)
Travel time  =    3.31 min.
Time of concentration =   19.37 min.
Critical depth =      0.115(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.870(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.650(CFS) for    0.470(Ac.)
Total runoff =      4.780(CFS)   Total area =       3.19(Ac.)


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Process from Point/Station      54.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.000(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.780(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.780(CFS)
Normal flow depth in pipe =   10.62(In.)
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Flow top width inside pipe =   17.71(In.)
Critical Depth =   10.08(In.)
Pipe flow velocity =      4.41(Ft/s)
Travel time through pipe =    0.78 min.
Time of concentration (TC) =    20.15 min.


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Process from Point/Station       54.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.190(Ac.)
Runoff from this stream =      4.780(CFS)
Time of concentration =   20.15 min.
Rainfall intensity =     1.833(In/Hr)
Summary of stream data:

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


1        9.302     19.79            1.850
2        4.780     20.15            1.833
Qmax(1) =
        1.000 *    1.000 *     9.302) +
        1.000 *    0.982 *     4.780) + =      13.994
Qmax(2) =
        0.991 *    1.000 *     9.302) +
        1.000 *    1.000 *     4.780) + =      13.994

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.302       4.780
Maximum flow rates at confluence using above data:
       13.994       13.994
Area of streams before confluence:
        6.040        3.190
Results of confluence:
Total flow rate =     13.994(CFS)
Time of concentration =    20.155 min.
Effective stream area after confluence =      9.230(Ac.)


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Process from Point/Station       42.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.994(CFS)
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Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    13.994(CFS)
Normal flow depth in pipe =   18.52(In.)
Flow top width inside pipe =   25.07(In.)
Critical Depth =   15.61(In.)
Pipe flow velocity =      4.82(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =    21.28 min.


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Process from Point/Station       42.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.230(Ac.)
Runoff from this stream =     13.994(CFS)
Time of concentration =   21.28 min.
Rainfall intensity =     1.782(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       70.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  264.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  490.700(Ft.)
Elevation difference =    2.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    11.02 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 264.000^.5)/( 0.871^(1/3)]=  11.02
Rainfall intensity (I) =      2.451(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.358(CFS)
Total initial stream area =       1.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       74.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.300(Ft.)
Downstream point elevation =   487.300(Ft.)
Channel length thru subarea  =   180.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
```

```
Estimated mean flow rate at midpoint of channel =      2.820(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.820(CFS)
Depth of flow =   0.191(Ft.), Average velocity =   0.719(Ft/s)
Channel flow top width =   21.144(Ft.)
Flow Velocity =    0.72(Ft/s)
Travel time  =    4.17 min.
Time of concentration =   15.20 min.
Critical depth =      0.085(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.107(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.795(CFS) for    0.510(Ac.)
Total runoff =      3.153(CFS)   Total area =       1.81(Ac.)


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Process from Point/Station       74.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   483.300(Ft.)
Downstream point/station elevation =   482.400(Ft.)
Pipe length  =   179.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.153(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.153(CFS)
Normal flow depth in pipe =    9.14(In.)
Flow top width inside pipe =   14.64(In.)
Critical Depth =    8.58(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    15.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.000 to Point/Station       76.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    15.94 min.
Rainfall intensity =      2.059(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.076(CFS) for    0.050(Ac.)
Total runoff =      3.229(CFS)   Total area =       1.86(Ac.)


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Process from Point/Station       76.000 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =   482.400(Ft.)
Downstream point/station elevation =   481.300(Ft.)
Pipe length  =   241.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.229(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.229(CFS)
Normal flow depth in pipe =    9.60(In.)
Flow top width inside pipe =   14.40(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      3.89(Ft/s)
Travel time through pipe =    1.03 min.
Time of concentration (TC) =    16.97 min.


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Process from Point/Station       79.000 to Point/Station       78.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.97 min.
Rainfall intensity =      1.997(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.044(CFS) for    0.030(Ac.)
Total runoff =      3.273(CFS)   Total area =       1.89(Ac.)


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Process from Point/Station       78.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.300(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.273(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.273(CFS)
Normal flow depth in pipe =    9.15(In.)
Flow top width inside pipe =   14.63(In.)
Critical Depth =    8.75(In.)
Pipe flow velocity =      4.17(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    17.71 min.


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Process from Point/Station       78.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.890(Ac.)
Runoff from this stream =      3.273(CFS)
Time of concentration =   17.71 min.
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Rainfall intensity =     1.956(In/Hr)


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Process from Point/Station      82.000 to Point/Station      84.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  814.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  487.800(Ft.)
Elevation difference =    5.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    21.47 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 814.000^.5)/( 0.639^(1/3)]=  21.47
Rainfall intensity (I) =      1.774(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.584(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      84.000 to Point/Station      86.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.500(Ft.)
Downstream point elevation =   484.500(Ft.)
Channel length thru subarea  =   216.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.912(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.912(CFS)
Depth of flow =   0.245(Ft.), Average velocity =   0.771(Ft/s)
Channel flow top width =   21.468(Ft.)
Flow Velocity =    0.77(Ft/s)
Travel time  =    4.67 min.
Time of concentration =   26.14 min.
Critical depth =      0.105(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.594(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.590(CFS) for    0.500(Ac.)
Total runoff =      4.173(CFS)   Total area =       3.23(Ac.)


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Process from Point/Station      86.000 to Point/Station      80.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.173(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.173(CFS)
Normal flow depth in pipe =   10.31(In.)
Flow top width inside pipe =   13.91(In.)
Critical Depth =    9.93(In.)
Pipe flow velocity =      4.64(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    26.25 min.


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Process from Point/Station       86.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.230(Ac.)
Runoff from this stream =      4.173(CFS)
Time of concentration =   26.25 min.
Rainfall intensity =     1.590(In/Hr)
Summary of stream data:

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


1        3.273     17.71            1.956
2        4.173     26.25            1.590
Qmax(1) =
        1.000 *    1.000 *     3.273) +
        1.000 *    0.675 *     4.173) + =       6.089
Qmax(2) =
        0.813 *    1.000 *     3.273) +
        1.000 *    1.000 *     4.173) + =       6.833

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.273       4.173
Maximum flow rates at confluence using above data:
        6.089        6.833
Area of streams before confluence:
        1.890        3.230
Results of confluence:
Total flow rate =      6.833(CFS)
Time of concentration =    26.250 min.
Effective stream area after confluence =      5.120(Ac.)
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Process from Point/Station      80.000 to Point/Station      88.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.300(Ft.)
Downstream point/station elevation =   478.300(Ft.)
Pipe length  =   398.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.833(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.833(CFS)
Normal flow depth in pipe =   13.57(In.)
Flow top width inside pipe =   15.51(In.)
Critical Depth =   12.14(In.)
Pipe flow velocity =      4.78(Ft/s)
Travel time through pipe =    1.39 min.
Time of concentration (TC) =    27.64 min.


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Process from Point/Station      89.000 to Point/Station      88.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    27.64 min.
Rainfall intensity =      1.543(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.034(CFS) for    0.030(Ac.)
Total runoff =      6.868(CFS)   Total area =       5.15(Ac.)


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Process from Point/Station      88.000 to Point/Station      60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.300(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   264.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.868(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.868(CFS)
Normal flow depth in pipe =   13.76(In.)
Flow top width inside pipe =   15.28(In.)
Critical Depth =   12.16(In.)
Pipe flow velocity =      4.74(Ft/s)
Travel time through pipe =    0.93 min.
Time of concentration (TC) =    28.57 min.


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Process from Point/Station      88.000 to Point/Station      60.000
**** CONFLUENCE OF MAIN STREAMS ****
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The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.150(Ac.)
Runoff from this stream =      6.868(CFS)
Time of concentration =   28.57 min.
Rainfall intensity =     1.514(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      90.000 to Point/Station      92.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  389.000(Ft.)
Highest elevation =  488.500(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    3.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.77 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 389.000^.5)/( 1.003^(1/3)]=  12.77
Rainfall intensity (I) =      2.288(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.489(CFS)
Total initial stream area =        1.470(Ac.)


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Process from Point/Station      92.000 to Point/Station      94.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =   482.700(Ft.)
Downstream point elevation =   482.000(Ft.)
Channel length thru subarea  =   133.000(Ft.)
Channel base width    =   40.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.692(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.692(CFS)
Depth of flow =   0.109(Ft.), Average velocity =   0.612(Ft/s)
Channel flow top width =   40.655(Ft.)
Flow Velocity =    0.61(Ft/s)
Travel time  =    3.62 min.
Time of concentration =   16.39 min.
Critical depth =      0.052(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.031(In/Hr) for a    10.0 year storm
```

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Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.361(CFS) for    0.240(Ac.)
Total runoff =      2.849(CFS)   Total area =        1.71(Ac.)


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Process from Point/Station      94.000 to Point/Station      60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.849(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.849(CFS)
Normal flow depth in pipe =    7.76(In.)
Flow top width inside pipe =   11.47(In.)
Critical Depth =    8.69(In.)
Pipe flow velocity =      5.31(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    16.67 min.


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Process from Point/Station      94.000 to Point/Station      66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.710(Ac.)
Runoff from this stream =      2.849(CFS)
Time of concentration =   16.67 min.
Rainfall intensity =     2.015(In/Hr)
Summary of stream data:

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


1       13.994     21.28            1.782
2        6.868     28.57            1.514
3        2.849     16.67            2.015
Qmax(1) =
        1.000 *    1.000 *    13.994) +
        1.000 *    0.745 *     6.868) +
        0.884 *    1.000 *     2.849) + =      21.630
Qmax(2) =
        0.849 *    1.000 *    13.994) +
        1.000 *    1.000 *     6.868) +
        0.751 *    1.000 *     2.849) + =      20.896
Qmax(3) =
        1.000 *    0.783 *    13.994) +
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        1.000 *    0.584 *     6.868) +
        1.000 *    1.000 *     2.849) + =      17.819

Total of 3 main streams to confluence:
Flow rates before confluence point:
      13.994       6.868       2.849
Maximum flow rates at confluence using above data:
       21.630       20.896       17.819
Area of streams before confluence:
        9.230        5.150        1.710


Results of confluence:
Total flow rate =     21.630(CFS)
Time of concentration =    21.280 min.
Effective stream area after confluence  =     16.090(Ac.)


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Process from Point/Station       60.000 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   477.000(Ft.)
Downstream point/station elevation =   476.680(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.630(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    21.630(CFS)
Normal flow depth in pipe =   23.67(In.)
Flow top width inside pipe =   24.48(In.)
Critical Depth =   18.96(In.)
Pipe flow velocity =      5.21(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =    21.62 min.


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Process from Point/Station       60.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     16.090(Ac.)
Runoff from this stream =     21.630(CFS)
Time of concentration =   21.62 min.
Rainfall intensity =     1.767(In/Hr)


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Process from Point/Station       98.000 to Point/Station       96.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
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Initial subarea flow distance  =  539.000(Ft.)
Highest elevation =  489.300(Ft.)
Lowest elevation =  482.700(Ft.)
Elevation difference =    6.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 539.000^.5)/( 1.224^(1/3)]=  14.06
Rainfall intensity (I) =      2.186(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.505(CFS)
Total initial stream area =       0.930(Ac.)


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Process from Point/Station       98.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.505(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     2.186(In/Hr)
Summary of stream data:

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


1       21.630     21.62            1.767
2        1.505     14.06            2.186
Qmax(1) =
        1.000 *    1.000 *    21.630) +
        0.808 *    1.000 *     1.505) + =      22.846
Qmax(2) =
        1.000 *    0.650 *    21.630) +
        1.000 *    1.000 *     1.505) + =      15.572

Total of 2 streams to confluence:
Flow rates before confluence point:
      21.630       1.505
Maximum flow rates at confluence using above data:
       22.846       15.572
Area of streams before confluence:
       16.090        0.930
Results of confluence:
Total flow rate =     22.846(CFS)
Time of concentration =    21.622 min.
Effective stream area after confluence =     17.020(Ac.)


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Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  191.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 191.000^.5)/( 1.309^(1/3)]=   8.19
Rainfall intensity (I) =      2.819(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.626(CFS)
Total initial stream area =        0.300(Ac.)


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Process from Point/Station      110.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 147.000^.5)/( 1.701^(1/3)]=   6.58
Rainfall intensity (I) =      3.132(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.556(CFS)
Total initial stream area =        0.240(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** 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  =  229.000(Ft.)
Highest elevation =  487.100(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.97 min.
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TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 229.000^.5)/(   1.092^(1/3)]=   3.97
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 =      2.184(CFS)
Total initial stream area =       0.640(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.000(Ft.)
Downstream point/station elevation =   479.800(Ft.)
Pipe length  =   254.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.184(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.184(CFS)
Normal flow depth in pipe =    8.84(In.)
Flow top width inside pipe =   10.57(In.)
Critical Depth =    7.58(In.)
Pipe flow velocity =      3.52(Ft/s)
Travel time through pipe =    1.20 min.
Time of concentration (TC) =     6.20 min.


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Process from Point/Station      126.000 to Point/Station      124.000
**** 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 =     6.20 min.
Rainfall intensity =      3.225(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.114(CFS) for    0.690(Ac.)
Total runoff =      4.298(CFS)   Total area =       1.33(Ac.)


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Process from Point/Station      124.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.800(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.298(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

```
Calculated individual pipe flow  =     4.298(CFS)
Normal flow depth in pipe =   11.16(In.)
Flow top width inside pipe =   17.48(In.)
Critical Depth =    9.54(In.)
Pipe flow velocity =      3.74(Ft/s)
Travel time through pipe =    0.93 min.
Time of concentration (TC) =     7.13 min.


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Process from Point/Station      130.000 to Point/Station      128.000
**** 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 =     7.13 min.
Rainfall intensity =      3.013(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.717(CFS) for    0.600(Ac.)
Total runoff =      6.016(CFS)   Total area =       1.93(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      128.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.400(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.016(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.016(CFS)
Normal flow depth in pipe =   13.95(In.)
Flow top width inside pipe =   15.04(In.)
Critical Depth =   11.38(In.)
Pipe flow velocity =      4.09(Ft/s)
Travel time through pipe =    0.78 min.
Time of concentration (TC) =     7.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      132.000
**** 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 =     7.91 min.
Rainfall intensity =      2.867(In/Hr) for a    10.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.751(CFS) for    1.010(Ac.)
Total runoff =      8.766(CFS)   Total area =       2.94(Ac.)


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Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.400(Ft.)
Downstream point/station elevation =   476.700(Ft.)
Pipe length  =   455.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.766(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.766(CFS)
Normal flow depth in pipe =   15.66(In.)
Flow top width inside pipe =   18.29(In.)
Critical Depth =   13.21(In.)
Pipe flow velocity =      4.56(Ft/s)
Travel time through pipe =    1.66 min.
Time of concentration (TC) =     9.57 min.


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Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =      8.766(CFS)
Time of concentration =    9.57 min.
Rainfall intensity =     2.619(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  179.000(Ft.)
Highest elevation =  489.000(Ft.)
Lowest elevation =  457.000(Ft.)
Elevation difference =   32.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 179.000^.5)/(  17.877^(1/3)]=   3.32
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 = 0.740
Subarea runoff =      0.691(CFS)
Total initial stream area =        0.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.000(Ft.)
Elevation difference =    2.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 215.000^.5)/( 1.023^(1/3)]=   9.43
Rainfall intensity (I) =      2.637(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.351(CFS)
Total initial stream area =        0.180(Ac.)
End of computations, total study area =         20.940 (Ac.)
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            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: 07/26/18
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Plaza La Media - North
Preliminary Hydrology
Proposed Conditions
25-Year Flow Rate

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

------------------------------------------------------------------------


Program License Serial Number 4028

------------------------------------------------------------------------
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


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Process from Point/Station       10.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  222.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =    2.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.41 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 222.000^.5)/( 1.081^(1/3)]=   9.41
Rainfall intensity (I) =      2.888(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.859(CFS)
Total initial stream area =        0.870(Ac.)
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Process from Point/Station      13.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =     9.41 min.
Rainfall intensity =      2.888(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.068(CFS) for    0.500(Ac.)
Total runoff =      2.928(CFS)   Total area =       1.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.300(Ft.)
Downstream point elevation =   484.900(Ft.)
Channel length thru subarea  =    80.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.163(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.163(CFS)
Depth of flow =   0.211(Ft.), Average velocity =   0.728(Ft/s)
Channel flow top width =   21.264(Ft.)
Flow Velocity =    0.73(Ft/s)
Travel time  =    1.83 min.
Time of concentration =   11.24 min.
Critical depth =      0.092(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.674(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.435(CFS) for    0.220(Ac.)
Total runoff =      3.363(CFS)   Total area =       1.59(Ac.)


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Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   311.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.363(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.363(CFS)
Normal flow depth in pipe =   11.88(In.)
Flow top width inside pipe =   12.17(In.)
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Critical Depth =    8.87(In.)
Pipe flow velocity =      3.23(Ft/s)
Travel time through pipe =    1.61 min.
Time of concentration (TC) =    12.85 min.


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Process from Point/Station      14.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.590(Ac.)
Runoff from this stream =      3.363(CFS)
Time of concentration =   12.85 min.
Rainfall intensity =     2.523(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      20.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  522.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    15.67 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 522.000^.5)/( 0.843^(1/3)]=  15.67
Rainfall intensity (I) =      2.311(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.668(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      22.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   484.300(Ft.)
Downstream point elevation =   484.000(Ft.)
Channel length thru subarea  =    62.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.668(CFS)
Depth of flow =   0.285(Ft.), Average velocity =   0.867(Ft/s)
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Channel flow top width =   19.712(Ft.)
Flow Velocity =    0.87(Ft/s)
Travel time  =    1.19 min.
Time of concentration =   16.86 min.
Critical depth =      0.127(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      22.000 to Point/Station      24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.730(Ac.)
Runoff from this stream =      4.668(CFS)
Time of concentration =   16.86 min.
Rainfall intensity =     2.235(In/Hr)


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Process from Point/Station      30.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  187.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.500(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 187.000^.5)/( 0.909^(1/3)]=   9.15
Rainfall intensity (I) =      2.923(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.714(CFS)
Total initial stream area =       0.330(Ac.)


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Process from Point/Station      32.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   486.500(Ft.)
Downstream point elevation =   484.100(Ft.)
Channel length thru subarea  =   367.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.714(CFS)
Depth of flow =   0.085(Ft.), Average velocity =   0.460(Ft/s)
Channel flow top width =   18.510(Ft.)
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Flow Velocity =    0.46(Ft/s)
Travel time  =   13.30 min.
Time of concentration =   22.45 min.
Critical depth =      0.037(Ft.)


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Process from Point/Station       32.000 to Point/Station       24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.714(CFS)
Time of concentration =   22.45 min.
Rainfall intensity =     1.946(In/Hr)
Summary of stream data:

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


1        4.668     16.86            2.235
2        0.714     22.45            1.946
Qmax(1) =
        1.000 *    1.000 *     4.668) +
        1.000 *    0.751 *     0.714) + =       5.204
Qmax(2) =
        0.871 *    1.000 *     4.668) +
        1.000 *    1.000 *     0.714) + =       4.778

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.668       0.714
Maximum flow rates at confluence using above data:
        5.204       4.778
Area of streams before confluence:
        2.730       0.330
Results of confluence:
Total flow rate =      5.204(CFS)
Time of concentration =    16.864 min.
Effective stream area after confluence =      3.060(Ac.)


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Process from Point/Station       24.000 to Point/Station       24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.86 min.
Rainfall intensity =      2.235(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.711(CFS) for    0.430(Ac.)
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Total runoff =      5.915(CFS)   Total area =        3.49(Ac.)


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Process from Point/Station      24.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.100(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.915(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     5.915(CFS)
Normal flow depth in pipe =   13.17(In.)
Flow top width inside pipe =   20.31(In.)
Critical Depth =   10.75(In.)
Pipe flow velocity =      3.73(Ft/s)
Travel time through pipe =    0.83 min.
Time of concentration (TC) =    17.69 min.


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Process from Point/Station      24.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.490(Ac.)
Runoff from this stream =      5.915(CFS)
Time of concentration =   17.69 min.
Rainfall intensity =     2.186(In/Hr)
Summary of stream data:

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


1        3.363     12.85             2.523
2        5.915     17.69             2.186
Qmax(1) =
        1.000 *    1.000 *     3.363) +
        1.000 *    0.726 *     5.915) + =       7.658
Qmax(2) =
        0.866 *    1.000 *     3.363) +
        1.000 *    1.000 *     5.915) + =       8.829

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.363       5.915
Maximum flow rates at confluence using above data:
        7.658        8.829
Area of streams before confluence:
```

```
        1.590        3.490


Results of confluence:
Total flow rate =      8.829(CFS)
Time of concentration =    17.692 min.
Effective stream area after confluence  =      5.080(Ac.)


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Process from Point/Station       16.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.600(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   161.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.829(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.829(CFS)
Normal flow depth in pipe =   17.20(In.)
Flow top width inside pipe =   16.16(In.)
Critical Depth =   13.24(In.)
Pipe flow velocity =      4.18(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =    18.33 min.


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Process from Point/Station       36.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.33 min.
Rainfall intensity =      2.150(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.113(CFS) for    0.700(Ac.)
Total runoff =      9.942(CFS)   Total area =       5.78(Ac.)


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Process from Point/Station       34.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.500(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.942(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =     9.942(CFS)
Normal flow depth in pipe =   15.98(In.)
Flow top width inside pipe =   22.64(In.)
Critical Depth =   13.54(In.)
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Pipe flow velocity =      4.48(Ft/s)
Travel time through pipe =    0.71 min.
Time of concentration (TC) =    19.04 min.


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Process from Point/Station      40.000 to Point/Station      38.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    19.04 min.
Rainfall intensity =      2.111(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.406(CFS) for    0.260(Ac.)
Total runoff =     10.348(CFS)   Total area =       6.04(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      38.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.500(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.348(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.348(CFS)
Normal flow depth in pipe =   16.29(In.)
Flow top width inside pipe =   22.41(In.)
Critical Depth =   13.82(In.)
Pipe flow velocity =      4.56(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =    19.60 min.


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Process from Point/Station      38.000 to Point/Station      42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.040(Ac.)
Runoff from this stream =     10.348(CFS)
Time of concentration =   19.60 min.
Rainfall intensity =     2.082(In/Hr)


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Process from Point/Station      50.000 to Point/Station      52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  455.000(Ft.)
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Highest elevation =  488.400(Ft.)
Lowest elevation =  485.500(Ft.)
Elevation difference =    2.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    16.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 455.000^.5)/( 0.637^(1/3)]=  16.06
Rainfall intensity (I) =      2.285(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.599(CFS)
Total initial stream area =        2.720(Ac.)


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Process from Point/Station       52.000 to Point/Station       54.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   483.800(Ft.)
Downstream point elevation =   483.000(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      4.997(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.997(CFS)
Depth of flow =   0.279(Ft.), Average velocity =   0.860(Ft/s)
Channel flow top width =   21.672(Ft.)
Flow Velocity =    0.86(Ft/s)
Travel time  =    3.18 min.
Time of concentration =   19.24 min.
Critical depth =      0.124(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.101(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.731(CFS) for    0.470(Ac.)
Total runoff =      5.330(CFS)   Total area =       3.19(Ac.)


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Process from Point/Station       54.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.000(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.330(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.330(CFS)
Normal flow depth in pipe =   11.41(In.)
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Flow top width inside pipe =   17.34(In.)
Critical Depth =   10.67(In.)
Pipe flow velocity =      4.51(Ft/s)
Travel time through pipe =    0.77 min.
Time of concentration (TC) =    20.00 min.


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Process from Point/Station       54.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.190(Ac.)
Runoff from this stream =      5.330(CFS)
Time of concentration =   20.00 min.
Rainfall intensity =     2.061(In/Hr)
Summary of stream data:

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


1       10.348     19.60            2.082
2        5.330     20.00            2.061
Qmax(1) =
        1.000 *    1.000 *    10.348) +
        1.000 *    0.980 *     5.330) + =      15.572
Qmax(2) =
        0.990 *    1.000 *    10.348) +
        1.000 *    1.000 *     5.330) + =      15.577

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.348       5.330
Maximum flow rates at confluence using above data:
       15.572       15.577
Area of streams before confluence:
        6.040        3.190
Results of confluence:
Total flow rate =     15.577(CFS)
Time of concentration =    20.003 min.
Effective stream area after confluence =      9.230(Ac.)


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Process from Point/Station       42.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.577(CFS)
```

```
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    15.577(CFS)
Normal flow depth in pipe =   20.16(In.)
Flow top width inside pipe =   23.49(In.)
Critical Depth =   16.52(In.)
Pipe flow velocity =      4.89(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =    21.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.230(Ac.)
Runoff from this stream =     15.577(CFS)
Time of concentration =   21.11 min.
Rainfall intensity =     2.007(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  264.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  490.700(Ft.)
Elevation difference =    2.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    11.02 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 264.000^.5)/( 0.871^(1/3)]=  11.02
Rainfall intensity (I) =      2.696(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.594(CFS)
Total initial stream area =       1.300(Ac.)


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Process from Point/Station       72.000 to Point/Station       74.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.300(Ft.)
Downstream point elevation =   487.300(Ft.)
Channel length thru subarea  =   180.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
```

```
Estimated mean flow rate at midpoint of channel =      3.102(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.102(CFS)
Depth of flow =   0.202(Ft.), Average velocity =   0.746(Ft/s)
Channel flow top width =   21.211(Ft.)
Flow Velocity =    0.75(Ft/s)
Travel time  =    4.02 min.
Time of concentration =   15.05 min.
Critical depth =      0.090(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.353(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.888(CFS) for    0.510(Ac.)
Total runoff =      3.482(CFS)   Total area =       1.81(Ac.)


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Process from Point/Station       74.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   483.300(Ft.)
Downstream point/station elevation =   482.400(Ft.)
Pipe length  =   179.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.482(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.482(CFS)
Normal flow depth in pipe =    9.79(In.)
Flow top width inside pipe =   14.29(In.)
Critical Depth =    9.04(In.)
Pipe flow velocity =      4.11(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =    15.77 min.


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Process from Point/Station       77.000 to Point/Station       76.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    15.77 min.
Rainfall intensity =      2.304(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.085(CFS) for    0.050(Ac.)
Total runoff =      3.567(CFS)   Total area =       1.86(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =   482.400(Ft.)
Downstream point/station elevation =   481.300(Ft.)
Pipe length  =   241.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.567(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.567(CFS)
Normal flow depth in pipe =   10.31(In.)
Flow top width inside pipe =   13.91(In.)
Critical Depth =    9.15(In.)
Pipe flow velocity =      3.97(Ft/s)
Travel time through pipe =    1.01 min.
Time of concentration (TC) =    16.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.000 to Point/Station       78.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.78 min.
Rainfall intensity =      2.240(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.050(CFS) for    0.030(Ac.)
Total runoff =      3.617(CFS)   Total area =       1.89(Ac.)


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Process from Point/Station       78.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.300(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.617(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.617(CFS)
Normal flow depth in pipe =    9.80(In.)
Flow top width inside pipe =   14.28(In.)
Critical Depth =    9.22(In.)
Pipe flow velocity =      4.26(Ft/s)
Travel time through pipe =    0.72 min.
Time of concentration (TC) =    17.51 min.


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Process from Point/Station       78.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.890(Ac.)
Runoff from this stream =      3.617(CFS)
Time of concentration =   17.51 min.
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Rainfall intensity =     2.196(In/Hr)


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Process from Point/Station      82.000 to Point/Station      84.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  814.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  487.800(Ft.)
Elevation difference =    5.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    21.47 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 814.000^.5)/( 0.639^(1/3)]=  21.47
Rainfall intensity (I) =      1.991(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.021(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      84.000 to Point/Station      86.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.500(Ft.)
Downstream point elevation =   484.500(Ft.)
Channel length thru subarea  =   216.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      4.390(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.390(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   0.806(Ft/s)
Channel flow top width =   21.572(Ft.)
Flow Velocity =    0.81(Ft/s)
Travel time  =    4.47 min.
Time of concentration =   25.93 min.
Critical depth =      0.113(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      1.802(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.667(CFS) for    0.500(Ac.)
Total runoff =      4.688(CFS)   Total area =       3.23(Ac.)


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Process from Point/Station      86.000 to Point/Station      80.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.688(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.688(CFS)
Normal flow depth in pipe =   11.32(In.)
Flow top width inside pipe =   12.91(In.)
Critical Depth =   10.54(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    26.05 min.


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Process from Point/Station       86.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.230(Ac.)
Runoff from this stream =      4.688(CFS)
Time of concentration =   26.05 min.
Rainfall intensity =     1.798(In/Hr)
Summary of stream data:

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


1        3.617     17.51            2.196
2        4.688     26.05            1.798
Qmax(1) =
        1.000 *    1.000 *     3.617) +
        1.000 *    0.672 *     4.688) + =       6.768
Qmax(2) =
        0.819 *    1.000 *     3.617) +
        1.000 *    1.000 *     4.688) + =       7.649

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.617       4.688
Maximum flow rates at confluence using above data:
        6.768        7.649
Area of streams before confluence:
        1.890        3.230
Results of confluence:
Total flow rate =      7.649(CFS)
Time of concentration =    26.047 min.
Effective stream area after confluence =      5.120(Ac.)
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Process from Point/Station       80.000 to Point/Station       88.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.300(Ft.)
Downstream point/station elevation =   478.300(Ft.)
Pipe length  =   398.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.649(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.649(CFS)
Normal flow depth in pipe =   12.71(In.)
Flow top width inside pipe =   20.53(In.)
Critical Depth =   12.29(In.)
Pipe flow velocity =      5.02(Ft/s)
Travel time through pipe =    1.32 min.
Time of concentration (TC) =    27.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.000 to Point/Station       88.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    27.37 min.
Rainfall intensity =      1.749(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.039(CFS) for    0.030(Ac.)
Total runoff =      7.687(CFS)   Total area =        5.15(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.300(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   264.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.687(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.687(CFS)
Normal flow depth in pipe =   12.84(In.)
Flow top width inside pipe =   20.47(In.)
Critical Depth =   12.32(In.)
Pipe flow velocity =      4.99(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    28.25 min.


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Process from Point/Station       88.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
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The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.150(Ac.)
Runoff from this stream =      7.687(CFS)
Time of concentration =   28.25 min.
Rainfall intensity =     1.717(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station       90.000 to Point/Station      92.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  389.000(Ft.)
Highest elevation =  488.500(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    3.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.77 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 389.000^.5)/( 1.003^(1/3)]=  12.77
Rainfall intensity (I) =      2.530(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.752(CFS)
Total initial stream area =       1.470(Ac.)


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Process from Point/Station       92.000 to Point/Station      94.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =   482.700(Ft.)
Downstream point elevation =   482.000(Ft.)
Channel length thru subarea  =   133.000(Ft.)
Channel base width    =   40.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.976(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.976(CFS)
Depth of flow =   0.116(Ft.), Average velocity =   0.637(Ft/s)
Channel flow top width =   40.695(Ft.)
Flow Velocity =    0.64(Ft/s)
Travel time  =    3.48 min.
Time of concentration =   16.25 min.
Critical depth =      0.056(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.273(In/Hr) for a    25.0 year storm
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Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.404(CFS) for    0.240(Ac.)
Total runoff =      3.155(CFS)   Total area =       1.71(Ac.)


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Process from Point/Station       94.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.155(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.155(CFS)
Normal flow depth in pipe =    8.36(In.)
Flow top width inside pipe =   11.04(In.)
Critical Depth =    9.13(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    16.52 min.


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Process from Point/Station       94.000 to Point/Station       66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.710(Ac.)
Runoff from this stream =      3.155(CFS)
Time of concentration =   16.52 min.
Rainfall intensity =     2.256(In/Hr)
Summary of stream data:

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



1       15.577     21.11            2.007
2        7.687     28.25            1.717
3        3.155     16.52            2.256
Qmax(1) =
        1.000 *    1.000 *    15.577) +
        1.000 *    0.747 *     7.687) +
        0.890 *    1.000 *     3.155) + =      24.130
Qmax(2) =
        0.856 *    1.000 *    15.577) +
        1.000 *    1.000 *     7.687) +
        0.761 *    1.000 *     3.155) + =      23.416
Qmax(3) =
        1.000 *    0.783 *    15.577) +
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        1.000 *    0.585 *     7.687) +
        1.000 *    1.000 *     3.155) + =      19.844

Total of 3 main streams to confluence:
Flow rates before confluence point:
      15.577       7.687       3.155
Maximum flow rates at confluence using above data:
       24.130       23.416       19.844
Area of streams before confluence:
        9.230        5.150        1.710


Results of confluence:
Total flow rate =     24.130(CFS)
Time of concentration =    21.110 min.
Effective stream area after confluence  =     16.090(Ac.)


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Process from Point/Station       60.000 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   477.000(Ft.)
Downstream point/station elevation =   476.680(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.130(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    24.130(CFS)
Normal flow depth in pipe =   23.04(In.)
Flow top width inside pipe =   30.30(In.)
Critical Depth =   19.52(In.)
Pipe flow velocity =      5.45(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =    21.44 min.


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Process from Point/Station       60.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     16.090(Ac.)
Runoff from this stream =     24.130(CFS)
Time of concentration =   21.44 min.
Rainfall intensity =     1.992(In/Hr)


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Process from Point/Station       98.000 to Point/Station       96.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
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Initial subarea flow distance  =  539.000(Ft.)
Highest elevation =  489.300(Ft.)
Lowest elevation =  482.700(Ft.)
Elevation difference =    6.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 539.000^.5)/( 1.224^(1/3)]=  14.06
Rainfall intensity (I) =      2.425(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.669(CFS)
Total initial stream area =       0.930(Ac.)


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Process from Point/Station       98.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.669(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     2.425(In/Hr)
Summary of stream data:

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


1       24.130     21.44            1.992
2        1.669     14.06            2.425
Qmax(1) =
        1.000 *    1.000 *    24.130) +
        0.821 *    1.000 *     1.669) + =      25.501
Qmax(2) =
        1.000 *    0.656 *    24.130) +
        1.000 *    1.000 *     1.669) + =      17.497

Total of 2 streams to confluence:
Flow rates before confluence point:
      24.130       1.669
Maximum flow rates at confluence using above data:
       25.501       17.497
Area of streams before confluence:
       16.090        0.930
Results of confluence:
Total flow rate =     25.501(CFS)
Time of concentration =    21.437 min.
Effective stream area after confluence =     17.020(Ac.)


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Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  191.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 191.000^.5)/( 1.309^(1/3)]=   8.19
Rainfall intensity (I) =      3.069(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.681(CFS)
Total initial stream area =        0.300(Ac.)


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Process from Point/Station      110.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 147.000^.5)/( 1.701^(1/3)]=   6.58
Rainfall intensity (I) =      3.383(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.601(CFS)
Total initial stream area =        0.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** 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  =  229.000(Ft.)
Highest elevation =  487.100(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.97 min.
```

```
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 229.000^.5)/(   1.092^(1/3)]=   3.97
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 =      2.338(CFS)
Total initial stream area =        0.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.000(Ft.)
Downstream point/station elevation =   479.800(Ft.)
Pipe length  =   254.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.338(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.338(CFS)
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
Critical Depth =    7.85(In.)
Pipe flow velocity =      3.55(Ft/s)
Travel time through pipe =    1.19 min.
Time of concentration (TC) =     6.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      124.000
**** 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 =     6.19 min.
Rainfall intensity =      3.479(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.280(CFS) for    0.690(Ac.)
Total runoff =      4.618(CFS)   Total area =        1.33(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.800(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.618(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

```
Calculated individual pipe flow  =     4.618(CFS)
Normal flow depth in pipe =   11.72(In.)
Flow top width inside pipe =   17.16(In.)
Critical Depth =    9.90(In.)
Pipe flow velocity =      3.79(Ft/s)
Travel time through pipe =    0.91 min.
Time of concentration (TC) =     7.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      128.000
**** 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 =     7.11 min.
Rainfall intensity =      3.268(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.863(CFS) for    0.600(Ac.)
Total runoff =      6.481(CFS)   Total area =        1.93(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      128.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.400(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.481(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.481(CFS)
Normal flow depth in pipe =   12.64(In.)
Flow top width inside pipe =   20.56(In.)
Critical Depth =   11.27(In.)
Pipe flow velocity =      4.28(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =     7.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      132.000
**** 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                       ]
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```
Time of concentration =     7.85 min.
Rainfall intensity =      3.126(In/Hr) for a    25.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.000(CFS) for    1.010(Ac.)
Total runoff =      9.480(CFS)   Total area =        2.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.400(Ft.)
Downstream point/station elevation =   476.700(Ft.)
Pipe length  =   455.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.480(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.480(CFS)
Normal flow depth in pipe =   16.83(In.)
Flow top width inside pipe =   16.76(In.)
Critical Depth =   13.75(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    1.65 min.
Time of concentration (TC) =     9.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =      9.480(CFS)
Time of concentration =    9.50 min.
Rainfall intensity =     2.875(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  179.000(Ft.)
Highest elevation =  489.000(Ft.)
Lowest elevation =  457.000(Ft.)
Elevation difference =   32.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 179.000^.5)/(  17.877^(1/3)]=   3.32
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 = 0.740
Subarea runoff =      0.740(CFS)
Total initial stream area =        0.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.000(Ft.)
Elevation difference =    2.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 215.000^.5)/( 1.023^(1/3)]=   9.43
Rainfall intensity (I) =      2.885(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.384(CFS)
Total initial stream area =        0.180(Ac.)
End of computations, total study area =         20.940 (Ac.)
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          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: 07/26/18
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Plaza La Media - North
Preliminary Hydrology
Proposed Conditions
50-Year Flow Rate

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

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Program License Serial Number 4028

------------------------------------------------------------------------
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


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Process from Point/Station      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  222.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =    2.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.41 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 222.000^.5)/( 1.081^(1/3)]=   9.41
Rainfall intensity (I) =      3.269(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.105(CFS)
Total initial stream area =       0.870(Ac.)
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Process from Point/Station      13.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =     9.41 min.
Rainfall intensity =      3.269(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.210(CFS) for    0.500(Ac.)
Total runoff =      3.315(CFS)   Total area =       1.37(Ac.)


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Process from Point/Station      12.000 to Point/Station      14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.300(Ft.)
Downstream point elevation =   484.900(Ft.)
Channel length thru subarea  =    80.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.581(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.581(CFS)
Depth of flow =   0.227(Ft.), Average velocity =   0.763(Ft/s)
Channel flow top width =   21.361(Ft.)
Flow Velocity =    0.76(Ft/s)
Travel time  =    1.75 min.
Time of concentration =   11.15 min.
Critical depth =      0.100(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      3.054(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.497(CFS) for    0.220(Ac.)
Total runoff =      3.812(CFS)   Total area =       1.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   311.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.812(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     3.812(CFS)
Normal flow depth in pipe =   10.83(In.)
Flow top width inside pipe =   17.62(In.)
```

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Critical Depth =    8.96(In.)
Pipe flow velocity =      3.43(Ft/s)
Travel time through pipe =    1.51 min.
Time of concentration (TC) =    12.66 min.


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Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.590(Ac.)
Runoff from this stream =      3.812(CFS)
Time of concentration =   12.66 min.
Rainfall intensity =     2.902(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  522.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    15.67 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 522.000^.5)/( 0.843^(1/3)]=  15.67
Rainfall intensity (I) =      2.657(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      5.368(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   484.300(Ft.)
Downstream point elevation =   484.000(Ft.)
Channel length thru subarea  =    62.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      5.368(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   0.914(Ft/s)
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```
Channel flow top width =   19.861(Ft.)
Flow Velocity =    0.91(Ft/s)
Travel time  =    1.13 min.
Time of concentration =   16.80 min.
Critical depth =      0.139(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      22.000 to Point/Station      24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.730(Ac.)
Runoff from this stream =      5.368(CFS)
Time of concentration =   16.80 min.
Rainfall intensity =     2.579(In/Hr)


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Process from Point/Station      30.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  187.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.500(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 187.000^.5)/( 0.909^(1/3)]=   9.15
Rainfall intensity (I) =      3.307(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.807(CFS)
Total initial stream area =        0.330(Ac.)


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Process from Point/Station      32.000 to Point/Station      24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   486.500(Ft.)
Downstream point elevation =   484.100(Ft.)
Channel length thru subarea  =   367.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.807(CFS)
Depth of flow =   0.092(Ft.), Average velocity =   0.483(Ft/s)
Channel flow top width =   18.549(Ft.)
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Flow Velocity =    0.48(Ft/s)
Travel time  =   12.67 min.
Time of concentration =   21.82 min.
Critical depth =      0.040(Ft.)


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Process from Point/Station      32.000 to Point/Station      24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.807(CFS)
Time of concentration =   21.82 min.
Rainfall intensity =     2.288(In/Hr)
Summary of stream data:

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


1        5.368     16.80            2.579
2        0.807     21.82            2.288
Qmax(1) =
        1.000 *    1.000 *     5.368) +
        1.000 *    0.770 *     0.807) + =       5.990
Qmax(2) =
        0.887 *    1.000 *     5.368) +
        1.000 *    1.000 *     0.807) + =       5.569

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.368       0.807
Maximum flow rates at confluence using above data:
        5.990       5.569
Area of streams before confluence:
        2.730       0.330
Results of confluence:
Total flow rate =      5.990(CFS)
Time of concentration =    16.803 min.
Effective stream area after confluence =      3.060(Ac.)


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Process from Point/Station      24.000 to Point/Station      24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.80 min.
Rainfall intensity =      2.579(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.821(CFS) for    0.430(Ac.)
```

```
Total runoff =      6.811(CFS)   Total area =       3.49(Ac.)


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Process from Point/Station      24.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.100(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.811(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.811(CFS)
Normal flow depth in pipe =   14.55(In.)
Flow top width inside pipe =   19.37(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      3.83(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =    17.61 min.


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Process from Point/Station      24.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.490(Ac.)
Runoff from this stream =      6.811(CFS)
Time of concentration =   17.61 min.
Rainfall intensity =     2.527(In/Hr)
Summary of stream data:

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


1        3.812     12.66            2.902
2        6.811     17.61            2.527
Qmax(1) =
        1.000 *    1.000 *     3.812) +
        1.000 *    0.719 *     6.811) + =       8.710
Qmax(2) =
        0.871 *    1.000 *     3.812) +
        1.000 *    1.000 *     6.811) + =      10.130

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.812       6.811
Maximum flow rates at confluence using above data:
        8.710       10.130
Area of streams before confluence:
```

```
        1.590        3.490


Results of confluence:
Total flow rate =     10.130(CFS)
Time of concentration =    17.609 min.
Effective stream area after confluence  =      5.080(Ac.)


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Process from Point/Station       16.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.600(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   161.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.130(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.130(CFS)
Normal flow depth in pipe =   16.29(In.)
Flow top width inside pipe =   22.41(In.)
Critical Depth =   13.67(In.)
Pipe flow velocity =      4.46(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =    18.21 min.


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Process from Point/Station       36.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.21 min.
Rainfall intensity =      2.489(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.290(CFS) for    0.700(Ac.)
Total runoff =     11.420(CFS)   Total area =       5.78(Ac.)


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Process from Point/Station       34.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.500(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.420(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.420(CFS)
Normal flow depth in pipe =   17.77(In.)
Flow top width inside pipe =   21.05(In.)
Critical Depth =   14.55(In.)
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Pipe flow velocity =      4.58(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    18.90 min.


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Process from Point/Station      40.000 to Point/Station      38.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.90 min.
Rainfall intensity =      2.448(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.471(CFS) for    0.260(Ac.)
Total runoff =     11.891(CFS)   Total area =       6.04(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      38.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.500(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.891(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.891(CFS)
Normal flow depth in pipe =   18.19(In.)
Flow top width inside pipe =   20.56(In.)
Critical Depth =   14.87(In.)
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    19.45 min.


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Process from Point/Station      38.000 to Point/Station      42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.040(Ac.)
Runoff from this stream =     11.891(CFS)
Time of concentration =   19.45 min.
Rainfall intensity =     2.416(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      50.000 to Point/Station      52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  455.000(Ft.)
```

```
Highest elevation =  488.400(Ft.)
Lowest elevation =  485.500(Ft.)
Elevation difference =    2.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    16.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 455.000^.5)/( 0.637^(1/3)]=  16.06
Rainfall intensity (I) =      2.630(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      5.293(CFS)
Total initial stream area =        2.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       54.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   483.800(Ft.)
Downstream point elevation =   483.000(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      5.750(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      5.750(CFS)
Depth of flow =   0.303(Ft.), Average velocity =   0.908(Ft/s)
Channel flow top width =   21.818(Ft.)
Flow Velocity =    0.91(Ft/s)
Travel time  =    3.01 min.
Time of concentration =   19.07 min.
Critical depth =      0.137(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.438(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.848(CFS) for    0.470(Ac.)
Total runoff =      6.141(CFS)   Total area =       3.19(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.000(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.141(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.141(CFS)
Normal flow depth in pipe =   12.64(In.)
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```
Flow top width inside pipe =   16.46(In.)
Critical Depth =   11.49(In.)
Pipe flow velocity =      4.63(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =    19.82 min.


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Process from Point/Station       54.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.190(Ac.)
Runoff from this stream =      6.141(CFS)
Time of concentration =   19.82 min.
Rainfall intensity =     2.395(In/Hr)
Summary of stream data:

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


1       11.891     19.45            2.416
2        6.141     19.82            2.395
Qmax(1) =
        1.000 *    1.000 *    11.891) +
        1.000 *    0.982 *     6.141) + =      17.918
Qmax(2) =
        0.991 *    1.000 *    11.891) +
        1.000 *    1.000 *     6.141) + =      17.930

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.891       6.141
Maximum flow rates at confluence using above data:
       17.918       17.930
Area of streams before confluence:
        6.040        3.190
Results of confluence:
Total flow rate =     17.930(CFS)
Time of concentration =    19.818 min.
Effective stream area after confluence =      9.230(Ac.)


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Process from Point/Station       42.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.930(CFS)
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```
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    17.930(CFS)
Normal flow depth in pipe =   23.34(In.)
Flow top width inside pipe =   18.48(In.)
Critical Depth =   17.76(In.)
Pipe flow velocity =      4.90(Ft/s)
Travel time through pipe =    1.10 min.
Time of concentration (TC) =    20.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.230(Ac.)
Runoff from this stream =     17.930(CFS)
Time of concentration =   20.92 min.
Rainfall intensity =     2.335(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  264.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  490.700(Ft.)
Elevation difference =    2.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    11.02 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 264.000^.5)/( 0.871^(1/3)]=  11.02
Rainfall intensity (I) =      3.068(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.952(CFS)
Total initial stream area =       1.300(Ac.)


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Process from Point/Station       72.000 to Point/Station       74.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.300(Ft.)
Downstream point elevation =   487.300(Ft.)
Channel length thru subarea  =   180.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
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```
Estimated mean flow rate at midpoint of channel =      3.531(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.531(CFS)
Depth of flow =   0.218(Ft.), Average velocity =   0.784(Ft/s)
Channel flow top width =   21.308(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    3.83 min.
Time of concentration =   14.85 min.
Critical depth =      0.099(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.718(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.026(CFS) for    0.510(Ac.)
Total runoff =      3.978(CFS)   Total area =       1.81(Ac.)


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Process from Point/Station       74.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   483.300(Ft.)
Downstream point/station elevation =   482.400(Ft.)
Pipe length  =   179.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.978(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.978(CFS)
Normal flow depth in pipe =   10.80(In.)
Flow top width inside pipe =   13.47(In.)
Critical Depth =    9.68(In.)
Pipe flow velocity =      4.20(Ft/s)
Travel time through pipe =    0.71 min.
Time of concentration (TC) =    15.56 min.


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Process from Point/Station       77.000 to Point/Station       76.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    15.56 min.
Rainfall intensity =      2.665(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.099(CFS) for    0.050(Ac.)
Total runoff =      4.076(CFS)   Total area =       1.86(Ac.)


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Process from Point/Station       76.000 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =   482.400(Ft.)
Downstream point/station elevation =   481.300(Ft.)
Pipe length  =   241.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.076(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.076(CFS)
Normal flow depth in pipe =   11.48(In.)
Flow top width inside pipe =   12.71(In.)
Critical Depth =    9.81(In.)
Pipe flow velocity =      4.04(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    16.55 min.


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Process from Point/Station       79.000 to Point/Station       78.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.55 min.
Rainfall intensity =      2.596(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.058(CFS) for    0.030(Ac.)
Total runoff =      4.134(CFS)   Total area =       1.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.300(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.134(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.134(CFS)
Normal flow depth in pipe =   10.83(In.)
Flow top width inside pipe =   13.44(In.)
Critical Depth =    9.88(In.)
Pipe flow velocity =      4.36(Ft/s)
Travel time through pipe =    0.71 min.
Time of concentration (TC) =    17.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.890(Ac.)
Runoff from this stream =      4.134(CFS)
Time of concentration =   17.26 min.
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Rainfall intensity =     2.549(In/Hr)


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Process from Point/Station      82.000 to Point/Station      84.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  814.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  487.800(Ft.)
Elevation difference =    5.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    21.47 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 814.000^.5)/( 0.639^(1/3)]=  21.47
Rainfall intensity (I) =      2.306(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      4.659(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      84.000 to Point/Station      86.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.500(Ft.)
Downstream point elevation =   484.500(Ft.)
Channel length thru subarea  =   216.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      5.085(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      5.085(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   0.852(Ft/s)
Channel flow top width =   21.716(Ft.)
Flow Velocity =    0.85(Ft/s)
Travel time  =    4.22 min.
Time of concentration =   25.69 min.
Critical depth =      0.125(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.104(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.779(CFS) for    0.500(Ac.)
Total runoff =      5.437(CFS)   Total area =       3.23(Ac.)


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Process from Point/Station      86.000 to Point/Station      80.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.437(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.437(CFS)
Normal flow depth in pipe =   10.62(In.)
Flow top width inside pipe =   17.71(In.)
Critical Depth =   10.79(In.)
Pipe flow velocity =      5.01(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    25.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.230(Ac.)
Runoff from this stream =      5.437(CFS)
Time of concentration =   25.80 min.
Rainfall intensity =     2.100(In/Hr)
Summary of stream data:

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


1        4.134     17.26            2.549
2        5.437     25.80            2.100
Qmax(1) =
        1.000 *    1.000 *     4.134) +
        1.000 *    0.669 *     5.437) + =       7.772
Qmax(2) =
        0.824 *    1.000 *     4.134) +
        1.000 *    1.000 *     5.437) + =       8.842

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.134       5.437
Maximum flow rates at confluence using above data:
        7.772        8.842
Area of streams before confluence:
        1.890        3.230
Results of confluence:
Total flow rate =      8.842(CFS)
Time of concentration =    25.797 min.
Effective stream area after confluence =      5.120(Ac.)
```

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Process from Point/Station      80.000 to Point/Station      88.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.300(Ft.)
Downstream point/station elevation =   478.300(Ft.)
Pipe length  =   398.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.842(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.842(CFS)
Normal flow depth in pipe =   14.04(In.)
Flow top width inside pipe =   19.77(In.)
Critical Depth =   13.27(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    1.28 min.
Time of concentration (TC) =    27.08 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      89.000 to Point/Station      88.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    27.08 min.
Rainfall intensity =      2.045(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.045(CFS) for    0.030(Ac.)
Total runoff =      8.888(CFS)   Total area =       5.15(Ac.)


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Process from Point/Station      88.000 to Point/Station      60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.300(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   264.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.888(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.888(CFS)
Normal flow depth in pipe =   14.20(In.)
Flow top width inside pipe =   19.65(In.)
Critical Depth =   13.31(In.)
Pipe flow velocity =      5.14(Ft/s)
Travel time through pipe =    0.86 min.
Time of concentration (TC) =    27.94 min.


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Process from Point/Station      88.000 to Point/Station      60.000
**** CONFLUENCE OF MAIN STREAMS ****
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________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.150(Ac.)
Runoff from this stream =      8.888(CFS)
Time of concentration =   27.94 min.
Rainfall intensity =     2.010(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station       90.000 to Point/Station      92.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  389.000(Ft.)
Highest elevation =  488.500(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    3.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.77 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 389.000^.5)/( 1.003^(1/3)]=  12.77
Rainfall intensity (I) =      2.892(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.146(CFS)
Total initial stream area =        1.470(Ac.)


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Process from Point/Station       92.000 to Point/Station      94.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   482.700(Ft.)
Downstream point elevation =   482.000(Ft.)
Channel length thru subarea  =   133.000(Ft.)
Channel base width    =   40.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.403(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.403(CFS)
Depth of flow =   0.126(Ft.), Average velocity =   0.671(Ft/s)
Channel flow top width =   40.753(Ft.)
Flow Velocity =    0.67(Ft/s)
Travel time  =    3.30 min.
Time of concentration =   16.07 min.
Critical depth =      0.061(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.629(In/Hr) for a    50.0 year storm
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Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.467(CFS) for    0.240(Ac.)
Total runoff =      3.613(CFS)   Total area =       1.71(Ac.)


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Process from Point/Station       94.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.613(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.613(CFS)
Normal flow depth in pipe =    9.35(In.)
Flow top width inside pipe =    9.95(In.)
Critical Depth =    9.73(In.)
Pipe flow velocity =      5.50(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    16.34 min.


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Process from Point/Station       94.000 to Point/Station       66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.710(Ac.)
Runoff from this stream =      3.613(CFS)
Time of concentration =   16.34 min.
Rainfall intensity =     2.611(In/Hr)
Summary of stream data:

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


1       17.930     20.92            2.335
2        8.888     27.94            2.010
3        3.613     16.34            2.611
Qmax(1) =
        1.000 *    1.000 *    17.930) +
        1.000 *    0.749 *     8.888) +
        0.894 *    1.000 *     3.613) + =      27.817
Qmax(2) =
        0.861 *    1.000 *    17.930) +
        1.000 *    1.000 *     8.888) +
        0.770 *    1.000 *     3.613) + =      27.102
Qmax(3) =
        1.000 *    0.781 *    17.930) +
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        1.000 *    0.585 *     8.888) +
        1.000 *    1.000 *     3.613) + =      22.812

Total of 3 main streams to confluence:
Flow rates before confluence point:
      17.930       8.888       3.613
Maximum flow rates at confluence using above data:
       27.817       27.102       22.812
Area of streams before confluence:
        9.230        5.150        1.710


Results of confluence:
Total flow rate =     27.817(CFS)
Time of concentration =    20.923 min.
Effective stream area after confluence  =     16.090(Ac.)


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Process from Point/Station       60.000 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   477.000(Ft.)
Downstream point/station elevation =   476.680(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.817(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    27.817(CFS)
Normal flow depth in pipe =   25.97(In.)
Flow top width inside pipe =   27.03(In.)
Critical Depth =   21.01(In.)
Pipe flow velocity =      5.55(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    21.24 min.


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Process from Point/Station       60.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     16.090(Ac.)
Runoff from this stream =     27.817(CFS)
Time of concentration =   21.24 min.
Rainfall intensity =     2.318(In/Hr)


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Process from Point/Station       98.000 to Point/Station       96.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
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```
Initial subarea flow distance  =  539.000(Ft.)
Highest elevation =  489.300(Ft.)
Lowest elevation =  482.700(Ft.)
Elevation difference =    6.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 539.000^.5)/( 1.224^(1/3)]=  14.06
Rainfall intensity (I) =      2.780(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      1.913(CFS)
Total initial stream area =        0.930(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       98.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.913(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     2.780(In/Hr)
Summary of stream data:

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


1       27.817     21.24            2.318
2        1.913     14.06            2.780
Qmax(1) =
        1.000 *    1.000 *    27.817) +
        0.834 *    1.000 *     1.913) + =      29.412
Qmax(2) =
        1.000 *    0.662 *    27.817) +
        1.000 *    1.000 *     1.913) + =      20.326

Total of 2 streams to confluence:
Flow rates before confluence point:
      27.817       1.913
Maximum flow rates at confluence using above data:
       29.412       20.326
Area of streams before confluence:
       16.090        0.930
Results of confluence:
Total flow rate =     29.412(CFS)
Time of concentration =    21.245 min.
Effective stream area after confluence =     17.020(Ac.)


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Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  191.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 191.000^.5)/( 1.309^(1/3)]=   8.19
Rainfall intensity (I) =      3.458(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.768(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 147.000^.5)/( 1.701^(1/3)]=   6.58
Rainfall intensity (I) =      3.785(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.672(CFS)
Total initial stream area =        0.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** 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  =  229.000(Ft.)
Highest elevation =  487.100(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.97 min.
```

```
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 229.000^.5)/(   1.092^(1/3)]=   3.97
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 =      2.593(CFS)
Total initial stream area =       0.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.000(Ft.)
Downstream point/station elevation =   479.800(Ft.)
Pipe length  =   254.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.593(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.593(CFS)
Normal flow depth in pipe =    8.24(In.)
Flow top width inside pipe =   14.93(In.)
Critical Depth =    7.75(In.)
Pipe flow velocity =      3.76(Ft/s)
Travel time through pipe =    1.13 min.
Time of concentration (TC) =     6.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      124.000
**** 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 =     6.13 min.
Rainfall intensity =      3.903(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.558(CFS) for    0.690(Ac.)
Total runoff =      5.151(CFS)   Total area =       1.33(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.800(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.151(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

```
Calculated individual pipe flow  =     5.151(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   16.41(In.)
Critical Depth =   10.48(In.)
Pipe flow velocity =      3.87(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =     7.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      128.000
**** 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 =     7.02 min.
Rainfall intensity =      3.684(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.100(CFS) for    0.600(Ac.)
Total runoff =      7.251(CFS)   Total area =       1.93(Ac.)


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Process from Point/Station      128.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.400(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.251(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.251(CFS)
Normal flow depth in pipe =   13.64(In.)
Flow top width inside pipe =   20.04(In.)
Critical Depth =   11.96(In.)
Pipe flow velocity =      4.38(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =     7.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      132.000
**** 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                        ]
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Time of concentration =     7.75 min.
Rainfall intensity =      3.537(In/Hr) for a    50.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.394(CFS) for    1.010(Ac.)
Total runoff =     10.645(CFS)   Total area =        2.94(Ac.)


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Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.400(Ft.)
Downstream point/station elevation =   476.700(Ft.)
Pipe length  =   455.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.645(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.645(CFS)
Normal flow depth in pipe =   15.80(In.)
Flow top width inside pipe =   22.77(In.)
Critical Depth =   14.03(In.)
Pipe flow velocity =      4.86(Ft/s)
Travel time through pipe =    1.56 min.
Time of concentration (TC) =     9.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =     10.645(CFS)
Time of concentration =    9.31 min.
Rainfall intensity =     3.283(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  179.000(Ft.)
Highest elevation =  489.000(Ft.)
Lowest elevation =  457.000(Ft.)
Elevation difference =   32.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 179.000^.5)/(  17.877^(1/3)]=   3.32
Setting time of concentration to 5 minutes
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```
Rainfall intensity (I) =      4.265(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.821(CFS)
Total initial stream area =       0.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.000(Ft.)
Elevation difference =    2.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 215.000^.5)/( 1.023^(1/3)]=   9.43
Rainfall intensity (I) =      3.266(In/Hr) for a    50.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.435(CFS)
Total initial stream area =       0.180(Ac.)
End of computations, total study area =         20.940 (Ac.)
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          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: 07/26/18
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Plaza La Media - North
Preliminary Hydrology
Proposed Conditions
100-Year Flow Rate

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

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Program License Serial Number 4028

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Rational hydrology study storm event year is   100.0
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


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Process from Point/Station      10.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  222.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  489.000(Ft.)
Elevation difference =    2.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.41 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 222.000^.5)/( 1.081^(1/3)]=   9.41
Rainfall intensity (I) =      3.450(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.221(CFS)
Total initial stream area =        0.870(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =     9.41 min.
Rainfall intensity =      3.450(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.276(CFS) for    0.500(Ac.)
Total runoff =      3.497(CFS)   Total area =       1.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      14.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.300(Ft.)
Downstream point elevation =   484.900(Ft.)
Channel length thru subarea  =    80.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.778(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.778(CFS)
Depth of flow =   0.234(Ft.), Average velocity =   0.779(Ft/s)
Channel flow top width =   21.405(Ft.)
Flow Velocity =    0.78(Ft/s)
Travel time  =    1.71 min.
Time of concentration =   11.12 min.
Critical depth =      0.104(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      3.247(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.529(CFS) for    0.220(Ac.)
Total runoff =      4.026(CFS)   Total area =       1.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   311.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.026(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.026(CFS)
Normal flow depth in pipe =   11.23(In.)
Flow top width inside pipe =   17.44(In.)
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Critical Depth =    9.21(In.)
Pipe flow velocity =      3.47(Ft/s)
Travel time through pipe =    1.49 min.
Time of concentration (TC) =    12.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.590(Ac.)
Runoff from this stream =      4.026(CFS)
Time of concentration =   12.61 min.
Rainfall intensity =     3.101(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  522.000(Ft.)
Highest elevation =  491.400(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =    4.400(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    15.67 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 522.000^.5)/( 0.843^(1/3)]=  15.67
Rainfall intensity (I) =      2.856(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      5.769(CFS)
Total initial stream area =        2.730(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   484.300(Ft.)
Downstream point elevation =   484.000(Ft.)
Channel length thru subarea  =    62.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      5.769(CFS)
Depth of flow =   0.324(Ft.), Average velocity =   0.939(Ft/s)
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Channel flow top width =   19.942(Ft.)
Flow Velocity =    0.94(Ft/s)
Travel time  =    1.10 min.
Time of concentration =   16.77 min.
Critical depth =      0.146(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.730(Ac.)
Runoff from this stream =      5.769(CFS)
Time of concentration =   16.77 min.
Rainfall intensity =     2.780(In/Hr)


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Process from Point/Station       30.000 to Point/Station       32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  187.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.500(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 187.000^.5)/( 0.909^(1/3)]=   9.15
Rainfall intensity (I) =      3.485(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.851(CFS)
Total initial stream area =        0.330(Ac.)


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Process from Point/Station       32.000 to Point/Station       24.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   486.500(Ft.)
Downstream point elevation =   484.100(Ft.)
Channel length thru subarea  =   367.000(Ft.)
Channel base width    =   18.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.851(CFS)
Depth of flow =   0.094(Ft.), Average velocity =   0.493(Ft/s)
Channel flow top width =   18.567(Ft.)
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Flow Velocity =    0.49(Ft/s)
Travel time  =   12.41 min.
Time of concentration =   21.56 min.
Critical depth =      0.041(Ft.)


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Process from Point/Station      32.000 to Point/Station      24.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.330(Ac.)
Runoff from this stream =      0.851(CFS)
Time of concentration =   21.56 min.
Rainfall intensity =     2.494(In/Hr)
Summary of stream data:

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


1        5.769     16.77            2.780
2        0.851     21.56            2.494
Qmax(1) =
        1.000 *    1.000 *     5.769) +
        1.000 *    0.778 *     0.851) + =       6.431
Qmax(2) =
        0.897 *    1.000 *     5.769) +
        1.000 *    1.000 *     0.851) + =       6.027

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.769       0.851
Maximum flow rates at confluence using above data:
        6.431        6.027
Area of streams before confluence:
        2.730        0.330
Results of confluence:
Total flow rate =      6.431(CFS)
Time of concentration =    16.773 min.
Effective stream area after confluence =      3.060(Ac.)


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Process from Point/Station      24.000 to Point/Station      24.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.77 min.
Rainfall intensity =      2.780(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.884(CFS) for    0.430(Ac.)
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Total runoff =      7.316(CFS)   Total area =       3.49(Ac.)


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Process from Point/Station      24.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.100(Ft.)
Downstream point/station elevation =   479.600(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.316(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.316(CFS)
Normal flow depth in pipe =   15.40(In.)
Flow top width inside pipe =   18.57(In.)
Critical Depth =   12.03(In.)
Pipe flow velocity =      3.87(Ft/s)
Travel time through pipe =    0.80 min.
Time of concentration (TC) =    17.57 min.


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Process from Point/Station      24.000 to Point/Station      16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.490(Ac.)
Runoff from this stream =      7.316(CFS)
Time of concentration =   17.57 min.
Rainfall intensity =     2.727(In/Hr)
Summary of stream data:

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


1        4.026     12.61             3.101
2        7.316     17.57             2.727
Qmax(1) =
        1.000 *    1.000 *     4.026) +
        1.000 *    0.718 *     7.316) + =       9.277
Qmax(2) =
        0.880 *    1.000 *     4.026) +
        1.000 *    1.000 *     7.316) + =      10.857

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.026       7.316
Maximum flow rates at confluence using above data:
        9.277       10.857
Area of streams before confluence:
```

```
        1.590        3.490


Results of confluence:
Total flow rate =     10.857(CFS)
Time of concentration =    17.570 min.
Effective stream area after confluence  =      5.080(Ac.)


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Process from Point/Station       16.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.600(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   161.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.857(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.857(CFS)
Normal flow depth in pipe =   17.18(In.)
Flow top width inside pipe =   21.65(In.)
Critical Depth =   14.18(In.)
Pipe flow velocity =      4.51(Ft/s)
Travel time through pipe =    0.59 min.
Time of concentration (TC) =    18.16 min.


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Process from Point/Station       36.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.16 min.
Rainfall intensity =      2.690(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.393(CFS) for    0.700(Ac.)
Total runoff =     12.250(CFS)   Total area =       5.78(Ac.)


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Process from Point/Station       34.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.500(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.250(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.250(CFS)
Normal flow depth in pipe =   18.94(In.)
Flow top width inside pipe =   19.58(In.)
Critical Depth =   15.09(In.)
```

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Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    18.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      40.000 to Point/Station      38.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    18.85 min.
Rainfall intensity =      2.648(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.509(CFS) for    0.260(Ac.)
Total runoff =     12.759(CFS)   Total area =       6.04(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      38.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.500(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   154.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.759(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.759(CFS)
Normal flow depth in pipe =   19.45(In.)
Flow top width inside pipe =   18.81(In.)
Critical Depth =   15.41(In.)
Pipe flow velocity =      4.68(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    19.40 min.


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Process from Point/Station      38.000 to Point/Station      42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.040(Ac.)
Runoff from this stream =     12.759(CFS)
Time of concentration =   19.40 min.
Rainfall intensity =     2.615(In/Hr)


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Process from Point/Station      50.000 to Point/Station      52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  455.000(Ft.)
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```
Highest elevation =  488.400(Ft.)
Lowest elevation =  485.500(Ft.)
Elevation difference =    2.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    16.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 455.000^.5)/( 0.637^(1/3)]=  16.06
Rainfall intensity (I) =      2.828(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      5.693(CFS)
Total initial stream area =       2.720(Ac.)


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Process from Point/Station       52.000 to Point/Station       54.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   483.800(Ft.)
Downstream point elevation =   483.000(Ft.)
Channel length thru subarea  =   164.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      6.185(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      6.185(CFS)
Depth of flow =   0.316(Ft.), Average velocity =   0.933(Ft/s)
Channel flow top width =   21.899(Ft.)
Flow Velocity =    0.93(Ft/s)
Travel time  =    2.93 min.
Time of concentration =   18.99 min.
Critical depth =      0.143(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.639(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.918(CFS) for    0.470(Ac.)
Total runoff =      6.611(CFS)   Total area =       3.19(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.000(Ft.)
Downstream point/station elevation =   478.000(Ft.)
Pipe length  =   207.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.611(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.611(CFS)
Normal flow depth in pipe =   13.43(In.)
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Flow top width inside pipe =   15.67(In.)
Critical Depth =   11.94(In.)
Pipe flow velocity =      4.68(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    19.73 min.


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Process from Point/Station       54.000 to Point/Station       42.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.190(Ac.)
Runoff from this stream =      6.611(CFS)
Time of concentration =   19.73 min.
Rainfall intensity =     2.596(In/Hr)
Summary of stream data:

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


1       12.759     19.40            2.615
2        6.611     19.73            2.596
Qmax(1) =
        1.000 *    1.000 *    12.759) +
        1.000 *    0.983 *     6.611) + =      19.260
Qmax(2) =
        0.993 *    1.000 *    12.759) +
        1.000 *    1.000 *     6.611) + =      19.277

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.759       6.611
Maximum flow rates at confluence using above data:
       19.260       19.277
Area of streams before confluence:
        6.040        3.190
Results of confluence:
Total flow rate =     19.277(CFS)
Time of concentration =    19.729 min.
Effective stream area after confluence =      9.230(Ac.)


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Process from Point/Station       42.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.277(CFS)
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Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    19.277(CFS)
Normal flow depth in pipe =   21.19(In.)
Flow top width inside pipe =   27.33(In.)
Critical Depth =   17.88(In.)
Pipe flow velocity =      5.20(Ft/s)
Travel time through pipe =    1.04 min.
Time of concentration (TC) =    20.77 min.


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Process from Point/Station       42.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.230(Ac.)
Runoff from this stream =     19.277(CFS)
Time of concentration =   20.77 min.
Rainfall intensity =     2.537(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       70.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  264.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  490.700(Ft.)
Elevation difference =    2.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    11.02 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 264.000^.5)/( 0.871^(1/3)]=  11.02
Rainfall intensity (I) =      3.257(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.133(CFS)
Total initial stream area =       1.300(Ac.)


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Process from Point/Station       72.000 to Point/Station       74.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.300(Ft.)
Downstream point elevation =   487.300(Ft.)
Channel length thru subarea  =   180.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
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Estimated mean flow rate at midpoint of channel =      3.748(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.748(CFS)
Depth of flow =   0.226(Ft.), Average velocity =   0.802(Ft/s)
Channel flow top width =   21.355(Ft.)
Flow Velocity =    0.80(Ft/s)
Travel time  =    3.74 min.
Time of concentration =   14.76 min.
Critical depth =      0.103(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.923(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      1.103(CFS) for    0.510(Ac.)
Total runoff =      4.236(CFS)   Total area =       1.81(Ac.)


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Process from Point/Station       74.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   483.300(Ft.)
Downstream point/station elevation =   482.400(Ft.)
Pipe length  =   179.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.236(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.236(CFS)
Normal flow depth in pipe =   11.39(In.)
Flow top width inside pipe =   12.82(In.)
Critical Depth =   10.00(In.)
Pipe flow velocity =      4.24(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =    15.47 min.


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Process from Point/Station       77.000 to Point/Station       76.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    15.47 min.
Rainfall intensity =      2.871(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.106(CFS) for    0.050(Ac.)
Total runoff =      4.343(CFS)   Total area =       1.86(Ac.)


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Process from Point/Station       76.000 to Point/Station       78.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =   482.400(Ft.)
Downstream point/station elevation =   481.300(Ft.)
Pipe length  =   241.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.343(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.343(CFS)
Normal flow depth in pipe =   12.23(In.)
Flow top width inside pipe =   11.63(In.)
Critical Depth =   10.14(In.)
Pipe flow velocity =      4.05(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    16.46 min.


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Process from Point/Station       79.000 to Point/Station       78.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    16.46 min.
Rainfall intensity =      2.801(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.062(CFS) for    0.030(Ac.)
Total runoff =      4.405(CFS)   Total area =       1.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       80.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.300(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.405(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.405(CFS)
Normal flow depth in pipe =   11.41(In.)
Flow top width inside pipe =   12.80(In.)
Critical Depth =   10.21(In.)
Pipe flow velocity =      4.39(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =    17.16 min.


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Process from Point/Station       78.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.890(Ac.)
Runoff from this stream =      4.405(CFS)
Time of concentration =   17.16 min.
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Rainfall intensity =     2.754(In/Hr)


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Process from Point/Station      82.000 to Point/Station      84.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  814.000(Ft.)
Highest elevation =  493.000(Ft.)
Lowest elevation =  487.800(Ft.)
Elevation difference =    5.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    21.47 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 814.000^.5)/( 0.639^(1/3)]=  21.47
Rainfall intensity (I) =      2.499(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      5.048(CFS)
Total initial stream area =        2.730(Ac.)


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Process from Point/Station      84.000 to Point/Station      86.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   485.500(Ft.)
Downstream point elevation =   484.500(Ft.)
Channel length thru subarea  =   216.000(Ft.)
Channel base width    =   20.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      5.511(CFS)
Manning's 'N'    = 0.050
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      5.511(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   0.879(Ft/s)
Channel flow top width =   21.801(Ft.)
Flow Velocity =    0.88(Ft/s)
Travel time  =    4.10 min.
Time of concentration =   25.56 min.
Critical depth =      0.133(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.294(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.849(CFS) for    0.500(Ac.)
Total runoff =      5.897(CFS)   Total area =       3.23(Ac.)


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Process from Point/Station      86.000 to Point/Station      80.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.500(Ft.)
Downstream point/station elevation =   480.300(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.897(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.897(CFS)
Normal flow depth in pipe =   11.20(In.)
Flow top width inside pipe =   17.45(In.)
Critical Depth =   11.25(In.)
Pipe flow velocity =      5.10(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    25.67 min.


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Process from Point/Station       86.000 to Point/Station       80.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.230(Ac.)
Runoff from this stream =      5.897(CFS)
Time of concentration =   25.67 min.
Rainfall intensity =     2.289(In/Hr)
Summary of stream data:

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



1        4.405     17.16            2.754
2        5.897     25.67            2.289
Qmax(1) =
        1.000 *    1.000 *     4.405) +
        1.000 *    0.669 *     5.897) + =       8.347
Qmax(2) =
        0.831 *    1.000 *     4.405) +
        1.000 *    1.000 *     5.897) + =       9.558

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.405       5.897
Maximum flow rates at confluence using above data:
        8.347        9.558
Area of streams before confluence:
        1.890        3.230
Results of confluence:
Total flow rate =      9.558(CFS)
Time of concentration =    25.668 min.
Effective stream area after confluence =      5.120(Ac.)
```

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Process from Point/Station       80.000 to Point/Station       88.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   480.300(Ft.)
Downstream point/station elevation =   478.300(Ft.)
Pipe length  =   398.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.558(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.558(CFS)
Normal flow depth in pipe =   14.88(In.)
Flow top width inside pipe =   19.08(In.)
Critical Depth =   13.80(In.)
Pipe flow velocity =      5.24(Ft/s)
Travel time through pipe =    1.27 min.
Time of concentration (TC) =    26.93 min.


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Process from Point/Station       89.000 to Point/Station       88.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Time of concentration =    26.93 min.
Rainfall intensity =      2.231(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.050(CFS) for    0.030(Ac.)
Total runoff =      9.607(CFS)   Total area =       5.15(Ac.)


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Process from Point/Station       88.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.300(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =   264.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.607(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.607(CFS)
Normal flow depth in pipe =   15.07(In.)
Flow top width inside pipe =   18.91(In.)
Critical Depth =   13.83(In.)
Pipe flow velocity =      5.20(Ft/s)
Travel time through pipe =    0.85 min.
Time of concentration (TC) =    27.78 min.


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Process from Point/Station       88.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
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The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.150(Ac.)
Runoff from this stream =      9.607(CFS)
Time of concentration =   27.78 min.
Rainfall intensity =     2.194(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      90.000 to Point/Station      92.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  389.000(Ft.)
Highest elevation =  488.500(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    3.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.77 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 389.000^.5)/( 1.003^(1/3)]=  12.77
Rainfall intensity (I) =      3.087(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      3.358(CFS)
Total initial stream area =        1.470(Ac.)


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Process from Point/Station      92.000 to Point/Station      94.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =   482.700(Ft.)
Downstream point elevation =   482.000(Ft.)
Channel length thru subarea  =   133.000(Ft.)
Channel base width    =   40.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.632(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      3.632(CFS)
Depth of flow =   0.131(Ft.), Average velocity =   0.689(Ft/s)
Channel flow top width =   40.783(Ft.)
Flow Velocity =    0.69(Ft/s)
Travel time  =    3.22 min.
Time of concentration =   15.99 min.
Critical depth =      0.063(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.740 given for subarea
Rainfall intensity =      2.833(In/Hr) for a   100.0 year storm
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Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.740
Subarea runoff =      0.503(CFS) for    0.240(Ac.)
Total runoff =      3.861(CFS)   Total area =       1.71(Ac.)


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Process from Point/Station      94.000 to Point/Station      60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.000(Ft.)
Downstream point/station elevation =   477.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.861(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.861(CFS)
Normal flow depth in pipe =    8.03(In.)
Flow top width inside pipe =   14.96(In.)
Critical Depth =    9.53(In.)
Pipe flow velocity =      5.77(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    16.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      94.000 to Point/Station      66.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.710(Ac.)
Runoff from this stream =      3.861(CFS)
Time of concentration =   16.24 min.
Rainfall intensity =     2.816(In/Hr)
Summary of stream data:

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


1       19.277     20.77            2.537
2        9.607     27.78            2.194
3        3.861     16.24            2.816
Qmax(1) =
        1.000 *    1.000 *    19.277) +
        1.000 *    0.748 *     9.607) +
        0.901 *    1.000 *     3.861) + =      29.939
Qmax(2) =
        0.865 *    1.000 *    19.277) +
        1.000 *    1.000 *     9.607) +
        0.779 *    1.000 *     3.861) + =      29.283
Qmax(3) =
        1.000 *    0.782 *    19.277) +
```

```
        1.000 *    0.585 *     9.607) +
        1.000 *    1.000 *     3.861) + =      24.553

Total of 3 main streams to confluence:
Flow rates before confluence point:
      19.277       9.607       3.861
Maximum flow rates at confluence using above data:
       29.939       29.283       24.553
Area of streams before confluence:
        9.230        5.150        1.710


Results of confluence:
Total flow rate =     29.939(CFS)
Time of concentration =    20.770 min.
Effective stream area after confluence  =     16.090(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       96.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   477.000(Ft.)
Downstream point/station elevation =   476.680(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    29.939(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    29.939(CFS)
Normal flow depth in pipe =   28.22(In.)
Flow top width inside pipe =   23.23(In.)
Critical Depth =   21.84(In.)
Pipe flow velocity =      5.53(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    21.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     16.090(Ac.)
Runoff from this stream =     29.939(CFS)
Time of concentration =   21.09 min.
Rainfall intensity =     2.519(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       98.000 to Point/Station       96.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
```

```
Initial subarea flow distance  =  539.000(Ft.)
Highest elevation =  489.300(Ft.)
Lowest elevation =  482.700(Ft.)
Elevation difference =    6.600(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 539.000^.5)/( 1.224^(1/3)]=  14.06
Rainfall intensity (I) =      2.978(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      2.049(CFS)
Total initial stream area =       0.930(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       98.000 to Point/Station       96.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      2.049(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     2.978(In/Hr)
Summary of stream data:

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


1       29.939     21.09            2.519
2        2.049     14.06            2.978
Qmax(1) =
        1.000 *    1.000 *    29.939) +
        0.846 *    1.000 *     2.049) + =      31.672
Qmax(2) =
        1.000 *    0.667 *    29.939) +
        1.000 *    1.000 *     2.049) + =      22.009

Total of 2 streams to confluence:
Flow rates before confluence point:
      29.939       2.049
Maximum flow rates at confluence using above data:
       31.672       22.009
Area of streams before confluence:
       16.090        0.930
Results of confluence:
Total flow rate =     31.672(CFS)
Time of concentration =    21.092 min.
Effective stream area after confluence =     17.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

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Process from Point/Station      100.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  191.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     8.19 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 191.000^.5)/( 1.309^(1/3)]=   8.19
Rainfall intensity (I) =      3.629(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.806(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  147.000(Ft.)
Highest elevation =  486.000(Ft.)
Lowest elevation =  483.500(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     6.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 147.000^.5)/( 1.701^(1/3)]=   6.58
Rainfall intensity (I) =      3.937(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.699(CFS)
Total initial stream area =        0.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** 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  =  229.000(Ft.)
Highest elevation =  487.100(Ft.)
Lowest elevation =  484.600(Ft.)
Elevation difference =    2.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.97 min.
```
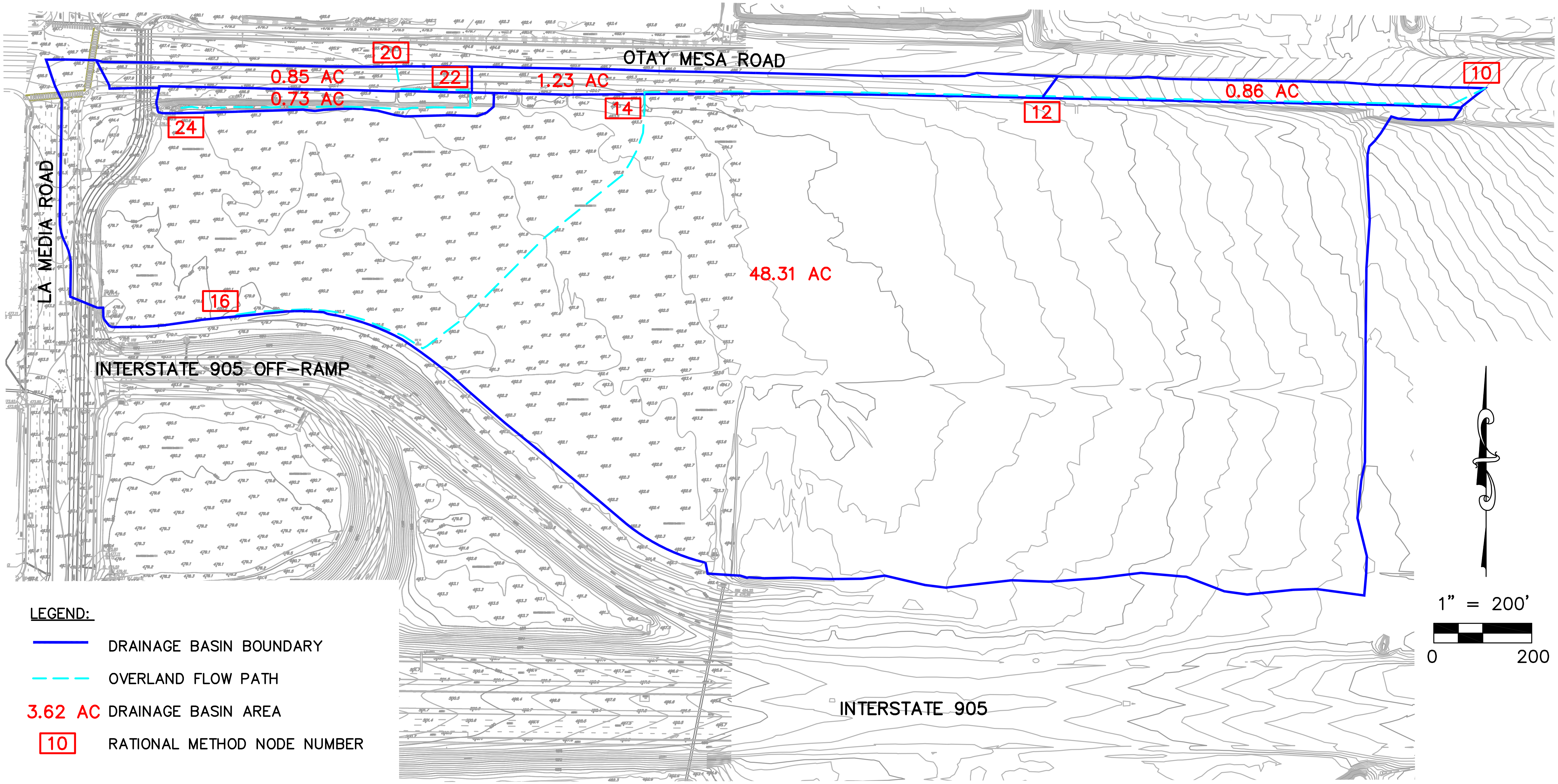

```
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 229.000^.5)/(   1.092^(1/3)]=   3.97
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =      2.669(CFS)
Total initial stream area =       0.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   481.000(Ft.)
Downstream point/station elevation =   479.800(Ft.)
Pipe length  =   254.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.669(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.669(CFS)
Normal flow depth in pipe =    8.38(In.)
Flow top width inside pipe =   14.90(In.)
Critical Depth =    7.86(In.)
Pipe flow velocity =      3.78(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =     6.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      124.000
**** 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 =     6.12 min.
Rainfall intensity =      4.049(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.654(CFS) for    0.690(Ac.)
Total runoff =      5.323(CFS)   Total area =       1.33(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      128.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.800(Ft.)
Downstream point/station elevation =   479.100(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.323(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

```
Calculated individual pipe flow  =     5.323(CFS)
Normal flow depth in pipe =   13.03(In.)
Flow top width inside pipe =   16.09(In.)
Critical Depth =   10.67(In.)
Pipe flow velocity =      3.89(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =     7.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      128.000
**** 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 =     7.01 min.
Rainfall intensity =      3.844(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.191(CFS) for    0.600(Ac.)
Total runoff =      7.514(CFS)   Total area =        1.93(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      128.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   479.100(Ft.)
Downstream point/station elevation =   478.400(Ft.)
Pipe length  =   191.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.514(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.514(CFS)
Normal flow depth in pipe =   13.99(In.)
Flow top width inside pipe =   19.80(In.)
Critical Depth =   12.19(In.)
Pipe flow velocity =      4.41(Ft/s)
Travel time through pipe =    0.72 min.
Time of concentration (TC) =     7.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      132.000
**** 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 =     7.73 min.
Rainfall intensity =      3.706(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.556(CFS) for    1.010(Ac.)
Total runoff =     11.070(CFS)   Total area =        2.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   478.400(Ft.)
Downstream point/station elevation =   476.700(Ft.)
Pipe length  =   455.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.070(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.070(CFS)
Normal flow depth in pipe =   16.24(In.)
Flow top width inside pipe =   22.45(In.)
Critical Depth =   14.31(In.)
Pipe flow velocity =      4.89(Ft/s)
Travel time through pipe =    1.55 min.
Time of concentration (TC) =     9.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.940(Ac.)
Runoff from this stream =     11.070(CFS)
Time of concentration =    9.28 min.
Rainfall intensity =     3.466(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  179.000(Ft.)
Highest elevation =  489.000(Ft.)
Lowest elevation =  457.000(Ft.)
Elevation difference =   32.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.32 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 179.000^.5)/(  17.877^(1/3)]=   3.32
Setting time of concentration to 5 minutes
```

```
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.844(CFS)
Total initial stream area =       0.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      212.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.740 given for subarea
Initial subarea flow distance  =  215.000(Ft.)
Highest elevation =  488.200(Ft.)
Lowest elevation =  486.000(Ft.)
Elevation difference =    2.200(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.43 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7400)*( 215.000^.5)/( 1.023^(1/3)]=   9.43
Rainfall intensity (I) =      3.447(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      0.459(CFS)
Total initial stream area =       0.180(Ac.)
End of computations, total study area =         20.940 (Ac.)
```



LEGEND:

DRAINAGE BASIN BOUNDARY

OVERLAND FLOW PATH

3.62 AC DRAINAGE BASIN AREA

10 RATIONAL METHOD NODE NUMBER

EXISTING CONDITION

RATIONAL METHOD WORK MAP

OTAY MESA ROAD
LA MEDIA ROAD
INTERSTATE 905 OFF-RAMP
G
PHARMACY
13,500 SF
F.F.E. 486.5
H
DRIVE-THRU REST.
2,500 SF
F.F.E. 488.0
J
DRIVE-THRU REST.
3,500 SF
F.F.E. 488.5
K
GAS / C-STORE
3,500 SF
F.F.E. 489.5
F
MAJOR (RETAIL)
12,800 SF
F.F.E. 488.0
E
SHOPS (RETAIL)
9,600 SF
F.F.E. 488.0
D
SHOPS (RETAIL)
6,300 SF
F.F.E. 488.0
C
MAJOR (RETAIL)
10,000 SF
F.F.E. 489.0
B
MAJOR (RETAIL)
20,000 SF
F.F.E. 490.5
A
GROCERY
45,000 SF
F.F.E. 491.5
PLAZA
T.B.D.
PLAZA
T.B.D.
1.01 AC
0.60 AC
0.69 AC
0.47 AC
0.43 AC
0.64 AC
0.30 AC
2.72 AC
0.27 AC
2.73 AC
0.93 AC
0.24 AC
0.26 AC
0.70 AC
0.33 AC
0.18 AC
0.22 AC
1.47 AC
0.24 AC
0.03 AC
0.50 AC
2.73 AC
0.87 AC
0.26 AC
0.03 AC
0.50 AC
0.05 AC
1.30 AC
0.51 AC
31.05 AC
98
136
132
128
124
134
130
126
122
54
52
24
22
102
100
110
112
40
38
36
34
16
32
120
42
50
90
94
60
89
88
96
92
84
80
86
14
30
210
212
12
13
202
20
10
82
79
78
70
200
77
76
72
74
SEE DETAIL BELOW LEFT FOR OFF-SITE CONTINUATION
MATCHLINE SEE ABOVE RIGHT
OFF-SITE CONTINUATION TO EAST (1=200')
GRAPHIC SCALE
50 0 25 50 100
1 INCH = 50 FEET
LEGEND:
DRAINAGE BASIN BOUNDARY
OVERLAND FLOW PATH
PROPOSED DRAINAGE FACILITY
3.62 AC DRAINAGE BASIN AREA
10 RATIONAL METHOD NODE NUMBER
PROPOSED CONDITION
RATIONAL METHOD WORK MAP

Attachment 6
Geotechnical and Groundwater Investigation Report

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

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GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

RESPONSE TO CITY COMMENTS

PLAZA LA MEDIA NORTH
OTAY MESA ROAD AND
LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

PREPARED FOR

WESTERN ALLIANCE BANK
REO/COMMERCIAL FACILITIES
% BANK OF NEVADA
LAS VEGAS, NEVADA

NOVEMBER 20, 2018
PROJECT NO. 07056-32-04

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. 07056-32-04
November 20, 2018

Western Alliance Bank REO/Commercial Facilities
% Bank of Nevada
2700 West Sahara Avenue, 5th Floor
Las Vegas, Nevada 89102

Attention: Ms. Anne Marie Berg

Subject: RESPONSE TO CITY COMMENTS
PLAZA LA MEDIA NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

References:

1. *Soil and Geologic investigation for Otay Mesa International Plaza Limited, San Diego, California,* prepared by Geocon Incorporated, dated April 26, 1989 (Project No. D-4342-JO1).
2. *Update Geotechnical Investigation for Judd and Dillard, LLC (Otay Mesa International Plaza Limited), San Diego, California*, prepared by Geocon Incorporated, dated March 14, 2003 (Project No. 07056-22-01).
3. *Update Geotechnical Investigation for Plaza La Media-North, Otay Mesa Road and La Media Road, San Diego, California,* prepared by Geocon Incorporated, dated September 11, 2017 (Project No. 07056-32-04).
4. *Storm Water Management Recommendations for Plaza La Media-North,* prepared by Geocon Incorporated, revised date January 15, 2018 (Project No. 07056-32-04).
5. *Grading and Drainage Plan, for Plaza La Media North, Sheet C-7,* prepared Kettler Leweck Engineering, dated August 31, 2017.
6. DMA/*BMP Plan for Plaza La Media-North, Sheet C-8,* prepared by Kettler Leweck Engineering, dated August 31, 2017.
7. *City of San Diego Review Comments for La Media Retail, Project No. 334235, LDR-Engineering,* dated October 17, 2018.

Dear Ms. Berg:

In accordance with the request of Mr. Theodore R. L. Shaw, we prepared this response to City of San Diego Review Comments (Reference 7). The review comment specific to geotechnical engineering aspects is provided herein followed by our response.

Comment No. 115: *Since the project civil engineer has classified the subject project as a no infiltration condition because of one of infiltration rates. Project geotechnical engineer shall submit an Infiltration Feasibility Condition Letter that demonstrates that the DMA/DMAs is a no infiltration condition. The Letter shall be stamped/signed by a licensed geotechnical engineer who prepared the letter. Letter shall contain at a minimum, the 10 discussion points stated in Section C.1.1 of the current Storm Water Standards including an exhibit that clearly labels the 4 design components.*

Response: The Appendix presents the Infiltration Feasibility Condition Letter.

Should you have any question regarding this letter, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON INCORPORATED

Raúl R. Garcia
GE 2842

REGISTERED PROFESSIONAL ENGINEER
RAUL R. GARCIA
No. 2842
GEOTECHNICAL
STATE OF CALIFORNIA

RRG:dmc

(e-mail)	Addressee
(2/del)	Atlantis Group Attention: Mr. Theodore R. L. Shaw
(e-mail)	Bank of Nevada Attention: Ms. Geysy Fernandez
(2/del)	Kettler Leweck Engineering Attention: Mr. Steve Kettler

APPENDIX

INFILTRATION FEASIBILITY CONDITION LETTER
PLAZA LA MEDIA–NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA
PREPARED BY GEOCON INCORPORATED
DATED NOVEMBER 20, 2018
(PROJECT NO. 07056-32-04)

FOR

PLAZA LA MEDIA NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

PROJECT NO. 07056-32-04

INFILTRATION FEASIBILITY CONDITION LETTER

PLAZA LA MEDIA–NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

WESTERN ALLIANCE BANK
REO/COMMERCIAL FACILITIES
% BANK OF NEVADA
LAS VEGAS, NEVADA

NOVEMBER 19, 2018
PROJECT NO. 07056-32-04

Project No. 07056-32-04
November 19, 2018

Western Alliance Bank REO/Commercial Facilities
% Bank of Nevada
2700 West Sahara Avenue, 5th Floor
Las Vegas, Nevada 89102

Attention: Ms. Anne Marie Berg

Subject: INFILTRATION FEASIBILITY CONDITION LETTER
PLAZA LA MEDIA–NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

References:

1. *Soil and Geologic Investigation for Otay Mesa International Plaza Limited, San Diego, California,* prepared by Geocon Incorporated, dated April 26, 1989 (Project No. D-4342-JO1).

2. *Update Geotechnical Investigation for Judd and Dillard LLC (Otay Mesa International Plaza Limited), San Diego, California*, prepared by Geocon Incorporated, dated March 14, 2003 (Project No. 07056-22-01).

3. *Update Geotechnical Investigation for Plaza La Media–North, Airway Road and La Media Road, San Diego, California*, prepared by Geocon Incorporated, dated September 11, 2017 (Project No. 07056-32-04).

4. *Storm Water Management Recommendations for Plaza La Media–North, San Diego, California,* prepared by Geocon Incorporated, revised date January 15, 2018 (Project No. 07056-32-04).

5. *Grading and Drainage Plan for Plaza La Media-North*, Sheet C-7, prepared by Kettler Leweck Engineering, dated August 31, 2017.

6. *DMA/BMP Plan for Plaza La Media-North, Sheet C-8,* prepared by Kettler Leweck Engineering, dated August 31, 2017.

Dear Ms. Berg:

In accordance with the request of Theodore L. Shaw with Atlantis Group, we prepared this report regarding storm water management for the subject project. We understand the City of San Diego is requesting we submit storm water recommendations based on the new 2018 Storm Water Standards.

For this property, we recommend the site be classified as a "No Infiltration" condition based on the discussion herein.

SITE AND PROJECT DESCRIPTION

The Plaza La Media-North consists of approximately 22 acres of undeveloped land located southeast of Otay Mesa Road and La Media Road in the Otay Mesa area of San Diego, California. The site is a semi-trapezoidal parcel and is delineated along the north property line with approximately 1,280 feet of frontage with Otay Mesa road, to the east with 720 feet along proposed Avenida Costa Azul, to the west with 520 feet along La Media Road and to the south with 1,400 feet adjacent and parallel to La Media Interstate 905 Offramp. The project limits are presented on the Geologic Map, Figure 1.

The site is relatively level with a northeast to southwesterly drainage gradient. Elevations vary from approximately 485 feet Mean Sea Level (MSL) in the northeast corner to approximately 478 feet MSL at the southwest corner. Vegetation typically consists of dense weeds and grasses.

Based on our review of the grading plans, we understand that proposed project will consist of developing a commercial retail center to receive 10 building pads with at grade parking areas, access driveways, associated improvements and six desilting basins. Widening of Otay Mesa Road and La Media Road and the construction of Avenida Costa Azul are contemplated as part of project development. We expect that the buildings will be one- to two-story structures with concrete slab-on-grade supported on conventional continuous and isolated spread footings.

Review of grading plans indicates that it is necessary to import approximately 170,000 cubic yards of fill soil to achieve proposed finish grades. In general, the grading will consist of importing fill to raise the grade approximately 7 to 10 feet above existing elevations.

PREVIOUS GEOTECHNICAL STUDIES

We prepared the referenced geotechnical investigations (see Reference Nos. 1 through 4). The site is underlain by undocumented fill and topsoil overlying Very Old Paralic Deposits. The undocumented fill and the topsoil was identified as soft sandy clay. The Very Old Paralic Deposits consist of stiff clay (upper 10 feet) overlying very dense clayey gravelly cobbly sand. A Geologic Map is presented as Figure 1 that shows the locations of previous borings, trenches, and infiltration testing.

HYDROLOGIC SOIL GROUP

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, provides general information regarding soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups.

TABLE 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 majority property generally falls within Hydrologic Soil Group C, which has a very slow infiltration rating. Table 2 presents the information from the USDA website for the property.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	Estimated Hydraulic Conductivity (in/hr)
Salinas Clay 0 to 2 percent slopes	ScA	96	C	0.2 – 0.57
Stockpen Gravelly loam 2 to 5 percent slopes	SuB	4	D	0.0 – 0.06

GROUNDWATER ELEVATIONS

Groundwater was not encountered in our field exploration. Permanent groundwater is expected to be at depths greater than 50 feet below the property.

INFILTRATION RATES

We performed five, constant-head, borehole infiltration tests using a Soilmoisture Corp Aardvark Permeameter at the approximate locations shown on the Geologic Map, Figure 1. The borings were advanced using a 4-inch diameter hand auger. Table 3 presents the results of the saturated hydraulic conductivity testing. The infiltration tests indicated unfactored rates of approximately 0.003 to 0.020 in/hr, and factored rates of approximately 0.002 to 0.010 in/hr.

We used the guidelines presented in the Riverside County Low Impact Development BMP Design Handbook to convert field saturated hydraulic conductivity to an infiltration rate. Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is approximately equal to the infiltration rate. Therefore, the Ksat value determined from the infiltration test is the unfactored infiltration rate.

TABLE 3
FIELD SATURATED HYDRAULIC CONDUCTIVITY TEST RESULTS
USING THE SOILMOISTURE AARDVARK PERMEAMETER

Location	Depth (inches)	Geologic Unit	Field Infiltration Rate (inches/hour)	Factored* Field Infiltration Rate, I (in/hr)
A-1	60	Qvop	0.003	0.002
A-2	30	Qvop	0.020	0.010
A-3	56	Qvop	0.009	0.005
A-4	68	Qvop	0.004	0.002
A-5	32	Qvop	0.016	0.008
		Average:	0.010	0.005

* Factor of Safety of 2.0 for feasibility determination.

Infiltration categories include full infiltration, partial infiltration, and no infiltration. Table 4 presents the commonly accepted definitions of the potential infiltration categories based on the infiltration rates.

TABLE 4
INFILTRATION CATEGORIES

Infiltration Category	Field Infiltration Rate, I (inches/hour)	Factored Infiltration Rate[1], I (inches/hour)
Full Infiltration	I > 1.0	I > 0.5
Partial Infiltration	0.10 < I ≤ 1.0	0.05 < I ≤ 0.5
No Infiltration (Infeasible)	I < 0.10	I < 0.05

[1] Using a Factor of Safety of 2.

SOIL TYPES

Proposed Compacted Fill

Compacted fill will be placed to achieve finish grades. The compacted fill will be underlain by highly expansive Very Old Paralic Deposits. The proposed storm water BMP's will be founded in compacted fill placed above the highly expansive soils. The compacted fill will be comprised of import granular fill and on-site soil generally consisting of highly expansive sandy/silty clay. The fill will be compacted to a dry density of at least 90 percent of the laboratory maximum dry density. In our experience, compacted fill does not possess infiltration rates appropriate for infiltration BMP's. Hazards that occur as a result of fill saturation include a potential for swelling of the expansive soils and lateral water migration into public and private improvements. The potential for heaving and lateral water migration to adversely impact existing or proposed structures, foundations, utilities, and roadways, is high. Therefore, full and partial infiltration should be considered infeasible.

Very Old Paralic Deposits (Mudstone Member)

Quaternary-age Very Old Paralic Deposits underlie the surficial soils. Historically this unit has been mapped in published literature and geotechnical reports as a terrace, channel, lacustrine, playa and estuarine deposits as well as the Lindavista Formation. In addition, this unit is characteristically known in the Otay Mesa area for having two different lithological units (i.e., the mudstone member and the gravel/sand member). The mudstone member is approximately 10 feet thick and overlies the gravel/sand member on the property. The mudstone is characterized as brown to reddish brown or gray to greenish gray, highly plastic clay with trace amounts of gravel. Based on laboratory testing the "mudstone member" has a "high" to "very high" expansion potential (EI greater than 91) in accordance with ASTM D 4829. The permeability characteristics of this mudstone are very low. Water infiltration would induce heaving of the highly expansive soils. In addition, the potential for lateral water migration to adversely impact public and private utilities and improvements is high.

DMA EXHIBIT AND GEOLOGIC MAP

BMP's IMP 1 through IMP 20

Based on the discussion herein, the field infiltration tests do not meet the feasibility criteria for full or partial infiltration. BMP's IMP 1 through 20 will be founded in compacted fill placed above highly expansive clays of the Very Old Paralic Deposits and are located adjacent to existing slopes, existing public streets, underground improvements, and proposed paved areas. In addition, the site is projected to receive imported fill soil with a thickness varying from 7 to 10 feet through the site. The entire property will be underlain by at least 7 feet of compacted fill placed above highly expansive soils.

Infiltration Tests A-1 through A-5 yielded an average factored infiltration rates of 0.005 in/hr. These values are less than the minimum 0.05 in/hr threshold required for partial infiltration. It is our opinion infiltration at the indicated BMP's is not feasible due to the thickness of compacted fill proposed to achieve finish grades, the infiltration rates obtained, proximity to slopes and public and private improvements, and the potential for lateral water migration, settlement of import granular fill soils and heaving of highly expansive soils. As such, the entire property should be considered as a "No Infiltration" condition.

A copy of the DMA/BMP Map (Reference No. 6) is presented as Figure 2. We also included the Geotechnical Map (Figure 1). The geotechnical map shows the proposed development and BMP locations. We added the geologic contacts and locations of exploratory test pits, borings, and infiltration tests on the Geologic Map, Figure 1.

STORM WATER MANAGEMENT DEVICES

Liners and subdrains are recommended in 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). 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.

STORM WATER NARRATIVE

We evaluated infiltration feasibility for the subject property in accordance with the *2018 City of San Diego Storm Water Standards*. Areas of infiltration would be feasible due to relatively flat nature of the property. We performed the infiltration tests in areas where infiltration could be feasible for the proposed project.

Based on our referenced geotechnical documents, the existing soil possesses about 10 feet of clayey material with a "high" to "very high" expansion potential.

STORM WATER STANDARD WORKSHEETS

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or I-8A) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 (Appendix A) presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table 5 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 5
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

Based on our geotechnical investigation and the previous table, Table 6 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 6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	3	0.75
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, $S_A = \Sigma p$			2.25

[1] The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data on this table. Additional information is required to evaluate the design factor of safety.

CONCLUSIONS AND RECOMMENDATIONS

Our results indicate the site has very low infiltration characteristics due to the stiff clays of the Old Paralic Deposits (upper 10 feet) and dense nature of sandy gravelly cobbly soil of the Very Old Paralic Deposits. In addition, the proposed BMP's will be supported by at least 7 feet of compacted fill.

In our professional opinion and based on our site specific investigation, there are no areas of the site where storm water infiltration is feasible. The infiltration rates are too low and there is an un-mitigatable risk of expansion on the property.

If you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

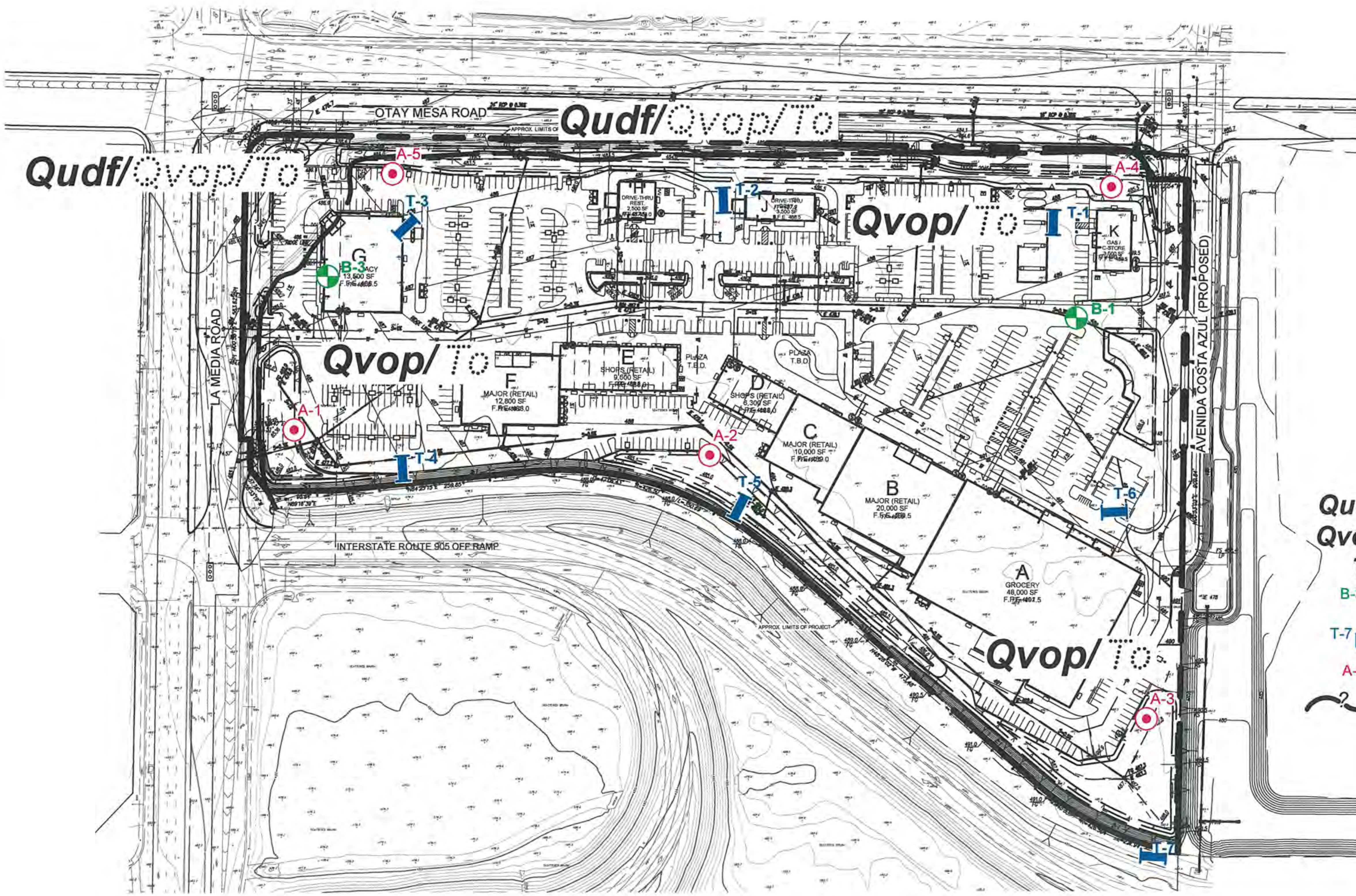
GEOCON INCORPORATED

Raul R. Garcia
GE 2842

RRG:dmc

(e-mail) Addressee
(4/del) Atlantis Group
Attention: Ted L. Shaw
(e-mail) Bank of Nevada
Attention: Mr. Geysy Fernandez
(2/del) Kettler Leweck Engineering
Attention: Mr. Steve Kettler

PLAZA LA MEDIA - NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA



0' 150' 300'
SCALE 1"= 150' (On 11x17)

GEOCON LEGEND

- **Qudf** ........UNDOCUMENTED FILL
- **Qvop** ....VERY OLD PARALIC DEPOSITS (Dotted Where Bureid)
- **To** ....OTAY FORMATION (Dotted Where Buried)
- B-3 ....APPROX. LOCATION OF LARGE DIAMETER BORING (Geocon Inc., Project No. D-4342-J01)
- T-7 ....APPROX. LOCATION OF EXPLORATORY TRENCH (Geocon Inc., Project No. D-4342-J01)
- A-5 ....APPROX. LOCATION OF INFILTRATION TEST
- ?........APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

PROJECT NO. 07056 - 32 - 04

GEOLOGIC MAP

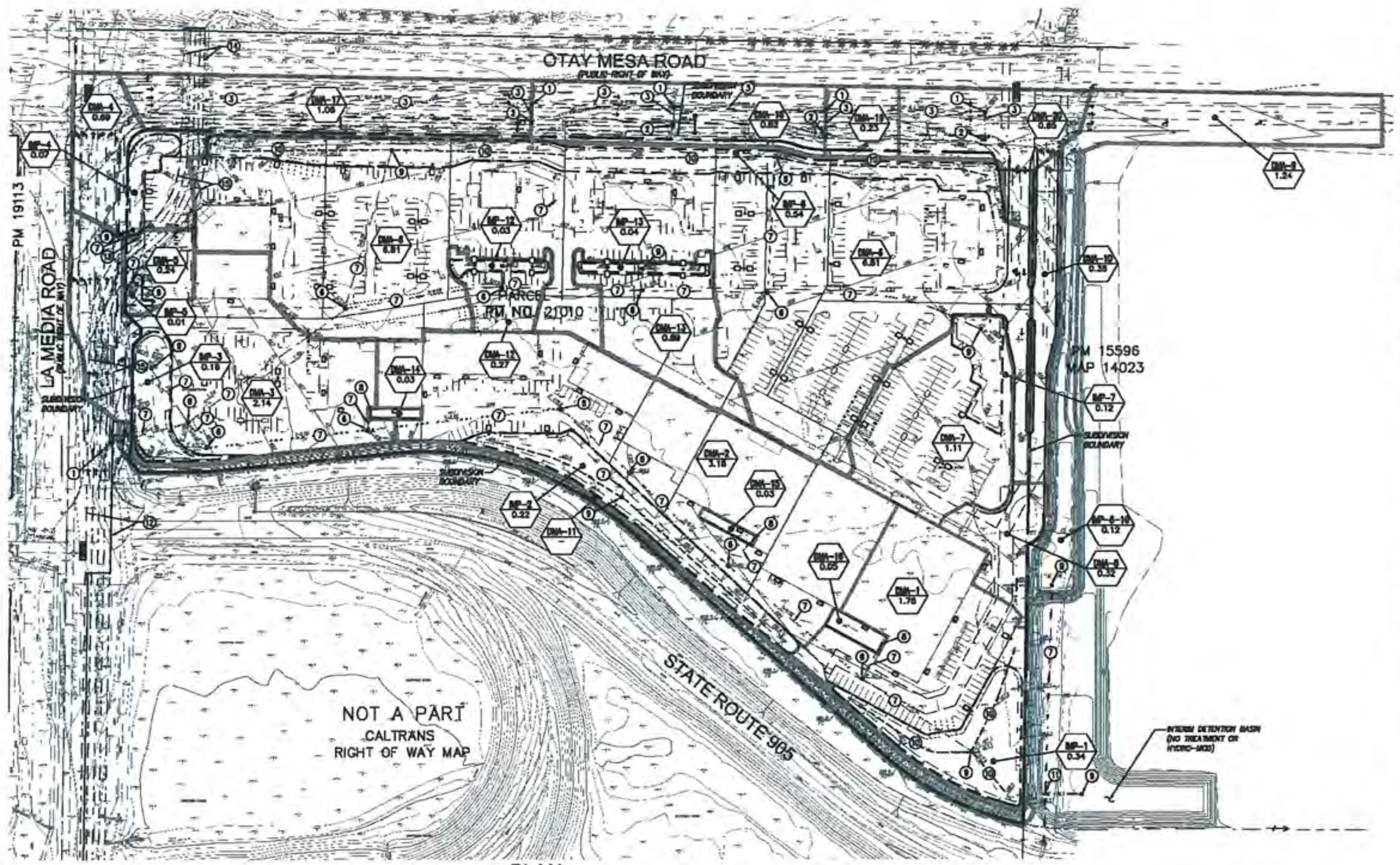
FIGURE 1

DATE 11 - 19 - 2018

Plotted:04/02/2019 2:10PM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\07056-32-04 (Plaza La Media)\SHEETS\07056-32-04 GeoMapNorthSide.dwg

PLANNED DEVELOPMENT PERMIT NO. 1174331
NEIGHBORHOOD USE PERMIT NO. 1174329
SITE DEVELOPMENT PERMIT NO. 1174334
RIGHT-OF-WAY AND EASEMENT VACATION NO. 1174332
VESTING TENTATIVE MAP NO. 1174336
NEIGHBORHOOD DEVELOPMENT PERMIT NO. 1174327

PLAZA LA MEDIA - NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA



PLAN
SCALE: 1"=80'

DRAINAGE MANAGEMENT AREA SUMMARY

ID/DMA #	TYPE	BMP ID	DESCRIPTION	DMA AREA (AC)	PRE-PROJECT COVER	POST SURFACE TYPE	DRAINAGE SOIL	SLOPE
DMA 1	DRAINS TO BMP	BMP 1	BMP 1-DMA 1	1.78	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 2	DRAINS TO BMP	BMP 2	BMP 2-DMA 2	3.18	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 3	DRAINS TO BMP	BMP 3	BMP 3-DMA 3	2.14	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 4	DRAINS TO BMP	BMP 4	BMP 4-DMA 4	0.69	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 5	DRAINS TO BMP	BMP 5	BMP 4-DMA 5	0.34	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 6	DRAINS TO BMP	BMP 6	BMP 6-DMA 6	4.81	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 7	DRAINS TO BMP	BMP 7	BMP 7-DMA 7	1.11	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 8	DRAINS TO BMP	BMP 8-10	BMP 8-10-DMA 8	6.32	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 9	DRAINS TO BMP	BMP 8-10	BMP 8-10-DMA 9	1.34	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 10	DRAINS TO BMP	BMP 8-10	BMP 8-10-DMA 10	0.35	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 11	-	BMP 11	SELF TREATING	-	PERVIOUS (PRE)	LANDSCAPE ONLY - SELF TREATING AREA	TYPE D SOIL	FLAT
DMA 12	DRAINS TO BMP	BMP 12	BMP 12-DMA 12	0.27	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 13	DRAINS TO BMP	BMP 13	BMP 13-DMA 13	0.68	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 14	-	-	-	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 15	-	-	-	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 16	-	-	-	0.05	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 17	-	-	-	1.08	IMPERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 18	-	-	-	0.82	IMPERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 19	-	-	-	0.33	IMPERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 20	-	-	-	0.65	IMPERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT

LID FACILITY SUMMARY

BMP ID	BMP AREA (AC)	TYPE	DESCRIPTION
BMP 1	0.34	BIORETENTION	LANDSCAPE BASIN
BMP 2	0.22	BIORETENTION	LANDSCAPE BASIN
BMP 3	0.16	BIORETENTION	LANDSCAPE BASIN
BMP 4	0.07	BIORETENTION	LANDSCAPE BASIN
BMP 5	0.01	BIORETENTION	LANDSCAPE BASIN
BMP 6	0.54	BIORETENTION	LANDSCAPE BASIN
BMP 7	0.12	BIORETENTION	LANDSCAPE BASIN
BMP 8-10	0.12	MODULAR WETLANDS	MODULAR WETLANDS
BMP 11	0.46	SELF-TREATING	LANDSCAPED SLOPES
BMP 12	0.03	BIORETENTION	LANDSCAPE BASIN
BMP 13	0.04	BIORETENTION	LANDSCAPE BASIN
BMP 17	-	-	-
BMP 18	-	-	-
BMP 19	-	-	-
BMP 20	-	-	-

NOTES:
1. SUMMARY TABLE PER WWW.PROJECTCLEANWATER.ORG BMP SIZING CALCULATOR
2. DMA 8 AND DMA 10 DRAIN TO AN OFFSITE BIORETENTION BASIN (BMP-17).
3. DMA 9 DRAINS TO A MODULAR WETLANDS UNIT.
4. DMA 14-16 ARE NOT BEING TREATED. LOADING DOCKS WILL BE COVERED.

BMP'S TABLE

PROJECT SUMMARY

PROJECT NAME	PLAZA LA MEDIA - NORTH
PROJECT APPLICANT	LAS VEGAS SUNSET PROPERTIES, A NEVADA CORPORATION
JURISDICTION	COUNTY OF SAN DIEGO
PARCEL (APN)	646-121-34
HYDROLOGIC UNIT	TIJUANA

COMPLIANCE BASIN SUMMARY

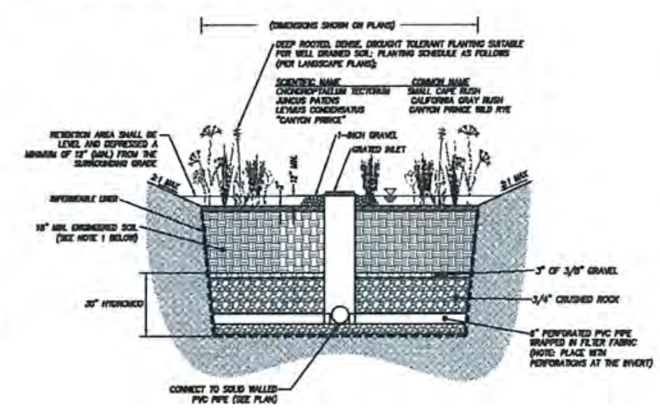
BASIN NAME	SAN YSIDRO HYDROLOGIC SUB-AREA
RECEIVING WATER	TIJUANA RIVER
RAINFALL BASIN	TIJUANA
MEAN ANNUAL PRECIPITATION (INCHES)	0.48
PROJECT BASIN AREA (ACRES)	20.84
WATERSHED AREA (ACRES)	1,000,066
SCCWRP LATERAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
SCCWRP VERTICAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
OVERALL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
LOWER FLOW THRESHOLD (% OF 2-YEAR FLOW)	0.5 Q2

LEGEND

SUBDIVISION BOUNDARY
EXISTING STORM DRAIN PIPE
EXISTING STORM DRAIN CLEANOUT
EXISTING STORM DRAIN CURB INLET
PROPOSED STORM DRAIN PIPE
PROPOSED STORM DRAIN CLEANOUT (PUBLIC)
PROPOSED STORM DRAIN CURB INLET (PUBLIC)
PROPOSED BOX CULVERT (PUBLIC)
PROPOSED STORM DRAIN PIPE (PRIVATE)
PROPOSED STORM DRAIN CLEANOUT (PRIVATE)
PROPOSED BROOK BOX (PRIVATE)
PROPOSED PERFORATED PVC PIPE (PRIVATE)
PROPOSED DRAINAGE BASINS
DRAINAGE MANAGEMENT AREAS — DMA1
INTEGRATED MANAGEMENT PRACTICE — IMP1
DRAINAGE MANAGEMENT AREA IDENTIFIER — (DMA#) (AREA IN ACRES)

CONSTRUCTION NOTES

1. INSTALL STORM DRAIN CLEANOUT (PUBLIC)
2. INSTALL STORM DRAIN CURB INLET (PUBLIC)
3. INSTALL STORM DRAIN PIPE (PUBLIC)
4. NOT USED
5. NOT USED
6. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
7. INSTALL STORM DRAIN PIPE (PRIVATE)
8. INSTALL TRENCH DRAIN (PRIVATE)
9. INSTALL STORM DRAIN BROOKS BOX (PRIVATE)
10. INSTALL STORM DRAIN PERFORATED PIPE (PRIVATE)
11. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
12. EXISTING STORM DRAIN BOX CULVERT (PUBLIC) TO REMAIN
13. EXISTING STORM DRAIN CURB INLET (PUBLIC) TO REMAIN
14. EXISTING 3-8'X4' BOX CULVERT AND 1-72" RCP STORM DRAIN TO REMAIN (PUBLIC)
15. EXISTING 4-8'X4' BOX CULVERT TO REMAIN (PUBLIC)



BIO-RETENTION BASIN DETAIL
NOT TO SCALE

BIORETENTION NOTES

1. BIORETENTION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.

NOTE: PERMANENT POST-CONSTRUCTION BMP DEVICES (BIO-SWALE AND BIO-BASIN) SHOWN ON PLAN SHALL NOT BE REMOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY OF SAN DIEGO.

SCALE: 1"=80'
80 0 80 160
GRAPHIC SCALE

ENGINEER OF WORK
KETTLER LEWECK ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101
PHONE NO. (619) 269-3444

STEVEN C. KETTLER, PE, C46356 — DATE

KETTLER LEWECK ENGINEERING
303 A STREET, SUITE 302
SAN DIEGO, CA 92101

PREPARED BY:
Name: KETTLER LEWECK ENGINEERING
Address: 303 A STREET, SUITE 302, SAN DIEGO, CA 92101
Phone no. (619) 269-3444

PROJECT ADDRESS: LA MEDIA ROAD AND STATE ROUTE 905, SAN DIEGO, CA
PROJECT NAME: PLAZA LA MEDIA-NORTH
SHEET TITLE: DMA / BMP PLAN

Revision 3: 08/31/2017
Revision 2: 12/12/2016
Revision 1: 08/20/2013
Submittal Date: 08/01/2013

Sheet 18 of 26
PDP NO. 1174331
NUP NO. 1174329
SDP NO. 1174334
VTM NO. 1174336

PDP Submittal for:
PLAZA LA MEDIA-NORTH
LA MEDIA & AIRWAY, LLC
AN ARIZONA LIMITED LIABILITY CORPORATION
Otay Mesa, San Diego, CA

SHEET TITLE: DMA / BMP PLAN

Drawing Date 08/31/17
Check By SCK
Drawn By SV
Scale AS NOTED
Sheet Number C8

0' 250' 500'
SCALE 1"= 250' (On 11x17)

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

PROJECT NO. 07056 - 32 - 04
FIGURE 2
DATE 11 - 19 - 2018

DRAINAGE MANAGEMENT AREA AND BMP SITE PLAN

APPENDIX A

APPENDIX A

STORM WATER MANAGEMENT

FOR

PLAZA LA MEDIA–NORTH
OTAY MESA ROAD AND LA MEDIA ROAD
SAN DIEGO, CALIFORNIA

PROJECT NO. 07056-32-04

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th>Worksheet C.4-1: Form I- 8A[10]</th></tr>
<tr><td colspan="3">Part 1 - Full Infiltration Feasibility Screening Criteria</td></tr>
<tr><td colspan="2">DMA(s) Being Analyzed:</td><td>Project Phase:</td></tr>
<tr><td colspan="2">Plaza La Media North</td><td>Design</td></tr>
<tr><td colspan="3">Criteria 1: Infiltration Rate Screening</td></tr>
<tr><td>1A</td><td colspan="2">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).</td></tr>
<tr><td>1B</td><td colspan="2">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.</td></tr>
<tr><td>1C</td><td colspan="2">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.</td></tr>
<tr><td>1D</td><td colspan="2">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.</td></tr>
</table>

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 include 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.

We performed five infiltration tests utilizing the Soilmoisture Equipment Corp aardvark permeameter, on approved Constant Head Borehole Test Method, at the locations shown in Figure 1, attached. The infiltration test results are presented below in the table form.

Infiltration Test No.	Depth (inches)	Geologic Unit	Unfactored Field Infiltration Rate (inches/hour)	Factored* Field Infiltration Rate, I (in/hr)
A-1	60	Qvop	0.003	0.002
A-2	33	Qvop	0.020	0.010
A-3	56	Qvop	0.009	0.005
A-4	48	Qvop	0.004	0.002
A-5	32	Qvop	0.016	0.008

The property is underlain by clayey soil that possesses a "high" to "very high" expansion potential (expansion index greater than 90). In addition, the infiltration tests we performed result in an average infiltration rate of about 0.005 inches/hour using a factor of safety of 2.

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.

The property is underlain by clayey soil that possesses a "high" to "very high" expansion potential (expansion index greater than 90). In addition, the infiltration tests we performed result in an average infiltration rate of about 0.005 inches/hour using a factor of safety of 2.

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:**
Plaza La Media North		Design
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). The property is underlain by clayey soil that possesses a "high" to "very high" expansion potential (expansion index greater than 90). In addition, the infiltration tests we performed result in an average infiltration rate of about 0.005 inches/hour using a factor of safety of 2.		

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 4B. 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.

The property is underlain by clayey soil that possesses a "high" to "very high" expansion potential (expansion index greater than 90). In addition, the infiltration tests we performed result in an average infiltration rate of about 0.005 inches/hour using a factor of safety of 2.

Refer also to our Storm Water Management report dated January 15, 2018 (Reference 4).

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.

Project No. 07056-32-04
June 23, 2016
Revised January 15, 2018

Western Alliance Bank REO/Commercial Facilities
% Bank of Nevada
2700 West Sahara Avenue, 5th Floor
Las Vegas, Nevada 89102

Attention: Mrs. Brenda Hrubetz

Subject: STORM WATER MANAGEMENT RECOMMENDATIONS
PLAZA LA MEDIA – NORTH
SAN DIEGO, CALIFORNIA

References:

1. *Soil and Geologic Investigation [for] Otay Mesa International Plaza Limited, San Diego, California,* prepared by Geocon Incorporated, dated April 26, 1989 (Project No. D-4342-J01)

2. *Updated Geotechnical Investigation [for] Judd and Dillard LLC (Otay Mesa International Plaza Limited), San Diego, California,* prepared by Geocon Incorporated, dated March 14, 2003 (Project No. 07056-22-01).

3. *BMP Calculations Exhibit for Plaza La Media, Sheet C11,* prepared by Kettler Leweck Engineering, dated January 6, 2016.

4. *Update Geotechnical Report for Plaza La Media-North, Otay Mesa Road and La Media Road, San Diego, California,* prepared by Geocon Incorporated, dated September 11, 2017 (Project No. 07056-32-04).

Dear Mrs. Hrubetz:

In accordance with the request of Mr. Theodore R. L. Shaw with Atlantis Group Land Use and Consultants, we have prepared this revised report to provide recommendations regarding storm water management for the subject project. This revised report presents recommendations in accordance with the new 2017 Storm Water Management criteria recently adopted by the City of San Diego.

We performed five, constant-head, hydraulic-conductivity tests at the locations shown on Figure 1. The locations were selected with a spread criteria to obtain general inforation regarding the infiltration characteristics of the subsoils. The tests were conducted in 4-inch-diameter hand auger boreholes using a Soilmoisture Equipment Corp Aardvark Permeameter. The results of the hydraulic-conductivty testing and information relating to the geotechnical aspects of storm water management are provided herein.

STORM WATER MANAGEMENT

If storm water management devices are not properly designed and constructed, there is a risk for detrimental impacts to improvements and properties 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, downgradient 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, provides general information regarding soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups.

TABLE 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 subject property is underlain by Very Old Paralic Deposits, which consists of clay. The subject site falls within Hydraulic Soil Groups C and D, which have very slow infiltration ratings. Table 2 presents the information from the USDA website for the property.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group
Salinas Clay 0 to 2 percent slopes	ScA	96.4	C
Stockpen Gravelly Clay Loam 2 to 5 percent slopes	SuB	3.6	D

In-Situ Testing

We performed 5 field-saturated, hydraulic conductivity tests at depths of approximately 3 to 5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations presented on Figure 1. The borings were hand-augured to construct a 4-inch diameter test hole. Table 3 presents the results of the saturated hydraulic conductivity testing. The soil types encountered generally consist of clays.

We used the guidelines presented the Riverside County Low Impact Development BMP Design Handbook which references the United States Bureau of Reclamation Well Permeameter Test Method (USBR 7300-89). Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is equal to the infiltration rate. Therefore, the Ksat value determined from the Aardvark Permeameter test is the unfactored infiltration rate. The ksat (infiltration rate) equation provided in the Riverside County Handbook was used to compute the unfactored infiltration rate.

TABLE 3
FIELD-SATURATED, HYDRAULIC CONDUCTIVITY TEST RESULTS USING THE SOIL MOISTURE CORP AARDVARK PERMEAMETER

Location	Depth (inches)	Geologic Unit	Unfactored Field Infiltration Rate, I (inches/hour)	Factored* Field Infiltration Rate, I (inches/hour)
A-1	60	Very Old Paralic Deposits	0.003	0.002
A-1	33	Very Old Paralic Deposits	0.02	0.01
A-3	56	Very Old Paralic Deposits	0.009	0.005
A-4	68	Very Old Paralic Deposits	0.004	0.002
A-5	32	Very Old Paralic Deposits	0.016	0.008

*Using a factor of safety of 2

Soil permeability values from in-situ tests can vary significantly from one location to another due to the non-homogeneous characteristics inherent to most soil. However, if a sufficient amount of field and laboratory test data is obtained, a general trend of soil permeability can usually be evaluated. For this project and for storm water purposes, the test results presented herein should be considered approximate values.

STORM WATER MANAGEMENT CONCLUSIONS

Soil Types

Previously Placed Fill – Compacted fill exists along the property lines parallel to the offramp and right-of-way of I-905, Otay Mesa Road, and La Media Road. The compacted fill was placed during previous grading and primarily consists of sandy clays. The existing fill thickness varies from 3 to 5 feet. Water that is allowed to infiltrate into compacted fill could cause settlement and impact proposed improvements supported by the compacted fill. Therefore, full or partial infiltration is not recommended where compacted fill is present.

Proposed Fill – Compacted fill will be placed above the Very Old Paralic Deposits. After grading, the site will consist of approximately 9 to 10 feet of compacted fill derived from the on-site clays. Section D.4.2 of the *2017 Storm Water Standards* (SWS) provides a discussion regarding fill materials used for infiltration. The SWS states:

- *For engineered fills, infiltration rates may still be quite uncertain due to layering and heterogeneities introduced as part of construction that cannot be precisely controlled.* Due to these uncertainties, full and partial infiltration should be considered geotechnically infeasible and liners and subdrains should be used in areas where infiltration BMP's are founded in compacted fill.

- *Where possible, infiltration BMPs on fill material should be designed such that their infiltrating surface extends into native soils.* The underlying Very Old Paralic Deposits below the proposed compacted fill is approximately 9 to 10 feet below proposed grades. Full and partial infiltration should be considered geotechnically infeasible within the compacted fill and liners and subdrains should be used.

- *Because of the uncertainty of fill parameters as well as potential compaction of the native soils, an infiltration BMP may not be feasible.* Therefore, full and partial infiltration should be considered geotechnically infeasible and liners and subdrains should be used in the fill areas.

- *If the source of fill material is defined and this material is known to be of a granular nature and that the native soils below are permeable and will not be highly compacted, infiltration through compacted fill materials may still be feasible. In this case, a project phasing approach could be used including the following general steps, (1) collect samples from areas expected to be used for fill, (2) remold samples to approximately the proposed degree of compaction and measure the saturated hydraulic conductivity of remolded samples using laboratory methods, (3) if infiltration rates appear adequate for infiltration, then apply an appropriate factor of safety and use the initial rates for preliminary design, (4) following placement of fill, conduct in-situ testing to refine design infiltration rates and adjust the design as needed.* However, based on the discussion above, it is our opinion that infiltrating into compacted fill should be considered geotechnically infeasible and liners and subdrains should be used.

Very Old Paralic Deposits – Very Old Paralic Deposits underlie the compacted fill. Based on our geotechnical investigation, the Very Old Paralic Deposits consist of slightly sandy clays in the upper 10 feet underlined by very dense clayey sands. Because of the presence of sand layers, this unit has a high probability for lateral water migration. Based on the in-situ testing, the upper clay layers have very slow infiltration rates. Therefore, full or partial infiltration should not be allowed within the Very Old Paralic Deposits.

Infiltration Rates

The results of the testing show factored infiltration rates ranging from approximately 0.002 to 0.01 inches per hour. The trench and boring logs from our geotechnical investigation and our experience with Very Old Paralic Deposits indicate the soils in the upper 10 feet of this unit consists of highly expansive clay with very low permeability characteristics. It is our opinion that there is a high probability for lateral water migration because of presence of interlayered permeable sands beds within the Very Old Paralic Deposits. Therefore, based on the results of the field infiltration tests, and our experience, full or partial infiltration should be considered infeasible.

Existing and Proposed Roadway Improvements

The existing improvements along the offramp and right-of-way of I-905, Otay Mesa Road, and La Media Road are underlain by previously placed compacted fill. Infiltration into the compacted fill could cause settlement and impact existing improvements. Because of this, infiltration into the compacted fill is considered infeasible.

Preliminary plans indicate that several sheet graded pads will be created to support commercial buildings with extensive on grade parking areas. Because of the potential for lateral movement of infiltration water, which could impact the proposed improvements, full or partial infiltration is not recommended.

Groundwater

Groundwater was not encountered during our geotechnical investigation. We expect groundwater is at a depth greater than 100 feet below current grades. Groundwater is not a constraint for storm water infiltration.

Existing and New Utilities

Existing utilities are located along the off-ramp and right-of-way of I-905, Otay Mesa Road, and La Media Road. Therefore, full infiltration near these utilities is considered infeasible. We also expect new utilities will be constructed for the anticipated widening of Otay Mesa Road and La Media Road. Infiltration near proposed or new utilities is not recommended.

Soil or Groundwater Contamination

Based on review of the GeoTracker website, no existing contaminated soils are known to exist on the site. We are unaware of contaminated soil or groundwater on the property. Therefore, infiltration associated with this risk is considered feasible.

Slopes

Existing fill slopes are present along the north and west property lines of the north parcel. Storm water contained in basins near the top of slopes could migrate laterally causing seepage and slope instability on the slope face. Because of the high probability for lateral water movement, full or partial infiltration should be considered infeasible within a horizontal distance equal to three times the height of the slope.

Storm Water Management Devices

Liners and subdrains are recommended in 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.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1: Form I-8A) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1: Form I-8A presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table 4 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 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 5 presents the estimated factor values for the evaluation of the factor of safety. The factor of safety is determined using the information contained in Table 4 and the results of review of the geotechnical investigation performed by Geocon Incorporated. Table 5 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 of Worksheet D.5-1) and use the combined safety factor for the design infiltration rate.

TABLE 5
FACTOR OF SAFETY WORKSHEET D.5-1 DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	3	0.75
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, $S_A = \Sigma p$			2.25

[1] The project civil engineer should complete Worksheet D.5-1 or Form I-9 to determine the overall factor of safety.

CONCLUSIONS

Our results indicate that, in general, the soils on the subject site have very low infiltration characteristics. Some interbedded permeable sandy layers occur, which, in our opinion, result in a high probability for lateral water migration. Considering the presence of compacted fill and clay and sand lenses in the Very Old Paralic Deposits and the presence of existing street improvements, slopes, and anticipated site development, it is our opinion that full or partial infiltration is infeasible on this site. Our evaluation included the soil and geologic conditions, settlement and expansion potential of the underlying soil, slope stability and utility considerations. Liners and subdrains should be installed to reduce the potential for lateral migration of seepage and the associated negative impacts to existing road right-of-ways and adjacent properties.

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. Seams and penetrations of the liners 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.

Should you have any questions regarding the letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Raul R. Garcia
GE 2842

REGISTERED PROFESSIONAL ENGINEER RAUL R. GARCIA No. 2842 GEOTECHNICAL STATE OF CALIFORNIA

David B. Evans
CEG 1860

PROFESSIONAL GEOLOGIST DAVID B. EVANS NO. 1860 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

RRG:DBE:dmc

Attachments: Figure 1
Worksheet C.4-1: Form I-8A
Aardvark Data

(2) Addressee
(4/del) Atlantis Group Land Use and Consultants w/ USB
Attention: Mr. Theodore R. L. Shaw
(2) Kettler Leweck Engineeering
Attention: Mr. Steve Kettler

PLAZA LA MEDIA - NORTH
SAN DIEGO, CALIFORNIA

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0' 200' 400'

SCALE 1"= 200' (On 11x17)

GEOCON LEGEND

A-5 ....APPROX. LOCATION OF INFILTRATION TEST

GEOCON INCORPORATED

GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974

PHONE 858 558-6900 - FAX 858 558-6159

PROJECT NO. 07056 - 32 - 04

SITE PLAN

FIGURE 1

DATE 06 - 23 - 2016

REVISED 01 - 15 - 2018

Plotted:01/15/2018 11:57AM | By:JONATHAN WILKINS | File Location:Y:\1_GEOTECH\07000\07000\07056-32-04\2018-01-11\07056-32-04 RevisedSitePlan.dwg

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:
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

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td>2C</td><td>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.</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td>Criteria 2 Result</td><td>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?</td><td>☐Yes</td><td>☐No</td></tr>
<tr><td colspan="4">Summarize findings and basis; provide references to related reports or exhibits.</td></tr>
<tr><td colspan="2">Part 1 Result – Full Infiltration Geotechnical Screening [12]</td><td colspan="2">Result</td></tr>
<tr><td colspan="2">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.</td><td colspan="2">☐Full infiltration Condition

☐Complete Part 2</td></tr>
</table>

[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:
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).		

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.

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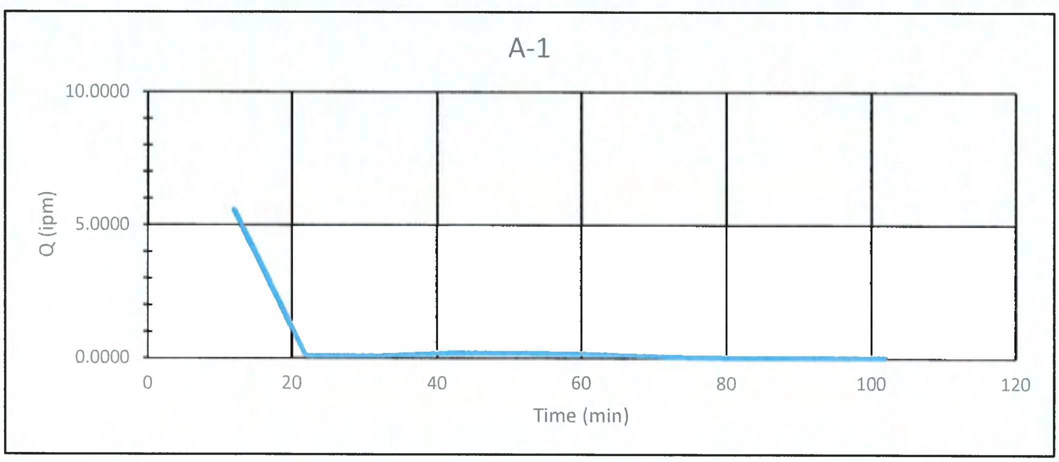
A-1

Dia_{hole}	4	inches
$Depth_{hole}$	60	inches
Wt_0	23.59	lbs
$h_{measured}$ =	3.5	inches

Q: 0.0554 in^3/min

K_{fs} (iph)	0.0029

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
12	12	21.170	2.420	3.88E-02	6.70E+01	5.5846
22	10	21.130	0.040	6.41E-04	1.11E+00	0.1108
32	10	21.090	0.040	6.41E-04	1.11E+00	0.1108
42	10	21.010	0.080	1.28E-03	2.22E+00	0.2215
52	10	20.930	0.080	1.28E-03	2.22E+00	0.2215
62	10	20.870	0.060	9.62E-04	1.66E+00	0.1662
72	10	20.840	0.030	4.81E-04	8.31E-01	0.0831
82	10	20.820	0.020	3.21E-04	5.54E-01	0.0554
92	10	20.800	0.020	3.21E-04	5.54E-01	0.0554
102	10	20.780	0.020	3.21E-04	5.54E-01	0.0554



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A-2

Dia_{hole}	4	inches
$Depth_{hole}$	33	inches

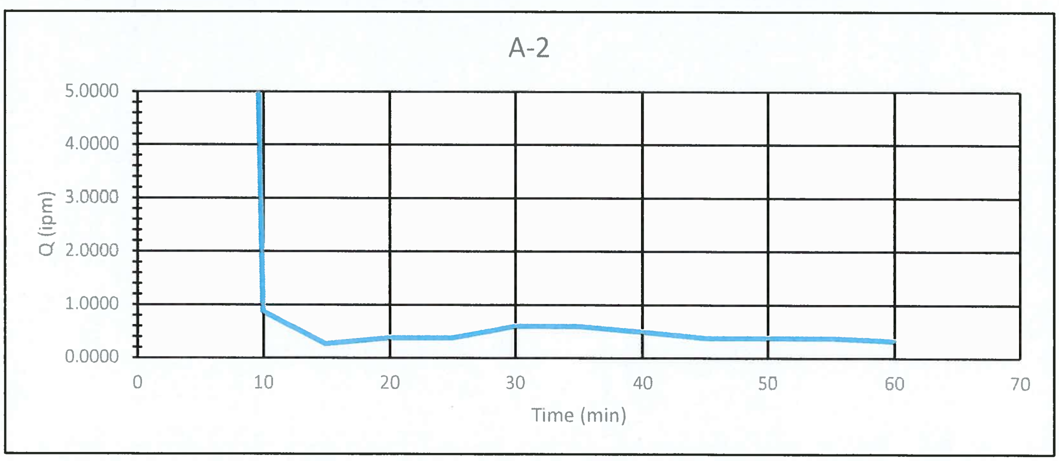
Q: 0.3880 in^3/min

Wt_0 27.55 lbs

K_{fs} (iph) 0.0191

$h_{measured}$ = 4 inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
5	5	17.450	10.100	1.62E-01	2.80E+02	55.9385
10	5	17.290	0.160	2.56E-03	4.43E+00	0.8862
15	5	17.240	0.050	8.01E-04	1.38E+00	0.2769
20	5	17.170	0.070	1.12E-03	1.94E+00	0.3877
25	5	17.100	0.070	1.12E-03	1.94E+00	0.3877
30	5	16.990	0.110	1.76E-03	3.05E+00	0.6092
35	5	16.880	0.110	1.76E-03	3.05E+00	0.6092
40	5	16.790	0.090	1.44E-03	2.49E+00	0.4985
45	5	16.720	0.070	1.12E-03	1.94E+00	0.3877
50	5	16.650	0.070	1.12E-03	1.94E+00	0.3877
55	5	16.580	0.070	1.12E-03	1.94E+00	0.3877
60	5	16.520	0.060	9.62E-04	1.66E+00	0.3323



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A-3

Dia_{hole}	4	inches
$Depth_{hole}$	55.5	inches

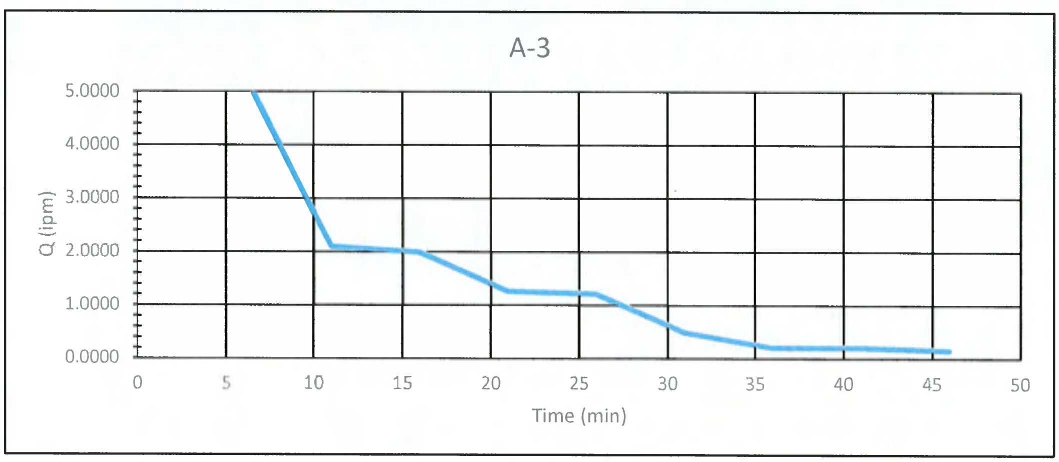
Q: 0.2215 in^3/min

Wt_0 17.83 lbs

K_{fs} (iph) 0.0088

$h_{measured}$ = 6 inches

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
3	3	15.330	2.500	4.01E-02	6.92E+01	23.0769
6	3	14.750	0.580	9.29E-03	1.61E+01	5.3538
11	5	14.370	0.380	6.09E-03	1.05E+01	2.1046
16	5	14.010	0.360	5.77E-03	9.97E+00	1.9938
21	5	13.780	0.230	3.69E-03	6.37E+00	1.2738
26	5	13.560	0.220	3.53E-03	6.09E+00	1.2185
31	5	13.470	0.090	1.44E-03	2.49E+00	0.4985
36	5	13.430	0.040	6.41E-04	1.11E+00	0.2215
41	5	13.390	0.040	6.41E-04	1.11E+00	0.2215
46	5	13.360	0.030	4.81E-04	8.31E-01	0.1662



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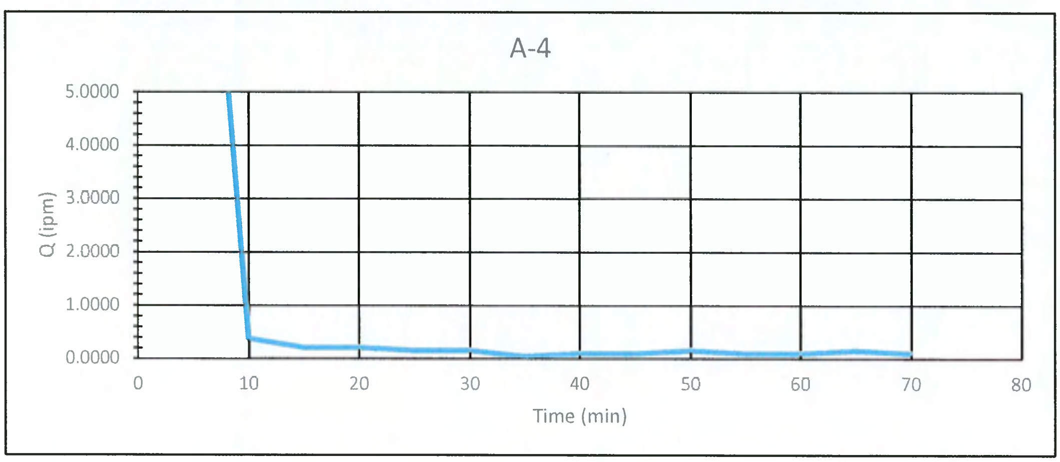
A-4

Dia_{hole}	4	inches
$Depth_{hole}$	68	inches
Wt_0	23.54	lbs
$h_{measured}$ =	6.5	inches

Q: 0.1110 in^3/min

K_{fs} (iph)	0.0042

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
5	5	21.160	2.380	3.81E-02	6.59E+01	13.1815
10	5	21.090	0.070	1.12E-03	1.94E+00	0.3877
15	5	21.050	0.040	6.41E-04	1.11E+00	0.2215
20	5	21.010	0.040	6.41E-04	1.11E+00	0.2215
25	5	20.980	0.030	4.81E-04	8.31E-01	0.1662
30	5	20.950	0.030	4.81E-04	8.31E-01	0.1662
35	5	20.940	0.010	1.60E-04	2.77E-01	0.0554
40	5	20.920	0.020	3.21E-04	5.54E-01	0.1108
45	5	20.900	0.020	3.21E-04	5.54E-01	0.1108
50	5	20.870	0.030	4.81E-04	8.31E-01	0.1662
55	5	20.850	0.020	3.21E-04	5.54E-01	0.1108
60	5	20.830	0.020	3.21E-04	5.54E-01	0.1108
65	5	20.800	0.030	4.81E-04	8.31E-01	0.1662
70	5	20.780	0.020	3.21E-04	5.54E-01	0.1108



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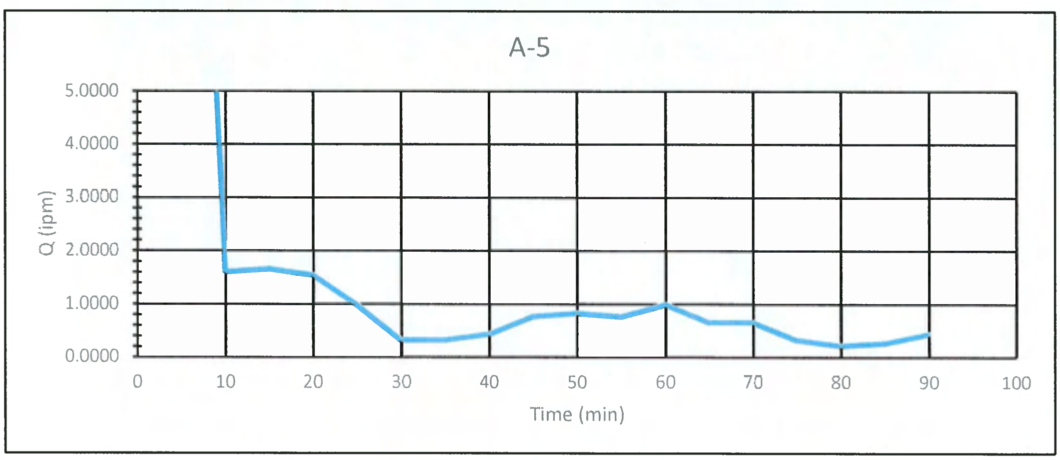
A-5

Dia_{hole}	4	inches
$Depth_{hole}$	32	inches
Wt_0	23.14	lbs
$h_{measured}$ =	5	inches

Q:	0.3540	in^3/min
K_{fs} (iph)	0.0156	

t (min)	Δt (min)	Wt (lbs)	ΔWt (lbs)	Δvol (ft^3)	Δvol (in^3)	Q (in^3/min)
5	5	19.760	3.380	5.42E-02	9.36E+01	18.7200
10	5	19.470	0.290	4.65E-03	8.03E+00	1.6062
15	5	19.170	0.300	4.81E-03	8.31E+00	1.6615
20	5	18.890	0.280	4.49E-03	7.75E+00	1.5508
25	5	18.710	0.180	2.88E-03	4.98E+00	0.9969
30	5	18.650	0.060	9.62E-04	1.66E+00	0.3323
35	5	18.590	0.060	9.62E-04	1.66E+00	0.3323
40	5	18.510	0.080	1.28E-03	2.22E+00	0.4431
45	5	18.370	0.140	2.24E-03	3.88E+00	0.7754
50	5	18.220	0.150	2.40E-03	4.15E+00	0.8308
55	5	18.080	0.140	2.24E-03	3.88E+00	0.7754
60	5	17.900	0.180	2.88E-03	4.98E+00	0.9969
65	5	17.780	0.120	1.92E-03	3.32E+00	0.6646
70	5	17.660	0.120	1.92E-03	3.32E+00	0.6646
75	5	17.600	0.060	9.62E-04	1.66E+00	0.3323
80	5	17.560	0.040	6.41E-04	1.11E+00	0.2215
85	5	17.510	0.050	8.01E-04	1.38E+00	0.2769
90	5	17.430	0.080	1.28E-03	2.22E+00	0.4431
95	5	17.340	0.090	1.44E-03	2.49E+00	0.4985



GEOCON
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Project No. 07056-32-04
June 23, 2016

Western Alliance Bank REO/Commercial Facilities
% Bank of Nevada
2700 West Sahara Avenue, 5th Floor
Las Vegas, Nevada 89102

Attention: Mrs. Brenda Hrubetz

Subject: STORM WATER MANAGEMENT RECOMMENDATIONS
PLAZA LA MEDIA
SAN DIEGO, CALIFORNIA

References:

1. *Soil and Geologic Investigation [for] Otay Mesa International Plaza Limited, San Diego, California,* prepared by Geocon Incorporated, dated April 26, 1989 (Project No. D-4342-J01)

2. *Updated Geotechnical Investigation [for] Judd and Dillard LLC (Otay Mesa International Plaza Limited), San Diego, California,* prepared by Geocon Incorporated, dated March 14, 2003 (Project No. 07056-22-01).

3. *BMP Calculations Exhibit for Plaza La Media, Sheet C11,* prepared by Kettler Leweck Engineering, dated January 6, 2016.

Dear Mrs. Hrubetz:

In accordance with the request of Mr. Steve Kettler with Kettler Leweck Engineering, we have prepared this report to provide recommendations regarding storm water management for the subject project. We performed seven, constant-head, hydraulic-conductivity tests at the locations shown on Figure 1. The locations were selected with a spread criteria to obtain general inforation regarding infiltration characteristics of the subsoils. The tests were conducted in 4-inch-diameter hand auger boreholes using a Soilmoisture Equipment Corp Aardvark Permeameter. The results of the hydraulic-conductivty testing and information relating to the geotechnical aspects of storm water management are provided herein.

STORM WATER MANAGEMENT

If storm water management devices are not properly designed and constructed, there is a risk for detrimental impacts to improvements and properties 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.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, provides general information regarding soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

TABLE 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 subject property is underlain by Very Old Paralic Deposits, which consists of clay. The subject site falls within Hydraulic Soil Group D, which has a very slow infiltration rating. Table 2 presents the information from the USDA website for the property.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group
Huerhuero Loam 2 to 9 percent slopes	HrC	50.5	D
Salinas Clay 0 to 2 percent slopes	ScA	45.9	D
Stockpen Gravelly Clay Loam 2 to 5 percent slopes	SuB	3.6	D

In-Situ Testing

Hydraulic conductivity and infiltration are not synonymous. Table 3 describes the differences in the definitions.

TABLE 3
SOIL PERMEABILITY DEFINITIONS

Term	Definition
Hydraulic Conductivity (K)	The ease at which water moves through a porous medium. It is a function of density, structure, stratification, grain-size distribution and discontinuities.
Infiltration Rate	The volume rate of water flowing into the ground. Infiltration rate is used to estimate hydraulic conductivity.

The degree of soil compaction or in-situ density has a significant impact on hydraulic conductivity. An increase in compaction results in a decrease in soil permeability.

We performed 7 field-saturated, hydraulic conductivity tests at depths of approximately 3 to 5 feet below the ground surface using a Soil Moisture Corp Aardvark Permeameter at the locations presented on Figure 1. The borings were hand-augured to construct a 4-inch diameter test hole. Table 4 presents the results of the saturated hydraulic conductivity testing. The soil types encountered generally consist of clays.

TABLE 4
UNFACTORED, FIELD-SATURATED, HYDRAULIC CONDUCTIVITY TEST RESULTS USING THE SOIL MOISTURE CORP AARDVARK PERMEAMETER

Location	Depth (inches)	Geologic Unit	Unfactored Field Infiltration Rate, I (inches/hour)	Unfactored Field Saturated Hydraulic Conductivity, K (inches/hour)
A-1	60	Very Old Paralic Deposits	0.05	0.03
A-1	33	Very Old Paralic Deposits	0.37	0.20
A-3	56	Very Old Paralic Deposits	0.13	0.05
A-4	68	Very Old Paralic Deposits	0.08	0.03
A-5	32	Very Old Paralic Deposits	0.19	0.09
A-6	54	Very Old Paralic Deposits	0.15	0.08
A-7	54	Very Old Paralic Deposits	0.24	0.13

Soil permeability values from in-situ tests can vary significantly from one location to another due to the non-homogeneous characteristics inherent to most soil. However, if a sufficient amount of field and laboratory test data is obtained, a general trend of soil permeability can usually be evaluated. For this project and for storm water purposes, the test results presented herein should be considered approximate values.

STORM WATER MANAGEMENT CONCLUSIONS

1.0 Soil Types

1.1 **Previously Placed Fill** – Compacted fill exists along the property lines parallel to the offramp and right-of-way of IS 905 and Otay Mesa, La Media, and Airway Roads. The compacted fill was placed during previous grading and consists predominately of slightly sandy clays. The fill thickness varies from 3 to 5 feet. Water that is allowed to infiltrate into compacted fill could cause saturation and settlement and impact proposed improvements placed within the compacted fill. Therefore full or partial infiltration is not recommended where compacted fills are present.

1.2 **Very Old Paralic Deposits** – Very Old Paralic Deposits underlie the compacted fill. Based on our geotechnical investigation, the Very Old Paralic Deposits consist of slightly sandy clays in the upper 10 feet underlined by very dense clayey sands. Because of the presence of sand layers, this unit has a high probability for lateral water migration. Based on the in-situ testing, the upper clay layers have very slow infiltration rates. Therefore, full or partial infiltration should not be allowed within the Very Old Paralic Deposits.

2.0 Infiltration and Hydraulic Conductivity Rates

2.1 The results of the testing show infiltration rates ranging from approximately 0.05 to 0.37 inches per hour and hydraulic conductivity rates of 0.03 to 0.20 inches per hour. The trench and boring logs from our geotechnical investigation and our experience with Very Old Paralic Deposits indicate the soils in the upper 10 feet of this unit consists of highly expansive clay with low permeability characteristics. It is our opinion that there is a high probability for lateral water migration because of presence of interlayered permeable sands beds within the Very Old Paralic Deposits. Therefore, based on the results of the field infiltration tests, and our experience, full or partial infiltration should be considered infeasible.

3.0 Existing and proposed road way improvements

3.1 The existing improvements along the offramp and right-of-way of IS 905 and Otay Mesa, La Media and Airway Roads are underlain by previously placed compacted fill. Infiltration into the compacted fill could cause settlement and impact existing improvements. Because of this, infiltration into the compacted fill is considered infeasible.

3.2 Preliminary plans indicate that several sheet graded pads will be created to support commercial buildings with extensive on grade parking areas. Because of the potential for lateral movement of infiltration water, which could impact the proposed improvements, full or partial infiltration is not recommended.

4.0 Groundwater

4.1 Groundwater was not encountered during our geotechnical investigation. We expect groundwater is at a depth greater than 100 feet below current grades. Groundwater is not a constraint for storm water infiltration.

5.0 Existing and New Utilities

5.1 Existing utilities are located along the off-ramp and right-of-way of IS 905 and Otay Mesa, Airway and La Media Roads. Therefore, full infiltration near these utilities is considered infeasible. We also expect new utilities will be constructed for the anticipated widening of Otay Mesa, Airway, and La Media Roads. Infiltration near proposed or new utilities is not recommended.

6.0 Soil or Groundwater Contamination

6.1 Based on review of the GeoTracker website, no existing contaminated soils are known to exist on the site. We are unaware of contaminated soil or groundwater on the property. Therefore, infiltration associated with this risk is considered feasible.

7.0 Slopes

7.1 Existing fill slopes are present along the north and west property lines of the north parcel and along the north property line of the south parcel. Storm water contained in basins near the top of slopes could migrate laterally causing seepage and slope instability on the slope face. Because of the high probability for lateral water movement, full or partial infiltration should be considered infeasible within a horizontal distance equal to three times the height of the slope.

8.0 Storm Water Management Devices

8.1 Liners and subdrains are recommended in 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.

9.0 Storm Water Standard Worksheets

9.1 The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or I-8) 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.

9.2 The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table 9.1 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 9.1
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

9.3 Table 9.2 presents the estimated factor values for the evaluation of the factor of safety. The factor of safety is determined using the information contained in Table 9.1 and the results of review of the geotechnical investigation performed by Geocon Incorporated. Table 9.2 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 of Worksheet D.5-1) and use the combined safety factor for the design infiltration rate.

TABLE 9.2
FACTOR OF SAFETY WORKSHEET D.5-1 DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	3	0.75
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, $S_A = \Sigma p$			2.25

[1] The project civil engineer should complete Worksheet D.5-1 or Form I-9 to determine the overall factor of safety.

CONCLUSIONS

Our results indicate that, in general, the soils on the subject site have very low infiltration characteristics. Some interbedded permeable sandy layers occur, which, in our opinion, result in a high probability for lateral water migration. Considering the presence of compacted fill and clay and sand lenses in the Very Old Paralic Deposits and the presence of existing street improvements, slopes, and anticipated site development, it is our opinion that full or partial infiltration is infeasible on this site. Our evaluation included the soil and geologic conditions, settlement and expansion potential of the underlying soil, slope stability, utility considerations, and groundwater mounding. Liners should be installed to reduce the potential for lateral migration of seepage and the associated negative impacts to existing road right-of-ways and adjacent properties.

Should you have any questions regarding the letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Raul R. Garcia
GE 2842

REGISTERED PROFESSIONAL ENGINEER RAUL R. GARCIA No. 2842 GEOTECHNICAL STATE OF CALIFORNIA

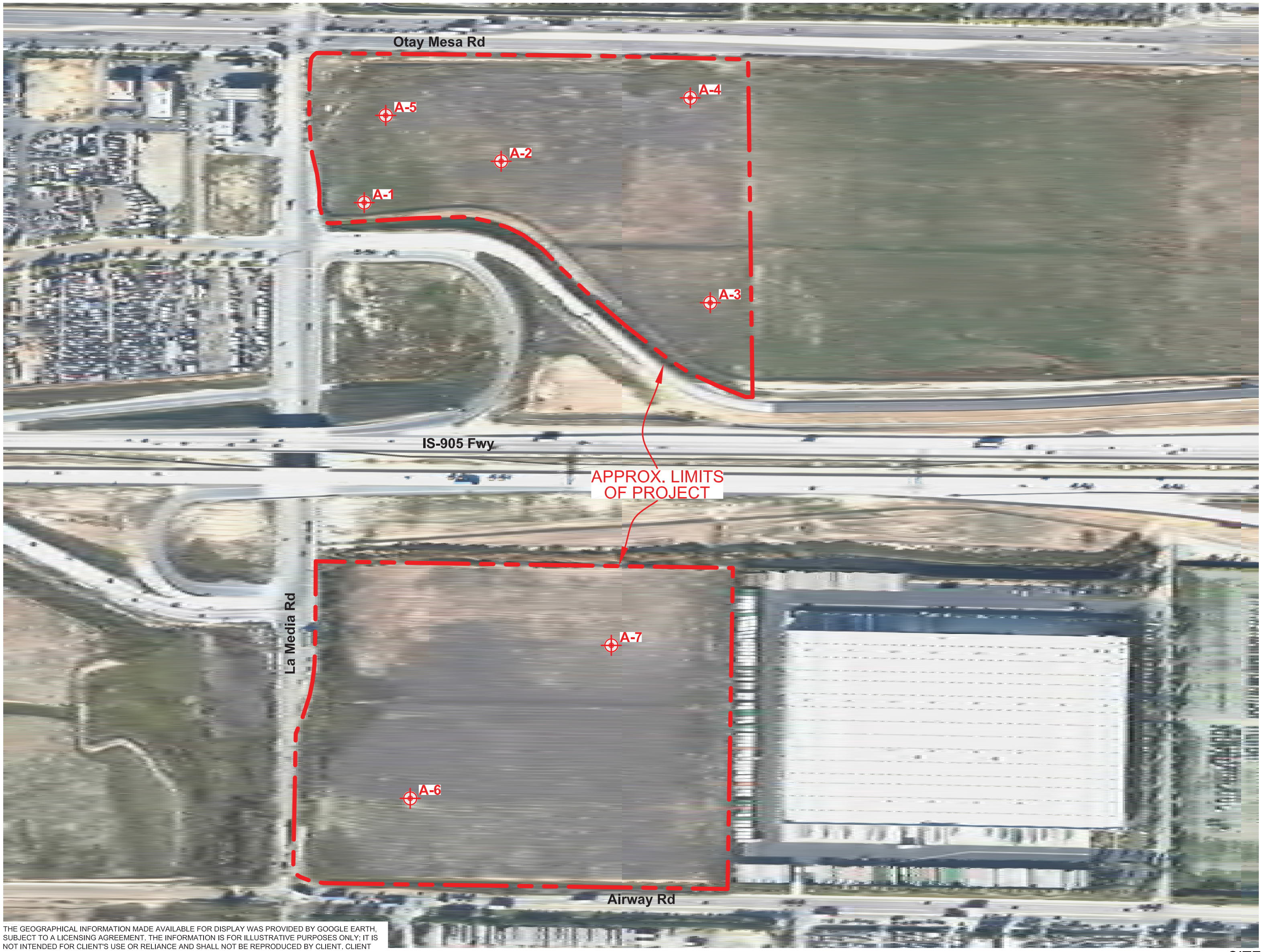
David B. Evans
CEG 1860

PROFESSIONAL GEOLOGIST DAVID B. EVANS NO. 1860 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

RRG:DBE:dmc

Attachments: Figure 1
Worksheet C.4-1
Aardvark Data

(2) Addressee
(2) Kettler Leweck Engineeering
Attention: Mr. Steve Kettler



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PLAZA LA MEDIA
SAN DIEGO, CALIFORNIA

0' 300' 600'
SCALE 1"= 300' (On 11x17)

GEOCON LEGEND

A-7 ....APPROX. LOCATION OF INFILTRATION TEST

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

SITE PLAN
PROJECT NO. 07056 - 32 - 04
FIGURE 1
DATE 06 - 23 - 2016

Plotted:06/23/2016 2:28PM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\07056-32-04 (Plaza La Media)\SHEETS\07056-32-04 SitePlan.dwg

Categorization of Infiltration Feasibility Condition			Worksheet C.4-1
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: We performed 7 infiltration tests using a Soil Moisture Corp Aardvark Constant Head Permeameter, placed inside a 4-inch-diameter boring. The unfactored (FS-1) test results indicate infiltration rates ranging between 0.05 inches/hour and 0.37 inches/hour. After applying a feasibility factor of safety of 2.0, the infiltration rates reduce to 0.025 to 0.19 inches/hour, which is below the minimum threshold value of 0.5 inches/hour. Based on the USDA Wets Soil Survey website, 100 percent of the site consists of a unit that possesses a Hydrologic Soil Group D classification with an estimated K_{SAT} of 0.06 to 0.57 inches per hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: The site is underlain by compacted fill and very stiff to very dense, clay and sand of the Very Old Paralic Deposits. Infiltration into compacted fill could cause settlement and adverse distress to improvements and structures. Additionally, the layered sands are below the upper clay layer. There is a high probability for lateral water migration, which could impact existing improvements as a result of soil settlement in the fill and/or volume change of the clay layer of the Very Old Paralic Deposits, which could impact existing improvements as a result of soil settlement in the fill or volume change expansion of the clay and cause water to perch and travel laterally to adjacent slopes and downgradient properties, streets, and utility lines. This could cause daylight water seepage and slope instability. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on our experience and review of www.water.ca.cgov website, groundwater is expected to be deeper than 100 feet; therefore, the risk of impacting the groundwater as a result of storm water infiltration is very low. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: From a geotechnical perspective, due to the very low permeability of the underlying soils, and lack of nearby streams downgradient from the site, we do not expect a significant change in any stream flow or seasonality of stream flow or increased risk of contaminated groundwater to adversely impact any stream flows. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		No

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

Worksheet C.4-1 Page 3 of 4

<u>**Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria**</u>

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:

Infiltration should be avoided in soils assigned to Hydrologic Soil Group D. The soils are moderately to highly expansive and subject to volume change and/or settlement when wetted. Existing utilities in the public right-of-way may be impacted as a result of lateral water migration.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Criteria	Screening Question	Yes	No
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:

Based on our study and information presented in the geotechnical reports dated April 26, 1989, and March 14, 2003, the site has variable soil conditions consisting of compacted fills and Very Old Paralic Deposits. Infiltration into compacted fill can cause heaving and/or settlement and distress to existing roadways and associated improvements. The Very Old Paralic Deposits consist of very stiff clays with a thickness on the order of 10 feet underlain by very dense clayey sands. As the test results indicate, infiltration rates are low across the site, there is a high probability that infiltration, even in inappreciable amounts, will migrate laterally to compacted fills, slopes, adjacent utility lines, and downgradient properties and could cause distress to existing and proposed site improvements. It is not feasible to mitigate lateral movement as the sandy layer exists across the site in both horizontal and vertical directions.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 4 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>7</td><td>Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis:

Based on our experience and review of www.water.ca.cgov website, groundwater is expected to be deeper than 100 feet; therefore, the risk of impacting the groundwater as a result of storm water infiltration is very low.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>8</td><td>Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis:

Researching downstream water rights is beyond the scope of our geotechnical services. In this regard, we are not aware of any downstream water rights that would be adversely impacted by storm water BMP's at the site. The volume of storm water to percolate into the ground is expected to be very low.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>Part 2 Result*</td><td colspan="2">If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.

If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.</td><td>No</td></tr>
</table>

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

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Plaza La Media	Date:	5/26/2016
Project Number:	07056-32-04	By:	NGB
Borehole Location:	A-1	Ref. EL:	488.00
		Bottom EL:	483.00

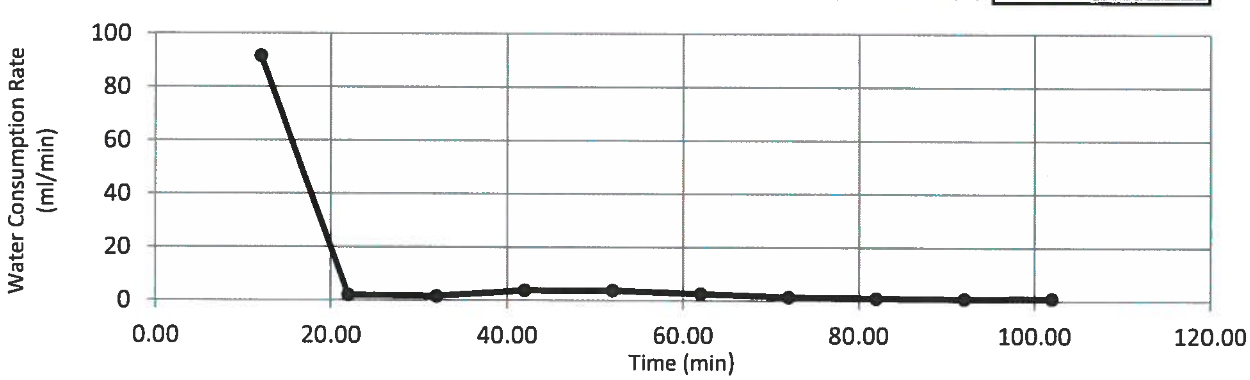
Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	5.00	ft	=	152.40	cm
Dist. Btwn Reservoir & Top of Borehole:	2.13	ft	=	64.77	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	0.00	in	=	0.00	cm

Distance Btwn Resevoir and APM (D):	198.755	cm
Head Height (h):	9.60	cm
Distance Btwn Constant Head and Water Table (L):	2905.20	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	0.00		10724			
2	12.00	12.00	9624	1100	1100	91.67
3	22.00	10.00	9604	20	1120	2.00
4	32.00	10.00	9588	16	1136	1.60
5	42.00	10.00	9550	38	1174	3.80
6	52.00	10.00	9512	38	1212	3.80
7	62.00	10.00	9486	26	1238	2.60
8	72.00	10.00	9472	14	1252	1.40
9	82.00	10.00	9462	10	1262	1.00
10	92.00	10.00	9454	8	1270	0.80
11	102.00	10.00	9445	9	1279	0.90
12						
13						
14						
15						
16						
17						
18						
19						
20						

*1 ml = 1 g

Steady Flow Rate (Q): 0.80 ml/min



Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0011 cm/min 0.0258 in/hr

GEOCON

SOIL INFILTRATION RATE BASED ON AARDVARK K_{SAT}

Project No:	07056-32-04
Project Name:	PLAZA LA MEDIA
Sample No:	A-1
Geologic Unit:	Qvop

Infiltration Rate (I) = Q/A

K_{sat} (in/hr):	0.0258
Flow rate (Q) ml/min:	0.8
Head (h) cm:	9.6
Flow Rate (Q) in^3/hr:	2.93
Head (h) in:	3.78
Diameter (in):	4
Wetted Area (A) in^2:	60.10
Unfactored Infiltration Rate (I) in/hr:	**0.05**
Feasibility Factor of Safety (FS):	2
Infiltration Rate (I) in/hr:	**0.02**

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Plaza La Media	Date:	5/27/2016
Project Number:	07056-32-04	By:	JTL
Borehole Location:	A-2	Ref. EL:	491.00
		Bottom EL:	488.25

Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	2.75	ft	=	83.82	cm
Dist. Btwn Reservoir & Top of Borehole:	2.50	ft	=	76.20	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	0.00	in	=	0.00	cm

Distance Btwn Resevoir and APM (D):	141.605	cm
Head Height (h):	9.42	cm
Distance Btwn Constant Head and Water Table (L):	2973.60	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	50.00		7976			
2	55.00	5.00	7934	42	42	8.40
3	60.00	5.00	7858	76	118	15.20
4	65.00	5.00	7836	22	140	4.40
5	70.00	5.00	7806	30	170	6.00
6	75.00	5.00	7774	32	202	6.40
7	80.00	5.00	7724	50	252	10.00
8	85.00	5.00	7674	50	302	10.00
9	90.00	5.00	7634	40	342	8.00
10	95.00	5.00	7598	36	378	7.20
11	100.00	5.00	7568	30	408	6.00
12	105.00	5.00	7538	30	438	6.00
13	110.00	5.00	7508	30	468	6.00
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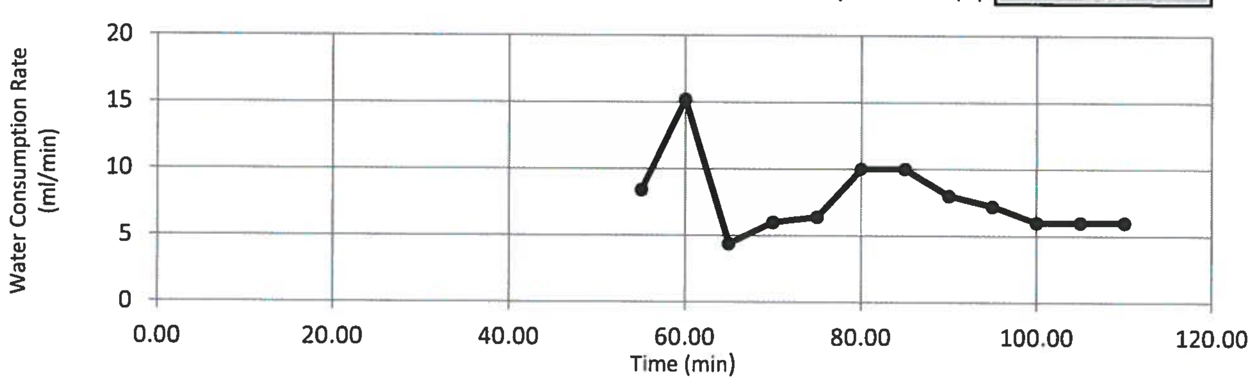
*1 ml = 1 g

Steady Flow Rate (Q): 6.00 ml/min



Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0084 cm/min 0.1982 in/hr

GEOCON

SOIL INFILTRATION RATE BASED ON AARDVARK K_{SAT}

Project No:	07056-32-04
Project Name:	PLAZA LA MEDIA
Sample No:	A-2
Geologic Unit:	Qvop

Infiltration Rate (I) = Q/A

K_{sat} (in/hr):	0.1982
Flow rate (Q) ml/min:	6
Head (h) cm:	9.42
Flow Rate (Q) in^3/hr:	21.95
Head (h) in:	3.71
Diameter (in):	4
Wetted Area (A) in^2:	59.21
Unfactored Infiltration Rate (I) in/hr:	**0.37**
Feasibility Factor of Safety (FS):	2
Infiltration Rate (I) in/hr:	**0.19**

GEOCON

Aardvark Permeameter Data Analysis

Project Name: Plaza La Media
Project Number: 07056-32-04
Borehole Location: A-3

Date: 5/27/2016
By: NGB
Ref. EL: 493.00
Bottom EL: 488.38

Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	4.63	ft	=	140.97	cm
Dist. Btwn Reservoir & Top of Borehole:	2.50	ft	=	76.20	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	2.50	in	=	6.35	cm

Distance Btwn Resevoir and APM (D):	198.755	cm
Head Height (h):	15.95	cm
Distance Btwn Constant Head and Water Table (L):	2922.98	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	19.00		8104			
2	22.00	3.00	6968	1136	1136	378.67
3	25.00	3.00	6704	264	1400	88.00
4	30.00	5.00	6532	172	1572	34.40
5	35.00	5.00	6368	164	1736	32.80
6	40.00	5.00	6264	104	1840	20.80
7	45.00	5.00	6164	100	1940	20.00
8	50.00	5.00	6124	40	1980	8.00
9	55.00	5.00	6104	20	2000	4.00
10	60.00	5.00	6088	16	2016	3.20
11	65.00	5.00	6072	16	2032	3.20
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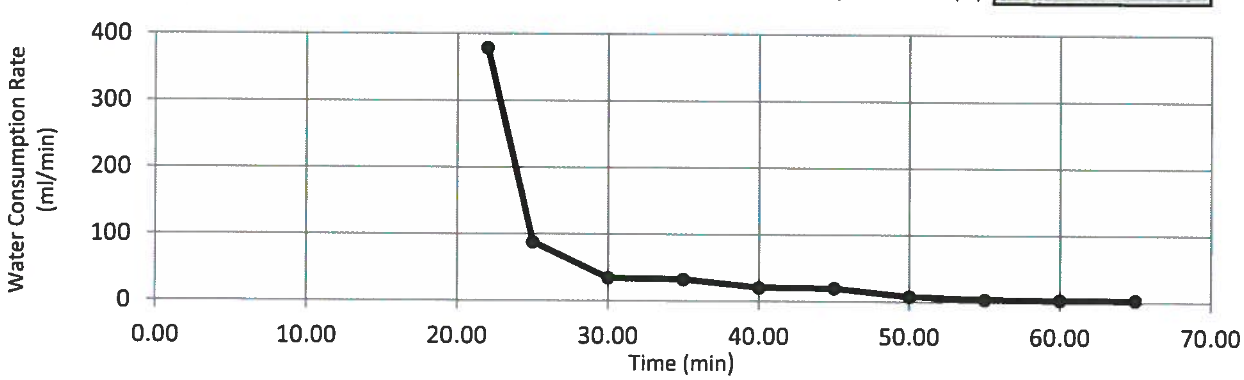
19						
20						

*1 ml = 1 g

Steady Flow Rate (Q): 3.20 ml/min



Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0023 cm/min 0.0535 in/hr

GEOCON

SOIL INFILTRATION RATE BASED ON AARDVARK K_{SAT}

Project No:	07056-32-04
Project Name:	PLAZA LA MEDIA
Sample No:	A-3
Geologic Unit:	Qvop

Infiltration Rate (I) = Q/A

K_{sat} (in/hr):	0.0535
Flow rate (Q) ml/min:	3.2
Head (h) cm:	15.95
Flow Rate (Q) in^3/hr:	11.71
Head (h) in:	6.28
Diameter (in):	4
Wetted Area (A) in^2:	91.54
Unfactored Infiltration Rate (I) in/hr:	**0.13**
Feasibility Factor of Safety (FS):	2
Infiltration Rate (I) in/hr:	**0.06**

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Plaza La Media	Date:	5/27/2016
Project Number:	07056-32-04	By:	NGB
Borehole Location:	A-4	Ref. EL:	493.00
		Bottom EL:	487.33

Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	5.67	ft	=	172.72	cm
Dist. Btwn Reservoir & Top of Borehole:	2.50	ft	=	76.20	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	2.75	in	=	6.99	cm

Distance Btwn Resevoir and APM (D):	230.502968	cm
Head Height (h):	16.68	cm
Distance Btwn Constant Head and Water Table (L):	2891.96	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	0.00		10698			
2	5.00	5.00	9616	1082	1082	216.40
3	10.00	5.00	9586	30	1112	6.00
4	15.00	5.00	9566	20	1132	4.00
5	20.00	5.00	9552	14	1146	2.80
6	25.00	5.00	9538	14	1160	2.80
7	30.00	5.00	9524	14	1174	2.80
8	35.00	5.00	9516	8	1182	1.60
9	40.00	5.00	9508	8	1190	1.60
10	45.00	5.00	9498	10	1200	2.00
11	50.00	5.00	9488	10	1210	2.00
12	55.00	5.00	9478	10	1220	2.00
13	60.00	5.00	9468	10	1230	2.00
14	65.00	5.00	9456	12	1242	2.40
15	70.00	5.00	9446	10	1252	2.00
16						
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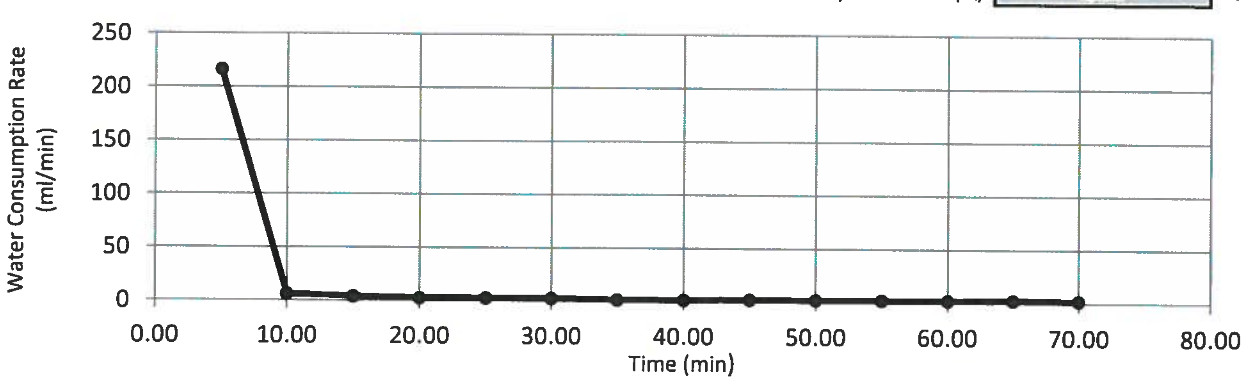
19						
20						

*1 ml = 1 g

Steady Flow Rate (Q): 2.00 ml/min



Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0013 cm/min 0.0315 in/hr

GEOCON

SOIL INFILTRATION RATE BASED ON AARDVARK K_{SAT}

Project No:	07056-32-04
Project Name:	PLAZA LA MEDIA
Sample No:	A-4
Geologic Unit:	Qvop

Infiltration Rate (I) = Q/A

K_{sat} (in/hr):	0.0315
Flow rate (Q) ml/min:	2
Head (h) cm:	16.68
Flow Rate (Q) in^3/hr:	7.32
Head (h) in:	6.57
Diameter (in):	4
Wetted Area (A) in^2:	95.15
Unfactored Infiltration Rate (I) in/hr:	**0.08**
Feasibility Factor of Safety (FS):	2
Infiltration Rate (I) in/hr:	**0.04**

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Plaza La Media	Date:	5/27/2016
Project Number:	07056-32-04	By:	NGB
Borehole Location:	A-5	Ref. EL:	491.00
		Bottom EL:	488.33

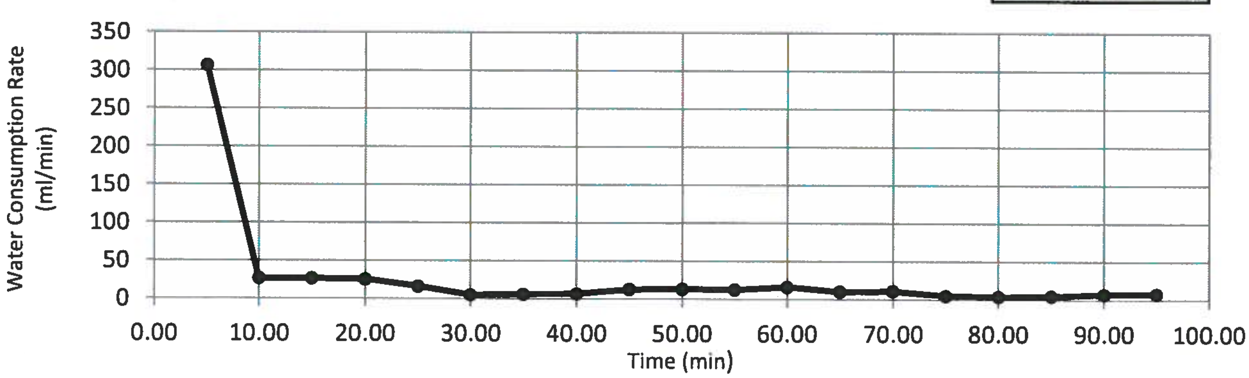
Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	2.67	ft	=	81.28	cm
Dist. Btwn Reservoir & Top of Borehole:	2.50	ft	=	76.20	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	1.50	in	=	3.81	cm

Distance Btwn Resevoir and APM (D):	139.062968	cm
Head Height (h):	13.23	cm
Distance Btwn Constant Head and Water Table (L):	2979.95	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	0.00		10516			
2	5.00	5.00	8982	1534	1534	306.80
3	10.00	5.00	8848	134	1668	26.80
4	15.00	5.00	8714	134	1802	26.80
5	20.00	5.00	8586	128	1930	25.60
6	25.00	5.00	8504	82	2012	16.40
7	30.00	5.00	8478	26	2038	5.20
8	35.00	5.00	8448	30	2068	6.00
9	40.00	5.00	8414	34	2102	6.80
10	45.00	5.00	8350	64	2166	12.80
11	50.00	5.00	8282	68	2234	13.60
12	55.00	5.00	8218	64	2298	12.80
13	60.00	5.00	8136	82	2380	16.40
14	65.00	5.00	8084	52	2432	10.40
15	70.00	5.00	8028	56	2488	11.20
16	75.00	5.00	8002	26	2514	5.20
17	80.00	5.00	7982	20	2534	4.00
18	85.00	5.00	7958	24	2558	4.80
19	90.00	5.00	7922	36	2594	7.20
20	95.00	5.00	7882	40	2634	8.00

*1 ml = 1 g

Steady Flow Rate (Q): 4.00 ml/min



Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0036 cm/min 0.0858 in/hr

GEOCON

SOIL INFILTRATION RATE BASED ON AARDVARK K_{SAT}

Project No:	07056-32-04
Project Name:	PLAZA LA MEDIA
Sample No:	A-5
Geologic Unit:	Qvop

Infiltration Rate (I) = Q/A

K_{sat} (in/hr):	0.0858
Flow rate (Q) ml/min:	4
Head (h) cm:	13.23
Flow Rate (Q) in^3/hr:	14.63
Head (h) in:	5.21
Diameter (in):	4
Wetted Area (A) in^2:	78.07
Unfactored Infiltration Rate (I) in/hr:	**0.19**
Feasibility Factor of Safety (FS):	2
Infiltration Rate (I) in/hr:	**0.09**

GEOCON

Aardvark Permeameter Data Analysis

Project Name:	Plaza La Media	Date:	5/27/2016
Project Number:	07056-32-04	By:	JTL
Borehole Location:	A-6	Ref. EL:	486.00
		Bottom EL:	481.50

Borehole Diameter (2r):	4.00	in	=	10.16	cm
Borehole Depth (H):	4.50	ft	=	137.16	cm
Dist. Btwn Reservoir & Top of Borehole:	2.50	ft	=	76.20	cm
Depth to Water Table (s):	100.00	ft	=	3048.00	cm
Height APM Raised from Bottom:	0.00	in	=	0.00	cm

Distance Btwn Resevoir and APM (D):	194.945	cm
Head Height (h):	9.58	cm
Distance Btwn Constant Head and Water Table (L):	2920.42	cm

Reading	Time (min)	Time Elapsed (min)	Resevoir Water Weight (g)	Interval Water Consumption (g)	Total Water Consumption (g)	*Water Consumption Rate (ml/min)
1	0.00		7434			
2	5.00	5.00	6340	1094	1094	218.80
3	10.00	5.00	4610	1730	2824	346.00
4	13.00	3.00	3530	1080	3904	360.00
5	15.00	2.00	3296	234	4138	117.00
6	17.00	2.00	3256	40	4178	20.00
7	19.00	2.00	3238	18	4196	9.00
8	21.00	2.00	3228	10	4206	5.00
9	25.00	4.00	3214	14	4220	3.50
10	30.00	5.00	3198	16	4236	3.20
11	35.00	5.00	3186	12	4248	2.40
12	40.00	5.00	3174	12	4260	2.40
13	45.00	5.00	3160	14	4274	2.80
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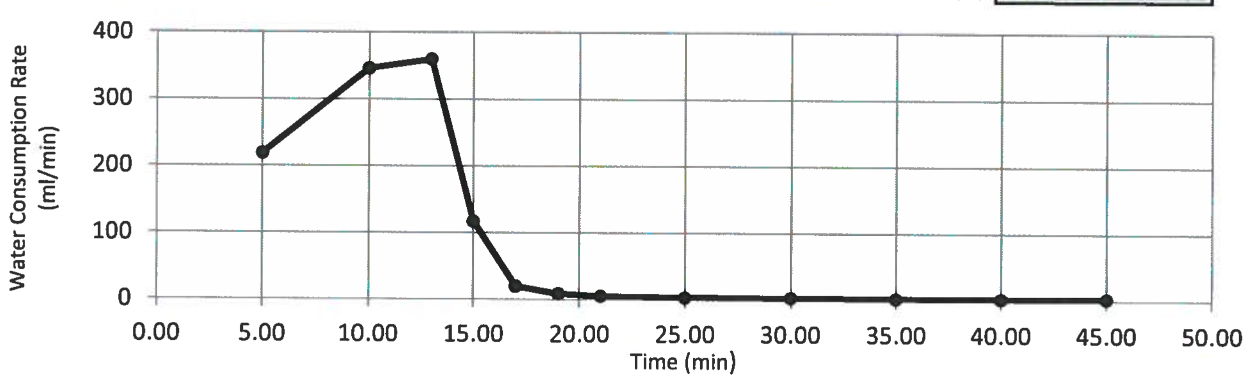
*1 ml = 1 g

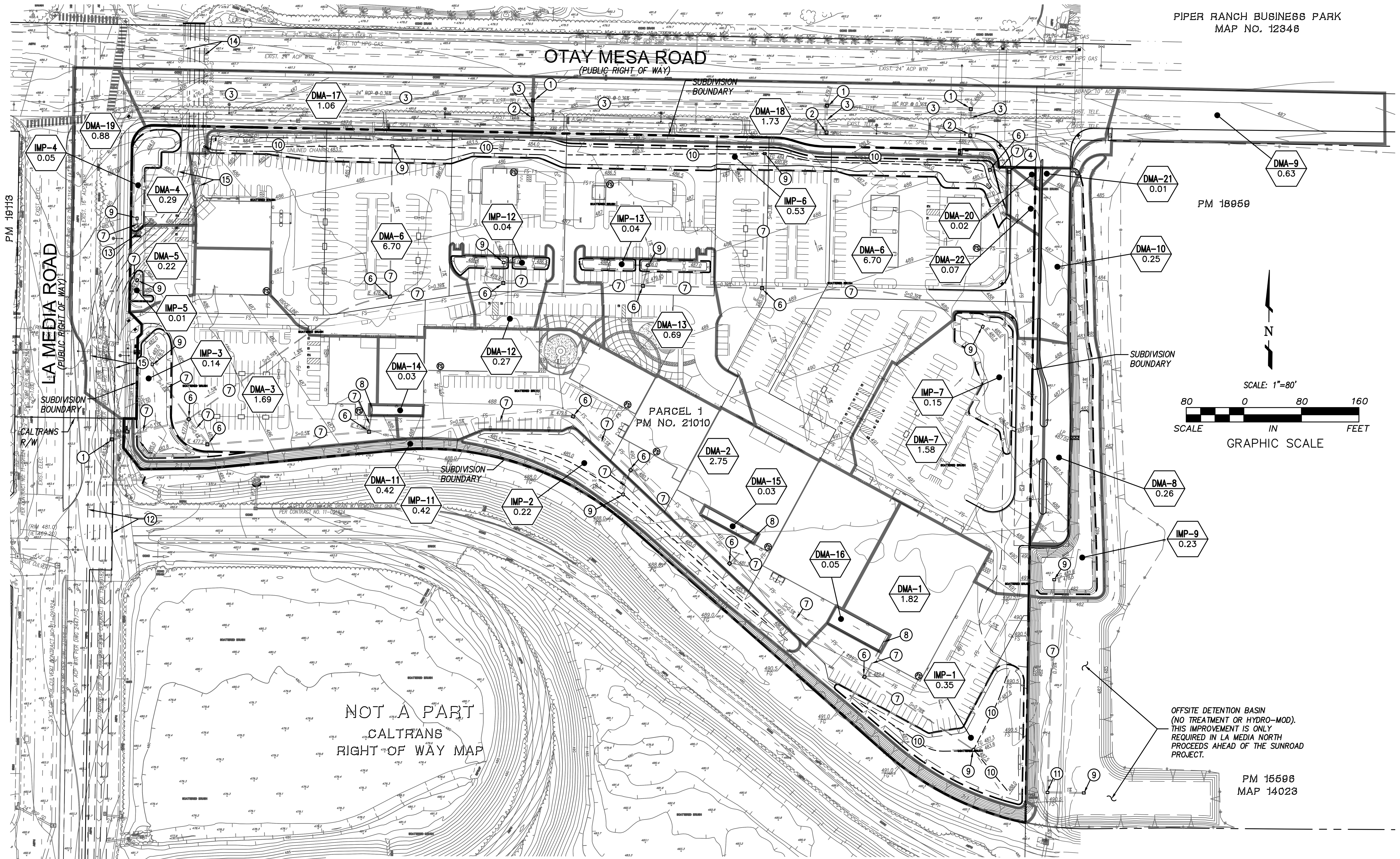
Steady Flow Rate (Q): 2.40 ml/min

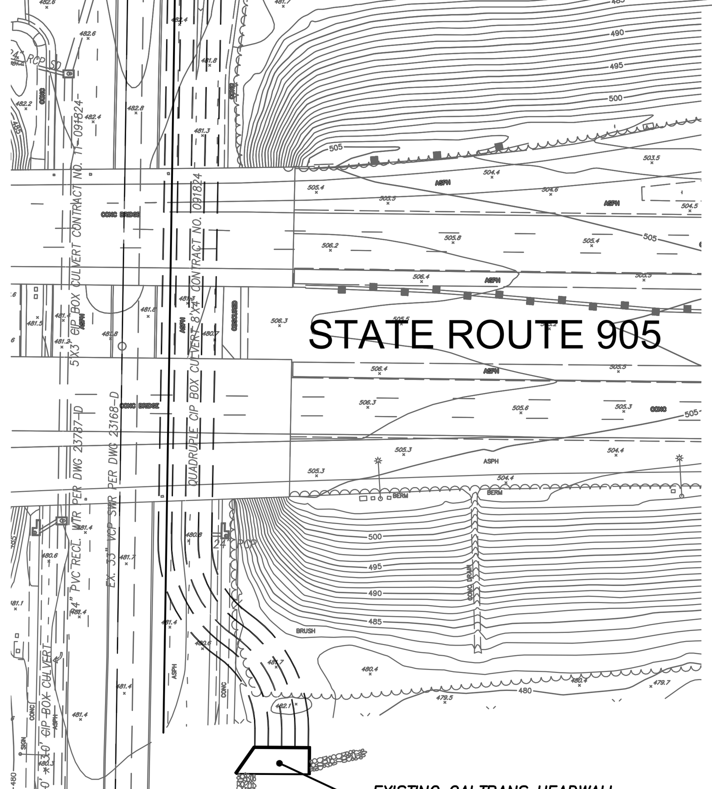


Field-Saturated Hydraulic Conductivity:

Case 1: L/h > 3 K_{sat} = 0.0033 cm/min 0.0776 in/hr

PLANNED DEVELOPMENT PERMIT NO. 1174331
NEIGHBORHOOD USE PERMIT NO. 1174329
SITE DEVELOPMENT PERMIT NO. 1174334
RIGHT-OF-WAY AND EASEMENT VACATION NO. 1174332
VESTING TENTATIVE MAP NO. 1174336
NEIGHBORHOOD DEVELOPMENT PERMIT NO. 1174327





PLAN

SCALE: 1"=80'

CONSTRUCTION NOTES

1. INSTALL STORM DRAIN CLEANOUT (PUBLIC)
2. INSTALL STORM DRAIN CURB INLET (PUBLIC)
3. INSTALL STORM DRAIN PIPE (PUBLIC)
4. INSTALL MODULAR WETLAND UNIT
5. NOT USED
6. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
7. INSTALL STORM DRAIN PIPE (PRIVATE)
8. INSTALL TRENCH DRAIN (PRIVATE)
9. INSTALL STORM DRAIN BROOKS BOX (PRIVATE)
10. INSTALL STORM DRAIN PERFORATED PIPE (PRIVATE)
11. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
12. EXISTING STORM DRAIN BOX CULVERT (PUBLIC) TO REMAIN
13. EXISTING STORM DRAIN CURB INLET (PUBLIC) TO REMAIN
14. EXISTING 3-6'X4' BOX CULVERT AND 1-72" RCP STORM DRAIN TO REMAIN (PUBLIC)
15. EXISTING 4-8'X4' BOX CULVERT TO REMAIN (PUBLIC)

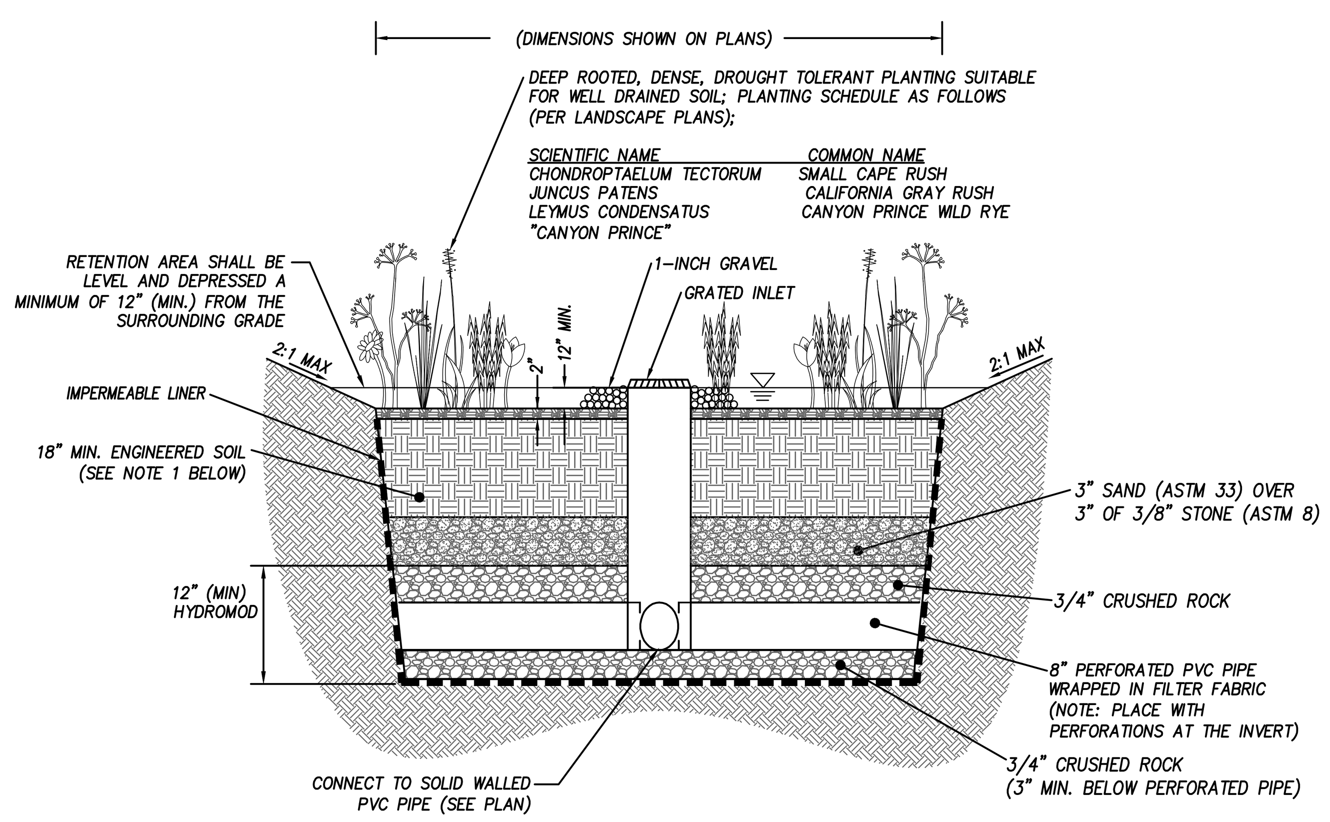
HMP NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP IS SOIL TYPE 'D'.
2. THE APPROXIMATE DEPTH TO GROUNDWATER IS GREATER THAN 20'.
3. EXISTING NATURAL HYDROLOGIC FEATURES – NONE.
4. CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED – NONE.
5. EXISTING TOPOGRAPHY – SHOWN HEREIN.
6. EXISTING AND PROPOSED DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE – SHOWN HEREIN.
7. PROPOSED GRADING – SHOWN HEREIN.
8. PROPOSED IMPERVIOUS FEATURES – SHOWN HEREIN.
9. PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS TO MINIMIZE IMPERVIOUSNESS – LANDSCAPE AND PERVIOUS PAVING.
10. POINTS OF COMPLIANCE (POC) FOR HYDROMODIFICATION MANAGEMENT AND EXISTING AND PROPOSED DRAINAGE BOUNDARY AND DRAINAGE AREA TO EACH POINTS OF COMPLIANCE – SHOWN HEREIN.
11. STRUCTURAL BMPS FOR HYDROMODIFICATION MANAGEMENT – BIOFILTRATION BASINS SHOWN HEREIN.

POTENTIAL POLLUTANTS SOURCE AREAS AND CORRESPONDING REQUIRED SOURCE CONTROLS

- ON-SITE STORM DRAIN INLETS
- INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
- NEED FOR FUTURE INDOOR AND STRUCTURAL PEST CONTROL
- LANDSCAPE/OUTDOOR PESTICIDE USE
- FOOD SERVICE
- REFUSE AREAS
- FUEL DISPENCING AREAS
- LOADING DOCKS
- FIRE SPRINKLER TEST WATER
- MISCELLANEOUS DRAIN OR WASH WATER
- PLAZAS, SIDEWALKS, AND PARKING LOTS

NOTE: THE PROJECT WILL HAVE A PRIVATE ON-SITE DRAINAGE SYSTEM TO CONVEY RUNOFF TO THE BIOFILTRATION BASINS. PROPOSED INLETS WILL INCLUDE STENCILING AND/OR SIGNAGE. OUTDOOR AREAS WILL BE PROTECTED. OTHER REQUIRED SOURCE CONTROL BMPS WILL BE IN ACCORDANCE WITH FORM I-4 AND I-5.



BIOFILTRATION BASIN DETAIL

NOT TO SCALE

BIOFILTRATION BASIN NOTES

1. BIOFILTRATION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.

NOTE: PERMANENT POST-CONSTRUCTION BMP DEVICES (BIOFILTRATION BASINS) SHOWN ON PLAN SHALL NOT BE REMOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY OF SAN DIEGO.

ATTACHMENT 1A - DMA EXHIBIT

DRAINAGE MANAGEMENT AREA SUMMARY

ID/DMA #	TYPE	BMP ID	DESCRIPTION	DMA AREA (AC)	PRE-PROJECT COVER	POST SURFACE TYPE	DRAINAGE SOIL	SLOPE
DMA 1	DRAINS TO IMP	BMP 1	IMP 1-DMA 1	1.82	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 2	DRAINS TO IMP	BMP 2	IMP 2-DMA 2	2.75	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 3	DRAINS TO IMP	BMP 3	IMP 3-DMA 3	1.69	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 4	DRAINS TO IMP	BMP 4	IMP 4-DMA 4	0.29	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 5	DRAINS TO IMP	BMP 5	IMP 5-DMA 5	0.22	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 6	DRAINS TO IMP	BMP 6	IMP 6-DMA 6	6.71	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 7	DRAINS TO IMP	BMP 7	IMP 7-DMA 7	1.58	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 8	DRAINS TO IMP	BMP 9	IMP 9-DMA 8	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 9	DRAINS TO IMP	BMP 9	IMP 9-DMA 9	0.63	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 10	DRAINS TO IMP	BMP 9	IMP 9-DMA 10	0.25	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 11	–	BMP 11	SELF MITIGATING	0.42	PERVIOUS (PRE)	LANDSCAPE ONLY – SELF MITIGATING AREA	TYPE D SOIL	FLAT
DMA 12	DRAINS TO IMP	BMP 12	IMP 12-DMA 12	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 13	DRAINS TO IMP	BMP 13	IMP 13-DMA 13	0.70	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 14	DRAINS TO IMP	BMP 3	IMP 3-DMA 14	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 15	DRAINS TO IMP	BMP 2	IMP 2-DMA 15	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 16	DRAINS TO IMP	BMP 1	IMP 1-DMA 16	0.05	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 17	GREEN STREET EXEMPTION		–	1.06	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 18	GREEN STREET EXEMPTION		–	1.73	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 19	GREEN STREET EXEMPTION		–	0.88	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 20	DEMINIMUS AREA		–	0.02	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 21	DEMINIMUS AREA		–	0.01	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 22	DRAINS TO IMP	BMP 22	IMP 22-DMA 22	0.07	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	

LID FACILITY SUMMARY

BMP ID	MINIMUM IMP AREA (SF)	IMP PROVIDED AREA (AC)	IMP PROVIDED AREA (SF)	TYPE	DESCRIPTION
IMP 1	2,415	0.35	15,192	BIOFILTRATION	LANDSCAPE BASIN
IMP 2	4,923	0.22	9,607	BIOFILTRATION	LANDSCAPE BASIN
IMP 3	3,097	0.14	6,265	BIOFILTRATION	LANDSCAPE BASIN
IMP 4	296	0.05	2,382	BIOFILTRATION	LANDSCAPE BASIN
IMP 5	308	0.01	466	BIOFILTRATION	LANDSCAPE BASIN
IMP 6	10,881	0.53	23,222	BIOFILTRATION	LANDSCAPE BASIN
IMP 7	2,623	0.15	6,514	BIOFILTRATION	LANDSCAPE BASIN
IMP 9	1,510	0.23	10,219	BIOFILTRATION	LANDSCAPE BASIN
IMP 11		0.42	18,375	SELF-MITIGATING	LANDSCAPED SLOPES
IMP 12	252	0.03	1,393	BIOFILTRATION	LANDSCAPE BASIN
IMP 13	1,080	0.04	1,794	BIOFILTRATION	LANDSCAPE BASIN
IMP 17				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 18				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 19				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 20				DEMINIMUS AREA	
IMP 21				DEMINIMUS AREA	
IMP 22				MODULAR WETLAND UNIT	MECHANICAL TREATMENT DEVICE

NOTES:
1. SUMMARY TABLE PER WWW.PROJECTCLEANWATER.ORG BMP SIZING CALCULATOR
2. DMA 8-10 DRAIN TO AN OFFSITE TEMPORARY BIORETENTION BASIN (IMP-9)
3. DMA 14-16 COVERED LOADING DOCKS
4. DMA 17-19 GREEN STREET EXEMPTION (STREET TREES AND SIDEWALK PLANTERS)
5. IMP 8 AND IMP 10 OMITTED ON PURPOSE
6. IMPS 1, 2, AND 6 WILL ALSO DETAIN THE Q_{100} INCREASE IN RUNOFF. FLOOD STORAGE EASEMENTS WILL BE REQUIRED.

COMPLIANCE BASIN SUMMARY

BASIN NAME	SAN YSIDRO HYDROLOGIC SUB-AREA
RECEIVING WATER	TIJUANA RIVER
RAINFALL BASIN	TIJUANA
MEAN ANNUAL PRECIPITATION (INCHES)	0.46
PROJECT BASIN AREA (ACRES)	20.94
WATERSHED AREA (ACRES)	1,000,088
SCCWRP LATERAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
SCCWRP VERTICAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
OVERALL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
LOWER FLOW THRESHOLD (% OF 2-YEAR FLOW)	0.5 Q2

PROJECT SUMMARY

PROJECT NAME	PLAZA LA MEDIA – NORTH
PROJECT APPLICANT	LAS VEGAS SUNSET PROPERTIES, A NEVADA CORPORATION
JURISDICTION	COUNTY OF SAN DIEGO
PARCEL (APN)	646-121-34
HYDROLOGIC UNIT	TIJUANA

LEGEND

- SUBDIVISION BOUNDARY
- EXISTING STORM DRAIN PIPE
- EXISTING STORM DRAIN CLEANOUT
- EXISTING STORM DRAIN CURB INLET
- PROPOSED STORM DRAIN PIPE
- PROPOSED STORM DRAIN CLEANOUT (PUBLIC)
- PROPOSED STORM DRAIN CURB INLET (PUBLIC)
- PROPOSED BOX CULVERT (PUBLIC)
- PROPOSED STORM DRAIN PIPE (PRIVATE)
- PROPOSED STORM DRAIN CLEANOUT (PRIVATE)
- PROPOSED BROOK BOX (PRIVATE)
- PROPOSED PERFOREATED PVC PIPE (PRIVATE)
- PROPOSED MODULAR WETLAND UNIT (PRIVATE)

LEGEND (CONT.)

- PROPOSED DRAINAGE BASINS
- DRAINAGE MANAGEMENT AREAS — DMA1
- INTEGRATED MANAGEMENT PRACTICE — IMP1
- DRAINAGE MANAGEMENT AREA IDENTIFIER — (DMA#) (AREA IN ACRES)

architecture
planning
interiors
sustainable design
sca
SmithConsultingArchitects
13280 Evening Creek Drive South
Suite 125
San Diego, CA 92128
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(858) 793 - 4787 Fax
(760) 797 - 1377 Palm Desert
www.sca-sd.com

PDP Submittal for:

PLAZA LA MEDIA-NORTH

LA MEDIA & AIRWAY, LLC
AN ARIZONA LIMITED LIABILITY CORPORATION
Otay Mesa, San Diego, CA

SHEET TITLE:

DMA / BMP PLAN

Issue Dates
Planning
Design Development -
Plan Check -
Bid Set -
Permit Set -
Construction Set -

Drawing Date 02/28/19
Check By
Drawn By
Scale AS SHOWN
Job Number
Sheet Number

C8

PREPARED BY:
Name:
Address:
Phone no.

PROJECT ADDRESS:
LA MEDIA ROAD AND STATE ROUTE 905
SAN DIEGO, CA

PROJECT NAME:
PLAZA LA MEDIA-NORTH

SHEET TITLE:
DMA / BMP PLAN
CITY PROJECT NO. 334235

Revision 8:
Revision 7:
Revision 6:
Revision 5: 02/28/2019
Revision 4: 07/31/2018
Revision 3: 09/08/2017
Revision 2: 12/12/2016
Revision 1: 08/20/2013
Submittal Date: 08/01/2013

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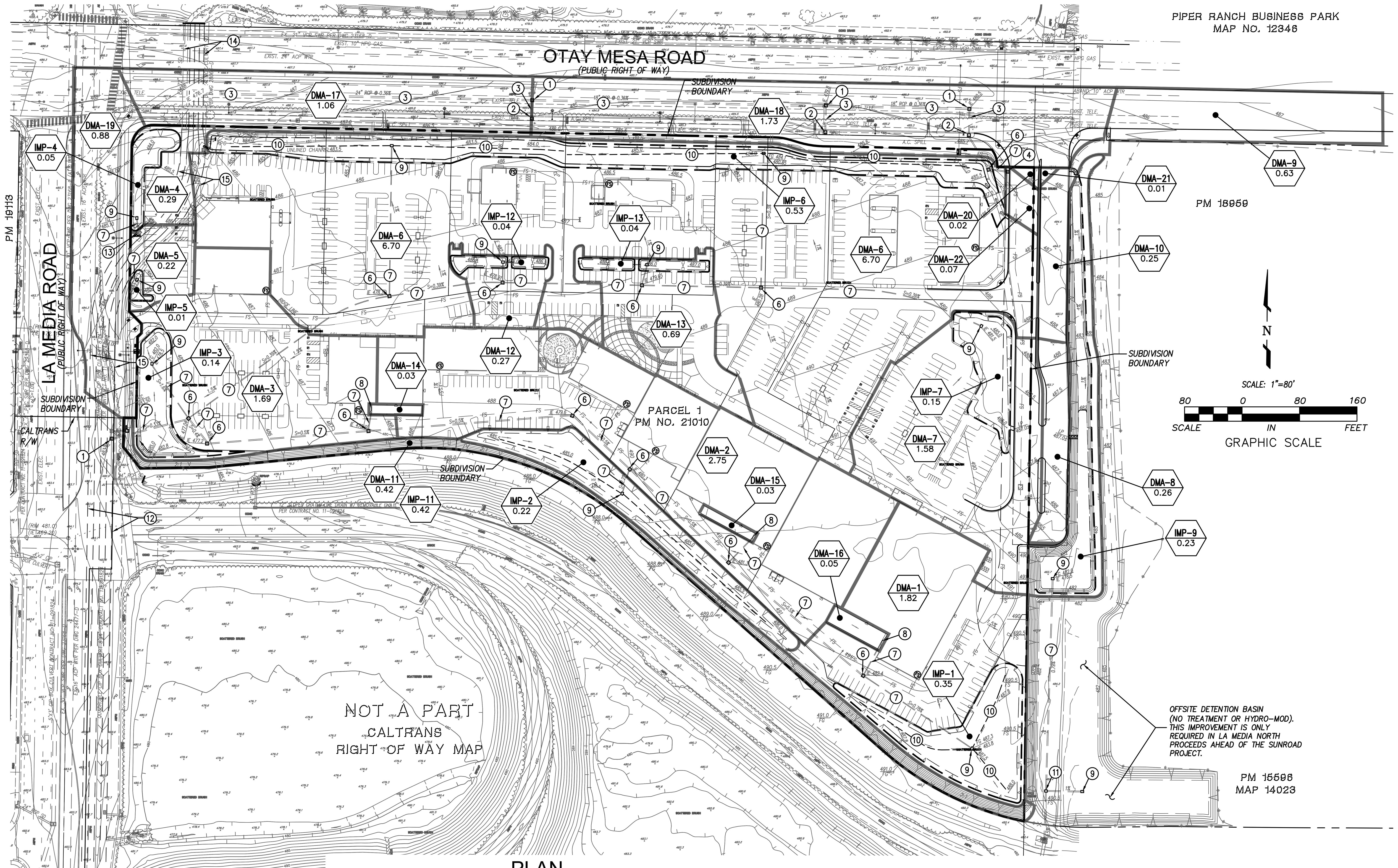
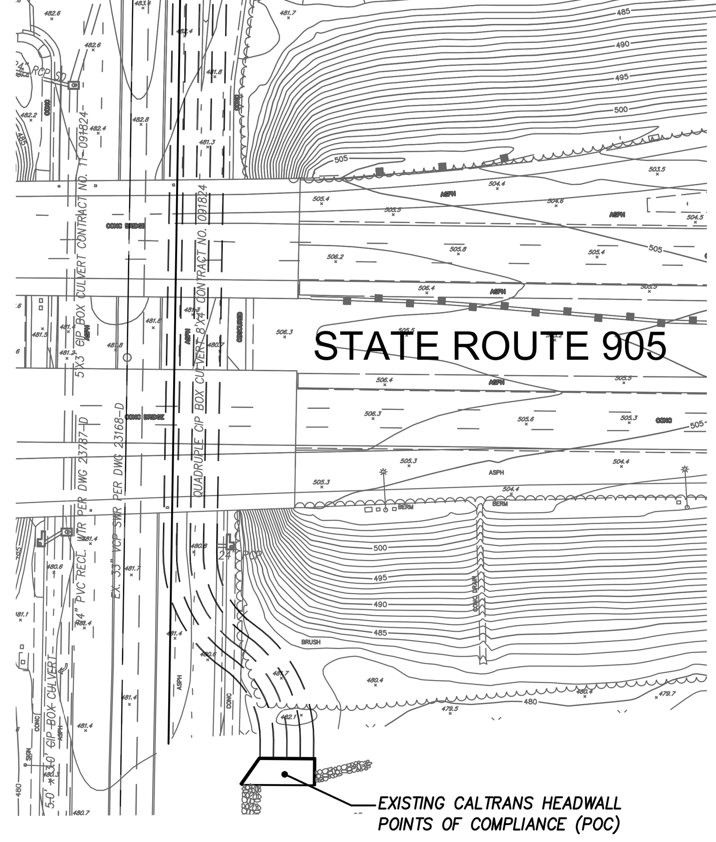
PDP NO. 1174331
NUP NO. 1174329
CUP NO.
SDP NO. 1174334
SV NO.
VTM NO. 1174336
OMDDP NO.

PLANNED DEVELOPMENT PERMIT NO. 1174331
NEIGHBORHOOD USE PERMIT NO. 1174329
SITE DEVELOPMENT PERMIT NO. 1174334
RIGHT-OF-WAY AND EASEMENT VACATION NO. 1174332
VESTING TENTATIVE MAP NO. 1174336
NEIGHBORHOOD DEVELOPMENT PERMIT NO. 1174327





PLAN

SCALE: 1"=80'

CONSTRUCTION NOTES

1. INSTALL STORM DRAIN CLEANOUT (PUBLIC)
2. INSTALL STORM DRAIN CURB INLET (PUBLIC)
3. INSTALL STORM DRAIN PIPE (PUBLIC)
4. INSTALL MODULAR WETLAND UNIT
5. NOT USED
6. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
7. INSTALL STORM DRAIN PIPE (PRIVATE)
8. INSTALL TRENCH DRAIN (PRIVATE)
9. INSTALL STORM DRAIN BROOKS BOX (PRIVATE)
10. INSTALL STORM DRAIN PERFORATED PIPE (PRIVATE)
11. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
12. EXISTING STORM DRAIN BOX CULVERT (PUBLIC) TO REMAIN
13. EXISTING STORM DRAIN CURB INLET (PUBLIC) TO REMAIN
14. EXISTING 3-6'X4' BOX CULVERT AND 1-72" RCP STORM DRAIN TO REMAIN (PUBLIC)
15. EXISTING 4-8'X4' BOX CULVERT TO REMAIN (PUBLIC)

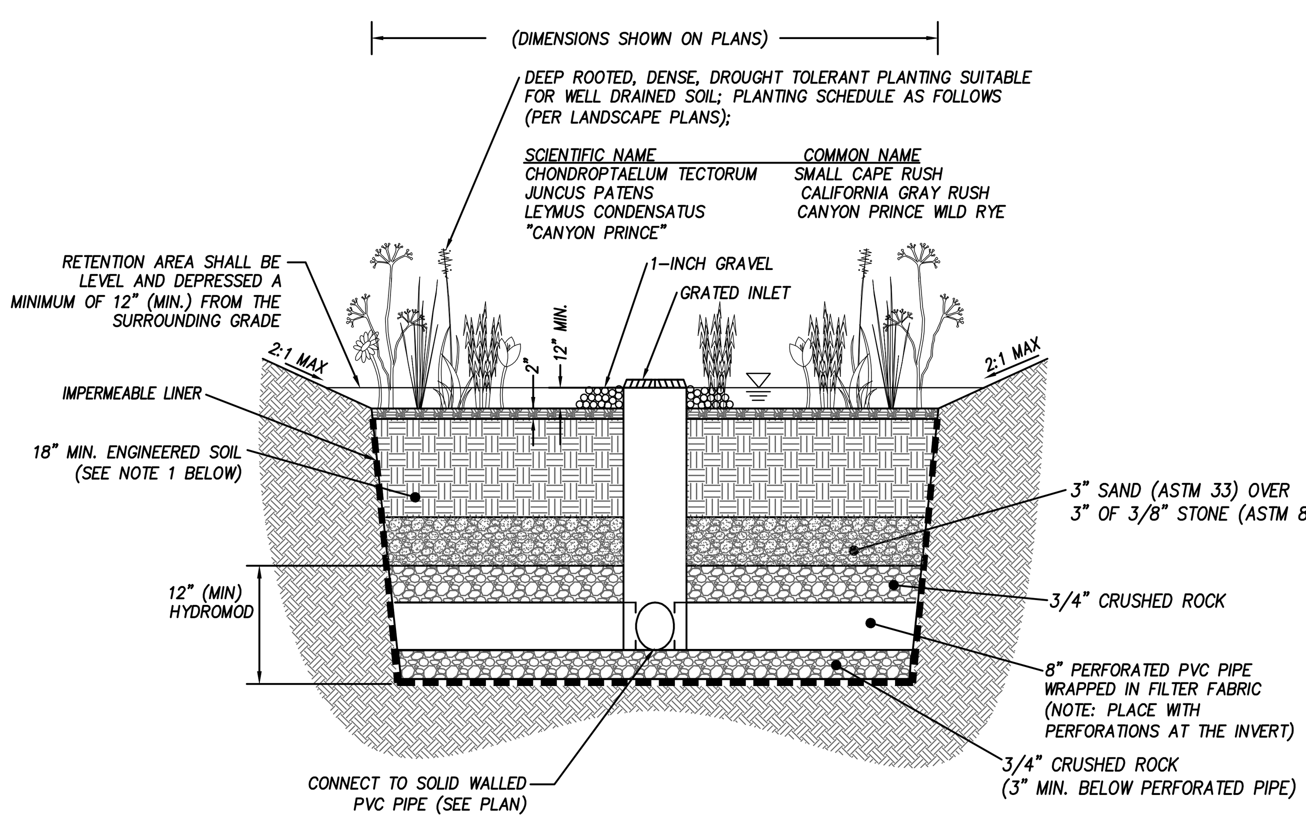
HMP NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP IS SOIL TYPE 'D'.
2. THE APPROXIMATE DEPTH TO GROUNDWATER IS GREATER THAN 20'.
3. EXISTING NATURAL HYDROLOGIC FEATURES – NONE.
4. CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED – NONE.
5. EXISTING TOPOGRAPHY – SHOWN HEREIN.
6. EXISTING AND PROPOSED DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE – SHOWN HEREIN.
7. PROPOSED GRADING – SHOWN HEREIN.
8. PROPOSED IMPERVIOUS FEATURES – SHOWN HEREIN.
9. PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS TO MINIMIZE IMPERVIOUSNESS – LANDSCAPE AND PERVIOUS PAVING.
10. POINTS OF COMPLIANCE (POC) FOR HYDROMODIFICATION MANAGEMENT AND EXISTING AND PROPOSED DRAINAGE BOUNDARY AND DRAINAGE AREA TO EACH POINTS OF COMPLIANCE – SHOWN HEREIN.
11. STRUCTURAL BMPS FOR HYDROMODIFICATION MANAGEMENT – BIOFILTRATION BASINS SHOWN HEREIN.

POTENTIAL POLLUTANTS SOURCE AREAS AND CORRESPONDING REQUIRED SOURCE CONTROLS

- ON-SITE STORM DRAIN INLETS
- INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
- NEED FOR FUTURE INDOOR AND STRUCTURAL PEST CONTROL
- LANDSCAPE/OUTDOOR PESTICIDE USE
- FOOD SERVICE
- REFUSE AREAS
- FUEL DISPENCING AREAS
- LOADING DOCKS
- FIRE SPRINKLER TEST WATER
- MISCELLANEOUS DRAIN OR WASH WATER
- PLAZAS, SIDEWALKS, AND PARKING LOTS

NOTE: THE PROJECT WILL HAVE A PRIVATE ON-SITE DRAINAGE SYSTEM TO CONVEY RUNOFF TO THE BIOFILTRATION BASINS. PROPOSED INLETS WILL INCLUDE STENCILING AND/OR SIGNAGE. OUTDOOR AREAS WILL BE PROTECTED. OTHER REQUIRED SOURCE CONTROL BMPS WILL BE IN ACCORDANCE WITH FORM I-4 AND I-5.



BIOFILTRATION BASIN DETAIL

NOT TO SCALE

BIOFILTRATION BASIN NOTES

1. BIOFILTRATION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.

NOTE: PERMANENT POST-CONSTRUCTION BMP DEVICES (BIOFILTRATION BASINS) SHOWN ON PLAN SHALL NOT BE REMOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY OF SAN DIEGO.

LEGEND

- SUBDIVISION BOUNDARY
- EXISTING STORM DRAIN PIPE
- EXISTING STORM DRAIN CLEANOUT
- EXISTING STORM DRAIN CURB INLET
- PROPOSED STORM DRAIN PIPE
- PROPOSED STORM DRAIN CLEANOUT (PUBLIC)
- PROPOSED STORM DRAIN CURB INLET (PUBLIC)
- PROPOSED BOX CULVERT (PUBLIC)
- PROPOSED STORM DRAIN PIPE (PRIVATE)
- PROPOSED STORM DRAIN CLEANOUT (PRIVATE)
- PROPOSED BROOK BOX (PRIVATE)
- PROPOSED PERFORETED PVC PIPE (PRIVATE)
- PROPOSED MODULAR WETLAND UNIT (PRIVATE)

DRAINAGE MANAGEMENT AREA SUMMARY

ID/DMA #	TYPE	BMP ID	DESCRIPTION	DMA AREA (AC)	PRE-PROJECT COVER	POST SURFACE TYPE	DRAINAGE SOIL	SLOPE
DMA 1	DRAINS TO IMP	BMP 1	IMP 1-DMA 1	1.82	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 2	DRAINS TO IMP	BMP 2	IMP 2-DMA 2	2.75	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 3	DRAINS TO IMP	BMP 3	IMP 3-DMA 3	1.69	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 4	DRAINS TO IMP	BMP 4	IMP 4-DMA 4	0.29	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 5	DRAINS TO IMP	BMP 5	IMP 5-DMA 5	0.22	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 6	DRAINS TO IMP	BMP 6	IMP 6-DMA 6	6.71	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 7	DRAINS TO IMP	BMP 7	IMP 7-DMA 7	1.58	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 8	DRAINS TO IMP	BMP 9	IMP 9-DMA 8	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 9	DRAINS TO IMP	BMP 9	IMP 9-DMA 9	0.63	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 10	DRAINS TO IMP	BMP 9	IMP 9-DMA 10	0.25	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 11	–	BMP 11	SELF MITIGATING	0.42	PERVIOUS (PRE)	LANDSCAPE ONLY – SELF MITIGATING AREA	TYPE D SOIL	FLAT
DMA 12	DRAINS TO IMP	BMP 12	IMP 12-DMA 12	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 13	DRAINS TO IMP	BMP 13	IMP 13-DMA 13	0.70	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 14	DRAINS TO IMP	BMP 3	IMP 3-DMA 14	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 15	DRAINS TO IMP	BMP 2	IMP 2-DMA 15	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 16	DRAINS TO IMP	BMP 1	IMP 1-DMA 16	0.05	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 17	GREEN STREET EXEMPTION		–	1.06	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 18	GREEN STREET EXEMPTION		–	1.73	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 19	GREEN STREET EXEMPTION		–	0.88	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 20	DEMINIMUS AREA		–	0.02	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 21	DEMINIMUS AREA		–	0.01	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 22	DRAINS TO IMP	BMP 22	IMP 22-DMA 22	0.07	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	

LID FACILITY SUMMARY

BMP ID	MINIMUM IMP AREA (SF)	IMP PROVIDED AREA (AC)	IMP PROVIDED AREA (SF)	TYPE	DESCRIPTION
IMP 1	2,415	0.35	15,192	BIOFILTRATION	LANDSCAPE BASIN
IMP 2	4,923	0.22	9,607	BIOFILTRATION	LANDSCAPE BASIN
IMP 3	3,097	0.14	6,265	BIOFILTRATION	LANDSCAPE BASIN
IMP 4	296	0.05	2,382	BIOFILTRATION	LANDSCAPE BASIN
IMP 5	308	0.01	466	BIOFILTRATION	LANDSCAPE BASIN
IMP 6	10,881	0.53	23,222	BIOFILTRATION	LANDSCAPE BASIN
IMP 7	2,623	0.15	6,514	BIOFILTRATION	LANDSCAPE BASIN
IMP 9	1,510	0.23	10,219	BIOFILTRATION	LANDSCAPE BASIN
IMP 11		0.42	18,375	SELF-MITIGATING	LANDSCAPED SLOPES
IMP 12	252	0.03	1,393	BIOFILTRATION	LANDSCAPE BASIN
IMP 13	1,080	0.04	1,794	BIOFILTRATION	LANDSCAPE BASIN
IMP 17				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 18				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 19				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 20				DEMINIMUS AREA	
IMP 21				DEMINIMUS AREA	
IMP 22				MODULAR WETLAND UNIT	MECHANICAL TREATMENT DEVICE

NOTES:
1. SUMMARY TABLE PER WWW.PROJECTCLEANWATER.ORG BMP SIZING CALCULATOR
2. DMA 8-10 DRAIN TO AN OFFSITE TEMPORARY BIORETENTION BASIN (IMP-9)
3. DMA 14-16 COVERED LOADING DOCKS
4. DMA 17-19 GREEN STREET EXEMPTION (STREET TREES AND SIDEWALK PLANTERS)
5. IMP 8 AND IMP 10 OMITTED ON PURPOSE
6. IMPS 1, 2, AND 6 WILL ALSO DETAIN THE Q_{100} INCREASE IN RUNOFF. FLOOD STORAGE EASEMENTS WILL BE REQUIRED.

COMPLIANCE BASIN SUMMARY

BASIN NAME	SAN YSIDRO HYDROLOGIC SUB-AREA
RECEIVING WATER	TIJUANA RIVER
RAINFALL BASIN	TIJUANA
MEAN ANNUAL PRECIPITATION (INCHES)	0.46
PROJECT BASIN AREA (ACRES)	20.94
WATERSHED AREA (ACRES)	1,000,088
SCCWRP LATERAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
SCCWRP VERTICAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
OVERALL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
LOWER FLOW THRESHOLD (% OF 2-YEAR FLOW)	0.5 Q2

PROJECT SUMMARY

PROJECT NAME	PLAZA LA MEDIA – NORTH
PROJECT APPLICANT	LAS VEGAS SUNSET PROPERTIES, A NEVADA CORPORATION
JURISDICTION	COUNTY OF SAN DIEGO
PARCEL (APN)	646-121-34
HYDROLOGIC UNIT	TIJUANA

LEGEND (CONT.)

- PROPOSED DRAINAGE BASINS
- DRAINAGE MANAGEMENT AREAS — DMA1
- INTEGRATED MANAGEMENT PRACTICE — IMP1
- DRAINAGE MANAGEMENT AREA IDENTIFIER — (DMA#) (AREA IN ACRES)

PREPARED BY:
Name:
Address:
Phone no.

PROJECT ADDRESS:
LA MEDIA ROAD AND STATE ROUTE 905
SAN DIEGO, CA

PROJECT NAME:
PLAZA LA MEDIA-NORTH

SHEET TITLE:
DMA / BMP PLAN
CITY PROJECT NO. 334235

Revision 8:
Revision 7:
Revision 6:
Revision 5: 02/28/2019
Revision 4: 07/31/2018
Revision 3: 09/08/2017
Revision 2: 12/12/2016
Revision 1: 08/20/2013
Submittal Date: 08/01/2013

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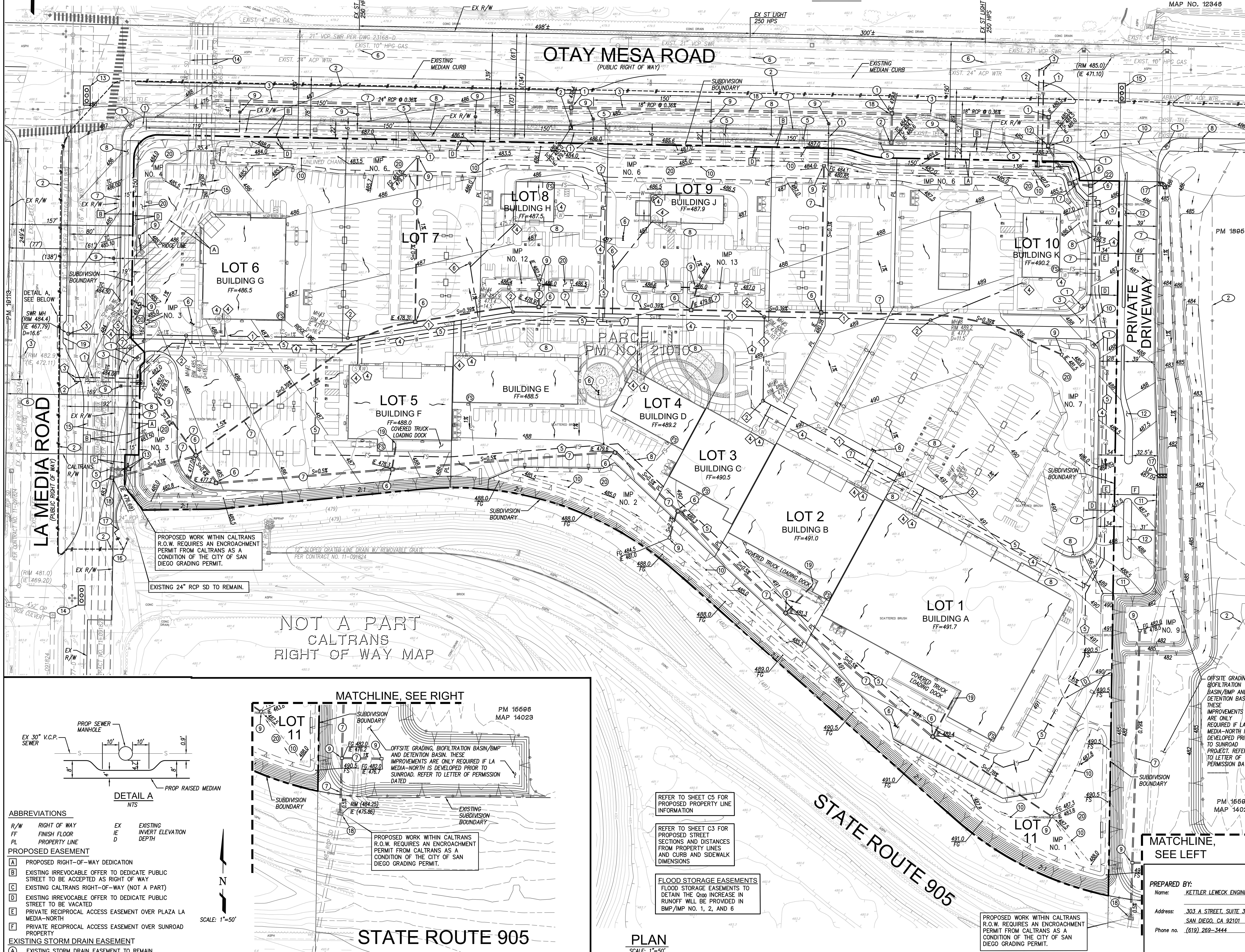
Job Number
Sheet Number
C8

ATTACHMENT 2A - HYDROMODIFICATION MANAGEMENT EXHIBIT

PLANNED DEVELOPMENT PERMIT NO. 1174331
NEIGHBORHOOD USE PERMIT NO. 1174329
SITE DEVELOPMENT PERMIT NO. 1174334
RIGHT-OF-WAY AND EASEMENT VACATION NO. 1174332
VESTING TENTATIVE MAP NO. 1174336
NEIGHBORHOOD DEVELOPMENT PERMIT NO. 1174327



PLAN
SCALE: 1"=50'

DETAIL A
NTS

LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
RIGHT-OF-WAY	R/W
PROPERTY LINE	PL
A.C. PAVING (SCHED. 'J')	
TRENCH RESURFACING	
CURB RAMP (TRUNCATED DOME DEPTH = 36")	
P.C.C. SIDEWALK	
6" TYPE 'G' CURB & GUTTER	
6" TYPE 'G' CURB	
PROPOSED DRIVEWAY PER SDG-159	
PROPOSED SEWER MAIN (PVC)	
PROPOSED SEWER MANHOLE	MH
PROPOSED SEWER LATERAL	
PROPOSED WATER MAIN (PVC)	
PROPOSED WATER SERVICE	
FIRE HYDRANT ASSY.	
STREET LIGHT	
SAWCUT LINE/LIMIT OF WORK	
PROPOSED PED RAMP	
PROPOSED RETAINING WALL	
SURVEY MONUMENT	
FINISH GRADE CONTOURS	288
PROPOSED SLOPES (2:1 MAX)	
PROPOSED DAYLIGHT LINE	
ROOF/DRAINAGE DIRECTIONAL ARROW	
P-TRAP (PRIVATE)	

CONSTRUCTION NOTES FOR STORM DRAIN

1. INSTALL STORM DRAIN CLEANOUT (PUBLIC)
2. INSTALL STORM DRAIN CURB INLET (PUBLIC)
3. INSTALL STORM DRAIN PIPE (PUBLIC)
4. INSTALL STORM DRAIN VAULT (PRIVATE)
5. EXISTING STORM DRAIN CLEANOUT TO REMAIN
6. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
7. INSTALL STORM DRAIN PIPE (PRIVATE)
8. INSTALL REVERSE FLOW CURB OUTLET (PRIVATE)
9. INSTALL STORM DRAIN BROOKS BOX WITH GRATED INLET (PRIVATE) UNLESS OTHERWISE NOTED
10. INSTALL STORM DRAIN PERFORATED PIPE (PRIVATE)
11. INSTALL STORM DRAIN PVC SOLID PIPE (PRIVATE)
12. INSTALL MODULAR WETLANDS UNIT (PRIVATE)
13. EXISTING STORM DRAIN CURB INLET (PUBLIC) TO BE RELOCATED
14. EXISTING 3-6'X4' BOX CULVERT AND 1-72" RCP STORM DRAIN TO REMAIN (PUBLIC)
15. EXISTING 4-8'X4' BOX CULVERT TO REMAIN (PUBLIC)
16. EXISTING 48" RCP STORM DRAIN TO REMAIN (PUBLIC)
17. PROPOSED SPILLWAY/REVERSE FLOW CURB OUTLET
18. CONNECT TO EXISTING STORM DRAIN
19. PROPOSED TRENCH DRAIN (PRIVATE)
20. PROPOSED BIOFILTRATION BASIN (PRIVATE)
21. PROPOSED STORM DRAIN HEADWALL (PRIVATE)
22. PROPOSED MODULAR WETLAND UNIT (PRIVATE)

CONSTRUCTION NOTES FOR WATER MAIN

1. PROPOSED DOMESTIC WATER SERVICE (PUBLIC) – OTAY WATER DISTRICT
2. PROPOSED FIRE SERVICE (PUBLIC) – OTAY WATER DISTRICT
3. CONNECT TO EXISTING WATER (PUBLIC) – OTAY WATER DISTRICT
4. PROPOSED DOMESTIC WATER SERVICE (PRIVATE)
5. PROPOSED FIRE SERVICE (PRIVATE)
6. PROPOSED FIRE HYDRANT (PRIVATE)
7. PROPOSED FIRE SERVICE END CAP (PRIVATE)
8. PROPOSED FIRE SERVICE GATE VALVE (PRIVATE)

CONSTRUCTION NOTES FOR SEWER MAIN

1. PROPOSED SEWER MAIN (PRIVATE)
2. PROPOSED SEWER MANHOLE (PRIVATE)
3. CONNECT TO EXISTING SEWER (PUBLIC) – CITY OF SAN DIEGO
4. PROPOSED SEWER LATERAL (PUBLIC)
5. PROPOSED SEWER MANHOLE (PRIVATE) – CITY OF SAN DIEGO. EMRA REQUIRED FOR PRIVATE SEWER CONNECTING TO PUBLIC SEWER SYSTEM.
6. PROPOSED SEWER CLEANOUT (PRIVATE)
7. PRIVATE P-TRAP TO BE INSTALLED.

CONSTRUCTION NOTES FOR SURFACE IMPROVEMENTS

1. PROPOSED PED RAMP WITH TRUNCATED DOME
2. PROPOSED SAWCUT LINE/LIMIT OF WORK
3. PROPOSED DRIVEWAY
4. EXISTING SIGN TO BE REMOVED
5. EXISTING ASPHALT CONCRETE SPILLWAY TO BE REMOVED
6. EXISTING STREET LIGHT TO REMAIN (250 HPS)
7. PROPOSED CURB AND GUTTER
8. PROPOSED CONCRETE SIDEWALK
9. PROPOSED STREET LIGHT (LED 127 WATT)
10. PROPOSED CROSS GUTTER
11. PROPOSED AC BERM
12. PROPOSED RAISED MEDIAN CURB
13. EXISTING TRAFFIC SIGNAL (TO BE MODIFIED)
14. EXISTING TRAFFIC SIGNAL (TO REMAIN)
15. PROPOSED TRAFFIC SIGNAL
16. EXISTING CURB RAMP WITH TRUNCATED DOME (TO REMAIN)
17. END OF IMPROVEMENT, MATCH EXISTING
18. EXISTING STREET LIGHT TO BE REMOVED
19. PROPOSED MEDIAN CURB (TYPE B-3)

ABBREVIATIONS

R/W	RIGHT OF WAY	EX	EXISTING
FF	FINISH FLOOR	IE	INVERT ELEVATION
PL	PROPERTY LINE	D	DEPTH

PROPOSED EASEMENT

A. PROPOSED RIGHT-OF-WAY DEDICATION
B. EXISTING IRREVOCABLE OFFER TO DEDICATE PUBLIC STREET TO BE ACCEPTED AS RIGHT OF WAY
C. EXISTING CALTRANS RIGHT-OF-WAY (NOT A PART)
D. EXISTING IRREVOCABLE OFFER TO DEDICATE PUBLIC STREET TO BE VACATED
E. PRIVATE RECIPROCAL ACCESS EASEMENT OVER PLAZA LA MEDIA-NORTH
F. PRIVATE RECIPROCAL ACCESS EASEMENT OVER SUNROAD PROPERTY

EXISTING STORM DRAIN EASEMENT

A. EXISTING STORM DRAIN EASEMENT TO REMAIN

CONSTRUCTION NOTE FOR EXISTING BOX CULVERT

1. THE DESIGN OF THE BUILDING ON LOT 6 (EXTERIOR ELEVATIONS AND FOUNDATION) SHALL AVOID ENCROACHMENTS INTO THE EXISTING DRAINAGE EASEMENT. IN ADDITION, THE FUTURE DESIGN OF THE BUILDING FOUNDATION SHALL AVOID "INFLUENCING" THE EXISTING BOX CULVERT.

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GRAPHIC SCALE: 50 0 50 100 FEET (IN FEET)

CONSTRUCTION NOTES FOR DRY UTILITIES

1. EXISTING POWER POLE AND OVERHEAD LINES ALONG THE FRONTAGE OF OTAY MESA ROAD TO BE UNDERGROUND WITH REASONABLE TRANSITIONS ON THE EAST AND WEST ENDS OF THE PROJECT (TYPICAL)
2. EXISTING STREET LIGHT TO BE RELOCATED
3. EXISTING STREET LIGHT TO REMAIN

STREET LIGHT NOTE

1. THE TYPE AND LOCATION OF THE STREET LIGHTS ON LA MEDIA AND OTAY MESA ROAD WILL BE IN ACCORDANCE WITH CURRENT CITY'S STREET DESIGN MANUAL.

CONSTRUCTION NOTES FOR PROPOSED MEDIAN ALONG LA MEDIA ROAD

1. INSTALL TYPE B-3 CURB WHERE EXISTING SEWER LIES WITHIN 3' OF THE CURB AND PROVIDE 10' OF PAVEMENT ON BOTH SIDES OF MANHOLES IN THE MEDIAN AREA.

REGISTERED PROFESSIONAL ENGINEER — STEVEN C. KETTLER — No. C48358 — Exp. 6-30-2020 — CIVIL — STATE OF CALIFORNIA

ENGINEER OF WORK

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STEVEN C. KETTLER, PE, C48358 ______ DATE ______

PREPARED BY:
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PROJECT ADDRESS:
LA MEDIA ROAD AND STATE ROUTE 905
SAN DIEGO, CA

PROJECT NAME:
PLAZA LA MEDIA-NORTH

SHEET TITLE:
GRADING AND DRAINAGE FOR PARCEL 1
CITY PROJECT NO. 334235

Revision 8:	
Revision 7:	11/8/2018 (ENGR SUBMITTAL)
Revision 6:	11/7/2018 (PUD SUBMITTAL)
Revision 5:	10/11/2018
Revision 4:	08/06/2018
Revision 3:	09/08/2017
Revision 2:	12/12/2016
Revision 1:	08/20/2013
Submittal Date:	08/01/2013

Sheet 17 of 26

PDP NO.	1174331
NUP NO.	1174329
CUP NO.	
SDP NO.	1174334
SV NO.	
VTM NO.	1174336
OMDDP NO.	

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PDP Submittal for:
PLAZA LA MEDIA-NORTH
LA MEDIA & AIRWAY, LLC
AN ARIZONA LIMITED LIABILITY CORPORATION
Otay Mesa, San Diego, CA

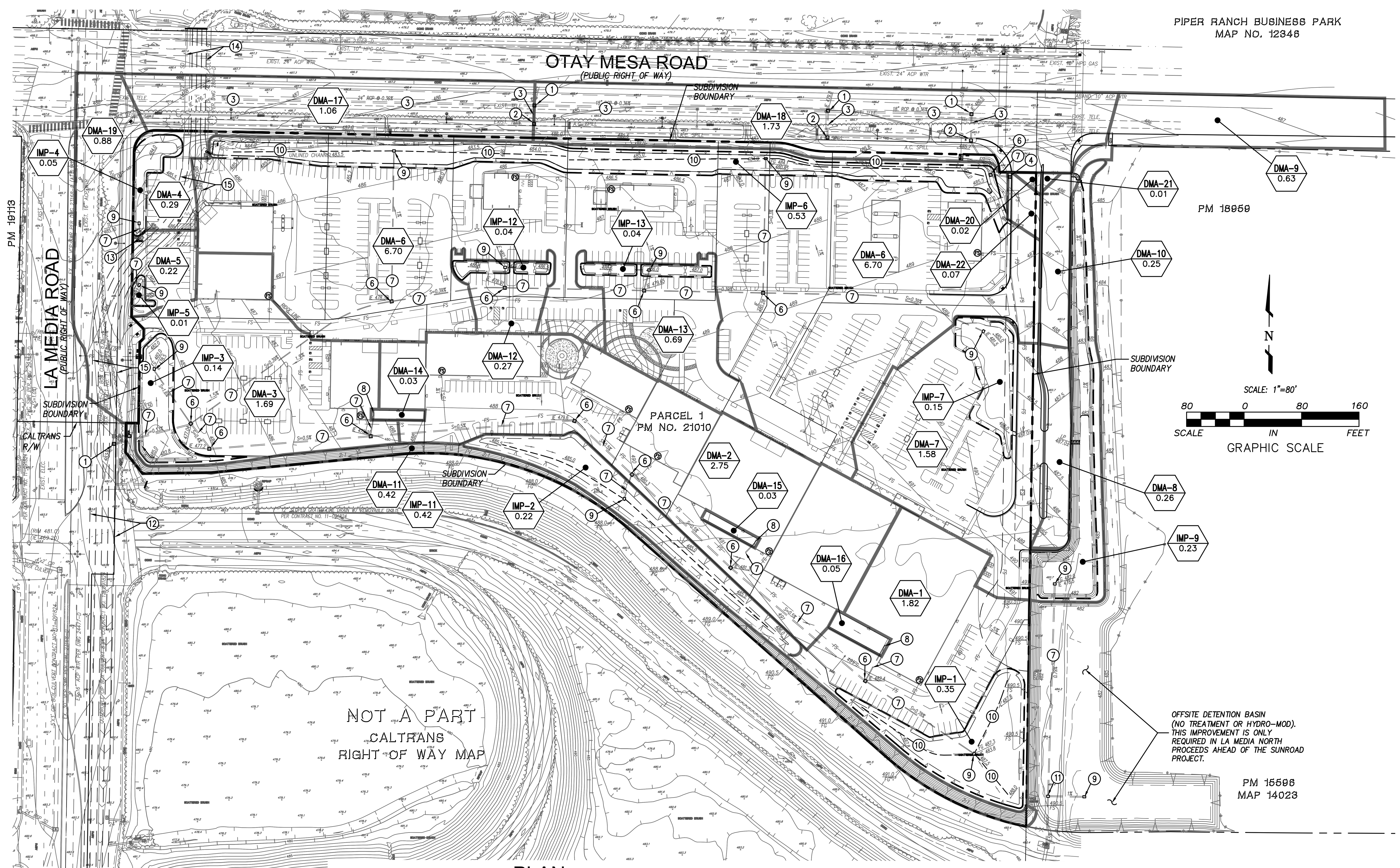
SHEET TITLE:
GRADING AND DRAINAGE PLAN

Issue Dates

Planning	
Design Development	-
Plan Check	-
Bid Set	-
Permit Set	-
Construction Set	-

Drawing Date	10/11/18
Check By	SCK
Drawn By	MGA
Scale	1"=50'
Job Number	0028
Sheet Number	C7

PLANNED DEVELOPMENT PERMIT NO. 1174331
NEIGHBORHOOD USE PERMIT NO. 1174329
SITE DEVELOPMENT PERMIT NO. 1174334
RIGHT-OF-WAY AND EASEMENT VACATION NO. 1174332
VESTING TENTATIVE MAP NO. 1174336
NEIGHBORHOOD DEVELOPMENT PERMIT NO. 1174327



PLAN

SCALE: 1"=80'

CONSTRUCTION NOTES

1. INSTALL STORM DRAIN CLEANOUT (PUBLIC)
2. INSTALL STORM DRAIN CURB INLET (PUBLIC)
3. INSTALL STORM DRAIN PIPE (PUBLIC)
4. INSTALL MODULAR WETLAND UNIT
5. NOT USED
6. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
7. INSTALL STORM DRAIN PIPE (PRIVATE)
8. INSTALL TRENCH DRAIN (PRIVATE)
9. INSTALL STORM DRAIN BROOKS BOX (PRIVATE)
10. INSTALL STORM DRAIN PERFORATED PIPE (PRIVATE)
11. INSTALL STORM DRAIN CLEANOUT (PRIVATE)
12. EXISTING STORM DRAIN BOX CULVERT (PUBLIC) TO REMAIN
13. EXISTING STORM DRAIN CURB INLET (PUBLIC) TO REMAIN
14. EXISTING 3-6'X4' BOX CULVERT AND 1-72" RCP STORM DRAIN TO REMAIN (PUBLIC)
15. EXISTING 4-8'X4' BOX CULVERT TO REMAIN (PUBLIC)

HMP NOTES

1. THE UNDERLYING HYDROLOGIC SOIL GROUP IS SOIL TYPE 'D'.
2. THE APPROXIMATE DEPTH TO GROUNDWATER IS GREATER THAN 20'.
3. EXISTING NATURAL HYDROLOGIC FEATURES – NONE.
4. CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED – NONE.
5. EXISTING TOPOGRAPHY – SHOWN HEREIN.
6. EXISTING AND PROPOSED DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE – SHOWN HEREIN.
7. PROPOSED GRADING – SHOWN HEREIN.
8. PROPOSED IMPERVIOUS FEATURES – SHOWN HEREIN.
9. PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS TO MINIMIZE IMPERVIOUSNESS – LANDSCAPE AND PERVIOUS PAVING.
10. POINTS OF COMPLIANCE (POC) FOR HYDROMODIFICATION MANAGEMENT AND EXISTING AND PROPOSED DRAINAGE BOUNDARY AND DRAINAGE AREA TO EACH POINTS OF COMPLIANCE – SHOWN HEREIN.
11. STRUCTURAL BMPS FOR HYDROMODIFICATION MANAGEMENT – BIOFILTRATION BASINS SHOWN HEREIN.

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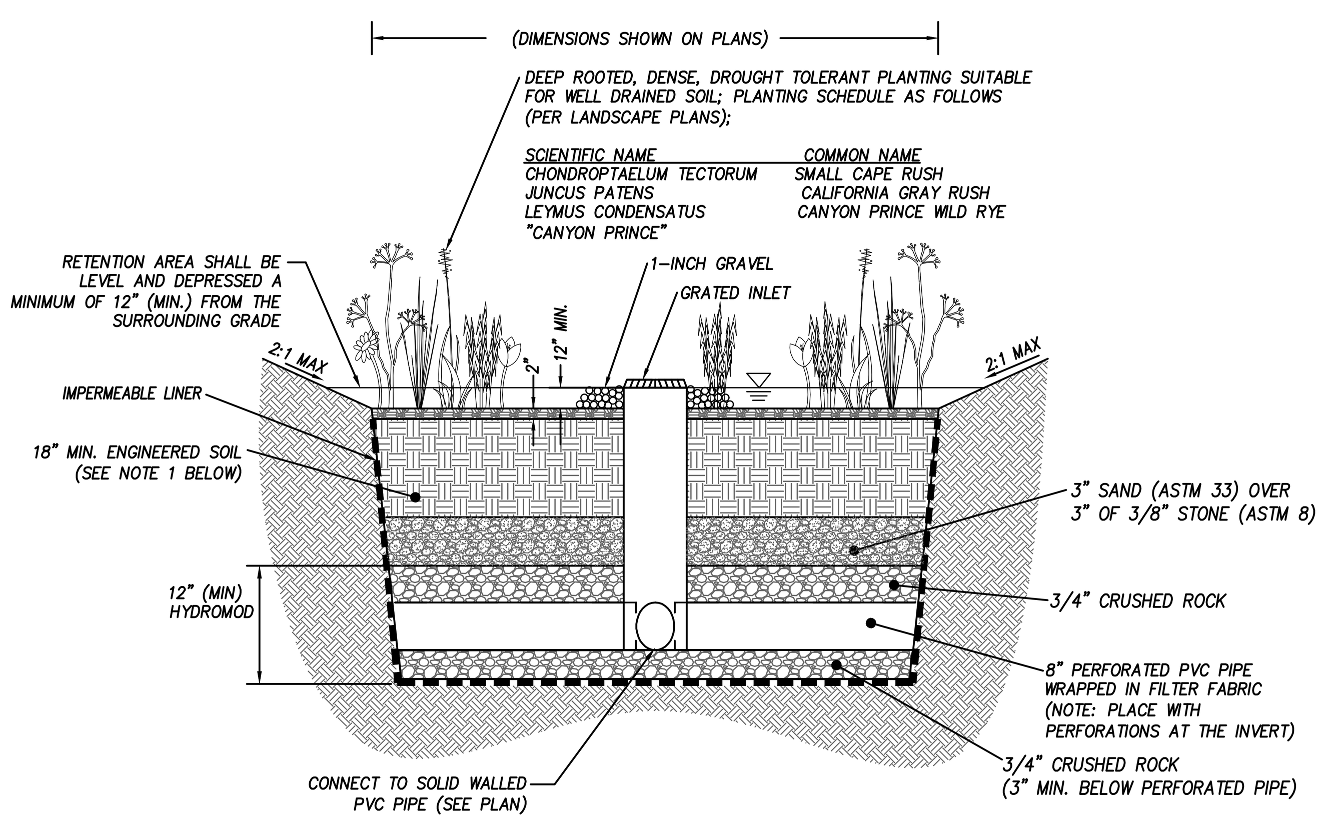
POTENTIAL POLLUTANTS SOURCE AREAS AND CORRESPONDING REQUIRED SOURCE CONTROLS

- ON-SITE STORM DRAIN INLETS
- INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
- NEED FOR FUTURE INDOOR AND STRUCTURAL PEST CONTROL
- LANDSCAPE/OUTDOOR PESTICIDE USE
- FOOD SERVICE
- REFUSE AREAS
- FUEL DISPENCING AREAS
- LOADING DOCKS
- FIRE SPRINKLER TEST WATER
- MISCELLANEOUS DRAIN OR WASH WATER
- PLAZAS, SIDEWALKS, AND PARKING LOTS

NOTE: THE PROJECT WILL HAVE A PRIVATE ON-SITE DRAINAGE SYSTEM TO CONVEY RUNOFF TO THE BIOFILTRATION BASINS. PROPOSED INLETS WILL INCLUDE STENCILING AND/OR SIGNAGE. OUTDOOR AREAS WILL BE PROTECTED. OTHER REQUIRED SOURCE CONTROL BMPS WILL BE IN ACCORDANCE WITH FORM I-4 AND I-5.



BIOFILTRATION BASIN DETAIL
NOT TO SCALE

BIOFILTRATION BASIN NOTES

1. BIOFILTRATION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 18" DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50–60% SAND, 20–30% COMPOST OR HARDWOOD MULCH, AND 20–30% TOPSOIL.
2. 3/4" CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 12" BUT MAY BE DEEPENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.
3. THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON CITY STORMWATER MANUAL CALCULATIONS. SEE PLAN FOR BOTTOM AREA AND ELEVATION.

NOTE: PERMANENT POST-CONSTRUCTION BMP DEVICES (BIOFILTRATION BASINS) SHOWN ON PLAN SHALL NOT BE REMOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY OF SAN DIEGO.

DRAINAGE MANAGEMENT AREA SUMMARY

ID/DMA #	TYPE	BMP ID	DESCRIPTION	DMA AREA (AC)	PRE-PROJECT COVER	POST SURFACE TYPE	DRAINAGE SOIL	SLOPE
DMA 1	DRAINS TO IMP	BMP 1	IMP 1–DMA 1	1.82	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 2	DRAINS TO IMP	BMP 2	IMP 2–DMA 2	2.75	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 3	DRAINS TO IMP	BMP 3	IMP 3–DMA 3	1.69	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 4	DRAINS TO IMP	BMP 4	IMP 4–DMA 4	0.29	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 5	DRAINS TO IMP	BMP 5	IMP 5–DMA 5	0.22	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 6	DRAINS TO IMP	BMP 6	IMP 6–DMA 6	6.71	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT OR ROOFS	TYPE D SOIL	FLAT
DMA 7	DRAINS TO IMP	BMP 7	IMP 7–DMA 7	1.58	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 8	DRAINS TO IMP	BMP 9	IMP 9–DMA 8	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 9	DRAINS TO IMP	BMP 9	IMP 9–DMA 9	0.63	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 10	DRAINS TO IMP	BMP 9	IMP 9–DMA 10	0.25	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 11	–	BMP 11	SELF MITIGATING	0.42	PERVIOUS (PRE)	LANDSCAPE ONLY – SELF MITIGATING AREA	TYPE D SOIL	FLAT
DMA 12	DRAINS TO IMP	BMP 12	IMP 12–DMA 12	0.26	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 13	DRAINS TO IMP	BMP 13	IMP 13–DMA 13	0.70	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 14	DRAINS TO IMP	BMP 3	IMP 3–DMA 14	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 15	DRAINS TO IMP	BMP 2	IMP 2–DMA 15	0.03	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 16	DRAINS TO IMP	BMP 1	IMP 1–DMA 16	0.05	PERVIOUS (PRE)	COVERED LANDING DOCK AREAS	TYPE D SOIL	FLAT
DMA 17	GREEN STREET EXEMPTION		–	1.06	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 18	GREEN STREET EXEMPTION		–	1.73	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 19	GREEN STREET EXEMPTION		–	0.88	PERVIOUS (PRE)	LANDSCAPE, CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 20	DEMINIMUS AREA		–	0.02	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 21	DEMINIMUS AREA		–	0.01	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	FLAT
DMA 22	DRAINS TO IMP	BMP 22	IMP 22–DMA 22	0.07	PERVIOUS (PRE)	CONCRETE AND ASPHALT	TYPE D SOIL	

LID FACILITY SUMMARY

BMP ID	MINIMUM IMP AREA (SF)	IMP PROVIDED AREA (AC)	IMP PROVIDED AREA (SF)	TYPE	DESCRIPTION
IMP 1	2,415	0.35	15,192	BIOFILTRATION	LANDSCAPE BASIN
IMP 2	4,923	0.22	9,607	BIOFILTRATION	LANDSCAPE BASIN
IMP 3	3,097	0.14	6,265	BIOFILTRATION	LANDSCAPE BASIN
IMP 4	296	0.05	2,382	BIOFILTRATION	LANDSCAPE BASIN
IMP 5	308	0.01	466	BIOFILTRATION	LANDSCAPE BASIN
IMP 6	10,881	0.53	23,222	BIOFILTRATION	LANDSCAPE BASIN
IMP 7	2,623	0.15	6,514	BIOFILTRATION	LANDSCAPE BASIN
IMP 9	1,510	0.23	10,219	BIOFILTRATION	LANDSCAPE BASIN
IMP 11		0.42	18,375	SELF-MITIGATING	LANDSCAPED SLOPES
IMP 12	252	0.03	1,393	BIOFILTRATION	LANDSCAPE BASIN
IMP 13	1,080	0.04	1,794	BIOFILTRATION	LANDSCAPE BASIN
IMP 17				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 18				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 19				GREEN STREET EXEMPTION	STREET TREES AND SIDEWALK PLANTER
IMP 20				DEMINIMUS AREA	
IMP 21				DEMINIMUS AREA	
IMP 22				MODULAR WETLAND UNIT	MECHANICAL TREATMENT DEVICE

NOTES:
1. SUMMARY TABLE PER WWW.PROJECTCLEANWATER.ORG BMP SIZING CALCULATOR
2. DMA 8–10 DRAIN TO AN OFFSITE TEMPORARY BIORETENTION BASIN (IMP–9)
3. DMA 14–16 COVERED LOADING DOCKS
4. DMA 17–19 GREEN STREET EXEMPTION (STREET TREES AND SIDEWALK PLANTERS)
5. IMP 8 AND IMP 10 OMITTED ON PURPOSE
6. IMPS 1, 2, AND 6 WILL ALSO DETAIN THE Q_{100} INCREASE IN RUNOFF. FLOOD STORAGE EASEMENTS WILL BE REQUIRED.

COMPLIANCE BASIN SUMMARY

BASIN NAME	SAN YSIDRO HYDROLOGIC SUB-AREA
RECEIVING WATER	TIJUANA RIVER
RAINFALL BASIN	TIJUANA
MEAN ANNUAL PRECIPITATION (INCHES)	0.46
PROJECT BASIN AREA (ACRES)	20.94
WATERSHED AREA (ACRES)	1,000,088
SCCWRP LATERAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
SCCWRP VERTICAL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
OVERALL CHANNEL SUSCEPTIBILITY (H, M, L)	LOW
LOWER FLOW THRESHOLD (% OF 2-YEAR FLOW)	0.5 Q2

PROJECT SUMMARY

PROJECT NAME	PLAZA LA MEDIA – NORTH
PROJECT APPLICANT	LAS VEGAS SUNSET PROPERTIES, A NEVADA CORPORATION
JURISDICTION	COUNTY OF SAN DIEGO
PARCEL (APN)	646-121-34
HYDROLOGIC UNIT	TIJUANA

LEGEND

- SUBDIVISION BOUNDARY
- EXISTING STORM DRAIN PIPE
- EXISTING STORM DRAIN CLEANOUT
- EXISTING STORM DRAIN CURB INLET
- PROPOSED STORM DRAIN PIPE
- PROPOSED STORM DRAIN CLEANOUT (PUBLIC)
- PROPOSED STORM DRAIN CURB INLET (PUBLIC)
- PROPOSED BOX CULVERT (PUBLIC)
- PROPOSED STORM DRAIN PIPE (PRIVATE)
- PROPOSED STORM DRAIN CLEANOUT (PRIVATE)
- PROPOSED BROOK BOX (PRIVATE)
- PROPOSED PERFORETED PVC PIPE (PRIVATE)
- PROPOSED MODULAR WETLAND UNIT (PRIVATE)

LEGEND (CONT.)

- PROPOSED DRAINAGE BASINS
- DRAINAGE MANAGEMENT AREAS — DMA1
- INTEGRATED MANAGEMENT PRACTICE — IMP1
- DRAINAGE MANAGEMENT AREA IDENTIFIER — # / # (DMA#) (AREA IN ACRES)

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REGISTERED PROFESSIONAL ENGINEER
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No. C48358
Exp. 6-30-2020
CIVIL
STATE OF CALIFORNIA

STEVEN C. KETTLER, PE, C48358 DATE

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Revision 8:
Revision 7: 11/8/2018 (ENGR SUBMITTAL)
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Revision 5: 10/11/2018
Revision 4: 08/06/2018
Revision 3: 09/08/2017
Revision 2: 12/12/2016
Revision 1: 08/20/2013
Submittal Date: 08/01/2013

PROJECT ADDRESS:
LA MEDIA ROAD AND STATE ROUTE 905
SAN DIEGO, CA

PROJECT NAME:
PLAZA LA MEDIA–NORTH

SHEET TITLE:
DMA / BMP PLAN
CITY PROJECT NO. 334235

Sheet 18 of 26
PDP NO. 1174331
NUP NO. 1174329
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VTM NO. 1174336
OMDDP NO.

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PDP Submittal for:
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LA MEDIA & AIRWAY, LLC
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SHEET TITLE:
DMA / BMP PLAN

Issue Dates
Planning
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Plan Check -
Bid Set -
Permit Set -
Construction Set -

Drawing Date 10/11/18
Check By SCK
Drawn By MGA
Scale AS SHOWN
Job Number 0028
Sheet Number
C8

PLAZA LA MEDIA NORTH – INDUSTRIAL ALTERNATIVE

PTS 334235

SWQMP Addendum for PDP SWQMP Plaza La Media North by Chang Consultants dated 2/28/2019

OTAY MESA ROAD AT LA MEDIA ROAD
SAN DIEGO, CA 92154
APN: 646-121-34-00

MARCH 26, 2020

Applicant:

LAS VEGAS SUNSET PROPERTIES
2700 W. SAHARA AVE
LAS VEGAS NV 89102

Prepared By:

Kimley»Horn

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
(619)234-9411

This SWQMP Addendum has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.

Registered Civil Engineer

Date

Contents

1 INTRODUCTION

1.1 SUMMARY

This addendum is prepared to study the Industrial land use alternative for the Plaza La Media North project in conjunction with that study prepared by Chang Consultants, dated 2/28/2019 for the Retail land use of the project. The Industrial Alternative is a proposed 2 building development for industrial distribution center along with parking areas, loading docks, driveways, and other supporting infrastructure. The substantial difference between the Industrial and Retail land uses is in the amount of impervious area for landscape. This project will implement biofiltration basins as structural BMPs for both pollutant and flow control. The BMPs were sized per the City of San Diego Storm Water Standards Manual to meet or exceed the required minimum footprints

Proposed BMP Summary

DMA and BMP	Area (SF)	DCV (CF)	Minimum BMP Footprint Required (SF)	Minimum BMP Footprint for Hydromod (SF)	BMP Footprint Provided (SF)
Basin 1	221,829	6,037	4,725	8,736	19,921
Basin 2	500,445	14,771	11,560	21,320	39,085
Basin 3	53,754	N/A*	N/A*	N/A*	N/A*
Basin 4	124,470	N/A *	N/A*	N/A*	N/A*

*Designed for Green Street Exemption

2 BMP CALCULATIONS

The City of SAN DIEGO	Project Name	La Media North	
	BMP ID	1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	221829	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.71	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	6037	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	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	24	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	12	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.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	9056	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	2058	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]	4528	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	2383	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]	4725	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	4725	sq. ft.
23	Provided BMP Footprint	19921	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	La Media North	
	BMP ID	2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	500445	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.77	
3	85th percentile 24-hour rainfall depth	0.46	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	14771	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	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	24	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	12	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.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	22157	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	5036	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]	11079	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	5831	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]	11560	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	11560	sq. ft.
23	Provided BMP Footprint	39085	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

3 HYDROMODIFICATION CALCULATIONS

85TH % ISOPLUVIAL	RAINFALL BASIN	NRCS SOIL TYPE	EXISTING SLOPE	2 YR UNIT RUNOFF RATIO (cfs/Ac)	PROJECT SLOPE
0.46	LINDBERGH	D	LOW	0.429	LOW

BIOFILTRATION HYDROMODIFICATION SIZING (PER APPENDIX G)											
DMA	AREA (SF)	IMPERVIOUS AREA (SF)	C IMPERVIOUS	PERVIOUS AREA (SF)	C PERVIOUS	COMPOSITE C	PRE DEVELOPED Q2 (cfs)	LOW FLOW HYDROMOD Q2 (cfs)	"A" (TABLE G.2-5)	MINIMUM BMP SURFACE AREA (SF)	SURFACE AREA PROVIDED (SF)
1	221829	170037	1	51792	0.1	0.79	2.18	1.09	0.05	8761	19921
2	500445	418174	1	82271	0.1	0.85	4.93	2.46	0.05	21320	39085
	722274										**59006**

Orifice Sizing BMP1

Project Description

Solve For	Diameter

Input Data

Discharge	1.09 cfs
Headwater Elevation	3.75 ft
Centroid Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Discharge Coefficient	0.600

Results

Diameter	4.6 in
Headwater Height Above Centroid	3.75 ft
Tailwater Height Above Centroid	0.00 ft
Flow Area	0.1 ft²
Velocity	9.32 ft/s

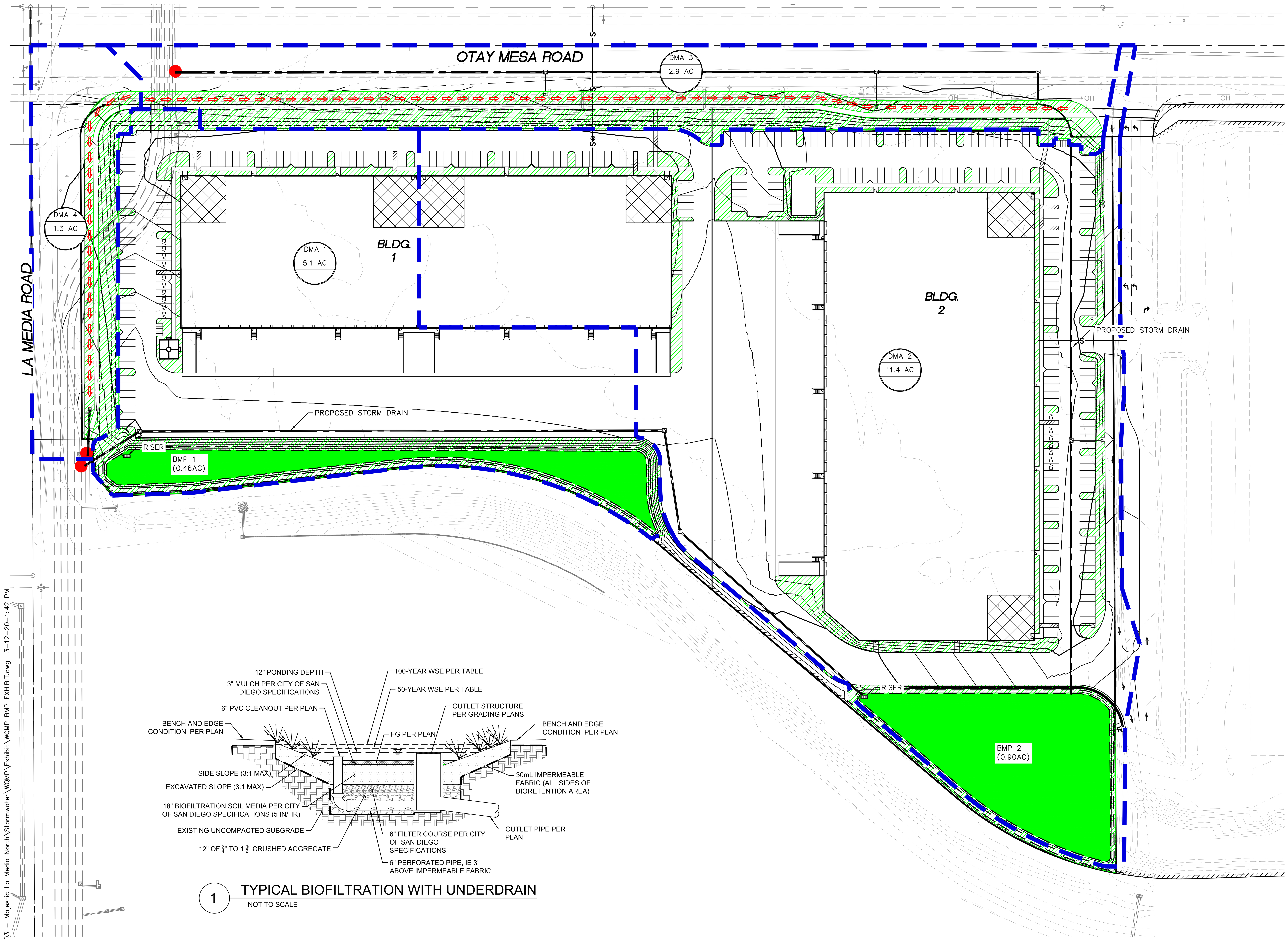
Orifice Sizing BMP2

Project Description	
Solve For	Diameter

Input Data	
Discharge	2.31 cfs
Headwater Elevation	3.75 ft
Centroid Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Discharge Coefficient	0.600

Results	
Diameter	6.7 in
Headwater Height Above Centroid	3.75 ft
Tailwater Height Above Centroid	0.00 ft
Flow Area	0.2 ft²
Velocity	9.32 ft/s

4 DMA EXHIBIT



1 TYPICAL BIOFILTRATION WITH UNDERDRAIN
NOT TO SCALE

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LEGEND

- PROPERTY BOUNDARY
- DRAINAGE MANAGEMENT AREA BOUNDARY
- EXISTING CONTOUR (XXXX)
- PROPOSED CONTOUR (XXXX)
- STORM DRAIN
- DRAINAGE MANAGEMENT AREA LABEL (DMA / AREA — ACRES)
- BMP AREA
- LANDSCAPE AREA
- POINT OF COMPLIANCE
- VEGETATED SWALE

BASIN ID	WQ PONDING DEPTH	FG ELEVATION OF BASIN
	INCHES	FEET
1	12	479.2
2	12	482.4

DMA	TYPE	AREA (AC)
1	DRAINS TO BIOFILTRATION BMP 1	5.1
2	DRAINS TO BIOFILTRATION BMP 2	11.4
3	GREEN STREET (VEGETATED SWALE AND TREES)	2.9
4	GREEN STREET (VEGETATED SWALE AND TREES)	1.3

SITE INFORMATION

1. HYDROLOGICAL SOIL GROUP: TYPE D
2. EXISTING CONDITION HAS NO IMPERVIOUS AREAS
3. DEPTH TO GROUNDWATER: 16' - 36'
4. ALL BMPS ARE BIOFILTRATION
5. THERE ARE NO EXISTING NATURAL HYDROLOGIC FEATURES ONSITE
6. THERE ARE NO EXISTING CCYSA'S ONSITE OR UPSTREAM OF THE PROJECT SITE
7. AREAS NOT SHOWN AS LANDSCAPE ARE IMPERVIOUS

NORTH

GRAPHIC SCALE IN FEET

Kimley»Horn

12 March 2020

DMA EXHIBIT

PLAZA LA MEDIA NORTH - SAN DIEGO, CALIFORNIA