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

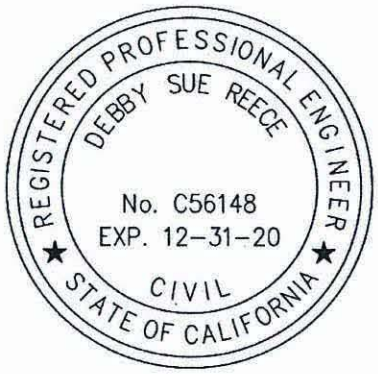
Prepared By:

PROJECT DESIGN CONSULTANTS

Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

PDC Job No. 2357.60



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.

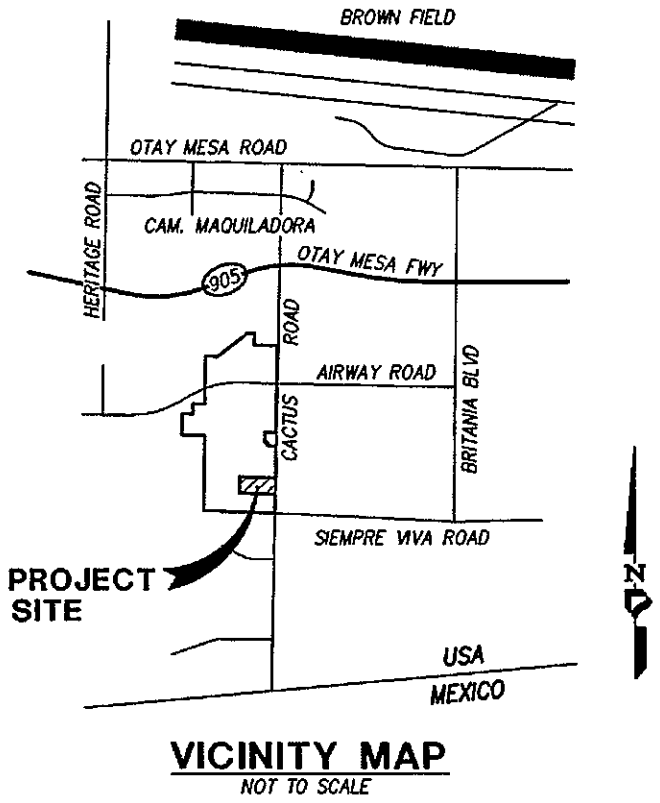


Figure 1: Vicinity Map

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

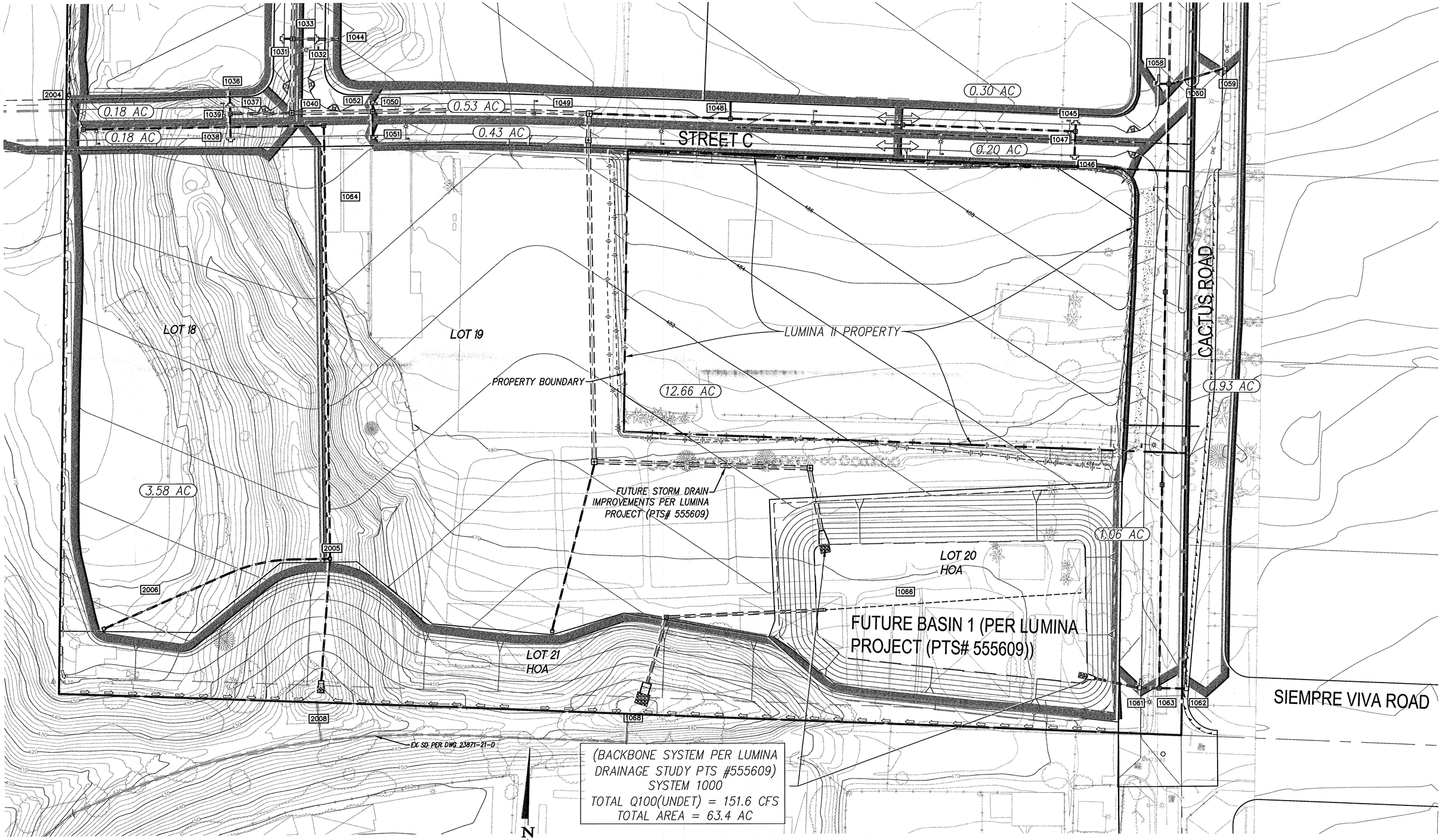
The hydrologic analysis was performed for the overall Lumina site (which included Lumina II) and can be found in the approved Lumina Drainage Study (PTS#555609), which is included in this submittal for reference. This Lumina II report does not include additional hydrologic analysis because the project 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



LEGEND

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

SCALE 1' = 50'

NOTE: SUPPLEMENTAL TOPOGRAPHY 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
Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

CITY OF SAN DIEGO

LUMINA II

DRAINAGE MAP
PROPOSED CONDITIONS
EXHIBIT A

APPENDIX 2

Lumina Drainage Study (For Reference Only)

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

Prepared For:

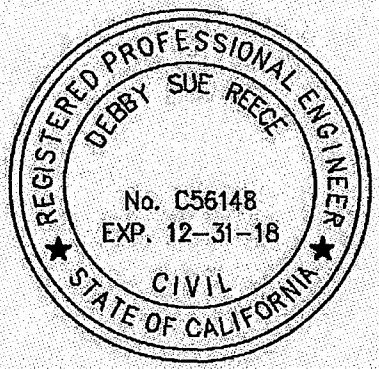
COLRICH
444 West Beech Street, Suite 300
San Diego, CA 92101

Prepared By:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

PDC Job No. 2357.35



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

Debby Reece, PE RCE 56148
Registration Expires 12/31/18

TABLE OF CONTENTS

TABLES

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.

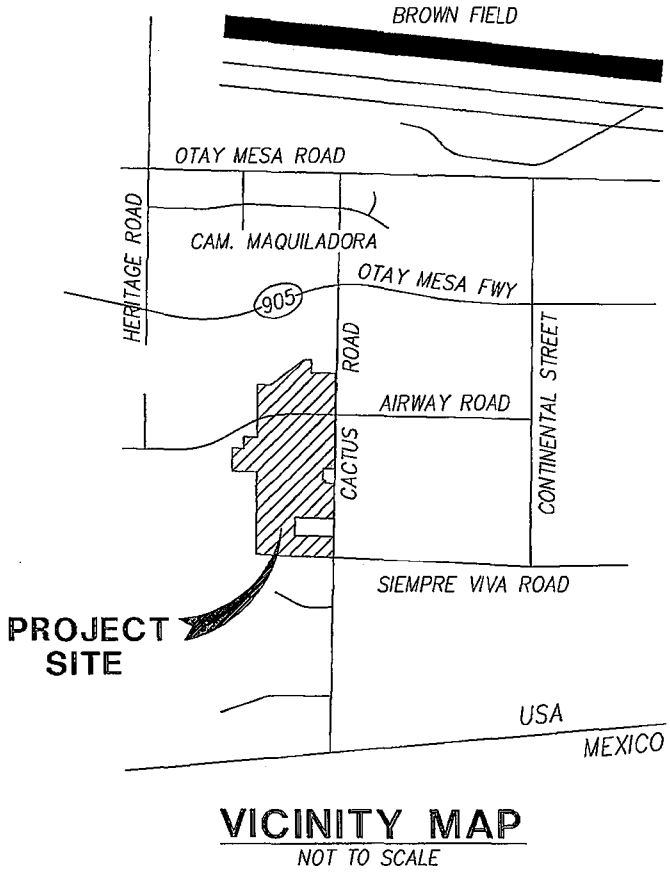


Figure 1: Vicinity Map

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.

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%

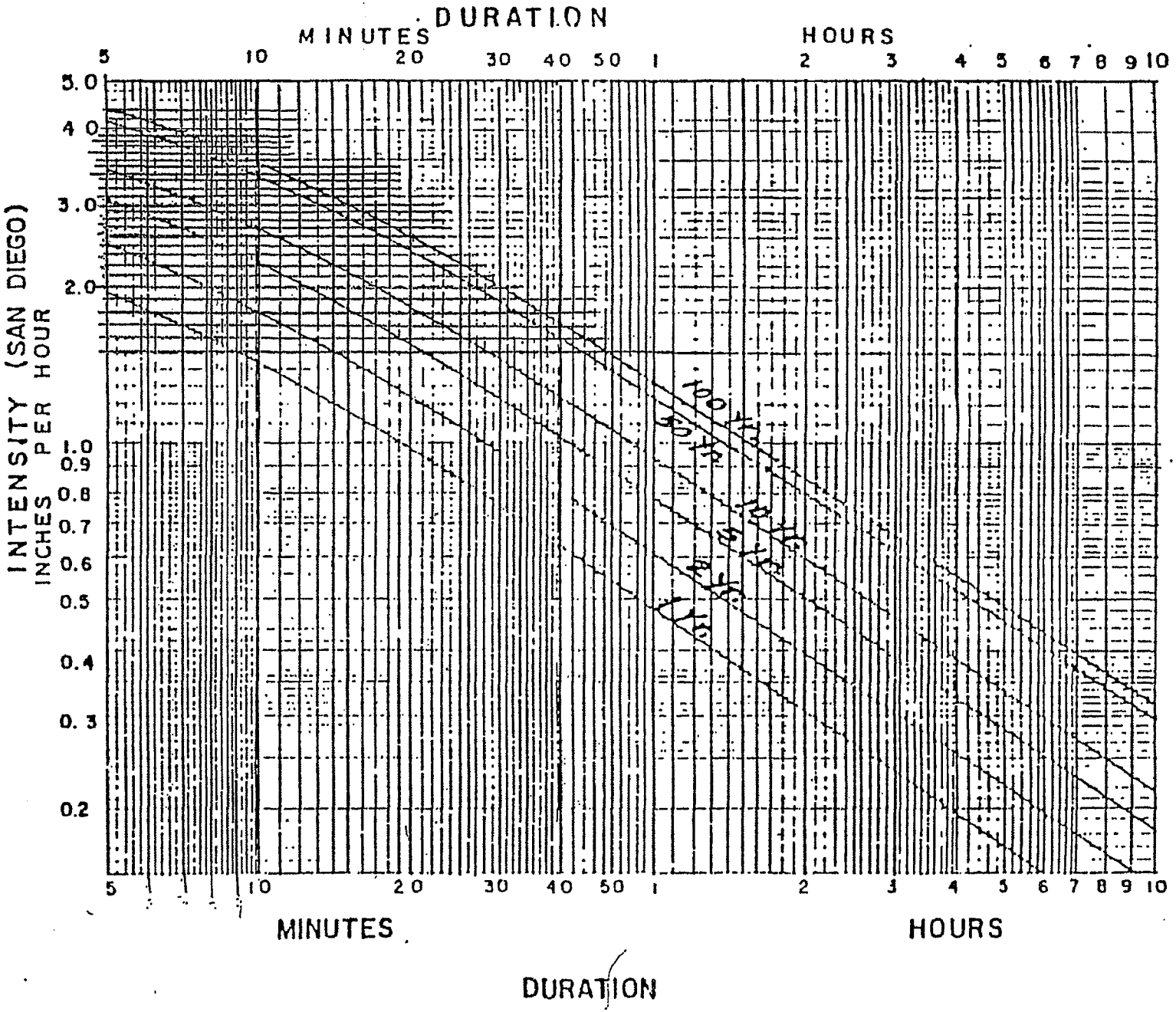
Revised C = $\frac{50}{80}$ x 0.85 = 0.53

APPENDIX

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

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.



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.)
```

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
```

```
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.)
```

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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```



```
[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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```

```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1015.000 to Point/Station     1023.000
```



```
**** 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)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.
```

```
Time of concentration (TC) =      5.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)
```



```
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```



```
Subarea runoff =      1.037(CFS) for    0.340(Ac.)
Total runoff =     49.689(CFS)  Total area =       19.33(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```

```
[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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```



```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)
```

```
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1039.000 to Point/Station     1040.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =    476.100(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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1039.000 to Point/Station     1040.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
```



```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```

```
Total runoff =    107.102(CFS)  Total area =       45.00(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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)]
```



```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1047.000 to Point/Station     1049.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
```

```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```



```
Total runoff =    136.805(CFS)  Total area =      58.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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
```

```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```

```
                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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
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.)
```

```
                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
```



```
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.)
```

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 **********

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.)

++
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.)

++
Process from Point/Station 4005.000 to Point/Station 4008.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```
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.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.
```



```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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.)
```

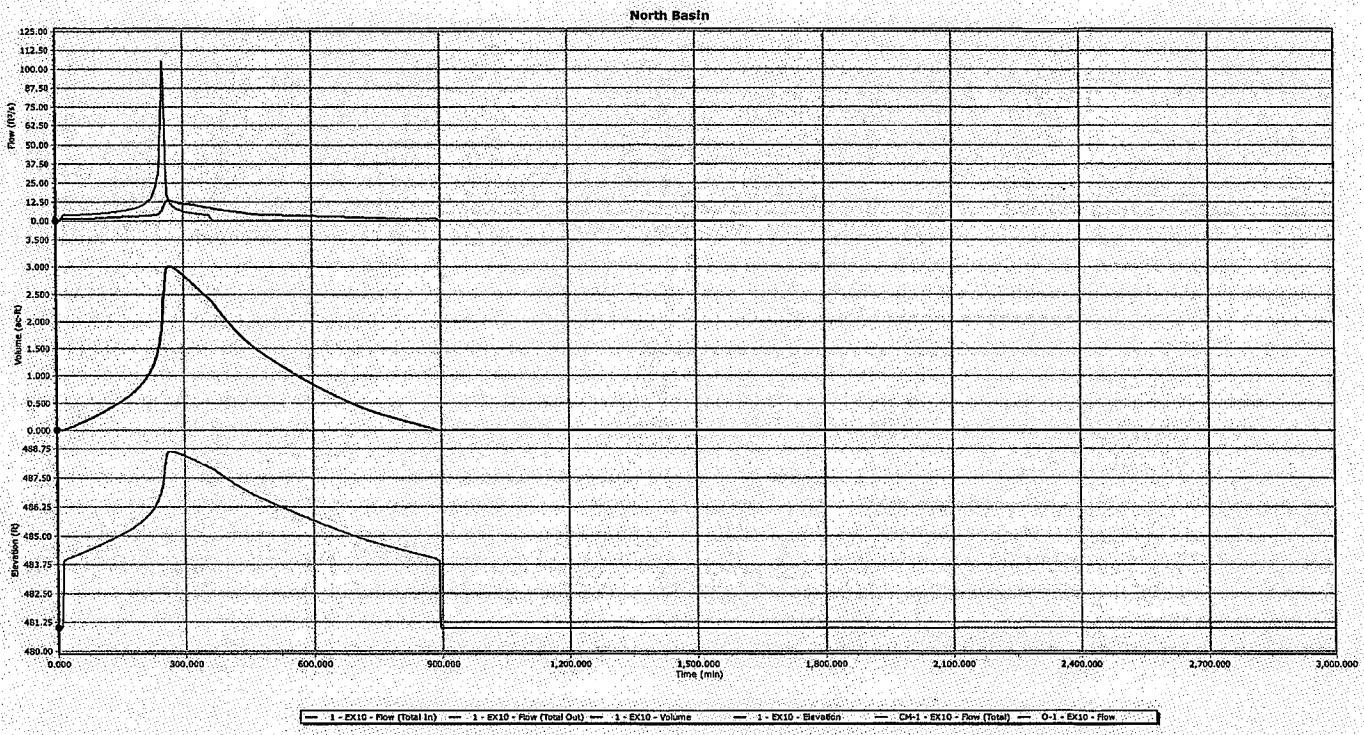


```
Length of street segment =   320.000(Ft.)
Height of curb above gutter flowline =    6.0(In.)
Width of half street (curb to crown) =  26.000(Ft.)
Distance from crown to crossfall grade break =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz) =   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.)
```

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
Label: 1

Return Event: 100 years
Storm Event:

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	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
Label: 1

Return Event: 100 years
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 ft²
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 (ft^3/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 (ft³/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
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
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
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
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
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
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
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 + 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 (ft^3/s)	Storage (ac-ft)	Area (ft^2)	Infiltration (ft^3/s)	Flow (Total) (ft^3/s)	2S/t + O (ft^3/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)
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)
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)

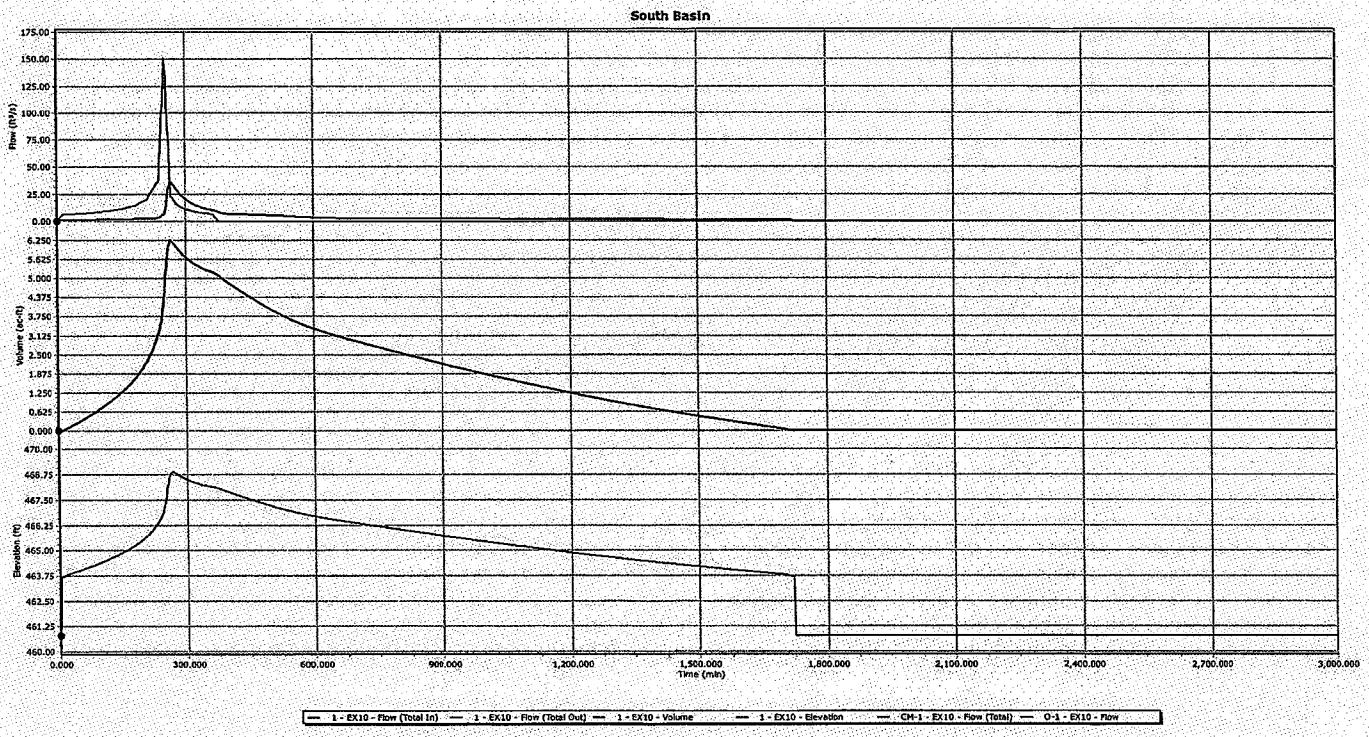
Return Event: 100 years
Storm Event:

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) (ft^3/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)
175.00
150.00
125.00
100.00
75.00
50.00
25.00
0.00
Volume (ac-ft)
6.250
5.625
5.000
4.375
3.750
3.125
2.500
1.875
1.250
0.625
0.000
Elevation (ft)
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
CM-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
Label: 1

Return Event: 100 years
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
Label: 1

Return Event: 100 years
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 ft²
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 (ft^3/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
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)
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
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
0-Underdrain orifice
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
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
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
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
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

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 + 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

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

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)
Label: 1

Return Event: 100 years
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)
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)
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)
Label: 1

Return Event: 100 years
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

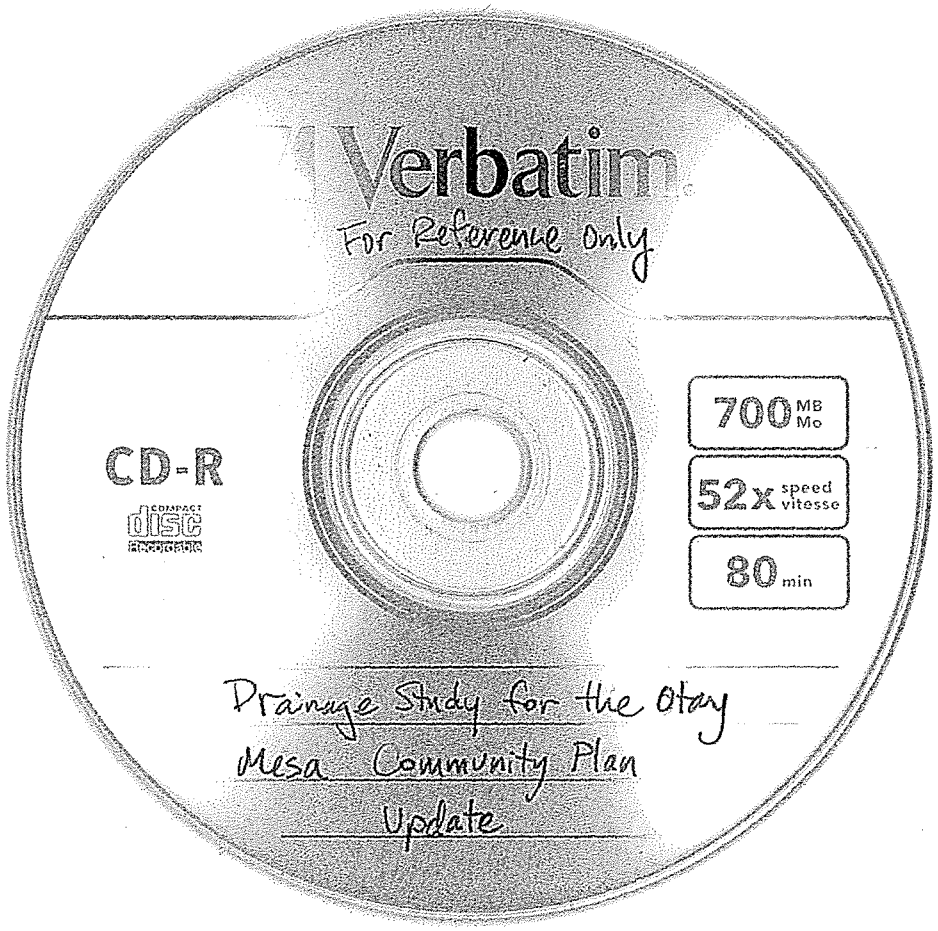
Node Inflows

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

APPENDIX 5

Drainage Study for the Otay Mesa Community Plan Update

(For Reference Only)


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

APPENDIX 6

Drainage Exhibits

N

SCALE 1" = 80'

SYSTEM 500
TOTAL Q100 = 11.7 CFS
TOTAL AREA = 7.7 AC

SYSTEM 300
TOTAL Q100 = 37.7 CFS
TOTAL AREA = 30.1 AC

SYSTEM 200
TOTAL Q100 = 54.0 CFS
TOTAL AREA = 49.3 AC

SYSTEM 100
TOTAL Q100 = 28.4 CFS
TOTAL AREA = 20.7 AC

6.19 AC
0.44 AC
8.49 AC
0.16 AC
0.95 AC
0.94 AC
13.86 AC
4.95 AC
0.42 AC
0.72 AC
0.87 AC
0.65 AC
1.27 AC
15.02 AC
0.15 AC
3.14 AC
32.17 AC
17.43 AC

510 305 504 503 303 502 304 310 302 501 400 301 200 201 308 204 100 101 202 203 102 103 205 105 DE 50 PER DWG 23871-21-D

AIRWAY ROAD
CACTUS ROAD
CACTUS ROAD
SIEMPRE VIVA ROAD

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: 5/01/17

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

CITY OF SAN DIEGO

LUMINA-OTAY CANYON RANCH

DRAINAGE MAP
EXISTING CONDITIONS
EXHIBIT A

SCALE 1" = 80'

N

SYSTEM 5000
TOTAL Q100 = 6.9 CFS
TOTAL AREA = 1.9 AC

SYSTEM 4000
TOTAL Q100(UNDET) = 105.6 CFS
TOTAL AREA = 33.9 AC

SYSTEM 3000
TOTAL Q100 = 3.9 CFS
TOTAL AREA = 0.9 AC

SYSTEM 2000
TOTAL Q100 = 10.2 CFS
TOTAL AREA = 8.2 AC

SYSTEM 1000
TOTAL Q100(UNDET) = 151.6 CFS
TOTAL AREA = 63.4 AC

BASIN A

BASIN 1

0.20 AC
0.11 AC
11.58 AC
0.36 AC
1.21 AC
0.63 AC
0.77 AC
0.30 AC
0.92 AC
1.91 AC
1.30 AC
0.64 AC
1.87 AC
0.43 AC
0.29 AC
0.50 AC
3.98 AC
9.94 AC
0.82 AC
0.19 AC
1.03 AC
0.80 AC
5.20 AC
2.99 AC
3.10 AC
0.93 AC
1.01 AC
0.73 AC
0.72 AC
0.77 AC
0.75 AC
0.46 AC
0.35 AC
0.31 AC
5.35 AC
0.34 AC
0.31 AC
0.73 AC
0.45 AC
1.72 AC
0.65 AC
16.79 AC
0.72 AC
0.45 AC
2.87 AC
0.61 AC
0.18 AC
0.53 AC
0.30 AC
0.18 AC
0.43 AC
0.20 AC
12.66 AC
0.93 AC
3.58 AC
1.06 AC

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14
LOT 15
LOT 17
LOT 18
LOT 19
LOT 20 HOA
LOT 21 HOA
LOT 22 HOA
LOT 23 HOA
LOT 24 OPEN SPACE HOA
LOT 25

AIRWAY ROAD
FUTURE AIRWAY ROAD (N.A.P.)
CENTRAL MAIN STREET
VILLAGE WAY
CACTUS ROAD
SIEMPRE VIVA ROAD
STREET C
ULTIMATE CONDITION ROW
N.A.P.
EX SD PER DWG 23871-21-D

LEGEND

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

NOTE: SUPPLEMENTAL TOPOGRAPY 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
701 B Street, Suite 800
San Diego, CA 92101
619.235.5471 Tel
619.234.0349 Fax

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