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

Lumina II

[Insert Permit Application Number]

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

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

Engineer of Work:

Debby Reece, PE, RCE 56148

Provide Wet Signature and Stamp Above Line

Prepared For:

COLRICH

444 West Beech Street, Suite 300

San Diego, CA 92101

[Insert Applicant Phone Number]

Prepared By:

PROJECT DESIGN CONSULTANTS

Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
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Project Design Consultants

701 B Street, Suite 800

San Diego, CA, 92101

619-235-6471

Date:

1/14/19

Approved by: City of San Diego　　　　Date

The City of SAN DIEGO

Written by: Jeff Novoa
Job No. 2357.60

Project Name: Lumina II

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Project Name: Lumina II

- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
- Attachment 4: Copy of Plan Sheets Showing Permanent Storm Water BMPs
- Attachment 5: Project's Drainage Report
- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

Project Name: Lumina II

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

Project Name: Lumina II

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

56148 | 12/31/2020

PE# | Expiration Date

Debby Reece

Print Name

Project Design Consultants

Company

Date

REGISTERED PROFESSIONAL ENGINEER
DEBBY SUE REECE
No. C56148
EXP. 12-31-20
CIVIL
STATE OF CALIFORNIA

Project Name: Lumina II

Submittal Record

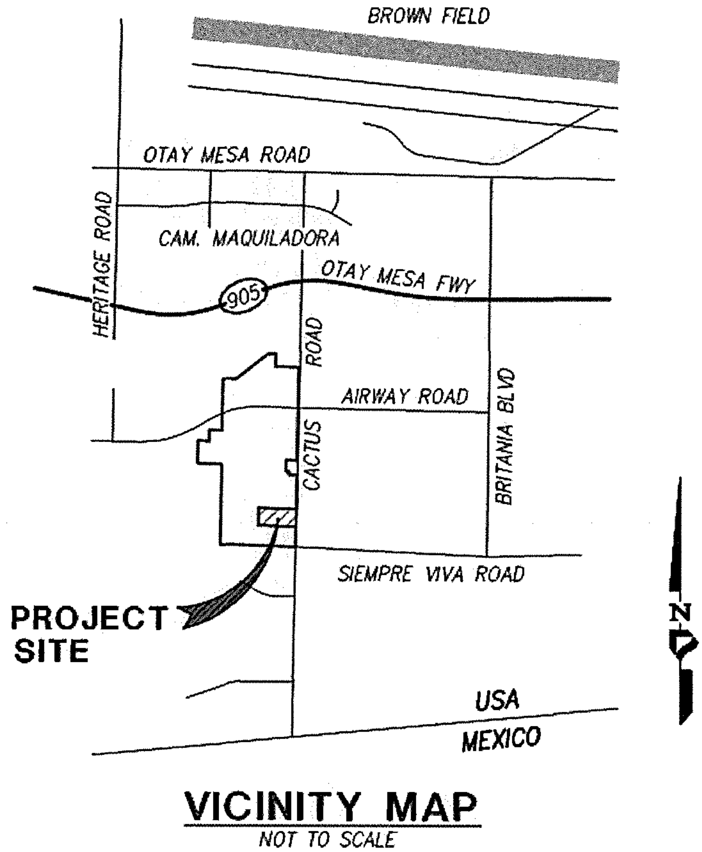
Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck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

Submittal Number	Date	Project Status	Changes
1	1/14/19	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Name: Lumina II

Project Vicinity Map

Project Name: Lumina II
Permit Application



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: Lumina II	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	☒

Danny Gabriel	Managing Member
Name of Owner or Agent *(Please Print)*	Title
[signature]	
Signature	Date

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Project Name: Lumina II

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Lumina II		
Permit Application Number:		Date: 1/14/19
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 <u>summary</u> 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 <u>not</u> 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: Lumina II

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 (<u>not required if prior lawful approval does not apply</u>):		
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 <u>not</u> 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 <u>not</u> apply:		

Project Name: Lumina II

HMP Exemption Exhibit

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

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

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Project Name: Lumina II

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Lumina II
Project Address	2380 Cactus Rd, San Diego, CA 92154
Assessor's Parcel Number(s) (APN(s))	646-100-54
Permit Application Number	
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)	Spring Canyon and Wruck Canyon 911.12
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	4.98 Acres (216,929 Square Feet)
Area to be disturbed by the project (Project Footprint)	4.69 Acres (204,305 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	3.52 Acres (153,229 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	1.17 Acres (51,076 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	67 %

Project Name: Lumina II

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:
Existing Land Cover Includes (select all that apply): ☑Vegetative Cover ☑Non-Vegetated Pervious Areas ☑Impervious Areas Description / Additional Information:
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐NRCS Type A ☐NRCS Type B ☐NRCS Type C ☑NRCS Type D
Approximate Depth to Groundwater: ☐Groundwater Depth < 5 feet ☐5 feet < Groundwater Depth < 10 feet ☐10 feet < Groundwater Depth < 20 feet ☑Groundwater Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☐Watercourses ☐Seeps ☐Springs ☐Wetlands ☑None Description / Additional Information:

Project Name: Lumina II

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: The Lumina II project represents a portion area similar to the Lumina Project and will propose development of medium density multi-unit homes, driveways and roadways and open spaces. Project Design Consultants prepared a Tentative Map for the Lumina Project (PTS# 555609) and the project-level SWQMP for the Lumina project is dated August 15, 2018. At the time of the development of the Lumina TM, the Cutberto property which is now know as the "Lumina II Project" was not owned by Colrich, but was subsequently acquired. Therefore, this subsequent entitlement is for the Lumina II property which eventually will be developed as port of the overall Lumina project site plan, but a separate entitlement is required. Calculations and Analysis for the Lumina II Project are in the Lumina Project SWQMP(PTS# 555609) and is provided in this submittal for reference.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): The proposed impervious features of the project include building roofs, and roadways will be constructed.
List/describe proposed pervious features of the project (e.g., landscape areas): The proposed pervious features include landscape areas for housing units and small courtyard features.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The site will be mass graded to regrade and flatten the site.

Project Name: Lumina II

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: Drainage still flows from the northeast side of the project to the southwest, but will be treated by a biofiltration basin designed in the Lumina SWQMP (TM PTS#555609).

Project Name: Lumina II

Form I-3B Page 3 of 11
Description of Existing Site Topography and Drainage
How is storm water runoff conveyed from the site? At a minimum, this description should answer: 1. Whether existing drainage conveyance is natural or urban; 2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site; 3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels; 4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.
Descriptions/Additional Information
1.The existing drainage conveyance is mostly natural with minimal drainage improvements. 2. In the existing condition, there is a small amount of offsite runon draining through the site. In the developed condition, the surroundings development will eliminate runon onto the onto the project due to the construction of Street C to north. 3.There are currently minimal drainage improvements within the project boundary. 4.The majority of the project drains to the south to a steep finger canyon (Wruck Creek) located to the west of the existing Cactus Road/Siempre Viva Road intersection. Two of the finger canyons drain to sump areas that are collected and drained to the west and discharged downstream within the canyon via an existing RCP storm drain per City Drawing 23871-21-D.

Project Name: Lumina II

Form I-3B Page 6 of 11
Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply): ☑Onsite storm drain inlets ☑Interior floor drains and elevator shaft sump pumps ☑Interior parking garages ☑Need for future indoor & structural pest control ☑Landscape/outdoor pesticide use ☑Pools, spas, ponds, decorative fountains, and other water features ☐Food service ☑Refuse areas ☐Industrial processes ☐Outdoor storage of equipment or materials ☐Vehicle and equipment cleaning ☐Vehicle/equipment repair and maintenance ☐Fuel dispensing areas ☐Loading docks ☑Fire sprinkler test water ☑Miscellaneous drain or wash water ☑Plazas, sidewalks, and parking lots Description/Additional Information:

Project Name: Lumina II

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) The project drains to the south to Wruck Canyon located to the west of the existing Cactus Road/Siempre Viva Road intersection. Two of the finger canyons drain to sump areas that are collected and drained to the west and discharged downstream within the canyon via an existing RCP storm drain per City Drawing 23871-21-D. Wruck Canyon confluences with Tijuana River, and travels southwesterly entering the Pacific Ocean close to US Mexico boundary.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations Per the basin plan, Spring Canyon and Wruck Canyon have the following beneficial uses: agricultural, rec 2, warm, and wild.
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 projects.
Provide distance from project outfall location to impaired or sensitive receiving waters The project is located approximately 2 miles upstream of Tijuana River, which is on the 303(d) list of impaired waterbodies for the following contaminants: Eutrophic, Indicator Bacteria, Low Dissolved Oxygen, Pesticides, Phosphorus, Sedimentation/Siltation, Selenium, Solids, Surfactants (MBAS), Synthetic Organics, Total Nitrogen as N, Toxicity, Trace Elements and Trash.
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 Proposed BMPs will be located out of MHPA or ESL areas.

Project Name: Lumina II

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	Eutrophic, Indicator Bacteria, Low Dissolved Oxygen,	Eutrophic, Indicator Bacteria, Low Dissolved Oxygen,
(cont)	Pesticides, Phosphorus, Sedimentation/Siltation,	Pesticides, Phosphorus, Sedimentation/Siltation,
(cont)	Selenium, Solids, Surfactants (MBAB),Synthetic Organics,	Selenium, Solids, Surfactants (MBAB),Synthetic Organics,
(cont)	Total Nitrogen as N, Toxicity, Trace Elements and Trash	Total Nitrogen as N, Toxicity, Trace Elements and Trash
Tijuana River Estuary	Eutrophic, Indicator Bacteria, Lead, Low Dissolved Oxygen,	Eutrophic, Indicator Bacteria, Lead, Low Dissolved Oxygen,
(cont)	Nickel, Pesticides, Thallium, Trash and Turbidity	Nickel, Pesticides, Thallium, Trash and Turbidity

Identification of Project Site Pollutants*

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

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

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

Project Name: Lumina II

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): Refer to Lumina SWQMP and hydromodification Study (PTS#555609). Hydromodification compliance for both projects are included in the previous study. 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: Refer to Lumina SWQMP and hydromodification Study (PTS#555609). Hydromodification compliance for both projects are included in the previous study.

Project Name: Lumina II

Form I-3B Page 10 of 11
Flow Control for Post-Project Runoff*   ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.   POC 1 – Outlet of Southern Systems to Spring Canyon after entering public park storm drain system.   Refer to the approved Lumina Hydromodification Study dated August 16,2018 (TM PTS #555609) for further details.
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 of Receiving Channels was performed by Chang Consultants for the Points of Compliance. Refer to "Hydromodification screening for Lumina-Otay Canyon Ranch" dated June 1, 2017.
Discussion / Additional Information: (optional)   It was determined that channel had a low susceptibility to erosion meaning that a 0.5 factor could be used as to calculate the low flow threshold from the flow rate of the 2-year recurrence interval.   Calculations and analysis were performed in the approved Lumina Hydromodification Study (TM PTS #555609). See Study for full analysis including this Lumina II project.

Project Name: Lumina II

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.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Project Name: Lumina II

Source Control BMP Checklist for PDPs			Form I-4B
Source Control BMPs			
All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented: No outdoor material storage areas planned.			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented: No outdoor work areas planned.			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: Lumina II

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 <u>all</u> "No" answers shown above.			

Project Name: Lumina II

Site Design BMP Checklist for PDPs	Form I-5B		
Site Design BMPs			
All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided. A site map with implemented site design BMPs must be included at the end of this checklist.			
Site Design Requirement	**Applied?**		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.1 not implemented:			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☑ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☑ No	☐ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.2 not implemented:			

Project Name: Lumina II

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:			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented: Runoff from the concrete sidewalks will be directed onto the landscaping.			
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: Lumina II

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

Project Name: Lumina II

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:
Refer to the DMA Map for the site design BMPs.

Project Name: Lumina II

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 site will flow to a biofiltration basin, referred herein as the South Basin. It will act as an integrated pollutant control/hydromod/detention BMP. The basin will be a Biofiltration with Partial Retention BMP. The South Basin will be unlined to allow infiltration. The Lumina II project site was included in the South Basin design during the Lumina SWQMP (TM PTS#555609). This area was assumed to be multi unit housing and multi-unit housing will be constructed in Lumina II. Pollutant and volume retention requirements are met on a regional basis with the South Basin (see the Lumina SWQMP for calculations and specific design). The overall Lumina project includes street trees to reduce the DCV, provide additional infiltration, and also hydromodification storage for low flow attenuation. Geotechnical testing was peformed for the overall Lumina project and indicated that rates within the site had potential for partial-retention along both the north and south drainage divides, and thus the South Basin will not be lined at the bottom of the storage to allow for infiltration. (Continue on page 2 as necessary.)	

Project Name: Lumina II

Form I-6 Page 2 of 1
(Continued from page 1) Refer to Lumina SWQMP (TM PTS#555609) for the Infiltration Assessment Study and the infiltration feasibility checklist. Also refer to the Lumina report for the feasibility checklist for harvest and reuse.

Project Name: Lumina II

Form I-6 Page 1 of 1 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. South basin (Basin #1)	
Construction Plan Sheet No. See Lumina SWQMP (PTS#555609)	
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	Debby Reece Project Design Consultants 619-235-6471
Who will be the final owner of this BMP?	HOA
Who will maintain this BMP into perpetuity?	HOA
What is the funding mechanism for maintenance?	Revenue from Property

Project Name: Lumina II

Form I-6 Page of 1 (Copy as many as needed)
Structural BMP ID No. South basin (Basin #1)
Construction Plan Sheet No. See Lumina SWQMP (PTS#555609)
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Project Name: Lumina II

Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

Project Name: Lumina II

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☐ Included Refer to Lumina SWQMP (PTS # 555609)
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 Refer to Lumina SWQMP (PTS # 555609) ☐ 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.	Refer to Lumina SWQMP (PTS # 555609) ☐ 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 Refer to Lumina SWQMP (PTS # 555609)

Project Name: Lumina II

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.

Refer to Lumina SWQMP (PTS # 555609)

Project Name: Lumina II

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: Lumina II

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

The Hydromodification Management Exhibit must identify:

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

Project Name: Lumina II

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Refer to Lumina SWQMP (PTS # 555609)

Project Name: Lumina II

Indicate which Items are Included:

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

Project Name: Lumina II

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).

Project Name: Lumina II

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Refer to Lumina SWQMP (PTS # 555609)

Project Name: Lumina II

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

The plans must identify:

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

Project Name: Lumina II

Attachment 5
Drainage Report

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

PRELIMINARY DRAINAGE REPORT
LUMINA II (PTS# ________)
CITY OF SAN DIEGO, CA
January 16th, 2019

Prepared For:

COLRICH
444 West Beech Street, Suite 300
San Diego, CA 92101

Prepared By:

PROJECT DESIGN CONSULTANTS

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PDC Job No. 2357.60

REGISTERED PROFESSIONAL ENGINEER
DEBBY SUE REECE
No. C56148
EXP. 12-31-20
CIVIL
STATE OF CALIFORNIA

Prepared by: C. Pack, P.E.
Under the supervision of

____

Debby Reece, PE RCE 56148
Registration Expires 12/31/20

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

This report describes the proposed storm water drainage improvements for the Lumina II entitlement submittal. The Lumina II project is owned by Colrich, and represents a portion of the Otay Mesa Central Village Specific Plan (CVSP) area. The TM development proposes development consistent with the land use designations of the approved Specific Plan. The overall drainage criteria for the project was identified in the technical report for the Specific Plan, entitled *Preliminary Drainage and Water Quality Summary for the Otay Mesa Central Village Specific Plan* (PTS 408329), which was prepared by Project Design Consultants and is dated January 22, 2016. Subsequent to the development of the Specific Plan report, Project Design Consultants prepared a Tentative Map for the Lumina Project (PTS# 555609) and the project-level drainage study for the Lumina project is dated August 15, 2018. At the time of the development of the Lumina TM, the Cutberto property which is now know as the "Lumina II Project" was not owned by Colrich, but was subsequently acquired. Therefore, this subsequent entitlement is for the Lumina II property which eventually will be developed as port of the overall Lumina project site plan, but a separate entitlement is required. The project is located South of the 905 highway along Cactus Road and northwest of the Siempre Viva intersection. See Figure 1 for a Vicinity Map.

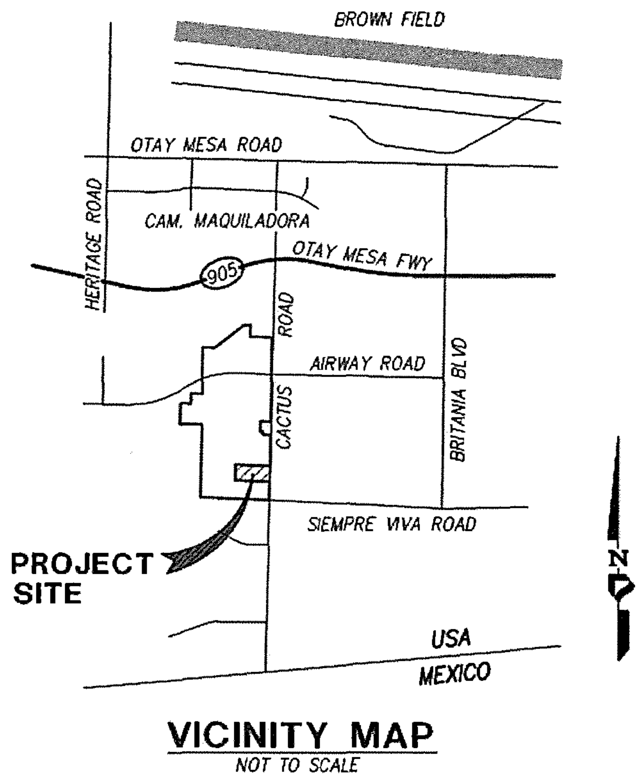

Figure 1: Vicinity Map

2. PROJECT BACKGROUND & RELATION TO PREVIOUS STUDIES

The project site was previously included in the drainage area evaluated in the preliminary Lumina Drainage Study (PTS #555609) because the Lumina project surrounded the Lumina II parcel and therefore incorporated the runon into the overall study. The Lumina II parcel was modeled in the previous study with an ultimate condition runoff coefficient for a multi-unit housing site. Therefore, project-level drainage analysis was already evaluated in the previous report. This Lumina II report, as a supplement document to the approved Lumina Drainage Study, shows that this Lumina II project is in compliance with the drainage criteria.

3. EXISTING AND PROPOSED DRAINAGE PATTERNS AND IMPROVEMENTS

The following sections provide descriptions of the existing and proposed drainage patterns and improvements for the project.

3.1 Existing Drainage Patterns

The site currently has a single family home and a wood shed on the western edge of the project. The rest of the site consists of dirt, shrubs, and trees. Topography within the project site is characterized by mostly gently sloping areas. There are currently minimal drainage improvements within the project boundary. The site drains to the south across the property boundary into the Lumina property, which is also owned by Colrich. From an overall perspective , the site drains to the south to a steep finger canyon (Wruck Creek) located to the west of the existing Cactus Road/Siempre Viva Road intersection. Two of the finger canyons drain to sump areas that are collected and drained to the west and discharged downstream within the canyon via an existing RCP storm drain per City Drawing 23871-21-D.

3.2 Proposed Drainage Improvements

The proposed drainage patterns and drainage improvements have been designed to mimic existing drainage patterns. All proposed drainage improvements from the Lumina II project can be found within the Lumina Drainage Study (PTS#555609) and will be further refined during final engineering. Because the ultimate condition for the Lumina II project was already evaluated in the Lumina Drainage Study, no further calculations are required. The drainage improvements for the proposed Lumina II project will drain into the storm drain improvements for the Lumina project, and the drainage will be detained in the proposed Lumina South Basin.

4. HYDROLOGY CRITERIA, METHODOLOGY, AND RESULTS

The hydrologic analysis was performed for the overall Lumina site (which included Lumina II) and can be found in the approved Lumina Drainage Study (PTS#555609), which is included in this submittal for reference. This Lumina II report does not include additional hydrologic analysis because the project site is the same land use as assumed in the previous study (multi-unit housing).

5. CONCLUSION

The proposed project development complies with detention criteria outlined in previous studies, and therefore, should not adversely affect downstream drainage conditions. The storm drain infrastructure in the Lumina Drainage Study (PTS#555609) will be adequate to convey the design flows and will be addressed regionally for both the Lumina and Lumina II projects. The storm drain detention facilities are designed as combined facilities for hydromodification and water quality purposes in addition to peak flow detention.

APPENDIX 1

Drainage Exhibit

SCALE 1' = 50'

LEGEND

PROPERTY BOUNDARY	— — —	HYDROLOGY NODE	#
DRAINAGE SUBAREA		AREA FROM UPSTREAM TO DOWNSTREAM NODE	X.XX AC
FLOW DIRECTION	→		

NOTE: SUPPLEMENTAL TOPOGRAPY IS 2-FT CONTOURS FROM SANGIS (1997, BEFORE SR 905 WAS BUILT)

SCALE: 1"=50'
JOB #: 2357.60
CREATED: 1/2/19

PREPARED BY:

PROJECT DESIGN CONSULTANTS
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CITY OF SAN DIEGO
LUMINA II

DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT A

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APPENDIX 2

Lumina Drainage Study (For Reference Only)

PRELIMINARY DRAINAGE REPORT
LUMINA (PTS 555609)
CITY OF SAN DIEGO, CA
August 15, 2018

Prepared For:

COLRICH
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STATE OF CALIFORNIA

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Registration Expires 12/31/18

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APPENDICES

1. INTRODUCTION

This report describes the existing and proposed storm water drainage improvements for the Lumina Tentative Map (TM) submittal. The Lumina project is owned by Colrich, and represents a portion of the Otay Mesa Central Village Specific Plan (CVSP) area. The TM development proposes development consistent with the land use designations of the recently approved Specific Plan. The overall drainage criteria for the project was identified in the technical report for the Specific Plan, entitled *Preliminary Drainage and Water Quality Summary for the Otay Mesa Central Village Specific Plan* (PTS 408329), which was prepared by Project Design Consultants and is dated January 22, 2016. The Specific Plan designated land uses within the proposed village area to accommodate future development consistent with the Otay Mesa Community Plan Update. Consistent with the land use designations applied to the site by the CVSP, the TM proposes development of Medium High Density Mixed-Use, Medium Density Multi-Family, Low Density Multi-Family, Public School Facilities, Recreation, and Open Space land uses.

This TM report builds upon the programmatic level drainage analysis in the Specific Plan and addresses the project-specific level analysis required for the Colrich parcels currently proposed per the Lumina TM. The project proposes a TM application for a 93.43-acre site located north of Siempre Viva Road and west of Cactus Road in the Otay Mesa community of the City of San Diego within the CVSP area. See Figure 1 for a Vicinity Map. The project proposes to impact small drainages in the canyons of the northern and southern project limits. We have mapped jurisdictional non-wetland Waters of the US (WUS) in these drainages. As such, we're anticipating needing agency permits (Corps 404, CDFW 1602, and RWQCB 401). We've got this in our scope and will be doing the fieldwork soon to update the delineation mapping.

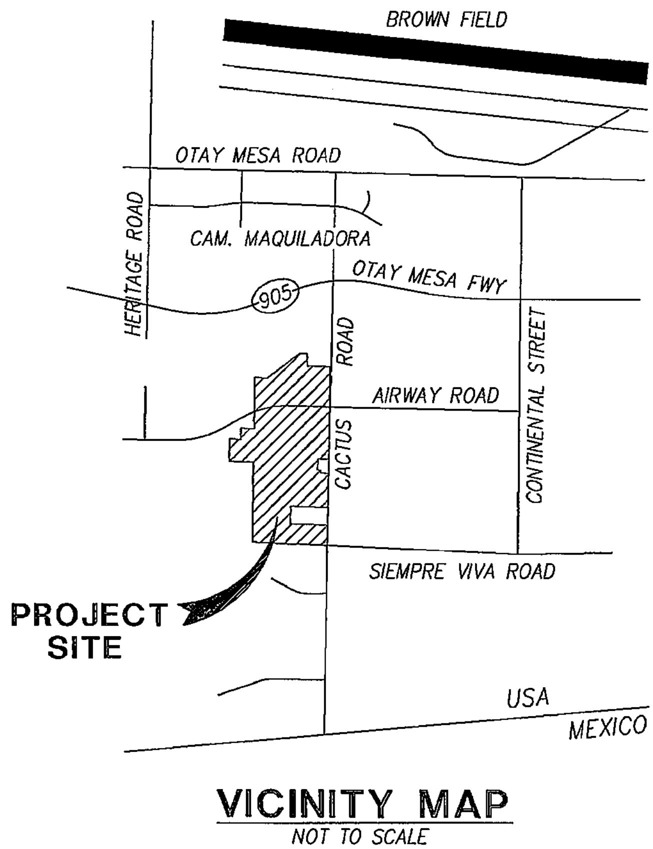


Figure 1: Vicinity Map

2. PROJECT BACKGROUND & RELATION TO PREVIOUS STUDIES

This report builds on the work done previously for the CVSP. The work done for the CVSP was based on the Otay Mesa Community Plan Update (CPU) and its associated EIR. Specifically, the Otay Mesa CPU Drainage Study that was part of the EIR outlined the drainage and water quality requirements for future development within Otay Mesa and identified some of the regional drainage and flooding issues within the area. The report is titled *Drainage Study for the Otay Mesa Community Plan Update*, and was prepared by Kimley-Horn and Associates in April 2007. Included in that report is as a companion study entitled *Review of Otay Mesa Drainage*

Studies, prepared by Tetratech. For a copy of this previously approved CPU Drainage report, refer to Appendix 4.

The report outlines the history and drainage challenges associated with the development of the Otay Mesa Community Plan Area. For example, for most of its early history, Otay Mesa was used for agriculture and farming. As industrial and commercial development started taking place in the 1960s, the City of San Diego recognized the need for a comprehensive drainage Master Plan for the Mesa. The topography of the majority of the area is mostly flat and some of the areas experience flooding during moderate storm events, particularly within the East Watershed (per the Watershed Map in the CPU Drainage Study). There was concern that the new development would increase the stormwater runoff crossing the border into Mexico. In 1987, the City Council approved a contract to prepare the Otay Mesa Master Drainage Plan and published a Notice to "All Private Engineers" that established drainage requirements for development within the East Watershed of Otay Mesa. (Refer to page 2 of the CPU Drainage Study). The Notice required no increase in the rate of stormwater runoff from the property after development, by construction of stormwater detention basins. Most of the drainage analysis associated with the CPU Drainage Study focused on the East Watershed, but the CPU Drainage Study also addressed the other areas within the CPU boundary. The Central Village Specific Plan is within the West Watershed, which is less developed than the East Watershed but still has some of the same drainage challenges. Per Section VII of the CPU Drainage report, the following describes the recommended drainage design criteria for future development within the West Watershed (which includes the Specific Plan Area):

> The West Watershed consists of smaller Mesa-top watersheds that drain into the tributary canyons of Spring Canyon. All of the flow from the watershed flows into Mexico at the Spring Canyon concentration point. Detention basins will be required to reduce the post-development peak flows to predevelopment levels for the 50-year and 100-year storm. If the detention basins concentrate flows at the upper edge of canyons, care must be taken to ensure that erosion potential is not increased downstream.

Therefore, the requirements of the West and East watersheds are different. While developments in the East watershed requires conformance with the Notice to "All Private Engineers", the West watershed is not subject to the same requirements, but it is subject to the 50-year and 100-year storm detention requirement, as outlined in the above paragraph.

Subsequent to the preparation of the previous Otay Mesa Drainage Studies, Caltrans has built the new State Route 905 and there have been other changes and development within the watershed. Some of the regional drainage improvements proposed in the original studies and master plans to alleviate regional flooding issues have still not been resolved. Therefore, this report follows the the guidance for future development established with the Specific Plan, specifically the requirement for detention. The guidance will require compliance with the overall goals of the CPU (reduce post-development peak flows) and will also require compliance with the applicable stormwater quality regulations.

3. EXISTING AND PROPOSED DRAINAGE PATTERNS AND IMPROVEMENTS

The following sections provide descriptions of the existing and proposed drainage patterns and improvements for the project.

3.1 Floodplains

The project is located within an area of the non-printed FEMA Firm Panel 06073C2200G. Per the FIRM index sheet, the panel is not printed is because there are no special flood hazard areas within the panel sheet. Therefore, there are no FEMA special flood hazard areas within the project. However, although there is no FEMA special flood hazard areas, there may be areas of localized flooding in the canyon and other drainage concentration points.

3.2 Existing Drainage Patterns

The site is currently used for agricultural uses, and there are a few residences and buildings scattered through the site. Topography within the project site is characterized by mostly gently sloping areas, with portions of the perimeter of the property within steep canyon areas. There are currently minimal drainage improvements within the project boundary. The majority of the project drains to the south to a steep finger canyon (Wruck Creek) located to the west of the existing Cactus Road/Siempre Viva Road intersection. Two of the finger canyons drain to sump areas that are collected and drained to the west and discharged downstream within the canyon via an existing RCP storm drain per City Drawing 23871-21-D. A large portion of the project area drains to the northwest to a canyon (North tributary of Spring Canyon) on the north side of the proposed Airway Road. A small portion of the project area (Cactus Road north of Airway Road) drains to the north along Cactus Road and drains into a culvert underneath Cactus Road. After crossing Cactus Road, the runoff commingles with other runoff draining from upstream areas including Caltrans right-of-way and then drains to the upstream point of the North Canyon.

See Exhibit A in Appendix 5 for the existing condition hydrology maps. Onsite drainage is divided generally into two main drainage areas, North and South. The Southern systems include Systems 100 and 200, and the Northern systems include Systems 300 and 500. They include the following areas:

> System 100: System 100 represents the area that drains to the south towards the finger canyon near the southerly property line near the existing eastern headwall per Drawing 23871-21-D.
>
> System 200: System 200 represents the area that drains to the south towards the existing steep finger canyon that flows in a southerly direction and enters the western headwall per Drawing 23871-21-D.
>
> System 300: System 300 represents the area that drains to the northwest towards the north tributary of Spring Canyon.
>
> System 500: System 500 represents the area that drains to the north along Cactus Road and eventually drains to the culvert that crosses underneath Cactus Road approximately 600 feet to the north of the site.

In order to adequately compare existing flows to proposed flows at each of the project outfalls and to provide a valid comparison, the downstream limits of the existing drainage boundaries match the limits of the proposed drainage boundaries. This was needed because of the large number of drainage outfalls, and lack of concentration points in the pre-developed condition.

3.3 Proposed Drainage Improvements

The proposed drainage patterns and drainage improvements have been designed to mimic existing drainage patterns. The proposed project will include a storm drain system consisting of inlets, pipes, brow ditches, roof drains, and water quality features/detention basins. Development of the site includes development of the backbone public streets with the associated utilities and the mass grading of the lots for future development. The lots will be developed with a range of land uses, including parks, residential, mixed use, and educational uses.

The proposed drainage improvements include public storm drain infrastructure serving the proposed public streets, and private storm drain improvements serving the private development lots. The backbone storm drain system will provide storm drain stubs to serve the proposed developable lots. The lots will be developed in phases.

Refer to Exhibit B for the proposed conditions hydrology map. The Southern systems include Systems 1000 and 2000, and the Northern systems include Systems 3000, 4000, and 5000. They include the following areas:

System 1000: System 1000 represents the area that drains to the south and into proposed Basin 1 (combined biofiltration/hydromodification/detention). The outlet of Basin 1 drains towards the existing eastern headwall per Drawing 23871-21-D.

System 2000: System 2000 represents the runon area draining onto the site from upstream areas to the west of the property. It also collects the portion of the future Trails Park. The drainage area drains towards the existing western headwall per Drawing 23871-21-D.

System 3000: System 3000 represents the drainage area that drains to the northerly canyon, but bypasses Basin 4. The drainage area includes a portion of Airway Road.

Airway Road will be extended to the west in the future by others with subsequent developments to the west.

System 4000: System 4000 represents the drainage area that drains to the northwest to Basin 4 and then outlets to the proposed storm drain outfall to the northerly canyon. Basin 4 is a combined biofiltration/hydromodification/detention basin. Note that a portion of existing Airway Road east of Cactus Road drains to the basin, so the ultimate width is used for the sizing calculations, even though the project's proposed widening will be widened to an interim width.

System 5000: System 5000 represents the Cactus Road drainage area that drains to the north along Cactus Road towards the existing culvert located north of the project approximately 600 feet to the north of the site.

4. HYDROLOGY CRITERIA, METHODOLOGY, AND RESULTS

The site was modeled for existing and proposed conditions to prevent any downstream impacts or increase in flow rates. Site hydrology was assessed to generate hydrographs to route through the basins being designed in concert with hydromodification criteria. Please see the Preliminary Hydromodification Management Study by Project Design Consultants for additional information regarding basin and outflow structure design.

4.1 Hydrology Criteria

Table 1 summarizes the key hydrology assumptions and criteria used for the hydrologic modeling.

Table 1: Hydrology Criteria

Existing and Proposed Hydrology:	100-year storm frequency
Soil Type:	Hydrologic Soil Group D

Land Use / Runoff Coefficients:	Assigned for each drainage area based on estimated percent imperviousness (C values range from C=0.45 to C=0.95).
Rainfall intensity:	Based on intensity duration frequency relationships presented in the 1984 City of San Diego Drainage Design Manual

4.2 Hydrologic Methodology

The Rational Method was used to determine the onsite 100-year storm flow for the design of the Project storm drainpipe improvements. The goal of this analysis was to:

- Determine the design flows for the sizing of storm drainpipe improvements.
- Determine project flows that will be conveyed by the storm drainpipe systems within the project.
- Determine the differences in the drainage conditions between existing and proposed conditions for sizing of detention facilities.

The Rational Method was used to calculate onsite and offsite runoff for the 100-year storm. CivilD hydrologic computer software was used to model the onsite and offsite drainage basins. Per the *City of San Diego Drainage Design Manual,* hydrologic soil type D was utilized for all calculations. The runoff coefficients were assigned based on the percent imperviousness proposed for each lot.

4.3 Description of Hydrologic Modeling Software

The Civil-D Rational Method Program was used to perform the Rational Method hydrologic calculations. This section provides a brief explanation of the computational procedure used in the computer model.

The Civil-D Modified Rational Method Hydrology Program is a computer-aided design program where the user develops a node link model of the watershed. Developing independent node link models for each interior watershed and linking these sub-models together at confluence points creates the node link model. The intensity-duration-frequency relationships are applied to each of the drainage areas in the model to get the peak flow rates at each point of interest.

The peak flows at the inlets to the basins were used to generate inflow hydrographs utilizing the RickRatHydro program. This program artificially generates a program based on time of concentration and an expected 2/3rds storm distribution as provided in Figure 6-2 of the Hydrology Manual. These hydrographs could them be routed through the basins to produce the final proposed peak flow. The EPA's Stormwater Management Model (SWMM) was used to route these hydrographs through the basins. For more information on this modeling effort see the Preliminary Hydromodofication Management Report for the project. With these routing efforts it was demonstrated that the appropriate reduction could be achieved. For future submittal SWMM will need to be utilized to demonstrate the 100 year storm is appropriately attenuated as only SWMM is capable representing the hybrid biofiltration system with above and below ground storage.

4.4 Hydrology Results

The proposed detention basins will mitigate peak flows to effectively reduce the post-developed runoff from the site due to the development, consistent with the drainage criteria outlined in the CPU Drainage Study. The basins will have a large subsurface detention area below the biofiltration, such that the combination of surface and subsurface storage will mitigate for peak-flow and hydromodification management. Detention routing will be performed for subsequent submittals. Table 2 below summarizes the Rational Method results for the key areas of interest.

Table 2: Hydrology Results

	EXISTING CONDITIONS			PROPOSED CONDITIONS		
Outfall of Interest	***System***	***Q_{100} (cfs)***	***Contrib. Area (acres)***	***System***	***Q_{100} (cfs)***	***Contrib. Area (acres)***
North	System 300	37.7	30.1	System 3000	3.9	0.9
	System 500	11.7	7.7	System 4000	105.6 undetained 13.4 detained	33.9
				System 5000	6.9	1.9
	Subtotal:	**49.4**	**37.8**	**Subtotal:**	**24.2**	**36.7**
South	System 100	28.4	20.7	System 1000	151.6 undetained 36.2 detained	63.4
	System 200	54.0	49.3	System 2000	10.2	8.2
	Subtotal:	**82.4**	**70.0**	**Subtotal:**	**46.4**	**71.6**
	Total:	**131.8**	**107.8**	**Total:**	**70.6**	**108.3**

5. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS

Hydraulic calculations will be performed during final engineering. The preliminary design for each basin includes additional depth for freeboard.

6. CONCLUSIONP

Proposed project development complies with detention criteria outlined in previous studies, and therefore, should not adversely affect downstream drainage conditions. The proposed onsite storm drain infrastructure will be adequate to convey the design flows. The storm drain detention facilities are designed as combined facilities for hydromodification and water quality purposes in addition to peak flow detention.

1

APPENDIX 1

Intensity Duration Frequency Curve and Runoff Coefficients

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

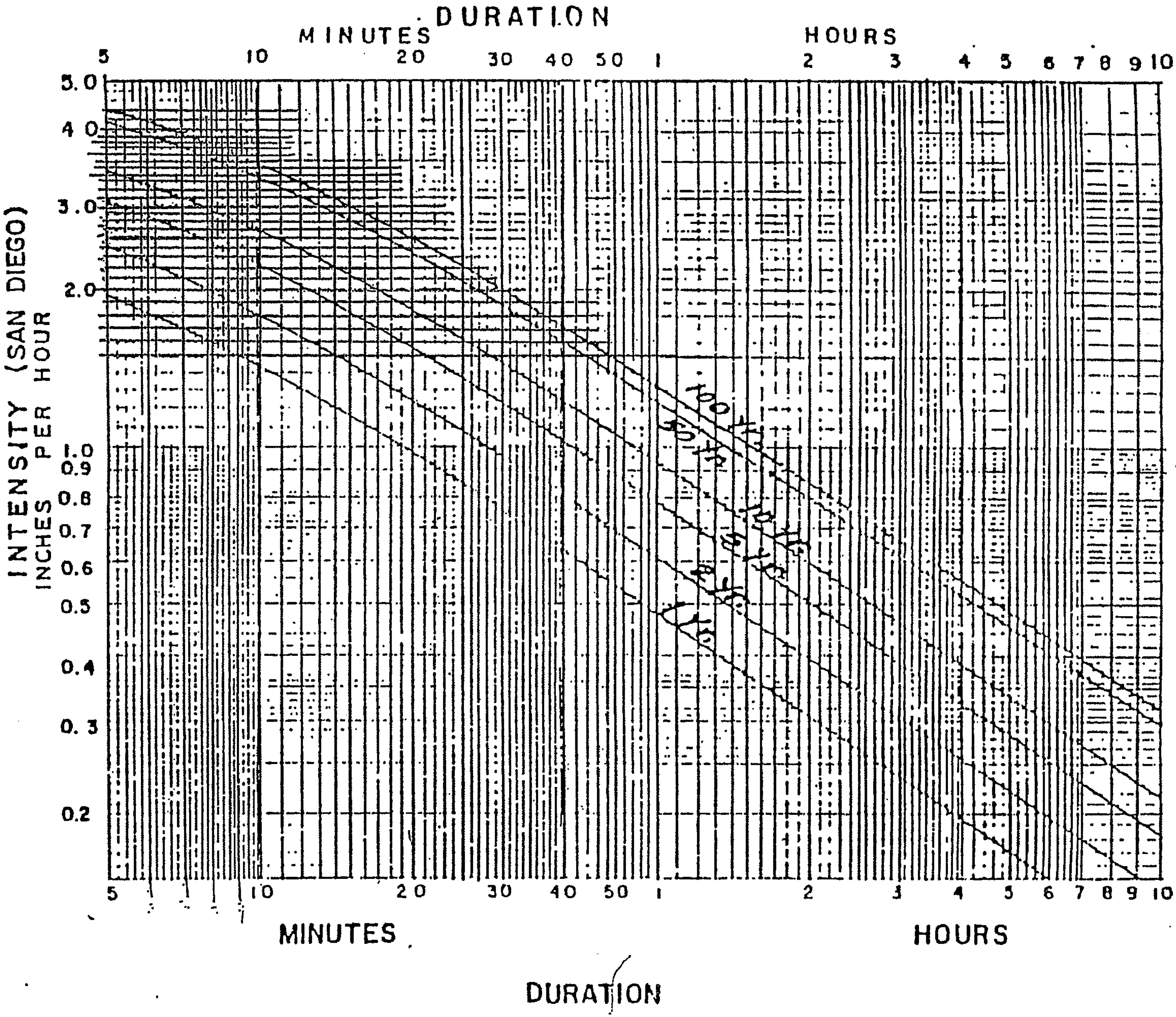
Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.



RAINFALL
INTENSITY - DURATION - FREQUEN
CURVES
for
COUNTY OF SAN DIEGO

APPENDIX

2

APPENDIX 2

Existing Conditions Rational Method Computer Output

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study       Date: 05/20/17
------------------------------------------------------------------------
2357.50 ILLUMINA
EXISTING CONDITIONS
100-YEAR
FILE:S100E100
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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


Program License Serial Number 4049

------------------------------------------------------------------------
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      100.000 to Point/Station      101.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Initial subarea flow distance  =  103.000(Ft.)
Highest elevation =  512.000(Ft.)
Lowest elevation =  510.000(Ft.)
Elevation difference =    2.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      9.52 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 103.000^.5)/( 1.942^(1/3)]=   9.52
Rainfall intensity (I) =       3.435(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =       0.232(CFS)
Total initial stream area =        0.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =   510.000(Ft.)
Downstream point elevation =   462.000(Ft.)
```

```
Channel length thru subarea  =  2096.000(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 =     13.703(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     13.703(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   3.508(Ft/s)
Channel flow top width =   16.008(Ft.)
Flow Velocity =     3.51(Ft/s)
Travel time  =    9.96 min.
Time of concentration =   19.48 min.
Critical depth =      0.344(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 =      2.611(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     20.478(CFS) for   17.430(Ac.)
Total runoff =     20.709(CFS)    Total area =       17.58(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   462.000(Ft.)
Downstream point elevation =   425.000(Ft.)
Channel length thru subarea  =   234.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     20.709(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   9.608(Ft/s)
Channel flow top width =    8.253(Ft.)
Flow Velocity =    9.61(Ft/s)
Travel time  =   0.41 min.
Time of concentration =   19.88 min.
Critical depth =      0.648(Ft.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      105.000
**** 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 =    19.88 min.
Rainfall intensity =      2.587(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      7.718(CFS) for    3.140(Ac.)
Total runoff =     28.427(CFS)    Total area =       20.72(Ac.)
End of computations, total study area =         20.720 (Ac.)
```

```
            San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 05/20/17
------------------------------------------------------------------------
2357.50 ILLUMINA
EXISTING CONDITIONS
SYSTEM 200, FILE: S200E100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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      200.000 to Point/Station      201.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Initial subarea flow distance  =  228.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  510.000(Ft.)
Elevation difference =    4.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    14.65 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 228.000^.5)/( 1.754^(1/3)]=  14.65
Rainfall intensity (I) =      2.932(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      1.148(CFS)
Total initial stream area =        0.870(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =   510.000(Ft.)
Downstream point elevation =   490.000(Ft.)
```

```
Channel length thru subarea  =  1131.000(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 =     11.055(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     11.055(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   3.000(Ft/s)
Channel flow top width =   15.729(Ft.)
Flow Velocity =    3.00(Ft/s)
Travel time  =    6.28 min.
Time of concentration =   20.93 min.
Critical depth =      0.301(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 =      2.528(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     17.088(CFS) for   15.020(Ac.)
Total runoff =     18.236(CFS)    Total area =       15.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   490.000(Ft.)
Downstream point elevation =   414.000(Ft.)
Channel length thru subarea  =  1266.000(Ft.)
Channel base width  =    10.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =     36.695(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     36.695(CFS)
Depth of flow =   0.417(Ft.), Average velocity =   7.282(Ft/s)
Channel flow top width =   14.170(Ft.)
Flow Velocity =    7.28(Ft/s)
Travel time  =    2.90 min.
Time of concentration =   23.83 min.
Critical depth =      0.664(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 =      2.377(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     34.410(CFS) for   32.170(Ac.)
Total runoff =     52.646(CFS)    Total area =       48.06(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      205.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   414.000(Ft.)
```

```
Downstream point elevation =    404.000(Ft.)
Channel length thru subarea  =    162.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     52.646(CFS)
Depth of flow =   0.508(Ft.), Average velocity =   8.273(Ft/s)
Channel flow top width =   15.075(Ft.)
Flow Velocity =    8.27(Ft/s)
Travel time  =    0.33 min.
Time of concentration =   24.15 min.
Critical depth =      0.820(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =    24.15 min.
Rainfall intensity =      2.361(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.349(CFS) for    1.270(Ac.)
Total runoff =     53.995(CFS)   Total area =      49.33(Ac.)
End of computations, total study area =        49.330 (Ac.)
```

```
              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 05/20/17
------------------------------------------------------------------------
2357.30 ILLUMINA
EXISTING CONDITIONS
SYSTEM 300, FILE: S300E100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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      301.000 to Point/Station      302.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Initial subarea flow distance  =  194.000(Ft.)
Highest elevation =  514.000(Ft.)
Lowest elevation =  510.000(Ft.)
Elevation difference =    4.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =    12.80 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 194.000^.5)/( 2.062^(1/3)]=  12.80
Rainfall intensity (I) =      3.084(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.999(CFS)
Total initial stream area =        0.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    510.000(Ft.)
Downstream point elevation =    488.000(Ft.)
```

```
Channel length thru subarea  =   675.000(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 =      6.890(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      6.890(CFS)
Depth of flow =   0.184(Ft.), Average velocity =   3.154(Ft/s)
Channel flow top width =   13.688(Ft.)
Flow Velocity =    3.15(Ft/s)
Travel time  =    3.57 min.
Time of concentration =   16.37 min.
Critical depth =      0.227(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 =      2.807(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     10.724(CFS) for    8.490(Ac.)
Total runoff =     11.723(CFS)    Total area =       9.21(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     303.000 to Point/Station     304.000
**** 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 =    16.37 min.
Rainfall intensity =      2.807(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      0.427(CFS) for    0.160(Ac.)
Total runoff =     12.150(CFS)    Total area =       9.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     304.000 to Point/Station     310.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   488.000(Ft.)
Downstream point elevation =   439.000(Ft.)
Channel length thru subarea  =   420.000(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 =     21.136(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     21.136(CFS)
Depth of flow =   0.243(Ft.), Average velocity =   7.007(Ft/s)
Channel flow top width =   14.855(Ft.)
Flow Velocity =    7.01(Ft/s)
Travel time  =    1.00 min.
Time of concentration =   17.37 min.
Critical depth =      0.445(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 =      2.740(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =     17.092(CFS) for   13.860(Ac.)
Total runoff =     29.241(CFS)   Total area =      23.23(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      310.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =    17.37 min.
Rainfall intensity =      2.740(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      7.633(CFS) for    6.190(Ac.)
Total runoff =     36.875(CFS)   Total area =      29.42(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      310.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =    17.37 min.
Rainfall intensity =      2.740(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      0.802(CFS) for    0.650(Ac.)
Total runoff =     37.676(CFS)   Total area =      30.07(Ac.)
End of computations, total study area =        30.070 (Ac.)
```

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              San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study       Date: 06/01/17
------------------------------------------------------------------------
2357.50 LUMINA
EXISTING CONDITIONS
SYSTEM 500, FILE: S500E100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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      500.000 to Point/Station      501.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Initial subarea flow distance  =   90.000(Ft.)
Highest elevation =  516.500(Ft.)
Lowest elevation =  515.000(Ft.)
Elevation difference =    1.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.36 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*(  90.000^.5)/( 1.667^(1/3)]=   9.36
Rainfall intensity (I) =      3.456(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      0.653(CFS)
Total initial stream area =       0.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   515.000(Ft.)
Downstream point elevation =   509.000(Ft.)
```

```
Channel length thru subarea   =    505.000(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 =      4.502(CFS)
Manning's 'N'     = 0.025
Maximum depth of channel   =    2.000(Ft.)
Flow(q) thru subarea =      4.502(CFS)
Depth of flow =   0.193(Ft.), Average velocity =   1.956(Ft/s)
Channel flow top width =   13.859(Ft.)
Flow Velocity =     1.96(Ft/s)
Travel time  =    4.30 min.
Time of concentration =   13.67 min.
Critical depth =      0.174(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 =      3.010(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      6.704(CFS) for    4.950(Ac.)
Total runoff =      7.358(CFS)    Total area =        5.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      504.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   509.000(Ft.)
Downstream point elevation =   507.900(Ft.)
Channel length thru subarea   =   147.000(Ft.)
Channel base width   =    1.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =      8.002(CFS)
Manning's 'N'     = 0.018
Maximum depth of channel   =    2.000(Ft.)
Flow(q) thru subarea =      8.002(CFS)
Depth of flow =   0.276(Ft.), Average velocity =   1.953(Ft/s)
Channel flow top width =   28.643(Ft.)
Flow Velocity =     1.95(Ft/s)
Travel time  =    1.25 min.
Time of concentration =   14.92 min.
Critical depth =      0.266(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
[INDUSTRIAL area type                        ]
Rainfall intensity =      2.911(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.600(CFS) for    0.940(Ac.)
Total runoff =      9.957(CFS)    Total area =        6.31(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
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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]
Time of concentration =    14.92 min.
Rainfall intensity =      2.911(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.244(CFS) for    0.950(Ac.)
Total runoff =     11.202(CFS)    Total area =        7.26(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      510.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   507.900(Ft.)
End of street segment elevation =   501.000(Ft.)
Length of street segment  =   523.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.500(Ft.)
Distance from crown to crossfall grade break  =  10.000(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  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =     11.541(CFS)
Depth of flow =   0.472(Ft.), Average velocity =   3.191(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.500(Ft.)
Flow velocity =   3.19(Ft/s)
Travel time =    2.73 min.     TC =   17.65  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 =      2.722(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      0.539(CFS) for    0.440(Ac.)
Total runoff =     11.741(CFS)    Total area =        7.70(Ac.)
Street flow at end of street =     11.741(CFS)
Half street flow at end of street =     11.741(CFS)
Depth of flow =   0.474(Ft.), Average velocity =   3.213(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.500(Ft.)
End of computations, total study area =          7.700 (Ac.)
```

3

APPENDIX 3

Proposed Conditions Rational Method Computer Output

```
                    San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study          Date: 08/02/18
------------------------------------------------------------------------
2357.50 ILLUMINA
PROPOSED CONDITIONS
SYSTEM 100, FILE: 1000P100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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     1000.000 to Point/Station      1001.000
**** 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  =  343.000(Ft.)
Highest elevation =  497.900(Ft.)
Lowest elevation =  492.100(Ft.)
Elevation difference =    5.800(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     4.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 343.000^.5)/(   1.691^(1/3)]=   4.20
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 =      1.209(CFS)
Total initial stream area =         0.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1001.000 to Point/Station      1003.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   488.500(Ft.)
Downstream point/station elevation =   488.300(Ft.)
```



```
Pipe length  =     18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      1.209(CFS)
Nearest computed pipe diameter  =       9.00(In.)
Calculated individual pipe flow  =      1.209(CFS)
Normal flow depth in pipe =      5.51(In.)
Flow top width inside pipe =     8.77(In.)
Critical Depth =     6.07(In.)
Pipe flow velocity =       4.26(Ft/s)
Travel time through pipe =     0.07 min.
Time of concentration (TC) =      5.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1002.000 to Point/Station      1003.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
Time of concentration =      5.07 min.
Rainfall intensity =      4.364(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.073(CFS) for     0.500(Ac.)
Total runoff =       3.282(CFS)  Total area =        0.79(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1003.000 to Point/Station      1007.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   488.300(Ft.)
Downstream point/station elevation =   483.100(Ft.)
Pipe length  =    411.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.282(CFS)
Nearest computed pipe diameter  =      12.00(In.)
Calculated individual pipe flow  =      3.282(CFS)
Normal flow depth in pipe =      8.26(In.)
Flow top width inside pipe =    11.11(In.)
Critical Depth =     9.31(In.)
Pipe flow velocity =       5.69(Ft/s)
Travel time through pipe =     1.20 min.
Time of concentration (TC) =      6.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1003.000 to Point/Station      1007.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.790(Ac.)
Runoff from this stream =      3.282(CFS)
Time of concentration =      6.27 min.
Rainfall intensity =      4.011(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1004.000 to Point/Station      1005.000
**** 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
[MULTI - UNITS area type                    ]
Initial subarea flow distance  =    80.000(Ft.)
Highest elevation =  502.500(Ft.)
Lowest elevation =  501.700(Ft.)
Elevation difference =     0.800(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       6.44 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*(  80.000^.5)/( 1.000^(1/3)]=    6.44
Rainfall intensity (I) =        3.970(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
Subarea runoff =        1.195(CFS)
Total initial stream area =           0.430(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1005.000 to Point/Station      1006.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =    501.700(Ft.)
Downstream point elevation =   496.500(Ft.)
Channel length thru subarea  =   532.000(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 =         8.421(CFS)
Manning's 'N'     = 0.015
Maximum depth of channel   =     2.000(Ft.)
Flow(q) thru subarea =       8.421(CFS)
Depth of flow =    0.537(Ft.), Average velocity =    5.096(Ft/s)
Channel flow top width =      4.150(Ft.)
Flow Velocity =     5.10(Ft/s)
Travel time   =    1.74 min.
Time of concentration =     8.18 min.
Critical depth =        0.656(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
[MULTI - UNITS area type                    ]
Rainfall intensity =          3.630(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      13.213(CFS) for      5.200(Ac.)
Total runoff =       14.408(CFS)  Total area =          5.63(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1006.000 to Point/Station      1009.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    483.700(Ft.)
Downstream point/station elevation =    483.400(Ft.)
Pipe length   =      31.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow   =      14.408(CFS)
Nearest computed pipe diameter    =        21.00(In.)
Calculated individual pipe flow   =      14.408(CFS)
Normal flow depth in pipe =     15.94(In.)
Flow top width inside pipe =     17.96(In.)
Critical Depth =     16.91(In.)
Pipe flow velocity =          7.36(Ft/s)
Travel time through pipe =       0.07 min.
Time of concentration (TC) =        8.25 min.
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1009.000 to Point/Station      1009.000
**** 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 =      8.25 min.
Rainfall intensity =        3.619(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =        2.750(CFS) for      0.800(Ac.)
Total runoff =       17.158(CFS)  Total area =         6.43(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1009.000 to Point/Station      1007.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    483.300(Ft.)
Downstream point/station elevation =    483.100(Ft.)
Pipe length   =      22.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow   =      17.158(CFS)
Nearest computed pipe diameter    =        24.00(In.)
Calculated individual pipe flow   =      17.158(CFS)
Normal flow depth in pipe =     16.17(In.)
Flow top width inside pipe =     22.50(In.)
Critical Depth =     17.91(In.)
Pipe flow velocity =          7.62(Ft/s)
Travel time through pipe =       0.05 min.
Time of concentration (TC) =        8.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1008.000 to Point/Station      1007.000
**** 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 =      8.30 min.
Rainfall intensity =        3.611(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =        2.813(CFS) for      0.820(Ac.)
Total runoff =       19.971(CFS)  Total area =         7.25(Ac.)


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Process from Point/Station      1008.000 to Point/Station      1007.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =        7.250(Ac.)
Runoff from this stream =       19.971(CFS)
Time of concentration =      8.30 min.
Rainfall intensity =        3.611(In/Hr)
Summary of stream data:

Stream    Flow rate       TC              Rainfall Intensity
```

```
No.        (CFS)        (min)                     (In/Hr)


1          3.282        6.27                    4.011
2         19.971        8.30                    3.611
Qmax(1) =
           1.000 *      1.000 *      3.282) +
           1.000 *      0.756 *     19.971) + =        18.381
Qmax(2) =
           0.900 *      1.000 *      3.282) +
           1.000 *      1.000 *     19.971) + =        22.926

Total of 2 streams to confluence:
Flow rates before confluence point:
      3.282      19.971
Maximum flow rates at confluence using above data:
      18.381      22.926
Area of streams before confluence:
       0.790       7.250
Results of confluence:
Total flow rate =      22.926(CFS)
Time of concentration =      8.298 min.
Effective stream area after confluence =       8.040(Ac.)


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Process from Point/Station     1007.000 to Point/Station     1027.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    483.100(Ft.)
Downstream point/station elevation =    481.450(Ft.)
Pipe length  =   109.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     22.926(CFS)
Nearest computed pipe diameter   =     24.00(In.)
Calculated individual pipe flow   =     22.926(CFS)
Normal flow depth in pipe =    16.59(In.)
Flow top width inside pipe =    22.17(In.)
Critical Depth =    20.46(In.)
Pipe flow velocity =        9.89(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =      8.48 min.


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Process from Point/Station     1007.000 to Point/Station     1027.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.040(Ac.)
Runoff from this stream =      22.926(CFS)
Time of concentration =     8.48 min.
Rainfall intensity =      3.582(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station     1010.000 to Point/Station     1011.000
**** 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
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[INDUSTRIAL area type                              ]
Initial subarea flow distance  =   120.000(Ft.)
Highest elevation =   515.000(Ft.)
Lowest elevation =   513.100(Ft.)
Elevation difference =       1.900(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =        2.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 120.000^.5)/(    1.583^(1/3)]=    2.54
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 =       0.792(CFS)
Total initial stream area =          0.190(Ac.)


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Process from Point/Station      1011.000 to Point/Station      1013.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation =    513.100(Ft.)
End of street segment elevation =    495.400(Ft.)
Length of street segment  =    772.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
Width of half street (curb to crown)  =   23.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(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  =  12.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =    1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =        2.731(CFS)
Depth of flow =    0.281(Ft.), Average velocity =    2.909(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =    9.315(Ft.)
Flow velocity =    2.91(Ft/s)
Travel time =     4.42 min.        TC =      9.42  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
[INDUSTRIAL area type                              ]
Rainfall intensity =        3.447(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =        3.046(CFS) for     0.930(Ac.)
Total runoff =        3.838(CFS)  Total area =          1.12(Ac.)
Street flow at end of street =         3.838(CFS)
Half street flow at end of street =          3.838(CFS)
Depth of flow =    0.310(Ft.), Average velocity =    3.124(Ft/s)
Flow width (from curb towards crown)=   10.758(Ft.)


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Process from Point/Station      1012.000 to Point/Station      1013.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                    ]
Time of concentration =      9.42 min.
Rainfall intensity =      3.447(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =       7.481(CFS) for     3.100(Ac.)
Total runoff =      11.319(CFS)   Total area =          4.22(Ac.)


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Process from Point/Station      1013.000 to Point/Station      1015.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    491.800(Ft.)
Downstream point/station elevation =    488.200(Ft.)
Pipe length   =     13.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     11.319(CFS)
Nearest computed pipe diameter   =     12.00(In.)
Calculated individual pipe flow  =     11.319(CFS)
Normal flow depth in pipe =     6.73(In.)
Flow top width inside pipe =    11.91(In.)
Critical depth could not be calculated.
Pipe flow velocity =      24.99(Ft/s)
Travel time through pipe =     0.01 min.
Time of concentration (TC) =      9.43 min.


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Process from Point/Station      1013.000 to Point/Station      1015.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                       ]
Time of concentration =      9.43 min.
Rainfall intensity =      3.446(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       1.506(CFS) for     0.460(Ac.)
Total runoff =      12.825(CFS)   Total area =          4.68(Ac.)


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Process from Point/Station      1015.000 to Point/Station      1023.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    488.200(Ft.)
Downstream point/station elevation =    483.200(Ft.)
Pipe length   =    444.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     12.825(CFS)
Nearest computed pipe diameter   =     21.00(In.)
Calculated individual pipe flow  =     12.825(CFS)
Normal flow depth in pipe =    13.73(In.)
Flow top width inside pipe =    19.98(In.)
Critical Depth =    16.00(In.)
Pipe flow velocity =       7.70(Ft/s)
Travel time through pipe =     0.96 min.
Time of concentration (TC) =     10.39 min.


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Process from Point/Station      1015.000 to Point/Station      1023.000
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**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area =       4.680(Ac.)
Runoff from this stream =      12.825(CFS)
Time of concentration =    10.39 min.
Rainfall intensity =      3.327(In/Hr)


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Process from Point/Station      1018.000 to Point/Station      1021.000
**** 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  =   371.000(Ft.)
Highest elevation =  494.000(Ft.)
Lowest elevation =   486.700(Ft.)
Elevation difference =     7.300(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       4.15 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 371.000^.5)/(   1.968^(1/3)]=    4.15
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 =       3.002(CFS)
Total initial stream area =          0.720(Ac.)


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Process from Point/Station      1020.000 to Point/Station      1021.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =      5.00 min.
Rainfall intensity =      4.389(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =       5.905(CFS) for     2.990(Ac.)
Total runoff =       8.908(CFS)   Total area =          3.71(Ac.)


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Process from Point/Station      1021.000 to Point/Station      1023.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    483.300(Ft.)
Downstream point/station elevation =    483.200(Ft.)
Pipe length   =     15.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      8.908(CFS)
Nearest computed pipe diameter   =     21.00(In.)
Calculated individual pipe flow  =      8.908(CFS)
Normal flow depth in pipe =    12.80(In.)
Flow top width inside pipe =    20.49(In.)
Critical Depth =    13.31(In.)
Pipe flow velocity =       5.80(Ft/s)
Travel time through pipe =     0.04 min.
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Time of concentration (TC) =     5.04 min.


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Process from Point/Station     1022.000 to Point/Station      1023.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Time of concentration =      5.04 min.
Rainfall intensity =      4.374(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.116(CFS) for     0.750(Ac.)
Total runoff =      12.024(CFS)  Total area =         4.46(Ac.)


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Process from Point/Station     1022.000 to Point/Station      1023.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area =       4.460(Ac.)
Runoff from this stream =       12.024(CFS)
Time of concentration =     5.04 min.
Rainfall intensity =     4.374(In/Hr)
Summary of stream data:

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


1        12.825     10.39                 3.327
2        12.024      5.04                 4.374
Qmax(1) =
            1.000 *    1.000 *    12.825) +
            0.761 *    1.000 *    12.024) + =       21.973
Qmax(2) =
            1.000 *    0.485 *    12.825) +
            1.000 *    1.000 *    12.024) + =       18.247

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.825       12.024
Maximum flow rates at confluence using above data:
       21.973       18.247
Area of streams before confluence:
        4.680        4.460
Results of confluence:
Total flow rate =      21.973(CFS)
Time of concentration =      10.393 min.
Effective stream area after confluence =        9.140(Ac.)


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Process from Point/Station     1023.000 to Point/Station      1027.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    482.900(Ft.)
Downstream point/station elevation =    481.500(Ft.)
Pipe length  =    158.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      21.973(CFS)
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Nearest computed pipe diameter   =      24.00(In.)
Calculated individual pipe flow   =      21.973(CFS)
Normal flow depth in pipe =    20.44(In.)
Flow top width inside pipe =    17.07(In.)
Critical Depth =    20.08(In.)
Pipe flow velocity =        7.71(Ft/s)
Travel time through pipe =     0.34 min.
Time of concentration (TC) =     10.73 min.


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Process from Point/Station     1023.000 to Point/Station      1027.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       9.140(Ac.)
Runoff from this stream =       21.973(CFS)
Time of concentration =     10.73 min.
Rainfall intensity =      3.289(In/Hr)
Summary of stream data:

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


1        22.926      8.48                 3.582
2        21.973  .  10.73                 3.289
Qmax(1) =
            1.000 *    1.000 *    22.926) +
            1.000 *    0.790 *    21.973) + =       40.287
Qmax(2) =
            0.918 *    1.000 *    22.926) +
            1.000 *    1.000 *    21.973) + =       43.021

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.926       21.973
Maximum flow rates at confluence using above data:
       40.287       43.021
Area of streams before confluence:
        8.040        9.140


Results of confluence:
Total flow rate =      43.021(CFS)
Time of concentration =      10.735 min.
Effective stream area after confluence =       17.180(Ac.)


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Process from Point/Station     1024.000 to Point/Station      1027.000
**** 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 =      10.73 min.
Rainfall intensity =      3.289(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.281(CFS) for     0.730(Ac.)
Total runoff =      45.302(CFS)  Total area =        17.91(Ac.)
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Process from Point/Station     1025.000 to Point/Station     1027.000
**** 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 =     10.73 min.
Rainfall intensity =      3.289(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       2.406(CFS) for     0.770(Ac.)
Total runoff =      47.707(CFS)  Total area =        18.68(Ac.)

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Process from Point/Station     1027.000 to Point/Station     1030.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    481.500(Ft.)
Downstream point/station elevation =    478.900(Ft.)
Pipe length  =   389.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     47.707(CFS)
Nearest computed pipe diameter  =       36.00(In.)
Calculated individual pipe flow  =     47.707(CFS)
Normal flow depth in pipe =   26.09(In.)
Flow top width inside pipe =   32.16(In.)
Critical Depth =   26.97(In.)
Pipe flow velocity =       8.70(Ft/s)
Travel time through pipe =     0.75 min.
Time of concentration (TC) =     11.48 min.

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Process from Point/Station     1027.000 to Point/Station     1030.000
**** 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 =     11.48 min.
Rainfall intensity =      3.210(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       0.945(CFS) for     0.310(Ac.)
Total runoff =      48.653(CFS)  Total area =        18.99(Ac.)

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Process from Point/Station     1029.000 to Point/Station     1030.000
**** 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 =     11.48 min.
Rainfall intensity =      3.210(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
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Subarea runoff =       1.037(CFS) for     0.340(Ac.)
Total runoff =      49.689(CFS)  Total area =        19.33(Ac.)

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Process from Point/Station     1030.000 to Point/Station     1033.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    478.900(Ft.)
Downstream point/station elevation =    476.200(Ft.)
Pipe length  =   447.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     49.689(CFS)
Nearest computed pipe diameter  =       36.00(In.)
Calculated individual pipe flow  =     49.689(CFS)
Normal flow depth in pipe =   28.27(In.)
Flow top width inside pipe =   29.57(In.)
Critical Depth =   27.53(In.)
Pipe flow velocity =       8.35(Ft/s)
Travel time through pipe =     0.89 min.
Time of concentration (TC) =     12.37 min.

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Process from Point/Station     1030.000 to Point/Station     1033.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =     19.330(Ac.)
Runoff from this stream =      49.689(CFS)
Time of concentration =    12.37 min.
Rainfall intensity =     3.123(In/Hr)

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Process from Point/Station     1042.000 to Point/Station     1043.000
**** 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
[MULTI - UNITS area type                 ]
Initial subarea flow distance  =  211.000(Ft.)
Highest elevation =  502.000(Ft.)
Lowest elevation =  496.500(Ft.)
Elevation difference =     5.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       7.60 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*( 211.000^.5)/( 2.607^(1/3)]=    7.60
Rainfall intensity (I) =        3.730(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
Subarea runoff =       0.809(CFS)
Total initial stream area =          0.310(Ac.)

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Process from Point/Station     1041.000 to Point/Station     1043.000
**** 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
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[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =      7.60 min.
Rainfall intensity =      3.730(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.225(CFS) for     0.730(Ac.)
Total runoff =      2.035(CFS)  Total area =          1.04(Ac.)


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Process from Point/Station      1043.000 to Point/Station      1044.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =    496.500(Ft.)
Downstream point elevation =    487.000(Ft.)
Channel length thru subarea  =  1040.000(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 =      18.449(CFS)
Manning's 'N'     = 0.015
Maximum depth of channel  =     2.000(Ft.)
Flow(q) thru subarea =      18.449(CFS)
Depth of flow =    0.820(Ft.), Average velocity =    6.177(Ft/s)
Channel flow top width =     5.282(Ft.)
Flow Velocity =     6.18(Ft/s)
Travel time   =     2.81 min.
Time of concentration =   10.41 min.
Critical depth =      1.000(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
[MULTI - UNITS area type                       ]
Rainfall intensity =      3.326(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =     39.067(CFS) for    16.780(Ac.)
Total runoff =     41.101(CFS)  Total area =         17.82(Ac.)


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Process from Point/Station      1044.000 to Point/Station      1032.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    482.000(Ft.)
Downstream point/station elevation =    476.500(Ft.)
Pipe length  =    24.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     41.101(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     41.101(CFS)
Normal flow depth in pipe =    12.38(In.)
Flow top width inside pipe =    16.69(In.)
Critical depth could not be calculated.
Pipe flow velocity =     31.74(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.42 min.


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Process from Point/Station      1032.000 to Point/Station      1032.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                          ]
Time of concentration =     10.42 min.
Rainfall intensity =      3.324(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.053(CFS) for     0.650(Ac.)
Total runoff =     43.154(CFS)  Total area =         18.47(Ac.)


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Process from Point/Station      1032.000 to Point/Station      1033.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    476.400(Ft.)
Downstream point/station elevation =    476.200(Ft.)
Pipe length  =    20.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     43.154(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =     43.154(CFS)
Normal flow depth in pipe =    26.34(In.)
Flow top width inside pipe =    19.63(In.)
Critical Depth =    26.32(In.)
Pipe flow velocity =      9.46(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.45 min.


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Process from Point/Station      1031.000 to Point/Station      1033.000
**** 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 =     10.45 min.
Rainfall intensity =      3.320(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      1.419(CFS) for     0.450(Ac.)
Total runoff =     44.574(CFS)  Total area =         18.92(Ac.)


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Process from Point/Station      1031.000 to Point/Station      1033.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =     18.920(Ac.)
Runoff from this stream =     44.574(CFS)
Time of concentration =    10.45 min.
Rainfall intensity =     3.320(In/Hr)
Summary of stream data:

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


1       49.689     12.37                3.123
2       44.574     10.45                3.320
Qmax(1) =
             1.000 *     1.000 *     49.689) +
             0.941 *     1.000 *     44.574) + =      91.612
```

```
Qmax(2) =
          1.000 *     0.845 *     49.689) +
          1.000 *     1.000 *     44.574) + =        86.557

Total of 2 streams to confluence:
Flow rates before confluence point:
     49.689       44.574
Maximum flow rates at confluence using above data:
      91.612       86.557
Area of streams before confluence:
      19.330       18.920
Results of confluence:
Total flow rate =       91.612(CFS)
Time of concentration =     12.372 min.
Effective stream area after confluence =      38.250(Ac.)


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Process from Point/Station      1033.000 to Point/Station      1040.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   476.200(Ft.)
Downstream point/station elevation =   475.600(Ft.)
Pipe length  =    87.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     91.612(CFS)
Nearest computed pipe diameter   =      45.00(In.)
Calculated individual pipe flow  =     91.612(CFS)
Normal flow depth in pipe =    33.75(In.)
Flow top width inside pipe =   38.97(In.)
Critical Depth =    35.33(In.)
Pipe flow velocity =      10.31(Ft/s)
Travel time through pipe =      0.14 min.
Time of concentration (TC) =     12.51 min.


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Process from Point/Station      1033.000 to Point/Station      1040.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =     38.250(Ac.)
Runoff from this stream =      91.612(CFS)
Time of concentration =    12.51 min.
Rainfall intensity =       3.110(In/Hr)


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Process from Point/Station      1034.000 to Point/Station      1035.000
**** 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
[MULTI - UNITS area type                          ]
Initial subarea flow distance  =   100.000(Ft.)
Highest elevation =  498.000(Ft.)
Lowest elevation =  493.000(Ft.)
Elevation difference =      5.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       4.21 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*( 100.000^.5)/(   5.000^(1/3)]=     4.21
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 = 0.700
Subarea runoff =        1.075(CFS)
Total initial stream area =          0.350(Ac.)


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Process from Point/Station      1035.000 to Point/Station      1036.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =    493.000(Ft.)
Downstream point elevation =    476.500(Ft.)
Channel length thru subarea  =   1050.000(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 =         9.294(CFS)
Manning's 'N'     = 0.015
Maximum depth of channel  =     2.000(Ft.)
Flow(q) thru subarea =        9.294(CFS)
Depth of flow =    0.499(Ft.), Average velocity =    6.210(Ft/s)
Channel flow top width =    3.997(Ft.)
Flow Velocity =     6.21(Ft/s)
Travel time  =    2.82 min.
Time of concentration =     7.82 min.
Critical depth =      0.688(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
[MULTI - UNITS area type                          ]
Rainfall intensity =        3.691(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =       13.822(CFS) for     5.350(Ac.)
Total runoff =      14.898(CFS)  Total area =          5.70(Ac.)


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Process from Point/Station      1036.000 to Point/Station      1037.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   476.500(Ft.)
Downstream point/station elevation =   476.340(Ft.)
Pipe length  =     14.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     14.898(CFS)
Nearest computed pipe diameter   =      21.00(In.)
Calculated individual pipe flow  =     14.898(CFS)
Normal flow depth in pipe =    15.28(In.)
Flow top width inside pipe =   18.70(In.)
Critical Depth =    17.16(In.)
Pipe flow velocity =       7.95(Ft/s)
Travel time through pipe =      0.03 min.
Time of concentration (TC) =      7.85 min.


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Process from Point/Station      1037.000 to Point/Station      1039.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   476.340(Ft.)
Downstream point/station elevation =   476.280(Ft.)
Pipe length  =      6.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     14.898(CFS)
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Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     14.898(CFS)
Normal flow depth in pipe =   16.17(In.)
Flow top width inside pipe =   17.67(In.)
Critical Depth =   17.16(In.)
Pipe flow velocity =      7.49(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =      7.86 min.


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Process from Point/Station     1037.000 to Point/Station     1039.000
**** 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
[MULTI - UNITS area type                    ]
Time of concentration =      7.86 min.
Rainfall intensity =      3.683(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      0.464(CFS) for     0.180(Ac.)
Total runoff =     15.362(CFS)  Total area =        5.88(Ac.)


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Process from Point/Station     1038.000 to Point/Station     1039.000
**** 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
[MULTI - UNITS area type                    ]
Time of concentration =      7.86 min.
Rainfall intensity =      3.683(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      0.464(CFS) for     0.180(Ac.)
Total runoff =     15.826(CFS)  Total area =        6.06(Ac.)


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Process from Point/Station     1039.000 to Point/Station     1040.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   476.180(Ft.)
Downstream point/station elevation =   475.600(Ft.)
Pipe length  =    66.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     15.826(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     15.826(CFS)
Normal flow depth in pipe =   18.90(In.)
Flow top width inside pipe =   12.60(In.)
Critical Depth =   17.62(In.)
Pipe flow velocity =      6.94(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =      8.02 min.


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Process from Point/Station     1039.000 to Point/Station     1040.000
**** CONFLUENCE OF MINOR STREAMS ****
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Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.060(Ac.)
Runoff from this stream =     15.826(CFS)
Time of concentration =     8.02 min.
Rainfall intensity =     3.656(In/Hr)
Summary of stream data:

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


1        91.612      12.51                    3.110
2        15.826       8.02                    3.656
Qmax(1) =
          1.000 *     1.000 *     91.612) +
          0.851 *     1.000 *     15.826) + =      105.073
Qmax(2) =
          1.000 *     0.641 *     91.612) +
          1.000 *     1.000 *     15.826) + =       74.537

Total of 2 streams to confluence:
Flow rates before confluence point:
     91.612      15.826
Maximum flow rates at confluence using above data:
     105.073      74.537
Area of streams before confluence:
      38.250       6.060
Results of confluence:
Total flow rate =     105.073(CFS)
Time of concentration =    12.513 min.
Effective stream area after confluence =      44.310(Ac.)


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Process from Point/Station     1040.000 to Point/Station     1052.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   475.500(Ft.)
Downstream point/station elevation =   474.950(Ft.)
Pipe length  =    91.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    105.073(CFS)
Nearest computed pipe diameter  =     48.00(In.)
Calculated individual pipe flow  =    105.073(CFS)
Normal flow depth in pipe =   37.03(In.)
Flow top width inside pipe =   40.31(In.)
Critical Depth =   37.24(In.)
Pipe flow velocity =     10.11(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     12.66 min.


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Process from Point/Station     1050.000 to Point/Station     1052.000
**** 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 =     12.66 min.
Rainfall intensity =      3.096(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.030(CFS) for     0.690(Ac.)
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Total runoff =     107.102(CFS)  Total area =         45.00(Ac.)


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Process from Point/Station     1051.000 to Point/Station      1052.000
**** 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 =     12.66 min.
Rainfall intensity =      3.096(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       1.265(CFS) for     0.430(Ac.)
Total runoff =     108.367(CFS)  Total area =         45.43(Ac.)


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Process from Point/Station     1052.000 to Point/Station      1049.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    474.850(Ft.)
Downstream point/station elevation =      0.000(Ft.)
Pipe length  =    236.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    108.367(CFS)
Nearest computed pipe diameter   =      18.00(In.)
Calculated individual pipe flow  =    108.367(CFS)
Normal flow depth in pipe =    11.39(In.)
Flow top width inside pipe =    17.35(In.)
Critical depth could not be calculated.
Pipe flow velocity =       91.97(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     12.71 min.


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Process from Point/Station     1052.000 to Point/Station      1049.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      45.430(Ac.)
Runoff from this stream =     108.367(CFS)
Time of concentration =    12.71 min.
Rainfall intensity =      3.092(In/Hr)


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Process from Point/Station     1060.000 to Point/Station      1045.000
**** 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  =   152.000(Ft.)
Highest elevation =  494.000(Ft.)
Lowest elevation =  487.000(Ft.)
Elevation difference =      7.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =        2.00 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
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TC = [1.8*(1.1-0.9500)*( 152.000^.5)/(   4.605^(1/3)]=    2.00
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 =       1.251(CFS)
Total initial stream area =          0.300(Ac.)


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Process from Point/Station     1045.000 to Point/Station      1047.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    483.300(Ft.)
Downstream point/station elevation =    482.900(Ft.)
Pipe length  =      6.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      1.251(CFS)
Nearest computed pipe diameter   =       6.00(In.)
Calculated individual pipe flow  =      1.251(CFS)
Normal flow depth in pipe =     4.30(In.)
Flow top width inside pipe =     5.41(In.)
Critical depth could not be calculated.
Pipe flow velocity =        8.30(Ft/s)
Travel time through pipe =     0.01 min.
Time of concentration (TC) =      5.01 min.


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Process from Point/Station     1046.000 to Point/Station      1047.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                         ]
Time of concentration =      5.01 min.
Rainfall intensity =      4.385(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       0.833(CFS) for     0.200(Ac.)
Total runoff =       2.084(CFS)  Total area =          0.50(Ac.)


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Process from Point/Station     1047.000 to Point/Station      1049.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    482.530(Ft.)
Downstream point/station elevation =    473.500(Ft.)
Pipe length  =    260.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      2.084(CFS)
Nearest computed pipe diameter   =       9.00(In.)
Calculated individual pipe flow  =      2.084(CFS)
Normal flow depth in pipe =     5.42(In.)
Flow top width inside pipe =     8.81(In.)
Critical Depth =      7.83(In.)
Pipe flow velocity =        7.49(Ft/s)
Travel time through pipe =     0.58 min.
Time of concentration (TC) =      5.59 min.


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Process from Point/Station     1047.000 to Point/Station      1049.000
**** CONFLUENCE OF MINOR STREAMS ****
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Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.500(Ac.)
Runoff from this stream =      2.084(CFS)
Time of concentration =     5.59 min.
Rainfall intensity =     4.196(In/Hr)
Summary of stream data:

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


1      108.367      12.71                     3.092
2        2.084       5.59                     4.196
Qmax(1) =
           1.000 *     1.000 *    108.367) +
           0.737 *     1.000 *      2.084) + =      109.903
Qmax(2) =
           1.000 *     0.440 *    108.367) +
           1.000 *     1.000 *      2.084) + =       49.763

Total of 2 streams to confluence:
Flow rates before confluence point:
     108.367        2.084
Maximum flow rates at confluence using above data:
      109.903       49.763
Area of streams before confluence:
       45.430        0.500
Results of confluence:
Total flow rate =     109.903(CFS)
Time of concentration =     12.706 min.
Effective stream area after confluence =       45.930(Ac.)


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Process from Point/Station      1049.000 to Point/Station      1066.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    473.330(Ft.)
Downstream point/station elevation =    467.000(Ft.)
Pipe length  =    516.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   109.903(CFS)
Nearest computed pipe diameter   =      42.00(In.)
Calculated individual pipe flow  =    109.903(CFS)
Normal flow depth in pipe =     33.94(In.)
Flow top width inside pipe =     33.08(In.)
Critical Depth =    38.03(In.)
Pipe flow velocity =      13.20(Ft/s)
Travel time through pipe =     0.65 min.
Time of concentration (TC) =     13.36 min.


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Process from Point/Station      1064.000 to Point/Station      1066.000
**** 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
[MULTI - UNITS area type                              ]
Time of concentration =     13.36 min.
Rainfall intensity =      3.036(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      26.902(CFS) for    12.660(Ac.)
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Total runoff =     136.805(CFS)   Total area =         58.59(Ac.)


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Process from Point/Station      1049.000 to Point/Station      1066.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      58.590(Ac.)
Runoff from this stream =     136.805(CFS)
Time of concentration =    13.36 min.
Rainfall intensity =      3.036(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      1067.000 to Point/Station      1055.000
**** 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  =   300.000(Ft.)
Highest elevation =  508.000(Ft.)
Lowest elevation =  504.000(Ft.)
Elevation difference =     4.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      4.25 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 300.000^.5)/(   1.333^(1/3)]=    4.25
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 =      1.876(CFS)
Total initial stream area =          0.450(Ac.)


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Process from Point/Station      1055.000 to Point/Station      1057.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    499.000(Ft.)
Downstream point/station elevation =    498.900(Ft.)
Pipe length  =      9.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      1.876(CFS)
Nearest computed pipe diameter   =      12.00(In.)
Calculated individual pipe flow  =      1.876(CFS)
Normal flow depth in pipe =      6.00(In.)
Flow top width inside pipe =     12.00(In.)
Critical Depth =      7.00(In.)
Pipe flow velocity =       4.78(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =      5.03 min.


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Process from Point/Station      1056.000 to Point/Station      1057.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
Time of concentration =     5.03 min.
Rainfall intensity =      4.378(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      4.201(CFS) for     1.010(Ac.)
Total runoff =      6.077(CFS)  Total area =        1.46(Ac.)


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Process from Point/Station     1057.000 to Point/Station     1058.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   498.600(Ft.)
Downstream point/station elevation =   488.800(Ft.)
Pipe length  =   477.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.077(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.077(CFS)
Normal flow depth in pipe =    8.86(In.)
Flow top width inside pipe =   14.75(In.)
Critical Depth =   11.95(In.)
Pipe flow velocity =      8.05(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =     6.02 min.


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Process from Point/Station     1057.000 to Point/Station     1058.000
**** 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 =     6.02 min.
Rainfall intensity =      4.076(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.788(CFS) for     0.720(Ac.)
Total runoff =      8.865(CFS)  Total area =        2.18(Ac.)


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Process from Point/Station     1059.000 to Point/Station     1058.000
**** 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 =     6.02 min.
Rainfall intensity =      4.076(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      2.362(CFS) for     0.610(Ac.)
Total runoff =     11.226(CFS)  Total area =        2.79(Ac.)


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Process from Point/Station     1058.000 to Point/Station     1063.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```



```
Upstream point/station elevation =   488.360(Ft.)
Downstream point/station elevation =   470.560(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.226(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.226(CFS)
Normal flow depth in pipe =   10.75(In.)
Flow top width inside pipe =   17.66(In.)
Critical Depth =   15.37(In.)
Pipe flow velocity =     10.20(Ft/s)
Travel time through pipe =    1.13 min.
Time of concentration (TC) =     7.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1062.000 to Point/Station     1063.000
**** 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 =     7.15 min.
Rainfall intensity =      3.815(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.371(CFS) for     0.930(Ac.)
Total runoff =     14.597(CFS)  Total area =        3.72(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1063.000 to Point/Station     1061.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   470.230(Ft.)
Downstream point/station elevation =   470.000(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.597(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    14.597(CFS)
Normal flow depth in pipe =   14.70(In.)
Flow top width inside pipe =   19.25(In.)
Critical Depth =   17.01(In.)
Pipe flow velocity =      8.12(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1060.000 to Point/Station     1061.000
**** 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 =     7.19 min.
Rainfall intensity =      3.808(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      3.907(CFS) for     1.080(Ac.)
Total runoff =     18.504(CFS)  Total area =        4.80(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1061.000 to Point/Station      1066.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    469.710(Ft.)
Downstream point/station elevation =    467.000(Ft.)
Pipe length   =     52.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     18.504(CFS)
Nearest computed pipe diameter   =     18.00(In.)
Calculated individual pipe flow   =     18.504(CFS)
Normal flow depth in pipe =   11.86(In.)
Flow top width inside pipe =   17.07(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.97(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1061.000 to Point/Station      1066.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.800(Ac.)
Runoff from this stream =     18.504(CFS)
Time of concentration =    7.25 min.
Rainfall intensity =     3.796(In/Hr)
Summary of stream data:

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


1      136.805      13.36                 3.036
2       18.504       7.25                 3.796
Qmax(1) =
          1.000 *    1.000 *    136.805) +
          0.800 *    1.000 *     18.504) + =      151.601
Qmax(2) =
          1.000 *    0.543 *    136.805) +
          1.000 *    1.000 *     18.504) + =       92.743

Total of 2 main streams to confluence:
Flow rates before confluence point:
     136.805       18.504
Maximum flow rates at confluence using above data:
      151.601       92.743
Area of streams before confluence:
       58.590        4.800


Results of confluence:
Total flow rate =     151.601(CFS)
Time of concentration =    13.357 min.
Effective stream area after confluence   =       63.390(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1066.000 to Point/Station      1066.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =     13.36 min.
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 =        0.000(CFS) for      0.000(Ac.)
Total runoff =       151.601(CFS)  Total area =         63.39(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1066.000 to Point/Station      1068.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    465.500(Ft.)
Downstream point/station elevation =    430.000(Ft.)
Pipe length   =    264.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    151.601(CFS)
Nearest computed pipe diameter   =     30.00(In.)
Calculated individual pipe flow   =    151.601(CFS)
Normal flow depth in pipe =   24.80(In.)
Flow top width inside pipe =   22.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =     34.92(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    13.48 min.
End of computations, total study area =           63.390 (Ac.)
```

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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 08/02/18
------------------------------------------------------------------------
2357.50 ILLUMINA
PROPOSED CONDITIONS
SYSTEM 200, FILE: 2000P100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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     2000.000 to Point/Station     2001.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Initial subarea flow distance  =  306.000(Ft.)
Highest elevation =  498.000(Ft.)
Lowest elevation =  490.000(Ft.)
Elevation difference =     8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     14.86 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4500)*( 306.000^.5)/( 2.614^(1/3)]=  14.86
Rainfall intensity (I) =       2.916(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =       2.257(CFS)
Total initial stream area =          1.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2001.000 to Point/Station     2003.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    489.000(Ft.)
Downstream point/station elevation =    473.700(Ft.)
Pipe length  =    420.00(Ft.)   Manning's N = 0.013
```



```
No. of pipes = 1  Required pipe flow  =      2.257(CFS)
Nearest computed pipe diameter   =        9.00(In.)
Calculated individual pipe flow   =      2.257(CFS)
Normal flow depth in pipe =     5.63(In.)
Flow top width inside pipe =     8.71(In.)
Critical Depth =     8.06(In.)
Pipe flow velocity =        7.77(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =     15.76 min.


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Process from Point/Station     2002.000 to Point/Station     2003.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =     15.76 min.
Rainfall intensity =       2.850(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =       3.680(CFS) for     2.870(Ac.)
Total runoff =       5.937(CFS)  Total area =         4.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2003.000 to Point/Station     2004.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    473.400(Ft.)
Downstream point/station elevation =    471.900(Ft.)
Pipe length  =    152.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      5.937(CFS)
Nearest computed pipe diameter   =       15.00(In.)
Calculated individual pipe flow   =      5.937(CFS)
Normal flow depth in pipe =    11.39(In.)
Flow top width inside pipe =    12.82(In.)
Critical Depth =    11.82(In.)
Pipe flow velocity =        5.94(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =     16.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2004.000 to Point/Station     2005.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    471.600(Ft.)
Downstream point/station elevation =    460.000(Ft.)
Pipe length  =    950.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      5.937(CFS)
Nearest computed pipe diameter   =       15.00(In.)
Calculated individual pipe flow   =      5.937(CFS)
Normal flow depth in pipe =    10.45(In.)
Flow top width inside pipe =    13.79(In.)
Critical Depth =    11.82(In.)
Pipe flow velocity =        6.51(Ft/s)
Travel time through pipe =    2.43 min.
Time of concentration (TC) =     18.62 min.


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Process from Point/Station      2006.000 to Point/Station      2005.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =    18.62 min.
Rainfall intensity =      2.662(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      4.288(CFS) for     3.580(Ac.)
Total runoff =     10.226(CFS)  Total area =         8.17(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2005.000 to Point/Station      2008.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    463.430(Ft.)
Downstream point/station elevation =    406.500(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      10.226(CFS)
Nearest computed pipe diameter   =        9.00(In.)
Calculated individual pipe flow  =     10.226(CFS)
Normal flow depth in pipe =     7.02(In.)
Flow top width inside pipe =     7.46(In.)
Critical depth could not be calculated.
Pipe flow velocity =     27.68(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    18.70 min.
End of computations, total study area =           8.170 (Ac.)
```

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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 10/13/17
------------------------------------------------------------------------
2357.50 ILLUMINA
PROPOSED CONDITIONS
SYSTEM 300, FILE: 3000P100

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

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


Program License Serial Number 4049

------------------------------------------------------------------------
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     3000.000 to Point/Station     3002.000
**** 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  =  130.000(Ft.)
Highest elevation =  499.000(Ft.)
Lowest elevation =  496.200(Ft.)
Elevation difference =     2.800(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      2.38 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 130.000^.5)/(   2.154^(1/3)]=   2.38
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 =      1.251(CFS)
Total initial stream area =          0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3001.000 to Point/Station     3002.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```


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```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                              ]
Time of concentration =       5.00 min.
Rainfall intensity =       4.389(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       2.669(CFS) for     0.640(Ac.)
Total runoff =       3.919(CFS)  Total area =          0.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3002.000 to Point/Station     3003.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   490.520(Ft.)
Downstream point/station elevation =   488.400(Ft.)
Pipe length  =   310.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.919(CFS)
Nearest computed pipe diameter  =      15.00(In.)
Calculated individual pipe flow  =     3.919(CFS)
Normal flow depth in pipe =      9.55(In.)
Flow top width inside pipe =    14.43(In.)
Critical Depth =     9.61(In.)
Pipe flow velocity =       4.76(Ft/s)
Travel time through pipe =     1.09 min.
Time of concentration (TC) =      6.09 min.
End of computations, total study area =             0.940 (Ac.)
```

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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 07/31/18
------------------------------------------------------------------------
2357.50 ILLUMINA
PROPOSED CONDITIONS
SYSTEM 4000, FILE: 4000P100

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

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Program License Serial Number 4049

------------------------------------------------------------------------
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     4019.000 to Point/Station      4010.000
**** 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  =  880.000(Ft.)
Highest elevation =  515.000(Ft.)
Lowest elevation =  502.000(Ft.)
Elevation difference =     13.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       7.03 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 880.000^.5)/( 1.477^(1/3)]=    7.03
Rainfall intensity (I) =       3.840(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =        6.967(CFS)
Total initial stream area =          1.910(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4010.000 to Point/Station      4011.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   498.100(Ft.)
Downstream point/station elevation =   497.300(Ft.)
Pipe length  =     80.00(Ft.)    Manning's N = 0.013
```



```
No. of pipes = 1  Required pipe flow  =      6.967(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =      6.967(CFS)
Normal flow depth in pipe =   10.71(In.)
Flow top width inside pipe =   17.67(In.)
Critical Depth =   12.26(In.)
Pipe flow velocity =       6.36(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =      7.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4009.000 to Point/Station      4011.000
**** 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 =      7.24 min.
Rainfall intensity =       3.797(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       2.778(CFS) for     0.770(Ac.)
Total runoff =       9.745(CFS)  Total area =          2.68(Ac.)


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Process from Point/Station     4009.000 to Point/Station      4011.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.680(Ac.)
Runoff from this stream =       9.745(CFS)
Time of concentration =     7.24 min.
Rainfall intensity =     3.797(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4003.000 to Point/Station      4005.000
**** 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  =  632.000(Ft.)
Highest elevation =  515.000(Ft.)
Lowest elevation =  508.300(Ft.)
Elevation difference =      6.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       6.66 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 632.000^.5)/( 1.060^(1/3)]=    6.66
Rainfall intensity (I) =       3.920(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff =        4.842(CFS)
Total initial stream area =          1.300(Ac.)


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Process from Point/Station     4005.000 to Point/Station      4008.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
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Upstream point/station elevation =    502.000(Ft.)
Downstream point/station elevation =    501.730(Ft.)
Pipe length  =     13.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      4.842(CFS)
Nearest computed pipe diameter  =      12.00(In.)
Calculated individual pipe flow  =      4.842(CFS)
Normal flow depth in pipe =     9.27(In.)
Flow top width inside pipe =    10.06(In.)
Critical Depth =    10.90(In.)
Pipe flow velocity =       7.43(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4004.000 to Point/Station      4008.000
**** 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 =      6.69 min.
Rainfall intensity =       3.914(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       6.953(CFS) for      1.870(Ac.)
Total runoff =      11.795(CFS)  Total area =         3.17(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4018.000 to Point/Station      4008.000
**** 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
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration =      6.69 min.
Rainfall intensity =       3.914(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =       7.010(CFS) for      3.980(Ac.)
Total runoff =      18.804(CFS)  Total area =         7.15(Ac.)


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Process from Point/Station      4008.000 to Point/Station      4011.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    501.400(Ft.)
Downstream point/station elevation =    493.360(Ft.)
Pipe length  =    766.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     18.804(CFS)
Nearest computed pipe diameter  =      24.00(In.)
Calculated individual pipe flow  =     18.804(CFS)
Normal flow depth in pipe =    16.41(In.)
Flow top width inside pipe =    22.32(In.)
Critical Depth =    18.73(In.)
Pipe flow velocity =       8.22(Ft/s)
Travel time through pipe =    1.55 min.
Time of concentration (TC) =     8.24 min.
```



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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4008.000 to Point/Station      4011.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =       7.150(Ac.)
Runoff from this stream =      18.804(CFS)
Time of concentration =      8.24 min.
Rainfall intensity =       3.620(In/Hr)
Summary of stream data:

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


1        9.745      7.24                    3.797
2       18.804      8.24                    3.620
Qmax(1) =
           1.000 *     1.000 *     9.745) +
           1.000 *     0.879 *    18.804) + =      26.273
Qmax(2) =
           0.953 *     1.000 *     9.745) +
           1.000 *     1.000 *    18.804) + =      28.094

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.745     18.804
Maximum flow rates at confluence using above data:
      26.273      28.094
Area of streams before confluence:
       2.680        7.150
Results of confluence:
Total flow rate =      28.094(CFS)
Time of concentration =      8.240 min.
Effective stream area after confluence =         9.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4011.000 to Point/Station      4017.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    496.800(Ft.)
Downstream point/station elevation =    492.560(Ft.)
Pipe length  =    421.78(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     28.094(CFS)
Nearest computed pipe diameter  =      27.00(In.)
Calculated individual pipe flow  =     28.094(CFS)
Normal flow depth in pipe =    20.11(In.)
Flow top width inside pipe =    23.54(In.)
Critical Depth =    22.13(In.)
Pipe flow velocity =       8.84(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =     9.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4011.000 to Point/Station      4017.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =       9.830(Ac.)
Runoff from this stream =      28.094(CFS)
Time of concentration =      9.03 min.
```

```
Rainfall intensity =       3.501(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4012.000 to Point/Station      4013.000
**** 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                     ]
Note: user entry of impervious value, Ap = 0.850
Initial subarea flow distance =  180.000(Ft.)
Highest elevation =  506.000(Ft.)
Lowest elevation =  504.200(Ft.)
Elevation difference =     1.800(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =       4.90 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8972)*( 180.000^.5)/(   1.000^(1/3)]=    4.90
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 = 0.897
Subarea runoff =      4.056(CFS)
Total initial stream area =          1.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4013.000 to Point/Station      4014.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =    504.200(Ft.)
Downstream point elevation =   496.000(Ft.)
Channel length thru subarea =    840.000(Ft.)
Channel base width      =      3.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =      23.608(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel   =     2.000(Ft.)
Flow(q) thru subarea =       23.608(CFS)
Depth of flow =    0.698(Ft.), Average velocity =    5.845(Ft/s)
Channel flow top width =     8.580(Ft.)
Flow Velocity =      5.85(Ft/s)
Travel time   =    2.40 min.
Time of concentration =     7.40 min.
Critical depth =       0.859(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
[INDUSTRIAL area type                    ]
Rainfall intensity =       3.768(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =      35.545(CFS) for     9.930(Ac.)
Total runoff =       39.601(CFS)  Total area =         10.96(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4014.000 to Point/Station      4015.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```



```
Upstream point/station elevation =    494.780(Ft.)
Downstream point/station elevation =    494.620(Ft.)
Pipe length   =      27.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow   =     39.601(CFS)
Nearest computed pipe diameter   =      33.00(In.)
Calculated individual pipe flow   =     39.601(CFS)
Normal flow depth in pipe =    26.25(In.)
Flow top width inside pipe =    26.62(In.)
Critical Depth =    25.14(In.)
Pipe flow velocity =        7.81(Ft/s)
Travel time through pipe =     0.06 min.
Time of concentration (TC) =      7.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4010.000 to Point/Station      4015.000
**** 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 =      7.45 min.
Rainfall intensity =       3.757(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       3.284(CFS) for     0.920(Ac.)
Total runoff =       42.884(CFS)  Total area =         11.88(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4015.000 to Point/Station      4016.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    494.520(Ft.)
Downstream point/station elevation =    494.150(Ft.)
Pipe length   =      63.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow   =     42.884(CFS)
Nearest computed pipe diameter   =      33.00(In.)
Calculated individual pipe flow   =     42.884(CFS)
Normal flow depth in pipe =    29.25(In.)
Flow top width inside pipe =    20.95(In.)
Critical Depth =    26.09(In.)
Pipe flow velocity =        7.71(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =      7.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      4009.000 to Point/Station      4016.000
**** 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 =      7.59 min.
Rainfall intensity =       3.732(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       2.233(CFS) for     0.630(Ac.)
Total runoff =       45.118(CFS)  Total area =         12.51(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4016.000 to Point/Station     4017.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   494.050(Ft.)
Downstream point/station elevation =   492.560(Ft.)
Pipe length  =   219.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    45.118(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    45.118(CFS)
Normal flow depth in pipe =   28.22(In.)
Flow top width inside pipe =    23.23(In.)
Critical Depth =   26.71(In.)
Pipe flow velocity =        8.35(Ft/s)
Travel time through pipe =     0.44 min.
Time of concentration (TC) =      8.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4016.000 to Point/Station     4017.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =     12.510(Ac.)
Runoff from this stream =      45.118(CFS)
Time of concentration =     8.03 min.
Rainfall intensity =      3.655(In/Hr)
Summary of stream data:

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


1       28.094       9.03                    3.501
2       45.118       8.03                    3.655
Qmax(1) =
             1.000 *     1.000 *     28.094) +
             0.958 *     1.000 *     45.118) + =         71.302
Qmax(2) =
             1.000 *     0.888 *     28.094) +
             1.000 *     1.000 *     45.118) + =         70.076

Total of 2 streams to confluence:
Flow rates before confluence point:
       28.094       45.118
Maximum flow rates at confluence using above data:
        71.302        70.076
Area of streams before confluence:
         9.830        12.510
Results of confluence:
Total flow rate =      71.302(CFS)
Time of concentration =       9.035 min.
Effective stream area after confluence =       22.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4017.000 to Point/Station     4020.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   492.460(Ft.)
Downstream point/station elevation =   492.000(Ft.)
Pipe length  =    78.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    71.302(CFS)
Nearest computed pipe diameter  =     42.00(In.)
```



```
Calculated individual pipe flow  =    71.302(CFS)
Normal flow depth in pipe =   31.83(In.)
Flow top width inside pipe =    35.99(In.)
Critical Depth =    31.73(In.)
Pipe flow velocity =        9.11(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =      9.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4000.000 to Point/Station     4020.000
**** 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
[COMMERCIAL area type                              ]
Time of concentration =       9.18 min.
Rainfall intensity =      3.481(In/Hr) for a    100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =     34.260(CFS) for    11.580(Ac.)
Total runoff =     105.562(CFS)  Total area =       33.92(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     4020.000 to Point/Station     4025.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   484.500(Ft.)
Downstream point/station elevation =   482.900(Ft.)
Pipe length  =    80.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    105.562(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    105.562(CFS)
Normal flow depth in pipe =   29.02(In.)
Flow top width inside pipe =    34.04(In.)
Critical Depth =    36.70(In.)
Pipe flow velocity =      15.94(Ft/s)
Travel time through pipe =     0.08 min.
Time of concentration (TC) =      9.26 min.
End of computations, total study area =          33.920 (Ac.)
```

```
San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.3

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
      Rational Hydrology Study        Date: 07/31/18
------------------------------------------------------------------------
2357.50 ILLUMINA
PROPOSED CONDITIONS
SYSTEM 500, FILE: 5000P100

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


Program License Serial Number 4049

------------------------------------------------------------------------
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     5000.000 to Point/Station     5003.000
**** 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  =  470.000(Ft.)
Highest elevation =  510.000(Ft.)
Lowest elevation =  502.000(Ft.)
Elevation difference =     8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =      4.90 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*( 470.000^.5)/(  1.702^(1/3)]=   4.90
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 =      1.501(CFS)
Total initial stream area =         0.360(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     5003.000 to Point/Station     5008.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation =    502.000(Ft.)
End of street segment elevation =    497.500(Ft.)
```



```
Length of street segment  =    320.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
Width of half street (curb to crown)  =  26.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(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  =  15.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =        1.918(CFS)
Depth of flow =    0.278(Ft.), Average velocity =    2.117(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.136(Ft.)
Flow velocity =    2.12(Ft/s)
Travel time =     2.52 min.      TC =     7.52  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
[INDUSTRIAL area type               ]
Rainfall intensity =       3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       0.711(CFS) for     0.200(Ac.)
Total runoff =      2.213(CFS)  Total area =         0.56(Ac.)
Street flow at end of street =       2.213(CFS)
Half street flow at end of street =       2.213(CFS)
Depth of flow =    0.289(Ft.), Average velocity =    2.187(Ft/s)
Flow width (from curb towards crown)=    9.697(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     5002.000 to Point/Station     5008.000
**** 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 =     7.52 min.
Rainfall intensity =       3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
Subarea runoff =       4.304(CFS) for     1.210(Ac.)
Total runoff =      6.517(CFS)  Total area =         1.77(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     5005.000 to Point/Station     5008.000
**** 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 =     7.52 min.
Rainfall intensity =       3.745(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.950
```

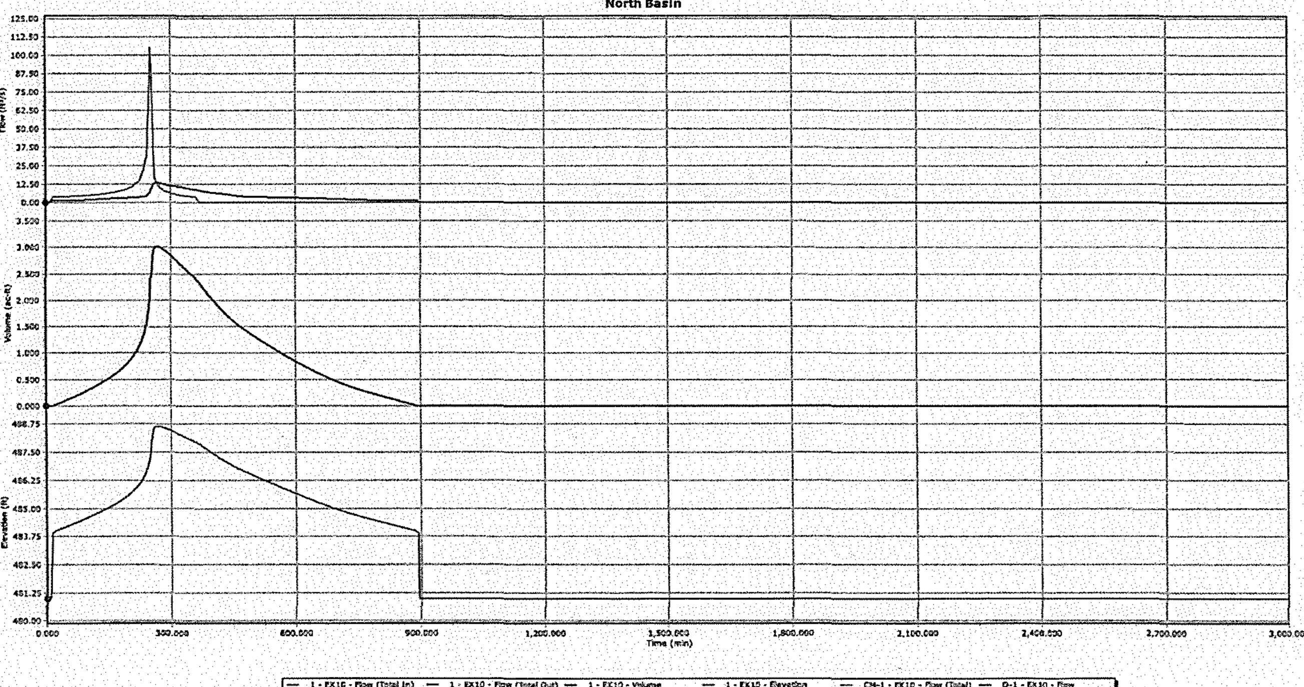
```
Subarea runoff =      0.391(CFS) for     0.110(Ac.)
Total runoff =      6.908(CFS)  Total area =        1.88(Ac.)
End of computations, total study area =           1.880 (Ac.)
```

4

APPENDIX 4

Preliminary Detention Calculations

North Basin


Flow (ft³/s)
125.00
112.50
100.00
87.50
75.00
62.50
50.00
37.50
25.00
12.50
0.00
Volume (ac-ft)
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Elevation (ft)
488.75
487.50
486.25
485.00
483.75
482.50
481.25
480.00
0.000
300.000
600.000
900.000
1,200.000
1,500.000
1,800.000
2,100.000
2,400.000
2,700.000
3,000.000
Time (min)
1 - EX10 - Flow (Total In)
1 - EX10 - Flow (Total Out)
1 - EX10 - Volume
1 - EX10 - Elevation
CM-1 - EX10 - Flow (Total)
O-1 - EX10 - Flow

North Basin

Project Summary	
Title	System 4000- North Basin
Engineer	PDC
Company	PDC
Date	7/23/2018

Notes

North Basin

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
CM-1	EX10	0	4.893	252.000	105.60

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
O-1	EX10	0	4.893	267.000	13.35

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1 (IN)	EX10	0	4.893	252.000	105.60	(N/A)	(N/A)
1 (OUT)	EX10	0	4.893	267.000	13.35	488.63	3.009

North Basin

Subsection: Read Hydrograph
Label: CM-1

Return Event: 100 years
Storm Event:

Peak Discharge	105.60 ft³/s
Time to Peak	252.000 min
Hydrograph Volume	4.893 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 9.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.00	3.60	3.70	3.80
45.000	3.90	4.00	4.10	4.30	4.40
90.000	4.60	4.70	5.00	5.10	5.40
135.000	5.60	6.00	6.30	6.80	7.10
180.000	7.90	8.40	9.60	10.40	12.70
225.000	14.50	21.30	32.00	105.60	17.10
270.000	11.40	8.90	7.50	6.50	5.80
315.000	5.30	4.90	4.50	4.20	4.00
360.000	3.80	0.00	(N/A)	(N/A)	(N/A)

North Basin

Subsection: Elevation-Area Volume Curve | Return Event: 100 years
Label: 1 | Storm Event:

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ac-ft)	Volume (Total) (ac-ft)
481.00	0.0	10.000	0.000	0.000	0.000
483.90	0.0	10.000	30.000	0.001	0.001
484.00	0.0	18,816.000	19,259.774	0.015	0.015
490.00	0.0	45,867.000	94,060.431	4.319	4.334

North Basin

Subsection: Volume Equations | Return Event: 100 years
Label: 1 | Storm Event:

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

North Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Requested Pond Water Surface Elevations	
Minimum (Headwater)	481.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	490.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	1-Lowflow orifice	Forward	TW	484.50	490.00
Orifice-Circular	2-Midflow orifice	Forward	TW	486.50	490.00
Orifice-Circular	3-Highflow orifice	Forward	TW	487.50	490.00
Stand Pipe	Riser - 1	Forward	TW	488.50	490.00
Orifice-Circular	0-Underdrain orifice	Forward	TW	481.25	490.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

North Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Structure ID: 0-Underdrain orifice Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	481.25 ft
Orifice Diameter	6.0 in
Orifice Coefficient	0.600

Structure ID: 2-Midflow orifice Structure Type: Orifice-Circular	
Number of Openings	3
Elevation	486.50 ft
Orifice Diameter	6.0 in
Orifice Coefficient	0.600

Structure ID: 3-Highflow orifice Structure Type: Orifice-Circular	
Number of Openings	2
Elevation	487.50 ft
Orifice Diameter	8.0 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	488.50 ft
Diameter	36.0 in
Orifice Area	7.1 ft^2
Orifice Coefficient	0.600
Weir Length	9.42 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	True

Structure ID: 1-Lowflow orifice Structure Type: Orifice-Circular	
Number of Openings	3
Elevation	484.50 ft
Orifice Diameter	4.0 in
Orifice Coefficient	0.600

North Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
481.00	0.00	(N/A)	0.00
481.10	0.00	(N/A)	0.00
481.20	0.00	(N/A)	0.00
481.25	0.00	(N/A)	0.00
481.30	0.01	(N/A)	0.00
481.40	0.05	(N/A)	0.00
481.50	0.13	(N/A)	0.00
481.60	0.25	(N/A)	0.00
481.70	0.38	(N/A)	0.00
481.80	0.52	(N/A)	0.00
481.90	0.60	(N/A)	0.00
482.00	0.67	(N/A)	0.00
482.10	0.73	(N/A)	0.00
482.20	0.79	(N/A)	0.00
482.30	0.85	(N/A)	0.00
482.40	0.90	(N/A)	0.00
482.50	0.95	(N/A)	0.00
482.60	0.99	(N/A)	0.00
482.70	1.04	(N/A)	0.00
482.80	1.08	(N/A)	0.00
482.90	1.12	(N/A)	0.00
483.00	1.16	(N/A)	0.00
483.10	1.20	(N/A)	0.00
483.20	1.23	(N/A)	0.00
483.30	1.27	(N/A)	0.00
483.40	1.30	(N/A)	0.00
483.50	1.34	(N/A)	0.00
483.60	1.37	(N/A)	0.00
483.70	1.40	(N/A)	0.00
483.80	1.43	(N/A)	0.00
483.90	1.46	(N/A)	0.00
484.00	1.49	(N/A)	0.00
484.10	1.52	(N/A)	0.00
484.20	1.55	(N/A)	0.00
484.30	1.58	(N/A)	0.00
484.40	1.61	(N/A)	0.00
484.50	1.64	(N/A)	0.00
484.60	1.72	(N/A)	0.00
484.70	1.90	(N/A)	0.00
484.80	2.13	(N/A)	0.00
484.90	2.35	(N/A)	0.00
485.00	2.50	(N/A)	0.00
485.10	2.62	(N/A)	0.00

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
485.20	2.74	(N/A)	0.00
485.30	2.84	(N/A)	0.00
485.40	2.95	(N/A)	0.00
485.50	3.04	(N/A)	0.00
485.60	3.13	(N/A)	0.00
485.70	3.22	(N/A)	0.00
485.80	3.30	(N/A)	0.00
485.90	3.38	(N/A)	0.00
486.00	3.46	(N/A)	0.00
486.10	3.54	(N/A)	0.00
486.20	3.61	(N/A)	0.00
486.30	3.68	(N/A)	0.00
486.40	3.75	(N/A)	0.00
486.50	3.82	(N/A)	0.00
486.60	3.96	(N/A)	0.00
486.70	4.22	(N/A)	0.00
486.80	4.58	(N/A)	0.00
486.90	5.02	(N/A)	0.00
487.00	5.56	(N/A)	0.00
487.10	5.88	(N/A)	0.00
487.20	6.16	(N/A)	0.00
487.30	6.42	(N/A)	0.00
487.40	6.66	(N/A)	0.00
487.50	6.89	(N/A)	0.00
487.60	7.16	(N/A)	0.00
487.70	7.52	(N/A)	0.00
487.80	7.96	(N/A)	0.00
487.90	8.47	(N/A)	0.00
488.00	9.03	(N/A)	0.00
488.10	9.63	(N/A)	0.00
488.20	10.26	(N/A)	0.00
488.30	10.69	(N/A)	0.00
488.40	11.09	(N/A)	0.00
488.50	11.46	(N/A)	0.00
488.60	12.71	(N/A)	0.00
488.70	14.68	(N/A)	0.00
488.80	17.12	(N/A)	0.00
488.90	19.94	(N/A)	0.00
489.00	23.09	(N/A)	0.00
489.10	26.53	(N/A)	0.00
489.20	30.23	(N/A)	0.00
489.30	34.18	(N/A)	0.00
489.40	38.36	(N/A)	0.00

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
489.50	42.76	(N/A)	0.00
489.60	47.36	(N/A)	0.00
489.70	52.16	(N/A)	0.00
489.80	54.03	(N/A)	0.00
489.90	55.74	(N/A)	0.00
490.00	57.39	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
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0-Underdrain orifice

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
0-Underdrain orifice
0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
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1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
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1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice

North Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 3-Highflow orifice + Riser - 1 + 0-Underdrain orifice

North Basin

Subsection: Elevation-Volume-Flow Table (Pond)
Label: 1

Return Event: 100 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	481.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
481.00	0.00	0.000	10.000	0.00	0.00	0.00
481.10	0.00	0.000	10.000	0.00	0.00	0.03
481.20	0.00	0.000	10.000	0.00	0.00	0.07
481.25	0.00	0.000	10.000	0.00	0.00	0.08
481.30	0.01	0.000	10.000	0.00	0.01	0.11
481.40	0.05	0.000	10.000	0.00	0.05	0.19
481.50	0.13	0.000	10.000	0.00	0.13	0.30
481.60	0.25	0.000	10.000	0.00	0.25	0.45
481.70	0.38	0.000	10.000	0.00	0.38	0.62
481.80	0.52	0.000	10.000	0.00	0.52	0.78
481.90	0.60	0.000	10.000	0.00	0.60	0.90
482.00	0.67	0.000	10.000	0.00	0.67	1.00
482.10	0.73	0.000	10.000	0.00	0.73	1.10
482.20	0.79	0.000	10.000	0.00	0.79	1.19
482.30	0.85	0.000	10.000	0.00	0.85	1.28
482.40	0.90	0.000	10.000	0.00	0.90	1.36
482.50	0.95	0.000	10.000	0.00	0.95	1.45
482.60	0.99	0.000	10.000	0.00	0.99	1.52
482.70	1.04	0.000	10.000	0.00	1.04	1.60
482.80	1.08	0.000	10.000	0.00	1.08	1.68
482.90	1.12	0.000	10.000	0.00	1.12	1.75
483.00	1.16	0.000	10.000	0.00	1.16	1.82
483.10	1.20	0.000	10.000	0.00	1.20	1.90
483.20	1.23	0.001	10.000	0.00	1.23	1.97
483.30	1.27	0.001	10.000	0.00	1.27	2.03
483.40	1.30	0.001	10.000	0.00	1.30	2.10
483.50	1.34	0.001	10.000	0.00	1.34	2.17
483.60	1.37	0.001	10.000	0.00	1.37	2.24
483.70	1.40	0.001	10.000	0.00	1.40	2.30

North Basin

Subsection: Elevation-Volume-Flow Table (Pond)
Label: 1

Return Event: 100 years
Storm Event:

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
483.80	1.43	0.001	10.000	0.00	1.43	2.37
483.90	1.46	0.001	10.000	0.00	1.46	2.43
484.00	1.49	0.015	18,816.000	0.00	1.49	23.86
484.10	1.52	0.059	19,169.694	0.00	1.52	87.20
484.20	1.55	0.103	19,526.682	0.00	1.55	151.72
484.30	1.58	0.149	19,886.963	0.00	1.58	217.44
484.40	1.61	0.195	20,250.538	0.00	1.61	284.36
484.50	1.64	0.242	20,617.406	0.00	1.64	352.50
484.60	1.72	0.289	20,987.568	0.00	1.72	421.92
484.70	1.90	0.338	21,361.023	0.00	1.90	492.68
484.80	2.13	0.387	21,737.771	0.00	2.13	564.75
484.90	2.35	0.438	22,117.812	0.00	2.35	638.06
485.00	2.50	0.489	22,501.148	0.00	2.50	712.57
485.10	2.62	0.541	22,887.776	0.00	2.62	788.34
485.20	2.74	0.594	23,277.698	0.00	2.74	865.40
485.30	2.84	0.648	23,670.913	0.00	2.84	943.75
485.40	2.95	0.703	24,067.422	0.00	2.95	1,023.41
485.50	3.04	0.759	24,467.224	0.00	3.04	1,104.40
485.60	3.13	0.815	24,870.320	0.00	3.13	1,186.72
485.70	3.22	0.873	25,276.709	0.00	3.22	1,270.38
485.80	3.30	0.931	25,686.391	0.00	3.30	1,355.40
485.90	3.38	0.991	26,099.367	0.00	3.38	1,441.79
486.00	3.46	1.051	26,515.636	0.00	3.46	1,529.56
486.10	3.54	1.112	26,935.199	0.00	3.54	1,618.72
486.20	3.61	1.175	27,358.055	0.00	3.61	1,709.28
486.30	3.68	1.238	27,784.204	0.00	3.68	1,801.26
486.40	3.75	1.302	28,213.647	0.00	3.75	1,894.66
486.50	3.82	1.368	28,646.383	0.00	3.82	1,989.49
486.60	3.96	1.434	29,082.413	0.00	3.96	2,085.84
486.70	4.22	1.501	29,521.736	0.00	4.22	2,183.78
486.80	4.58	1.569	29,964.352	0.00	4.58	2,283.28
486.90	5.02	1.639	30,410.262	0.00	5.02	2,384.34
487.00	5.56	1.709	30,859.466	0.00	5.56	2,487.00
487.10	5.88	1.780	31,311.962	0.00	5.88	2,590.94
487.20	6.16	1.853	31,767.752	0.00	6.16	2,696.35
487.30	6.42	1.926	32,226.836	0.00	6.42	2,803.27
487.40	6.66	2.001	32,689.213	0.00	6.66	2,911.70
487.50	6.89	2.076	33,154.883	0.00	6.89	3,021.67
487.60	7.16	2.153	33,623.847	0.00	7.16	3,133.24
487.70	7.52	2.231	34,096.104	0.00	7.52	3,246.46
487.80	7.96	2.309	34,571.655	0.00	7.96	3,361.35
487.90	8.47	2.389	35,050.499	0.00	8.47	3,477.89
488.00	9.03	2.470	35,532.636	0.00	9.03	3,596.09

North Basin

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years
Label: 1 Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
488.10	9.63	2.553	36,018.067	0.00	9.63	3,715.94
488.20	10.26	2.636	36,506.791	0.00	10.26	3,837.45
488.30	10.69	2.720	36,998.809	0.00	10.69	3,960.38
488.40	11.09	2.806	37,494.120	0.00	11.09	4,084.93
488.50	11.46	2.892	37,992.724	0.00	11.46	4,211.12
488.60	12.71	2.980	38,494.622	0.00	12.71	4,339.84
488.70	14.68	3.069	38,999.813	0.00	14.68	4,470.97
488.80	17.12	3.159	39,508.298	0.00	17.12	4,604.26
488.90	19.94	3.250	40,020.076	0.00	19.94	4,739.63
489.00	23.09	3.343	40,535.148	0.00	23.09	4,877.03
489.10	26.53	3.437	41,053.512	0.00	26.53	5,016.45
489.20	30.23	3.531	41,575.171	0.00	30.23	5,157.86
489.30	34.18	3.627	42,100.123	0.00	34.18	5,301.27
489.40	38.36	3.725	42,628.368	0.00	38.36	5,446.67
489.50	42.76	3.823	43,159.906	0.00	42.76	5,594.04
489.60	47.36	3.923	43,694.738	0.00	47.36	5,743.40
489.70	52.16	4.024	44,232.863	0.00	52.16	5,894.75
489.80	54.03	4.126	44,774.282	0.00	54.03	6,044.96
489.90	55.74	4.229	45,318.994	0.00	55.74	6,196.82
490.00	57.39	4.334	45,867.000	0.00	57.39	6,350.45

North Basin

Subsection: Pond Inflow Summary
Label: 1 (IN)

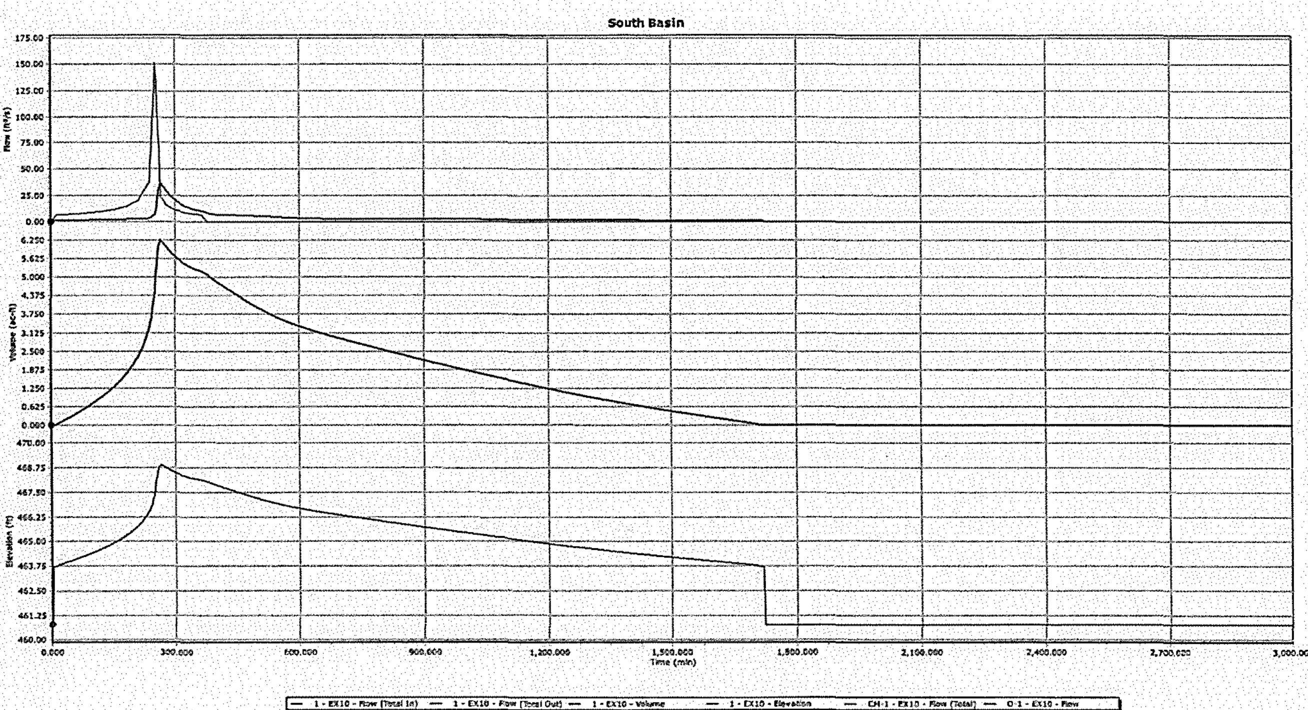
Return Event: 100 years
Storm Event:

Summary for Hydrograph Addition at '1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft³/s)
Flow (From)	CM-1	4.893	252.000	105.60
Flow (In)	1	4.893	252.000	105.60



South Basin
Flow (ft³/s)
Volume (ac-ft)
Elevation (ft)
175.00
150.00
125.00
100.00
75.00
50.00
25.00
0.00
6.250
5.625
5.000
4.375
3.750
3.125
2.500
1.875
1.250
0.625
0.000
470.00
468.75
467.50
466.25
465.00
463.75
462.50
461.25
460.00
0.000
300.000
600.000
900.000
1,200.000
1,500.000
1,800.000
2,100.000
2,400.000
2,700.000
3,000.000
Time (min)
1 - EX10 - Flow (Total In)
1 - EX10 - Flow (Total Out)
1 - EX10 - Volume
1 - EX10 - Elevation
CH-1 - EX10 - Flow (Total)
O-1 - EX10 - Flow

South Basin

Project Summary	
Title	South Basin
Engineer	PDC
Company	PDC
Date	8/15/2018

Notes

South Basin

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
CM-1	EX10	0	9.069	252.000	151.60

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)
O-1	EX10	0	9.069	265.000	36.24

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1 (IN)	EX10	0	9.069	252.000	151.60	(N/A)	(N/A)
1 (OUT)	EX10	0	9.069	265.000	36.24	468.88	6.242

South Basin

Subsection: Read Hydrograph
Label: CM-1

Return Event: 100 years
Storm Event:

Peak Discharge	151.60 ft³/s
Time to Peak	252.000 min
Hydrograph Volume	9.069 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 14.000 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	6.50	6.90	7.00	7.50
70.000	7.70	8.30	8.60	9.40	9.80
140.000	10.90	11.50	13.20	14.30	17.50
210.000	19.90	29.30	37.60	151.60	23.50
280.000	15.70	12.30	10.30	9.00	8.00
350.000	7.30	6.70	0.00	(N/A)	(N/A)

South Basin

Subsection: Elevation-Area Volume Curve | Return Event: 100 years
Label: 1 | Storm Event:

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ac-ft)	Volume (Total) (ac-ft)
460.80	0.0	10.000	0.000	0.000	0.000
463.70	0.0	10.000	30.000	0.001	0.001
463.80	0.0	46,285.000	46,975.331	0.036	0.037
474.00	0.0	76,427.000	182,188.245	14.220	14.257

South Basin

Subsection: Volume Equations　　　　Return Event: 100 years
Label: 1　　　　Storm Event:

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

South Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Requested Pond Water Surface Elevations	
Minimum (Headwater)	460.80 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	474.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	1-Lowflow orifice	Forward	TW	464.30	474.00
Orifice-Circular	2-Midflow orifice	Forward	TW	466.30	474.00
Stand Pipe	Riser - 1	Forward	TW	467.90	474.00
Orifice-Circular	0-Underdrain orifice	Forward	TW	461.05	474.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

South Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Structure ID: 0-Underdrain orifice Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	461.05 ft
Orifice Diameter	6.0 in
Orifice Coefficient	0.600

Structure ID: 2-Midflow orifice Structure Type: Orifice-Circular	
Number of Openings	2
Elevation	466.30 ft
Orifice Diameter	8.0 in
Orifice Coefficient	0.600

Structure ID: Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	467.90 ft
Diameter	36.0 in
Orifice Area	7.1 ft^2
Orifice Coefficient	0.600
Weir Length	9.42 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	True

Structure ID: 1-Lowflow orifice Structure Type: Orifice-Circular	
Number of Openings	2
Elevation	464.30 ft
Orifice Diameter	3.0 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30

South Basin

Subsection: Outlet Input Data
Label: Outlet#1

Return Event: 100 years
Storm Event:

Convergence Tolerances	
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
460.80	0.00	(N/A)	0.00
460.90	0.00	(N/A)	0.00
461.00	0.00	(N/A)	0.00
461.05	0.00	(N/A)	0.00
461.10	0.01	(N/A)	0.00
461.20	0.05	(N/A)	0.00
461.30	0.13	(N/A)	0.00
461.40	0.25	(N/A)	0.00
461.50	0.38	(N/A)	0.00
461.60	0.52	(N/A)	0.00
461.70	0.60	(N/A)	0.00
461.80	0.67	(N/A)	0.00
461.90	0.73	(N/A)	0.00
462.00	0.79	(N/A)	0.00
462.10	0.85	(N/A)	0.00
462.20	0.90	(N/A)	0.00
462.30	0.95	(N/A)	0.00
462.40	0.99	(N/A)	0.00
462.50	1.04	(N/A)	0.00
462.60	1.08	(N/A)	0.00
462.70	1.12	(N/A)	0.00
462.80	1.16	(N/A)	0.00
462.90	1.20	(N/A)	0.00
463.00	1.23	(N/A)	0.00
463.10	1.27	(N/A)	0.00
463.20	1.30	(N/A)	0.00
463.30	1.34	(N/A)	0.00
463.40	1.37	(N/A)	0.00
463.50	1.40	(N/A)	0.00
463.60	1.43	(N/A)	0.00
463.70	1.46	(N/A)	0.00
463.80	1.49	(N/A)	0.00
463.90	1.52	(N/A)	0.00
464.00	1.55	(N/A)	0.00
464.10	1.58	(N/A)	0.00
464.20	1.61	(N/A)	0.00
464.30	1.64	(N/A)	0.00
464.40	1.70	(N/A)	0.00
464.50	1.80	(N/A)	0.00
464.60	1.91	(N/A)	0.00
464.70	1.99	(N/A)	0.00
464.80	2.06	(N/A)	0.00
464.90	2.12	(N/A)	0.00

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
465.00	2.18	(N/A)	0.00
465.10	2.23	(N/A)	0.00
465.20	2.28	(N/A)	0.00
465.30	2.33	(N/A)	0.00
465.40	2.38	(N/A)	0.00
465.50	2.43	(N/A)	0.00
465.60	2.47	(N/A)	0.00
465.70	2.52	(N/A)	0.00
465.80	2.56	(N/A)	0.00
465.90	2.60	(N/A)	0.00
466.00	2.64	(N/A)	0.00
466.10	2.68	(N/A)	0.00
466.20	2.72	(N/A)	0.00
466.30	2.76	(N/A)	0.00
466.40	2.85	(N/A)	0.00
466.50	3.05	(N/A)	0.00
466.60	3.33	(N/A)	0.00
466.70	3.68	(N/A)	0.00
466.80	4.10	(N/A)	0.00
466.90	4.56	(N/A)	0.00
467.00	5.05	(N/A)	0.00
467.10	5.34	(N/A)	0.00
467.20	5.61	(N/A)	0.00
467.30	5.86	(N/A)	0.00
467.40	6.09	(N/A)	0.00
467.50	6.31	(N/A)	0.00
467.60	6.52	(N/A)	0.00
467.70	6.72	(N/A)	0.00
467.80	6.91	(N/A)	0.00
467.90	7.09	(N/A)	0.00
468.00	8.16	(N/A)	0.00
468.10	9.97	(N/A)	0.00
468.20	12.25	(N/A)	0.00
468.30	14.92	(N/A)	0.00
468.40	17.92	(N/A)	0.00
468.50	21.22	(N/A)	0.00
468.60	24.79	(N/A)	0.00
468.70	28.61	(N/A)	0.00
468.80	32.66	(N/A)	0.00
468.90	36.94	(N/A)	0.00
469.00	41.42	(N/A)	0.00
469.10	46.11	(N/A)	0.00
469.20	47.86	(N/A)	0.00

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)	Convergence Error (ft)
469.30	49.46	(N/A)	0.00
469.40	51.00	(N/A)	0.00
469.50	52.49	(N/A)	0.00
469.60	53.94	(N/A)	0.00
469.70	55.35	(N/A)	0.00
469.80	56.73	(N/A)	0.00
469.90	58.06	(N/A)	0.00
470.00	59.37	(N/A)	0.00
470.10	60.65	(N/A)	0.00
470.20	61.90	(N/A)	0.00
470.30	63.12	(N/A)	0.00
470.40	64.32	(N/A)	0.00
470.50	65.50	(N/A)	0.00
470.60	66.65	(N/A)	0.00
470.70	67.79	(N/A)	0.00
470.80	68.90	(N/A)	0.00
470.90	70.00	(N/A)	0.00
471.00	71.08	(N/A)	0.00
471.10	72.14	(N/A)	0.00
471.20	73.19	(N/A)	0.00
471.30	74.22	(N/A)	0.00
471.40	75.24	(N/A)	0.00
471.50	76.24	(N/A)	0.00
471.60	77.23	(N/A)	0.00
471.70	78.21	(N/A)	0.00
471.80	79.17	(N/A)	0.00
471.90	80.12	(N/A)	0.00
472.00	81.06	(N/A)	0.00
472.10	81.99	(N/A)	0.00
472.20	82.91	(N/A)	0.00
472.30	83.82	(N/A)	0.00
472.40	84.72	(N/A)	0.00
472.50	85.61	(N/A)	0.00
472.60	86.49	(N/A)	0.00
472.70	87.36	(N/A)	0.00
472.80	88.23	(N/A)	0.00
472.90	89.08	(N/A)	0.00
473.00	89.93	(N/A)	0.00
473.10	90.76	(N/A)	0.00
473.20	91.59	(N/A)	0.00
473.30	92.42	(N/A)	0.00
473.40	93.23	(N/A)	0.00
473.50	94.04	(N/A)	0.00

South Basin

Subsection: Composite Rating Curve — Return Event: 100 years
Label: Outlet#1 — Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
473.60	94.84	(N/A)	0.00
473.70	95.63	(N/A)	0.00
473.80	96.42	(N/A)	0.00
473.90	97.20	(N/A)	0.00
474.00	97.98	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
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0-Underdrain orifice

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
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1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice

South Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Contributing Structures
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice
1-Lowflow orifice + 2-Midflow orifice + Riser - 1 + 0-Underdrain orifice

South Basin

Subsection: Elevation-Volume-Flow Table (Pond)
Label: 1

Return Event: 100 years
Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	460.80 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	1.000 min

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
460.80	0.00	0.000	10.000	0.00	0.00	0.00
460.90	0.00	0.000	10.000	0.00	0.00	0.03
461.00	0.00	0.000	10.000	0.00	0.00	0.07
461.05	0.00	0.000	10.000	0.00	0.00	0.08
461.10	0.01	0.000	10.000	0.00	0.01	0.11
461.20	0.05	0.000	10.000	0.00	0.05	0.19
461.30	0.13	0.000	10.000	0.00	0.13	0.30
461.40	0.25	0.000	10.000	0.00	0.25	0.45
461.50	0.38	0.000	10.000	0.00	0.38	0.62
461.60	0.52	0.000	10.000	0.00	0.52	0.78
461.70	0.60	0.000	10.000	0.00	0.60	0.90
461.80	0.67	0.000	10.000	0.00	0.67	1.00
461.90	0.73	0.000	10.000	0.00	0.73	1.10
462.00	0.79	0.000	10.000	0.00	0.79	1.19
462.10	0.85	0.000	10.000	0.00	0.85	1.28
462.20	0.90	0.000	10.000	0.00	0.90	1.36
462.30	0.95	0.000	10.000	0.00	0.95	1.45
462.40	0.99	0.000	10.000	0.00	0.99	1.52
462.50	1.04	0.000	10.000	0.00	1.04	1.60
462.60	1.08	0.000	10.000	0.00	1.08	1.68
462.70	1.12	0.000	10.000	0.00	1.12	1.75
462.80	1.16	0.000	10.000	0.00	1.16	1.82
462.90	1.20	0.000	10.000	0.00	1.20	1.90
463.00	1.23	0.001	10.000	0.00	1.23	1.97
463.10	1.27	0.001	10.000	0.00	1.27	2.03
463.20	1.30	0.001	10.000	0.00	1.30	2.10
463.30	1.34	0.001	10.000	0.00	1.34	2.17
463.40	1.37	0.001	10.000	0.00	1.37	2.24
463.50	1.40	0.001	10.000	0.00	1.40	2.30

South Basin

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years
Label: 1 Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
463.60	1.43	0.001	10.000	0.00	1.43	2.37
463.70	1.46	0.001	10.000	0.00	1.46	2.43
463.80	1.49	0.037	46,285.000	0.00	1.49	54.66
463.90	1.52	0.143	46,544.013	0.00	1.52	209.40
464.00	1.55	0.250	46,803.749	0.00	1.55	365.01
464.10	1.58	0.358	47,064.208	0.00	1.58	521.48
464.20	1.61	0.466	47,325.389	0.00	1.61	678.83
464.30	1.64	0.575	47,587.293	0.00	1.64	837.04
464.40	1.70	0.685	47,849.920	0.00	1.70	996.16
464.50	1.80	0.795	48,113.269	0.00	1.80	1,156.21
464.60	1.91	0.906	48,377.341	0.00	1.91	1,317.14
464.70	1.99	1.017	48,642.136	0.00	1.99	1,478.91
464.80	2.06	1.129	48,907.654	0.00	2.06	1,641.56
464.90	2.12	1.242	49,173.894	0.00	2.12	1,805.09
465.00	2.18	1.355	49,440.857	0.00	2.18	1,969.51
465.10	2.23	1.469	49,708.543	0.00	2.23	2,134.81
465.20	2.28	1.583	49,976.951	0.00	2.28	2,301.01
465.30	2.33	1.698	50,246.082	0.00	2.33	2,468.09
465.40	2.38	1.814	50,515.936	0.00	2.38	2,636.08
465.50	2.43	1.930	50,786.512	0.00	2.43	2,804.96
465.60	2.47	2.047	51,057.812	0.00	2.47	2,974.75
465.70	2.52	2.165	51,329.834	0.00	2.52	3,145.44
465.80	2.56	2.283	51,602.578	0.00	2.56	3,317.03
465.90	2.60	2.401	51,876.045	0.00	2.60	3,489.54
466.00	2.64	2.521	52,150.235	0.00	2.64	3,662.96
466.10	2.68	2.641	52,425.148	0.00	2.68	3,837.29
466.20	2.72	2.762	52,700.784	0.00	2.72	4,012.54
466.30	2.76	2.883	52,977.142	0.00	2.76	4,188.71
466.40	2.85	3.005	53,254.223	0.00	2.85	4,365.85
466.50	3.05	3.127	53,532.026	0.00	3.05	4,544.02
466.60	3.33	3.251	53,810.552	0.00	3.33	4,723.21
466.70	3.68	3.374	54,089.801	0.00	3.68	4,903.40
466.80	4.10	3.499	54,369.773	0.00	4.10	5,084.58
466.90	4.56	3.624	54,650.467	0.00	4.56	5,266.74
467.00	5.05	3.750	54,931.884	0.00	5.05	5,449.87
467.10	5.34	3.876	55,214.024	0.00	5.34	5,633.74
467.20	5.61	4.003	55,496.887	0.00	5.61	5,818.52
467.30	5.86	4.131	55,780.472	0.00	5.86	6,004.23
467.40	6.09	4.259	56,064.780	0.00	6.09	6,190.87
467.50	6.31	4.389	56,349.810	0.00	6.31	6,378.45
467.60	6.52	4.518	56,635.564	0.00	6.52	6,566.97
467.70	6.72	4.649	56,922.039	0.00	6.72	6,756.43
467.80	6.91	4.780	57,209.238	0.00	6.91	6,946.84

South Basin

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years
Label: 1 Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
467.90	7.09	4.911	57,497.160	0.00	7.09	7,138.20
468.00	8.16	5.044	57,785.804	0.00	8.16	7,331.41
468.10	9.97	5.177	58,075.171	0.00	9.97	7,526.31
468.20	12.25	5.310	58,365.260	0.00	12.25	7,722.67
468.30	14.92	5.445	58,656.072	0.00	14.92	7,920.37
468.40	17.92	5.580	58,947.607	0.00	17.92	8,119.38
468.50	21.22	5.715	59,239.865	0.00	21.22	8,319.65
468.60	24.79	5.852	59,532.845	0.00	24.79	8,521.18
468.70	28.61	5.989	59,826.548	0.00	28.61	8,723.93
468.80	32.66	6.126	60,120.974	0.00	32.66	8,927.90
468.90	36.94	6.265	60,416.122	0.00	36.94	9,133.07
469.00	41.42	6.404	60,711.994	0.00	41.42	9,339.43
469.10	46.11	6.543	61,008.587	0.00	46.11	9,546.98
469.20	47.86	6.684	61,305.904	0.00	47.86	9,752.59
469.30	49.46	6.825	61,603.943	0.00	49.46	9,959.04
469.40	51.00	6.967	61,902.705	0.00	51.00	10,166.43
469.50	52.49	7.109	62,202.190	0.00	52.49	10,374.76
469.60	53.94	7.252	62,502.397	0.00	53.94	10,584.05
469.70	55.35	7.396	62,803.327	0.00	55.35	10,794.30
469.80	56.73	7.540	63,104.980	0.00	56.73	11,005.52
469.90	58.06	7.686	63,407.356	0.00	58.06	11,217.71
470.00	59.37	7.832	63,710.454	0.00	59.37	11,430.88
470.10	60.65	7.978	64,014.275	0.00	60.65	11,645.04
470.20	61.90	8.126	64,318.818	0.00	61.90	11,860.17
470.30	63.12	8.274	64,624.085	0.00	63.12	12,076.30
470.40	64.32	8.422	64,930.074	0.00	64.32	12,293.42
470.50	65.50	8.572	65,236.785	0.00	65.50	12,511.55
470.60	66.65	8.722	65,544.220	0.00	66.65	12,730.67
470.70	67.79	8.873	65,852.377	0.00	67.79	12,950.80
470.80	68.90	9.024	66,161.257	0.00	68.90	13,171.93
470.90	70.00	9.176	66,470.859	0.00	70.00	13,394.08
471.00	71.08	9.329	66,781.185	0.00	71.08	13,617.25
471.10	72.14	9.483	67,092.233	0.00	72.14	13,841.44
471.20	73.19	9.637	67,404.003	0.00	73.19	14,066.64
471.30	74.22	9.792	67,716.497	0.00	74.22	14,292.87
471.40	75.24	9.948	68,029.713	0.00	75.24	14,520.14
471.50	76.24	10.105	68,343.652	0.00	76.24	14,748.43
471.60	77.23	10.262	68,658.313	0.00	77.23	14,977.75
471.70	78.21	10.420	68,973.697	0.00	78.21	15,208.12
471.80	79.17	10.579	69,289.804	0.00	79.17	15,439.52
471.90	80.12	10.738	69,606.634	0.00	80.12	15,671.97
472.00	81.06	10.898	69,924.186	0.00	81.06	15,905.46
472.10	81.99	11.059	70,242.461	0.00	81.99	16,140.00

South Basin

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 100 years

Label: 1 Storm Event:

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
472.20	82.91	11.221	70,561.459	0.00	82.91	16,375.59
472.30	83.82	11.383	70,881.179	0.00	83.82	16,612.24
472.40	84.72	11.546	71,201.622	0.00	84.72	16,849.94
472.50	85.61	11.710	71,522.788	0.00	85.61	17,088.71
472.60	86.49	11.875	71,844.677	0.00	86.49	17,328.53
472.70	87.36	12.040	72,167.288	0.00	87.36	17,569.42
472.80	88.23	12.206	72,490.622	0.00	88.23	17,811.38
472.90	89.08	12.373	72,814.678	0.00	89.08	18,054.41
473.00	89.93	12.540	73,139.458	0.00	89.93	18,298.51
473.10	90.76	12.709	73,464.960	0.00	90.76	18,543.69
473.20	91.59	12.878	73,791.185	0.00	91.59	18,789.95
473.30	92.42	13.047	74,118.132	0.00	92.42	19,037.29
473.40	93.23	13.218	74,445.802	0.00	93.23	19,285.71
473.50	94.04	13.389	74,774.195	0.00	94.04	19,535.22
473.60	94.84	13.561	75,103.311	0.00	94.84	19,785.81
473.70	95.63	13.734	75,433.149	0.00	95.63	20,037.50
473.80	96.42	13.908	75,763.710	0.00	96.42	20,290.28
473.90	97.20	14.082	76,094.994	0.00	97.20	20,544.16
474.00	97.98	14.257	76,427.000	0.00	97.98	20,799.14

South Basin

Subsection: Pond Inflow Summary
Label: 1 (IN)

Return Event: 100 years
Storm Event:

Summary for Hydrograph Addition at '1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

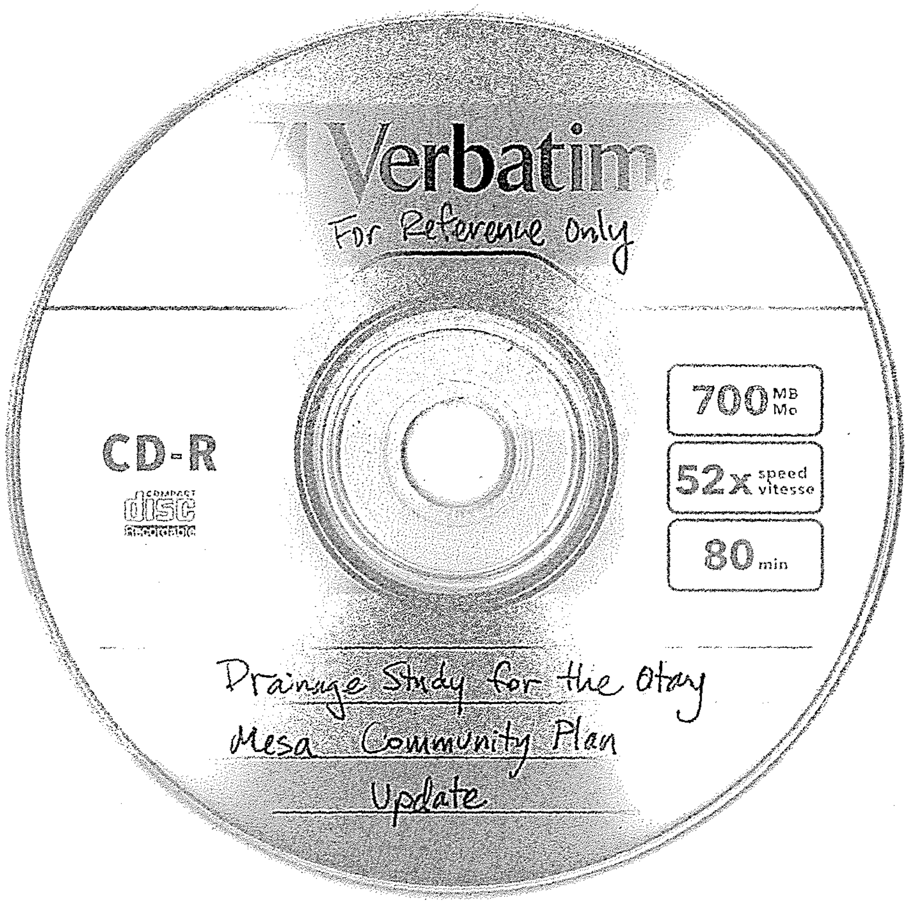
Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	CM-1	9.069	252.000	151.60
Flow (In)	1	9.069	252.000	151.60

5

APPENDIX 5

Drainage Study for the Otay Mesa Community Plan Update

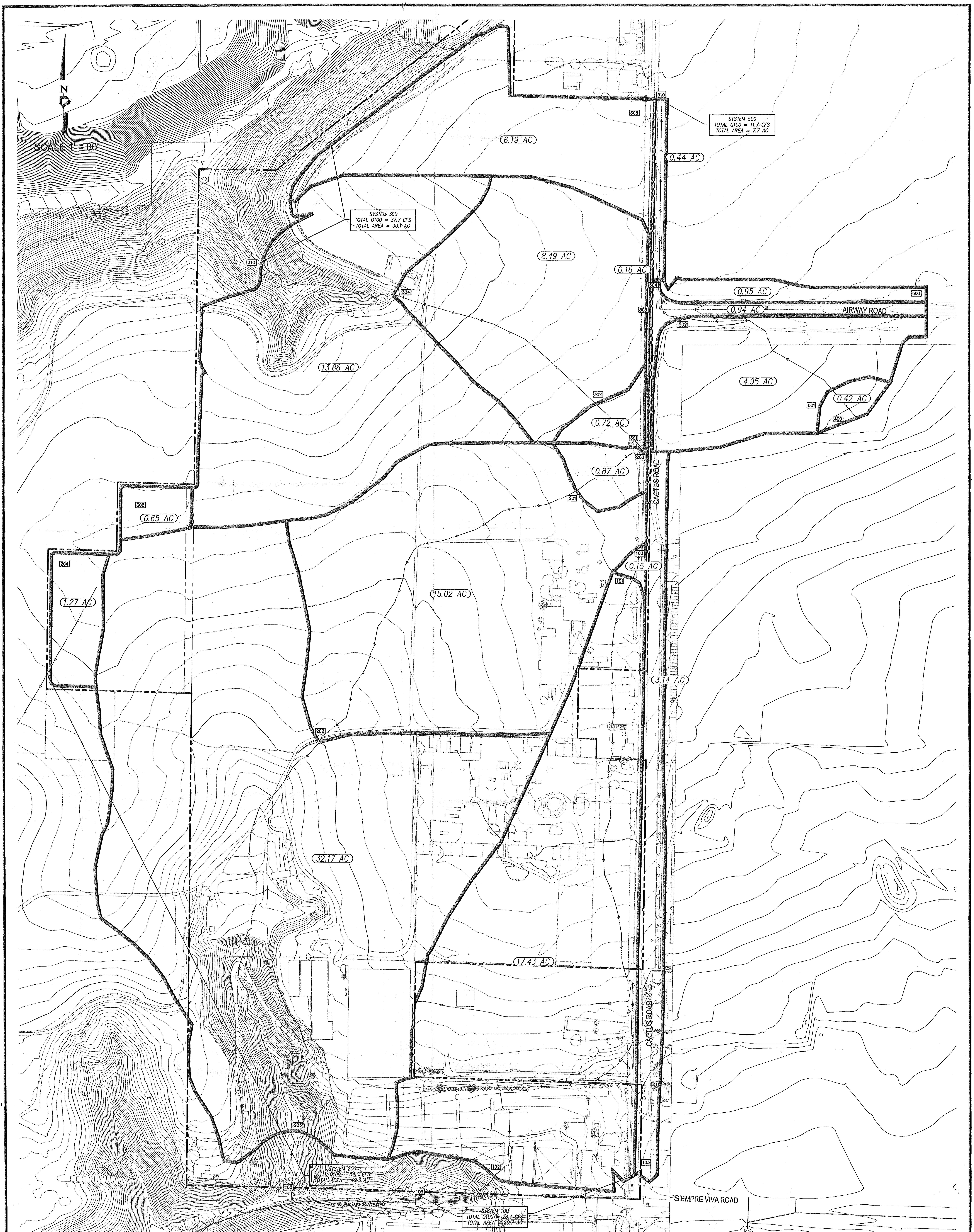
(For Reference Only)


Verbatim
For Reference Only
CD-R
COMPACT disc Recordable
700 MB Mo
52x speed vitesse
80 min
Drainage Study for the Otay
Mesa Community Plan
Update

6

APPENDIX 6

Drainage Exhibits



LEGEND

PROPERTY BOUNDARY		HYDROLOGY NODE	
DRAINAGE SUBAREA		AREA FROM UPSTREAM TO DOWNSTREAM NODE	X.XX AC
FLOW DIRECTION			

NOTE: SUPPLEMENTAL TOPOGRAPHY IS 2-FT CONTOURS FROM SANGIS (1997, BEFORE SR 905 WAS BUILT)

SCALE: 1"=80'

JOB #: 2357.35

CREATED: 5/01/17

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

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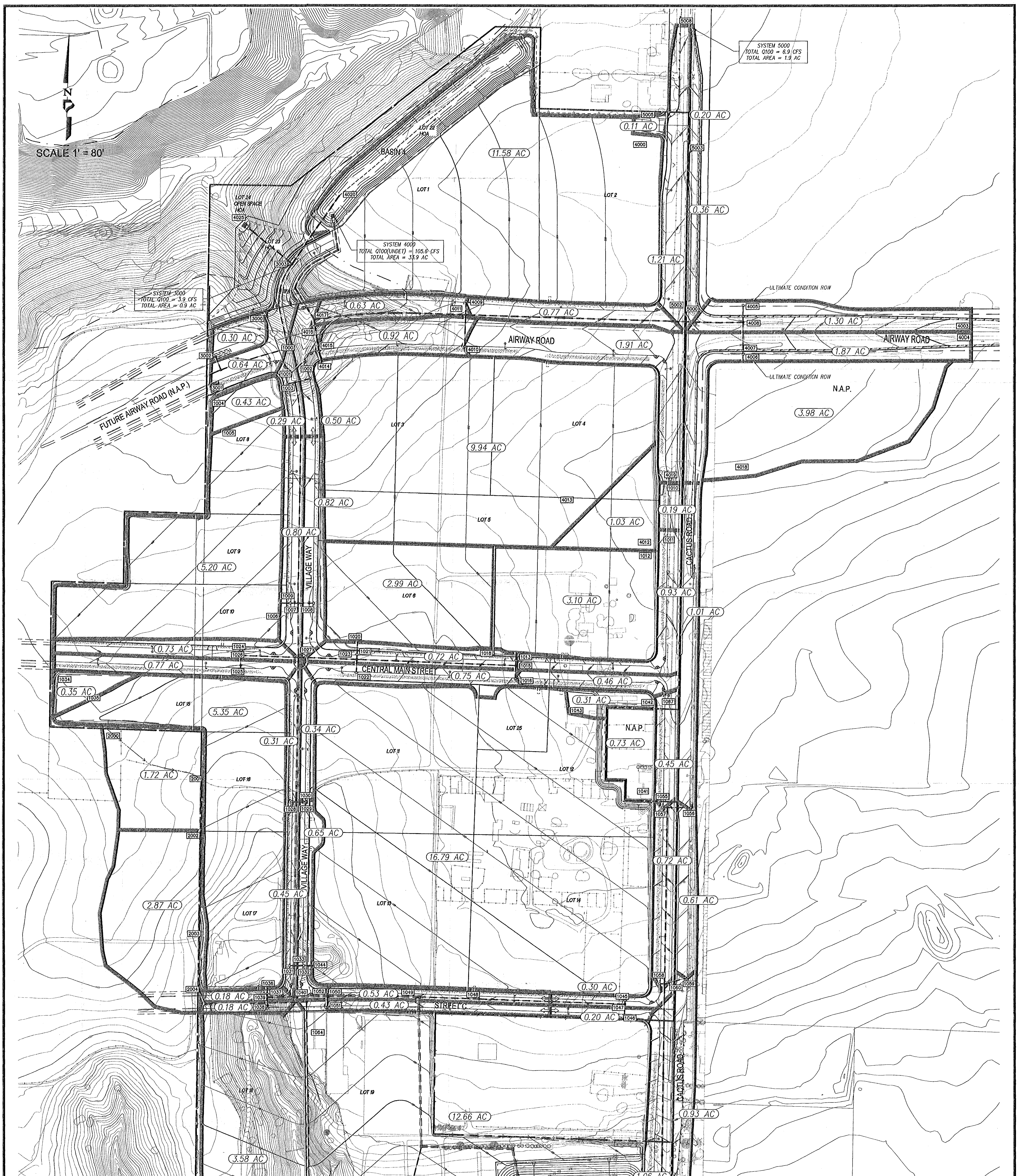
CITY OF SAN DIEGO

LUMINA-OTAY CANYON RANCH

DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A



LEGEND

PROPERTY BOUNDARY	
DRAINAGE SUBAREA	
FLOW DIRECTION	
HYDROLOGY NODE	
AREA FROM UPSTREAM TO DOWNSTREAM NODE	X.XX AC

NOTE: SUPPLEMENTAL TOPOGRAPHY IS 2-FT CONTOURS FROM SANGIS (1997, BEFORE SR 905 WAS BUILT)

SCALE: 1"=80'
JOB #: 2357.35
CREATED: 8/7/18

PREPARED BY:
PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

CITY OF SAN DIEGO
LUMINA-OTAY CANYON RANCH
DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT B

Project Name: Lumina II

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.