



CONCEPTUAL DRAINAGE STUDY

CIELO VISTA TRACT 17341

Yorba Linda, California
County of Orange

PLANNING APPLICATION NO. PA100004

Prepared for

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FOR
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APN: 351-031-05 AND 351-031-17
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1.0 INTRODUCTION

1.1 PROJECT INTRODUCTION AND BACKGROUND

The proposed Cielo Vista Project, Tract No. 17341 site encompasses approximately 84 acres located in unincorporated Orange County, within the city sphere of Yorba Linda. The project sits within the foothills of Yorba Linda and is bounded by Dorinda Road and Aspen Way to the west; Via Del Agua and Stonehaven Drive to the south, east-west trending hills with v-shaped canyons to the east and existing residential units to the north. Adjacent land uses include residential properties to the west and south of the site. A Vicinity Map is included in Section 1.4.

Under existing conditions, the project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails that traverse the site. The project site has been subject to a mineral lease for oil production as part of the Esperanza Oil Field. Oil production facilities within the project site include both operational and abandoned wells, one idle well and tank batteries, unimproved oil field service roads, and unimproved drill pad sites scattered throughout the site.

The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure within two Planning Areas. Planning Area 1 (south site), located in the southerly portion of the site, would include 95 residences within 41.3 gross acres with access provided through Via Del Agua along the south of the site. Planning Area 2 (north site), located in the northwesterly part of the site, would include 17 residences within 6.4 gross acres with access provided from Aspen Way to the west.

1.2 PURPOSE OF THIS REPORT

The purpose of this “conceptual” analysis is to identify and analyze the pre and post-project drainage conditions in order to provide adequate drainage facilities for the proposed Cielo Vista residential development located in unincorporated County of Orange, California.

This Conceptual Drainage Study will analyze and compare the 10-year, 25-year and 100-year storm events for the existing and proposed conditions. Outcomes of the analysis will facilitate the conceptual layout of a drainage system in support of the project Environmental Impact Report (EIR) to adequately convey storm runoff through the site without adversely impacting surrounding areas, neighboring properties, and/or existing storm drain facilities.

This report also includes a discussion of the MS4 stormwater requirements for the County of Orange and will integrate a water quality concept that will be further described in a separate Conceptual WQMP.

1.3 REFERENCES

The following references were used to evaluate hydrologic conditions and water quality requirements:

- Orange County Hydrology Manual (October 1986)
- Orange County Hydrology Manual Addendum No. 1 (1996)
- Orange County Local Drainage Manual (January 1996)
- Orange County MS4 Permit. Order No. R8-2009-0030, NPDES Permit No. CAS618030 as Amended by Order No. R8-2010-0062.

1.4 PROJECT SITE LOCATION MAP

The Project Site is identified in the location map shown below.



2.0 EXISTING TOPOGRAPHIC & HYDROLOGIC CONDITIONS

2.1 EXISTING TOPOGRAPHY

The approximate 84-acre project site is characterized by steeply sloping hillsides vegetated by scrub and chaparral. Runoff from the site is directed to drainages that slope southwesterly with slopes varying from two percent (2%) to areas as steep as 1.5:1. Side sloped canyons, to which the drainages are located, have slopes up to 2:1 with some locally steeper and flatter elements. Elevations range from 560 feet above mean sea level (MSL) in the southern portions of the project site, to approximately 885 feet above MSL at the highest point in the northern portions of the project site. With the exception of the few on-site oil production facilities, the site is nearly a 100 percent pervious area.

2.2 EXISTING DRAINAGE PATTERN

For purposes of this hydrology discussion, the project site is generally described as consisting of two distinct areas: Planning Area 1 (approximately 41.3 acres, located in the southerly portion of the site, also known as the South Site) and Planning Area 2 (approximately 42.7 acres, located in the northwesterly part of the site, also known as the North Site).

The project site is downstream of four significant offsite natural tributary areas that drain via overland flow through natural flow paths, which are ultimately intercepted by the drainage systems described in Section 2.3. The four tributary areas from the east, identified as Creeks 'A', 'B', 'C', and 'D', pass through the project site and are illustrated in the existing hydrology maps located in Appendix A. Additionally, a major tributary runoff from the northwest emanates from the existing residential Tract 9813 and is conveyed towards the Cielo Vista project via an 84" R.C.P. which then joins Creek 'D'. The natural onsite terrain conveys the flows through the site towards downstream offsite drainage facilities.

Natural runoff from the onsite and offsite tributary areas are directed towards three receiving storm drain systems located downstream of the project at the following locations;

1. An 8' wide by 7' high RCB, located at Stonehaven Drive to the south (referred to as the "Southern Boundary").
2. A 36-inch RCP, located just east of Dorinda Road, north of Felipa Road (referred to as "Dorinda Road").
3. Esperanza Channel, located between San Antonio Road and Via Corona to the west of the project site (referred to as the "Western Boundary").

These three facilities will intercept storm flows discharged from the project site. The North Site drains to the Western Boundary, while the South Site drains to both the Southern Boundary and Dorinda Road.

Runoff from the North Site, inclusive of four large offsite tributaries (Creeks 'B', 'C', 'D' and Tract 9813), converge onsite prior to leaving the property at the western project boundary. These combined flows (identified as Creek 'F') continue to drain via overland flow where they are intercepted by Esperanza Channel located adjacent to San Antonio Road.

A large offsite natural tributary area located to the west of the project site (Creek 'E'), drains to the receiving southern portion of the project site, discharging to the receiving box culvert (8-foot by 7-foot) storm drain located within Stonehaven Drive. Approximately 17.8 acres, comprised of 13 acres of onsite from the South Site and 4.8 acres of offsite storm flows drain to a 36-inch RCP at Dorinda Road (Creek 'E').

2.3 EXISTING OFFSITE STORM DRAIN FACILITIES

As noted previously, the project site experiences offsite surface drainages from the north, northwest, and easterly areas. In order to accurately document the offsite existing drainage conditions, field investigations were performed along with reviewing aerials, various historical photos and as-built plans. There is one upstream offsite drainage facilities from Tract 9813 as described previously that discharges storm flows towards the project.

Upstream Storm Drain – Currently one existing storm drain facility discharges storm flows towards to the site. Detailed information for this facility is summarized below;

Table 2.3-1

| Description | Type | Size | Ownership | Flowrate (cfs) | |
|---------------------------|---------------|------|---------------------|---------------------|---------------------|
| | | | | 25 year | 100 year |
| Tract 9813 ⁽¹⁾ | Circular Pipe | 84" | City of Yorba Linda | 1160 ⁽²⁾ | 1580 ⁽²⁾ |

Notes:

1. Previous drainage studies in support of the Project EIR include Tract 9813 within Creek 'D' tributaries and analyses.
2. Flow rates are based upon the Preliminary Drainage Report for the Esperanza Hills Project, dated June 20, 2013.

Downstream Storm Drain Point of Connection – Each of the three existing storm drain facilities downstream of the project as described in Section 2.2 are publically owned and maintained. The drainage inlets off Stonehaven Drive and Dorinda Road are owned and maintained by the city of Yorba Linda, whereas the drainage inlet at Esperanza Channel off San Antonio Road is owned and maintained by OCFCD. Each system outlets to the Santa Ana River, approximately two miles south of the project site. These storm drain facilities currently have adequate capacity to accommodate existing storm flows. The proposed project will propose a drainage design that will not exceed the current conveyance capacity of the existing downstream facilities. Detailed storm drain information for each facility is provided as follows;

Table 2.3-2

| Description | Type | Size | Ownership | Flowrate (cfs) | |
|----------------------------|---------------|---------|---------------------|----------------|----------|
| | | | | 25 year | 100 year |
| Esperanza Channel | Open Channel | 13'x11' | OCFCD | 2593.6 | 3470.2 |
| Storm Drain at Dorinda Rd. | Circular Pipe | 36" RCP | City of Yorba Linda | 39.4 | 52.3 |
| RCB at Stonehaven Dr. | RCB | 8'x7' | City of Yorba Linda | 890.4 | 1195.5 |

See "Base Map of Drainage Facilities in Orange County" – Sheet No. 9 for facility ownership identification (located in Appendix E). Existing plans for each offsite drainage facility are located in Appendix E.

2.4 EXISTING ONSITE STORM DRAIN FACILITIES

There are no known onsite drainage facilities that discharge storm flows onto the project or convey storm flows through the project. All storm flows are currently conveyed through the site via natural v-shaped surface drainages.

3.0 HYDROLOGY

3.1 STORM FREQUENCY

Per Orange County's requirements, the design storm for this project varies based upon the design facilities, a 10-year, 25-year, and 100-year storm event is analyzed and modeled as applicable. The 100-year storm event will be analyzed to model the off-site tributary flows and hydraulic conveyance through the project. The 25-year storm will be analyzed for the proposed condition street capacities and hydraulic conveyance of the onsite storm drain facilities. Ultimately habitable building floor elevations must be designed to be at least 1 foot above the 100-year flood water surface.

3.2 METHODOLOGY

The area of the study site is under the jurisdiction of the County of Orange, Department of Public Works.

The County of Orange accepts methodologies and practices as described in the Orange County Hydrology Manual and the Orange County Local Drainage Manual – January 1996. The Orange County Hydrology Manual uses a return period of 10-year, 25-year, and 100-year storm event to describe drainage characteristics and design capacity.

The computer program used for this report to perform hydrologic calculations is the CivilCadd/Civil Design Engineering Software, Version 7.0 program packaged 2005 by Bondiman and Associates, Inc. This software has been identified as acceptable software within the County of Orange.

Civil Design's Rational Hydrology Program and Unit Hydrograph Analysis was used to determine all runoff tributary to Planning Area 1. Included in this area of study are the areas

tributary to project outfall for the existing 8'x7' RCB at Stonehaven Dr. (Creek 'A') and existing 36" RCP at Dorinda Road (Creek 'E').

For Planning Area 2 upstream tributary runoff was sourced from the approved "Preliminary Drainage Reports for Esperanza Hills Property, Option 2" prepared by KWC Engineers, dated May 2013. Specifically Creek 'B', 'C' and 'D' are all tributary to the northern portion of the subject property and areas adjacent to Planning Area 2. This study area encompasses all runoff tributary to the existing project outfall of Esperanza Channel (Creek 'F'), located at San Antonio Road. For key portions along the perimeter of the site, the runoff was based on prorated Q's from KWC's analysis, unless otherwise identified. Existing drainage subareas B-1, F-1 and F-2 were calculated using Civil Design's Rational Hydrology Program with user defined time of concentration of upstream portions from KWC's study.

3.3 EXISTING CONDITION HYDROLOGY

As described in Section 2.2, five major drainage tributaries flow towards the project are identified as Creeks 'A', 'B', 'C', 'D' and Tract 9813 tributary. Table 3.3-1 below summarizes the existing 25-year and 100-year storm event flow rates as applicable and tributary area for each creek at various points of interest (indicated as node points on the existing hydrology maps in Appendix A). The nodal points of interest are at the east property boundary, west property boundary and the downstream point of connection to existing facilities. Downstream Creek 'F' is also summarized at its point of connection with the beginning of the Esperanza Channel.

Per this study, the entire tributary area for Creek 'A' was analyzed and modeled to the two points of interest described in Section 3.2. For Creeks 'B', 'C', 'D', and Tract 9813 tributary, hydrologic data from the County approved Esperanza "Preliminary Drainage Report" was utilized to obtain various storm frequency volumetric flow rates as applicable to the Cielo Vista project. Each drainage course was then analyzed from this point to its downstream existing facility point of connection.

See Figures A.1, A.2 and A.3 for Existing Condition Hydrology Maps for Watershed A (Creek 'A'), Watershed E (Creek 'E') and Planning Area 2 respectively. See Figure 9 from the approved "Preliminary Drainage Reports for Esperanza Hills Property, Option 2" (Appendix D) for upstream tributary flows to Planning Area 2.

Table 3.3-1

| Creek Watershed | Node | Description | Existing Runoff (CFS) | | Area Acres |
|-----------------|------|------------------------|-----------------------|--------|------------|
| | | | 100-Yr | 25-Yr | |
| B-1 | 201 | B Creek at east PL | 427.1 | 319.2 | 16.7 |
| B-2 | 202 | Subarea B-2 at east PL | 4.5 | 3.3 | 1.8 |
| B-3 | 203 | Subarea B-3 at east PL | 18.2 | 13.6 | 7.3 |
| C | 304 | C Creek at east PL | 1409.6 | 1054.9 | 647.2 |
| C-1 | 301 | Subarea C-1 at east PL | 8.0 | 6.0 | 3.2 |
| C-2 | 302 | Subarea C-2 at east PL | 3.2 | 2.4 | 1.3 |
| C-3 | 303 | Subarea C-3 at east PL | 12 | 8.9 | 4.8 |

Table 3.3-1

| Creek Watershed | Node | Description | Existing Runoff (CFS) | | Area Acres |
|-----------------|------|------------------------------------|-----------------------|--------|------------|
| | | | 100-Yr | 25-Yr | |
| D-1 | 401 | Subarea D-1 at west PL | 14.7 | 10.0 | 5.4 |
| D-2 | 402 | Subarea D-2 at west PL | 2.0 | 1.5 | 0.8 |
| D-3 | 403 | Subarea D-3 at west PL | 9.0 | 6.7 | 3.8 |
| C | 305 | C Creek at C and D Confluence | 1409.6 | 1054.9 | 647.2 |
| D | 404 | D Creek at C and D Confluence | 1580.8 | 1160.7 | 435.6 |
| B | 204 | B Creek at B and C Confluence | 456.5 | 338.5 | 217.7 |
| F | 501 | F Creek Downstream from Confluence | 3401.8 | 2543.0 | 1366.0 |
| F-1 | 603 | F Creek at west PL | 3406.1 | 2546.2 | 1368.6 |
| F-2 | 606 | F Creek at San Antonio Rd. Inlet | 3470.2 | 2593.6 | 1401.6 |

See “Planning Area 2 – Existing Hydrology Map” (Figure B.3) in Appendix A for node and watershed locations.

3.4 DEBRIS BASIN

It has been understood that the county of Orange defers to the Army Core of Engineers LA District Debris methods and requirements. In order to accommodate this criteria and to protect the proposed storm drain system from debris laden flows, the development project proposes three debris basin as shown in Figures B.2 and B.3.

One debris Basin is proposed for a drainage tributary of approximately 636 acres, which enters the project site at the easterly property line within Planning Area 1 identified as Creek ‘A’. The total debris potential volume for this tributary is approximately 4500 CY, based upon the calculations provided in Appendix C. An area within the project boundary between most easterly cul-de-sac and the property line is designated for a debris basin and shown on the proposed condition Hydrology Map Figure B-2. Further details for calculations and basin design will be provided at the TTM level. If additional area is needed to capture the required debris volume, the proposed lots in this area may be utilized for the construction of a debris basin.

The remaining areas of the project where offsite storm flows must be intercepted in order to convey peak storm flows safely through the project will not require debris basins based upon the Army Core of Engineers LA District Debris methods and requirements (due to the relative small natural tributary areas). Therefore storm drain facilities for these drainages will be designed to pass a bulked flow rate based upon the County’s current requirements.

3.5 PROPOSED CONDITION HYDROLOGY

The proposed condition will consist of a maximum 112 single-family dwelling units along with neighborhood open space and related planning infrastructure required to accommodate the Cielo Vista hillside community. Planning Area 1 is comprised of 95 single-family homes and Planning Area 2 is comprised of 17 single-family homes. Each Planning Area proposes quarter acre residential lots as its land use. A hydrology study was prepared for the onsite

proposed conditions and analyzed a 25-year storm event in order to conceptually design storm drain alignments and estimate storm drain facility sizes. Furthermore a second hydrology study was prepared for the proposed condition, which analyzes a 100-year and 10-year storm event in order to provide conveyance for offsite storm flows through the proposed project and their impacts to the downstream point of connections. These studies were conducted for both Planning Area 1 and Planning Area 2.

Planning Area 1- Generally, the onsite drainage patterns for the proposed condition will be consistent with the existing condition. The site will be graded to slope in a southerly direction and the majority of the on-site flows (approximately 31.9 acres within the limits of construction) will be directed towards Stonehaven Drive, joining an existing City of Yorba Linda maintained 8'x7' reinforced concrete box (RCB) E06501. Creek 'A' also enters this existing facility as it will cross the southeasterly tip of the proposed south site development. This portion of the site will be filled to create development area (see Planning Area 1 - Proposed Hydrology Map - Figure A.2). The portion of Creek 'A' that resides upstream of the development will remain natural.

One adjacent localized creek, Creek 'E' also traverses the southwesterly portion of the site and will be filled to create the development area. This results in roughly 2.2 acres of the proposed developed portions of Planning Area 1, which will drain to the westerly property line as previous described, to be conveyed southerly and directed offsite towards the existing City of Yorba Linda maintained 36-inch storm drain line at Dorinda Road as described in Section 2.3.

Total watershed area tributary to Creek 'A' totals 674 acres with 41.3 acres ($\approx 6.1\%$) comprising the development area and 632.7 acres ($\approx 93.9\%$) comprising upstream natural canyon areas.

Planning Area 2- The north and south sites will be separated by a natural creek approximately 50 feet below proposed pad elevations. Generally, the onsite drainage patterns for the proposed condition will be consistent with the existing condition as well. Creeks 'C' and 'D', as described in the existing condition, will cross the North Site and will be filled to create the development area. Just south of the North Site development area, Creeks 'C' and 'D' confluence with a third creek, Creek 'B' thus becoming Creek 'F', which then drains downstream approximately one-half mile in a southwesterly direction before entering the County of Orange's Esperanza Channel drainage facility at San Antonia Road (see Planning Area 2 - Existing Hydrology Map - Figure A.3). Creek 'B', Creek 'F' and those portions of Creeks 'C' and 'D' that reside upstream of the development will remain natural.

Total watershed area tributary to Creeks 'B', 'C', 'D' and 'F' totals 1,401.6 acres with 7.2 acres ($\approx 0.5\%$) comprising development area and 1,371.3 acres ($\approx 99.5\%$) comprising upstream natural canyon areas. Post development conditions results in an increase of runoff flows toward 'F' Creek. This increase will be detained onsite to maintain predevelopment conditions.

A comparison table between the pre and post project conditions is provided below for the 10, 25 and 100-year storm events at the downstream point of connections. Per As-Built plans, the

existing capacity of the 8'x7' RCB is 1,200 cfs and the existing capacity of the 36" RCP at Dorinda Road is 46.87 cfs (As-Built storm drain plans are located in Appendix E).

Hydrology Calculations for Table 3.5-1 below are provided in Appendix C.

Table 3-5.1

| Unmitigated Hydrology Calculations Summary Table | | | | | | | | | |
|--|------------------------------------|--------------|--------------|--------------------------------------|--------------|--------------|---|--------------|--------------|
| | South Outlet – 8'x7' RCB (PA 1) | | | Southwest Outlet – 36" RCP (PA 1) | | | West Outlet at PL – 'F' Creek (PA 2) | | |
| | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) |
| Existing | 1195.5 | 890.4 | 658.0 | 52.3 | 39.4 | 31.7 | 3406.1 | 2546.2 | 2046.6 |
| Proposed | 1217.5 | 909.9 | 672.8 | 14.1* | 10.6* | 8.6* | 3413.5 | 2551.8 | 2056.3 |
| Change | +22.0 | +19.5 | +14.8 | -38.2 | -28.8 | -23.1 | +7.4 | +5.6 | +9.7 |

*Calculated using the existing conditions flow rate (CFS/Acre) applied to the remaining area tributary to the 36" RCP outlet.

4.0 PROPOSED STORM DRAIN FACILITIES

The proposed onsite storm drain facilities will consist of a combined bulked and clear flow, low flow water quality, and peak flow conveyance system for Planning Area 1 and a combined low flow water quality and peak flow conveyance system for Planning Area 2. Planning Area 2 will integrate some level of detention.

Planning Area 1- A debris basins is proposed at the easterly property boundary within Planning Area 1, which will de-bulk approximately 636 acres of offsite undeveloped tributary storm flows. Clear flows will then leave the basin and be conveyed through the site via a proposed 8x7 RCB with a transition inlet to allow open flow into the system and prevent upstream ponding. The proposed development will be designed to allow for onsite flows to be directed towards proposed local streets and then intercepted by proposed catch basins. Once the storm flows are within the proposed storm drain system, flows will be conveyed to water quality facilities as required and then ultimately to the proposed 8x7 RCB, prior to leaving the project boundary, and joining the existing downstream facility in Stonehaven drive as described in Section 2.3.

The existing facility in Stonehaven has a hydraulic design capacity of 1,200 cfs, per the as-built plans locate in Appendix E. The proposed grading design of the site causes an increase in tributary area to the existing downstream RCB as flows are being diverted from the existing Creek 'E' adjacent to the west. In order to not exceed design capacity of the existing 8'x7' RCB and to maintain drainage patterns similar to predeveloped conditions, a portion of on-site runoff will be bifurcated from the proposed storm drain to the west towards Creek 'E' and ultimately discharging to the existing 36" RCP at Dorinda Road (See Figures B.1 and B.2 in Appendix B). This will ensure the existing capacity of the existing downstream facilities are not exceeded (See Table 4.0-1).

A system of bioretention basins will be installed to provide water quality treatment in order to comply with the North Orange County Technical Guidance Document (further described in the Cielo Vista project specific Conceptual WQMP).

Planning Area 2 - North site drainage improvements will include the interception of Creeks 'C' and 'D' runoff at the project's upstream interface and conveyance of said runoff along the easterly edge of the developed area, and outlet south of the project site via a proposed 96" RCP. On-site local catch basins and drains will intercept storm flows and convey improved area runoff through the site to a proposed water quality facility. A multiple use basin for mitigating water quality, and potential hydromodification is proposed in line of the onsite flow within the southerly portion of this planning area and upstream of the outlet location. The proposed basin will have a total storage of approximately 0.42 acre-ft of which the lower portions will be utilized for bio-filtration and hydromodification mitigation with the higher portions provided for detention.

A 96" RCP is proposed near the westerly boundary just east of an existing 100' wide Southern California Gas Co. easement. This system will intercept approximately 1410 cfs from Tract 9813 as described in Section 3.3 and convey these storm flows through Planning Area 2 back to its original flow path within Creek 'C', just before its confluence with Creek 'B'. Only "clean" storm flows from the onsite development will join this system (See Figure B.3 in Appendix B).

The low flow water quality system and bio-filtration portion of the proposed basin will provide water quality treatment in order to comply with the North Orange County Technical Guidance Document (further described in the Cielo Vista project specific Conceptual WQMP).

Tributary runoff for Planning Area 1 (Creeks 'A' and 'E') actually decreases in post development conditions. The existing condition is steep hillsides which does not allow for much infiltration. Therefore with the graded portions of Planning Area 1 reducing portions of steeper hillsides, at the conceptual level of analysis, it seems feasible that there may be a slight reduction of tributary runoff flows.

The post developed conditions for Planning Area 1 results in a reduction of overall site runoff and therefore by utilizing a bifurcation design to balance storm discharges, detention is not required. Conceptually, a 30" storm drain mainline within Street 'B' can convey approximately 36 cfs (5% slope) emanating from Area A1 per Figure 1-1 of the WQMP, which results in 3.8 cfs/acre. The bifurcation structure adjacent to Lot A will be designed to split off approximately 22 cfs from this line during a 100 year storm event and convey these flows to the existing 36" RCP via an 24" RCP as described in the report. The design of this structure as attached will ensure that the 85th percentile storm and hydromodification mitigation flows will also be split off at this location. These flows are 0.55 cfs and 12.74 cfs, respectfully.

Table 4.0-1 below compares predevelopment and post development (mitigated) hydrologic conditions at adjacent downstream conveyance points from both Planning Areas 1 and 2. Note that Overall, the post developed conditions for the Project (including both Planning Areas 1 and 2) will not exceed the predeveloped conditions at the downstream drainage facilities.

Hydrology Calculations for Table 4.0-1 below are provided in Appendix C.

Table 4.0-1

| Mitigated Hydrology Calculations Summary Table | | | | | | | | | |
|--|------------------------------------|--------------|--------------|---|--------------|--------------|---|--------------|--------------|
| | South Outlet – 8’x7’ RCB (PA 1) | | | Southwest Outlet – 36” RCP (PA 1) | | | West Outlet at PL – ‘F’ Creek (PA 2) | | |
| | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) | Q100 (cfs) | Q25 (cfs) | Q10 (cfs) |
| Predevelopment | 1195.5 | 890.4 | 658.0 | 52.3 | 39.4 | 31.7 | 3406.1 | 2546.2 | 2046.6 |
| Postdevelopment (Mitigated) | 1195.5 | 890.4 | 658.0 | 36.1 | 30.1 | 23.4 | 3406.1 | 2546.2 | 2046.6 |
| Change | 0 | 0 | 0 | -16.2 | -9.3 | -8.3 | 0 | 0 | 0 |
| Detention Basin (Mitigated) | N/A | N/A | N/A | N/A | N/A | N/A | 7.4 | 5.6 | 9.7 |

The proposed drainage facilities described in this report will provide for adequate flood control protection per the current County of Orange Hydrology Manual and the County of Orange Local Drainage Manual requirements. The proposed project will reduce the storm flow rate at each discharge location for the various studied storm events to meet Orange County Public Works and other agency standard guidelines to ensure discharge velocities at this location are non-erosive, less than 5 fps. A detailed design for an energy dissipating structure will be prepared at the TTM stage.

Based upon the hydrologic analyses performed for the pre and post project conditions, the upstream and downstream properties will not experience any significant drainage impacts.

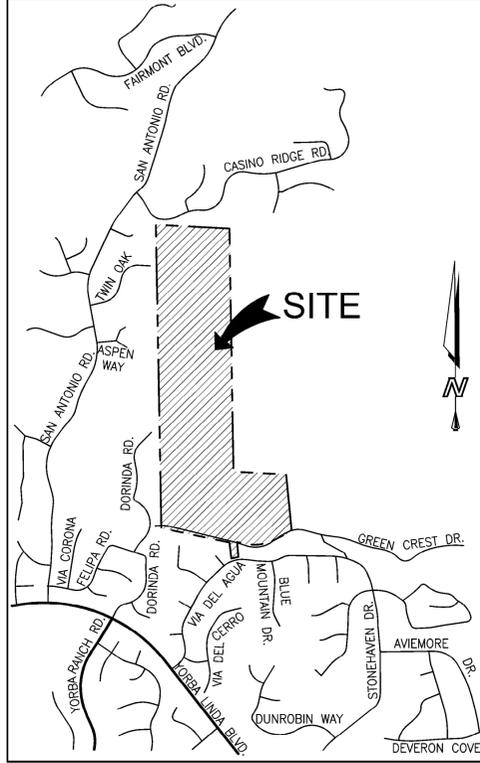
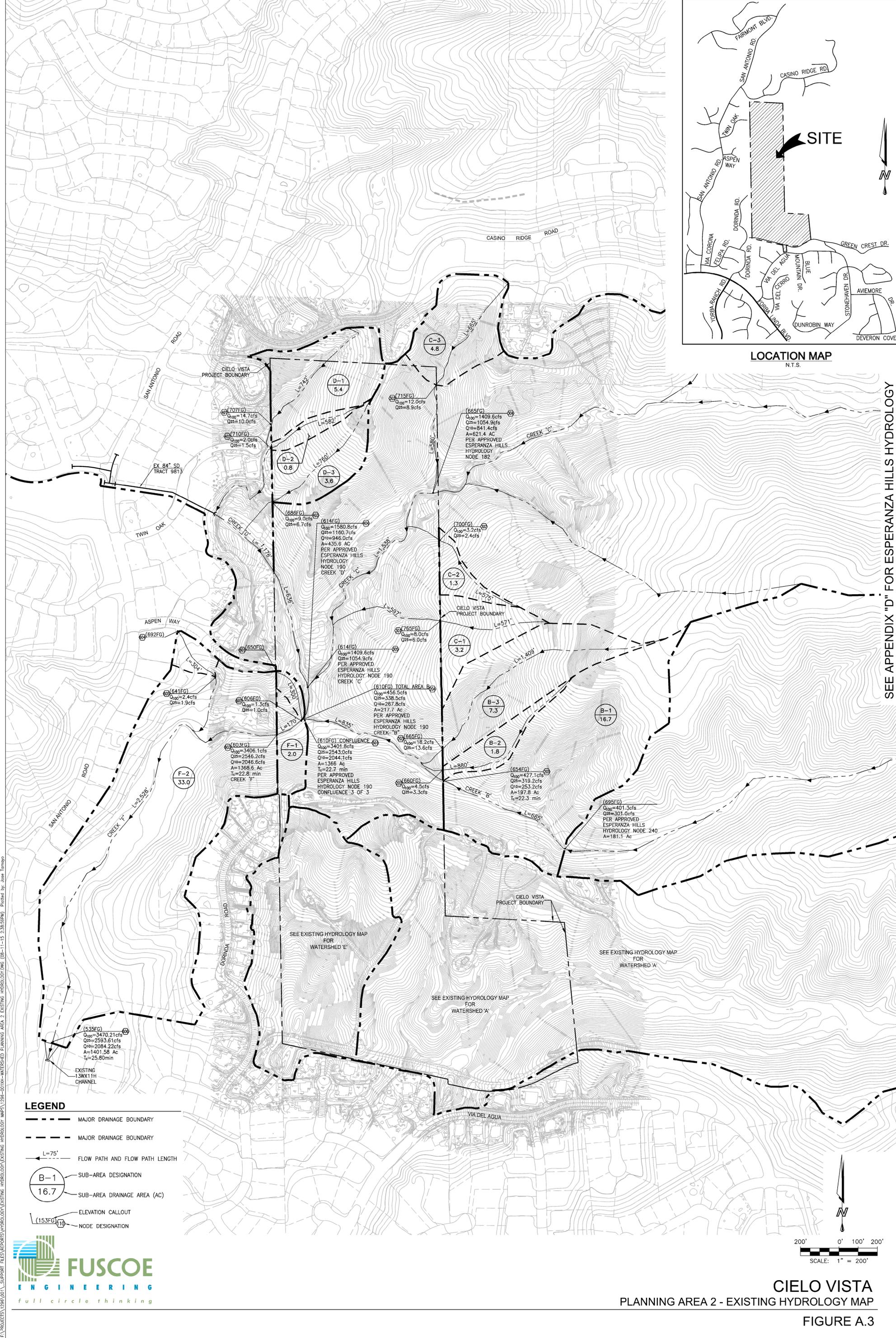
5.0 CONCLUSION

Given that the Project would be designed to maintain existing drainage patterns and post development runoff volume would not significantly exceed the pre-development condition, the post-project site would not result in significant hydrology impacts downstream such that flooding or erosion would occur on- or off-site. Furthermore, based upon the mitigation measures described in the above sections of this report, the Project would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage.¹

¹ County of Orange/Santa Ana Region Priority Project Water Quality Management Plan: Cielo Vista Tentative Tract 17341, prepared by Charles Hartman & Associates in August 2012.

APPENDICES

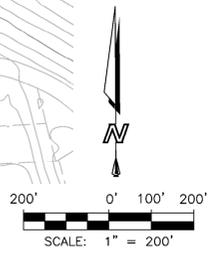
APPENDIX A:
Existing Hydrology Maps



LOCATION MAP
N.T.S.

SEE APPENDIX "D" FOR ESPERANZA HILLS HYDROLOGY

- LEGEND**
- MAJOR DRAINAGE BOUNDARY
 - MAJOR DRAINAGE BOUNDARY
 - ← L=75' FLOW PATH AND FLOW PATH LENGTH
 - (B-1) SUB-AREA DESIGNATION
 - (16.7) SUB-AREA DRAINAGE AREA (AC)
 - (153FG) ELEVATION CALLOUT
 - (10) NODE DESIGNATION

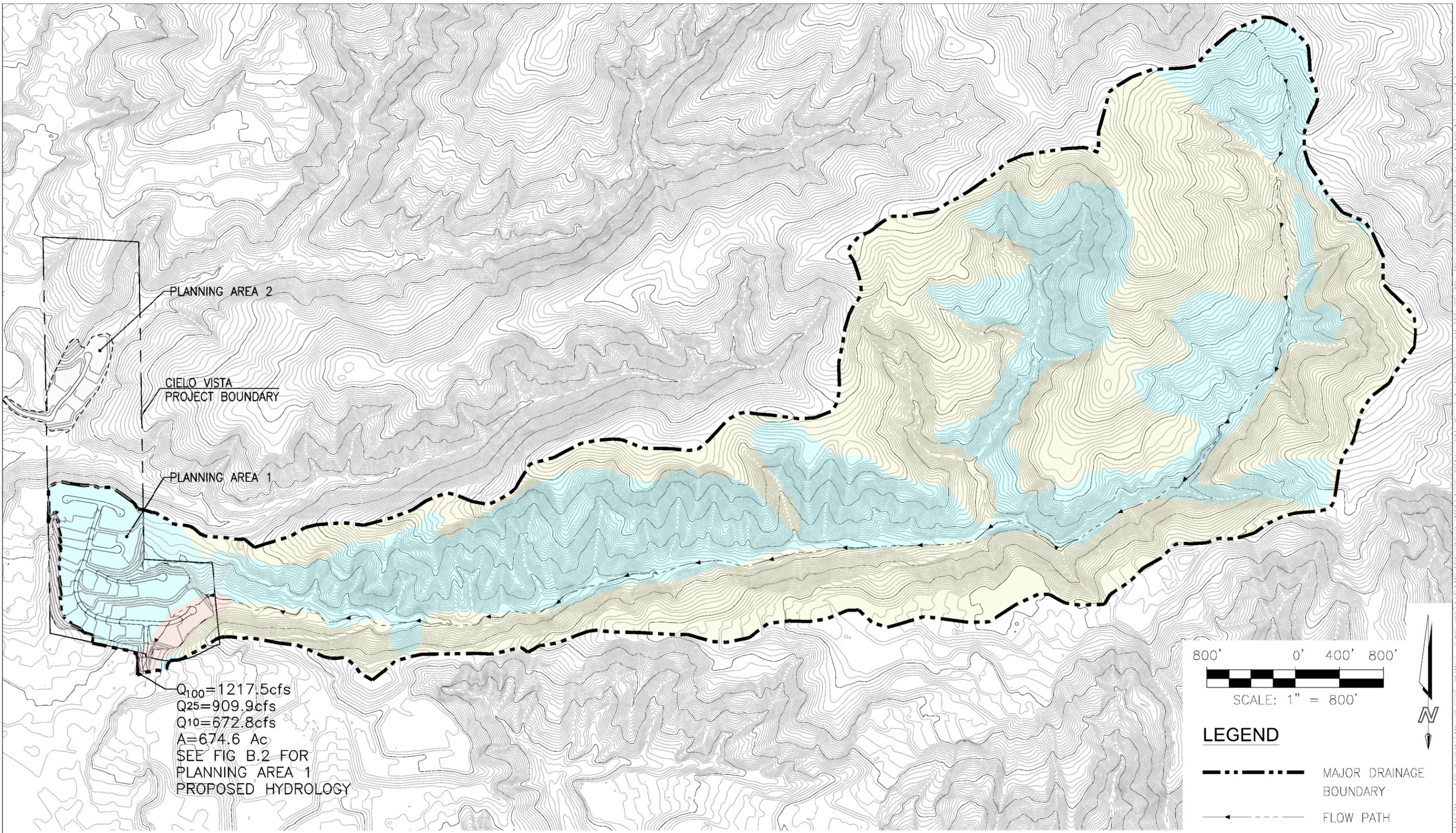


CIELO VISTA
PLANNING AREA 2 - EXISTING HYDROLOGY MAP

FIGURE A.3

F:\PROJECTS\729\001\Support Files\REPORTS\HYDROLOGY\EXISTING HYDROLOGY\PLANNING AREA 2 EXISTING HYDROLOGY.DWG (08-11-15 2:38:59PM) Plotted by: Jose Tamayo

APPENDIX B:
Proposed Hydrology Maps

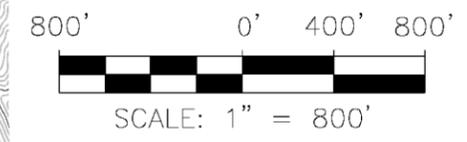


PLANNING AREA 2

CIELO VISTA
PROJECT BOUNDARY

PLANNING AREA 1

$Q_{100} = 1217.5 \text{ cfs}$
 $Q_{25} = 909.9 \text{ cfs}$
 $Q_{10} = 672.8 \text{ cfs}$
 $A = 674.6 \text{ Ac}$
 SEE FIG B.2 FOR
 PLANNING AREA 1
 PROPOSED HYDROLOGY



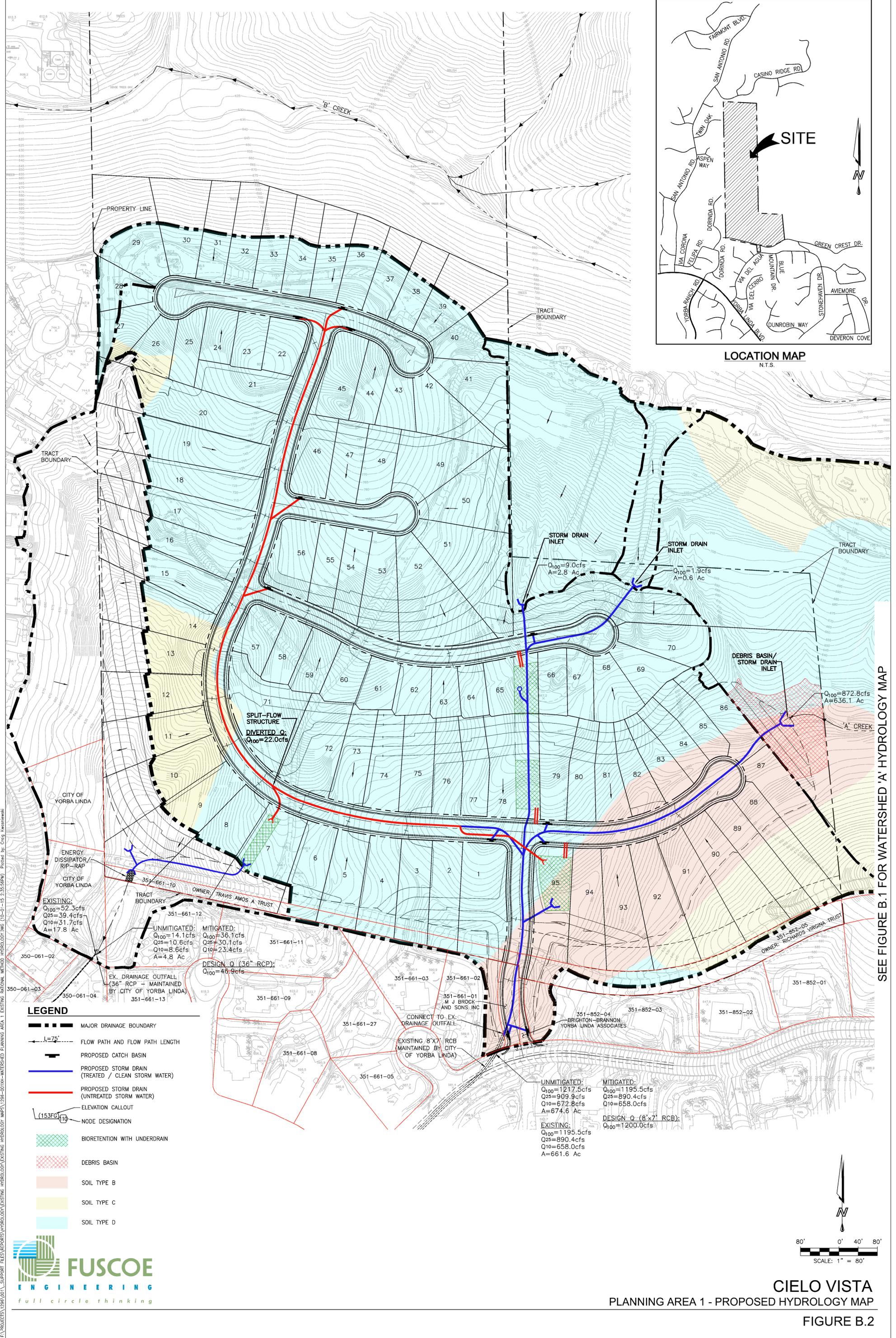
LEGEND

-  MAJOR DRAINAGE BOUNDARY
-  FLOW PATH
-  SOIL TYPE B
-  SOIL TYPE C
-  SOIL TYPE D

CIELO VISTA

WATERSHED 'A' PROPOSED UNIT HYDROGRAPH HYDROLOGY MAP

FIGURE B.1



APPENDIX C:
Hydrology Calculations

Creek "A"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CIELOVISTAEXWSDARAT.roc

WATERSHED A
EXISTING CONDITIONS - CREEK A
100-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 1640.000(Ft.)
Bottom (of initial area) elevation = 1580.000(Ft.)
Difference in elevation = 60.000(Ft.)
Slope = 0.20000 s(%)= 20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.538 min.
Rainfall intensity = 4.274(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.858
Subarea runoff = 1.466(CFS)
Total initial stream area = 0.400(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1580.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 214.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 3.259(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 3.259(CFS)
Depth of flow = 0.031(Ft.), Average velocity = 2.106(Ft/s)
Channel flow top width = 50.185(Ft.)
Flow Velocity = 2.11(Ft/s)
Travel time = 1.69 min.
Time of concentration = 11.23 min.

Critical depth = 0.051(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 3.891(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.854
 Subarea runoff = 3.517(CFS) for 1.100(Ac.)
 Total runoff = 4.983(CFS) Total area = 1.50(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.040(Ft.), Average velocity = 2.494(Ft/s)
 Critical depth = 0.067(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
 Downstream point elevation = 1425.000(Ft.)
 Channel length thru subarea = 217.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 12.092(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 12.092(CFS)
 Depth of flow = 0.075(Ft.), Average velocity = 3.206(Ft/s)
 Channel flow top width = 50.451(Ft.)
 Flow Velocity = 3.21(Ft/s)
 Travel time = 1.13 min.
 Time of concentration = 12.36 min.
 Critical depth = 0.121(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 3.684(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.851
 Subarea runoff = 14.142(CFS) for 4.600(Ac.)
 Total runoff = 19.126(CFS) Total area = 6.10(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.099(Ft.), Average velocity = 3.847(Ft/s)
 Critical depth = 0.164(Ft.)

++++++
 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1425.000(Ft.)
 Downstream point elevation = 1310.000(Ft.)
 Channel length thru subarea = 882.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 29.729(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 29.729(CFS)

Depth of flow = 0.165(Ft.), Average velocity = 3.564(Ft/s)
 Channel flow top width = 50.991(Ft.)
 Flow Velocity = 3.56(Ft/s)
 Travel time = 4.12 min.
 Time of concentration = 16.48 min.
 Critical depth = 0.223(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 3.123(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.842
 Subarea runoff = 21.130(CFS) for 9.200(Ac.)
 Total runoff = 40.255(CFS) Total area = 15.30(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.198(Ft.), Average velocity = 4.017(Ft/s)
 Critical depth = 0.270(Ft.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1310.000(Ft.)
 Downstream point elevation = 1280.000(Ft.)
 Channel length thru subarea = 387.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 85.607(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 85.607(CFS)
 Depth of flow = 0.363(Ft.), Average velocity = 4.610(Ft/s)
 Channel flow top width = 52.181(Ft.)
 Flow Velocity = 4.61(Ft/s)
 Travel time = 1.40 min.
 Time of concentration = 17.88 min.
 Critical depth = 0.445(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 2.981(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.833
 Subarea runoff = 90.636(CFS) for 37.400(Ac.)
 Total runoff = 130.892(CFS) Total area = 52.70(Ac.)
 Area averaged Fm value = 0.221(In/Hr)
 Depth of flow = 0.468(Ft.), Average velocity = 5.436(Ft/s)
 Critical depth = 0.594(Ft.)

 Process from Point/Station 106.000 to Point/Station 107.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1280.000(Ft.)
 Downstream point elevation = 1130.000(Ft.)
 Channel length thru subarea = 1775.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000

Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 212.181(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 212.181(CFS)
 Depth of flow = 0.609(Ft.), Average velocity = 6.723(Ft/s)
 Channel flow top width = 53.654(Ft.)
 Flow Velocity = 6.72(Ft/s)
 Travel time = 4.40 min.
 Time of concentration = 22.28 min.
 Critical depth = 0.813(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.850
 Decimal fraction soil group D = 0.150
 SCS curve number for soil(AMC 2) = 79.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.242(In/Hr)
 Max Catchment Loss (Fm) = 0.242(In/Hr)
 Rainfall intensity = 2.628(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.820
 Subarea runoff = 162.520(CFS) for 83.500(Ac.)
 Total runoff = 293.411(CFS) Total area = 136.20(Ac.)
 Area averaged Fm value = 0.234(In/Hr)
 Depth of flow = 0.739(Ft.), Average velocity = 7.607(Ft/s)
 Critical depth = 1.000(Ft.)

++++++
 Process from Point/Station 107.000 to Point/Station 108.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1130.000(Ft.)
 Downstream point elevation = 1030.000(Ft.)
 Channel length thru subarea = 1615.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 350.048(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 350.048(CFS)
 Depth of flow = 0.900(Ft.), Average velocity = 7.382(Ft/s)
 Channel flow top width = 55.399(Ft.)
 Flow Velocity = 7.38(Ft/s)
 Travel time = 3.65 min.
 Time of concentration = 25.93 min.
 Critical depth = 1.125(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 2.409(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.814
 Subarea runoff = 113.181(CFS) for 71.200(Ac.)
 Total runoff = 406.593(CFS) Total area = 207.40(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.983(Ft.), Average velocity = 7.808(Ft/s)
 Critical depth = 1.234(Ft.)

++++++
 Process from Point/Station 108.000 to Point/Station 116.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1030.000(Ft.)
 Downstream point elevation = 950.000(Ft.)
 Channel length thru subarea = 1655.000(Ft.)
 Channel base width = 60.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 424.878(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 424.878(CFS)
 Depth of flow = 0.977(Ft.), Average velocity = 6.912(Ft/s)
 Channel flow top width = 65.861(Ft.)
 Flow Velocity = 6.91(Ft/s)
 Travel time = 3.99 min.
 Time of concentration = 29.92 min.
 Critical depth = 1.141(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.650
 Decimal fraction soil group D = 0.350
 SCS curve number for soil(AMC 2) = 80.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
 Max Catchment Loss (Fm) = 0.232(In/Hr)
 Rainfall intensity = 2.220(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.806
 Subarea runoff = 36.477(CFS) for 40.200(Ac.)
 Total runoff = 443.069(CFS) Total area = 247.60(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 1.001(Ft.), Average velocity = 7.022(Ft/s)
 Critical depth = 1.172(Ft.)

 Process from Point/Station 108.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 247.600(Ac.)
 Runoff from this stream = 443.069(CFS)
 Time of concentration = 29.92 min.
 Rainfall intensity = 2.220(In/Hr)
 Area averaged loss rate (Fm) = 0.2313(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Program is now starting with Main Stream No. 2

 Process from Point/Station 109.000 to Point/Station 110.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 1.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 79.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.250(In/Hr)
 Max Catchment Loss (Fm) = 0.250(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 1680.000(Ft.)
 Bottom (of initial area) elevation = 1550.000(Ft.)
 Difference in elevation = 130.000(Ft.)
 Slope = 0.43333 s(%) = 43.33
 $TC = k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 8.171 min.
 Rainfall intensity = 4.669(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.852
 Subarea runoff = 1.591(CFS)

Total initial stream area = 0.400(Ac.)

Process from Point/Station 110.000 to Point/Station 111.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1550.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 75.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 3.549(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 3.549(CFS)
Depth of flow = 0.036(Ft.), Average velocity = 3.237(Ft/s)
Channel flow top width = 30.219(Ft.)
Flow Velocity = 3.24(Ft/s)
Travel time = 0.39 min.
Time of concentration = 8.56 min.
Critical depth = 0.075(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2) = 82.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
Max Catchment Loss (Fm) = 0.215(In/Hr)
Rainfall intensity = 4.548(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.855
Subarea runoff = 3.855(CFS) for 1.000(Ac.)
Total runoff = 5.446(CFS) Total area = 1.40(Ac.)
Area averaged Fm value = 0.225(In/Hr)
Depth of flow = 0.047(Ft.), Average velocity = 3.838(Ft/s)
Critical depth = 0.101(Ft.)

Process from Point/Station 111.000 to Point/Station 112.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
Downstream point elevation = 1395.000(Ft.)
Channel length thru subarea = 196.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 13.692(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 13.692(CFS)
Depth of flow = 0.095(Ft.), Average velocity = 4.756(Ft/s)
Channel flow top width = 30.570(Ft.)
Flow Velocity = 4.76(Ft/s)
Travel time = 0.69 min.
Time of concentration = 9.24 min.
Critical depth = 0.186(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2) = 80.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.235(In/Hr)
Rainfall intensity = 4.351(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified

rational method)(Q=KCIA) is C = 0.852
Subarea runoff = 16.421(CFS) for 4.500(Ac.)
Total runoff = 21.867(CFS) Total area = 5.90(Ac.)
Area averaged Fm value = 0.233(In/Hr)
Depth of flow = 0.126(Ft.), Average velocity = 5.721(Ft/s)
Critical depth = 0.254(Ft.)

Process from Point/Station 112.000 to Point/Station 113.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1395.000(Ft.)
Downstream point elevation = 1175.000(Ft.)
Channel length thru subarea = 811.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 48.764(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 48.764(CFS)
Depth of flow = 0.242(Ft.), Average velocity = 6.562(Ft/s)
Channel flow top width = 31.451(Ft.)
Flow Velocity = 6.56(Ft/s)
Travel time = 2.06 min.
Time of concentration = 11.30 min.
Critical depth = 0.430(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2) = 83.75
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.203(In/Hr)
Max Catchment Loss (Fm) = 0.203(In/Hr)
Rainfall intensity = 3.877(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.851
Subarea runoff = 53.706(CFS) for 17.000(Ac.)
Total runoff = 75.573(CFS) Total area = 22.90(Ac.)
Area averaged Fm value = 0.210(In/Hr)
Depth of flow = 0.314(Ft.), Average velocity = 7.774(Ft/s)
Critical depth = 0.570(Ft.)

Process from Point/Station 113.000 to Point/Station 114.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1175.000(Ft.)
Downstream point elevation = 1110.000(Ft.)
Channel length thru subarea = 543.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 115.590(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 115.590(CFS)
Depth of flow = 0.516(Ft.), Average velocity = 7.097(Ft/s)
Channel flow top width = 33.097(Ft.)
Flow Velocity = 7.10(Ft/s)
Travel time = 1.28 min.
Time of concentration = 12.58 min.
Critical depth = 0.750(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500

SCS curve number for soil(AMC 2) = 81.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
Max Catchment Loss (Fm) = 0.225(In/Hr)
Rainfall intensity = 3.647(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.846
Subarea runoff = 79.942(CFS) for 27.500(Ac.)
Total runoff = 155.515(CFS) Total area = 50.40(Ac.)
Area averaged Fm value = 0.218(In/Hr)
Depth of flow = 0.616(Ft.), Average velocity = 7.932(Ft/s)
Critical depth = 0.914(Ft.)

Process from Point/Station 114.000 to Point/Station 115.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1110.000(Ft.)
Downstream point elevation = 1000.000(Ft.)
Channel length thru subarea = 1355.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 210.985(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 210.985(CFS)
Depth of flow = 0.827(Ft.), Average velocity = 7.853(Ft/s)
Channel flow top width = 34.963(Ft.)
Flow Velocity = 7.85(Ft/s)
Travel time = 2.88 min.
Time of concentration = 15.45 min.
Critical depth = 1.109(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2) = 81.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
Max Catchment Loss (Fm) = 0.230(In/Hr)
Rainfall intensity = 3.241(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.838
Subarea runoff = 110.854(CFS) for 47.700(Ac.)
Total runoff = 266.369(CFS) Total area = 98.10(Ac.)
Area averaged Fm value = 0.224(In/Hr)
Depth of flow = 0.949(Ft.), Average velocity = 8.546(Ft/s)
Critical depth = 1.281(Ft.)

Process from Point/Station 115.000 to Point/Station 116.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1000.000(Ft.)
Downstream point elevation = 950.000(Ft.)
Channel length thru subarea = 750.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 319.926(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 319.926(CFS)
Depth of flow = 0.834(Ft.), Average velocity = 7.302(Ft/s)
Channel flow top width = 55.007(Ft.)
Flow Velocity = 7.30(Ft/s)
Travel time = 1.71 min.
Time of concentration = 17.17 min.
Critical depth = 1.063(Ft.)
Adding area flow to channel

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.900
 Decimal fraction soil group D = 0.100
 SCS curve number for soil(AMC 2) = 79.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.245(In/Hr)
 Max Catchment Loss (Fm) = 0.245(In/Hr)
 Rainfall intensity = 3.052(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.832
 Subarea runoff = 107.058(CFS) for 49.000(Ac.)
 Total runoff = 373.426(CFS) Total area = 147.10(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.915(Ft.), Average velocity = 7.740(Ft/s)
 Critical depth = 1.172(Ft.)

 Process from Point/Station 115.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 147.100(Ac.)
 Runoff from this stream = 373.426(CFS)
 Time of concentration = 17.17 min.
 Rainfall intensity = 3.052(In/Hr)
 Area averaged loss rate (Fm) = 0.2310(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|------------|----------------------------|
| 1 | 247.60 | 443.069 | 29.92 | 0.231 | 2.220 |
| 2 | 147.10 | 373.426 | 17.17 | 0.231 | 3.052 |

Qmax(1) =
 1.000 * 1.000 * 443.069) +
 0.705 * 1.000 * 373.426) + = 706.343
 Qmax(2) =
 1.418 * 0.574 * 443.069) +
 1.000 * 1.000 * 373.426) + = 734.010

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 444.069 374.426
 Maximum flow rates at confluence using above data:
 706.343 734.010
 Area of streams before confluence:
 247.600 147.100
 Effective area values after confluence:
 394.700 289.158

Results of confluence:
 Total flow rate = 734.010(CFS)
 Time of concentration = 17.167 min.
 Effective stream area after confluence = 289.158(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.231(In/Hr)
 Study area total = 394.70(Ac.)

 Process from Point/Station 116.000 to Point/Station 117.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 950.000(Ft.)
 Downstream point elevation = 700.000(Ft.)
 Channel length thru subarea = 5095.000(Ft.)
 Channel base width = 90.000(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 = 801.567(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 801.567(CFS)
 Depth of flow = 1.111(Ft.), Average velocity = 7.547(Ft/s)
 Channel flow top width = 101.114(Ft.)
 Flow Velocity = 7.55(Ft/s)
 Travel time = 11.25 min.
 Time of concentration = 28.42 min.
 Critical depth = 1.313(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 2.286(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.810
 Subarea runoff = 135.045(CFS) for 180.200(Ac.)
 Total runoff = 869.054(CFS) Total area = 469.36(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 1.166(Ft.), Average velocity = 7.778(Ft/s)
 Critical depth = 1.391(Ft.)

++++++
 Process from Point/Station 117.000 to Point/Station 118.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 700.000(Ft.)
 Downstream point elevation = 570.000(Ft.)
 Channel length thru subarea = 3345.000(Ft.)
 Channel base width = 110.000(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 = 871.720(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 871.720(CFS)
 Depth of flow = 1.114(Ft.), Average velocity = 6.771(Ft/s)
 Channel flow top width = 121.139(Ft.)
 Flow Velocity = 6.77(Ft/s)
 Travel time = 8.23 min.
 Time of concentration = 36.65 min.
 Critical depth = 1.219(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.100
 Decimal fraction soil group C = 0.400
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 80.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 1.976(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.796
 Subarea runoff = 5.233(CFS) for 86.700(Ac.)
 Total runoff = 874.287(CFS) Total area = 556.06(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 1.116(Ft.), Average velocity = 6.779(Ft/s)
 Critical depth = 1.234(Ft.)
 End of computations, total study area = 661.60 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 81.0

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CieloVistaExWshdARat25.roc

WATERSHED A
EXISTING CONDITIONS - CREEK A
25-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 1640.000(Ft.)
Bottom (of initial area) elevation = 1580.000(Ft.)
Difference in elevation = 60.000(Ft.)
Slope = 0.20000 s(%)= 20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.538 min.
Rainfall intensity = 3.347(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.846
Subarea runoff = 1.133(CFS)
Total initial stream area = 0.400(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1580.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 214.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 2.501(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 2.501(CFS)
Depth of flow = 0.026(Ft.), Average velocity = 1.894(Ft/s)
Channel flow top width = 50.158(Ft.)
Flow Velocity = 1.89(Ft/s)
Travel time = 1.88 min.
Time of concentration = 11.42 min.

Critical depth = 0.042(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 3.022(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.840
 Subarea runoff = 2.677(CFS) for 1.100(Ac.)
 Total runoff = 3.810(CFS) Total area = 1.50(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.034(Ft.), Average velocity = 2.241(Ft/s)
 Critical depth = 0.057(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
 Downstream point elevation = 1425.000(Ft.)
 Channel length thru subarea = 217.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 9.208(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 9.208(CFS)
 Depth of flow = 0.064(Ft.), Average velocity = 2.877(Ft/s)
 Channel flow top width = 50.383(Ft.)
 Flow Velocity = 2.88(Ft/s)
 Travel time = 1.26 min.
 Time of concentration = 12.68 min.
 Critical depth = 0.102(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 2.849(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.837
 Subarea runoff = 10.732(CFS) for 4.600(Ac.)
 Total runoff = 14.542(CFS) Total area = 6.10(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.084(Ft.), Average velocity = 3.450(Ft/s)
 Critical depth = 0.137(Ft.)

++++++
 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1425.000(Ft.)
 Downstream point elevation = 1310.000(Ft.)
 Channel length thru subarea = 882.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 22.380(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 22.380(CFS)

Depth of flow = 0.139(Ft.), Average velocity = 3.185(Ft/s)
 Channel flow top width = 50.836(Ft.)
 Flow Velocity = 3.19(Ft/s)
 Travel time = 4.61 min.
 Time of concentration = 17.29 min.
 Critical depth = 0.184(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 2.390(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.825
 Subarea runoff = 15.612(CFS) for 9.200(Ac.)
 Total runoff = 30.154(CFS) Total area = 15.30(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.167(Ft.), Average velocity = 3.584(Ft/s)
 Critical depth = 0.223(Ft.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1310.000(Ft.)
 Downstream point elevation = 1280.000(Ft.)
 Channel length thru subarea = 387.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 63.814(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 63.814(CFS)
 Depth of flow = 0.305(Ft.), Average velocity = 4.111(Ft/s)
 Channel flow top width = 51.829(Ft.)
 Flow Velocity = 4.11(Ft/s)
 Travel time = 1.57 min.
 Time of concentration = 18.86 min.
 Critical depth = 0.367(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 2.275(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.812
 Subarea runoff = 67.263(CFS) for 37.400(Ac.)
 Total runoff = 97.418(CFS) Total area = 52.70(Ac.)
 Area averaged Fm value = 0.221(In/Hr)
 Depth of flow = 0.393(Ft.), Average velocity = 4.848(Ft/s)
 Critical depth = 0.484(Ft.)

 Process from Point/Station 106.000 to Point/Station 107.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1280.000(Ft.)
 Downstream point elevation = 1130.000(Ft.)
 Channel length thru subarea = 1775.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000

Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 156.626(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 156.626(CFS)
 Depth of flow = 0.508(Ft.), Average velocity = 5.983(Ft/s)
 Channel flow top width = 53.049(Ft.)
 Flow Velocity = 5.98(Ft/s)
 Travel time = 4.94 min.
 Time of concentration = 23.81 min.
 Critical depth = 0.664(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.850
 Decimal fraction soil group D = 0.150
 SCS curve number for soil(AMC 2) = 79.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.242(In/Hr)
 Max Catchment Loss (Fm) = 0.242(In/Hr)
 Rainfall intensity = 1.994(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.794
 Subarea runoff = 118.324(CFS) for 83.500(Ac.)
 Total runoff = 215.741(CFS) Total area = 136.20(Ac.)
 Area averaged Fm value = 0.234(In/Hr)
 Depth of flow = 0.615(Ft.), Average velocity = 6.766(Ft/s)
 Critical depth = 0.820(Ft.)

++++++
 Process from Point/Station 107.000 to Point/Station 108.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1130.000(Ft.)
 Downstream point elevation = 1030.000(Ft.)
 Channel length thru subarea = 1615.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 256.454(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 256.454(CFS)
 Depth of flow = 0.748(Ft.), Average velocity = 6.564(Ft/s)
 Channel flow top width = 54.487(Ft.)
 Flow Velocity = 6.56(Ft/s)
 Travel time = 4.10 min.
 Time of concentration = 27.91 min.
 Critical depth = 0.922(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 1.823(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.786
 Subarea runoff = 81.352(CFS) for 71.200(Ac.)
 Total runoff = 297.094(CFS) Total area = 207.40(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.816(Ft.), Average velocity = 6.940(Ft/s)
 Critical depth = 1.016(Ft.)

++++++
 Process from Point/Station 108.000 to Point/Station 116.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1030.000(Ft.)
 Downstream point elevation = 950.000(Ft.)
 Channel length thru subarea = 1655.000(Ft.)
 Channel base width = 60.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 309.417(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 309.417(CFS)
 Depth of flow = 0.809(Ft.), Average velocity = 6.128(Ft/s)
 Channel flow top width = 64.853(Ft.)
 Flow Velocity = 6.13(Ft/s)
 Travel time = 4.50 min.
 Time of concentration = 32.41 min.
 Critical depth = 0.922(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.650
 Decimal fraction soil group D = 0.350
 SCS curve number for soil(AMC 2) = 80.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
 Max Catchment Loss (Fm) = 0.232(In/Hr)
 Rainfall intensity = 1.675(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.776
 Subarea runoff = 24.572(CFS) for 40.200(Ac.)
 Total runoff = 321.666(CFS) Total area = 247.60(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.828(Ft.), Average velocity = 6.219(Ft/s)
 Critical depth = 0.953(Ft.)

 Process from Point/Station 108.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 247.600(Ac.)
 Runoff from this stream = 321.666(CFS)
 Time of concentration = 32.41 min.
 Rainfall intensity = 1.675(In/Hr)
 Area averaged loss rate (Fm) = 0.2313(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Program is now starting with Main Stream No. 2

 Process from Point/Station 109.000 to Point/Station 110.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 1.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 79.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.250(In/Hr)
 Max Catchment Loss (Fm) = 0.250(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 1680.000(Ft.)
 Bottom (of initial area) elevation = 1550.000(Ft.)
 Difference in elevation = 130.000(Ft.)
 Slope = 0.43333 s(%) = 43.33
 $TC = k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 8.171 min.
 Rainfall intensity = 3.653(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.838
 Subarea runoff = 1.225(CFS)

Total initial stream area = 0.400(Ac.)

Process from Point/Station 110.000 to Point/Station 111.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1550.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 75.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 2.756(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 2.756(CFS)
Depth of flow = 0.031(Ft.), Average velocity = 2.927(Ft/s)
Channel flow top width = 30.188(Ft.)
Flow Velocity = 2.93(Ft/s)
Travel time = 0.43 min.
Time of concentration = 8.60 min.
Critical depth = 0.063(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2) = 82.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
Max Catchment Loss (Fm) = 0.215(In/Hr)
Rainfall intensity = 3.549(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.843
Subarea runoff = 2.963(CFS) for 1.000(Ac.)
Total runoff = 4.188(CFS) Total area = 1.40(Ac.)
Area averaged Fm value = 0.225(In/Hr)
Depth of flow = 0.040(Ft.), Average velocity = 3.457(Ft/s)
Critical depth = 0.084(Ft.)

Process from Point/Station 111.000 to Point/Station 112.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
Downstream point elevation = 1395.000(Ft.)
Channel length thru subarea = 196.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 10.487(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 10.487(CFS)
Depth of flow = 0.081(Ft.), Average velocity = 4.279(Ft/s)
Channel flow top width = 30.486(Ft.)
Flow Velocity = 4.28(Ft/s)
Travel time = 0.76 min.
Time of concentration = 9.36 min.
Critical depth = 0.154(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2) = 80.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.235(In/Hr)
Rainfall intensity = 3.382(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area,(total area with modified

rational method)(Q=KCIA) is C = 0.838
Subarea runoff = 12.536(CFS) for 4.500(Ac.)
Total runoff = 16.725(CFS) Total area = 5.90(Ac.)
Area averaged Fm value = 0.233(In/Hr)
Depth of flow = 0.107(Ft.), Average velocity = 5.147(Ft/s)
Critical depth = 0.211(Ft.)

Process from Point/Station 112.000 to Point/Station 113.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1395.000(Ft.)
Downstream point elevation = 1175.000(Ft.)
Channel length thru subarea = 811.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 37.023(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 37.023(CFS)
Depth of flow = 0.205(Ft.), Average velocity = 5.895(Ft/s)
Channel flow top width = 31.231(Ft.)
Flow Velocity = 5.90(Ft/s)
Travel time = 2.29 min.
Time of concentration = 11.65 min.
Critical depth = 0.359(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2) = 83.75
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.203(In/Hr)
Max Catchment Loss (Fm) = 0.203(In/Hr)
Rainfall intensity = 2.988(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method)(Q=KCIA) is C = 0.837
Subarea runoff = 40.522(CFS) for 17.000(Ac.)
Total runoff = 57.247(CFS) Total area = 22.90(Ac.)
Area averaged Fm value = 0.210(In/Hr)
Depth of flow = 0.266(Ft.), Average velocity = 6.983(Ft/s)
Critical depth = 0.477(Ft.)

Process from Point/Station 113.000 to Point/Station 114.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1175.000(Ft.)
Downstream point elevation = 1110.000(Ft.)
Channel length thru subarea = 543.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 87.210(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 87.210(CFS)
Depth of flow = 0.437(Ft.), Average velocity = 6.380(Ft/s)
Channel flow top width = 32.620(Ft.)
Flow Velocity = 6.38(Ft/s)
Travel time = 1.42 min.
Time of concentration = 13.07 min.
Critical depth = 0.625(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500

SCS curve number for soil(AMC 2) = 81.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
Max Catchment Loss (Fm) = 0.225(In/Hr)
Rainfall intensity = 2.800(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.830
Subarea runoff = 59.851(CFS) for 27.500(Ac.)
Total runoff = 117.097(CFS) Total area = 50.40(Ac.)
Area averaged Fm value = 0.218(In/Hr)
Depth of flow = 0.520(Ft.), Average velocity = 7.132(Ft/s)
Critical depth = 0.758(Ft.)

Process from Point/Station 114.000 to Point/Station 115.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1110.000(Ft.)
Downstream point elevation = 1000.000(Ft.)
Channel length thru subarea = 1355.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 157.892(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 157.892(CFS)
Depth of flow = 0.697(Ft.), Average velocity = 7.060(Ft/s)
Channel flow top width = 34.181(Ft.)
Flow Velocity = 7.06(Ft/s)
Travel time = 3.20 min.
Time of concentration = 16.27 min.
Critical depth = 0.922(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2) = 81.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
Max Catchment Loss (Fm) = 0.230(In/Hr)
Rainfall intensity = 2.474(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
Subarea runoff = 81.519(CFS) for 47.700(Ac.)
Total runoff = 198.616(CFS) Total area = 98.10(Ac.)
Area averaged Fm value = 0.224(In/Hr)
Depth of flow = 0.798(Ft.), Average velocity = 7.682(Ft/s)
Critical depth = 1.063(Ft.)

Process from Point/Station 115.000 to Point/Station 116.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1000.000(Ft.)
Downstream point elevation = 950.000(Ft.)
Channel length thru subarea = 750.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 237.805(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 237.805(CFS)
Depth of flow = 0.699(Ft.), Average velocity = 6.526(Ft/s)
Channel flow top width = 54.197(Ft.)
Flow Velocity = 6.53(Ft/s)
Travel time = 1.92 min.
Time of concentration = 18.19 min.
Critical depth = 0.875(Ft.)
Adding area flow to channel

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.900
 Decimal fraction soil group D = 0.100
 SCS curve number for soil(AMC 2) = 79.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.245(In/Hr)
 Max Catchment Loss (Fm) = 0.245(In/Hr)
 Rainfall intensity = 2.323(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.810
 Subarea runoff = 78.289(CFS) for 49.000(Ac.)
 Total runoff = 276.905(CFS) Total area = 147.10(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.766(Ft.), Average velocity = 6.914(Ft/s)
 Critical depth = 0.969(Ft.)

 Process from Point/Station 115.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 147.100(Ac.)
 Runoff from this stream = 276.905(CFS)
 Time of concentration = 18.19 min.
 Rainfall intensity = 2.323(In/Hr)
 Area averaged loss rate (Fm) = 0.2310(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|--------------|----------------------------|
| 1 | 247.60 | 321.666 | 32.41 | 0.231 | 1.675 |
| 2 | 147.10 | 276.905 | 18.19 | 0.231 | 2.323 |
| Qmax(1) = | | | | | |
| | | 1.000 * | 1.000 * | 321.666) + | |
| | | 0.690 * | 1.000 * | 276.905) + = | 512.813 |
| Qmax(2) = | | | | | |
| | | 1.449 * | 0.561 * | 321.666) + | |
| | | 1.000 * | 1.000 * | 276.905) + = | 538.427 |

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 322.666 277.905
 Maximum flow rates at confluence using above data:
 512.813 538.427
 Area of streams before confluence:
 247.600 147.100
 Effective area values after confluence:
 394.700 286.051

Results of confluence:
 Total flow rate = 538.427(CFS)
 Time of concentration = 18.187 min.
 Effective stream area after confluence = 286.051(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.231(In/Hr)
 Study area total = 394.70(Ac.)

 Process from Point/Station 116.000 to Point/Station 117.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 950.000(Ft.)
 Downstream point elevation = 700.000(Ft.)
 Channel length thru subarea = 5095.000(Ft.)
 Channel base width = 90.000(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 = 582.425(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 582.425(CFS)
 Depth of flow = 0.920(Ft.), Average velocity = 6.694(Ft/s)
 Channel flow top width = 99.197(Ft.)
 Flow Velocity = 6.69(Ft/s)
 Travel time = 12.69 min.
 Time of concentration = 30.87 min.
 Critical depth = 1.070(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 1.721(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.780
 Subarea runoff = 87.938(CFS) for 180.200(Ac.)
 Total runoff = 626.365(CFS) Total area = 466.25(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 0.960(Ft.), Average velocity = 6.880(Ft/s)
 Critical depth = 1.125(Ft.)

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 Process from Point/Station 117.000 to Point/Station 118.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 700.000(Ft.)
 Downstream point elevation = 570.000(Ft.)
 Channel length thru subarea = 3345.000(Ft.)
 Channel base width = 110.000(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 = 626.394(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 626.394(CFS)
 Depth of flow = 0.915(Ft.), Average velocity = 5.973(Ft/s)
 Channel flow top width = 119.153(Ft.)
 Flow Velocity = 5.97(Ft/s)
 Travel time = 9.33 min.
 Time of concentration = 40.21 min.
 Critical depth = 0.984(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.100
 Decimal fraction soil group C = 0.400
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 80.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 626.365(CFS) is being used
 Rainfall intensity = 1.482(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.761
 Subarea runoff = 0.000(CFS) for 86.700(Ac.)
 Total runoff = 626.365(CFS) Total area = 552.95(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 0.915(Ft.), Average velocity = 5.973(Ft/s)
 Critical depth = 0.984(Ft.)
 End of computations, total study area = 661.60 (Ac.)
 The following figures may

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 81.0

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CieloVistaExWshdARat10.roc

WATERSHED A
EXISTING CONDITIONS - CREEK A
10-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 10.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 1640.000(Ft.)
Bottom (of initial area) elevation = 1580.000(Ft.)
Difference in elevation = 60.000(Ft.)
Slope = 0.20000 s(%)= 20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.538 min.
Rainfall intensity = 2.804(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.836
Subarea runoff = 0.937(CFS)
Total initial stream area = 0.400(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1580.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 214.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 2.054(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 2.054(CFS)
Depth of flow = 0.023(Ft.), Average velocity = 1.751(Ft/s)
Channel flow top width = 50.141(Ft.)
Flow Velocity = 1.75(Ft/s)
Travel time = 2.04 min.
Time of concentration = 11.57 min.

Critical depth = 0.038(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 2.510(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.828
 Subarea runoff = 2.181(CFS) for 1.100(Ac.)
 Total runoff = 3.118(CFS) Total area = 1.50(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.030(Ft.), Average velocity = 2.069(Ft/s)
 Critical depth = 0.049(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
 Downstream point elevation = 1425.000(Ft.)
 Channel length thru subarea = 217.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 7.501(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 7.501(CFS)
 Depth of flow = 0.056(Ft.), Average velocity = 2.651(Ft/s)
 Channel flow top width = 50.338(Ft.)
 Flow Velocity = 2.65(Ft/s)
 Travel time = 1.36 min.
 Time of concentration = 12.94 min.
 Critical depth = 0.089(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 2.354(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.824
 Subarea runoff = 8.710(CFS) for 4.600(Ac.)
 Total runoff = 11.827(CFS) Total area = 6.10(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.074(Ft.), Average velocity = 3.178(Ft/s)
 Critical depth = 0.120(Ft.)

++++++
 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1425.000(Ft.)
 Downstream point elevation = 1310.000(Ft.)
 Channel length thru subarea = 882.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 17.994(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 17.994(CFS)

Depth of flow = 0.122(Ft.), Average velocity = 2.922(Ft/s)
 Channel flow top width = 50.734(Ft.)
 Flow Velocity = 2.92(Ft/s)
 Travel time = 5.03 min.
 Time of concentration = 17.97 min.
 Critical depth = 0.158(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Rainfall intensity = 1.950(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.808
 Subarea runoff = 12.276(CFS) for 9.200(Ac.)
 Total runoff = 24.103(CFS) Total area = 15.30(Ac.)
 Area averaged Fm value = 0.200(In/Hr)
 Depth of flow = 0.146(Ft.), Average velocity = 3.280(Ft/s)
 Critical depth = 0.191(Ft.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1310.000(Ft.)
 Downstream point elevation = 1280.000(Ft.)
 Channel length thru subarea = 387.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 50.751(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 50.751(CFS)
 Depth of flow = 0.266(Ft.), Average velocity = 3.758(Ft/s)
 Channel flow top width = 51.595(Ft.)
 Flow Velocity = 3.76(Ft/s)
 Travel time = 1.72 min.
 Time of concentration = 19.69 min.
 Critical depth = 0.316(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 1.851(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.792
 Subarea runoff = 53.198(CFS) for 37.400(Ac.)
 Total runoff = 77.302(CFS) Total area = 52.70(Ac.)
 Area averaged Fm value = 0.221(In/Hr)
 Depth of flow = 0.342(Ft.), Average velocity = 4.430(Ft/s)
 Critical depth = 0.414(Ft.)

 Process from Point/Station 106.000 to Point/Station 107.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1280.000(Ft.)
 Downstream point elevation = 1130.000(Ft.)
 Channel length thru subarea = 1775.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000

Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 123.008(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 123.008(CFS)
 Depth of flow = 0.440(Ft.), Average velocity = 5.449(Ft/s)
 Channel flow top width = 52.639(Ft.)
 Flow Velocity = 5.45(Ft/s)
 Travel time = 5.43 min.
 Time of concentration = 25.12 min.
 Critical depth = 0.566(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.850
 Decimal fraction soil group D = 0.150
 SCS curve number for soil(AMC 2) = 79.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.242(In/Hr)
 Max Catchment Loss (Fm) = 0.242(In/Hr)
 Rainfall intensity = 1.610(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.769
 Subarea runoff = 91.330(CFS) for 83.500(Ac.)
 Total runoff = 168.632(CFS) Total area = 136.20(Ac.)
 Area averaged Fm value = 0.234(In/Hr)
 Depth of flow = 0.531(Ft.), Average velocity = 6.155(Ft/s)
 Critical depth = 0.695(Ft.)

++++++
 Process from Point/Station 107.000 to Point/Station 108.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1130.000(Ft.)
 Downstream point elevation = 1030.000(Ft.)
 Channel length thru subarea = 1615.000(Ft.)
 Channel base width = 50.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 199.463(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 199.463(CFS)
 Depth of flow = 0.644(Ft.), Average velocity = 5.965(Ft/s)
 Channel flow top width = 53.864(Ft.)
 Flow Velocity = 5.96(Ft/s)
 Travel time = 4.51 min.
 Time of concentration = 29.63 min.
 Critical depth = 0.781(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 1.465(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.758
 Subarea runoff = 61.601(CFS) for 71.200(Ac.)
 Total runoff = 230.233(CFS) Total area = 207.40(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.701(Ft.), Average velocity = 6.300(Ft/s)
 Critical depth = 0.859(Ft.)

++++++
 Process from Point/Station 108.000 to Point/Station 116.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1030.000(Ft.)
 Downstream point elevation = 950.000(Ft.)
 Channel length thru subarea = 1655.000(Ft.)
 Channel base width = 60.000(Ft.)
 Slope or 'Z' of left channel bank = 3.000
 Slope or 'Z' of right channel bank = 3.000
 Estimated mean flow rate at midpoint of channel = 238.675(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 238.675(CFS)
 Depth of flow = 0.693(Ft.), Average velocity = 5.549(Ft/s)
 Channel flow top width = 64.157(Ft.)
 Flow Velocity = 5.55(Ft/s)
 Travel time = 4.97 min.
 Time of concentration = 34.60 min.
 Critical depth = 0.781(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.650
 Decimal fraction soil group D = 0.350
 SCS curve number for soil(AMC 2) = 80.75
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
 Max Catchment Loss (Fm) = 0.232(In/Hr)
 Rainfall intensity = 1.340(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.745
 Subarea runoff = 16.820(CFS) for 40.200(Ac.)
 Total runoff = 247.053(CFS) Total area = 247.60(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.707(Ft.), Average velocity = 5.623(Ft/s)
 Critical depth = 0.797(Ft.)

 Process from Point/Station 108.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 247.600(Ac.)
 Runoff from this stream = 247.053(CFS)
 Time of concentration = 34.60 min.
 Rainfall intensity = 1.340(In/Hr)
 Area averaged loss rate (Fm) = 0.2313(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Program is now starting with Main Stream No. 2

 Process from Point/Station 109.000 to Point/Station 110.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 1.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 79.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.250(In/Hr)
 Max Catchment Loss (Fm) = 0.250(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 1680.000(Ft.)
 Bottom (of initial area) elevation = 1550.000(Ft.)
 Difference in elevation = 130.000(Ft.)
 Slope = 0.43333 s(%) = 43.33
 $TC = k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 8.171 min.
 Rainfall intensity = 3.064(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.827
 Subarea runoff = 1.013(CFS)

Total initial stream area = 0.400(Ac.)

Process from Point/Station 110.000 to Point/Station 111.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1550.000(Ft.)
Downstream point elevation = 1490.000(Ft.)
Channel length thru subarea = 75.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 2.279(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 2.279(CFS)
Depth of flow = 0.028(Ft.), Average velocity = 2.713(Ft/s)
Channel flow top width = 30.168(Ft.)
Flow Velocity = 2.71(Ft/s)
Travel time = 0.46 min.
Time of concentration = 8.63 min.
Critical depth = 0.057(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2) = 82.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
Max Catchment Loss (Fm) = 0.215(In/Hr)
Rainfall intensity = 2.969(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.832
Subarea runoff = 2.444(CFS) for 1.000(Ac.)
Total runoff = 3.457(CFS) Total area = 1.40(Ac.)
Area averaged Fm value = 0.225(In/Hr)
Depth of flow = 0.036(Ft.), Average velocity = 3.203(Ft/s)
Critical depth = 0.074(Ft.)

Process from Point/Station 111.000 to Point/Station 112.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1490.000(Ft.)
Downstream point elevation = 1395.000(Ft.)
Channel length thru subarea = 196.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 8.619(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 8.619(CFS)
Depth of flow = 0.072(Ft.), Average velocity = 3.959(Ft/s)
Channel flow top width = 30.432(Ft.)
Flow Velocity = 3.96(Ft/s)
Travel time = 0.83 min.
Time of concentration = 9.46 min.
Critical depth = 0.137(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2) = 80.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.235(In/Hr)
Rainfall intensity = 2.818(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified

rational method)(Q=KCIA) is C = 0.826
Subarea runoff = 10.269(CFS) for 4.500(Ac.)
Total runoff = 13.726(CFS) Total area = 5.90(Ac.)
Area averaged Fm value = 0.233(In/Hr)
Depth of flow = 0.095(Ft.), Average velocity = 4.760(Ft/s)
Critical depth = 0.186(Ft.)

Process from Point/Station 112.000 to Point/Station 113.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1395.000(Ft.)
Downstream point elevation = 1175.000(Ft.)
Channel length thru subarea = 811.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 30.131(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 30.131(CFS)
Depth of flow = 0.181(Ft.), Average velocity = 5.439(Ft/s)
Channel flow top width = 31.088(Ft.)
Flow Velocity = 5.44(Ft/s)
Travel time = 2.49 min.
Time of concentration = 11.94 min.
Critical depth = 0.313(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2) = 83.75
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.203(In/Hr)
Max Catchment Loss (Fm) = 0.203(In/Hr)
Rainfall intensity = 2.465(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.823
Subarea runoff = 32.744(CFS) for 17.000(Ac.)
Total runoff = 46.470(CFS) Total area = 22.90(Ac.)
Area averaged Fm value = 0.210(In/Hr)
Depth of flow = 0.235(Ft.), Average velocity = 6.441(Ft/s)
Critical depth = 0.414(Ft.)

Process from Point/Station 113.000 to Point/Station 114.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1175.000(Ft.)
Downstream point elevation = 1110.000(Ft.)
Channel length thru subarea = 543.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 70.474(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 70.474(CFS)
Depth of flow = 0.385(Ft.), Average velocity = 5.882(Ft/s)
Channel flow top width = 32.307(Ft.)
Flow Velocity = 5.88(Ft/s)
Travel time = 1.54 min.
Time of concentration = 13.48 min.
Critical depth = 0.547(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500

SCS curve number for soil(AMC 2) = 81.50
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
Max Catchment Loss (Fm) = 0.225(In/Hr)
Rainfall intensity = 2.300(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.815
Subarea runoff = 47.939(CFS) for 27.500(Ac.)
Total runoff = 94.409(CFS) Total area = 50.40(Ac.)
Area averaged Fm value = 0.218(In/Hr)
Depth of flow = 0.458(Ft.), Average velocity = 6.575(Ft/s)
Critical depth = 0.656(Ft.)

Process from Point/Station 114.000 to Point/Station 115.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1110.000(Ft.)
Downstream point elevation = 1000.000(Ft.)
Channel length thru subarea = 1355.000(Ft.)
Channel base width = 30.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 126.365(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 126.365(CFS)
Depth of flow = 0.611(Ft.), Average velocity = 6.500(Ft/s)
Channel flow top width = 33.665(Ft.)
Flow Velocity = 6.50(Ft/s)
Travel time = 3.47 min.
Time of concentration = 16.96 min.
Critical depth = 0.797(Ft.)
Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2) = 81.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
Max Catchment Loss (Fm) = 0.230(In/Hr)
Rainfall intensity = 2.016(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.800
Subarea runoff = 63.849(CFS) for 47.700(Ac.)
Total runoff = 158.258(CFS) Total area = 98.10(Ac.)
Area averaged Fm value = 0.224(In/Hr)
Depth of flow = 0.698(Ft.), Average velocity = 7.066(Ft/s)
Critical depth = 0.922(Ft.)

Process from Point/Station 115.000 to Point/Station 116.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1000.000(Ft.)
Downstream point elevation = 950.000(Ft.)
Channel length thru subarea = 750.000(Ft.)
Channel base width = 50.000(Ft.)
Slope or 'Z' of left channel bank = 3.000
Slope or 'Z' of right channel bank = 3.000
Estimated mean flow rate at midpoint of channel = 188.750(CFS)
Manning's 'N' = 0.045
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 188.750(CFS)
Depth of flow = 0.610(Ft.), Average velocity = 5.975(Ft/s)
Channel flow top width = 53.657(Ft.)
Flow Velocity = 5.97(Ft/s)
Travel time = 2.09 min.
Time of concentration = 19.05 min.
Critical depth = 0.750(Ft.)
Adding area flow to channel

UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.900
 Decimal fraction soil group D = 0.100
 SCS curve number for soil(AMC 2) = 79.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.245(In/Hr)
 Max Catchment Loss (Fm) = 0.245(In/Hr)
 Rainfall intensity = 1.886(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.790
 Subarea runoff = 60.904(CFS) for 49.000(Ac.)
 Total runoff = 219.162(CFS) Total area = 147.10(Ac.)
 Area averaged Fm value = 0.231(In/Hr)
 Depth of flow = 0.666(Ft.), Average velocity = 6.326(Ft/s)
 Critical depth = 0.828(Ft.)

 Process from Point/Station 115.000 to Point/Station 116.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 147.100(Ac.)
 Runoff from this stream = 219.162(CFS)
 Time of concentration = 19.05 min.
 Rainfall intensity = 1.886(In/Hr)
 Area averaged loss rate (Fm) = 0.2310(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|--------------|----------------------------|
| 1 | 247.60 | 247.053 | 34.60 | 0.231 | 1.340 |
| 2 | 147.10 | 219.162 | 19.05 | 0.231 | 1.886 |
| Qmax(1) = | | | | | |
| | | 1.000 * | 1.000 * | 247.053) + | |
| | | 0.670 * | 1.000 * | 219.162) + = | 393.873 |
| Qmax(2) = | | | | | |
| | | 1.493 * | 0.551 * | 247.053) + | |
| | | 1.000 * | 1.000 * | 219.162) + = | 422.205 |

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 248.053 220.162
 Maximum flow rates at confluence using above data:
 393.873 422.205
 Area of streams before confluence:
 247.600 147.100
 Effective area values after confluence:
 394.700 283.409

Results of confluence:
 Total flow rate = 422.205(CFS)
 Time of concentration = 19.047 min.
 Effective stream area after confluence = 283.409(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.231(In/Hr)
 Study area total = 394.70(Ac.)

 Process from Point/Station 116.000 to Point/Station 117.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 950.000(Ft.)
 Downstream point elevation = 700.000(Ft.)
 Channel length thru subarea = 5095.000(Ft.)
 Channel base width = 90.000(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 = 450.507(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 450.507(CFS)
 Depth of flow = 0.790(Ft.), Average velocity = 6.073(Ft/s)
 Channel flow top width = 97.896(Ft.)
 Flow Velocity = 6.07(Ft/s)
 Travel time = 13.98 min.
 Time of concentration = 33.03 min.
 Critical depth = 0.906(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.500
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 81.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.225(In/Hr)
 Max Catchment Loss (Fm) = 0.225(In/Hr)
 Rainfall intensity = 1.376(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.750
 Subarea runoff = 56.511(CFS) for 180.200(Ac.)
 Total runoff = 478.715(CFS) Total area = 463.61(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 0.819(Ft.), Average velocity = 6.215(Ft/s)
 Critical depth = 0.938(Ft.)

++++++
 Process from Point/Station 117.000 to Point/Station 118.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 700.000(Ft.)
 Downstream point elevation = 570.000(Ft.)
 Channel length thru subarea = 3345.000(Ft.)
 Channel base width = 110.000(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 = 478.759(CFS)
 Manning's 'N' = 0.045
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 478.759(CFS)
 Depth of flow = 0.780(Ft.), Average velocity = 5.389(Ft/s)
 Channel flow top width = 117.800(Ft.)
 Flow Velocity = 5.39(Ft/s)
 Travel time = 10.35 min.
 Time of concentration = 43.37 min.
 Critical depth = 0.828(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.100
 Decimal fraction soil group C = 0.400
 Decimal fraction soil group D = 0.500
 SCS curve number for soil(AMC 2) = 80.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 478.715(CFS) is being used
 Rainfall intensity = 1.177(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.725
 Subarea runoff = 0.000(CFS) for 86.700(Ac.)
 Total runoff = 478.715(CFS) Total area = 550.31(Ac.)
 Area averaged Fm value = 0.229(In/Hr)
 Depth of flow = 0.780(Ft.), Average velocity = 5.389(Ft/s)
 Critical depth = 0.828(Ft.)
 End of computations, total study area = 661.60 (Ac.)
 The following figures may

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 81.0

Creek "A"
Existing Unit Hydrograph Calculations
10, 25 & 100-Year Storms

Unit Hydrograph Analysis

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Study date 08/03/15 File Name CieloVistaExWshdAUH.out

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
100-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.55 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.40 | D | 0.200 | 1.000 | 0.200 |
| 82.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 23.1 | 0.03 | D | 0.200 | 1.000 | 0.200 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC3) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 95.2 | 0.50 | 0.900 |
| 0.20 | 0.000 | 72.0 | 88.6 | 1.29 | 0.770 |
| 365.10 | 0.552 | 79.0 | 93.4 | 0.71 | 0.864 |
| 264.30 | 0.399 | 84.0 | 96.4 | 0.37 | 0.925 |
| 2.50 | 0.004 | 82.0 | 95.2 | 0.50 | 0.900 |
| 2.50 | 0.004 | 72.0 | 88.6 | 1.29 | 0.770 |
| 3.70 | 0.006 | 79.0 | 93.4 | 0.71 | 0.864 |
| 23.10 | 0.035 | 84.0 | 96.4 | 0.37 | 0.925 |

Area-averaged catchment yield fraction, Y = 0.890

Area-averaged low loss fraction, Yb = 0.110

User entry of time of concentration = 0.617 (hours)

Watershed area = 661.60(Ac.)

Catchment Lag time = 0.493 hours

Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 16.8937
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.229(In/Hr)
 Average low loss rate fraction (Yb) = 0.110 (decimal)
 FOOTHILL S-Graph Selected
 Computed peak 5-minute rainfall = 0.520(In)
 Computed peak 30-minute rainfall = 1.090(In)
 Specified peak 1-hour rainfall = 1.450(In)
 Computed peak 3-hour rainfall = 2.430(In)
 Specified peak 6-hour rainfall = 3.360(In)
 Specified peak 24-hour rainfall = 5.630(In)

Rainfall depth area reduction factors:
 Using a total area of 661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969 Adjusted rainfall = 0.504(In)
 30-minute factor = 0.969 Adjusted rainfall = 1.056(In)
 1-hour factor = 0.969 Adjusted rainfall = 1.405(In)
 3-hour factor = 0.996 Adjusted rainfall = 2.420(In)
 6-hour factor = 0.998 Adjusted rainfall = 3.353(In)
 24-hour factor = 0.999 Adjusted rainfall = 5.625(In)

U n i t H y d r o g r a p h

+++++

| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|
| | (K = | 8001.23 (CFS)) |
| 1 | 1.077 | 86.146 |
| 2 | 3.933 | 228.564 |
| 3 | 8.078 | 331.619 |
| 4 | 13.921 | 467.504 |
| 5 | 22.799 | 710.399 |
| 6 | 39.604 | 1344.595 |
| 7 | 56.304 | 1336.209 |
| 8 | 64.238 | 634.773 |
| 9 | 69.997 | 460.799 |
| 10 | 74.376 | 350.360 |
| 11 | 78.182 | 304.557 |
| 12 | 81.338 | 252.537 |
| 13 | 84.009 | 213.663 |
| 14 | 86.347 | 187.113 |
| 15 | 88.387 | 163.191 |
| 16 | 90.138 | 140.103 |
| 17 | 91.689 | 124.130 |
| 18 | 93.043 | 108.341 |
| 19 | 94.202 | 92.724 |
| 20 | 95.205 | 80.229 |
| 21 | 96.018 | 65.063 |
| 22 | 96.729 | 56.854 |
| 23 | 97.339 | 48.846 |
| 24 | 97.802 | 37.039 |
| 25 | 98.067 | 21.183 |
| 26 | 98.269 | 16.220 |
| 27 | 98.470 | 16.042 |
| 28 | 98.646 | 14.066 |
| 29 | 98.815 | 13.517 |
| 30 | 98.978 | 13.078 |
| 31 | 99.092 | 9.073 |
| 32 | 99.193 | 8.110 |
| 33 | 99.298 | 8.376 |
| 34 | 99.428 | 10.395 |
| 35 | 99.563 | 10.814 |
| 36 | 99.690 | 10.181 |
| 37 | 99.766 | 6.127 |
| 38 | 99.834 | 5.407 |
| 39 | 99.897 | 5.035 |
| 40 | 99.935 | 3.009 |
| 41 | 99.968 | 2.703 |

| 42 | 100.000 | 2.529 |
|---------------------|-----------------------------------|-----------------------|
| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
| 1 | 0.5039 | 0.5039 |
| 2 | 0.6709 | 0.1670 |
| 3 | 0.7932 | 0.1223 |
| 4 | 0.8933 | 0.1001 |
| 5 | 0.9796 | 0.0863 |
| 6 | 1.0562 | 0.0766 |
| 7 | 1.1254 | 0.0692 |
| 8 | 1.1890 | 0.0636 |
| 9 | 1.2481 | 0.0591 |
| 10 | 1.3034 | 0.0553 |
| 11 | 1.3556 | 0.0522 |
| 12 | 1.4050 | 0.0494 |
| 13 | 1.4618 | 0.0568 |
| 14 | 1.5165 | 0.0546 |
| 15 | 1.5691 | 0.0527 |
| 16 | 1.6201 | 0.0509 |
| 17 | 1.6695 | 0.0494 |
| 18 | 1.7174 | 0.0479 |
| 19 | 1.7640 | 0.0466 |
| 20 | 1.8093 | 0.0454 |
| 21 | 1.8536 | 0.0442 |
| 22 | 1.8968 | 0.0432 |
| 23 | 1.9390 | 0.0422 |
| 24 | 1.9802 | 0.0413 |
| 25 | 2.0207 | 0.0404 |
| 26 | 2.0603 | 0.0396 |
| 27 | 2.0991 | 0.0389 |
| 28 | 2.1373 | 0.0381 |
| 29 | 2.1747 | 0.0375 |
| 30 | 2.2115 | 0.0368 |
| 31 | 2.2477 | 0.0362 |
| 32 | 2.2834 | 0.0356 |
| 33 | 2.3184 | 0.0351 |
| 34 | 2.3529 | 0.0345 |
| 35 | 2.3869 | 0.0340 |
| 36 | 2.4205 | 0.0335 |
| 37 | 2.4518 | 0.0314 |
| 38 | 2.4828 | 0.0309 |
| 39 | 2.5133 | 0.0305 |
| 40 | 2.5434 | 0.0301 |
| 41 | 2.5731 | 0.0297 |
| 42 | 2.6024 | 0.0293 |
| 43 | 2.6314 | 0.0290 |
| 44 | 2.6600 | 0.0286 |
| 45 | 2.6882 | 0.0283 |
| 46 | 2.7161 | 0.0279 |
| 47 | 2.7437 | 0.0276 |
| 48 | 2.7710 | 0.0273 |
| 49 | 2.7980 | 0.0270 |
| 50 | 2.8247 | 0.0267 |
| 51 | 2.8512 | 0.0264 |
| 52 | 2.8773 | 0.0262 |
| 53 | 2.9032 | 0.0259 |
| 54 | 2.9288 | 0.0256 |
| 55 | 2.9542 | 0.0254 |
| 56 | 2.9793 | 0.0251 |
| 57 | 3.0042 | 0.0249 |
| 58 | 3.0289 | 0.0247 |
| 59 | 3.0534 | 0.0244 |
| 60 | 3.0776 | 0.0242 |
| 61 | 3.1016 | 0.0240 |
| 62 | 3.1254 | 0.0238 |
| 63 | 3.1490 | 0.0236 |
| 64 | 3.1724 | 0.0234 |
| 65 | 3.1956 | 0.0232 |
| 66 | 3.2186 | 0.0230 |
| 67 | 3.2415 | 0.0228 |
| 68 | 3.2641 | 0.0227 |
| 69 | 3.2866 | 0.0225 |

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| 70 | 3.3089 | 0.0223 |
| 71 | 3.3311 | 0.0221 |
| 72 | 3.3531 | 0.0220 |
| 73 | 3.3704 | 0.0173 |
| 74 | 3.3875 | 0.0172 |
| 75 | 3.4045 | 0.0170 |
| 76 | 3.4214 | 0.0169 |
| 77 | 3.4381 | 0.0167 |
| 78 | 3.4547 | 0.0166 |
| 79 | 3.4712 | 0.0165 |
| 80 | 3.4875 | 0.0163 |
| 81 | 3.5037 | 0.0162 |
| 82 | 3.5198 | 0.0161 |
| 83 | 3.5358 | 0.0160 |
| 84 | 3.5516 | 0.0158 |
| 85 | 3.5673 | 0.0157 |
| 86 | 3.5830 | 0.0156 |
| 87 | 3.5984 | 0.0155 |
| 88 | 3.6138 | 0.0154 |
| 89 | 3.6291 | 0.0153 |
| 90 | 3.6443 | 0.0152 |
| 91 | 3.6593 | 0.0151 |
| 92 | 3.6743 | 0.0150 |
| 93 | 3.6891 | 0.0149 |
| 94 | 3.7039 | 0.0148 |
| 95 | 3.7186 | 0.0147 |
| 96 | 3.7331 | 0.0146 |
| 97 | 3.7476 | 0.0145 |
| 98 | 3.7620 | 0.0144 |
| 99 | 3.7762 | 0.0143 |
| 100 | 3.7904 | 0.0142 |
| 101 | 3.8045 | 0.0141 |
| 102 | 3.8186 | 0.0140 |
| 103 | 3.8325 | 0.0139 |
| 104 | 3.8463 | 0.0138 |
| 105 | 3.8601 | 0.0138 |
| 106 | 3.8738 | 0.0137 |
| 107 | 3.8874 | 0.0136 |
| 108 | 3.9009 | 0.0135 |
| 109 | 3.9143 | 0.0134 |
| 110 | 3.9277 | 0.0134 |
| 111 | 3.9410 | 0.0133 |
| 112 | 3.9542 | 0.0132 |
| 113 | 3.9673 | 0.0131 |
| 114 | 3.9804 | 0.0131 |
| 115 | 3.9934 | 0.0130 |
| 116 | 4.0063 | 0.0129 |
| 117 | 4.0192 | 0.0129 |
| 118 | 4.0320 | 0.0128 |
| 119 | 4.0447 | 0.0127 |
| 120 | 4.0573 | 0.0127 |
| 121 | 4.0699 | 0.0126 |
| 122 | 4.0825 | 0.0125 |
| 123 | 4.0949 | 0.0125 |
| 124 | 4.1073 | 0.0124 |
| 125 | 4.1196 | 0.0123 |
| 126 | 4.1319 | 0.0123 |
| 127 | 4.1441 | 0.0122 |
| 128 | 4.1563 | 0.0121 |
| 129 | 4.1684 | 0.0121 |
| 130 | 4.1804 | 0.0120 |
| 131 | 4.1924 | 0.0120 |
| 132 | 4.2043 | 0.0119 |
| 133 | 4.2161 | 0.0119 |
| 134 | 4.2279 | 0.0118 |
| 135 | 4.2397 | 0.0117 |
| 136 | 4.2514 | 0.0117 |
| 137 | 4.2630 | 0.0116 |
| 138 | 4.2746 | 0.0116 |
| 139 | 4.2861 | 0.0115 |
| 140 | 4.2976 | 0.0115 |
| 141 | 4.3091 | 0.0114 |
| 142 | 4.3204 | 0.0114 |

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| 143 | 4.3318 | 0.0113 |
| 144 | 4.3430 | 0.0113 |
| 145 | 4.3543 | 0.0112 |
| 146 | 4.3655 | 0.0112 |
| 147 | 4.3766 | 0.0111 |
| 148 | 4.3877 | 0.0111 |
| 149 | 4.3987 | 0.0110 |
| 150 | 4.4097 | 0.0110 |
| 151 | 4.4207 | 0.0109 |
| 152 | 4.4316 | 0.0109 |
| 153 | 4.4424 | 0.0109 |
| 154 | 4.4533 | 0.0108 |
| 155 | 4.4640 | 0.0108 |
| 156 | 4.4748 | 0.0107 |
| 157 | 4.4854 | 0.0107 |
| 158 | 4.4961 | 0.0106 |
| 159 | 4.5067 | 0.0106 |
| 160 | 4.5172 | 0.0106 |
| 161 | 4.5278 | 0.0105 |
| 162 | 4.5382 | 0.0105 |
| 163 | 4.5487 | 0.0104 |
| 164 | 4.5591 | 0.0104 |
| 165 | 4.5694 | 0.0104 |
| 166 | 4.5797 | 0.0103 |
| 167 | 4.5900 | 0.0103 |
| 168 | 4.6003 | 0.0102 |
| 169 | 4.6105 | 0.0102 |
| 170 | 4.6206 | 0.0102 |
| 171 | 4.6307 | 0.0101 |
| 172 | 4.6408 | 0.0101 |
| 173 | 4.6509 | 0.0101 |
| 174 | 4.6609 | 0.0100 |
| 175 | 4.6709 | 0.0100 |
| 176 | 4.6808 | 0.0099 |
| 177 | 4.6907 | 0.0099 |
| 178 | 4.7006 | 0.0099 |
| 179 | 4.7104 | 0.0098 |
| 180 | 4.7202 | 0.0098 |
| 181 | 4.7300 | 0.0098 |
| 182 | 4.7398 | 0.0097 |
| 183 | 4.7495 | 0.0097 |
| 184 | 4.7591 | 0.0097 |
| 185 | 4.7688 | 0.0096 |
| 186 | 4.7784 | 0.0096 |
| 187 | 4.7879 | 0.0096 |
| 188 | 4.7975 | 0.0095 |
| 189 | 4.8070 | 0.0095 |
| 190 | 4.8165 | 0.0095 |
| 191 | 4.8259 | 0.0094 |
| 192 | 4.8353 | 0.0094 |
| 193 | 4.8447 | 0.0094 |
| 194 | 4.8541 | 0.0094 |
| 195 | 4.8634 | 0.0093 |
| 196 | 4.8727 | 0.0093 |
| 197 | 4.8819 | 0.0093 |
| 198 | 4.8912 | 0.0092 |
| 199 | 4.9004 | 0.0092 |
| 200 | 4.9096 | 0.0092 |
| 201 | 4.9187 | 0.0091 |
| 202 | 4.9278 | 0.0091 |
| 203 | 4.9369 | 0.0091 |
| 204 | 4.9460 | 0.0091 |
| 205 | 4.9550 | 0.0090 |
| 206 | 4.9640 | 0.0090 |
| 207 | 4.9730 | 0.0090 |
| 208 | 4.9820 | 0.0090 |
| 209 | 4.9909 | 0.0089 |
| 210 | 4.9998 | 0.0089 |
| 211 | 5.0087 | 0.0089 |
| 212 | 5.0175 | 0.0088 |
| 213 | 5.0263 | 0.0088 |
| 214 | 5.0351 | 0.0088 |
| 215 | 5.0439 | 0.0088 |

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| 216 | 5.0526 | 0.0087 |
| 217 | 5.0614 | 0.0087 |
| 218 | 5.0700 | 0.0087 |
| 219 | 5.0787 | 0.0087 |
| 220 | 5.0874 | 0.0086 |
| 221 | 5.0960 | 0.0086 |
| 222 | 5.1046 | 0.0086 |
| 223 | 5.1131 | 0.0086 |
| 224 | 5.1217 | 0.0085 |
| 225 | 5.1302 | 0.0085 |
| 226 | 5.1387 | 0.0085 |
| 227 | 5.1472 | 0.0085 |
| 228 | 5.1556 | 0.0085 |
| 229 | 5.1641 | 0.0084 |
| 230 | 5.1725 | 0.0084 |
| 231 | 5.1808 | 0.0084 |
| 232 | 5.1892 | 0.0084 |
| 233 | 5.1975 | 0.0083 |
| 234 | 5.2059 | 0.0083 |
| 235 | 5.2141 | 0.0083 |
| 236 | 5.2224 | 0.0083 |
| 237 | 5.2307 | 0.0082 |
| 238 | 5.2389 | 0.0082 |
| 239 | 5.2471 | 0.0082 |
| 240 | 5.2553 | 0.0082 |
| 241 | 5.2634 | 0.0082 |
| 242 | 5.2716 | 0.0081 |
| 243 | 5.2797 | 0.0081 |
| 244 | 5.2878 | 0.0081 |
| 245 | 5.2959 | 0.0081 |
| 246 | 5.3039 | 0.0081 |
| 247 | 5.3120 | 0.0080 |
| 248 | 5.3200 | 0.0080 |
| 249 | 5.3280 | 0.0080 |
| 250 | 5.3360 | 0.0080 |
| 251 | 5.3439 | 0.0080 |
| 252 | 5.3519 | 0.0079 |
| 253 | 5.3598 | 0.0079 |
| 254 | 5.3677 | 0.0079 |
| 255 | 5.3755 | 0.0079 |
| 256 | 5.3834 | 0.0079 |
| 257 | 5.3912 | 0.0078 |
| 258 | 5.3991 | 0.0078 |
| 259 | 5.4069 | 0.0078 |
| 260 | 5.4147 | 0.0078 |
| 261 | 5.4224 | 0.0078 |
| 262 | 5.4302 | 0.0077 |
| 263 | 5.4379 | 0.0077 |
| 264 | 5.4456 | 0.0077 |
| 265 | 5.4533 | 0.0077 |
| 266 | 5.4610 | 0.0077 |
| 267 | 5.4686 | 0.0077 |
| 268 | 5.4762 | 0.0076 |
| 269 | 5.4839 | 0.0076 |
| 270 | 5.4915 | 0.0076 |
| 271 | 5.4990 | 0.0076 |
| 272 | 5.5066 | 0.0076 |
| 273 | 5.5142 | 0.0075 |
| 274 | 5.5217 | 0.0075 |
| 275 | 5.5292 | 0.0075 |
| 276 | 5.5367 | 0.0075 |
| 277 | 5.5442 | 0.0075 |
| 278 | 5.5516 | 0.0075 |
| 279 | 5.5591 | 0.0074 |
| 280 | 5.5665 | 0.0074 |
| 281 | 5.5739 | 0.0074 |
| 282 | 5.5813 | 0.0074 |
| 283 | 5.5887 | 0.0074 |
| 284 | 5.5961 | 0.0074 |
| 285 | 5.6034 | 0.0073 |
| 286 | 5.6107 | 0.0073 |
| 287 | 5.6180 | 0.0073 |
| 288 | 5.6253 | 0.0073 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0073 | 0.0008 | 0.0065 |
| 2 | 0.0073 | 0.0008 | 0.0065 |
| 3 | 0.0073 | 0.0008 | 0.0065 |
| 4 | 0.0074 | 0.0008 | 0.0066 |
| 5 | 0.0074 | 0.0008 | 0.0066 |
| 6 | 0.0074 | 0.0008 | 0.0066 |
| 7 | 0.0074 | 0.0008 | 0.0066 |
| 8 | 0.0075 | 0.0008 | 0.0066 |
| 9 | 0.0075 | 0.0008 | 0.0067 |
| 10 | 0.0075 | 0.0008 | 0.0067 |
| 11 | 0.0075 | 0.0008 | 0.0067 |
| 12 | 0.0076 | 0.0008 | 0.0067 |
| 13 | 0.0076 | 0.0008 | 0.0068 |
| 14 | 0.0076 | 0.0008 | 0.0068 |
| 15 | 0.0077 | 0.0008 | 0.0068 |
| 16 | 0.0077 | 0.0008 | 0.0068 |
| 17 | 0.0077 | 0.0008 | 0.0069 |
| 18 | 0.0077 | 0.0009 | 0.0069 |
| 19 | 0.0078 | 0.0009 | 0.0069 |
| 20 | 0.0078 | 0.0009 | 0.0069 |
| 21 | 0.0078 | 0.0009 | 0.0070 |
| 22 | 0.0078 | 0.0009 | 0.0070 |
| 23 | 0.0079 | 0.0009 | 0.0070 |
| 24 | 0.0079 | 0.0009 | 0.0070 |
| 25 | 0.0079 | 0.0009 | 0.0071 |
| 26 | 0.0080 | 0.0009 | 0.0071 |
| 27 | 0.0080 | 0.0009 | 0.0071 |
| 28 | 0.0080 | 0.0009 | 0.0071 |
| 29 | 0.0081 | 0.0009 | 0.0072 |
| 30 | 0.0081 | 0.0009 | 0.0072 |
| 31 | 0.0081 | 0.0009 | 0.0072 |
| 32 | 0.0081 | 0.0009 | 0.0072 |
| 33 | 0.0082 | 0.0009 | 0.0073 |
| 34 | 0.0082 | 0.0009 | 0.0073 |
| 35 | 0.0082 | 0.0009 | 0.0073 |
| 36 | 0.0083 | 0.0009 | 0.0074 |
| 37 | 0.0083 | 0.0009 | 0.0074 |
| 38 | 0.0083 | 0.0009 | 0.0074 |
| 39 | 0.0084 | 0.0009 | 0.0075 |
| 40 | 0.0084 | 0.0009 | 0.0075 |
| 41 | 0.0085 | 0.0009 | 0.0075 |
| 42 | 0.0085 | 0.0009 | 0.0075 |
| 43 | 0.0085 | 0.0009 | 0.0076 |
| 44 | 0.0085 | 0.0009 | 0.0076 |
| 45 | 0.0086 | 0.0009 | 0.0076 |
| 46 | 0.0086 | 0.0009 | 0.0077 |
| 47 | 0.0087 | 0.0010 | 0.0077 |
| 48 | 0.0087 | 0.0010 | 0.0077 |
| 49 | 0.0087 | 0.0010 | 0.0078 |
| 50 | 0.0088 | 0.0010 | 0.0078 |
| 51 | 0.0088 | 0.0010 | 0.0078 |
| 52 | 0.0088 | 0.0010 | 0.0079 |
| 53 | 0.0089 | 0.0010 | 0.0079 |
| 54 | 0.0089 | 0.0010 | 0.0079 |
| 55 | 0.0090 | 0.0010 | 0.0080 |
| 56 | 0.0090 | 0.0010 | 0.0080 |
| 57 | 0.0091 | 0.0010 | 0.0081 |
| 58 | 0.0091 | 0.0010 | 0.0081 |
| 59 | 0.0091 | 0.0010 | 0.0081 |
| 60 | 0.0092 | 0.0010 | 0.0082 |
| 61 | 0.0092 | 0.0010 | 0.0082 |
| 62 | 0.0093 | 0.0010 | 0.0082 |
| 63 | 0.0093 | 0.0010 | 0.0083 |
| 64 | 0.0094 | 0.0010 | 0.0083 |
| 65 | 0.0094 | 0.0010 | 0.0084 |
| 66 | 0.0094 | 0.0010 | 0.0084 |
| 67 | 0.0095 | 0.0010 | 0.0085 |
| 68 | 0.0095 | 0.0011 | 0.0085 |

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|-----|--------|--------|--------|
| 69 | 0.0096 | 0.0011 | 0.0085 |
| 70 | 0.0096 | 0.0011 | 0.0086 |
| 71 | 0.0097 | 0.0011 | 0.0086 |
| 72 | 0.0097 | 0.0011 | 0.0087 |
| 73 | 0.0098 | 0.0011 | 0.0087 |
| 74 | 0.0098 | 0.0011 | 0.0088 |
| 75 | 0.0099 | 0.0011 | 0.0088 |
| 76 | 0.0099 | 0.0011 | 0.0088 |
| 77 | 0.0100 | 0.0011 | 0.0089 |
| 78 | 0.0101 | 0.0011 | 0.0089 |
| 79 | 0.0101 | 0.0011 | 0.0090 |
| 80 | 0.0102 | 0.0011 | 0.0090 |
| 81 | 0.0102 | 0.0011 | 0.0091 |
| 82 | 0.0103 | 0.0011 | 0.0091 |
| 83 | 0.0104 | 0.0011 | 0.0092 |
| 84 | 0.0104 | 0.0011 | 0.0093 |
| 85 | 0.0105 | 0.0012 | 0.0093 |
| 86 | 0.0105 | 0.0012 | 0.0094 |
| 87 | 0.0106 | 0.0012 | 0.0094 |
| 88 | 0.0106 | 0.0012 | 0.0095 |
| 89 | 0.0107 | 0.0012 | 0.0095 |
| 90 | 0.0108 | 0.0012 | 0.0096 |
| 91 | 0.0109 | 0.0012 | 0.0097 |
| 92 | 0.0109 | 0.0012 | 0.0097 |
| 93 | 0.0110 | 0.0012 | 0.0098 |
| 94 | 0.0110 | 0.0012 | 0.0098 |
| 95 | 0.0111 | 0.0012 | 0.0099 |
| 96 | 0.0112 | 0.0012 | 0.0100 |
| 97 | 0.0113 | 0.0012 | 0.0100 |
| 98 | 0.0113 | 0.0012 | 0.0101 |
| 99 | 0.0114 | 0.0013 | 0.0102 |
| 100 | 0.0115 | 0.0013 | 0.0102 |
| 101 | 0.0116 | 0.0013 | 0.0103 |
| 102 | 0.0116 | 0.0013 | 0.0104 |
| 103 | 0.0117 | 0.0013 | 0.0105 |
| 104 | 0.0118 | 0.0013 | 0.0105 |
| 105 | 0.0119 | 0.0013 | 0.0106 |
| 106 | 0.0120 | 0.0013 | 0.0107 |
| 107 | 0.0121 | 0.0013 | 0.0108 |
| 108 | 0.0121 | 0.0013 | 0.0108 |
| 109 | 0.0123 | 0.0014 | 0.0109 |
| 110 | 0.0123 | 0.0014 | 0.0110 |
| 111 | 0.0125 | 0.0014 | 0.0111 |
| 112 | 0.0125 | 0.0014 | 0.0111 |
| 113 | 0.0127 | 0.0014 | 0.0113 |
| 114 | 0.0127 | 0.0014 | 0.0113 |
| 115 | 0.0129 | 0.0014 | 0.0114 |
| 116 | 0.0129 | 0.0014 | 0.0115 |
| 117 | 0.0131 | 0.0014 | 0.0116 |
| 118 | 0.0131 | 0.0014 | 0.0117 |
| 119 | 0.0133 | 0.0015 | 0.0118 |
| 120 | 0.0134 | 0.0015 | 0.0119 |
| 121 | 0.0135 | 0.0015 | 0.0120 |
| 122 | 0.0136 | 0.0015 | 0.0121 |
| 123 | 0.0138 | 0.0015 | 0.0122 |
| 124 | 0.0138 | 0.0015 | 0.0123 |
| 125 | 0.0140 | 0.0015 | 0.0125 |
| 126 | 0.0141 | 0.0016 | 0.0126 |
| 127 | 0.0143 | 0.0016 | 0.0127 |
| 128 | 0.0144 | 0.0016 | 0.0128 |
| 129 | 0.0146 | 0.0016 | 0.0130 |
| 130 | 0.0147 | 0.0016 | 0.0130 |
| 131 | 0.0149 | 0.0016 | 0.0132 |
| 132 | 0.0150 | 0.0016 | 0.0133 |
| 133 | 0.0152 | 0.0017 | 0.0135 |
| 134 | 0.0153 | 0.0017 | 0.0136 |
| 135 | 0.0155 | 0.0017 | 0.0138 |
| 136 | 0.0156 | 0.0017 | 0.0139 |
| 137 | 0.0158 | 0.0017 | 0.0141 |
| 138 | 0.0160 | 0.0018 | 0.0142 |
| 139 | 0.0162 | 0.0018 | 0.0144 |
| 140 | 0.0163 | 0.0018 | 0.0145 |
| 141 | 0.0166 | 0.0018 | 0.0148 |

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| 142 | 0.0167 | 0.0018 | 0.0149 |
| 143 | 0.0170 | 0.0019 | 0.0151 |
| 144 | 0.0172 | 0.0019 | 0.0153 |
| 145 | 0.0220 | 0.0024 | 0.0196 |
| 146 | 0.0221 | 0.0024 | 0.0197 |
| 147 | 0.0225 | 0.0025 | 0.0200 |
| 148 | 0.0227 | 0.0025 | 0.0202 |
| 149 | 0.0230 | 0.0025 | 0.0205 |
| 150 | 0.0232 | 0.0026 | 0.0207 |
| 151 | 0.0236 | 0.0026 | 0.0210 |
| 152 | 0.0238 | 0.0026 | 0.0212 |
| 153 | 0.0242 | 0.0027 | 0.0216 |
| 154 | 0.0244 | 0.0027 | 0.0218 |
| 155 | 0.0249 | 0.0027 | 0.0222 |
| 156 | 0.0251 | 0.0028 | 0.0224 |
| 157 | 0.0256 | 0.0028 | 0.0228 |
| 158 | 0.0259 | 0.0028 | 0.0230 |
| 159 | 0.0264 | 0.0029 | 0.0235 |
| 160 | 0.0267 | 0.0029 | 0.0238 |
| 161 | 0.0273 | 0.0030 | 0.0243 |
| 162 | 0.0276 | 0.0030 | 0.0246 |
| 163 | 0.0283 | 0.0031 | 0.0251 |
| 164 | 0.0286 | 0.0031 | 0.0254 |
| 165 | 0.0293 | 0.0032 | 0.0261 |
| 166 | 0.0297 | 0.0033 | 0.0264 |
| 167 | 0.0305 | 0.0034 | 0.0272 |
| 168 | 0.0309 | 0.0034 | 0.0275 |
| 169 | 0.0335 | 0.0037 | 0.0298 |
| 170 | 0.0340 | 0.0037 | 0.0303 |
| 171 | 0.0351 | 0.0039 | 0.0312 |
| 172 | 0.0356 | 0.0039 | 0.0317 |
| 173 | 0.0368 | 0.0041 | 0.0328 |
| 174 | 0.0375 | 0.0041 | 0.0333 |
| 175 | 0.0389 | 0.0043 | 0.0346 |
| 176 | 0.0396 | 0.0044 | 0.0353 |
| 177 | 0.0413 | 0.0045 | 0.0367 |
| 178 | 0.0422 | 0.0046 | 0.0376 |
| 179 | 0.0442 | 0.0049 | 0.0394 |
| 180 | 0.0454 | 0.0050 | 0.0404 |
| 181 | 0.0479 | 0.0053 | 0.0426 |
| 182 | 0.0494 | 0.0054 | 0.0439 |
| 183 | 0.0527 | 0.0058 | 0.0469 |
| 184 | 0.0546 | 0.0060 | 0.0486 |
| 185 | 0.0494 | 0.0054 | 0.0440 |
| 186 | 0.0522 | 0.0057 | 0.0464 |
| 187 | 0.0591 | 0.0065 | 0.0526 |
| 188 | 0.0636 | 0.0070 | 0.0566 |
| 189 | 0.0766 | 0.0084 | 0.0682 |
| 190 | 0.0863 | 0.0095 | 0.0768 |
| 191 | 0.1223 | 0.0135 | 0.1089 |
| 192 | 0.1670 | 0.0184 | 0.1486 |
| 193 | 0.5039 | 0.0191 | 0.4848 |
| 194 | 0.1001 | 0.0110 | 0.0891 |
| 195 | 0.0692 | 0.0076 | 0.0616 |
| 196 | 0.0553 | 0.0061 | 0.0492 |
| 197 | 0.0568 | 0.0063 | 0.0505 |
| 198 | 0.0509 | 0.0056 | 0.0453 |
| 199 | 0.0466 | 0.0051 | 0.0415 |
| 200 | 0.0432 | 0.0048 | 0.0384 |
| 201 | 0.0404 | 0.0045 | 0.0360 |
| 202 | 0.0381 | 0.0042 | 0.0339 |
| 203 | 0.0362 | 0.0040 | 0.0322 |
| 204 | 0.0345 | 0.0038 | 0.0307 |
| 205 | 0.0314 | 0.0035 | 0.0279 |
| 206 | 0.0301 | 0.0033 | 0.0268 |
| 207 | 0.0290 | 0.0032 | 0.0258 |
| 208 | 0.0279 | 0.0031 | 0.0249 |
| 209 | 0.0270 | 0.0030 | 0.0240 |
| 210 | 0.0262 | 0.0029 | 0.0233 |
| 211 | 0.0254 | 0.0028 | 0.0226 |
| 212 | 0.0247 | 0.0027 | 0.0220 |
| 213 | 0.0240 | 0.0026 | 0.0214 |
| 214 | 0.0234 | 0.0026 | 0.0208 |

| | | | |
|-----|--------|--------|--------|
| 215 | 0.0228 | 0.0025 | 0.0203 |
| 216 | 0.0223 | 0.0025 | 0.0199 |
| 217 | 0.0173 | 0.0019 | 0.0154 |
| 218 | 0.0169 | 0.0019 | 0.0150 |
| 219 | 0.0165 | 0.0018 | 0.0147 |
| 220 | 0.0161 | 0.0018 | 0.0143 |
| 221 | 0.0157 | 0.0017 | 0.0140 |
| 222 | 0.0154 | 0.0017 | 0.0137 |
| 223 | 0.0151 | 0.0017 | 0.0134 |
| 224 | 0.0148 | 0.0016 | 0.0131 |
| 225 | 0.0145 | 0.0016 | 0.0129 |
| 226 | 0.0142 | 0.0016 | 0.0126 |
| 227 | 0.0139 | 0.0015 | 0.0124 |
| 228 | 0.0137 | 0.0015 | 0.0122 |
| 229 | 0.0134 | 0.0015 | 0.0120 |
| 230 | 0.0132 | 0.0015 | 0.0118 |
| 231 | 0.0130 | 0.0014 | 0.0116 |
| 232 | 0.0128 | 0.0014 | 0.0114 |
| 233 | 0.0126 | 0.0014 | 0.0112 |
| 234 | 0.0124 | 0.0014 | 0.0110 |
| 235 | 0.0122 | 0.0013 | 0.0109 |
| 236 | 0.0120 | 0.0013 | 0.0107 |
| 237 | 0.0119 | 0.0013 | 0.0106 |
| 238 | 0.0117 | 0.0013 | 0.0104 |
| 239 | 0.0115 | 0.0013 | 0.0103 |
| 240 | 0.0114 | 0.0013 | 0.0101 |
| 241 | 0.0112 | 0.0012 | 0.0100 |
| 242 | 0.0111 | 0.0012 | 0.0099 |
| 243 | 0.0109 | 0.0012 | 0.0097 |
| 244 | 0.0108 | 0.0012 | 0.0096 |
| 245 | 0.0107 | 0.0012 | 0.0095 |
| 246 | 0.0106 | 0.0012 | 0.0094 |
| 247 | 0.0104 | 0.0011 | 0.0093 |
| 248 | 0.0103 | 0.0011 | 0.0092 |
| 249 | 0.0102 | 0.0011 | 0.0091 |
| 250 | 0.0101 | 0.0011 | 0.0090 |
| 251 | 0.0100 | 0.0011 | 0.0089 |
| 252 | 0.0099 | 0.0011 | 0.0088 |
| 253 | 0.0098 | 0.0011 | 0.0087 |
| 254 | 0.0097 | 0.0011 | 0.0086 |
| 255 | 0.0096 | 0.0011 | 0.0085 |
| 256 | 0.0095 | 0.0010 | 0.0084 |
| 257 | 0.0094 | 0.0010 | 0.0084 |
| 258 | 0.0093 | 0.0010 | 0.0083 |
| 259 | 0.0092 | 0.0010 | 0.0082 |
| 260 | 0.0091 | 0.0010 | 0.0081 |
| 261 | 0.0090 | 0.0010 | 0.0080 |
| 262 | 0.0090 | 0.0010 | 0.0080 |
| 263 | 0.0089 | 0.0010 | 0.0079 |
| 264 | 0.0088 | 0.0010 | 0.0078 |
| 265 | 0.0087 | 0.0010 | 0.0078 |
| 266 | 0.0086 | 0.0010 | 0.0077 |
| 267 | 0.0086 | 0.0009 | 0.0076 |
| 268 | 0.0085 | 0.0009 | 0.0076 |
| 269 | 0.0084 | 0.0009 | 0.0075 |
| 270 | 0.0084 | 0.0009 | 0.0074 |
| 271 | 0.0083 | 0.0009 | 0.0074 |
| 272 | 0.0082 | 0.0009 | 0.0073 |
| 273 | 0.0082 | 0.0009 | 0.0073 |
| 274 | 0.0081 | 0.0009 | 0.0072 |
| 275 | 0.0080 | 0.0009 | 0.0072 |
| 276 | 0.0080 | 0.0009 | 0.0071 |
| 277 | 0.0079 | 0.0009 | 0.0070 |
| 278 | 0.0079 | 0.0009 | 0.0070 |
| 279 | 0.0078 | 0.0009 | 0.0069 |
| 280 | 0.0077 | 0.0009 | 0.0069 |
| 281 | 0.0077 | 0.0008 | 0.0068 |
| 282 | 0.0076 | 0.0008 | 0.0068 |
| 283 | 0.0076 | 0.0008 | 0.0067 |
| 284 | 0.0075 | 0.0008 | 0.0067 |
| 285 | 0.0075 | 0.0008 | 0.0067 |
| 286 | 0.0074 | 0.0008 | 0.0066 |
| 287 | 0.0074 | 0.0008 | 0.0066 |

| | | | | | | | |
|-------|---------|-------|-----|--|--|--|--|
| 4+50 | 19.6381 | 62.56 | Q | | | | |
| 4+55 | 20.0709 | 62.84 | Q | | | | |
| 5+ 0 | 20.5056 | 63.12 | Q | | | | |
| 5+ 5 | 20.9422 | 63.40 | QV | | | | |
| 5+10 | 21.3809 | 63.69 | QV | | | | |
| 5+15 | 21.8215 | 63.98 | QV | | | | |
| 5+20 | 22.2642 | 64.27 | QV | | | | |
| 5+25 | 22.7089 | 64.57 | QV | | | | |
| 5+30 | 23.1556 | 64.87 | QV | | | | |
| 5+35 | 23.6045 | 65.18 | QV | | | | |
| 5+40 | 24.0555 | 65.48 | QV | | | | |
| 5+45 | 24.5086 | 65.80 | QV | | | | |
| 5+50 | 24.9640 | 66.11 | QV | | | | |
| 5+55 | 25.4215 | 66.43 | QV | | | | |
| 6+ 0 | 25.8812 | 66.76 | QV | | | | |
| 6+ 5 | 26.3432 | 67.08 | QV | | | | |
| 6+10 | 26.8075 | 67.42 | QV | | | | |
| 6+15 | 27.2742 | 67.75 | QV | | | | |
| 6+20 | 27.7431 | 68.09 | QV | | | | |
| 6+25 | 28.2145 | 68.44 | Q V | | | | |
| 6+30 | 28.6882 | 68.79 | Q V | | | | |
| 6+35 | 29.1644 | 69.14 | Q V | | | | |
| 6+40 | 29.6431 | 69.50 | Q V | | | | |
| 6+45 | 30.1243 | 69.87 | Q V | | | | |
| 6+50 | 30.6080 | 70.24 | Q V | | | | |
| 6+55 | 31.0943 | 70.61 | Q V | | | | |
| 7+ 0 | 31.5832 | 70.99 | Q V | | | | |
| 7+ 5 | 32.0748 | 71.38 | Q V | | | | |
| 7+10 | 32.5691 | 71.77 | Q V | | | | |
| 7+15 | 33.0661 | 72.16 | Q V | | | | |
| 7+20 | 33.5659 | 72.57 | Q V | | | | |
| 7+25 | 34.0684 | 72.98 | Q V | | | | |
| 7+30 | 34.5739 | 73.39 | Q V | | | | |
| 7+35 | 35.0822 | 73.81 | Q V | | | | |
| 7+40 | 35.5935 | 74.23 | Q V | | | | |
| 7+45 | 36.1077 | 74.67 | Q V | | | | |
| 7+50 | 36.6250 | 75.11 | Q V | | | | |
| 7+55 | 37.1453 | 75.55 | Q V | | | | |
| 8+ 0 | 37.6688 | 76.01 | Q V | | | | |
| 8+ 5 | 38.1954 | 76.47 | Q V | | | | |
| 8+10 | 38.7253 | 76.93 | Q V | | | | |
| 8+15 | 39.2584 | 77.41 | Q V | | | | |
| 8+20 | 39.7949 | 77.89 | Q V | | | | |
| 8+25 | 40.3347 | 78.39 | Q V | | | | |
| 8+30 | 40.8780 | 78.88 | Q V | | | | |
| 8+35 | 41.4248 | 79.39 | Q V | | | | |
| 8+40 | 41.9751 | 79.91 | Q V | | | | |
| 8+45 | 42.5290 | 80.43 | Q V | | | | |
| 8+50 | 43.0866 | 80.97 | Q V | | | | |
| 8+55 | 43.6480 | 81.51 | Q V | | | | |
| 9+ 0 | 44.2132 | 82.06 | Q V | | | | |
| 9+ 5 | 44.7822 | 82.63 | Q V | | | | |
| 9+10 | 45.3552 | 83.20 | Q V | | | | |
| 9+15 | 45.9322 | 83.78 | Q V | | | | |
| 9+20 | 46.5133 | 84.37 | Q V | | | | |
| 9+25 | 47.0986 | 84.98 | Q V | | | | |
| 9+30 | 47.6881 | 85.60 | Q V | | | | |
| 9+35 | 48.2819 | 86.23 | Q V | | | | |
| 9+40 | 48.8801 | 86.86 | Q V | | | | |
| 9+45 | 49.4829 | 87.52 | Q V | | | | |
| 9+50 | 50.0902 | 88.18 | Q V | | | | |
| 9+55 | 50.7022 | 88.86 | Q V | | | | |
| 10+ 0 | 51.3190 | 89.56 | Q V | | | | |
| 10+ 5 | 51.9407 | 90.27 | Q V | | | | |
| 10+10 | 52.5673 | 90.99 | Q V | | | | |
| 10+15 | 53.1990 | 91.72 | Q V | | | | |
| 10+20 | 53.8359 | 92.48 | Q V | | | | |
| 10+25 | 54.4781 | 93.25 | Q V | | | | |
| 10+30 | 55.1257 | 94.03 | Q V | | | | |
| 10+35 | 55.7789 | 94.84 | Q V | | | | |
| 10+40 | 56.4377 | 95.66 | Q V | | | | |
| 10+45 | 57.1023 | 96.50 | Q V | | | | |
| 10+50 | 57.7728 | 97.36 | Q V | | | | |

| | | | | | |
|-------|----------|--------|--|--|---|
| 17+ 0 | 201.2244 | 517.93 | | | V |
| 17+ 5 | 204.5166 | 478.03 | | | V |
| 17+10 | 207.5807 | 444.91 | | | V |
| 17+15 | 210.4380 | 414.88 | | | V |
| 17+20 | 213.1025 | 386.89 | | | V |
| 17+25 | 215.6005 | 362.70 | | | V |
| 17+30 | 217.9349 | 338.96 | | | V |
| 17+35 | 220.1139 | 316.39 | | | V |
| 17+40 | 222.1593 | 297.00 | | | V |
| 17+45 | 224.0745 | 278.08 | | | V |
| 17+50 | 225.8844 | 262.79 | | | V |
| 17+55 | 227.5939 | 248.22 | | | V |
| 18+ 0 | 229.1988 | 233.04 | | | V |
| 18+ 5 | 230.6964 | 217.44 | | | V |
| 18+10 | 232.1199 | 206.70 | | | V |
| 18+15 | 233.4859 | 198.34 | | | V |
| 18+20 | 234.7911 | 189.52 | | | V |
| 18+25 | 236.0354 | 180.68 | | | V |
| 18+30 | 237.2040 | 169.68 | | | V |
| 18+35 | 238.2920 | 157.97 | | | V |
| 18+40 | 239.3304 | 150.78 | | | V |
| 18+45 | 240.3305 | 145.21 | | | V |
| 18+50 | 241.3011 | 140.93 | | | V |
| 18+55 | 242.2395 | 136.25 | | | V |
| 19+ 0 | 243.1441 | 131.36 | | | V |
| 19+ 5 | 244.0092 | 125.61 | | | V |
| 19+10 | 244.8455 | 121.43 | | | V |
| 19+15 | 245.6557 | 117.64 | | | V |
| 19+20 | 246.4378 | 113.57 | | | V |
| 19+25 | 247.1975 | 110.30 | | | V |
| 19+30 | 247.9361 | 107.25 | | | V |
| 19+35 | 248.6499 | 103.64 | | | V |
| 19+40 | 249.3468 | 101.19 | | | V |
| 19+45 | 250.0284 | 98.97 | | | V |
| 19+50 | 250.6959 | 96.92 | | | V |
| 19+55 | 251.3500 | 94.98 | | | V |
| 20+ 0 | 251.9917 | 93.18 | | | V |
| 20+ 5 | 252.6220 | 91.53 | | | V |
| 20+10 | 253.2417 | 89.97 | | | V |
| 20+15 | 253.8511 | 88.48 | | | V |
| 20+20 | 254.4507 | 87.07 | | | V |
| 20+25 | 255.0410 | 85.71 | | | V |
| 20+30 | 255.6224 | 84.41 | | | V |
| 20+35 | 256.1952 | 83.18 | | | V |
| 20+40 | 256.7599 | 82.00 | | | V |
| 20+45 | 257.3168 | 80.85 | | | V |
| 20+50 | 257.8660 | 79.74 | | | V |
| 20+55 | 258.4078 | 78.67 | | | V |
| 21+ 0 | 258.9424 | 77.63 | | | V |
| 21+ 5 | 259.4703 | 76.65 | | | V |
| 21+10 | 259.9916 | 75.69 | | | V |
| 21+15 | 260.5065 | 74.77 | | | V |
| 21+20 | 261.0154 | 73.89 | | | V |
| 21+25 | 261.5183 | 73.03 | | | V |
| 21+30 | 262.0156 | 72.20 | | | V |
| 21+35 | 262.5073 | 71.40 | | | V |
| 21+40 | 262.9937 | 70.63 | | | V |
| 21+45 | 263.4750 | 69.88 | | | V |
| 21+50 | 263.9512 | 69.14 | | | V |
| 21+55 | 264.4225 | 68.43 | | | V |
| 22+ 0 | 264.8890 | 67.74 | | | V |
| 22+ 5 | 265.3509 | 67.07 | | | V |
| 22+10 | 265.8082 | 66.41 | | | V |
| 22+15 | 266.2612 | 65.77 | | | V |
| 22+20 | 266.7099 | 65.15 | | | V |
| 22+25 | 267.1543 | 64.54 | | | V |
| 22+30 | 267.5947 | 63.94 | | | V |
| 22+35 | 268.0311 | 63.36 | | | V |
| 22+40 | 268.4636 | 62.80 | | | V |
| 22+45 | 268.8922 | 62.24 | | | V |
| 22+50 | 269.3172 | 61.70 | | | V |
| 22+55 | 269.7385 | 61.17 | | | V |
| 23+ 0 | 270.1562 | 60.66 | | | V |

| | | | | | | | |
|-------|----------|-------|---|--|--|--|---|
| 23+ 5 | 270.5705 | 60.15 | Q | | | | V |
| 23+10 | 270.9813 | 59.66 | Q | | | | V |
| 23+15 | 271.3889 | 59.17 | Q | | | | V |
| 23+20 | 271.7931 | 58.70 | Q | | | | V |
| 23+25 | 272.1942 | 58.23 | Q | | | | V |
| 23+30 | 272.5921 | 57.78 | Q | | | | V |
| 23+35 | 272.9870 | 57.33 | Q | | | | V |
| 23+40 | 273.3789 | 56.90 | Q | | | | V |
| 23+45 | 273.7678 | 56.47 | Q | | | | V |
| 23+50 | 274.1538 | 56.05 | Q | | | | V |
| 23+55 | 274.5370 | 55.64 | Q | | | | V |
| 24+ 0 | 274.9174 | 55.24 | Q | | | | V |

Unit Hydrograph Analysis

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Study date 08/03/15 File Name CieloVistaExWshdAUH25.out

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
25-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.55 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.40 | D | 0.200 | 1.000 | 0.200 |
| 82.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 23.1 | 0.03 | D | 0.200 | 1.000 | 0.200 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC2) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 82.0 | 2.20 | 0.585 |
| 0.20 | 0.000 | 72.0 | 72.0 | 3.89 | 0.404 |
| 365.10 | 0.552 | 79.0 | 79.0 | 2.66 | 0.527 |
| 264.30 | 0.399 | 84.0 | 84.0 | 1.90 | 0.625 |
| 2.50 | 0.004 | 82.0 | 82.0 | 2.20 | 0.585 |
| 2.50 | 0.004 | 72.0 | 72.0 | 3.89 | 0.404 |
| 3.70 | 0.006 | 79.0 | 79.0 | 2.66 | 0.527 |
| 23.10 | 0.035 | 84.0 | 84.0 | 1.90 | 0.625 |

Area-averaged catchment yield fraction, Y = 0.570

Area-averaged low loss fraction, Yb = 0.430

User entry of time of concentration = 0.670 (hours)

Watershed area = 661.60(Ac.)

Catchment Lag time = 0.536 hours

Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 15.5426
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.229(In/Hr)
 Average low loss rate fraction (Yb) = 0.430 (decimal)
 FOOTHILL S-Graph Selected
 Computed peak 5-minute rainfall = 0.400(In)
 Computed peak 30-minute rainfall = 0.870(In)
 Specified peak 1-hour rainfall = 1.150(In)
 Computed peak 3-hour rainfall = 1.940(In)
 Specified peak 6-hour rainfall = 2.710(In)
 Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
 Using a total area of 661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969 Adjusted rainfall = 0.388(In)
 30-minute factor = 0.969 Adjusted rainfall = 0.843(In)
 1-hour factor = 0.969 Adjusted rainfall = 1.114(In)
 3-hour factor = 0.996 Adjusted rainfall = 1.932(In)
 6-hour factor = 0.998 Adjusted rainfall = 2.704(In)
 24-hour factor = 0.999 Adjusted rainfall = 4.486(In)

U n i t H y d r o g r a p h

+++++

| Interval Number | 'S' Graph Mean values | Unit Hydrograph ((CFS)) |
|---------------------|-----------------------|-------------------------|
| (K = 8001.23 (CFS)) | | |
| 1 | 0.985 | 78.809 |
| 2 | 3.515 | 202.465 |
| 3 | 7.138 | 289.887 |
| 4 | 11.980 | 387.379 |
| 5 | 19.155 | 574.077 |
| 6 | 30.299 | 891.700 |
| 7 | 49.711 | 1553.140 |
| 8 | 59.911 | 816.187 |
| 9 | 66.264 | 508.290 |
| 10 | 71.169 | 392.439 |
| 11 | 75.015 | 307.716 |
| 12 | 78.461 | 275.753 |
| 13 | 81.343 | 230.563 |
| 14 | 83.815 | 197.811 |
| 15 | 86.002 | 174.986 |
| 16 | 87.909 | 152.618 |
| 17 | 89.618 | 136.732 |
| 18 | 91.100 | 118.557 |
| 19 | 92.403 | 104.270 |
| 20 | 93.586 | 94.638 |
| 21 | 94.591 | 80.416 |
| 22 | 95.440 | 67.936 |
| 23 | 96.172 | 58.541 |
| 24 | 96.810 | 51.082 |
| 25 | 97.361 | 44.060 |
| 26 | 97.789 | 34.246 |
| 27 | 98.043 | 20.308 |
| 28 | 98.229 | 14.923 |
| 29 | 98.416 | 14.920 |
| 30 | 98.585 | 13.565 |
| 31 | 98.741 | 12.436 |
| 32 | 98.896 | 12.436 |
| 33 | 99.030 | 10.721 |
| 34 | 99.124 | 7.533 |
| 35 | 99.217 | 7.462 |
| 36 | 99.316 | 7.930 |
| 37 | 99.438 | 9.763 |
| 38 | 99.563 | 9.949 |
| 39 | 99.682 | 9.558 |
| 40 | 99.756 | 5.880 |
| 41 | 99.818 | 4.974 |

| | | |
|----|---------|-------|
| 42 | 99.880 | 4.934 |
| 43 | 99.921 | 3.324 |
| 44 | 99.952 | 2.487 |
| 45 | 99.983 | 2.487 |
| 46 | 100.000 | 1.337 |

| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
|---------------------|-----------------------------------|-----------------------|
| 1 | 0.3876 | 0.3876 |
| 2 | 0.5235 | 0.1359 |
| 3 | 0.6242 | 0.1006 |
| 4 | 0.7071 | 0.0829 |
| 5 | 0.7789 | 0.0718 |
| 6 | 0.8430 | 0.0641 |
| 7 | 0.8970 | 0.0540 |
| 8 | 0.9465 | 0.0495 |
| 9 | 0.9925 | 0.0460 |
| 10 | 1.0355 | 0.0430 |
| 11 | 1.0760 | 0.0405 |
| 12 | 1.1143 | 0.0384 |
| 13 | 1.1599 | 0.0456 |
| 14 | 1.2038 | 0.0439 |
| 15 | 1.2462 | 0.0423 |
| 16 | 1.2871 | 0.0410 |
| 17 | 1.3268 | 0.0397 |
| 18 | 1.3654 | 0.0386 |
| 19 | 1.4029 | 0.0375 |
| 20 | 1.4394 | 0.0365 |
| 21 | 1.4750 | 0.0356 |
| 22 | 1.5098 | 0.0348 |
| 23 | 1.5438 | 0.0340 |
| 24 | 1.5771 | 0.0333 |
| 25 | 1.6097 | 0.0326 |
| 26 | 1.6416 | 0.0319 |
| 27 | 1.6730 | 0.0313 |
| 28 | 1.7037 | 0.0308 |
| 29 | 1.7340 | 0.0302 |
| 30 | 1.7637 | 0.0297 |
| 31 | 1.7929 | 0.0292 |
| 32 | 1.8216 | 0.0288 |
| 33 | 1.8499 | 0.0283 |
| 34 | 1.8778 | 0.0279 |
| 35 | 1.9053 | 0.0275 |
| 36 | 1.9324 | 0.0271 |
| 37 | 1.9582 | 0.0258 |
| 38 | 1.9837 | 0.0255 |
| 39 | 2.0089 | 0.0251 |
| 40 | 2.0337 | 0.0248 |
| 41 | 2.0582 | 0.0245 |
| 42 | 2.0824 | 0.0242 |
| 43 | 2.1063 | 0.0239 |
| 44 | 2.1299 | 0.0236 |
| 45 | 2.1532 | 0.0233 |
| 46 | 2.1763 | 0.0231 |
| 47 | 2.1991 | 0.0228 |
| 48 | 2.2217 | 0.0226 |
| 49 | 2.2440 | 0.0223 |
| 50 | 2.2661 | 0.0221 |
| 51 | 2.2879 | 0.0219 |
| 52 | 2.3096 | 0.0216 |
| 53 | 2.3310 | 0.0214 |
| 54 | 2.3523 | 0.0212 |
| 55 | 2.3733 | 0.0210 |
| 56 | 2.3941 | 0.0208 |
| 57 | 2.4147 | 0.0206 |
| 58 | 2.4352 | 0.0205 |
| 59 | 2.4555 | 0.0203 |
| 60 | 2.4756 | 0.0201 |
| 61 | 2.4955 | 0.0199 |
| 62 | 2.5152 | 0.0198 |
| 63 | 2.5348 | 0.0196 |
| 64 | 2.5543 | 0.0194 |
| 65 | 2.5735 | 0.0193 |

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| 66 | 2.5927 | 0.0191 |
| 67 | 2.6116 | 0.0190 |
| 68 | 2.6305 | 0.0188 |
| 69 | 2.6492 | 0.0187 |
| 70 | 2.6677 | 0.0185 |
| 71 | 2.6861 | 0.0184 |
| 72 | 2.7044 | 0.0183 |
| 73 | 2.7181 | 0.0137 |
| 74 | 2.7316 | 0.0135 |
| 75 | 2.7450 | 0.0134 |
| 76 | 2.7583 | 0.0133 |
| 77 | 2.7715 | 0.0132 |
| 78 | 2.7846 | 0.0131 |
| 79 | 2.7976 | 0.0130 |
| 80 | 2.8105 | 0.0129 |
| 81 | 2.8232 | 0.0128 |
| 82 | 2.8359 | 0.0127 |
| 83 | 2.8485 | 0.0126 |
| 84 | 2.8610 | 0.0125 |
| 85 | 2.8734 | 0.0124 |
| 86 | 2.8857 | 0.0123 |
| 87 | 2.8979 | 0.0122 |
| 88 | 2.9100 | 0.0121 |
| 89 | 2.9220 | 0.0120 |
| 90 | 2.9340 | 0.0119 |
| 91 | 2.9458 | 0.0119 |
| 92 | 2.9576 | 0.0118 |
| 93 | 2.9693 | 0.0117 |
| 94 | 2.9809 | 0.0116 |
| 95 | 2.9924 | 0.0115 |
| 96 | 3.0039 | 0.0115 |
| 97 | 3.0153 | 0.0114 |
| 98 | 3.0266 | 0.0113 |
| 99 | 3.0378 | 0.0112 |
| 100 | 3.0490 | 0.0112 |
| 101 | 3.0601 | 0.0111 |
| 102 | 3.0711 | 0.0110 |
| 103 | 3.0821 | 0.0110 |
| 104 | 3.0930 | 0.0109 |
| 105 | 3.1038 | 0.0108 |
| 106 | 3.1146 | 0.0108 |
| 107 | 3.1253 | 0.0107 |
| 108 | 3.1359 | 0.0106 |
| 109 | 3.1465 | 0.0106 |
| 110 | 3.1570 | 0.0105 |
| 111 | 3.1674 | 0.0104 |
| 112 | 3.1778 | 0.0104 |
| 113 | 3.1882 | 0.0103 |
| 114 | 3.1984 | 0.0103 |
| 115 | 3.2086 | 0.0102 |
| 116 | 3.2188 | 0.0102 |
| 117 | 3.2289 | 0.0101 |
| 118 | 3.2389 | 0.0100 |
| 119 | 3.2489 | 0.0100 |
| 120 | 3.2589 | 0.0099 |
| 121 | 3.2688 | 0.0099 |
| 122 | 3.2786 | 0.0098 |
| 123 | 3.2884 | 0.0098 |
| 124 | 3.2981 | 0.0097 |
| 125 | 3.3078 | 0.0097 |
| 126 | 3.3175 | 0.0096 |
| 127 | 3.3270 | 0.0096 |
| 128 | 3.3366 | 0.0095 |
| 129 | 3.3461 | 0.0095 |
| 130 | 3.3555 | 0.0094 |
| 131 | 3.3649 | 0.0094 |
| 132 | 3.3743 | 0.0094 |
| 133 | 3.3836 | 0.0093 |
| 134 | 3.3929 | 0.0093 |
| 135 | 3.4021 | 0.0092 |
| 136 | 3.4113 | 0.0092 |
| 137 | 3.4204 | 0.0091 |
| 138 | 3.4295 | 0.0091 |

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| 139 | 3.4385 | 0.0091 |
| 140 | 3.4476 | 0.0090 |
| 141 | 3.4565 | 0.0090 |
| 142 | 3.4655 | 0.0089 |
| 143 | 3.4744 | 0.0089 |
| 144 | 3.4832 | 0.0089 |
| 145 | 3.4920 | 0.0088 |
| 146 | 3.5008 | 0.0088 |
| 147 | 3.5095 | 0.0087 |
| 148 | 3.5182 | 0.0087 |
| 149 | 3.5269 | 0.0087 |
| 150 | 3.5355 | 0.0086 |
| 151 | 3.5441 | 0.0086 |
| 152 | 3.5526 | 0.0086 |
| 153 | 3.5612 | 0.0085 |
| 154 | 3.5696 | 0.0085 |
| 155 | 3.5781 | 0.0084 |
| 156 | 3.5865 | 0.0084 |
| 157 | 3.5949 | 0.0084 |
| 158 | 3.6032 | 0.0083 |
| 159 | 3.6115 | 0.0083 |
| 160 | 3.6198 | 0.0083 |
| 161 | 3.6280 | 0.0082 |
| 162 | 3.6363 | 0.0082 |
| 163 | 3.6444 | 0.0082 |
| 164 | 3.6526 | 0.0081 |
| 165 | 3.6607 | 0.0081 |
| 166 | 3.6688 | 0.0081 |
| 167 | 3.6768 | 0.0081 |
| 168 | 3.6849 | 0.0080 |
| 169 | 3.6929 | 0.0080 |
| 170 | 3.7008 | 0.0080 |
| 171 | 3.7088 | 0.0079 |
| 172 | 3.7167 | 0.0079 |
| 173 | 3.7245 | 0.0079 |
| 174 | 3.7324 | 0.0078 |
| 175 | 3.7402 | 0.0078 |
| 176 | 3.7480 | 0.0078 |
| 177 | 3.7557 | 0.0078 |
| 178 | 3.7635 | 0.0077 |
| 179 | 3.7712 | 0.0077 |
| 180 | 3.7789 | 0.0077 |
| 181 | 3.7865 | 0.0077 |
| 182 | 3.7941 | 0.0076 |
| 183 | 3.8017 | 0.0076 |
| 184 | 3.8093 | 0.0076 |
| 185 | 3.8169 | 0.0075 |
| 186 | 3.8244 | 0.0075 |
| 187 | 3.8319 | 0.0075 |
| 188 | 3.8393 | 0.0075 |
| 189 | 3.8468 | 0.0074 |
| 190 | 3.8542 | 0.0074 |
| 191 | 3.8616 | 0.0074 |
| 192 | 3.8690 | 0.0074 |
| 193 | 3.8763 | 0.0073 |
| 194 | 3.8836 | 0.0073 |
| 195 | 3.8909 | 0.0073 |
| 196 | 3.8982 | 0.0073 |
| 197 | 3.9055 | 0.0072 |
| 198 | 3.9127 | 0.0072 |
| 199 | 3.9199 | 0.0072 |
| 200 | 3.9271 | 0.0072 |
| 201 | 3.9342 | 0.0072 |
| 202 | 3.9414 | 0.0071 |
| 203 | 3.9485 | 0.0071 |
| 204 | 3.9556 | 0.0071 |
| 205 | 3.9626 | 0.0071 |
| 206 | 3.9697 | 0.0070 |
| 207 | 3.9767 | 0.0070 |
| 208 | 3.9837 | 0.0070 |
| 209 | 3.9907 | 0.0070 |
| 210 | 3.9976 | 0.0070 |
| 211 | 4.0046 | 0.0069 |

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| 212 | 4.0115 | 0.0069 |
| 213 | 4.0184 | 0.0069 |
| 214 | 4.0253 | 0.0069 |
| 215 | 4.0321 | 0.0069 |
| 216 | 4.0390 | 0.0068 |
| 217 | 4.0458 | 0.0068 |
| 218 | 4.0526 | 0.0068 |
| 219 | 4.0594 | 0.0068 |
| 220 | 4.0661 | 0.0068 |
| 221 | 4.0729 | 0.0067 |
| 222 | 4.0796 | 0.0067 |
| 223 | 4.0863 | 0.0067 |
| 224 | 4.0930 | 0.0067 |
| 225 | 4.0996 | 0.0067 |
| 226 | 4.1063 | 0.0066 |
| 227 | 4.1129 | 0.0066 |
| 228 | 4.1195 | 0.0066 |
| 229 | 4.1261 | 0.0066 |
| 230 | 4.1327 | 0.0066 |
| 231 | 4.1392 | 0.0066 |
| 232 | 4.1457 | 0.0065 |
| 233 | 4.1523 | 0.0065 |
| 234 | 4.1588 | 0.0065 |
| 235 | 4.1652 | 0.0065 |
| 236 | 4.1717 | 0.0065 |
| 237 | 4.1781 | 0.0064 |
| 238 | 4.1846 | 0.0064 |
| 239 | 4.1910 | 0.0064 |
| 240 | 4.1974 | 0.0064 |
| 241 | 4.2037 | 0.0064 |
| 242 | 4.2101 | 0.0064 |
| 243 | 4.2165 | 0.0063 |
| 244 | 4.2228 | 0.0063 |
| 245 | 4.2291 | 0.0063 |
| 246 | 4.2354 | 0.0063 |
| 247 | 4.2417 | 0.0063 |
| 248 | 4.2479 | 0.0063 |
| 249 | 4.2542 | 0.0062 |
| 250 | 4.2604 | 0.0062 |
| 251 | 4.2666 | 0.0062 |
| 252 | 4.2728 | 0.0062 |
| 253 | 4.2790 | 0.0062 |
| 254 | 4.2852 | 0.0062 |
| 255 | 4.2913 | 0.0062 |
| 256 | 4.2975 | 0.0061 |
| 257 | 4.3036 | 0.0061 |
| 258 | 4.3097 | 0.0061 |
| 259 | 4.3158 | 0.0061 |
| 260 | 4.3218 | 0.0061 |
| 261 | 4.3279 | 0.0061 |
| 262 | 4.3340 | 0.0060 |
| 263 | 4.3400 | 0.0060 |
| 264 | 4.3460 | 0.0060 |
| 265 | 4.3520 | 0.0060 |
| 266 | 4.3580 | 0.0060 |
| 267 | 4.3640 | 0.0060 |
| 268 | 4.3699 | 0.0060 |
| 269 | 4.3759 | 0.0059 |
| 270 | 4.3818 | 0.0059 |
| 271 | 4.3877 | 0.0059 |
| 272 | 4.3936 | 0.0059 |
| 273 | 4.3995 | 0.0059 |
| 274 | 4.4054 | 0.0059 |
| 275 | 4.4113 | 0.0059 |
| 276 | 4.4171 | 0.0058 |
| 277 | 4.4230 | 0.0058 |
| 278 | 4.4288 | 0.0058 |
| 279 | 4.4346 | 0.0058 |
| 280 | 4.4404 | 0.0058 |
| 281 | 4.4462 | 0.0058 |
| 282 | 4.4519 | 0.0058 |
| 283 | 4.4577 | 0.0058 |
| 284 | 4.4634 | 0.0057 |

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| 285 | 4.4692 | 0.0057 |
| 286 | 4.4749 | 0.0057 |
| 287 | 4.4806 | 0.0057 |
| 288 | 4.4863 | 0.0057 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0057 | 0.0025 | 0.0032 |
| 2 | 0.0057 | 0.0025 | 0.0033 |
| 3 | 0.0057 | 0.0025 | 0.0033 |
| 4 | 0.0057 | 0.0025 | 0.0033 |
| 5 | 0.0058 | 0.0025 | 0.0033 |
| 6 | 0.0058 | 0.0025 | 0.0033 |
| 7 | 0.0058 | 0.0025 | 0.0033 |
| 8 | 0.0058 | 0.0025 | 0.0033 |
| 9 | 0.0058 | 0.0025 | 0.0033 |
| 10 | 0.0059 | 0.0025 | 0.0033 |
| 11 | 0.0059 | 0.0025 | 0.0034 |
| 12 | 0.0059 | 0.0025 | 0.0034 |
| 13 | 0.0059 | 0.0026 | 0.0034 |
| 14 | 0.0059 | 0.0026 | 0.0034 |
| 15 | 0.0060 | 0.0026 | 0.0034 |
| 16 | 0.0060 | 0.0026 | 0.0034 |
| 17 | 0.0060 | 0.0026 | 0.0034 |
| 18 | 0.0060 | 0.0026 | 0.0034 |
| 19 | 0.0061 | 0.0026 | 0.0035 |
| 20 | 0.0061 | 0.0026 | 0.0035 |
| 21 | 0.0061 | 0.0026 | 0.0035 |
| 22 | 0.0061 | 0.0026 | 0.0035 |
| 23 | 0.0062 | 0.0026 | 0.0035 |
| 24 | 0.0062 | 0.0027 | 0.0035 |
| 25 | 0.0062 | 0.0027 | 0.0035 |
| 26 | 0.0062 | 0.0027 | 0.0035 |
| 27 | 0.0062 | 0.0027 | 0.0036 |
| 28 | 0.0063 | 0.0027 | 0.0036 |
| 29 | 0.0063 | 0.0027 | 0.0036 |
| 30 | 0.0063 | 0.0027 | 0.0036 |
| 31 | 0.0063 | 0.0027 | 0.0036 |
| 32 | 0.0064 | 0.0027 | 0.0036 |
| 33 | 0.0064 | 0.0028 | 0.0036 |
| 34 | 0.0064 | 0.0028 | 0.0037 |
| 35 | 0.0064 | 0.0028 | 0.0037 |
| 36 | 0.0065 | 0.0028 | 0.0037 |
| 37 | 0.0065 | 0.0028 | 0.0037 |
| 38 | 0.0065 | 0.0028 | 0.0037 |
| 39 | 0.0066 | 0.0028 | 0.0037 |
| 40 | 0.0066 | 0.0028 | 0.0037 |
| 41 | 0.0066 | 0.0028 | 0.0038 |
| 42 | 0.0066 | 0.0029 | 0.0038 |
| 43 | 0.0067 | 0.0029 | 0.0038 |
| 44 | 0.0067 | 0.0029 | 0.0038 |
| 45 | 0.0067 | 0.0029 | 0.0038 |
| 46 | 0.0067 | 0.0029 | 0.0038 |
| 47 | 0.0068 | 0.0029 | 0.0039 |
| 48 | 0.0068 | 0.0029 | 0.0039 |
| 49 | 0.0068 | 0.0029 | 0.0039 |
| 50 | 0.0069 | 0.0030 | 0.0039 |
| 51 | 0.0069 | 0.0030 | 0.0039 |
| 52 | 0.0069 | 0.0030 | 0.0039 |
| 53 | 0.0070 | 0.0030 | 0.0040 |
| 54 | 0.0070 | 0.0030 | 0.0040 |
| 55 | 0.0070 | 0.0030 | 0.0040 |
| 56 | 0.0070 | 0.0030 | 0.0040 |
| 57 | 0.0071 | 0.0031 | 0.0040 |
| 58 | 0.0071 | 0.0031 | 0.0041 |
| 59 | 0.0072 | 0.0031 | 0.0041 |
| 60 | 0.0072 | 0.0031 | 0.0041 |
| 61 | 0.0072 | 0.0031 | 0.0041 |
| 62 | 0.0072 | 0.0031 | 0.0041 |
| 63 | 0.0073 | 0.0031 | 0.0042 |
| 64 | 0.0073 | 0.0032 | 0.0042 |

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| 65 | 0.0074 | 0.0032 | 0.0042 |
| 66 | 0.0074 | 0.0032 | 0.0042 |
| 67 | 0.0074 | 0.0032 | 0.0042 |
| 68 | 0.0075 | 0.0032 | 0.0043 |
| 69 | 0.0075 | 0.0032 | 0.0043 |
| 70 | 0.0075 | 0.0032 | 0.0043 |
| 71 | 0.0076 | 0.0033 | 0.0043 |
| 72 | 0.0076 | 0.0033 | 0.0043 |
| 73 | 0.0077 | 0.0033 | 0.0044 |
| 74 | 0.0077 | 0.0033 | 0.0044 |
| 75 | 0.0078 | 0.0033 | 0.0044 |
| 76 | 0.0078 | 0.0034 | 0.0044 |
| 77 | 0.0078 | 0.0034 | 0.0045 |
| 78 | 0.0079 | 0.0034 | 0.0045 |
| 79 | 0.0079 | 0.0034 | 0.0045 |
| 80 | 0.0080 | 0.0034 | 0.0045 |
| 81 | 0.0080 | 0.0035 | 0.0046 |
| 82 | 0.0081 | 0.0035 | 0.0046 |
| 83 | 0.0081 | 0.0035 | 0.0046 |
| 84 | 0.0081 | 0.0035 | 0.0046 |
| 85 | 0.0082 | 0.0035 | 0.0047 |
| 86 | 0.0082 | 0.0035 | 0.0047 |
| 87 | 0.0083 | 0.0036 | 0.0047 |
| 88 | 0.0083 | 0.0036 | 0.0048 |
| 89 | 0.0084 | 0.0036 | 0.0048 |
| 90 | 0.0084 | 0.0036 | 0.0048 |
| 91 | 0.0085 | 0.0037 | 0.0049 |
| 92 | 0.0086 | 0.0037 | 0.0049 |
| 93 | 0.0086 | 0.0037 | 0.0049 |
| 94 | 0.0087 | 0.0037 | 0.0049 |
| 95 | 0.0087 | 0.0038 | 0.0050 |
| 96 | 0.0088 | 0.0038 | 0.0050 |
| 97 | 0.0089 | 0.0038 | 0.0050 |
| 98 | 0.0089 | 0.0038 | 0.0051 |
| 99 | 0.0090 | 0.0039 | 0.0051 |
| 100 | 0.0090 | 0.0039 | 0.0051 |
| 101 | 0.0091 | 0.0039 | 0.0052 |
| 102 | 0.0091 | 0.0039 | 0.0052 |
| 103 | 0.0092 | 0.0040 | 0.0053 |
| 104 | 0.0093 | 0.0040 | 0.0053 |
| 105 | 0.0094 | 0.0040 | 0.0053 |
| 106 | 0.0094 | 0.0040 | 0.0054 |
| 107 | 0.0095 | 0.0041 | 0.0054 |
| 108 | 0.0095 | 0.0041 | 0.0054 |
| 109 | 0.0096 | 0.0041 | 0.0055 |
| 110 | 0.0097 | 0.0042 | 0.0055 |
| 111 | 0.0098 | 0.0042 | 0.0056 |
| 112 | 0.0098 | 0.0042 | 0.0056 |
| 113 | 0.0099 | 0.0043 | 0.0057 |
| 114 | 0.0100 | 0.0043 | 0.0057 |
| 115 | 0.0101 | 0.0043 | 0.0058 |
| 116 | 0.0102 | 0.0044 | 0.0058 |
| 117 | 0.0103 | 0.0044 | 0.0059 |
| 118 | 0.0103 | 0.0044 | 0.0059 |
| 119 | 0.0104 | 0.0045 | 0.0060 |
| 120 | 0.0105 | 0.0045 | 0.0060 |
| 121 | 0.0106 | 0.0046 | 0.0061 |
| 122 | 0.0107 | 0.0046 | 0.0061 |
| 123 | 0.0108 | 0.0047 | 0.0062 |
| 124 | 0.0109 | 0.0047 | 0.0062 |
| 125 | 0.0110 | 0.0047 | 0.0063 |
| 126 | 0.0111 | 0.0048 | 0.0063 |
| 127 | 0.0112 | 0.0048 | 0.0064 |
| 128 | 0.0113 | 0.0049 | 0.0064 |
| 129 | 0.0115 | 0.0049 | 0.0065 |
| 130 | 0.0115 | 0.0050 | 0.0066 |
| 131 | 0.0117 | 0.0050 | 0.0067 |
| 132 | 0.0118 | 0.0051 | 0.0067 |
| 133 | 0.0119 | 0.0051 | 0.0068 |
| 134 | 0.0120 | 0.0052 | 0.0069 |
| 135 | 0.0122 | 0.0053 | 0.0070 |
| 136 | 0.0123 | 0.0053 | 0.0070 |
| 137 | 0.0125 | 0.0054 | 0.0071 |

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| 138 | 0.0126 | 0.0054 | 0.0072 |
| 139 | 0.0128 | 0.0055 | 0.0073 |
| 140 | 0.0129 | 0.0055 | 0.0073 |
| 141 | 0.0131 | 0.0056 | 0.0075 |
| 142 | 0.0132 | 0.0057 | 0.0075 |
| 143 | 0.0134 | 0.0058 | 0.0076 |
| 144 | 0.0135 | 0.0058 | 0.0077 |
| 145 | 0.0183 | 0.0079 | 0.0104 |
| 146 | 0.0184 | 0.0079 | 0.0105 |
| 147 | 0.0187 | 0.0080 | 0.0106 |
| 148 | 0.0188 | 0.0081 | 0.0107 |
| 149 | 0.0191 | 0.0082 | 0.0109 |
| 150 | 0.0193 | 0.0083 | 0.0110 |
| 151 | 0.0196 | 0.0084 | 0.0112 |
| 152 | 0.0198 | 0.0085 | 0.0113 |
| 153 | 0.0201 | 0.0086 | 0.0114 |
| 154 | 0.0203 | 0.0087 | 0.0115 |
| 155 | 0.0206 | 0.0089 | 0.0118 |
| 156 | 0.0208 | 0.0090 | 0.0119 |
| 157 | 0.0212 | 0.0091 | 0.0121 |
| 158 | 0.0214 | 0.0092 | 0.0122 |
| 159 | 0.0219 | 0.0094 | 0.0125 |
| 160 | 0.0221 | 0.0095 | 0.0126 |
| 161 | 0.0226 | 0.0097 | 0.0129 |
| 162 | 0.0228 | 0.0098 | 0.0130 |
| 163 | 0.0233 | 0.0100 | 0.0133 |
| 164 | 0.0236 | 0.0102 | 0.0135 |
| 165 | 0.0242 | 0.0104 | 0.0138 |
| 166 | 0.0245 | 0.0105 | 0.0140 |
| 167 | 0.0251 | 0.0108 | 0.0143 |
| 168 | 0.0255 | 0.0110 | 0.0145 |
| 169 | 0.0271 | 0.0117 | 0.0154 |
| 170 | 0.0275 | 0.0118 | 0.0157 |
| 171 | 0.0283 | 0.0122 | 0.0161 |
| 172 | 0.0288 | 0.0124 | 0.0164 |
| 173 | 0.0297 | 0.0128 | 0.0169 |
| 174 | 0.0302 | 0.0130 | 0.0172 |
| 175 | 0.0313 | 0.0135 | 0.0179 |
| 176 | 0.0319 | 0.0137 | 0.0182 |
| 177 | 0.0333 | 0.0143 | 0.0190 |
| 178 | 0.0340 | 0.0146 | 0.0194 |
| 179 | 0.0356 | 0.0153 | 0.0203 |
| 180 | 0.0365 | 0.0157 | 0.0208 |
| 181 | 0.0386 | 0.0166 | 0.0220 |
| 182 | 0.0397 | 0.0171 | 0.0226 |
| 183 | 0.0423 | 0.0182 | 0.0241 |
| 184 | 0.0439 | 0.0189 | 0.0250 |
| 185 | 0.0384 | 0.0165 | 0.0218 |
| 186 | 0.0405 | 0.0174 | 0.0231 |
| 187 | 0.0460 | 0.0191 | 0.0269 |
| 188 | 0.0495 | 0.0191 | 0.0305 |
| 189 | 0.0641 | 0.0191 | 0.0450 |
| 190 | 0.0718 | 0.0191 | 0.0528 |
| 191 | 0.1006 | 0.0191 | 0.0816 |
| 192 | 0.1359 | 0.0191 | 0.1169 |
| 193 | 0.3876 | 0.0191 | 0.3685 |
| 194 | 0.0829 | 0.0191 | 0.0639 |
| 195 | 0.0540 | 0.0191 | 0.0349 |
| 196 | 0.0430 | 0.0185 | 0.0245 |
| 197 | 0.0456 | 0.0191 | 0.0265 |
| 198 | 0.0410 | 0.0176 | 0.0233 |
| 199 | 0.0375 | 0.0161 | 0.0214 |
| 200 | 0.0348 | 0.0150 | 0.0198 |
| 201 | 0.0326 | 0.0140 | 0.0186 |
| 202 | 0.0308 | 0.0132 | 0.0175 |
| 203 | 0.0292 | 0.0126 | 0.0166 |
| 204 | 0.0279 | 0.0120 | 0.0159 |
| 205 | 0.0258 | 0.0111 | 0.0147 |
| 206 | 0.0248 | 0.0107 | 0.0141 |
| 207 | 0.0239 | 0.0103 | 0.0136 |
| 208 | 0.0231 | 0.0099 | 0.0131 |
| 209 | 0.0223 | 0.0096 | 0.0127 |
| 210 | 0.0216 | 0.0093 | 0.0123 |

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| 211 | 0.0210 | 0.0090 | 0.0120 |
| 212 | 0.0205 | 0.0088 | 0.0117 |
| 213 | 0.0199 | 0.0086 | 0.0113 |
| 214 | 0.0194 | 0.0084 | 0.0111 |
| 215 | 0.0190 | 0.0082 | 0.0108 |
| 216 | 0.0185 | 0.0080 | 0.0106 |
| 217 | 0.0137 | 0.0059 | 0.0078 |
| 218 | 0.0133 | 0.0057 | 0.0076 |
| 219 | 0.0130 | 0.0056 | 0.0074 |
| 220 | 0.0127 | 0.0055 | 0.0072 |
| 221 | 0.0124 | 0.0053 | 0.0071 |
| 222 | 0.0121 | 0.0052 | 0.0069 |
| 223 | 0.0119 | 0.0051 | 0.0068 |
| 224 | 0.0116 | 0.0050 | 0.0066 |
| 225 | 0.0114 | 0.0049 | 0.0065 |
| 226 | 0.0112 | 0.0048 | 0.0064 |
| 227 | 0.0110 | 0.0047 | 0.0062 |
| 228 | 0.0108 | 0.0046 | 0.0061 |
| 229 | 0.0106 | 0.0045 | 0.0060 |
| 230 | 0.0104 | 0.0045 | 0.0059 |
| 231 | 0.0102 | 0.0044 | 0.0058 |
| 232 | 0.0100 | 0.0043 | 0.0057 |
| 233 | 0.0099 | 0.0043 | 0.0056 |
| 234 | 0.0097 | 0.0042 | 0.0055 |
| 235 | 0.0096 | 0.0041 | 0.0055 |
| 236 | 0.0094 | 0.0041 | 0.0054 |
| 237 | 0.0093 | 0.0040 | 0.0053 |
| 238 | 0.0092 | 0.0040 | 0.0052 |
| 239 | 0.0091 | 0.0039 | 0.0052 |
| 240 | 0.0089 | 0.0038 | 0.0051 |
| 241 | 0.0088 | 0.0038 | 0.0050 |
| 242 | 0.0087 | 0.0037 | 0.0050 |
| 243 | 0.0086 | 0.0037 | 0.0049 |
| 244 | 0.0085 | 0.0036 | 0.0048 |
| 245 | 0.0084 | 0.0036 | 0.0048 |
| 246 | 0.0083 | 0.0036 | 0.0047 |
| 247 | 0.0082 | 0.0035 | 0.0047 |
| 248 | 0.0081 | 0.0035 | 0.0046 |
| 249 | 0.0080 | 0.0034 | 0.0046 |
| 250 | 0.0079 | 0.0034 | 0.0045 |
| 251 | 0.0078 | 0.0034 | 0.0045 |
| 252 | 0.0077 | 0.0033 | 0.0044 |
| 253 | 0.0077 | 0.0033 | 0.0044 |
| 254 | 0.0076 | 0.0033 | 0.0043 |
| 255 | 0.0075 | 0.0032 | 0.0043 |
| 256 | 0.0074 | 0.0032 | 0.0042 |
| 257 | 0.0073 | 0.0032 | 0.0042 |
| 258 | 0.0073 | 0.0031 | 0.0041 |
| 259 | 0.0072 | 0.0031 | 0.0041 |
| 260 | 0.0071 | 0.0031 | 0.0041 |
| 261 | 0.0071 | 0.0030 | 0.0040 |
| 262 | 0.0070 | 0.0030 | 0.0040 |
| 263 | 0.0069 | 0.0030 | 0.0040 |
| 264 | 0.0069 | 0.0030 | 0.0039 |
| 265 | 0.0068 | 0.0029 | 0.0039 |
| 266 | 0.0068 | 0.0029 | 0.0038 |
| 267 | 0.0067 | 0.0029 | 0.0038 |
| 268 | 0.0066 | 0.0029 | 0.0038 |
| 269 | 0.0066 | 0.0028 | 0.0038 |
| 270 | 0.0065 | 0.0028 | 0.0037 |
| 271 | 0.0065 | 0.0028 | 0.0037 |
| 272 | 0.0064 | 0.0028 | 0.0037 |
| 273 | 0.0064 | 0.0027 | 0.0036 |
| 274 | 0.0063 | 0.0027 | 0.0036 |
| 275 | 0.0063 | 0.0027 | 0.0036 |
| 276 | 0.0062 | 0.0027 | 0.0035 |
| 277 | 0.0062 | 0.0027 | 0.0035 |
| 278 | 0.0061 | 0.0026 | 0.0035 |
| 279 | 0.0061 | 0.0026 | 0.0035 |
| 280 | 0.0060 | 0.0026 | 0.0034 |
| 281 | 0.0060 | 0.0026 | 0.0034 |
| 282 | 0.0060 | 0.0026 | 0.0034 |
| 283 | 0.0059 | 0.0025 | 0.0034 |

| | | | |
|-----|--------|--------|--------|
| 284 | 0.0059 | 0.0025 | 0.0033 |
| 285 | 0.0058 | 0.0025 | 0.0033 |
| 286 | 0.0058 | 0.0025 | 0.0033 |
| 287 | 0.0058 | 0.0025 | 0.0033 |
| 288 | 0.0057 | 0.0025 | 0.0033 |

Total soil rain loss = 1.67(In)
Total effective rainfall = 2.81(In)
Peak flow rate in flood hydrograph = 890.39(CFS)

+++++
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 225.0 | 450.0 | 675.0 | 900.0 |
|-----------|--------------|--------|----|-------|-------|-------|-------|
| 0+ 5 | 0.0018 | 0.26 | Q | | | | |
| 0+10 | 0.0080 | 0.91 | Q | | | | |
| 0+15 | 0.0208 | 1.86 | Q | | | | |
| 0+20 | 0.0423 | 3.12 | Q | | | | |
| 0+25 | 0.0767 | 4.99 | Q | | | | |
| 0+30 | 0.1311 | 7.90 | Q | | | | |
| 0+35 | 0.2203 | 12.96 | Q | | | | |
| 0+40 | 0.3281 | 15.65 | Q | | | | |
| 0+45 | 0.4475 | 17.35 | Q | | | | |
| 0+50 | 0.5762 | 18.68 | Q | | | | |
| 0+55 | 0.7121 | 19.74 | Q | | | | |
| 1+ 0 | 0.8547 | 20.70 | Q | | | | |
| 1+ 5 | 1.0029 | 21.52 | Q | | | | |
| 1+10 | 1.1560 | 22.23 | Q | | | | |
| 1+15 | 1.3135 | 22.88 | VQ | | | | |
| 1+20 | 1.4750 | 23.45 | VQ | | | | |
| 1+25 | 1.6402 | 23.98 | VQ | | | | |
| 1+30 | 1.8085 | 24.44 | VQ | | | | |
| 1+35 | 1.9798 | 24.87 | VQ | | | | |
| 1+40 | 2.1537 | 25.26 | VQ | | | | |
| 1+45 | 2.3301 | 25.61 | VQ | | | | |
| 1+50 | 2.5086 | 25.92 | VQ | | | | |
| 1+55 | 2.6891 | 26.21 | VQ | | | | |
| 2+ 0 | 2.8714 | 26.46 | VQ | | | | |
| 2+ 5 | 3.0553 | 26.70 | VQ | | | | |
| 2+10 | 3.2406 | 26.91 | VQ | | | | |
| 2+15 | 3.4271 | 27.08 | VQ | | | | |
| 2+20 | 3.6146 | 27.22 | VQ | | | | |
| 2+25 | 3.8031 | 27.37 | VQ | | | | |
| 2+30 | 3.9926 | 27.52 | Q | | | | |
| 2+35 | 4.1832 | 27.66 | Q | | | | |
| 2+40 | 4.3746 | 27.80 | Q | | | | |
| 2+45 | 4.5671 | 27.95 | Q | | | | |
| 2+50 | 4.7605 | 28.07 | Q | | | | |
| 2+55 | 4.9547 | 28.21 | Q | | | | |
| 3+ 0 | 5.1499 | 28.34 | Q | | | | |
| 3+ 5 | 5.3461 | 28.48 | Q | | | | |
| 3+10 | 5.5432 | 28.63 | Q | | | | |
| 3+15 | 5.7414 | 28.77 | Q | | | | |
| 3+20 | 5.9404 | 28.90 | Q | | | | |
| 3+25 | 6.1404 | 29.03 | Q | | | | |
| 3+30 | 6.3412 | 29.16 | Q | | | | |
| 3+35 | 6.5430 | 29.29 | Q | | | | |
| 3+40 | 6.7456 | 29.42 | Q | | | | |
| 3+45 | 6.9490 | 29.55 | Q | | | | |
| 3+50 | 7.1534 | 29.67 | Q | | | | |
| 3+55 | 7.3586 | 29.79 | Q | | | | |
| 4+ 0 | 7.5646 | 29.92 | Q | | | | |
| 4+ 5 | 7.7715 | 30.04 | QV | | | | |
| 4+10 | 7.9793 | 30.17 | QV | | | | |
| 4+15 | 8.1879 | 30.30 | QV | | | | |
| 4+20 | 8.3975 | 30.42 | QV | | | | |
| 4+25 | 8.6079 | 30.56 | QV | | | | |

| | | | |
|-------|---------|-------|-----|
| 4+30 | 8.8192 | 30.68 | QV |
| 4+35 | 9.0315 | 30.82 | QV |
| 4+40 | 9.2447 | 30.95 | QV |
| 4+45 | 9.4588 | 31.09 | QV |
| 4+50 | 9.6738 | 31.23 | QV |
| 4+55 | 9.8899 | 31.37 | QV |
| 5+ 0 | 10.1069 | 31.51 | QV |
| 5+ 5 | 10.3249 | 31.65 | QV |
| 5+10 | 10.5438 | 31.79 | QV |
| 5+15 | 10.7638 | 31.94 | QV |
| 5+20 | 10.9848 | 32.09 | QV |
| 5+25 | 11.2069 | 32.24 | QV |
| 5+30 | 11.4299 | 32.39 | QV |
| 5+35 | 11.6541 | 32.55 | Q V |
| 5+40 | 11.8793 | 32.70 | Q V |
| 5+45 | 12.1056 | 32.86 | Q V |
| 5+50 | 12.3329 | 33.01 | Q V |
| 5+55 | 12.5614 | 33.18 | Q V |
| 6+ 0 | 12.7910 | 33.34 | Q V |
| 6+ 5 | 13.0218 | 33.51 | Q V |
| 6+10 | 13.2537 | 33.67 | Q V |
| 6+15 | 13.4868 | 33.84 | Q V |
| 6+20 | 13.7210 | 34.01 | Q V |
| 6+25 | 13.9565 | 34.19 | Q V |
| 6+30 | 14.1931 | 34.36 | Q V |
| 6+35 | 14.4310 | 34.54 | Q V |
| 6+40 | 14.6701 | 34.72 | Q V |
| 6+45 | 14.9106 | 34.91 | Q V |
| 6+50 | 15.1522 | 35.09 | Q V |
| 6+55 | 15.3952 | 35.28 | Q V |
| 7+ 0 | 15.6395 | 35.47 | Q V |
| 7+ 5 | 15.8852 | 35.67 | Q V |
| 7+10 | 16.1321 | 35.86 | Q V |
| 7+15 | 16.3805 | 36.06 | Q V |
| 7+20 | 16.6303 | 36.26 | Q V |
| 7+25 | 16.8815 | 36.47 | Q V |
| 7+30 | 17.1340 | 36.68 | Q V |
| 7+35 | 17.3881 | 36.89 | Q V |
| 7+40 | 17.6437 | 37.10 | Q V |
| 7+45 | 17.9007 | 37.33 | Q V |
| 7+50 | 18.1593 | 37.54 | Q V |
| 7+55 | 18.4194 | 37.77 | Q V |
| 8+ 0 | 18.6811 | 37.99 | Q V |
| 8+ 5 | 18.9444 | 38.23 | Q V |
| 8+10 | 19.2093 | 38.46 | Q V |
| 8+15 | 19.4758 | 38.71 | Q V |
| 8+20 | 19.7441 | 38.94 | Q V |
| 8+25 | 20.0140 | 39.20 | Q V |
| 8+30 | 20.2857 | 39.44 | Q V |
| 8+35 | 20.5591 | 39.70 | Q V |
| 8+40 | 20.8343 | 39.96 | Q V |
| 8+45 | 21.1113 | 40.23 | Q V |
| 8+50 | 21.3902 | 40.49 | Q V |
| 8+55 | 21.6710 | 40.77 | Q V |
| 9+ 0 | 21.9536 | 41.04 | Q V |
| 9+ 5 | 22.2383 | 41.33 | Q V |
| 9+10 | 22.5249 | 41.61 | Q V |
| 9+15 | 22.8135 | 41.91 | Q V |
| 9+20 | 23.1042 | 42.21 | Q V |
| 9+25 | 23.3970 | 42.52 | Q V |
| 9+30 | 23.6920 | 42.82 | Q V |
| 9+35 | 23.9891 | 43.14 | Q V |
| 9+40 | 24.2884 | 43.46 | Q V |
| 9+45 | 24.5900 | 43.80 | Q V |
| 9+50 | 24.8939 | 44.12 | Q V |
| 9+55 | 25.2002 | 44.47 | Q V |
| 10+ 0 | 25.5088 | 44.81 | Q V |
| 10+ 5 | 25.8199 | 45.18 | Q V |
| 10+10 | 26.1335 | 45.53 | Q V |
| 10+15 | 26.4497 | 45.91 | Q V |
| 10+20 | 26.7685 | 46.28 | Q V |
| 10+25 | 27.0900 | 46.68 | Q V |
| 10+30 | 27.4141 | 47.07 | Q V |

| | | | | |
|-------|----------|-------|---|---|
| 22+45 | 150.3055 | 31.37 | Q | V |
| 22+50 | 150.5197 | 31.09 | Q | V |
| 22+55 | 150.7320 | 30.82 | Q | V |
| 23+ 0 | 150.9424 | 30.55 | Q | V |
| 23+ 5 | 151.1510 | 30.29 | Q | V |
| 23+10 | 151.3579 | 30.04 | Q | V |
| 23+15 | 151.5631 | 29.79 | Q | V |
| 23+20 | 151.7665 | 29.54 | Q | V |
| 23+25 | 151.9684 | 29.31 | Q | V |
| 23+30 | 152.1686 | 29.07 | Q | V |
| 23+35 | 152.3672 | 28.84 | Q | V |
| 23+40 | 152.5643 | 28.62 | Q | V |
| 23+45 | 152.7599 | 28.40 | Q | V |
| 23+50 | 152.9539 | 28.18 | Q | V |
| 23+55 | 153.1466 | 27.97 | Q | V |
| 24+ 0 | 153.3377 | 27.76 | Q | V |
| 24+ 5 | 153.5258 | 27.30 | Q | V |
| 24+10 | 153.7079 | 26.45 | Q | V |
| 24+15 | 153.8823 | 25.32 | Q | V |
| 24+20 | 154.0468 | 23.89 | Q | V |
| 24+25 | 154.1974 | 21.86 | Q | V |
| 24+30 | 154.3270 | 18.82 | Q | V |
| 24+35 | 154.4210 | 13.66 | Q | V |
| 24+40 | 154.4963 | 10.92 | Q | V |
| 24+45 | 154.5596 | 9.20 | Q | V |
| 24+50 | 154.6138 | 7.86 | Q | V |
| 24+55 | 154.6607 | 6.81 | Q | V |
| 25+ 0 | 154.7011 | 5.87 | Q | V |
| 25+ 5 | 154.7361 | 5.08 | Q | V |
| 25+10 | 154.7665 | 4.41 | Q | V |
| 25+15 | 154.7927 | 3.81 | Q | V |
| 25+20 | 154.8153 | 3.29 | Q | V |
| 25+25 | 154.8348 | 2.82 | Q | V |
| 25+30 | 154.8514 | 2.42 | Q | V |
| 25+35 | 154.8656 | 2.06 | Q | V |
| 25+40 | 154.8776 | 1.74 | Q | V |
| 25+45 | 154.8878 | 1.47 | Q | V |
| 25+50 | 154.8963 | 1.24 | Q | V |
| 25+55 | 154.9035 | 1.04 | Q | V |
| 26+ 0 | 154.9095 | 0.87 | Q | V |
| 26+ 5 | 154.9144 | 0.72 | Q | V |
| 26+10 | 154.9186 | 0.60 | Q | V |
| 26+15 | 154.9223 | 0.53 | Q | V |
| 26+20 | 154.9256 | 0.48 | Q | V |
| 26+25 | 154.9285 | 0.43 | Q | V |
| 26+30 | 154.9312 | 0.38 | Q | V |
| 26+35 | 154.9335 | 0.34 | Q | V |
| 26+40 | 154.9356 | 0.30 | Q | V |
| 26+45 | 154.9374 | 0.26 | Q | V |
| 26+50 | 154.9390 | 0.23 | Q | V |
| 26+55 | 154.9404 | 0.21 | Q | V |
| 27+ 0 | 154.9417 | 0.18 | Q | V |
| 27+ 5 | 154.9427 | 0.15 | Q | V |
| 27+10 | 154.9435 | 0.12 | Q | V |
| 27+15 | 154.9441 | 0.08 | Q | V |
| 27+20 | 154.9445 | 0.06 | Q | V |
| 27+25 | 154.9449 | 0.05 | Q | V |
| 27+30 | 154.9451 | 0.03 | Q | V |
| 27+35 | 154.9452 | 0.02 | Q | V |
| 27+40 | 154.9453 | 0.01 | Q | V |
| 27+45 | 154.9453 | 0.00 | Q | V |

Unit Hydrograph Analysis

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Study date 08/03/15 File Name CieloVistaExWshdAUH10.out

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
10-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.55 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.40 | D | 0.200 | 1.000 | 0.200 |
| 82.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 2.5 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 23.1 | 0.03 | D | 0.200 | 1.000 | 0.200 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC2) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 82.0 | 2.20 | 0.525 |
| 0.20 | 0.000 | 72.0 | 72.0 | 3.89 | 0.337 |
| 365.10 | 0.552 | 79.0 | 79.0 | 2.66 | 0.464 |
| 264.30 | 0.399 | 84.0 | 84.0 | 1.90 | 0.568 |
| 2.50 | 0.004 | 82.0 | 82.0 | 2.20 | 0.525 |
| 2.50 | 0.004 | 72.0 | 72.0 | 3.89 | 0.337 |
| 3.70 | 0.006 | 79.0 | 79.0 | 2.66 | 0.464 |
| 23.10 | 0.035 | 84.0 | 84.0 | 1.90 | 0.568 |

Area-averaged catchment yield fraction, Y = 0.509

Area-averaged low loss fraction, Yb = 0.491

User entry of time of concentration = 0.723 (hours)

Watershed area = 661.60(Ac.)

Catchment Lag time = 0.578 hours

Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 14.4115
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.229(In/Hr)
 Average low loss rate fraction (Yb) = 0.491 (decimal)
 FOOTHILL S-Graph Selected
 Computed peak 5-minute rainfall = 0.340(In)
 Computed peak 30-minute rainfall = 0.720(In)
 Specified peak 1-hour rainfall = 0.950(In)
 Computed peak 3-hour rainfall = 1.590(In)
 Specified peak 6-hour rainfall = 2.200(In)
 Specified peak 24-hour rainfall = 3.680(In)

Rainfall depth area reduction factors:
 Using a total area of 661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969 Adjusted rainfall = 0.329(In)
 30-minute factor = 0.969 Adjusted rainfall = 0.698(In)
 1-hour factor = 0.969 Adjusted rainfall = 0.921(In)
 3-hour factor = 0.996 Adjusted rainfall = 1.584(In)
 6-hour factor = 0.998 Adjusted rainfall = 2.195(In)
 24-hour factor = 0.999 Adjusted rainfall = 3.677(In)

U n i t H y d r o g r a p h

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| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|
| ----- | | |
| | (K = | 8001.23 (CFS)) |
| 1 | 0.913 | 73.030 |
| 2 | 3.173 | 180.870 |
| 3 | 6.383 | 256.833 |
| 4 | 10.595 | 337.019 |
| 5 | 16.518 | 473.908 |
| 6 | 24.901 | 670.697 |
| 7 | 40.633 | 1258.742 |
| 8 | 55.356 | 1178.079 |
| 9 | 62.562 | 576.560 |
| 10 | 67.895 | 426.725 |
| 11 | 72.147 | 340.175 |
| 12 | 75.613 | 277.322 |
| 13 | 78.739 | 250.115 |
| 14 | 81.394 | 212.439 |
| 15 | 83.691 | 183.815 |
| 16 | 85.741 | 163.968 |
| 17 | 87.535 | 143.563 |
| 18 | 89.191 | 132.475 |
| 19 | 90.595 | 112.366 |
| 20 | 91.881 | 102.922 |
| 21 | 93.031 | 92.000 |
| 22 | 94.030 | 79.950 |
| 23 | 94.929 | 71.942 |
| 24 | 95.656 | 58.153 |
| 25 | 96.319 | 52.998 |
| 26 | 96.900 | 46.502 |
| 27 | 97.393 | 39.490 |
| 28 | 97.790 | 31.738 |
| 29 | 98.029 | 19.103 |
| 30 | 98.202 | 13.837 |
| 31 | 98.375 | 13.837 |
| 32 | 98.539 | 13.145 |
| 33 | 98.684 | 11.589 |
| 34 | 98.828 | 11.531 |
| 35 | 98.969 | 11.316 |
| 36 | 99.070 | 8.031 |
| 37 | 99.156 | 6.919 |
| 38 | 99.243 | 6.919 |
| 39 | 99.339 | 7.725 |
| 40 | 99.454 | 9.194 |
| 41 | 99.569 | 9.225 |

| | | |
|----|---------|-------|
| 42 | 99.681 | 8.915 |
| 43 | 99.750 | 5.537 |
| 44 | 99.808 | 4.612 |
| 45 | 99.865 | 4.612 |
| 46 | 99.911 | 3.684 |
| 47 | 99.940 | 2.318 |
| 48 | 99.969 | 2.306 |
| 49 | 100.000 | 1.153 |

| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
|---------------------|-----------------------------------|-----------------------|
| 1 | 0.3295 | 0.3295 |
| 2 | 0.4404 | 0.1110 |
| 3 | 0.5219 | 0.0815 |
| 4 | 0.5887 | 0.0668 |
| 5 | 0.6464 | 0.0577 |
| 6 | 0.6977 | 0.0513 |
| 7 | 0.7420 | 0.0444 |
| 8 | 0.7827 | 0.0407 |
| 9 | 0.8205 | 0.0378 |
| 10 | 0.8558 | 0.0353 |
| 11 | 0.8891 | 0.0333 |
| 12 | 0.9205 | 0.0315 |
| 13 | 0.9577 | 0.0371 |
| 14 | 0.9934 | 0.0357 |
| 15 | 1.0278 | 0.0344 |
| 16 | 1.0611 | 0.0333 |
| 17 | 1.0933 | 0.0323 |
| 18 | 1.1246 | 0.0313 |
| 19 | 1.1551 | 0.0304 |
| 20 | 1.1847 | 0.0296 |
| 21 | 1.2136 | 0.0289 |
| 22 | 1.2418 | 0.0282 |
| 23 | 1.2694 | 0.0276 |
| 24 | 1.2963 | 0.0270 |
| 25 | 1.3227 | 0.0264 |
| 26 | 1.3486 | 0.0259 |
| 27 | 1.3740 | 0.0254 |
| 28 | 1.3989 | 0.0249 |
| 29 | 1.4233 | 0.0245 |
| 30 | 1.4474 | 0.0240 |
| 31 | 1.4710 | 0.0236 |
| 32 | 1.4943 | 0.0232 |
| 33 | 1.5171 | 0.0229 |
| 34 | 1.5397 | 0.0225 |
| 35 | 1.5619 | 0.0222 |
| 36 | 1.5838 | 0.0219 |
| 37 | 1.6043 | 0.0206 |
| 38 | 1.6246 | 0.0203 |
| 39 | 1.6446 | 0.0200 |
| 40 | 1.6644 | 0.0197 |
| 41 | 1.6838 | 0.0195 |
| 42 | 1.7031 | 0.0192 |
| 43 | 1.7221 | 0.0190 |
| 44 | 1.7408 | 0.0188 |
| 45 | 1.7593 | 0.0185 |
| 46 | 1.7776 | 0.0183 |
| 47 | 1.7958 | 0.0181 |
| 48 | 1.8137 | 0.0179 |
| 49 | 1.8314 | 0.0177 |
| 50 | 1.8489 | 0.0175 |
| 51 | 1.8662 | 0.0173 |
| 52 | 1.8834 | 0.0172 |
| 53 | 1.9003 | 0.0170 |
| 54 | 1.9172 | 0.0168 |
| 55 | 1.9338 | 0.0166 |
| 56 | 1.9503 | 0.0165 |
| 57 | 1.9666 | 0.0163 |
| 58 | 1.9828 | 0.0162 |
| 59 | 1.9988 | 0.0160 |
| 60 | 2.0147 | 0.0159 |
| 61 | 2.0305 | 0.0158 |
| 62 | 2.0461 | 0.0156 |

| | | |
|-----|--------|--------|
| 63 | 2.0616 | 0.0155 |
| 64 | 2.0769 | 0.0154 |
| 65 | 2.0922 | 0.0152 |
| 66 | 2.1073 | 0.0151 |
| 67 | 2.1222 | 0.0150 |
| 68 | 2.1371 | 0.0149 |
| 69 | 2.1519 | 0.0148 |
| 70 | 2.1665 | 0.0146 |
| 71 | 2.1810 | 0.0145 |
| 72 | 2.1955 | 0.0144 |
| 73 | 2.2067 | 0.0113 |
| 74 | 2.2179 | 0.0112 |
| 75 | 2.2290 | 0.0111 |
| 76 | 2.2401 | 0.0110 |
| 77 | 2.2510 | 0.0109 |
| 78 | 2.2618 | 0.0108 |
| 79 | 2.2725 | 0.0107 |
| 80 | 2.2832 | 0.0107 |
| 81 | 2.2938 | 0.0106 |
| 82 | 2.3043 | 0.0105 |
| 83 | 2.3147 | 0.0104 |
| 84 | 2.3250 | 0.0103 |
| 85 | 2.3353 | 0.0103 |
| 86 | 2.3455 | 0.0102 |
| 87 | 2.3556 | 0.0101 |
| 88 | 2.3656 | 0.0100 |
| 89 | 2.3756 | 0.0100 |
| 90 | 2.3855 | 0.0099 |
| 91 | 2.3953 | 0.0098 |
| 92 | 2.4051 | 0.0098 |
| 93 | 2.4147 | 0.0097 |
| 94 | 2.4244 | 0.0096 |
| 95 | 2.4339 | 0.0096 |
| 96 | 2.4434 | 0.0095 |
| 97 | 2.4529 | 0.0094 |
| 98 | 2.4622 | 0.0094 |
| 99 | 2.4716 | 0.0093 |
| 100 | 2.4808 | 0.0093 |
| 101 | 2.4900 | 0.0092 |
| 102 | 2.4992 | 0.0091 |
| 103 | 2.5083 | 0.0091 |
| 104 | 2.5173 | 0.0090 |
| 105 | 2.5263 | 0.0090 |
| 106 | 2.5352 | 0.0089 |
| 107 | 2.5441 | 0.0089 |
| 108 | 2.5529 | 0.0088 |
| 109 | 2.5616 | 0.0088 |
| 110 | 2.5704 | 0.0087 |
| 111 | 2.5790 | 0.0087 |
| 112 | 2.5876 | 0.0086 |
| 113 | 2.5962 | 0.0086 |
| 114 | 2.6047 | 0.0085 |
| 115 | 2.6132 | 0.0085 |
| 116 | 2.6216 | 0.0084 |
| 117 | 2.6300 | 0.0084 |
| 118 | 2.6384 | 0.0083 |
| 119 | 2.6467 | 0.0083 |
| 120 | 2.6549 | 0.0083 |
| 121 | 2.6631 | 0.0082 |
| 122 | 2.6713 | 0.0082 |
| 123 | 2.6794 | 0.0081 |
| 124 | 2.6875 | 0.0081 |
| 125 | 2.6955 | 0.0080 |
| 126 | 2.7035 | 0.0080 |
| 127 | 2.7115 | 0.0080 |
| 128 | 2.7194 | 0.0079 |
| 129 | 2.7273 | 0.0079 |
| 130 | 2.7352 | 0.0078 |
| 131 | 2.7430 | 0.0078 |
| 132 | 2.7507 | 0.0078 |
| 133 | 2.7585 | 0.0077 |
| 134 | 2.7662 | 0.0077 |
| 135 | 2.7738 | 0.0077 |

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| 136 | 2.7815 | 0.0076 |
| 137 | 2.7890 | 0.0076 |
| 138 | 2.7966 | 0.0076 |
| 139 | 2.8041 | 0.0075 |
| 140 | 2.8116 | 0.0075 |
| 141 | 2.8191 | 0.0075 |
| 142 | 2.8265 | 0.0074 |
| 143 | 2.8339 | 0.0074 |
| 144 | 2.8412 | 0.0074 |
| 145 | 2.8486 | 0.0073 |
| 146 | 2.8558 | 0.0073 |
| 147 | 2.8631 | 0.0073 |
| 148 | 2.8703 | 0.0072 |
| 149 | 2.8775 | 0.0072 |
| 150 | 2.8847 | 0.0072 |
| 151 | 2.8918 | 0.0071 |
| 152 | 2.8990 | 0.0071 |
| 153 | 2.9060 | 0.0071 |
| 154 | 2.9131 | 0.0071 |
| 155 | 2.9201 | 0.0070 |
| 156 | 2.9271 | 0.0070 |
| 157 | 2.9341 | 0.0070 |
| 158 | 2.9410 | 0.0069 |
| 159 | 2.9479 | 0.0069 |
| 160 | 2.9548 | 0.0069 |
| 161 | 2.9617 | 0.0069 |
| 162 | 2.9685 | 0.0068 |
| 163 | 2.9753 | 0.0068 |
| 164 | 2.9821 | 0.0068 |
| 165 | 2.9888 | 0.0068 |
| 166 | 2.9955 | 0.0067 |
| 167 | 3.0022 | 0.0067 |
| 168 | 3.0089 | 0.0067 |
| 169 | 3.0156 | 0.0067 |
| 170 | 3.0222 | 0.0066 |
| 171 | 3.0288 | 0.0066 |
| 172 | 3.0354 | 0.0066 |
| 173 | 3.0419 | 0.0066 |
| 174 | 3.0485 | 0.0065 |
| 175 | 3.0550 | 0.0065 |
| 176 | 3.0614 | 0.0065 |
| 177 | 3.0679 | 0.0065 |
| 178 | 3.0743 | 0.0064 |
| 179 | 3.0807 | 0.0064 |
| 180 | 3.0871 | 0.0064 |
| 181 | 3.0935 | 0.0064 |
| 182 | 3.0999 | 0.0063 |
| 183 | 3.1062 | 0.0063 |
| 184 | 3.1125 | 0.0063 |
| 185 | 3.1188 | 0.0063 |
| 186 | 3.1250 | 0.0063 |
| 187 | 3.1313 | 0.0062 |
| 188 | 3.1375 | 0.0062 |
| 189 | 3.1437 | 0.0062 |
| 190 | 3.1499 | 0.0062 |
| 191 | 3.1560 | 0.0062 |
| 192 | 3.1622 | 0.0061 |
| 193 | 3.1683 | 0.0061 |
| 194 | 3.1744 | 0.0061 |
| 195 | 3.1804 | 0.0061 |
| 196 | 3.1865 | 0.0061 |
| 197 | 3.1925 | 0.0060 |
| 198 | 3.1986 | 0.0060 |
| 199 | 3.2046 | 0.0060 |
| 200 | 3.2105 | 0.0060 |
| 201 | 3.2165 | 0.0060 |
| 202 | 3.2224 | 0.0059 |
| 203 | 3.2284 | 0.0059 |
| 204 | 3.2343 | 0.0059 |
| 205 | 3.2402 | 0.0059 |
| 206 | 3.2460 | 0.0059 |
| 207 | 3.2519 | 0.0059 |
| 208 | 3.2577 | 0.0058 |

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| 209 | 3.2635 | 0.0058 |
| 210 | 3.2693 | 0.0058 |
| 211 | 3.2751 | 0.0058 |
| 212 | 3.2809 | 0.0058 |
| 213 | 3.2866 | 0.0057 |
| 214 | 3.2924 | 0.0057 |
| 215 | 3.2981 | 0.0057 |
| 216 | 3.3038 | 0.0057 |
| 217 | 3.3095 | 0.0057 |
| 218 | 3.3151 | 0.0057 |
| 219 | 3.3208 | 0.0056 |
| 220 | 3.3264 | 0.0056 |
| 221 | 3.3320 | 0.0056 |
| 222 | 3.3376 | 0.0056 |
| 223 | 3.3432 | 0.0056 |
| 224 | 3.3488 | 0.0056 |
| 225 | 3.3543 | 0.0056 |
| 226 | 3.3599 | 0.0055 |
| 227 | 3.3654 | 0.0055 |
| 228 | 3.3709 | 0.0055 |
| 229 | 3.3764 | 0.0055 |
| 230 | 3.3819 | 0.0055 |
| 231 | 3.3873 | 0.0055 |
| 232 | 3.3928 | 0.0054 |
| 233 | 3.3982 | 0.0054 |
| 234 | 3.4036 | 0.0054 |
| 235 | 3.4090 | 0.0054 |
| 236 | 3.4144 | 0.0054 |
| 237 | 3.4198 | 0.0054 |
| 238 | 3.4252 | 0.0054 |
| 239 | 3.4305 | 0.0053 |
| 240 | 3.4358 | 0.0053 |
| 241 | 3.4412 | 0.0053 |
| 242 | 3.4465 | 0.0053 |
| 243 | 3.4518 | 0.0053 |
| 244 | 3.4570 | 0.0053 |
| 245 | 3.4623 | 0.0053 |
| 246 | 3.4675 | 0.0053 |
| 247 | 3.4728 | 0.0052 |
| 248 | 3.4780 | 0.0052 |
| 249 | 3.4832 | 0.0052 |
| 250 | 3.4884 | 0.0052 |
| 251 | 3.4936 | 0.0052 |
| 252 | 3.4988 | 0.0052 |
| 253 | 3.5039 | 0.0052 |
| 254 | 3.5091 | 0.0051 |
| 255 | 3.5142 | 0.0051 |
| 256 | 3.5193 | 0.0051 |
| 257 | 3.5244 | 0.0051 |
| 258 | 3.5295 | 0.0051 |
| 259 | 3.5346 | 0.0051 |
| 260 | 3.5397 | 0.0051 |
| 261 | 3.5447 | 0.0051 |
| 262 | 3.5498 | 0.0050 |
| 263 | 3.5548 | 0.0050 |
| 264 | 3.5598 | 0.0050 |
| 265 | 3.5649 | 0.0050 |
| 266 | 3.5699 | 0.0050 |
| 267 | 3.5748 | 0.0050 |
| 268 | 3.5798 | 0.0050 |
| 269 | 3.5848 | 0.0050 |
| 270 | 3.5897 | 0.0050 |
| 271 | 3.5947 | 0.0049 |
| 272 | 3.5996 | 0.0049 |
| 273 | 3.6045 | 0.0049 |
| 274 | 3.6094 | 0.0049 |
| 275 | 3.6143 | 0.0049 |
| 276 | 3.6192 | 0.0049 |
| 277 | 3.6241 | 0.0049 |
| 278 | 3.6289 | 0.0049 |
| 279 | 3.6338 | 0.0049 |
| 280 | 3.6386 | 0.0048 |
| 281 | 3.6435 | 0.0048 |

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| 282 | 3.6483 | 0.0048 |
| 283 | 3.6531 | 0.0048 |
| 284 | 3.6579 | 0.0048 |
| 285 | 3.6627 | 0.0048 |
| 286 | 3.6674 | 0.0048 |
| 287 | 3.6722 | 0.0048 |
| 288 | 3.6770 | 0.0048 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0048 | 0.0023 | 0.0024 |
| 2 | 0.0048 | 0.0023 | 0.0024 |
| 3 | 0.0048 | 0.0023 | 0.0024 |
| 4 | 0.0048 | 0.0024 | 0.0024 |
| 5 | 0.0048 | 0.0024 | 0.0025 |
| 6 | 0.0048 | 0.0024 | 0.0025 |
| 7 | 0.0049 | 0.0024 | 0.0025 |
| 8 | 0.0049 | 0.0024 | 0.0025 |
| 9 | 0.0049 | 0.0024 | 0.0025 |
| 10 | 0.0049 | 0.0024 | 0.0025 |
| 11 | 0.0049 | 0.0024 | 0.0025 |
| 12 | 0.0049 | 0.0024 | 0.0025 |
| 13 | 0.0050 | 0.0024 | 0.0025 |
| 14 | 0.0050 | 0.0024 | 0.0025 |
| 15 | 0.0050 | 0.0024 | 0.0025 |
| 16 | 0.0050 | 0.0025 | 0.0025 |
| 17 | 0.0050 | 0.0025 | 0.0026 |
| 18 | 0.0050 | 0.0025 | 0.0026 |
| 19 | 0.0051 | 0.0025 | 0.0026 |
| 20 | 0.0051 | 0.0025 | 0.0026 |
| 21 | 0.0051 | 0.0025 | 0.0026 |
| 22 | 0.0051 | 0.0025 | 0.0026 |
| 23 | 0.0051 | 0.0025 | 0.0026 |
| 24 | 0.0051 | 0.0025 | 0.0026 |
| 25 | 0.0052 | 0.0025 | 0.0026 |
| 26 | 0.0052 | 0.0025 | 0.0026 |
| 27 | 0.0052 | 0.0026 | 0.0027 |
| 28 | 0.0052 | 0.0026 | 0.0027 |
| 29 | 0.0053 | 0.0026 | 0.0027 |
| 30 | 0.0053 | 0.0026 | 0.0027 |
| 31 | 0.0053 | 0.0026 | 0.0027 |
| 32 | 0.0053 | 0.0026 | 0.0027 |
| 33 | 0.0053 | 0.0026 | 0.0027 |
| 34 | 0.0053 | 0.0026 | 0.0027 |
| 35 | 0.0054 | 0.0026 | 0.0027 |
| 36 | 0.0054 | 0.0026 | 0.0027 |
| 37 | 0.0054 | 0.0027 | 0.0028 |
| 38 | 0.0054 | 0.0027 | 0.0028 |
| 39 | 0.0055 | 0.0027 | 0.0028 |
| 40 | 0.0055 | 0.0027 | 0.0028 |
| 41 | 0.0055 | 0.0027 | 0.0028 |
| 42 | 0.0055 | 0.0027 | 0.0028 |
| 43 | 0.0056 | 0.0027 | 0.0028 |
| 44 | 0.0056 | 0.0027 | 0.0028 |
| 45 | 0.0056 | 0.0028 | 0.0029 |
| 46 | 0.0056 | 0.0028 | 0.0029 |
| 47 | 0.0056 | 0.0028 | 0.0029 |
| 48 | 0.0057 | 0.0028 | 0.0029 |
| 49 | 0.0057 | 0.0028 | 0.0029 |
| 50 | 0.0057 | 0.0028 | 0.0029 |
| 51 | 0.0057 | 0.0028 | 0.0029 |
| 52 | 0.0058 | 0.0028 | 0.0029 |
| 53 | 0.0058 | 0.0028 | 0.0030 |
| 54 | 0.0058 | 0.0029 | 0.0030 |
| 55 | 0.0059 | 0.0029 | 0.0030 |
| 56 | 0.0059 | 0.0029 | 0.0030 |
| 57 | 0.0059 | 0.0029 | 0.0030 |
| 58 | 0.0059 | 0.0029 | 0.0030 |
| 59 | 0.0060 | 0.0029 | 0.0030 |
| 60 | 0.0060 | 0.0029 | 0.0030 |
| 61 | 0.0060 | 0.0030 | 0.0031 |

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| 62 | 0.0060 | 0.0030 | 0.0031 |
| 63 | 0.0061 | 0.0030 | 0.0031 |
| 64 | 0.0061 | 0.0030 | 0.0031 |
| 65 | 0.0061 | 0.0030 | 0.0031 |
| 66 | 0.0062 | 0.0030 | 0.0031 |
| 67 | 0.0062 | 0.0030 | 0.0032 |
| 68 | 0.0062 | 0.0031 | 0.0032 |
| 69 | 0.0063 | 0.0031 | 0.0032 |
| 70 | 0.0063 | 0.0031 | 0.0032 |
| 71 | 0.0063 | 0.0031 | 0.0032 |
| 72 | 0.0063 | 0.0031 | 0.0032 |
| 73 | 0.0064 | 0.0031 | 0.0033 |
| 74 | 0.0064 | 0.0031 | 0.0033 |
| 75 | 0.0065 | 0.0032 | 0.0033 |
| 76 | 0.0065 | 0.0032 | 0.0033 |
| 77 | 0.0065 | 0.0032 | 0.0033 |
| 78 | 0.0066 | 0.0032 | 0.0033 |
| 79 | 0.0066 | 0.0032 | 0.0034 |
| 80 | 0.0066 | 0.0033 | 0.0034 |
| 81 | 0.0067 | 0.0033 | 0.0034 |
| 82 | 0.0067 | 0.0033 | 0.0034 |
| 83 | 0.0068 | 0.0033 | 0.0034 |
| 84 | 0.0068 | 0.0033 | 0.0034 |
| 85 | 0.0068 | 0.0034 | 0.0035 |
| 86 | 0.0069 | 0.0034 | 0.0035 |
| 87 | 0.0069 | 0.0034 | 0.0035 |
| 88 | 0.0069 | 0.0034 | 0.0035 |
| 89 | 0.0070 | 0.0034 | 0.0036 |
| 90 | 0.0070 | 0.0034 | 0.0036 |
| 91 | 0.0071 | 0.0035 | 0.0036 |
| 92 | 0.0071 | 0.0035 | 0.0036 |
| 93 | 0.0072 | 0.0035 | 0.0036 |
| 94 | 0.0072 | 0.0035 | 0.0037 |
| 95 | 0.0073 | 0.0036 | 0.0037 |
| 96 | 0.0073 | 0.0036 | 0.0037 |
| 97 | 0.0074 | 0.0036 | 0.0037 |
| 98 | 0.0074 | 0.0036 | 0.0038 |
| 99 | 0.0075 | 0.0037 | 0.0038 |
| 100 | 0.0075 | 0.0037 | 0.0038 |
| 101 | 0.0076 | 0.0037 | 0.0038 |
| 102 | 0.0076 | 0.0037 | 0.0039 |
| 103 | 0.0077 | 0.0038 | 0.0039 |
| 104 | 0.0077 | 0.0038 | 0.0039 |
| 105 | 0.0078 | 0.0038 | 0.0040 |
| 106 | 0.0078 | 0.0038 | 0.0040 |
| 107 | 0.0079 | 0.0039 | 0.0040 |
| 108 | 0.0079 | 0.0039 | 0.0040 |
| 109 | 0.0080 | 0.0039 | 0.0041 |
| 110 | 0.0080 | 0.0039 | 0.0041 |
| 111 | 0.0081 | 0.0040 | 0.0041 |
| 112 | 0.0082 | 0.0040 | 0.0042 |
| 113 | 0.0083 | 0.0041 | 0.0042 |
| 114 | 0.0083 | 0.0041 | 0.0042 |
| 115 | 0.0084 | 0.0041 | 0.0043 |
| 116 | 0.0084 | 0.0041 | 0.0043 |
| 117 | 0.0085 | 0.0042 | 0.0043 |
| 118 | 0.0086 | 0.0042 | 0.0044 |
| 119 | 0.0087 | 0.0043 | 0.0044 |
| 120 | 0.0087 | 0.0043 | 0.0044 |
| 121 | 0.0088 | 0.0043 | 0.0045 |
| 122 | 0.0089 | 0.0044 | 0.0045 |
| 123 | 0.0090 | 0.0044 | 0.0046 |
| 124 | 0.0090 | 0.0044 | 0.0046 |
| 125 | 0.0091 | 0.0045 | 0.0047 |
| 126 | 0.0092 | 0.0045 | 0.0047 |
| 127 | 0.0093 | 0.0046 | 0.0047 |
| 128 | 0.0094 | 0.0046 | 0.0048 |
| 129 | 0.0095 | 0.0047 | 0.0048 |
| 130 | 0.0096 | 0.0047 | 0.0049 |
| 131 | 0.0097 | 0.0048 | 0.0049 |
| 132 | 0.0098 | 0.0048 | 0.0050 |
| 133 | 0.0099 | 0.0049 | 0.0050 |
| 134 | 0.0100 | 0.0049 | 0.0051 |

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| 135 | 0.0101 | 0.0050 | 0.0051 |
| 136 | 0.0102 | 0.0050 | 0.0052 |
| 137 | 0.0103 | 0.0051 | 0.0053 |
| 138 | 0.0104 | 0.0051 | 0.0053 |
| 139 | 0.0106 | 0.0052 | 0.0054 |
| 140 | 0.0107 | 0.0052 | 0.0054 |
| 141 | 0.0108 | 0.0053 | 0.0055 |
| 142 | 0.0109 | 0.0054 | 0.0056 |
| 143 | 0.0111 | 0.0055 | 0.0057 |
| 144 | 0.0112 | 0.0055 | 0.0057 |
| 145 | 0.0144 | 0.0071 | 0.0073 |
| 146 | 0.0145 | 0.0071 | 0.0074 |
| 147 | 0.0148 | 0.0072 | 0.0075 |
| 148 | 0.0149 | 0.0073 | 0.0076 |
| 149 | 0.0151 | 0.0074 | 0.0077 |
| 150 | 0.0152 | 0.0075 | 0.0078 |
| 151 | 0.0155 | 0.0076 | 0.0079 |
| 152 | 0.0156 | 0.0077 | 0.0079 |
| 153 | 0.0159 | 0.0078 | 0.0081 |
| 154 | 0.0160 | 0.0079 | 0.0082 |
| 155 | 0.0163 | 0.0080 | 0.0083 |
| 156 | 0.0165 | 0.0081 | 0.0084 |
| 157 | 0.0168 | 0.0083 | 0.0086 |
| 158 | 0.0170 | 0.0083 | 0.0086 |
| 159 | 0.0173 | 0.0085 | 0.0088 |
| 160 | 0.0175 | 0.0086 | 0.0089 |
| 161 | 0.0179 | 0.0088 | 0.0091 |
| 162 | 0.0181 | 0.0089 | 0.0092 |
| 163 | 0.0185 | 0.0091 | 0.0094 |
| 164 | 0.0188 | 0.0092 | 0.0095 |
| 165 | 0.0192 | 0.0094 | 0.0098 |
| 166 | 0.0195 | 0.0096 | 0.0099 |
| 167 | 0.0200 | 0.0098 | 0.0102 |
| 168 | 0.0203 | 0.0100 | 0.0103 |
| 169 | 0.0219 | 0.0107 | 0.0111 |
| 170 | 0.0222 | 0.0109 | 0.0113 |
| 171 | 0.0229 | 0.0112 | 0.0116 |
| 172 | 0.0232 | 0.0114 | 0.0118 |
| 173 | 0.0240 | 0.0118 | 0.0122 |
| 174 | 0.0245 | 0.0120 | 0.0124 |
| 175 | 0.0254 | 0.0125 | 0.0129 |
| 176 | 0.0259 | 0.0127 | 0.0132 |
| 177 | 0.0270 | 0.0132 | 0.0137 |
| 178 | 0.0276 | 0.0135 | 0.0140 |
| 179 | 0.0289 | 0.0142 | 0.0147 |
| 180 | 0.0296 | 0.0146 | 0.0151 |
| 181 | 0.0313 | 0.0154 | 0.0159 |
| 182 | 0.0323 | 0.0158 | 0.0164 |
| 183 | 0.0344 | 0.0169 | 0.0175 |
| 184 | 0.0357 | 0.0175 | 0.0182 |
| 185 | 0.0315 | 0.0155 | 0.0160 |
| 186 | 0.0333 | 0.0163 | 0.0169 |
| 187 | 0.0378 | 0.0185 | 0.0192 |
| 188 | 0.0407 | 0.0191 | 0.0216 |
| 189 | 0.0513 | 0.0191 | 0.0322 |
| 190 | 0.0577 | 0.0191 | 0.0386 |
| 191 | 0.0815 | 0.0191 | 0.0624 |
| 192 | 0.1110 | 0.0191 | 0.0919 |
| 193 | 0.3295 | 0.0191 | 0.3104 |
| 194 | 0.0668 | 0.0191 | 0.0478 |
| 195 | 0.0444 | 0.0191 | 0.0253 |
| 196 | 0.0353 | 0.0173 | 0.0180 |
| 197 | 0.0371 | 0.0182 | 0.0189 |
| 198 | 0.0333 | 0.0163 | 0.0169 |
| 199 | 0.0304 | 0.0149 | 0.0155 |
| 200 | 0.0282 | 0.0138 | 0.0144 |
| 201 | 0.0264 | 0.0130 | 0.0134 |
| 202 | 0.0249 | 0.0122 | 0.0127 |
| 203 | 0.0236 | 0.0116 | 0.0120 |
| 204 | 0.0225 | 0.0111 | 0.0115 |
| 205 | 0.0206 | 0.0101 | 0.0105 |
| 206 | 0.0197 | 0.0097 | 0.0100 |
| 207 | 0.0190 | 0.0093 | 0.0097 |

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| 208 | 0.0183 | 0.0090 | 0.0093 |
| 209 | 0.0177 | 0.0087 | 0.0090 |
| 210 | 0.0172 | 0.0084 | 0.0087 |
| 211 | 0.0166 | 0.0082 | 0.0085 |
| 212 | 0.0162 | 0.0079 | 0.0082 |
| 213 | 0.0158 | 0.0077 | 0.0080 |
| 214 | 0.0154 | 0.0075 | 0.0078 |
| 215 | 0.0150 | 0.0074 | 0.0076 |
| 216 | 0.0146 | 0.0072 | 0.0075 |
| 217 | 0.0113 | 0.0055 | 0.0057 |
| 218 | 0.0110 | 0.0054 | 0.0056 |
| 219 | 0.0107 | 0.0053 | 0.0055 |
| 220 | 0.0105 | 0.0052 | 0.0053 |
| 221 | 0.0103 | 0.0050 | 0.0052 |
| 222 | 0.0100 | 0.0049 | 0.0051 |
| 223 | 0.0098 | 0.0048 | 0.0050 |
| 224 | 0.0096 | 0.0047 | 0.0049 |
| 225 | 0.0094 | 0.0046 | 0.0048 |
| 226 | 0.0093 | 0.0045 | 0.0047 |
| 227 | 0.0091 | 0.0045 | 0.0046 |
| 228 | 0.0089 | 0.0044 | 0.0045 |
| 229 | 0.0088 | 0.0043 | 0.0045 |
| 230 | 0.0086 | 0.0042 | 0.0044 |
| 231 | 0.0085 | 0.0042 | 0.0043 |
| 232 | 0.0083 | 0.0041 | 0.0042 |
| 233 | 0.0082 | 0.0040 | 0.0042 |
| 234 | 0.0081 | 0.0040 | 0.0041 |
| 235 | 0.0080 | 0.0039 | 0.0041 |
| 236 | 0.0078 | 0.0039 | 0.0040 |
| 237 | 0.0077 | 0.0038 | 0.0039 |
| 238 | 0.0076 | 0.0037 | 0.0039 |
| 239 | 0.0075 | 0.0037 | 0.0038 |
| 240 | 0.0074 | 0.0036 | 0.0038 |
| 241 | 0.0073 | 0.0036 | 0.0037 |
| 242 | 0.0072 | 0.0036 | 0.0037 |
| 243 | 0.0071 | 0.0035 | 0.0036 |
| 244 | 0.0071 | 0.0035 | 0.0036 |
| 245 | 0.0070 | 0.0034 | 0.0035 |
| 246 | 0.0069 | 0.0034 | 0.0035 |
| 247 | 0.0068 | 0.0033 | 0.0035 |
| 248 | 0.0067 | 0.0033 | 0.0034 |
| 249 | 0.0067 | 0.0033 | 0.0034 |
| 250 | 0.0066 | 0.0032 | 0.0033 |
| 251 | 0.0065 | 0.0032 | 0.0033 |
| 252 | 0.0064 | 0.0032 | 0.0033 |
| 253 | 0.0064 | 0.0031 | 0.0032 |
| 254 | 0.0063 | 0.0031 | 0.0032 |
| 255 | 0.0062 | 0.0031 | 0.0032 |
| 256 | 0.0062 | 0.0030 | 0.0031 |
| 257 | 0.0061 | 0.0030 | 0.0031 |
| 258 | 0.0061 | 0.0030 | 0.0031 |
| 259 | 0.0060 | 0.0029 | 0.0031 |
| 260 | 0.0059 | 0.0029 | 0.0030 |
| 261 | 0.0059 | 0.0029 | 0.0030 |
| 262 | 0.0058 | 0.0029 | 0.0030 |
| 263 | 0.0058 | 0.0028 | 0.0029 |
| 264 | 0.0057 | 0.0028 | 0.0029 |
| 265 | 0.0057 | 0.0028 | 0.0029 |
| 266 | 0.0056 | 0.0028 | 0.0029 |
| 267 | 0.0056 | 0.0027 | 0.0028 |
| 268 | 0.0055 | 0.0027 | 0.0028 |
| 269 | 0.0055 | 0.0027 | 0.0028 |
| 270 | 0.0054 | 0.0027 | 0.0028 |
| 271 | 0.0054 | 0.0027 | 0.0028 |
| 272 | 0.0054 | 0.0026 | 0.0027 |
| 273 | 0.0053 | 0.0026 | 0.0027 |
| 274 | 0.0053 | 0.0026 | 0.0027 |
| 275 | 0.0052 | 0.0026 | 0.0027 |
| 276 | 0.0052 | 0.0026 | 0.0026 |
| 277 | 0.0052 | 0.0025 | 0.0026 |
| 278 | 0.0051 | 0.0025 | 0.0026 |
| 279 | 0.0051 | 0.0025 | 0.0026 |
| 280 | 0.0050 | 0.0025 | 0.0026 |

| | | | |
|-----|--------|--------|--------|
| 281 | 0.0050 | 0.0025 | 0.0026 |
| 282 | 0.0050 | 0.0024 | 0.0025 |
| 283 | 0.0049 | 0.0024 | 0.0025 |
| 284 | 0.0049 | 0.0024 | 0.0025 |
| 285 | 0.0049 | 0.0024 | 0.0025 |
| 286 | 0.0048 | 0.0024 | 0.0025 |
| 287 | 0.0048 | 0.0024 | 0.0024 |
| 288 | 0.0048 | 0.0023 | 0.0024 |

Total soil rain loss = 1.57(In)
Total effective rainfall = 2.10(In)
Peak flow rate in flood hydrograph = 657.98(CFS)

+++++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 175.0 | 350.0 | 525.0 | 700.0 |
|-----------|--------------|--------|----|-------|-------|-------|-------|
| 0+ 5 | 0.0012 | 0.18 | Q | | | | |
| 0+10 | 0.0055 | 0.61 | Q | | | | |
| 0+15 | 0.0140 | 1.24 | Q | | | | |
| 0+20 | 0.0281 | 2.06 | Q | | | | |
| 0+25 | 0.0503 | 3.21 | Q | | | | |
| 0+30 | 0.0836 | 4.84 | Q | | | | |
| 0+35 | 0.1381 | 7.90 | Q | | | | |
| 0+40 | 0.2123 | 10.78 | Q | | | | |
| 0+45 | 0.2964 | 12.21 | Q | | | | |
| 0+50 | 0.3879 | 13.28 | Q | | | | |
| 0+55 | 0.4853 | 14.15 | Q | | | | |
| 1+ 0 | 0.5877 | 14.87 | Q | | | | |
| 1+ 5 | 0.6946 | 15.52 | Q | | | | |
| 1+10 | 0.8054 | 16.09 | Q | | | | |
| 1+15 | 0.9197 | 16.59 | Q | | | | |
| 1+20 | 1.0370 | 17.04 | Q | | | | |
| 1+25 | 1.1572 | 17.45 | Q | | | | |
| 1+30 | 1.2800 | 17.83 | VQ | | | | |
| 1+35 | 1.4051 | 18.16 | VQ | | | | |
| 1+40 | 1.5323 | 18.47 | VQ | | | | |
| 1+45 | 1.6615 | 18.76 | VQ | | | | |
| 1+50 | 1.7925 | 19.02 | VQ | | | | |
| 1+55 | 1.9251 | 19.26 | VQ | | | | |
| 2+ 0 | 2.0592 | 19.47 | VQ | | | | |
| 2+ 5 | 2.1947 | 19.67 | VQ | | | | |
| 2+10 | 2.3314 | 19.85 | VQ | | | | |
| 2+15 | 2.4693 | 20.02 | VQ | | | | |
| 2+20 | 2.6082 | 20.17 | VQ | | | | |
| 2+25 | 2.7479 | 20.29 | VQ | | | | |
| 2+30 | 2.8883 | 20.39 | VQ | | | | |
| 2+35 | 3.0295 | 20.50 | Q | | | | |
| 2+40 | 3.1715 | 20.61 | Q | | | | |
| 2+45 | 3.3142 | 20.72 | Q | | | | |
| 2+50 | 3.4576 | 20.82 | Q | | | | |
| 2+55 | 3.6017 | 20.93 | Q | | | | |
| 3+ 0 | 3.7465 | 21.03 | Q | | | | |
| 3+ 5 | 3.8920 | 21.12 | Q | | | | |
| 3+10 | 4.0381 | 21.22 | Q | | | | |
| 3+15 | 4.1850 | 21.32 | Q | | | | |
| 3+20 | 4.3325 | 21.43 | Q | | | | |
| 3+25 | 4.4808 | 21.53 | Q | | | | |
| 3+30 | 4.6298 | 21.64 | Q | | | | |
| 3+35 | 4.7796 | 21.74 | Q | | | | |
| 3+40 | 4.9299 | 21.84 | Q | | | | |
| 3+45 | 5.0810 | 21.93 | Q | | | | |
| 3+50 | 5.2327 | 22.03 | Q | | | | |
| 3+55 | 5.3851 | 22.13 | Q | | | | |
| 4+ 0 | 5.5382 | 22.22 | Q | | | | |
| 4+ 5 | 5.6918 | 22.32 | Q | | | | |
| 4+10 | 5.8462 | 22.41 | QV | | | | |

| | | | |
|-------|---------|-------|-----|
| 4+15 | 6.0011 | 22.50 | QV |
| 4+20 | 6.1568 | 22.60 | QV |
| 4+25 | 6.3130 | 22.69 | QV |
| 4+30 | 6.4700 | 22.79 | QV |
| 4+35 | 6.6276 | 22.89 | QV |
| 4+40 | 6.7859 | 22.98 | QV |
| 4+45 | 6.9449 | 23.08 | QV |
| 4+50 | 7.1045 | 23.18 | QV |
| 4+55 | 7.2649 | 23.29 | QV |
| 5+ 0 | 7.4260 | 23.39 | QV |
| 5+ 5 | 7.5878 | 23.49 | QV |
| 5+10 | 7.7503 | 23.60 | QV |
| 5+15 | 7.9136 | 23.71 | QV |
| 5+20 | 8.0776 | 23.81 | QV |
| 5+25 | 8.2424 | 23.92 | QV |
| 5+30 | 8.4079 | 24.03 | QV |
| 5+35 | 8.5742 | 24.15 | QV |
| 5+40 | 8.7413 | 24.26 | Q V |
| 5+45 | 8.9091 | 24.37 | Q V |
| 5+50 | 9.0778 | 24.49 | Q V |
| 5+55 | 9.2473 | 24.61 | Q V |
| 6+ 0 | 9.4176 | 24.73 | Q V |
| 6+ 5 | 9.5887 | 24.85 | Q V |
| 6+10 | 9.7607 | 24.97 | Q V |
| 6+15 | 9.9335 | 25.09 | Q V |
| 6+20 | 10.1072 | 25.22 | Q V |
| 6+25 | 10.2817 | 25.35 | Q V |
| 6+30 | 10.4572 | 25.47 | Q V |
| 6+35 | 10.6335 | 25.60 | Q V |
| 6+40 | 10.8107 | 25.74 | Q V |
| 6+45 | 10.9889 | 25.87 | Q V |
| 6+50 | 11.1680 | 26.01 | Q V |
| 6+55 | 11.3481 | 26.14 | Q V |
| 7+ 0 | 11.5291 | 26.28 | Q V |
| 7+ 5 | 11.7111 | 26.42 | Q V |
| 7+10 | 11.8941 | 26.57 | Q V |
| 7+15 | 12.0780 | 26.71 | Q V |
| 7+20 | 12.2630 | 26.86 | Q V |
| 7+25 | 12.4491 | 27.01 | Q V |
| 7+30 | 12.6361 | 27.16 | Q V |
| 7+35 | 12.8243 | 27.32 | Q V |
| 7+40 | 13.0135 | 27.47 | Q V |
| 7+45 | 13.2038 | 27.63 | Q V |
| 7+50 | 13.3952 | 27.79 | Q V |
| 7+55 | 13.5877 | 27.96 | Q V |
| 8+ 0 | 13.7814 | 28.12 | Q V |
| 8+ 5 | 13.9763 | 28.29 | Q V |
| 8+10 | 14.1723 | 28.46 | Q V |
| 8+15 | 14.3695 | 28.64 | Q V |
| 8+20 | 14.5679 | 28.81 | Q V |
| 8+25 | 14.7676 | 28.99 | Q V |
| 8+30 | 14.9686 | 29.18 | Q V |
| 8+35 | 15.1708 | 29.36 | Q V |
| 8+40 | 15.3743 | 29.55 | Q V |
| 8+45 | 15.5792 | 29.74 | Q V |
| 8+50 | 15.7853 | 29.94 | Q V |
| 8+55 | 15.9929 | 30.14 | Q V |
| 9+ 0 | 16.2018 | 30.34 | Q V |
| 9+ 5 | 16.4122 | 30.55 | Q V |
| 9+10 | 16.6240 | 30.75 | Q V |
| 9+15 | 16.8373 | 30.97 | Q V |
| 9+20 | 17.0521 | 31.18 | Q V |
| 9+25 | 17.2684 | 31.41 | Q V |
| 9+30 | 17.4862 | 31.63 | Q V |
| 9+35 | 17.7056 | 31.86 | Q V |
| 9+40 | 17.9267 | 32.09 | Q V |
| 9+45 | 18.1494 | 32.33 | Q V |
| 9+50 | 18.3737 | 32.58 | Q V |
| 9+55 | 18.5998 | 32.82 | Q V |
| 10+ 0 | 18.8276 | 33.08 | Q V |
| 10+ 5 | 19.0572 | 33.34 | Q V |
| 10+10 | 19.2885 | 33.60 | Q V |
| 10+15 | 19.5218 | 33.87 | Q V |

| | | | | | | | |
|-------|---------|--------|---|---|--|--|--|
| 10+20 | 19.7569 | 34.14 | Q | V | | | |
| 10+25 | 19.9940 | 34.42 | Q | V | | | |
| 10+30 | 20.2330 | 34.71 | Q | V | | | |
| 10+35 | 20.4741 | 35.00 | Q | V | | | |
| 10+40 | 20.7172 | 35.30 | Q | V | | | |
| 10+45 | 20.9624 | 35.61 | Q | V | | | |
| 10+50 | 21.2098 | 35.92 | Q | V | | | |
| 10+55 | 21.4594 | 36.24 | Q | V | | | |
| 11+ 0 | 21.7112 | 36.57 | Q | V | | | |
| 11+ 5 | 21.9654 | 36.90 | Q | V | | | |
| 11+10 | 22.2219 | 37.25 | Q | V | | | |
| 11+15 | 22.4808 | 37.60 | Q | V | | | |
| 11+20 | 22.7423 | 37.96 | Q | V | | | |
| 11+25 | 23.0062 | 38.33 | Q | V | | | |
| 11+30 | 23.2728 | 38.71 | Q | V | | | |
| 11+35 | 23.5421 | 39.10 | Q | V | | | |
| 11+40 | 23.8142 | 39.50 | Q | V | | | |
| 11+45 | 24.0891 | 39.91 | Q | V | | | |
| 11+50 | 24.3668 | 40.33 | Q | V | | | |
| 11+55 | 24.6476 | 40.77 | Q | V | | | |
| 12+ 0 | 24.9315 | 41.22 | Q | V | | | |
| 12+ 5 | 25.2193 | 41.79 | Q | V | | | |
| 12+10 | 25.5123 | 42.54 | Q | V | | | |
| 12+15 | 25.8113 | 43.43 | Q | V | | | |
| 12+20 | 26.1175 | 44.45 | Q | V | | | |
| 12+25 | 26.4322 | 45.70 | Q | V | | | |
| 12+30 | 26.7579 | 47.28 | Q | V | | | |
| 12+35 | 27.1007 | 49.78 | Q | V | | | |
| 12+40 | 27.4601 | 52.18 | Q | V | | | |
| 12+45 | 27.8298 | 53.69 | Q | V | | | |
| 12+50 | 28.2085 | 54.98 | Q | V | | | |
| 12+55 | 28.5953 | 56.16 | Q | V | | | |
| 13+ 0 | 28.9897 | 57.28 | Q | V | | | |
| 13+ 5 | 29.3917 | 58.37 | Q | V | | | |
| 13+10 | 29.8011 | 59.44 | Q | V | | | |
| 13+15 | 30.2177 | 60.49 | Q | V | | | |
| 13+20 | 30.6415 | 61.54 | Q | V | | | |
| 13+25 | 31.0725 | 62.59 | Q | V | | | |
| 13+30 | 31.5109 | 63.65 | Q | V | | | |
| 13+35 | 31.9567 | 64.73 | Q | V | | | |
| 13+40 | 32.4100 | 65.82 | Q | V | | | |
| 13+45 | 32.8711 | 66.94 | Q | V | | | |
| 13+50 | 33.3400 | 68.09 | Q | V | | | |
| 13+55 | 33.8171 | 69.27 | Q | V | | | |
| 14+ 0 | 34.3025 | 70.48 | Q | V | | | |
| 14+ 5 | 34.7968 | 71.78 | Q | V | | | |
| 14+10 | 35.3008 | 73.18 | Q | V | | | |
| 14+15 | 35.8151 | 74.67 | Q | V | | | |
| 14+20 | 36.3403 | 76.27 | Q | V | | | |
| 14+25 | 36.8775 | 77.99 | Q | V | | | |
| 14+30 | 37.4277 | 79.89 | Q | V | | | |
| 14+35 | 37.9937 | 82.19 | Q | V | | | |
| 14+40 | 38.5759 | 84.54 | Q | V | | | |
| 14+45 | 39.1731 | 86.71 | Q | V | | | |
| 14+50 | 39.7856 | 88.93 | Q | V | | | |
| 14+55 | 40.4141 | 91.26 | Q | V | | | |
| 15+ 0 | 41.0594 | 93.70 | Q | V | | | |
| 15+ 5 | 41.7229 | 96.33 | Q | V | | | |
| 15+10 | 42.4057 | 99.14 | Q | V | | | |
| 15+15 | 43.1097 | 102.22 | Q | V | | | |
| 15+20 | 43.8366 | 105.55 | Q | V | | | |
| 15+25 | 44.5873 | 108.99 | Q | V | | | |
| 15+30 | 45.3615 | 112.42 | Q | V | | | |
| 15+35 | 46.1612 | 116.12 | Q | V | | | |
| 15+40 | 46.9890 | 120.19 | Q | V | | | |
| 15+45 | 47.8517 | 125.27 | Q | V | | | |
| 15+50 | 48.7589 | 131.72 | Q | V | | | |
| 15+55 | 49.7221 | 139.85 | Q | V | | | |
| 16+ 0 | 50.7879 | 154.77 | Q | V | | | |
| 16+ 5 | 52.1329 | 195.29 | Q | V | | | |
| 16+10 | 53.8415 | 248.08 | Q | V | | | |
| 16+15 | 55.9001 | 298.91 | Q | V | | | |
| 16+20 | 58.3386 | 354.07 | Q | V | | | |

| | | | | | | |
|-------|----------|--------|--|--|---|---|
| 16+25 | 61.2855 | 427.89 | | | V | |
| 16+30 | 64.8387 | 515.92 | | | V | Q |
| 16+35 | 69.3702 | 657.98 | | | V | |
| 16+40 | 73.4991 | 599.52 | | | | Q |
| 16+45 | 76.3122 | 408.45 | | | Q | |
| 16+50 | 78.6186 | 334.89 | | | V | |
| 16+55 | 80.6322 | 292.37 | | | V | |
| 17+ 0 | 82.4400 | 262.50 | | | V | |
| 17+ 5 | 84.1077 | 242.15 | | | V | |
| 17+10 | 85.6302 | 221.06 | | | V | |
| 17+15 | 87.0314 | 203.45 | | | V | |
| 17+20 | 88.3342 | 189.17 | | | V | |
| 17+25 | 89.5446 | 175.75 | | | V | |
| 17+30 | 90.6810 | 165.01 | | | V | |
| 17+35 | 91.7319 | 152.59 | | | V | |
| 17+40 | 92.7184 | 143.23 | | | V | |
| 17+45 | 93.6435 | 134.33 | | | V | |
| 17+50 | 94.5086 | 125.61 | | | V | |
| 17+55 | 95.3223 | 118.15 | | | V | |
| 18+ 0 | 96.0789 | 109.86 | | | V | |
| 18+ 5 | 96.7942 | 103.85 | | | V | |
| 18+10 | 97.4665 | 97.62 | | | V | |
| 18+15 | 98.0950 | 91.25 | | | V | |
| 18+20 | 98.6786 | 84.74 | | | V | |
| 18+25 | 99.2121 | 77.47 | | | V | |
| 18+30 | 99.7106 | 72.38 | | | V | |
| 18+35 | 100.1801 | 68.18 | | | V | |
| 18+40 | 100.6222 | 64.19 | | | V | |
| 18+45 | 101.0428 | 61.08 | | | V | |
| 18+50 | 101.4467 | 58.64 | | | V | |
| 18+55 | 101.8349 | 56.36 | | | V | |
| 19+ 0 | 102.2042 | 53.62 | | | V | |
| 19+ 5 | 102.5598 | 51.64 | | | V | |
| 19+10 | 102.9056 | 50.21 | | | V | |
| 19+15 | 103.2440 | 49.13 | | | V | |
| 19+20 | 103.5760 | 48.21 | | | V | |
| 19+25 | 103.8989 | 46.89 | | | V | |
| 19+30 | 104.2115 | 45.39 | | | V | |
| 19+35 | 104.5094 | 43.26 | | | V | |
| 19+40 | 104.7975 | 41.83 | | | V | |
| 19+45 | 105.0779 | 40.71 | | | V | |
| 19+50 | 105.3494 | 39.42 | | | V | |
| 19+55 | 105.6117 | 38.09 | | | V | |
| 20+ 0 | 105.8674 | 37.12 | | | V | |
| 20+ 5 | 106.1150 | 35.96 | | | V | |
| 20+10 | 106.3553 | 34.89 | | | V | |
| 20+15 | 106.5908 | 34.19 | | | V | |
| 20+20 | 106.8219 | 33.56 | | | V | |
| 20+25 | 107.0491 | 32.99 | | | V | |
| 20+30 | 107.2725 | 32.44 | | | V | |
| 20+35 | 107.4924 | 31.92 | | | V | |
| 20+40 | 107.7089 | 31.43 | | | V | |
| 20+45 | 107.9221 | 30.96 | | | V | |
| 20+50 | 108.1322 | 30.51 | | | V | |
| 20+55 | 108.3393 | 30.07 | | | V | |
| 21+ 0 | 108.5435 | 29.66 | | | V | |
| 21+ 5 | 108.7450 | 29.26 | | | V | |
| 21+10 | 108.9439 | 28.88 | | | V | |
| 21+15 | 109.1402 | 28.50 | | | V | |
| 21+20 | 109.3340 | 28.14 | | | V | |
| 21+25 | 109.5254 | 27.79 | | | V | |
| 21+30 | 109.7145 | 27.45 | | | V | |
| 21+35 | 109.9013 | 27.13 | | | V | |
| 21+40 | 110.0860 | 26.82 | | | V | |
| 21+45 | 110.2686 | 26.51 | | | V | |
| 21+50 | 110.4492 | 26.22 | | | V | |
| 21+55 | 110.6278 | 25.94 | | | V | |
| 22+ 0 | 110.8046 | 25.66 | | | V | |
| 22+ 5 | 110.9795 | 25.40 | | | V | |
| 22+10 | 111.1526 | 25.14 | | | V | |
| 22+15 | 111.3240 | 24.89 | | | V | |
| 22+20 | 111.4938 | 24.65 | | | V | |
| 22+25 | 111.6619 | 24.41 | | | V | |

| | | | | |
|-------|----------|-------|---|---|
| 22+30 | 111.8284 | 24.18 | Q | V |
| 22+35 | 111.9933 | 23.95 | Q | V |
| 22+40 | 112.1567 | 23.73 | Q | V |
| 22+45 | 112.3187 | 23.52 | Q | V |
| 22+50 | 112.4792 | 23.31 | Q | V |
| 22+55 | 112.6383 | 23.10 | Q | V |
| 23+ 0 | 112.7960 | 22.90 | Q | V |
| 23+ 5 | 112.9524 | 22.70 | Q | V |
| 23+10 | 113.1074 | 22.51 | Q | V |
| 23+15 | 113.2612 | 22.33 | Q | V |
| 23+20 | 113.4137 | 22.14 | Q | V |
| 23+25 | 113.5649 | 21.96 | Q | V |
| 23+30 | 113.7150 | 21.79 | Q | V |
| 23+35 | 113.8639 | 21.62 | Q | V |
| 23+40 | 114.0116 | 21.45 | Q | V |
| 23+45 | 114.1581 | 21.28 | Q | V |
| 23+50 | 114.3036 | 21.12 | Q | V |
| 23+55 | 114.4480 | 20.96 | Q | V |
| 24+ 0 | 114.5913 | 20.81 | Q | V |
| 24+ 5 | 114.7323 | 20.48 | Q | V |
| 24+10 | 114.8693 | 19.89 | Q | V |
| 24+15 | 115.0010 | 19.13 | Q | V |
| 24+20 | 115.1262 | 18.18 | Q | V |
| 24+25 | 115.2427 | 16.91 | Q | V |
| 24+30 | 115.3471 | 15.17 | Q | V |
| 24+35 | 115.4299 | 12.02 | Q | V |
| 24+40 | 115.4926 | 9.09 | Q | V |
| 24+45 | 115.5452 | 7.64 | Q | V |
| 24+50 | 115.5903 | 6.55 | Q | V |
| 24+55 | 115.6294 | 5.68 | Q | V |
| 25+ 0 | 115.6637 | 4.97 | Q | V |
| 25+ 5 | 115.6935 | 4.33 | Q | V |
| 25+10 | 115.7196 | 3.79 | Q | V |
| 25+15 | 115.7425 | 3.32 | Q | V |
| 25+20 | 115.7625 | 2.90 | Q | V |
| 25+25 | 115.7799 | 2.53 | Q | V |
| 25+30 | 115.7951 | 2.20 | Q | V |
| 25+35 | 115.8082 | 1.91 | Q | V |
| 25+40 | 115.8196 | 1.65 | Q | V |
| 25+45 | 115.8293 | 1.41 | Q | V |
| 25+50 | 115.8376 | 1.21 | Q | V |
| 25+55 | 115.8447 | 1.03 | Q | V |
| 26+ 0 | 115.8508 | 0.88 | Q | V |
| 26+ 5 | 115.8559 | 0.75 | Q | V |
| 26+10 | 115.8602 | 0.63 | Q | V |
| 26+15 | 115.8639 | 0.53 | Q | V |
| 26+20 | 115.8670 | 0.45 | Q | V |
| 26+25 | 115.8697 | 0.40 | Q | V |
| 26+30 | 115.8722 | 0.36 | Q | V |
| 26+35 | 115.8745 | 0.33 | Q | V |
| 26+40 | 115.8765 | 0.29 | Q | V |
| 26+45 | 115.8783 | 0.26 | Q | V |
| 26+50 | 115.8799 | 0.23 | Q | V |
| 26+55 | 115.8813 | 0.20 | Q | V |
| 27+ 0 | 115.8826 | 0.18 | Q | V |
| 27+ 5 | 115.8837 | 0.17 | Q | V |
| 27+10 | 115.8847 | 0.15 | Q | V |
| 27+15 | 115.8856 | 0.13 | Q | V |
| 27+20 | 115.8863 | 0.10 | Q | V |
| 27+25 | 115.8869 | 0.08 | Q | V |
| 27+30 | 115.8873 | 0.06 | Q | V |
| 27+35 | 115.8876 | 0.05 | Q | V |
| 27+40 | 115.8878 | 0.03 | Q | V |
| 27+45 | 115.8880 | 0.02 | Q | V |
| 27+50 | 115.8881 | 0.01 | Q | V |
| 27+55 | 115.8882 | 0.01 | Q | V |
| 28+ 0 | 115.8882 | 0.00 | Q | V |

Creek "E"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CVEXWE.roc

WATERSHED E
EXISTING CONDITIONS - CREEK E
100-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 817.000(Ft.)
Bottom (of initial area) elevation = 765.000(Ft.)
Difference in elevation = 52.000(Ft.)
Slope = 0.17333 s(%)= 17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.815 min.
Rainfall intensity = 4.204(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.857
Subarea runoff = 1.081(CFS)
Total initial stream area = 0.300(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 765.000(Ft.)
Downstream point elevation = 645.000(Ft.)
Channel length thru subarea = 630.000(Ft.)
Channel base width = 10.000(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 = 6.606(CFS)
Manning's 'N' = 0.035
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 6.606(CFS)
Depth of flow = 0.135(Ft.), Average velocity = 4.770(Ft/s)
Channel flow top width = 10.539(Ft.)
Flow Velocity = 4.77(Ft/s)
Travel time = 2.20 min.
Time of concentration = 12.02 min.

Critical depth = 0.234(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.300
 Decimal fraction soil group D = 0.700
 SCS curve number for soil(AMC 2) = 82.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
 Max Catchment Loss (Fm) = 0.215(In/Hr)
 Rainfall intensity = 3.744(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.849
 Subarea runoff = 10.991(CFS) for 3.500(Ac.)
 Total runoff = 12.072(CFS) Total area = 3.80(Ac.)
 Area averaged Fm value = 0.214(In/Hr)
 Depth of flow = 0.193(Ft.), Average velocity = 6.012(Ft/s)
 Critical depth = 0.348(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 645.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 141.000(Ft.)
 Channel base width = 10.000(Ft.)
 Slope or 'Z' of left channel bank = 2.000
 Slope or 'Z' of right channel bank = 2.000
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 12.072(CFS)
 Depth of flow = 0.289(Ft.), Average velocity = 3.955(Ft/s)
 Channel flow top width = 11.154(Ft.)
 Flow Velocity = 3.96(Ft/s)
 Travel time = 0.59 min.
 Time of concentration = 12.61 min.
 Critical depth = 0.348(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 3.800(Ac.)
 Runoff from this stream = 12.072(CFS)
 Time of concentration = 12.61 min.
 Rainfall intensity = 3.642(In/Hr)
 Area averaged loss rate (Fm) = 0.2138(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

++++++
 Process from Point/Station 101.000 to Point/Station 104.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 817.000(Ft.)
 Bottom (of initial area) elevation = 699.000(Ft.)
 Difference in elevation = 118.000(Ft.)
 Slope = 0.39333 s(%)= 39.33
 TC = k(0.706)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 8.331 min.
 Rainfall intensity = 4.618(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.861
 Subarea runoff = 3.579(CFS)
 Total initial stream area = 0.900(Ac.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 699.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 468.000(Ft.)
 Channel base width = 10.000(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 = 10.801(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 10.801(CFS)
 Depth of flow = 0.203(Ft.), Average velocity = 5.124(Ft/s)
 Channel flow top width = 10.810(Ft.)
 Flow Velocity = 5.12(Ft/s)
 Travel time = 1.52 min.
 Time of concentration = 9.85 min.
 Critical depth = 0.324(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.100
 Decimal fraction soil group D = 0.900
 SCS curve number for soil(AMC 2) = 83.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.205(In/Hr)
 Max Catchment Loss (Fm) = 0.205(In/Hr)
 Rainfall intensity = 4.195(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.856
 Subarea runoff = 14.379(CFS) for 4.100(Ac.)
 Total runoff = 17.957(CFS) Total area = 5.00(Ac.)
 Area averaged Fm value = 0.204(In/Hr)
 Depth of flow = 0.274(Ft.), Average velocity = 6.207(Ft/s)
 Critical depth = 0.453(Ft.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 5.000(Ac.)
 Runoff from this stream = 17.957(CFS)
 Time of concentration = 9.85 min.
 Rainfall intensity = 4.195(In/Hr)
 Area averaged loss rate (Fm) = 0.2041(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|-------------|----------------------------|
| 1 | 3.80 | 12.072 | 12.61 | 0.214 | 3.642 |
| 2 | 5.00 | 17.957 | 9.85 | 0.204 | 4.195 |
| Qmax(1) = | | | | | |
| | | 1.000 * | 1.000 * | 12.072) + | |
| | | 0.861 * | 1.000 * | 17.957) + = | 27.541 |
| Qmax(2) = | | | | | |
| | | 1.161 * | 0.781 * | 12.072) + | |
| | | 1.000 * | 1.000 * | 17.957) + = | 28.912 |

Total of 2 streams to confluence:

Flow rates before confluence point:
 12.072 17.957
 Maximum flow rates at confluence using above data:
 27.541 28.912
 Area of streams before confluence:
 3.800 5.000
 Effective area values after confluence:
 8.800 7.969
 Results of confluence:
 Total flow rate = 28.912(CFS)
 Time of concentration = 9.853 min.
 Effective stream area after confluence = 7.969(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.208(In/Hr)
 Study area total (this main stream) = 8.80(Ac.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 638.000(Ft.)
 Downstream point elevation = 609.000(Ft.)
 Channel length thru subarea = 663.000(Ft.)
 Channel base width = 30.000(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 = 40.636(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 40.636(CFS)
 Depth of flow = 0.320(Ft.), Average velocity = 4.016(Ft/s)
 Channel flow top width = 33.202(Ft.)
 Flow Velocity = 4.02(Ft/s)
 Travel time = 2.75 min.
 Time of concentration = 12.60 min.
 Critical depth = 0.375(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 3.643(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.846
 Subarea runoff = 23.361(CFS) for 9.000(Ac.)
 Total runoff = 52.273(CFS) Total area = 16.97(Ac.)
 Area averaged Fm value = 0.220(In/Hr)
 Depth of flow = 0.372(Ft.), Average velocity = 4.414(Ft/s)
 Critical depth = 0.445(Ft.)
 End of computations, total study area = 17.80 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
 Area averaged SCS curve number (AMC 2) = 82.1

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CVEXWE25.roc

WATERSHED E
EXISTING CONDITIONS - CREEK E
25-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 817.000(Ft.)
Bottom (of initial area) elevation = 765.000(Ft.)
Difference in elevation = 52.000(Ft.)
Slope = 0.17333 s(%)= 17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.815 min.
Rainfall intensity = 3.293(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.845
Subarea runoff = 0.835(CFS)
Total initial stream area = 0.300(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 765.000(Ft.)
Downstream point elevation = 645.000(Ft.)
Channel length thru subarea = 630.000(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 5.067(CFS)
Manning's 'N' = 0.035
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 5.067(CFS)
Depth of flow = 0.115(Ft.), Average velocity = 4.304(Ft/s)
Channel flow top width = 10.460(Ft.)
Flow Velocity = 4.30(Ft/s)
Travel time = 2.44 min.
Time of concentration = 12.25 min.

Critical depth = 0.197(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.300
 Decimal fraction soil group D = 0.700
 SCS curve number for soil(AMC 2) = 82.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
 Max Catchment Loss (Fm) = 0.215(In/Hr)
 Rainfall intensity = 2.904(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.834
 Subarea runoff = 8.366(CFS) for 3.500(Ac.)
 Total runoff = 9.201(CFS) Total area = 3.80(Ac.)
 Area averaged Fm value = 0.214(In/Hr)
 Depth of flow = 0.164(Ft.), Average velocity = 5.419(Ft/s)
 Critical depth = 0.293(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 645.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 141.000(Ft.)
 Channel base width = 10.000(Ft.)
 Slope or 'Z' of left channel bank = 2.000
 Slope or 'Z' of right channel bank = 2.000
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 9.201(CFS)
 Depth of flow = 0.246(Ft.), Average velocity = 3.573(Ft/s)
 Channel flow top width = 10.982(Ft.)
 Flow Velocity = 3.57(Ft/s)
 Travel time = 0.66 min.
 Time of concentration = 12.91 min.
 Critical depth = 0.293(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 3.800(Ac.)
 Runoff from this stream = 9.201(CFS)
 Time of concentration = 12.91 min.
 Rainfall intensity = 2.820(In/Hr)
 Area averaged loss rate (Fm) = 0.2138(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

++++++
 Process from Point/Station 101.000 to Point/Station 104.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 817.000(Ft.)
 Bottom (of initial area) elevation = 699.000(Ft.)
 Difference in elevation = 118.000(Ft.)
 Slope = 0.39333 s(%)= 39.33
 TC = k(0.706)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 8.331 min.
 Rainfall intensity = 3.613(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
 Subarea runoff = 2.765(CFS)
 Total initial stream area = 0.900(Ac.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 699.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 468.000(Ft.)
 Channel base width = 10.000(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 = 8.277(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 8.277(CFS)
 Depth of flow = 0.173(Ft.), Average velocity = 4.629(Ft/s)
 Channel flow top width = 10.691(Ft.)
 Flow Velocity = 4.63(Ft/s)
 Travel time = 1.68 min.
 Time of concentration = 10.02 min.
 Critical depth = 0.273(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.100
 Decimal fraction soil group D = 0.900
 SCS curve number for soil(AMC 2) = 83.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.205(In/Hr)
 Max Catchment Loss (Fm) = 0.205(In/Hr)
 Rainfall intensity = 3.255(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.844
 Subarea runoff = 10.966(CFS) for 4.100(Ac.)
 Total runoff = 13.731(CFS) Total area = 5.00(Ac.)
 Area averaged Fm value = 0.204(In/Hr)
 Depth of flow = 0.234(Ft.), Average velocity = 5.612(Ft/s)
 Critical depth = 0.379(Ft.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 5.000(Ac.)
 Runoff from this stream = 13.731(CFS)
 Time of concentration = 10.02 min.
 Rainfall intensity = 3.255(In/Hr)
 Area averaged loss rate (Fm) = 0.2041(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|-------------|----------------------------|
| 1 | 3.80 | 9.201 | 12.91 | 0.214 | 2.820 |
| 2 | 5.00 | 13.731 | 10.02 | 0.204 | 3.255 |
| Qmax(1) = | | | | | |
| | | 1.000 * | 1.000 * | 9.201) + | |
| | | 0.857 * | 1.000 * | 13.731) + = | 20.971 |
| Qmax(2) = | | | | | |
| | | 1.167 * | 0.776 * | 9.201) + | |
| | | 1.000 * | 1.000 * | 13.731) + = | 22.062 |

Total of 2 streams to confluence:

Flow rates before confluence point:
 9.201 13.731
 Maximum flow rates at confluence using above data:
 20.971 22.062
 Area of streams before confluence:
 3.800 5.000
 Effective area values after confluence:
 8.800 7.948
 Results of confluence:
 Total flow rate = 22.062(CFS)
 Time of concentration = 10.016 min.
 Effective stream area after confluence = 7.948(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.208(In/Hr)
 Study area total (this main stream) = 8.80(Ac.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 638.000(Ft.)
 Downstream point elevation = 609.000(Ft.)
 Channel length thru subarea = 663.000(Ft.)
 Channel base width = 30.000(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 = 30.744(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 30.744(CFS)
 Depth of flow = 0.271(Ft.), Average velocity = 3.614(Ft/s)
 Channel flow top width = 32.713(Ft.)
 Flow Velocity = 3.61(Ft/s)
 Travel time = 3.06 min.
 Time of concentration = 13.07 min.
 Critical depth = 0.313(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 2.800(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.829
 Subarea runoff = 17.289(CFS) for 9.000(Ac.)
 Total runoff = 39.351(CFS) Total area = 16.95(Ac.)
 Area averaged Fm value = 0.220(In/Hr)
 Depth of flow = 0.314(Ft.), Average velocity = 3.968(Ft/s)
 Critical depth = 0.367(Ft.)
 End of computations, total study area = 17.80 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
 Area averaged SCS curve number (AMC 2) = 82.1

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/03/15 File Name: CVEXWE10.roc

WATERSHED E
EXISTING CONDITIONS - CREEK F
10-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 10.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
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
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.200(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 817.000(Ft.)
Bottom (of initial area) elevation = 765.000(Ft.)
Difference in elevation = 52.000(Ft.)
Slope = 0.17333 s(%)= 17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.815 min.
Rainfall intensity = 2.758(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff = 0.691(CFS)
Total initial stream area = 0.300(Ac.)

Process from Point/Station 102.000 to Point/Station 103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 765.000(Ft.)
Downstream point elevation = 645.000(Ft.)
Channel length thru subarea = 630.000(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 2.000
Slope or 'Z' of right channel bank = 2.000
Estimated mean flow rate at midpoint of channel = 4.139(CFS)
Manning's 'N' = 0.035
Maximum depth of channel = 20.000(Ft.)
Flow(q) thru subarea = 4.139(CFS)
Depth of flow = 0.102(Ft.), Average velocity = 3.979(Ft/s)
Channel flow top width = 10.408(Ft.)
Flow Velocity = 3.98(Ft/s)
Travel time = 2.64 min.
Time of concentration = 12.45 min.

Critical depth = 0.172(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.300
 Decimal fraction soil group D = 0.700
 SCS curve number for soil(AMC 2) = 82.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.215(In/Hr)
 Max Catchment Loss (Fm) = 0.215(In/Hr)
 Rainfall intensity = 2.406(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.820
 Subarea runoff = 6.808(CFS) for 3.500(Ac.)
 Total runoff = 7.499(CFS) Total area = 3.80(Ac.)
 Area averaged Fm value = 0.214(In/Hr)
 Depth of flow = 0.145(Ft.), Average velocity = 5.009(Ft/s)
 Critical depth = 0.254(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 645.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 141.000(Ft.)
 Channel base width = 10.000(Ft.)
 Slope or 'Z' of left channel bank = 2.000
 Slope or 'Z' of right channel bank = 2.000
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 7.499(CFS)
 Depth of flow = 0.217(Ft.), Average velocity = 3.307(Ft/s)
 Channel flow top width = 10.869(Ft.)
 Flow Velocity = 3.31(Ft/s)
 Travel time = 0.71 min.
 Time of concentration = 13.16 min.
 Critical depth = 0.254(Ft.)

++++++
 Process from Point/Station 103.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 3.800(Ac.)
 Runoff from this stream = 7.499(CFS)
 Time of concentration = 13.16 min.
 Rainfall intensity = 2.331(In/Hr)
 Area averaged loss rate (Fm) = 0.2138(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

++++++
 Process from Point/Station 101.000 to Point/Station 104.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
 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
 SCS curve number for soil(AMC 2) = 84.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 817.000(Ft.)
 Bottom (of initial area) elevation = 699.000(Ft.)
 Difference in elevation = 118.000(Ft.)
 Slope = 0.39333 s(%)= 39.33
 TC = k(0.706)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 8.331 min.
 Rainfall intensity = 3.030(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.841
 Subarea runoff = 2.292(CFS)
 Total initial stream area = 0.900(Ac.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 699.000(Ft.)
 Downstream point elevation = 638.000(Ft.)
 Channel length thru subarea = 468.000(Ft.)
 Channel base width = 10.000(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 = 6.802(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 6.802(CFS)
 Depth of flow = 0.154(Ft.), Average velocity = 4.293(Ft/s)
 Channel flow top width = 10.615(Ft.)
 Flow Velocity = 4.29(Ft/s)
 Travel time = 1.82 min.
 Time of concentration = 10.15 min.
 Critical depth = 0.238(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.100
 Decimal fraction soil group D = 0.900
 SCS curve number for soil(AMC 2) = 83.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.205(In/Hr)
 Max Catchment Loss (Fm) = 0.205(In/Hr)
 Rainfall intensity = 2.706(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.832
 Subarea runoff = 8.966(CFS) for 4.100(Ac.)
 Total runoff = 11.259(CFS) Total area = 5.00(Ac.)
 Area averaged Fm value = 0.204(In/Hr)
 Depth of flow = 0.208(Ft.), Average velocity = 5.206(Ft/s)
 Critical depth = 0.332(Ft.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 5.000(Ac.)
 Runoff from this stream = 11.259(CFS)
 Time of concentration = 10.15 min.
 Rainfall intensity = 2.706(In/Hr)
 Area averaged loss rate (Fm) = 0.2041(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|-------------|------------|----------------------------|
| 1 | 3.80 | 7.499 | 13.16 | 0.214 | 2.331 |
| 2 | 5.00 | 11.259 | 10.15 | 0.204 | 2.706 |
| Qmax(1) = | | | | | |
| | 1.000 * | 1.000 * | 7.499) + | | |
| | 0.850 * | 1.000 * | 11.259) + = | | 17.070 |
| Qmax(2) = | | | | | |
| | 1.177 * | 0.771 * | 7.499) + | | |
| | 1.000 * | 1.000 * | 11.259) + = | | 18.063 |

Total of 2 streams to confluence:

Flow rates before confluence point:
 7.499 11.259
 Maximum flow rates at confluence using above data:
 17.070 18.063
 Area of streams before confluence:
 3.800 5.000
 Effective area values after confluence:
 8.800 7.929
 Results of confluence:
 Total flow rate = 18.063(CFS)
 Time of concentration = 10.148 min.
 Effective stream area after confluence = 7.929(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.208(In/Hr)
 Study area total (this main stream) = 8.80(Ac.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 638.000(Ft.)
 Downstream point elevation = 609.000(Ft.)
 Channel length thru subarea = 663.000(Ft.)
 Channel base width = 30.000(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 = 24.924(CFS)
 Manning's 'N' = 0.035
 Maximum depth of channel = 20.000(Ft.)
 Flow(q) thru subarea = 24.924(CFS)
 Depth of flow = 0.239(Ft.), Average velocity = 3.336(Ft/s)
 Channel flow top width = 32.395(Ft.)
 Flow Velocity = 3.34(Ft/s)
 Travel time = 3.31 min.
 Time of concentration = 13.46 min.
 Critical depth = 0.273(Ft.)
 Adding area flow to channel
 UNDEVELOPED (average cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.600
 Decimal fraction soil group D = 0.400
 SCS curve number for soil(AMC 2) = 81.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.230(In/Hr)
 Max Catchment Loss (Fm) = 0.230(In/Hr)
 Rainfall intensity = 2.302(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.814
 Subarea runoff = 13.657(CFS) for 9.000(Ac.)
 Total runoff = 31.719(CFS) Total area = 16.93(Ac.)
 Area averaged Fm value = 0.220(In/Hr)
 Depth of flow = 0.276(Ft.), Average velocity = 3.657(Ft/s)
 Critical depth = 0.320(Ft.)
 End of computations, total study area = 17.80 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
 Area averaged SCS curve number (AMC 2) = 82.1

Creek "B" (Upstream of Site)
Existing Rational Method Calculations
10, 25 & 100-Year Storms

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/30/15 File Name: EXBCREEK.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK B
100-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 240.000 to Point/Station 240.000
*** USER DEFINED FLOW INFORMATION AT A POINT ***

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2) = 76.22
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.231(In/Hr)
Max Catchment Loss (Fm) = 0.231(In/Hr)
Rainfall intensity = 2.697(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 21.30 min. Rain intensity = 2.70(In/Hr)
Total area = 181.14(Ac.) Total runoff = 402.16(CFS)

Process from Point/Station 240.000 to Point/Station 201.000
*** IRREGULAR CHANNEL FLOW TRAVEL TIME ***

Estimated mean flow rate at midpoint of channel = 414.658(CFS)
Depth of flow = 3.212(Ft.), Average velocity = 11.300(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 414.658(CFS)
' ' flow top width = 17.848(Ft.)
' ' velocity= 11.300(Ft/s)
' ' area = 36.694(Sq.Ft)
' ' Froude number = 1.389

Upstream point elevation = 695.000(Ft.)
Downstream point elevation = 654.000(Ft.)
Flow length = 665.000(Ft.)
Travel time = 0.98 min.
Time of concentration = 22.28 min.

Depth of flow = 3.212(Ft.)
 Average velocity = 11.300(Ft/s)
 Total irregular channel flow = 414.658(CFS)
 Irregular channel normal depth above invert elev. = 3.212(Ft.)
 Average velocity of channel(s) = 11.300(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.800
 SCS curve number for soil(AMC 2) = 78.80
 Pervious ratio(A_p) = 1.0000 Max loss rate(F_p)= 0.210(In/Hr)
 Max Catchment Loss (F_m) = 0.210(In/Hr)
 Rainfall intensity = 2.628(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)($Q=KCIA$) is $C = 0.821$
 Subarea runoff = 24.893(CFS) for 16.700(Ac.)
 Total runoff = 427.056(CFS) Total area = 197.84(Ac.)
 Area averaged F_m value = 0.230(In/Hr)
 Depth of flow = 3.257(Ft.), Average velocity = 11.387(Ft/s)
 End of computations, total study area = 197.84 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
 Area averaged SCS curve number (AMC 2) = 76.4

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/30/15 File Name: EXBCREEK25.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK B
25-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 240.000 to Point/Station 240.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2) = 76.22
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.231(In/Hr)
Max Catchment Loss (Fm) = 0.231(In/Hr)
Rainfall intensity = 2.076(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 22.17 min. Rain intensity = 2.08(In/Hr)
Total area = 181.14(Ac.) Total runoff = 301.00(CFS)

Process from Point/Station 240.000 to Point/Station 201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 310.126(CFS)
Depth of flow = 2.795(Ft.), Average velocity = 10.476(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 310.126(CFS)
' ' flow top width = 16.181(Ft.)
' ' velocity= 10.476(Ft/s)
' ' area = 29.602(Sq.Ft)
' ' Froude number = 1.365

Upstream point elevation = 695.000(Ft.)
Downstream point elevation = 654.000(Ft.)
Flow length = 665.000(Ft.)
Travel time = 1.06 min.
Time of concentration = 23.23 min.

Depth of flow = 2.795(Ft.)
 Average velocity = 10.476(Ft/s)
 Total irregular channel flow = 310.126(CFS)
 Irregular channel normal depth above invert elev. = 2.795(Ft.)
 Average velocity of channel(s) = 10.476(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.800
 SCS curve number for soil(AMC 2) = 78.80
 Pervious ratio(A_p) = 1.0000 Max loss rate(F_p)= 0.210(In/Hr)
 Max Catchment Loss (F_m) = 0.210(In/Hr)
 Rainfall intensity = 2.022(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)($Q=KCIA$) is $C = 0.798$
 Subarea runoff = 18.185(CFS) for 16.700(Ac.)
 Total runoff = 319.180(CFS) Total area = 197.84(Ac.)
 Area averaged F_m value = 0.230(In/Hr)
 Depth of flow = 2.834(Ft.), Average velocity = 10.556(Ft/s)
 End of computations, total study area = 197.84 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
 Area averaged SCS curve number (AMC 2) = 76.4

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/30/15 File Name: EXBCREEK10.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK B
10-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 10.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 240.000 to Point/Station 240.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2) = 76.22
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.231(In/Hr)
Max Catchment Loss (Fm) = 0.231(In/Hr)
Rainfall intensity = 1.698(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 22.89 min. Rain intensity = 1.70(In/Hr)
Total area = 181.14(Ac.) Total runoff = 239.22(CFS)

Process from Point/Station 240.000 to Point/Station 201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 246.257(CFS)
Depth of flow = 2.498(Ft.), Average velocity = 9.859(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 246.257(CFS)
' ' flow top width = 14.994(Ft.)
' ' velocity= 9.859(Ft/s)
' ' area = 24.977(Sq.Ft)
' ' Froude number = 1.346

Upstream point elevation = 695.000(Ft.)
Downstream point elevation = 654.000(Ft.)
Flow length = 665.000(Ft.)
Travel time = 1.12 min.
Time of concentration = 24.01 min.

Depth of flow = 2.498(Ft.)
 Average velocity = 9.859(Ft/s)
 Total irregular channel flow = 246.257(CFS)
 Irregular channel normal depth above invert elev. = 2.498(Ft.)
 Average velocity of channel(s) = 9.859(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.800
 SCS curve number for soil(AMC 2) = 78.80
 Pervious ratio(A_p) = 1.0000 Max loss rate(F_p)= 0.210(In/Hr)
 Max Catchment Loss (F_m) = 0.210(In/Hr)
 Rainfall intensity = 1.652(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)($Q=KCIA$) is $C = 0.775$
 Subarea runoff = 14.006(CFS) for 16.700(Ac.)
 Total runoff = 253.228(CFS) Total area = 197.84(Ac.)
 Area averaged F_m value = 0.230(In/Hr)
 Depth of flow = 2.533(Ft.), Average velocity = 9.932(Ft/s)
 End of computations, total study area = 197.84 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
 Area averaged SCS curve number (AMC 2) = 76.4

Creek "F"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 07/31/15 File Name: exfcreek.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK F
100-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 501.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2) = 75.54
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 2.604(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 22.65 min. Rain intensity = 2.60(In/Hr)
Total area = 1366.51(Ac.) Total runoff = 3401.84(CFS)

Process from Point/Station 501.000 to Point/Station 603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 8.958(Ft.), Average velocity = 16.573(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 3401.833(CFS)
' ' flow top width = 40.831(Ft.)
' ' velocity = 16.573(Ft/s)
' ' area = 205.267(Sq.Ft)
' ' Froude number = 1.303

Upstream point elevation = 610.000(Ft.)
Downstream point elevation = 603.000(Ft.)
Flow length = 170.000(Ft.)
Travel time = 0.17 min.
Time of concentration = 22.82 min.
Depth of flow = 8.958(Ft.)

Average velocity = 16.573(Ft/s)
 Total irregular channel flow = 3401.836(CFS)
 Irregular channel normal depth above invert elev. = 8.958(Ft.)
 Average velocity of channel(s) = 16.573(Ft/s)

 Process from Point/Station 501.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1366.510(Ac.)
 Runoff from this stream = 3401.836(CFS)
 Time of concentration = 22.82 min.
 Rainfall intensity = 2.593(In/Hr)
 Area averaged loss rate (Fm) = 0.2325(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 601.000 to Point/Station 602.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 61.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.300(In/Hr)
 Max Catchment Loss (Fm) = 0.300(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 650.000(Ft.)
 Bottom (of initial area) elevation = 606.000(Ft.)
 Difference in elevation = 44.000(Ft.)
 Slope = 0.14667 s(%)= 14.67
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.440 min.
 Rainfall intensity = 3.511(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.823
 Subarea runoff = 1.300(CFS)
 Total initial stream area = 0.450(Ac.)

 Process from Point/Station 602.000 to Point/Station 603.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 3.497(CFS)
 Depth of flow = 0.335(Ft.), Average velocity = 1.841(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 50.00 |
| 2 | 100.00 | 0.00 |
| 3 | 105.00 | 0.00 |
| 4 | 205.00 | 50.00 |

 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 3.497(CFS)
 ' ' flow top width = 6.340(Ft.)
 ' ' velocity= 1.841(Ft/s)
 ' ' area = 1.900(Sq.Ft)
 ' ' Froude number = 0.592

Upstream point elevation = 606.000(Ft.)
 Downstream point elevation = 603.000(Ft.)
 Flow length = 151.800(Ft.)
 Travel time = 1.37 min.
 Time of concentration = 14.81 min.
 Depth of flow = 0.335(Ft.)

Average velocity = 1.841(Ft/s)
 Total irregular channel flow = 3.497(CFS)
 Irregular channel normal depth above invert elev. = 0.335(Ft.)
 Average velocity of channel(s) = 1.841(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.430
 Decimal fraction soil group C = 0.550
 Decimal fraction soil group D = 0.020
 SCS curve number for soil(AMC 2) = 68.53
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.271(In/Hr)
 Max Catchment Loss (Fm) = 0.271(In/Hr)
 Rainfall intensity = 3.321(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.825
 Subarea runoff = 4.315(CFS) for 1.600(Ac.)
 Total runoff = 5.615(CFS) Total area = 2.05(Ac.)
 Area averaged Fm value = 0.277(In/Hr)
 Depth of flow = 0.441(Ft.), Average velocity = 2.162(Ft/s)

 Process from Point/Station 602.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 2.050(Ac.)
 Runoff from this stream = 5.615(CFS)
 Time of concentration = 14.81 min.
 Rainfall intensity = 3.321(In/Hr)
 Area averaged loss rate (Fm) = 0.2770(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|------------|----------------------------|
| 1 | 1366.51 | 3401.836 | 22.82 | 0.232 | 2.593 |
| 2 | 2.05 | 5.615 | 14.81 | 0.277 | 3.321 |

Qmax(1) =
 1.000 * 1.000 * 3401.836) +
 0.761 * 1.000 * 5.615) + = 3406.108
 Qmax(2) =
 1.308 * 0.649 * 3401.836) +
 1.000 * 1.000 * 5.615) + = 2895.627

Total of 2 streams to confluence:
 Flow rates before confluence point:
 3401.836 5.615
 Maximum flow rates at confluence using above data:
 3406.108 2895.627
 Area of streams before confluence:
 1366.510 2.050
 Effective area values after confluence:
 1368.560 889.287
 Results of confluence:
 Total flow rate = 3406.108(CFS)
 Time of concentration = 22.817 min.
 Effective stream area after confluence = 1368.560(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.233(In/Hr)
 Study area total (this main stream) = 1368.56(Ac.)

 Process from Point/Station 603.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 9.799(Ft.), Average velocity = 14.132(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 3406.108(CFS)
 ' ' flow top width = 44.194(Ft.)
 ' ' velocity= 14.132(Ft/s)
 ' ' area = 241.017(Sq.Ft)
 ' ' Froude number = 1.066

Upstream point elevation = 603.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2528.000(Ft.)
 Travel time = 2.98 min.
 Time of concentration = 25.80 min.
 Depth of flow = 9.799(Ft.)
 Average velocity = 14.132(Ft/s)
 Total irregular channel flow = 3406.108(CFS)
 Irregular channel normal depth above invert elev. = 9.799(Ft.)
 Average velocity of channel(s) = 14.132(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1368.560(Ac.)
 Runoff from this stream = 3406.108(CFS)
 Time of concentration = 25.80 min.
 Rainfall intensity = 2.416(In/Hr)
 Area averaged loss rate (Fm) = 0.2326(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 604.000 to Point/Station 605.000
 **** INITIAL AREA EVALUATION ****

 UNDEVELOPED (dense cover) subarea
 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
 SCS curve number for soil(AMC 2) = 80.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 304.500(Ft.)
 Top (of initial area) elevation = 692.000(Ft.)
 Bottom (of initial area) elevation = 641.000(Ft.)
 Difference in elevation = 51.000(Ft.)
 Slope = 0.16749 s(%)= 16.75
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.166 min.
 Rainfall intensity = 3.553(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.849
 Subarea runoff = 2.444(CFS)
 Total initial stream area = 0.810(Ac.)

 Process from Point/Station 605.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 38.496(CFS)
 Depth of flow = 1.029(Ft.), Average velocity = 5.301(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 38.496(CFS)
 ' ' flow top width = 9.116(Ft.)
 ' ' velocity = 5.301(Ft/s)
 ' ' area = 7.263(Sq.Ft)
 ' ' Froude number = 1.047

Upstream point elevation = 641.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2296.600(Ft.)
 Travel time = 7.22 min.
 Time of concentration = 20.39 min.
 Depth of flow = 1.029(Ft.)
 Average velocity = 5.301(Ft/s)
 Total irregular channel flow = 38.496(CFS)
 Irregular channel normal depth above invert elev. = 1.029(Ft.)
 Average velocity of channel(s) = 5.301(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.510
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.290
 SCS curve number for soil(AMC 2) = 69.11
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.261(In/Hr)
 Max Catchment Loss (Fm) = 0.261(In/Hr)
 Rainfall intensity = 2.765(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.816
 Subarea runoff = 72.024(CFS) for 32.210(Ac.)
 Total runoff = 74.468(CFS) Total area = 33.02(Ac.)
 Area averaged Fm value = 0.260(In/Hr)
 Depth of flow = 1.465(Ft.), Average velocity = 6.409(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 33.020(Ac.)
 Runoff from this stream = 74.468(CFS)
 Time of concentration = 20.39 min.
 Rainfall intensity = 2.765(In/Hr)
 Area averaged loss rate (Fm) = 0.2595(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|-----------|------------|----------------------------|
| 1 | 1368.56 | 3406.108 | 25.80 | 0.233 | 2.416 |
| 2 | 33.02 | 74.468 | 20.39 | 0.260 | 2.765 |
| Qmax(1) = | | | | | |
| | 1.000 * | 1.000 * | 3406.108) | + | |
| | 0.861 * | 1.000 * | 74.468) | + | 3470.207 |
| Qmax(2) = | | | | | |
| | 1.160 * | 0.790 * | 3406.108) | + | |
| | 1.000 * | 1.000 * | 74.468) | + | 3196.243 |

Total of 2 streams to confluence:
 Flow rates before confluence point:
 3406.108 74.468
 Maximum flow rates at confluence using above data:
 3470.207 3196.243

Area of streams before confluence:
1368.560 33.020
Effective area values after confluence:
1401.580 1114.528
Results of confluence:
Total flow rate = 3470.207(CFS)
Time of concentration = 25.798 min.
Effective stream area after confluence = 1401.580(Ac.)
Study area average Pervious fraction(A_p) = 1.000
Study area average soil loss rate(F_m) = 0.233(In/Hr)
Study area total (this main stream) = 1401.58(Ac.)
End of computations, total study area = 1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 75.4

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/02/15 File Name: EXFCREEK25.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK F
25-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 501.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2) = 75.54
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 2.001(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 23.66 min. Rain intensity = 2.00(In/Hr)
Total area = 1366.51(Ac.) Total runoff = 2543.03(CFS)

Process from Point/Station 501.000 to Point/Station 603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 7.920(Ft.), Average velocity = 15.407(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 2543.027(CFS)
' ' flow top width = 36.680(Ft.)
' ' velocity = 15.407(Ft/s)
' ' area = 165.052(Sq.Ft)
' ' Froude number = 1.280

Upstream point elevation = 610.000(Ft.)
Downstream point elevation = 603.000(Ft.)
Flow length = 170.000(Ft.)
Travel time = 0.18 min.
Time of concentration = 23.85 min.
Depth of flow = 7.920(Ft.)

Average velocity = 15.407(Ft/s)
 Total irregular channel flow = 2543.028(CFS)
 Irregular channel normal depth above invert elev. = 7.920(Ft.)
 Average velocity of channel(s) = 15.407(Ft/s)

 Process from Point/Station 501.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1366.510(Ac.)
 Runoff from this stream = 2543.028(CFS)
 Time of concentration = 23.85 min.
 Rainfall intensity = 1.992(In/Hr)
 Area averaged loss rate (Fm) = 0.2325(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 601.000 to Point/Station 602.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 61.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.300(In/Hr)
 Max Catchment Loss (Fm) = 0.300(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 650.000(Ft.)
 Bottom (of initial area) elevation = 606.000(Ft.)
 Difference in elevation = 44.000(Ft.)
 Slope = 0.14667 s(%)= 14.67
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.440 min.
 Rainfall intensity = 2.756(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area (Q=KClA) is C = 0.802
 Subarea runoff = 0.995(CFS)
 Total initial stream area = 0.450(Ac.)

 Process from Point/Station 602.000 to Point/Station 603.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 2.668(CFS)
 Depth of flow = 0.286(Ft.), Average velocity = 1.675(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 50.00 |
| 2 | 100.00 | 0.00 |
| 3 | 105.00 | 0.00 |
| 4 | 205.00 | 50.00 |

 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 2.668(CFS)
 ' ' flow top width = 6.144(Ft.)
 ' ' velocity= 1.675(Ft/s)
 ' ' area = 1.593(Sq.Ft)
 ' ' Froude number = 0.580

Upstream point elevation = 606.000(Ft.)
 Downstream point elevation = 603.000(Ft.)
 Flow length = 151.800(Ft.)
 Travel time = 1.51 min.
 Time of concentration = 14.95 min.
 Depth of flow = 0.286(Ft.)

Average velocity = 1.675(Ft/s)
 Total irregular channel flow = 2.668(CFS)
 Irregular channel normal depth above invert elev. = 0.286(Ft.)
 Average velocity of channel(s) = 1.675(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.430
 Decimal fraction soil group C = 0.550
 Decimal fraction soil group D = 0.020
 SCS curve number for soil(AMC 2) = 68.53
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.271(In/Hr)
 Max Catchment Loss (Fm) = 0.271(In/Hr)
 Rainfall intensity = 2.595(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.804
 Subarea runoff = 3.282(CFS) for 1.600(Ac.)
 Total runoff = 4.277(CFS) Total area = 2.05(Ac.)
 Area averaged Fm value = 0.277(In/Hr)
 Depth of flow = 0.377(Ft.), Average velocity = 1.972(Ft/s)

 Process from Point/Station 602.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 2.050(Ac.)
 Runoff from this stream = 4.277(CFS)
 Time of concentration = 14.95 min.
 Rainfall intensity = 2.595(In/Hr)
 Area averaged loss rate (Fm) = 0.2770(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|------------|----------------------------|
| 1 | 1366.51 | 2543.028 | 23.85 | 0.232 | 1.992 |
| 2 | 2.05 | 4.277 | 14.95 | 0.277 | 2.595 |

Qmax(1) =
 1.000 * 1.000 * 2543.028) +
 0.740 * 1.000 * 4.277) + = 2546.193
 Qmax(2) =
 1.342 * 0.627 * 2543.028) +
 1.000 * 1.000 * 4.277) + = 2144.528

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2543.028 4.277
 Maximum flow rates at confluence using above data:
 2546.193 2144.528
 Area of streams before confluence:
 1366.510 2.050
 Effective area values after confluence:
 1368.560 858.734

Results of confluence:
 Total flow rate = 2546.193(CFS)
 Time of concentration = 23.848 min.
 Effective stream area after confluence = 1368.560(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.233(In/Hr)
 Study area total (this main stream) = 1368.56(Ac.)

 Process from Point/Station 603.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 8.672(Ft.), Average velocity = 13.140(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 2546.192(CFS)
 ' ' flow top width = 39.689(Ft.)
 ' ' velocity= 13.140(Ft/s)
 ' ' area = 193.781(Sq.Ft)
 ' ' Froude number = 1.048

Upstream point elevation = 603.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2528.000(Ft.)
 Travel time = 3.21 min.
 Time of concentration = 27.05 min.
 Depth of flow = 8.672(Ft.)
 Average velocity = 13.140(Ft/s)
 Total irregular channel flow = 2546.193(CFS)
 Irregular channel normal depth above invert elev. = 8.672(Ft.)
 Average velocity of channel(s) = 13.140(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1368.560(Ac.)
 Runoff from this stream = 2546.193(CFS)
 Time of concentration = 27.05 min.
 Rainfall intensity = 1.855(In/Hr)
 Area averaged loss rate (Fm) = 0.2326(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 604.000 to Point/Station 605.000
 **** INITIAL AREA EVALUATION ****

 UNDEVELOPED (dense cover) subarea
 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
 SCS curve number for soil(AMC 2) = 80.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 304.500(Ft.)
 Top (of initial area) elevation = 692.000(Ft.)
 Bottom (of initial area) elevation = 641.000(Ft.)
 Difference in elevation = 51.000(Ft.)
 Slope = 0.16749 s(%)= 16.75
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.166 min.
 Rainfall intensity = 2.789(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
 Subarea runoff = 1.887(CFS)
 Total initial stream area = 0.810(Ac.)

 Process from Point/Station 605.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 28.908(CFS)
 Depth of flow = 0.879(Ft.), Average velocity = 4.866(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 28.908(CFS)
 ' ' flow top width = 8.516(Ft.)
 ' ' velocity = 4.866(Ft/s)
 ' ' area = 5.941(Sq.Ft)
 ' ' Froude number = 1.027

Upstream point elevation = 641.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2296.600(Ft.)
 Travel time = 7.87 min.
 Time of concentration = 21.03 min.
 Depth of flow = 0.879(Ft.)
 Average velocity = 4.866(Ft/s)
 Total irregular channel flow = 28.908(CFS)
 Irregular channel normal depth above invert elev. = 0.879(Ft.)
 Average velocity of channel(s) = 4.866(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.510
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.290
 SCS curve number for soil(AMC 2) = 69.11
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.261(In/Hr)
 Max Catchment Loss (Fm) = 0.261(In/Hr)
 Rainfall intensity = 2.139(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.791
 Subarea runoff = 53.972(CFS) for 32.210(Ac.)
 Total runoff = 55.859(CFS) Total area = 33.02(Ac.)
 Area averaged Fm value = 0.260(In/Hr)
 Depth of flow = 1.258(Ft.), Average velocity = 5.907(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 33.020(Ac.)
 Runoff from this stream = 55.859(CFS)
 Time of concentration = 21.03 min.
 Rainfall intensity = 2.139(In/Hr)
 Area averaged loss rate (Fm) = 0.2595(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|-----------|------------|----------------------------|
| 1 | 1368.56 | 2546.193 | 27.05 | 0.233 | 1.855 |
| 2 | 33.02 | 55.859 | 21.03 | 0.260 | 2.139 |
| Qmax(1) = | | | | | |
| | 1.000 * | 1.000 * | 2546.193) | + | |
| | 0.849 * | 1.000 * | 55.859) | + | 2593.609 |
| Qmax(2) = | | | | | |
| | 1.175 * | 0.777 * | 2546.193) | + | |
| | 1.000 * | 1.000 * | 55.859) | + | 2381.952 |

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2546.193 55.859
 Maximum flow rates at confluence using above data:
 2593.609 2381.952

Area of streams before confluence:
1368.560 33.020
Effective area values after confluence:
1401.580 1096.971
Results of confluence:
Total flow rate = 2593.609(CFS)
Time of concentration = 27.055 min.
Effective stream area after confluence = 1401.580(Ac.)
Study area average Pervious fraction(A_p) = 1.000
Study area average soil loss rate(F_m) = 0.233(In/Hr)
Study area total (this main stream) = 1401.58(Ac.)
End of computations, total study area = 1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 75.4

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/02/15 File Name: EXFCREEK10.roc

PLANNING AREA 2
EXISTING CONDITION - CREEK F
10-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 10.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 501.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2) = 75.54
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 1.652(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 24.00 min. Rain intensity = 1.65(In/Hr)
Total area = 1366.51(Ac.) Total runoff = 2044.07(CFS)

Process from Point/Station 501.000 to Point/Station 603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 7.214(Ft.), Average velocity = 14.586(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 2044.063(CFS)
' ' flow top width = 33.855(Ft.)
' ' velocity= 14.586(Ft/s)
' ' area = 140.143(Sq.Ft)
' ' Froude number = 1.263

Upstream point elevation = 610.000(Ft.)
Downstream point elevation = 603.000(Ft.)
Flow length = 170.000(Ft.)
Travel time = 0.19 min.
Time of concentration = 24.19 min.
Depth of flow = 7.214(Ft.)

Average velocity = 14.586(Ft/s)
 Total irregular channel flow = 2044.065(CFS)
 Irregular channel normal depth above invert elev. = 7.214(Ft.)
 Average velocity of channel(s) = 14.586(Ft/s)

 Process from Point/Station 501.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1366.510(Ac.)
 Runoff from this stream = 2044.065(CFS)
 Time of concentration = 24.19 min.
 Rainfall intensity = 1.645(In/Hr)
 Area averaged loss rate (Fm) = 0.2325(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 601.000 to Point/Station 602.000
 **** INITIAL AREA EVALUATION ****

UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 61.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.300(In/Hr)
 Max Catchment Loss (Fm) = 0.300(In/Hr)
 Initial subarea data:
 Initial area flow distance = 300.000(Ft.)
 Top (of initial area) elevation = 650.000(Ft.)
 Bottom (of initial area) elevation = 606.000(Ft.)
 Difference in elevation = 44.000(Ft.)
 Slope = 0.14667 s(%)= 14.67
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.440 min.
 Rainfall intensity = 2.304(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.783
 Subarea runoff = 0.811(CFS)
 Total initial stream area = 0.450(Ac.)

 Process from Point/Station 602.000 to Point/Station 603.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 2.170(CFS)
 Depth of flow = 0.253(Ft.), Average velocity = 1.556(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 50.00 |
| 2 | 100.00 | 0.00 |
| 3 | 105.00 | 0.00 |
| 4 | 205.00 | 50.00 |

 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 2.170(CFS)
 ' ' flow top width = 6.013(Ft.)
 ' ' velocity= 1.556(Ft/s)
 ' ' area = 1.394(Sq.Ft)
 ' ' Froude number = 0.570

Upstream point elevation = 606.000(Ft.)
 Downstream point elevation = 603.000(Ft.)
 Flow length = 151.800(Ft.)
 Travel time = 1.63 min.
 Time of concentration = 15.07 min.
 Depth of flow = 0.253(Ft.)

Average velocity = 1.556(Ft/s)
 Total irregular channel flow = 2.170(CFS)
 Irregular channel normal depth above invert elev. = 0.253(Ft.)
 Average velocity of channel(s) = 1.556(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.430
 Decimal fraction soil group C = 0.550
 Decimal fraction soil group D = 0.020
 SCS curve number for soil(AMC 2) = 68.53
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.271(In/Hr)
 Max Catchment Loss (Fm) = 0.271(In/Hr)
 Rainfall intensity = 2.158(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.784
 Subarea runoff = 2.659(CFS) for 1.600(Ac.)
 Total runoff = 3.470(CFS) Total area = 2.05(Ac.)
 Area averaged Fm value = 0.277(In/Hr)
 Depth of flow = 0.334(Ft.), Average velocity = 1.836(Ft/s)

+-----+
 Process from Point/Station 602.000 to Point/Station 603.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 2.050(Ac.)
 Runoff from this stream = 3.470(CFS)
 Time of concentration = 15.07 min.
 Rainfall intensity = 2.158(In/Hr)
 Area averaged loss rate (Fm) = 0.2770(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|----------|------------|----------------------------|
| 1 | 1366.51 | 2044.065 | 24.19 | 0.232 | 1.645 |
| 2 | 2.05 | 3.470 | 15.07 | 0.277 | 2.158 |

Qmax(1) =
 1.000 * 1.000 * 2044.065) +
 0.727 * 1.000 * 3.470) + = 2046.589
 Qmax(2) =
 1.363 * 0.623 * 2044.065) +
 1.000 * 1.000 * 3.470) + = 1738.550

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2044.065 3.470
 Maximum flow rates at confluence using above data:
 2046.589 1738.550
 Area of streams before confluence:
 1366.510 2.050
 Effective area values after confluence:
 1368.560 852.958

Results of confluence:
 Total flow rate = 2046.589(CFS)
 Time of concentration = 24.194 min.
 Effective stream area after confluence = 1368.560(Ac.)
 Study area average Pervious fraction(Ap) = 1.000
 Study area average soil loss rate(Fm) = 0.233(In/Hr)
 Study area total (this main stream) = 1368.56(Ac.)

+-----+
 Process from Point/Station 603.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 7.906(Ft.), Average velocity = 12.440(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 2046.587(CFS)
 ' ' flow top width = 36.622(Ft.)
 ' ' velocity= 12.440(Ft/s)
 ' ' area = 164.523(Sq.Ft)
 ' ' Froude number = 1.034

Upstream point elevation = 603.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2528.000(Ft.)
 Travel time = 3.39 min.
 Time of concentration = 27.58 min.
 Depth of flow = 7.906(Ft.)
 Average velocity = 12.440(Ft/s)
 Total irregular channel flow = 2046.589(CFS)
 Irregular channel normal depth above invert elev. = 7.906(Ft.)
 Average velocity of channel(s) = 12.440(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1368.560(Ac.)
 Runoff from this stream = 2046.589(CFS)
 Time of concentration = 27.58 min.
 Rainfall intensity = 1.526(In/Hr)
 Area averaged loss rate (Fm) = 0.2326(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000

 Process from Point/Station 604.000 to Point/Station 605.000
 **** INITIAL AREA EVALUATION ****

 UNDEVELOPED (dense cover) subarea
 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
 SCS curve number for soil(AMC 2) = 80.00
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.200(In/Hr)
 Max Catchment Loss (Fm) = 0.200(In/Hr)
 Initial subarea data:
 Initial area flow distance = 304.500(Ft.)
 Top (of initial area) elevation = 692.000(Ft.)
 Bottom (of initial area) elevation = 641.000(Ft.)
 Difference in elevation = 51.000(Ft.)
 Slope = 0.16749 s(%)= 16.75
 $TC = k(0.935)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.166 min.
 Rainfall intensity = 2.331(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.823
 Subarea runoff = 1.553(CFS)
 Total initial stream area = 0.810(Ac.)

 Process from Point/Station 605.000 to Point/Station 606.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 23.036(CFS)
 Depth of flow = 0.775(Ft.), Average velocity = 4.539(Ft/s)
 ***** Irregular Channel Data *****

Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 23.036(CFS)
 ' ' flow top width = 8.099(Ft.)
 ' ' velocity = 4.540(Ft/s)
 ' ' area = 5.075(Sq.Ft)
 ' ' Froude number = 1.011

Upstream point elevation = 641.000(Ft.)
 Downstream point elevation = 535.000(Ft.)
 Flow length = 2296.600(Ft.)
 Travel time = 8.43 min.
 Time of concentration = 21.60 min.
 Depth of flow = 0.775(Ft.)
 Average velocity = 4.539(Ft/s)
 Total irregular channel flow = 23.036(CFS)
 Irregular channel normal depth above invert elev. = 0.775(Ft.)
 Average velocity of channel(s) = 4.539(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.510
 Decimal fraction soil group C = 0.200
 Decimal fraction soil group D = 0.290
 SCS curve number for soil(AMC 2) = 69.11
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp) = 0.261(In/Hr)
 Max Catchment Loss (Fm) = 0.261(In/Hr)
 Rainfall intensity = 1.755(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.767
 Subarea runoff = 42.900(CFS) for 32.210(Ac.)
 Total runoff = 44.454(CFS) Total area = 33.02(Ac.)
 Area averaged Fm value = 0.260(In/Hr)
 Depth of flow = 1.113(Ft.), Average velocity = 5.529(Ft/s)

 Process from Point/Station 606.000 to Point/Station 606.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 33.020(Ac.)
 Runoff from this stream = 44.454(CFS)
 Time of concentration = 21.60 min.
 Rainfall intensity = 1.755(In/Hr)
 Area averaged loss rate (Fm) = 0.2595(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream No. | Area (Ac.) | Flow rate (CFS) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|------------|-----------------|-----------|------------|----------------------------|
| 1 | 1368.56 | 2046.589 | 27.58 | 0.233 | 1.526 |
| 2 | 33.02 | 44.454 | 21.60 | 0.260 | 1.755 |
| Qmax(1) = | | | | | |
| | 1.000 * | 1.000 * | 2046.589) | + | |
| | 0.847 * | 1.000 * | 44.454) | + | 2084.222 |
| Qmax(2) = | | | | | |
| | 1.177 * | 0.783 * | 2046.589) | + | |
| | 1.000 * | 1.000 * | 44.454) | + | 1931.463 |

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2046.589 44.454
 Maximum flow rates at confluence using above data:
 2084.222 1931.463

Area of streams before confluence:
1368.560 33.020
Effective area values after confluence:
1401.580 1104.683
Results of confluence:
Total flow rate = 2084.222(CFS)
Time of concentration = 27.581 min.
Effective stream area after confluence = 1401.580(Ac.)
Study area average Pervious fraction(A_p) = 1.000
Study area average soil loss rate(F_m) = 0.233(In/Hr)
Study area total (this main stream) = 1401.58(Ac.)
End of computations, total study area = 1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged SCS curve number (AMC 2) = 75.4

Creek "A"
Proposed Unit Hydrograph Calculations
10, 25 & 100-Year Storms

Unit Hydrograph Analysis

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Study date 08/04/15 File Name CieloVistaPrWshdAUH.out

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Orange County Unit Hydrograph Hydrology Method
 Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

 WATERSHED A
 PROPOSED CONDITIONS - CREEK A
 100-YEAR STORM
 BY FUSCOE ENGINEERING

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.54 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.39 | D | 0.200 | 1.000 | 0.200 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 8.0 | 0.01 | D | 0.200 | 1.000 | 0.200 |
| 75.0 | 15.1 | 0.02 | D | 0.200 | 0.600 | 0.120 |
| 75.0 | 13.0 | 0.02 | D | 0.200 | 0.600 | 0.120 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC3) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 95.2 | 0.50 | 0.900 |
| 0.20 | 0.000 | 72.0 | 88.6 | 1.29 | 0.770 |
| 365.10 | 0.541 | 79.0 | 93.4 | 0.71 | 0.864 |
| 264.30 | 0.392 | 84.0 | 96.4 | 0.37 | 0.925 |
| 1.50 | 0.002 | 56.0 | 75.8 | 3.19 | 0.541 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.958 |
| 1.50 | 0.002 | 56.0 | 75.8 | 3.19 | 0.541 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.958 |
| 3.70 | 0.005 | 79.0 | 93.4 | 0.71 | 0.864 |
| 8.00 | 0.012 | 84.0 | 96.4 | 0.37 | 0.925 |
| 9.06 | 0.013 | 75.0 | 91.0 | 0.99 | 0.816 |
| 6.04 | 0.009 | 98.0 | 98.0 | 0.20 | 0.958 |

7.80 0.012 75.0 91.0 0.99 0.816
 5.20 0.008 98.0 98.0 0.20 0.958

Area-averaged catchment yield fraction, Y = 0.887
 Area-averaged low loss fraction, Yb = 0.113
 +-----+
 User entry of time of concentration = 0.617 (hours)
 Watershed area = 674.60(Ac.)
 Catchment Lag time = 0.493 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 16.8937
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
 Average low loss rate fraction (Yb) = 0.113 (decimal)
 FOOTHILL S-Graph Selected
 Computed peak 5-minute rainfall = 0.520(In)
 Computed peak 30-minute rainfall = 1.090(In)
 Specified peak 1-hour rainfall = 1.450(In)
 Computed peak 3-hour rainfall = 2.430(In)
 Specified peak 6-hour rainfall = 3.360(In)
 Specified peak 24-hour rainfall = 5.630(In)

Rainfall depth area reduction factors:
 Using a total area of 674.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.968 Adjusted rainfall = 0.504(In)
 30-minute factor = 0.968 Adjusted rainfall = 1.056(In)
 1-hour factor = 0.968 Adjusted rainfall = 1.404(In)
 3-hour factor = 0.996 Adjusted rainfall = 2.420(In)
 6-hour factor = 0.998 Adjusted rainfall = 3.353(In)
 24-hour factor = 0.999 Adjusted rainfall = 5.625(In)

U n i t H y d r o g r a p h

| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|
| | (K = | 8158.44 (CFS)) |
| 1 | 1.077 | 87.839 |
| 2 | 3.933 | 233.055 |
| 3 | 8.078 | 338.135 |
| 4 | 13.921 | 476.690 |
| 5 | 22.799 | 724.358 |
| 6 | 39.604 | 1371.016 |
| 7 | 56.304 | 1362.464 |
| 8 | 64.238 | 647.246 |
| 9 | 69.997 | 469.854 |
| 10 | 74.376 | 357.244 |
| 11 | 78.182 | 310.541 |
| 12 | 81.338 | 257.499 |
| 13 | 84.009 | 217.861 |
| 14 | 86.347 | 190.790 |
| 15 | 88.387 | 166.398 |
| 16 | 90.138 | 142.856 |
| 17 | 91.689 | 126.569 |
| 18 | 93.043 | 110.469 |
| 19 | 94.202 | 94.545 |
| 20 | 95.205 | 81.805 |
| 21 | 96.018 | 66.342 |
| 22 | 96.729 | 57.971 |
| 23 | 97.339 | 49.806 |
| 24 | 97.802 | 37.767 |
| 25 | 98.067 | 21.599 |
| 26 | 98.269 | 16.539 |
| 27 | 98.470 | 16.358 |
| 28 | 98.646 | 14.342 |
| 29 | 98.815 | 13.783 |
| 30 | 98.978 | 13.335 |
| 31 | 99.092 | 9.251 |

| | | |
|----|---------|--------|
| 32 | 99.193 | 8.270 |
| 33 | 99.298 | 8.541 |
| 34 | 99.428 | 10.599 |
| 35 | 99.563 | 11.026 |
| 36 | 99.690 | 10.381 |
| 37 | 99.766 | 6.247 |
| 38 | 99.834 | 5.513 |
| 39 | 99.897 | 5.134 |
| 40 | 99.935 | 3.069 |
| 41 | 99.968 | 2.757 |
| 42 | 100.000 | 2.579 |

| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
|---------------------|-----------------------------------|-----------------------|
| 1 | 0.5036 | 0.5036 |
| 2 | 0.6705 | 0.1669 |
| 3 | 0.7927 | 0.1222 |
| 4 | 0.8928 | 0.1000 |
| 5 | 0.9790 | 0.0862 |
| 6 | 1.0555 | 0.0766 |
| 7 | 1.1247 | 0.0692 |
| 8 | 1.1883 | 0.0636 |
| 9 | 1.2473 | 0.0590 |
| 10 | 1.3026 | 0.0553 |
| 11 | 1.3547 | 0.0521 |
| 12 | 1.4041 | 0.0494 |
| 13 | 1.4610 | 0.0568 |
| 14 | 1.5156 | 0.0547 |
| 15 | 1.5683 | 0.0527 |
| 16 | 1.6193 | 0.0510 |
| 17 | 1.6687 | 0.0494 |
| 18 | 1.7166 | 0.0479 |
| 19 | 1.7633 | 0.0466 |
| 20 | 1.8087 | 0.0454 |
| 21 | 1.8529 | 0.0443 |
| 22 | 1.8961 | 0.0432 |
| 23 | 1.9384 | 0.0422 |
| 24 | 1.9797 | 0.0413 |
| 25 | 2.0201 | 0.0405 |
| 26 | 2.0598 | 0.0396 |
| 27 | 2.0987 | 0.0389 |
| 28 | 2.1368 | 0.0382 |
| 29 | 2.1743 | 0.0375 |
| 30 | 2.2112 | 0.0368 |
| 31 | 2.2474 | 0.0362 |
| 32 | 2.2830 | 0.0356 |
| 33 | 2.3181 | 0.0351 |
| 34 | 2.3527 | 0.0346 |
| 35 | 2.3867 | 0.0340 |
| 36 | 2.4203 | 0.0336 |
| 37 | 2.4517 | 0.0314 |
| 38 | 2.4826 | 0.0309 |
| 39 | 2.5131 | 0.0305 |
| 40 | 2.5432 | 0.0301 |
| 41 | 2.5729 | 0.0297 |
| 42 | 2.6022 | 0.0293 |
| 43 | 2.6312 | 0.0290 |
| 44 | 2.6598 | 0.0286 |
| 45 | 2.6880 | 0.0283 |
| 46 | 2.7160 | 0.0279 |
| 47 | 2.7436 | 0.0276 |
| 48 | 2.7709 | 0.0273 |
| 49 | 2.7979 | 0.0270 |
| 50 | 2.8246 | 0.0267 |
| 51 | 2.8510 | 0.0264 |
| 52 | 2.8772 | 0.0262 |
| 53 | 2.9030 | 0.0259 |
| 54 | 2.9287 | 0.0256 |
| 55 | 2.9540 | 0.0254 |
| 56 | 2.9792 | 0.0251 |
| 57 | 3.0041 | 0.0249 |
| 58 | 3.0288 | 0.0247 |
| 59 | 3.0532 | 0.0244 |

| | | |
|-----|--------|--------|
| 60 | 3.0774 | 0.0242 |
| 61 | 3.1014 | 0.0240 |
| 62 | 3.1252 | 0.0238 |
| 63 | 3.1489 | 0.0236 |
| 64 | 3.1723 | 0.0234 |
| 65 | 3.1955 | 0.0232 |
| 66 | 3.2185 | 0.0230 |
| 67 | 3.2413 | 0.0228 |
| 68 | 3.2640 | 0.0227 |
| 69 | 3.2865 | 0.0225 |
| 70 | 3.3088 | 0.0223 |
| 71 | 3.3309 | 0.0221 |
| 72 | 3.3529 | 0.0220 |
| 73 | 3.3702 | 0.0173 |
| 74 | 3.3874 | 0.0172 |
| 75 | 3.4044 | 0.0170 |
| 76 | 3.4213 | 0.0169 |
| 77 | 3.4380 | 0.0167 |
| 78 | 3.4546 | 0.0166 |
| 79 | 3.4711 | 0.0165 |
| 80 | 3.4874 | 0.0163 |
| 81 | 3.5036 | 0.0162 |
| 82 | 3.5197 | 0.0161 |
| 83 | 3.5357 | 0.0160 |
| 84 | 3.5515 | 0.0158 |
| 85 | 3.5672 | 0.0157 |
| 86 | 3.5828 | 0.0156 |
| 87 | 3.5983 | 0.0155 |
| 88 | 3.6137 | 0.0154 |
| 89 | 3.6290 | 0.0153 |
| 90 | 3.6441 | 0.0152 |
| 91 | 3.6592 | 0.0151 |
| 92 | 3.6742 | 0.0150 |
| 93 | 3.6890 | 0.0149 |
| 94 | 3.7038 | 0.0148 |
| 95 | 3.7184 | 0.0147 |
| 96 | 3.7330 | 0.0146 |
| 97 | 3.7475 | 0.0145 |
| 98 | 3.7618 | 0.0144 |
| 99 | 3.7761 | 0.0143 |
| 100 | 3.7903 | 0.0142 |
| 101 | 3.8044 | 0.0141 |
| 102 | 3.8184 | 0.0140 |
| 103 | 3.8323 | 0.0139 |
| 104 | 3.8462 | 0.0138 |
| 105 | 3.8600 | 0.0138 |
| 106 | 3.8736 | 0.0137 |
| 107 | 3.8872 | 0.0136 |
| 108 | 3.9008 | 0.0135 |
| 109 | 3.9142 | 0.0134 |
| 110 | 3.9276 | 0.0134 |
| 111 | 3.9409 | 0.0133 |
| 112 | 3.9541 | 0.0132 |
| 113 | 3.9672 | 0.0131 |
| 114 | 3.9803 | 0.0131 |
| 115 | 3.9933 | 0.0130 |
| 116 | 4.0062 | 0.0129 |
| 117 | 4.0191 | 0.0129 |
| 118 | 4.0318 | 0.0128 |
| 119 | 4.0446 | 0.0127 |
| 120 | 4.0572 | 0.0127 |
| 121 | 4.0698 | 0.0126 |
| 122 | 4.0823 | 0.0125 |
| 123 | 4.0948 | 0.0125 |
| 124 | 4.1072 | 0.0124 |
| 125 | 4.1195 | 0.0123 |
| 126 | 4.1318 | 0.0123 |
| 127 | 4.1440 | 0.0122 |
| 128 | 4.1561 | 0.0121 |
| 129 | 4.1682 | 0.0121 |
| 130 | 4.1803 | 0.0120 |
| 131 | 4.1922 | 0.0120 |
| 132 | 4.2041 | 0.0119 |

| | | |
|-----|--------|--------|
| 133 | 4.2160 | 0.0119 |
| 134 | 4.2278 | 0.0118 |
| 135 | 4.2396 | 0.0117 |
| 136 | 4.2513 | 0.0117 |
| 137 | 4.2629 | 0.0116 |
| 138 | 4.2745 | 0.0116 |
| 139 | 4.2860 | 0.0115 |
| 140 | 4.2975 | 0.0115 |
| 141 | 4.3089 | 0.0114 |
| 142 | 4.3203 | 0.0114 |
| 143 | 4.3316 | 0.0113 |
| 144 | 4.3429 | 0.0113 |
| 145 | 4.3542 | 0.0112 |
| 146 | 4.3653 | 0.0112 |
| 147 | 4.3765 | 0.0111 |
| 148 | 4.3876 | 0.0111 |
| 149 | 4.3986 | 0.0110 |
| 150 | 4.4096 | 0.0110 |
| 151 | 4.4206 | 0.0109 |
| 152 | 4.4315 | 0.0109 |
| 153 | 4.4423 | 0.0109 |
| 154 | 4.4531 | 0.0108 |
| 155 | 4.4639 | 0.0108 |
| 156 | 4.4746 | 0.0107 |
| 157 | 4.4853 | 0.0107 |
| 158 | 4.4960 | 0.0106 |
| 159 | 4.5066 | 0.0106 |
| 160 | 4.5171 | 0.0106 |
| 161 | 4.5276 | 0.0105 |
| 162 | 4.5381 | 0.0105 |
| 163 | 4.5485 | 0.0104 |
| 164 | 4.5589 | 0.0104 |
| 165 | 4.5693 | 0.0104 |
| 166 | 4.5796 | 0.0103 |
| 167 | 4.5899 | 0.0103 |
| 168 | 4.6001 | 0.0102 |
| 169 | 4.6103 | 0.0102 |
| 170 | 4.6205 | 0.0102 |
| 171 | 4.6306 | 0.0101 |
| 172 | 4.6407 | 0.0101 |
| 173 | 4.6508 | 0.0101 |
| 174 | 4.6608 | 0.0100 |
| 175 | 4.6708 | 0.0100 |
| 176 | 4.6807 | 0.0099 |
| 177 | 4.6906 | 0.0099 |
| 178 | 4.7005 | 0.0099 |
| 179 | 4.7103 | 0.0098 |
| 180 | 4.7201 | 0.0098 |
| 181 | 4.7299 | 0.0098 |
| 182 | 4.7396 | 0.0097 |
| 183 | 4.7493 | 0.0097 |
| 184 | 4.7590 | 0.0097 |
| 185 | 4.7687 | 0.0096 |
| 186 | 4.7783 | 0.0096 |
| 187 | 4.7878 | 0.0096 |
| 188 | 4.7974 | 0.0095 |
| 189 | 4.8069 | 0.0095 |
| 190 | 4.8164 | 0.0095 |
| 191 | 4.8258 | 0.0094 |
| 192 | 4.8352 | 0.0094 |
| 193 | 4.8446 | 0.0094 |
| 194 | 4.8540 | 0.0094 |
| 195 | 4.8633 | 0.0093 |
| 196 | 4.8726 | 0.0093 |
| 197 | 4.8818 | 0.0093 |
| 198 | 4.8911 | 0.0092 |
| 199 | 4.9003 | 0.0092 |
| 200 | 4.9095 | 0.0092 |
| 201 | 4.9186 | 0.0091 |
| 202 | 4.9277 | 0.0091 |
| 203 | 4.9368 | 0.0091 |
| 204 | 4.9459 | 0.0091 |
| 205 | 4.9549 | 0.0090 |

| | | |
|-----|--------|--------|
| 206 | 4.9639 | 0.0090 |
| 207 | 4.9729 | 0.0090 |
| 208 | 4.9819 | 0.0090 |
| 209 | 4.9908 | 0.0089 |
| 210 | 4.9997 | 0.0089 |
| 211 | 5.0086 | 0.0089 |
| 212 | 5.0174 | 0.0088 |
| 213 | 5.0262 | 0.0088 |
| 214 | 5.0350 | 0.0088 |
| 215 | 5.0438 | 0.0088 |
| 216 | 5.0525 | 0.0087 |
| 217 | 5.0612 | 0.0087 |
| 218 | 5.0699 | 0.0087 |
| 219 | 5.0786 | 0.0087 |
| 220 | 5.0872 | 0.0086 |
| 221 | 5.0959 | 0.0086 |
| 222 | 5.1045 | 0.0086 |
| 223 | 5.1130 | 0.0086 |
| 224 | 5.1216 | 0.0085 |
| 225 | 5.1301 | 0.0085 |
| 226 | 5.1386 | 0.0085 |
| 227 | 5.1471 | 0.0085 |
| 228 | 5.1555 | 0.0085 |
| 229 | 5.1640 | 0.0084 |
| 230 | 5.1724 | 0.0084 |
| 231 | 5.1807 | 0.0084 |
| 232 | 5.1891 | 0.0084 |
| 233 | 5.1974 | 0.0083 |
| 234 | 5.2058 | 0.0083 |
| 235 | 5.2140 | 0.0083 |
| 236 | 5.2223 | 0.0083 |
| 237 | 5.2306 | 0.0082 |
| 238 | 5.2388 | 0.0082 |
| 239 | 5.2470 | 0.0082 |
| 240 | 5.2552 | 0.0082 |
| 241 | 5.2633 | 0.0082 |
| 242 | 5.2715 | 0.0081 |
| 243 | 5.2796 | 0.0081 |
| 244 | 5.2877 | 0.0081 |
| 245 | 5.2958 | 0.0081 |
| 246 | 5.3038 | 0.0081 |
| 247 | 5.3119 | 0.0080 |
| 248 | 5.3199 | 0.0080 |
| 249 | 5.3279 | 0.0080 |
| 250 | 5.3359 | 0.0080 |
| 251 | 5.3438 | 0.0080 |
| 252 | 5.3518 | 0.0079 |
| 253 | 5.3597 | 0.0079 |
| 254 | 5.3676 | 0.0079 |
| 255 | 5.3755 | 0.0079 |
| 256 | 5.3833 | 0.0079 |
| 257 | 5.3911 | 0.0078 |
| 258 | 5.3990 | 0.0078 |
| 259 | 5.4068 | 0.0078 |
| 260 | 5.4146 | 0.0078 |
| 261 | 5.4223 | 0.0078 |
| 262 | 5.4301 | 0.0077 |
| 263 | 5.4378 | 0.0077 |
| 264 | 5.4455 | 0.0077 |
| 265 | 5.4532 | 0.0077 |
| 266 | 5.4609 | 0.0077 |
| 267 | 5.4685 | 0.0077 |
| 268 | 5.4761 | 0.0076 |
| 269 | 5.4838 | 0.0076 |
| 270 | 5.4914 | 0.0076 |
| 271 | 5.4989 | 0.0076 |
| 272 | 5.5065 | 0.0076 |
| 273 | 5.5141 | 0.0075 |
| 274 | 5.5216 | 0.0075 |
| 275 | 5.5291 | 0.0075 |
| 276 | 5.5366 | 0.0075 |
| 277 | 5.5441 | 0.0075 |
| 278 | 5.5515 | 0.0075 |

| | | |
|-----|--------|--------|
| 279 | 5.5590 | 0.0074 |
| 280 | 5.5664 | 0.0074 |
| 281 | 5.5738 | 0.0074 |
| 282 | 5.5812 | 0.0074 |
| 283 | 5.5886 | 0.0074 |
| 284 | 5.5960 | 0.0074 |
| 285 | 5.6033 | 0.0073 |
| 286 | 5.6106 | 0.0073 |
| 287 | 5.6180 | 0.0073 |
| 288 | 5.6253 | 0.0073 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0073 | 0.0008 | 0.0065 |
| 2 | 0.0073 | 0.0008 | 0.0065 |
| 3 | 0.0073 | 0.0008 | 0.0065 |
| 4 | 0.0074 | 0.0008 | 0.0065 |
| 5 | 0.0074 | 0.0008 | 0.0066 |
| 6 | 0.0074 | 0.0008 | 0.0066 |
| 7 | 0.0074 | 0.0008 | 0.0066 |
| 8 | 0.0075 | 0.0008 | 0.0066 |
| 9 | 0.0075 | 0.0008 | 0.0067 |
| 10 | 0.0075 | 0.0008 | 0.0067 |
| 11 | 0.0075 | 0.0008 | 0.0067 |
| 12 | 0.0076 | 0.0009 | 0.0067 |
| 13 | 0.0076 | 0.0009 | 0.0067 |
| 14 | 0.0076 | 0.0009 | 0.0068 |
| 15 | 0.0077 | 0.0009 | 0.0068 |
| 16 | 0.0077 | 0.0009 | 0.0068 |
| 17 | 0.0077 | 0.0009 | 0.0068 |
| 18 | 0.0077 | 0.0009 | 0.0069 |
| 19 | 0.0078 | 0.0009 | 0.0069 |
| 20 | 0.0078 | 0.0009 | 0.0069 |
| 21 | 0.0078 | 0.0009 | 0.0069 |
| 22 | 0.0078 | 0.0009 | 0.0070 |
| 23 | 0.0079 | 0.0009 | 0.0070 |
| 24 | 0.0079 | 0.0009 | 0.0070 |
| 25 | 0.0079 | 0.0009 | 0.0070 |
| 26 | 0.0080 | 0.0009 | 0.0071 |
| 27 | 0.0080 | 0.0009 | 0.0071 |
| 28 | 0.0080 | 0.0009 | 0.0071 |
| 29 | 0.0081 | 0.0009 | 0.0072 |
| 30 | 0.0081 | 0.0009 | 0.0072 |
| 31 | 0.0081 | 0.0009 | 0.0072 |
| 32 | 0.0081 | 0.0009 | 0.0072 |
| 33 | 0.0082 | 0.0009 | 0.0073 |
| 34 | 0.0082 | 0.0009 | 0.0073 |
| 35 | 0.0082 | 0.0009 | 0.0073 |
| 36 | 0.0083 | 0.0009 | 0.0073 |
| 37 | 0.0083 | 0.0009 | 0.0074 |
| 38 | 0.0083 | 0.0009 | 0.0074 |
| 39 | 0.0084 | 0.0009 | 0.0074 |
| 40 | 0.0084 | 0.0009 | 0.0075 |
| 41 | 0.0085 | 0.0010 | 0.0075 |
| 42 | 0.0085 | 0.0010 | 0.0075 |
| 43 | 0.0085 | 0.0010 | 0.0076 |
| 44 | 0.0085 | 0.0010 | 0.0076 |
| 45 | 0.0086 | 0.0010 | 0.0076 |
| 46 | 0.0086 | 0.0010 | 0.0076 |
| 47 | 0.0087 | 0.0010 | 0.0077 |
| 48 | 0.0087 | 0.0010 | 0.0077 |
| 49 | 0.0087 | 0.0010 | 0.0078 |
| 50 | 0.0088 | 0.0010 | 0.0078 |
| 51 | 0.0088 | 0.0010 | 0.0078 |
| 52 | 0.0088 | 0.0010 | 0.0079 |
| 53 | 0.0089 | 0.0010 | 0.0079 |
| 54 | 0.0089 | 0.0010 | 0.0079 |
| 55 | 0.0090 | 0.0010 | 0.0080 |
| 56 | 0.0090 | 0.0010 | 0.0080 |
| 57 | 0.0091 | 0.0010 | 0.0080 |
| 58 | 0.0091 | 0.0010 | 0.0081 |

| | | | |
|-----|--------|--------|--------|
| 59 | 0.0091 | 0.0010 | 0.0081 |
| 60 | 0.0092 | 0.0010 | 0.0081 |
| 61 | 0.0092 | 0.0010 | 0.0082 |
| 62 | 0.0093 | 0.0010 | 0.0082 |
| 63 | 0.0093 | 0.0010 | 0.0083 |
| 64 | 0.0094 | 0.0011 | 0.0083 |
| 65 | 0.0094 | 0.0011 | 0.0084 |
| 66 | 0.0094 | 0.0011 | 0.0084 |
| 67 | 0.0095 | 0.0011 | 0.0084 |
| 68 | 0.0095 | 0.0011 | 0.0085 |
| 69 | 0.0096 | 0.0011 | 0.0085 |
| 70 | 0.0096 | 0.0011 | 0.0086 |
| 71 | 0.0097 | 0.0011 | 0.0086 |
| 72 | 0.0097 | 0.0011 | 0.0086 |
| 73 | 0.0098 | 0.0011 | 0.0087 |
| 74 | 0.0098 | 0.0011 | 0.0087 |
| 75 | 0.0099 | 0.0011 | 0.0088 |
| 76 | 0.0099 | 0.0011 | 0.0088 |
| 77 | 0.0100 | 0.0011 | 0.0089 |
| 78 | 0.0101 | 0.0011 | 0.0089 |
| 79 | 0.0101 | 0.0011 | 0.0090 |
| 80 | 0.0102 | 0.0011 | 0.0090 |
| 81 | 0.0102 | 0.0012 | 0.0091 |
| 82 | 0.0103 | 0.0012 | 0.0091 |
| 83 | 0.0104 | 0.0012 | 0.0092 |
| 84 | 0.0104 | 0.0012 | 0.0092 |
| 85 | 0.0105 | 0.0012 | 0.0093 |
| 86 | 0.0105 | 0.0012 | 0.0093 |
| 87 | 0.0106 | 0.0012 | 0.0094 |
| 88 | 0.0106 | 0.0012 | 0.0094 |
| 89 | 0.0107 | 0.0012 | 0.0095 |
| 90 | 0.0108 | 0.0012 | 0.0096 |
| 91 | 0.0109 | 0.0012 | 0.0096 |
| 92 | 0.0109 | 0.0012 | 0.0097 |
| 93 | 0.0110 | 0.0012 | 0.0098 |
| 94 | 0.0110 | 0.0012 | 0.0098 |
| 95 | 0.0111 | 0.0013 | 0.0099 |
| 96 | 0.0112 | 0.0013 | 0.0099 |
| 97 | 0.0113 | 0.0013 | 0.0100 |
| 98 | 0.0113 | 0.0013 | 0.0101 |
| 99 | 0.0114 | 0.0013 | 0.0101 |
| 100 | 0.0115 | 0.0013 | 0.0102 |
| 101 | 0.0116 | 0.0013 | 0.0103 |
| 102 | 0.0116 | 0.0013 | 0.0103 |
| 103 | 0.0117 | 0.0013 | 0.0104 |
| 104 | 0.0118 | 0.0013 | 0.0105 |
| 105 | 0.0119 | 0.0013 | 0.0106 |
| 106 | 0.0120 | 0.0013 | 0.0106 |
| 107 | 0.0121 | 0.0014 | 0.0107 |
| 108 | 0.0121 | 0.0014 | 0.0108 |
| 109 | 0.0123 | 0.0014 | 0.0109 |
| 110 | 0.0123 | 0.0014 | 0.0109 |
| 111 | 0.0125 | 0.0014 | 0.0111 |
| 112 | 0.0125 | 0.0014 | 0.0111 |
| 113 | 0.0127 | 0.0014 | 0.0112 |
| 114 | 0.0127 | 0.0014 | 0.0113 |
| 115 | 0.0129 | 0.0014 | 0.0114 |
| 116 | 0.0129 | 0.0015 | 0.0115 |
| 117 | 0.0131 | 0.0015 | 0.0116 |
| 118 | 0.0131 | 0.0015 | 0.0117 |
| 119 | 0.0133 | 0.0015 | 0.0118 |
| 120 | 0.0134 | 0.0015 | 0.0119 |
| 121 | 0.0135 | 0.0015 | 0.0120 |
| 122 | 0.0136 | 0.0015 | 0.0121 |
| 123 | 0.0138 | 0.0015 | 0.0122 |
| 124 | 0.0138 | 0.0016 | 0.0123 |
| 125 | 0.0140 | 0.0016 | 0.0124 |
| 126 | 0.0141 | 0.0016 | 0.0125 |
| 127 | 0.0143 | 0.0016 | 0.0127 |
| 128 | 0.0144 | 0.0016 | 0.0128 |
| 129 | 0.0146 | 0.0016 | 0.0129 |
| 130 | 0.0147 | 0.0016 | 0.0130 |
| 131 | 0.0149 | 0.0017 | 0.0132 |

| | | | |
|-----|--------|--------|--------|
| 132 | 0.0150 | 0.0017 | 0.0133 |
| 133 | 0.0152 | 0.0017 | 0.0135 |
| 134 | 0.0153 | 0.0017 | 0.0136 |
| 135 | 0.0155 | 0.0017 | 0.0138 |
| 136 | 0.0156 | 0.0018 | 0.0139 |
| 137 | 0.0158 | 0.0018 | 0.0141 |
| 138 | 0.0160 | 0.0018 | 0.0142 |
| 139 | 0.0162 | 0.0018 | 0.0144 |
| 140 | 0.0163 | 0.0018 | 0.0145 |
| 141 | 0.0166 | 0.0019 | 0.0147 |
| 142 | 0.0167 | 0.0019 | 0.0149 |
| 143 | 0.0170 | 0.0019 | 0.0151 |
| 144 | 0.0172 | 0.0019 | 0.0152 |
| 145 | 0.0220 | 0.0025 | 0.0195 |
| 146 | 0.0221 | 0.0025 | 0.0197 |
| 147 | 0.0225 | 0.0025 | 0.0200 |
| 148 | 0.0227 | 0.0025 | 0.0201 |
| 149 | 0.0230 | 0.0026 | 0.0204 |
| 150 | 0.0232 | 0.0026 | 0.0206 |
| 151 | 0.0236 | 0.0027 | 0.0209 |
| 152 | 0.0238 | 0.0027 | 0.0211 |
| 153 | 0.0242 | 0.0027 | 0.0215 |
| 154 | 0.0244 | 0.0028 | 0.0217 |
| 155 | 0.0249 | 0.0028 | 0.0221 |
| 156 | 0.0251 | 0.0028 | 0.0223 |
| 157 | 0.0256 | 0.0029 | 0.0227 |
| 158 | 0.0259 | 0.0029 | 0.0230 |
| 159 | 0.0264 | 0.0030 | 0.0235 |
| 160 | 0.0267 | 0.0030 | 0.0237 |
| 161 | 0.0273 | 0.0031 | 0.0242 |
| 162 | 0.0276 | 0.0031 | 0.0245 |
| 163 | 0.0283 | 0.0032 | 0.0251 |
| 164 | 0.0286 | 0.0032 | 0.0254 |
| 165 | 0.0293 | 0.0033 | 0.0260 |
| 166 | 0.0297 | 0.0033 | 0.0264 |
| 167 | 0.0305 | 0.0034 | 0.0271 |
| 168 | 0.0309 | 0.0035 | 0.0275 |
| 169 | 0.0336 | 0.0038 | 0.0298 |
| 170 | 0.0340 | 0.0038 | 0.0302 |
| 171 | 0.0351 | 0.0039 | 0.0311 |
| 172 | 0.0356 | 0.0040 | 0.0316 |
| 173 | 0.0368 | 0.0041 | 0.0327 |
| 174 | 0.0375 | 0.0042 | 0.0333 |
| 175 | 0.0389 | 0.0044 | 0.0345 |
| 176 | 0.0396 | 0.0045 | 0.0352 |
| 177 | 0.0413 | 0.0046 | 0.0367 |
| 178 | 0.0422 | 0.0048 | 0.0375 |
| 179 | 0.0443 | 0.0050 | 0.0393 |
| 180 | 0.0454 | 0.0051 | 0.0403 |
| 181 | 0.0479 | 0.0054 | 0.0425 |
| 182 | 0.0494 | 0.0056 | 0.0438 |
| 183 | 0.0527 | 0.0059 | 0.0468 |
| 184 | 0.0547 | 0.0061 | 0.0485 |
| 185 | 0.0494 | 0.0056 | 0.0439 |
| 186 | 0.0521 | 0.0059 | 0.0463 |
| 187 | 0.0590 | 0.0066 | 0.0524 |
| 188 | 0.0636 | 0.0072 | 0.0564 |
| 189 | 0.0766 | 0.0086 | 0.0680 |
| 190 | 0.0862 | 0.0097 | 0.0765 |
| 191 | 0.1222 | 0.0138 | 0.1085 |
| 192 | 0.1669 | 0.0187 | 0.1483 |
| 193 | 0.5036 | 0.0187 | 0.4849 |
| 194 | 0.1000 | 0.0113 | 0.0888 |
| 195 | 0.0692 | 0.0078 | 0.0614 |
| 196 | 0.0553 | 0.0062 | 0.0491 |
| 197 | 0.0568 | 0.0064 | 0.0504 |
| 198 | 0.0510 | 0.0057 | 0.0452 |
| 199 | 0.0466 | 0.0052 | 0.0414 |
| 200 | 0.0432 | 0.0049 | 0.0384 |
| 201 | 0.0405 | 0.0046 | 0.0359 |
| 202 | 0.0382 | 0.0043 | 0.0339 |
| 203 | 0.0362 | 0.0041 | 0.0321 |
| 204 | 0.0346 | 0.0039 | 0.0307 |

| | | | |
|-----|--------|--------|--------|
| 205 | 0.0314 | 0.0035 | 0.0279 |
| 206 | 0.0301 | 0.0034 | 0.0267 |
| 207 | 0.0290 | 0.0033 | 0.0257 |
| 208 | 0.0279 | 0.0031 | 0.0248 |
| 209 | 0.0270 | 0.0030 | 0.0240 |
| 210 | 0.0262 | 0.0029 | 0.0232 |
| 211 | 0.0254 | 0.0029 | 0.0225 |
| 212 | 0.0247 | 0.0028 | 0.0219 |
| 213 | 0.0240 | 0.0027 | 0.0213 |
| 214 | 0.0234 | 0.0026 | 0.0208 |
| 215 | 0.0228 | 0.0026 | 0.0203 |
| 216 | 0.0223 | 0.0025 | 0.0198 |
| 217 | 0.0173 | 0.0019 | 0.0154 |
| 218 | 0.0169 | 0.0019 | 0.0150 |
| 219 | 0.0165 | 0.0019 | 0.0146 |
| 220 | 0.0161 | 0.0018 | 0.0143 |
| 221 | 0.0157 | 0.0018 | 0.0140 |
| 222 | 0.0154 | 0.0017 | 0.0137 |
| 223 | 0.0151 | 0.0017 | 0.0134 |
| 224 | 0.0148 | 0.0017 | 0.0131 |
| 225 | 0.0145 | 0.0016 | 0.0128 |
| 226 | 0.0142 | 0.0016 | 0.0126 |
| 227 | 0.0139 | 0.0016 | 0.0124 |
| 228 | 0.0137 | 0.0015 | 0.0121 |
| 229 | 0.0134 | 0.0015 | 0.0119 |
| 230 | 0.0132 | 0.0015 | 0.0117 |
| 231 | 0.0130 | 0.0015 | 0.0115 |
| 232 | 0.0128 | 0.0014 | 0.0113 |
| 233 | 0.0126 | 0.0014 | 0.0112 |
| 234 | 0.0124 | 0.0014 | 0.0110 |
| 235 | 0.0122 | 0.0014 | 0.0108 |
| 236 | 0.0120 | 0.0014 | 0.0107 |
| 237 | 0.0119 | 0.0013 | 0.0105 |
| 238 | 0.0117 | 0.0013 | 0.0104 |
| 239 | 0.0115 | 0.0013 | 0.0102 |
| 240 | 0.0114 | 0.0013 | 0.0101 |
| 241 | 0.0112 | 0.0013 | 0.0100 |
| 242 | 0.0111 | 0.0012 | 0.0098 |
| 243 | 0.0109 | 0.0012 | 0.0097 |
| 244 | 0.0108 | 0.0012 | 0.0096 |
| 245 | 0.0107 | 0.0012 | 0.0095 |
| 246 | 0.0106 | 0.0012 | 0.0094 |
| 247 | 0.0104 | 0.0012 | 0.0093 |
| 248 | 0.0103 | 0.0012 | 0.0092 |
| 249 | 0.0102 | 0.0011 | 0.0091 |
| 250 | 0.0101 | 0.0011 | 0.0090 |
| 251 | 0.0100 | 0.0011 | 0.0089 |
| 252 | 0.0099 | 0.0011 | 0.0088 |
| 253 | 0.0098 | 0.0011 | 0.0087 |
| 254 | 0.0097 | 0.0011 | 0.0086 |
| 255 | 0.0096 | 0.0011 | 0.0085 |
| 256 | 0.0095 | 0.0011 | 0.0084 |
| 257 | 0.0094 | 0.0011 | 0.0083 |
| 258 | 0.0093 | 0.0010 | 0.0082 |
| 259 | 0.0092 | 0.0010 | 0.0082 |
| 260 | 0.0091 | 0.0010 | 0.0081 |
| 261 | 0.0090 | 0.0010 | 0.0080 |
| 262 | 0.0090 | 0.0010 | 0.0079 |
| 263 | 0.0089 | 0.0010 | 0.0079 |
| 264 | 0.0088 | 0.0010 | 0.0078 |
| 265 | 0.0087 | 0.0010 | 0.0077 |
| 266 | 0.0086 | 0.0010 | 0.0077 |
| 267 | 0.0086 | 0.0010 | 0.0076 |
| 268 | 0.0085 | 0.0010 | 0.0075 |
| 269 | 0.0084 | 0.0009 | 0.0075 |
| 270 | 0.0084 | 0.0009 | 0.0074 |
| 271 | 0.0083 | 0.0009 | 0.0074 |
| 272 | 0.0082 | 0.0009 | 0.0073 |
| 273 | 0.0082 | 0.0009 | 0.0072 |
| 274 | 0.0081 | 0.0009 | 0.0072 |
| 275 | 0.0080 | 0.0009 | 0.0071 |
| 276 | 0.0080 | 0.0009 | 0.0071 |
| 277 | 0.0079 | 0.0009 | 0.0070 |

| | | | |
|-----|--------|--------|--------|
| 278 | 0.0079 | 0.0009 | 0.0070 |
| 279 | 0.0078 | 0.0009 | 0.0069 |
| 280 | 0.0077 | 0.0009 | 0.0069 |
| 281 | 0.0077 | 0.0009 | 0.0068 |
| 282 | 0.0076 | 0.0009 | 0.0068 |
| 283 | 0.0076 | 0.0009 | 0.0067 |
| 284 | 0.0075 | 0.0008 | 0.0067 |
| 285 | 0.0075 | 0.0008 | 0.0066 |
| 286 | 0.0074 | 0.0008 | 0.0066 |
| 287 | 0.0074 | 0.0008 | 0.0065 |
| 288 | 0.0073 | 0.0008 | 0.0065 |

Total soil rain loss = 0.59(In)
Total effective rainfall = 5.03(In)
Peak flow rate in flood hydrograph = 1217.45(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 325.0 | 650.0 | 975.0 | 1300.0 |
|-----------|--------------|--------|----|-------|-------|-------|--------|
| 0+ 5 | 0.0039 | 0.57 | Q | | | | |
| 0+10 | 0.0182 | 2.08 | Q | | | | |
| 0+15 | 0.0477 | 4.28 | Q | | | | |
| 0+20 | 0.0985 | 7.38 | Q | | | | |
| 0+25 | 0.1818 | 12.09 | Q | | | | |
| 0+30 | 0.3264 | 21.01 | Q | | | | |
| 0+35 | 0.5323 | 29.89 | Q | | | | |
| 0+40 | 0.7677 | 34.18 | VQ | | | | |
| 0+45 | 1.0249 | 37.34 | VQ | | | | |
| 0+50 | 1.2988 | 39.77 | VQ | | | | |
| 0+55 | 1.5875 | 41.92 | VQ | | | | |
| 1+ 0 | 1.8887 | 43.73 | VQ | | | | |
| 1+ 5 | 2.2005 | 45.28 | VQ | | | | |
| 1+10 | 2.5220 | 46.67 | VQ | | | | |
| 1+15 | 2.8519 | 47.91 | VQ | | | | |
| 1+20 | 3.1894 | 49.00 | VQ | | | | |
| 1+25 | 3.5336 | 49.99 | VQ | | | | |
| 1+30 | 3.8840 | 50.87 | VQ | | | | |
| 1+35 | 4.2398 | 51.66 | VQ | | | | |
| 1+40 | 4.6005 | 52.37 | VQ | | | | |
| 1+45 | 4.9654 | 52.98 | VQ | | | | |
| 1+50 | 5.3341 | 53.55 | VQ | | | | |
| 1+55 | 5.7064 | 54.06 | VQ | | | | |
| 2+ 0 | 6.0817 | 54.49 | VQ | | | | |
| 2+ 5 | 6.4594 | 54.83 | VQ | | | | |
| 2+10 | 6.8391 | 55.13 | VQ | | | | |
| 2+15 | 7.2209 | 55.44 | Q | | | | |
| 2+20 | 7.6047 | 55.73 | Q | | | | |
| 2+25 | 7.9906 | 56.03 | Q | | | | |
| 2+30 | 8.3784 | 56.32 | Q | | | | |
| 2+35 | 8.7682 | 56.59 | Q | | | | |
| 2+40 | 9.1597 | 56.85 | Q | | | | |
| 2+45 | 9.5531 | 57.12 | Q | | | | |
| 2+50 | 9.9484 | 57.40 | Q | | | | |
| 2+55 | 10.3458 | 57.69 | Q | | | | |
| 3+ 0 | 10.7451 | 57.98 | Q | | | | |
| 3+ 5 | 11.1462 | 58.24 | Q | | | | |
| 3+10 | 11.5491 | 58.50 | Q | | | | |
| 3+15 | 11.9538 | 58.76 | Q | | | | |
| 3+20 | 12.3602 | 59.01 | Q | | | | |
| 3+25 | 12.7683 | 59.26 | Q | | | | |
| 3+30 | 13.1782 | 59.51 | Q | | | | |
| 3+35 | 13.5897 | 59.75 | Q | | | | |
| 3+40 | 14.0028 | 59.99 | Q | | | | |
| 3+45 | 14.4176 | 60.23 | QV | | | | |
| 3+50 | 14.8341 | 60.47 | QV | | | | |
| 3+55 | 15.2523 | 60.72 | QV | | | | |

| | | | | | | |
|-------|---------|-------|-------|--|--|--|
| 4+ 0 | 15.6722 | 60.97 | QV | | | |
| 4+ 5 | 16.0938 | 61.22 | QV | | | |
| 4+10 | 16.5172 | 61.48 | QV | | | |
| 4+15 | 16.9424 | 61.73 | QV | | | |
| 4+20 | 17.3693 | 61.99 | QV | | | |
| 4+25 | 17.7981 | 62.26 | QV | | | |
| 4+30 | 18.2287 | 62.52 | QV | | | |
| 4+35 | 18.6611 | 62.79 | QV | | | |
| 4+40 | 19.0955 | 63.06 | QV | | | |
| 4+45 | 19.5317 | 63.34 | QV | | | |
| 4+50 | 19.9699 | 63.62 | QV | | | |
| 4+55 | 20.4099 | 63.90 | QV | | | |
| 5+ 0 | 20.8520 | 64.19 | QV | | | |
| 5+ 5 | 21.2960 | 64.47 | Q V | | | |
| 5+10 | 21.7421 | 64.76 | Q V | | | |
| 5+15 | 22.1901 | 65.06 | QV | | | |
| 5+20 | 22.6403 | 65.36 | QV | | | |
| 5+25 | 23.0925 | 65.66 | QV | | | |
| 5+30 | 23.5468 | 65.97 | QV | | | |
| 5+35 | 24.0033 | 66.28 | QV | | | |
| 5+40 | 24.4619 | 66.59 | QV | | | |
| 5+45 | 24.9227 | 66.91 | QV | | | |
| 5+50 | 25.3857 | 67.23 | QV | | | |
| 5+55 | 25.8509 | 67.55 | QV | | | |
| 6+ 0 | 26.3184 | 67.88 | QV | | | |
| 6+ 5 | 26.7882 | 68.22 | QV | | | |
| 6+10 | 27.2604 | 68.55 | QV | | | |
| 6+15 | 27.7349 | 68.90 | QV | | | |
| 6+20 | 28.2118 | 69.24 | QV | | | |
| 6+25 | 28.6911 | 69.60 | Q V V | | | |
| 6+30 | 29.1728 | 69.95 | Q V | | | |
| 6+35 | 29.6571 | 70.31 | Q V | | | |
| 6+40 | 30.1438 | 70.68 | Q V | | | |
| 6+45 | 30.6331 | 71.05 | Q V | | | |
| 6+50 | 31.1250 | 71.42 | Q V | | | |
| 6+55 | 31.6196 | 71.81 | Q V | | | |
| 7+ 0 | 32.1167 | 72.19 | Q V | | | |
| 7+ 5 | 32.6166 | 72.58 | Q V | | | |
| 7+10 | 33.1192 | 72.98 | Q V | | | |
| 7+15 | 33.6246 | 73.38 | Q V | | | |
| 7+20 | 34.1328 | 73.79 | Q V | | | |
| 7+25 | 34.6439 | 74.21 | Q V | | | |
| 7+30 | 35.1579 | 74.63 | Q V | | | |
| 7+35 | 35.6748 | 75.06 | Q V | | | |
| 7+40 | 36.1947 | 75.49 | Q V | | | |
| 7+45 | 36.7176 | 75.93 | Q V | | | |
| 7+50 | 37.2436 | 76.38 | Q V | | | |
| 7+55 | 37.7727 | 76.83 | Q V | | | |
| 8+ 0 | 38.3050 | 77.29 | Q V | | | |
| 8+ 5 | 38.8406 | 77.76 | Q V | | | |
| 8+10 | 39.3794 | 78.23 | Q V | | | |
| 8+15 | 39.9215 | 78.72 | Q V | | | |
| 8+20 | 40.4670 | 79.21 | Q V | | | |
| 8+25 | 41.0160 | 79.71 | Q V | | | |
| 8+30 | 41.5684 | 80.22 | Q V | | | |
| 8+35 | 42.1244 | 80.73 | Q V | | | |
| 8+40 | 42.6840 | 81.26 | Q V | | | |
| 8+45 | 43.2473 | 81.79 | Q V | | | |
| 8+50 | 43.8144 | 82.33 | Q V | | | |
| 8+55 | 44.3852 | 82.89 | Q V | | | |
| 9+ 0 | 44.9599 | 83.45 | Q V | | | |
| 9+ 5 | 45.5386 | 84.02 | Q V | | | |
| 9+10 | 46.1212 | 84.60 | Q V | | | |
| 9+15 | 46.7080 | 85.20 | Q V | | | |
| 9+20 | 47.2989 | 85.80 | Q V | | | |
| 9+25 | 47.8940 | 86.42 | Q V | | | |
| 9+30 | 48.4935 | 87.04 | Q V | | | |
| 9+35 | 49.0973 | 87.68 | Q V | | | |
| 9+40 | 49.7057 | 88.33 | Q V | | | |
| 9+45 | 50.3186 | 89.00 | Q V | | | |
| 9+50 | 50.9362 | 89.67 | Q V | | | |
| 9+55 | 51.5585 | 90.36 | Q V | | | |
| 10+ 0 | 52.1857 | 91.07 | Q V | | | |

| | | | | | | | | |
|-------|----------|--------|---|---|--|--|--|--|
| 10+ 5 | 52.8179 | 91.79 | Q | V | | | | |
| 10+10 | 53.4551 | 92.52 | Q | V | | | | |
| 10+15 | 54.0975 | 93.27 | Q | V | | | | |
| 10+20 | 54.7451 | 94.04 | Q | V | | | | |
| 10+25 | 55.3981 | 94.82 | Q | V | | | | |
| 10+30 | 56.0567 | 95.62 | Q | V | | | | |
| 10+35 | 56.7209 | 96.44 | Q | V | | | | |
| 10+40 | 57.3908 | 97.27 | Q | V | | | | |
| 10+45 | 58.0666 | 98.13 | Q | V | | | | |
| 10+50 | 58.7485 | 99.00 | Q | V | | | | |
| 10+55 | 59.4365 | 99.90 | Q | V | | | | |
| 11+ 0 | 60.1308 | 100.82 | Q | V | | | | |
| 11+ 5 | 60.8316 | 101.76 | Q | V | | | | |
| 11+10 | 61.5390 | 102.72 | Q | V | | | | |
| 11+15 | 62.2533 | 103.71 | Q | V | | | | |
| 11+20 | 62.9745 | 104.72 | Q | V | | | | |
| 11+25 | 63.7028 | 105.76 | Q | V | | | | |
| 11+30 | 64.4385 | 106.82 | Q | V | | | | |
| 11+35 | 65.1817 | 107.92 | Q | V | | | | |
| 11+40 | 65.9327 | 109.04 | Q | V | | | | |
| 11+45 | 66.6916 | 110.19 | Q | V | | | | |
| 11+50 | 67.4587 | 111.38 | Q | V | | | | |
| 11+55 | 68.2342 | 112.60 | Q | V | | | | |
| 12+ 0 | 69.0183 | 113.86 | Q | V | | | | |
| 12+ 5 | 69.8138 | 115.51 | Q | V | | | | |
| 12+10 | 70.6249 | 117.77 | Q | V | | | | |
| 12+15 | 71.4549 | 120.51 | Q | V | | | | |
| 12+20 | 72.3078 | 123.85 | Q | V | | | | |
| 12+25 | 73.1909 | 128.23 | Q | V | | | | |
| 12+30 | 74.1225 | 135.26 | Q | V | | | | |
| 12+35 | 75.1028 | 142.34 | Q | V | | | | |
| 12+40 | 76.1124 | 146.60 | Q | V | | | | |
| 12+45 | 77.1471 | 150.23 | Q | V | | | | |
| 12+50 | 78.2040 | 153.46 | Q | V | | | | |
| 12+55 | 79.2824 | 156.59 | Q | V | | | | |
| 13+ 0 | 80.3813 | 159.56 | Q | V | | | | |
| 13+ 5 | 81.5001 | 162.45 | Q | V | | | | |
| 13+10 | 82.6386 | 165.31 | Q | V | | | | |
| 13+15 | 83.7966 | 168.15 | Q | V | | | | |
| 13+20 | 84.9742 | 170.99 | Q | V | | | | |
| 13+25 | 86.1716 | 173.85 | Q | V | | | | |
| 13+30 | 87.3888 | 176.74 | Q | V | | | | |
| 13+35 | 88.6263 | 179.69 | Q | V | | | | |
| 13+40 | 89.8844 | 182.68 | Q | V | | | | |
| 13+45 | 91.1636 | 185.74 | Q | V | | | | |
| 13+50 | 92.4645 | 188.89 | Q | V | | | | |
| 13+55 | 93.7878 | 192.15 | Q | V | | | | |
| 14+ 0 | 95.1343 | 195.50 | Q | V | | | | |
| 14+ 5 | 96.5055 | 199.10 | Q | V | | | | |
| 14+10 | 97.9039 | 203.06 | Q | V | | | | |
| 14+15 | 99.3322 | 207.38 | Q | V | | | | |
| 14+20 | 100.7930 | 212.11 | Q | V | | | | |
| 14+25 | 102.2906 | 217.45 | Q | V | | | | |
| 14+30 | 103.8333 | 224.01 | Q | V | | | | |
| 14+35 | 105.4231 | 230.83 | Q | V | | | | |
| 14+40 | 107.0545 | 236.88 | Q | V | | | | |
| 14+45 | 108.7281 | 243.02 | Q | V | | | | |
| 14+50 | 110.4456 | 249.37 | Q | V | | | | |
| 14+55 | 112.2095 | 256.12 | Q | V | | | | |
| 15+ 0 | 114.0226 | 263.26 | Q | V | | | | |
| 15+ 5 | 115.8885 | 270.93 | Q | V | | | | |
| 15+10 | 117.8113 | 279.19 | Q | V | | | | |
| 15+15 | 119.7963 | 288.22 | Q | V | | | | |
| 15+20 | 121.8493 | 298.10 | Q | V | | | | |
| 15+25 | 123.9726 | 308.31 | Q | V | | | | |
| 15+30 | 126.1664 | 318.54 | Q | V | | | | |
| 15+35 | 128.4358 | 329.51 | Q | V | | | | |
| 15+40 | 130.7866 | 341.34 | Q | V | | | | |
| 15+45 | 133.2238 | 353.89 | Q | V | | | | |
| 15+50 | 135.7360 | 364.76 | Q | V | | | | |
| 15+55 | 138.3686 | 382.26 | Q | V | | | | |
| 16+ 0 | 141.2445 | 417.58 | Q | V | | | | |
| 16+ 5 | 144.6644 | 496.57 | Q | V | | | | |

| | | | | | | | | |
|-------|----------|---------|--|--|---|---|---|---|
| 16+10 | 148.8172 | 602.99 | | | Q | V | | |
| 16+15 | 153.6329 | 699.23 | | | Q | V | | |
| 16+20 | 159.2527 | 816.00 | | | | V | Q | |
| 16+25 | 165.9539 | 973.01 | | | | V | | Q |
| 16+30 | 174.3385 | 1217.45 | | | | V | | Q |
| 16+35 | 182.3077 | 1157.13 | | | | V | | Q |
| 16+40 | 187.9918 | 825.33 | | | | Q | V | |
| 16+45 | 192.8173 | 700.66 | | | | | V | |
| 16+50 | 197.0987 | 621.66 | | | | Q | V | |
| 16+55 | 201.0627 | 575.57 | | | | | V | |
| 17+ 0 | 204.6928 | 527.09 | | | | | V | |
| 17+ 5 | 208.0432 | 486.48 | | | | | V | |
| 17+10 | 211.1615 | 452.78 | | | Q | | V | |
| 17+15 | 214.0693 | 422.22 | | | Q | | V | |
| 17+20 | 216.7809 | 393.73 | | | Q | | V | |
| 17+25 | 219.3229 | 369.10 | | | Q | | V | |
| 17+30 | 221.6983 | 344.91 | | | Q | | V | |
| 17+35 | 223.9153 | 321.91 | | | Q | | V | |
| 17+40 | 225.9963 | 302.16 | | | Q | | V | |
| 17+45 | 227.9447 | 282.90 | | | Q | | V | |
| 17+50 | 229.7859 | 267.34 | | | Q | | V | |
| 17+55 | 231.5250 | 252.51 | | | Q | | V | |
| 18+ 0 | 233.1575 | 237.05 | | | Q | | V | |
| 18+ 5 | 234.6807 | 221.17 | | | Q | | V | |
| 18+10 | 236.1286 | 210.23 | | | Q | | V | |
| 18+15 | 237.5179 | 201.73 | | | Q | | V | |
| 18+20 | 238.8454 | 192.76 | | | Q | | V | |
| 18+25 | 240.1110 | 183.76 | | | Q | | V | |
| 18+30 | 241.2995 | 172.58 | | | Q | | V | |
| 18+35 | 242.4060 | 160.66 | | | Q | | V | |
| 18+40 | 243.4621 | 153.34 | | | Q | | V | |
| 18+45 | 244.4791 | 147.68 | | | Q | | V | |
| 18+50 | 245.4662 | 143.33 | | | Q | | V | |
| 18+55 | 246.4206 | 138.57 | | | Q | | V | |
| 19+ 0 | 247.3406 | 133.59 | | | Q | | V | |
| 19+ 5 | 248.2204 | 127.74 | | | Q | | V | |
| 19+10 | 249.0708 | 123.49 | | | Q | | V | |
| 19+15 | 249.8948 | 119.63 | | | Q | | V | |
| 19+20 | 250.6901 | 115.49 | | | Q | | V | |
| 19+25 | 251.4627 | 112.17 | | | Q | | V | |
| 19+30 | 252.2138 | 109.07 | | | Q | | V | |
| 19+35 | 252.9396 | 105.39 | | | Q | | V | |
| 19+40 | 253.6483 | 102.90 | | | Q | | V | |
| 19+45 | 254.3414 | 100.65 | | | Q | | V | |
| 19+50 | 255.0202 | 98.55 | | | Q | | V | |
| 19+55 | 255.6854 | 96.58 | | | Q | | V | |
| 20+ 0 | 256.3379 | 94.75 | | | Q | | V | |
| 20+ 5 | 256.9789 | 93.07 | | | Q | | V | |
| 20+10 | 257.6090 | 91.49 | | | Q | | V | |
| 20+15 | 258.2287 | 89.98 | | | Q | | V | |
| 20+20 | 258.8384 | 88.54 | | | Q | | V | |
| 20+25 | 259.4387 | 87.16 | | | Q | | V | |
| 20+30 | 260.0299 | 85.84 | | | Q | | V | |
| 20+35 | 260.6124 | 84.58 | | | Q | | V | |
| 20+40 | 261.1866 | 83.38 | | | Q | | V | |
| 20+45 | 261.7529 | 82.22 | | | Q | | V | |
| 20+50 | 262.3114 | 81.09 | | | Q | | V | |
| 20+55 | 262.8623 | 80.00 | | | Q | | V | |
| 21+ 0 | 263.4060 | 78.94 | | | Q | | V | |
| 21+ 5 | 263.9428 | 77.94 | | | Q | | V | |
| 21+10 | 264.4729 | 76.97 | | | Q | | V | |
| 21+15 | 264.9965 | 76.03 | | | Q | | V | |
| 21+20 | 265.5140 | 75.13 | | | Q | | V | |
| 21+25 | 266.0254 | 74.26 | | | Q | | V | |
| 21+30 | 266.5310 | 73.42 | | | Q | | V | |
| 21+35 | 267.0311 | 72.61 | | | Q | | V | |
| 21+40 | 267.5257 | 71.82 | | | Q | | V | |
| 21+45 | 268.0151 | 71.06 | | | Q | | V | |
| 21+50 | 268.4993 | 70.31 | | | Q | | V | |
| 21+55 | 268.9786 | 69.59 | | | Q | | V | |
| 22+ 0 | 269.4530 | 68.88 | | | Q | | V | |
| 22+ 5 | 269.9227 | 68.20 | | | Q | | V | |
| 22+10 | 270.3878 | 67.53 | | | Q | | V | |

| | | | | | | |
|-------|----------|-------|---|--|--|---|
| 22+15 | 270.8484 | 66.88 | Q | | | V |
| 22+20 | 271.3046 | 66.25 | Q | | | V |
| 22+25 | 271.7566 | 65.63 | Q | | | V |
| 22+30 | 272.2044 | 65.02 | Q | | | V |
| 22+35 | 272.6481 | 64.43 | Q | | | V |
| 22+40 | 273.0879 | 63.86 | Q | | | V |
| 22+45 | 273.5238 | 63.29 | Q | | | V |
| 22+50 | 273.9559 | 62.74 | Q | | | V |
| 22+55 | 274.3844 | 62.21 | Q | | | V |
| 23+ 0 | 274.8092 | 61.68 | Q | | | V |
| 23+ 5 | 275.2304 | 61.17 | Q | | | V |
| 23+10 | 275.6482 | 60.66 | Q | | | V |
| 23+15 | 276.0627 | 60.17 | Q | | | V |
| 23+20 | 276.4737 | 59.69 | Q | | | V |
| 23+25 | 276.8816 | 59.22 | Q | | | V |
| 23+30 | 277.2862 | 58.76 | Q | | | V |
| 23+35 | 277.6878 | 58.30 | Q | | | V |
| 23+40 | 278.0863 | 57.86 | Q | | | V |
| 23+45 | 278.4817 | 57.42 | Q | | | V |
| 23+50 | 278.8743 | 57.00 | Q | | | V |
| 23+55 | 279.2640 | 56.58 | Q | | | V |
| 24+ 0 | 279.6508 | 56.17 | Q | | | V |

Unit Hydrograph Analysis

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Study date 08/04/15 File Name CieloVistaPrWshdAUH25.out

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Orange County Unit Hydrograph Hydrology Method
 Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

 WATERSHED A
 PROPOSED CONDITIONS - CREEK A
 25-YEAR STORM
 BY FUSCOE ENGINEERING

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.54 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.39 | D | 0.200 | 1.000 | 0.200 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 8.0 | 0.01 | D | 0.200 | 1.000 | 0.200 |
| 75.0 | 15.1 | 0.02 | D | 0.200 | 0.600 | 0.120 |
| 75.0 | 13.0 | 0.02 | D | 0.200 | 0.600 | 0.120 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC2) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 82.0 | 2.20 | 0.585 |
| 0.20 | 0.000 | 72.0 | 72.0 | 3.89 | 0.404 |
| 365.10 | 0.541 | 79.0 | 79.0 | 2.66 | 0.527 |
| 264.30 | 0.392 | 84.0 | 84.0 | 1.90 | 0.625 |
| 1.50 | 0.002 | 56.0 | 56.0 | 7.86 | 0.176 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.947 |
| 1.50 | 0.002 | 56.0 | 56.0 | 7.86 | 0.176 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.947 |
| 3.70 | 0.005 | 79.0 | 79.0 | 2.66 | 0.527 |
| 8.00 | 0.012 | 84.0 | 84.0 | 1.90 | 0.625 |
| 9.06 | 0.013 | 75.0 | 75.0 | 3.33 | 0.455 |
| 6.04 | 0.009 | 98.0 | 98.0 | 0.20 | 0.947 |

| | | | | | |
|------|-------|------|------|------|-------|
| 7.80 | 0.012 | 75.0 | 75.0 | 3.33 | 0.455 |
| 5.20 | 0.008 | 98.0 | 98.0 | 0.20 | 0.947 |

Area-averaged catchment yield fraction, Y = 0.572
Area-averaged low loss fraction, Yb = 0.428
++++
User entry of time of concentration = 0.670 (hours)
Watershed area = 674.60(Ac.)
Catchment Lag time = 0.536 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 15.5426
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
Average low loss rate fraction (Yb) = 0.428 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 674.60(Ac.) (Ref: fig. E-4)

| | |
|--------------------------|-------------------------------|
| 5-minute factor = 0.968 | Adjusted rainfall = 0.387(In) |
| 30-minute factor = 0.968 | Adjusted rainfall = 0.842(In) |
| 1-hour factor = 0.968 | Adjusted rainfall = 1.114(In) |
| 3-hour factor = 0.996 | Adjusted rainfall = 1.932(In) |
| 6-hour factor = 0.998 | Adjusted rainfall = 2.704(In) |
| 24-hour factor = 0.999 | Adjusted rainfall = 4.486(In) |

U n i t H y d r o g r a p h

++++

| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|
| ----- | | |
| | (K = | 8158.44 (CFS)) |
| 1 | 0.985 | 80.358 |
| 2 | 3.515 | 206.443 |
| 3 | 7.138 | 295.583 |
| 4 | 11.980 | 394.990 |
| 5 | 19.155 | 585.357 |
| 6 | 30.299 | 909.222 |
| 7 | 49.711 | 1583.658 |
| 8 | 59.911 | 832.225 |
| 9 | 66.264 | 518.277 |
| 10 | 71.169 | 400.150 |
| 11 | 75.015 | 313.763 |
| 12 | 78.461 | 281.172 |
| 13 | 81.343 | 235.093 |
| 14 | 83.815 | 201.698 |
| 15 | 86.002 | 178.424 |
| 16 | 87.909 | 155.617 |
| 17 | 89.618 | 139.419 |
| 18 | 91.100 | 120.887 |
| 19 | 92.403 | 106.319 |
| 20 | 93.586 | 96.497 |
| 21 | 94.591 | 81.996 |
| 22 | 95.440 | 69.271 |
| 23 | 96.172 | 59.691 |
| 24 | 96.810 | 52.086 |
| 25 | 97.361 | 44.926 |
| 26 | 97.789 | 34.919 |
| 27 | 98.043 | 20.707 |
| 28 | 98.229 | 15.216 |
| 29 | 98.416 | 15.214 |
| 30 | 98.585 | 13.831 |
| 31 | 98.741 | 12.680 |

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| 32 | 98.896 | 12.680 |
| 33 | 99.030 | 10.932 |
| 34 | 99.124 | 7.681 |
| 35 | 99.217 | 7.608 |
| 36 | 99.316 | 8.085 |
| 37 | 99.438 | 9.955 |
| 38 | 99.563 | 10.144 |
| 39 | 99.682 | 9.746 |
| 40 | 99.756 | 5.996 |
| 41 | 99.818 | 5.072 |
| 42 | 99.880 | 5.031 |
| 43 | 99.921 | 3.390 |
| 44 | 99.952 | 2.536 |
| 45 | 99.983 | 2.536 |
| 46 | 100.000 | 1.363 |

| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
|---------------------|-----------------------------------|-----------------------|
| 1 | 0.3874 | 0.3874 |
| 2 | 0.5232 | 0.1358 |
| 3 | 0.6238 | 0.1006 |
| 4 | 0.7066 | 0.0829 |
| 5 | 0.7784 | 0.0718 |
| 6 | 0.8425 | 0.0640 |
| 7 | 0.8964 | 0.0539 |
| 8 | 0.9459 | 0.0495 |
| 9 | 0.9919 | 0.0459 |
| 10 | 1.0348 | 0.0430 |
| 11 | 1.0753 | 0.0405 |
| 12 | 1.1136 | 0.0383 |
| 13 | 1.1593 | 0.0456 |
| 14 | 1.2032 | 0.0439 |
| 15 | 1.2455 | 0.0424 |
| 16 | 1.2865 | 0.0410 |
| 17 | 1.3262 | 0.0397 |
| 18 | 1.3648 | 0.0386 |
| 19 | 1.4023 | 0.0375 |
| 20 | 1.4389 | 0.0365 |
| 21 | 1.4745 | 0.0356 |
| 22 | 1.5093 | 0.0348 |
| 23 | 1.5433 | 0.0340 |
| 24 | 1.5766 | 0.0333 |
| 25 | 1.6093 | 0.0326 |
| 26 | 1.6412 | 0.0320 |
| 27 | 1.6726 | 0.0314 |
| 28 | 1.7034 | 0.0308 |
| 29 | 1.7336 | 0.0302 |
| 30 | 1.7634 | 0.0297 |
| 31 | 1.7926 | 0.0292 |
| 32 | 1.8214 | 0.0288 |
| 33 | 1.8497 | 0.0283 |
| 34 | 1.8776 | 0.0279 |
| 35 | 1.9051 | 0.0275 |
| 36 | 1.9322 | 0.0271 |
| 37 | 1.9581 | 0.0258 |
| 38 | 1.9836 | 0.0255 |
| 39 | 2.0087 | 0.0251 |
| 40 | 2.0335 | 0.0248 |
| 41 | 2.0580 | 0.0245 |
| 42 | 2.0822 | 0.0242 |
| 43 | 2.1061 | 0.0239 |
| 44 | 2.1297 | 0.0236 |
| 45 | 2.1531 | 0.0233 |
| 46 | 2.1761 | 0.0231 |
| 47 | 2.1990 | 0.0228 |
| 48 | 2.2215 | 0.0226 |
| 49 | 2.2439 | 0.0223 |
| 50 | 2.2659 | 0.0221 |
| 51 | 2.2878 | 0.0219 |
| 52 | 2.3095 | 0.0216 |
| 53 | 2.3309 | 0.0214 |
| 54 | 2.3521 | 0.0212 |
| 55 | 2.3731 | 0.0210 |

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| 56 | 2.3940 | 0.0208 |
| 57 | 2.4146 | 0.0206 |
| 58 | 2.4351 | 0.0205 |
| 59 | 2.4553 | 0.0203 |
| 60 | 2.4754 | 0.0201 |
| 61 | 2.4954 | 0.0199 |
| 62 | 2.5151 | 0.0198 |
| 63 | 2.5347 | 0.0196 |
| 64 | 2.5541 | 0.0194 |
| 65 | 2.5734 | 0.0193 |
| 66 | 2.5925 | 0.0191 |
| 67 | 2.6115 | 0.0190 |
| 68 | 2.6304 | 0.0188 |
| 69 | 2.6490 | 0.0187 |
| 70 | 2.6676 | 0.0186 |
| 71 | 2.6860 | 0.0184 |
| 72 | 2.7043 | 0.0183 |
| 73 | 2.7179 | 0.0137 |
| 74 | 2.7315 | 0.0135 |
| 75 | 2.7449 | 0.0134 |
| 76 | 2.7582 | 0.0133 |
| 77 | 2.7714 | 0.0132 |
| 78 | 2.7845 | 0.0131 |
| 79 | 2.7975 | 0.0130 |
| 80 | 2.8103 | 0.0129 |
| 81 | 2.8231 | 0.0128 |
| 82 | 2.8358 | 0.0127 |
| 83 | 2.8484 | 0.0126 |
| 84 | 2.8609 | 0.0125 |
| 85 | 2.8732 | 0.0124 |
| 86 | 2.8855 | 0.0123 |
| 87 | 2.8978 | 0.0122 |
| 88 | 2.9099 | 0.0121 |
| 89 | 2.9219 | 0.0120 |
| 90 | 2.9338 | 0.0119 |
| 91 | 2.9457 | 0.0119 |
| 92 | 2.9575 | 0.0118 |
| 93 | 2.9692 | 0.0117 |
| 94 | 2.9808 | 0.0116 |
| 95 | 2.9923 | 0.0115 |
| 96 | 3.0038 | 0.0115 |
| 97 | 3.0152 | 0.0114 |
| 98 | 3.0265 | 0.0113 |
| 99 | 3.0377 | 0.0112 |
| 100 | 3.0489 | 0.0112 |
| 101 | 3.0600 | 0.0111 |
| 102 | 3.0710 | 0.0110 |
| 103 | 3.0820 | 0.0110 |
| 104 | 3.0929 | 0.0109 |
| 105 | 3.1037 | 0.0108 |
| 106 | 3.1145 | 0.0108 |
| 107 | 3.1252 | 0.0107 |
| 108 | 3.1358 | 0.0106 |
| 109 | 3.1464 | 0.0106 |
| 110 | 3.1569 | 0.0105 |
| 111 | 3.1673 | 0.0104 |
| 112 | 3.1777 | 0.0104 |
| 113 | 3.1880 | 0.0103 |
| 114 | 3.1983 | 0.0103 |
| 115 | 3.2085 | 0.0102 |
| 116 | 3.2187 | 0.0102 |
| 117 | 3.2288 | 0.0101 |
| 118 | 3.2388 | 0.0100 |
| 119 | 3.2488 | 0.0100 |
| 120 | 3.2588 | 0.0099 |
| 121 | 3.2687 | 0.0099 |
| 122 | 3.2785 | 0.0098 |
| 123 | 3.2883 | 0.0098 |
| 124 | 3.2980 | 0.0097 |
| 125 | 3.3077 | 0.0097 |
| 126 | 3.3174 | 0.0096 |
| 127 | 3.3269 | 0.0096 |
| 128 | 3.3365 | 0.0095 |

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| 129 | 3.3460 | 0.0095 |
| 130 | 3.3554 | 0.0094 |
| 131 | 3.3648 | 0.0094 |
| 132 | 3.3742 | 0.0094 |
| 133 | 3.3835 | 0.0093 |
| 134 | 3.3928 | 0.0093 |
| 135 | 3.4020 | 0.0092 |
| 136 | 3.4112 | 0.0092 |
| 137 | 3.4203 | 0.0091 |
| 138 | 3.4294 | 0.0091 |
| 139 | 3.4384 | 0.0091 |
| 140 | 3.4475 | 0.0090 |
| 141 | 3.4564 | 0.0090 |
| 142 | 3.4654 | 0.0089 |
| 143 | 3.4743 | 0.0089 |
| 144 | 3.4831 | 0.0089 |
| 145 | 3.4919 | 0.0088 |
| 146 | 3.5007 | 0.0088 |
| 147 | 3.5094 | 0.0087 |
| 148 | 3.5181 | 0.0087 |
| 149 | 3.5268 | 0.0087 |
| 150 | 3.5354 | 0.0086 |
| 151 | 3.5440 | 0.0086 |
| 152 | 3.5525 | 0.0086 |
| 153 | 3.5611 | 0.0085 |
| 154 | 3.5695 | 0.0085 |
| 155 | 3.5780 | 0.0084 |
| 156 | 3.5864 | 0.0084 |
| 157 | 3.5948 | 0.0084 |
| 158 | 3.6031 | 0.0083 |
| 159 | 3.6114 | 0.0083 |
| 160 | 3.6197 | 0.0083 |
| 161 | 3.6280 | 0.0082 |
| 162 | 3.6362 | 0.0082 |
| 163 | 3.6443 | 0.0082 |
| 164 | 3.6525 | 0.0081 |
| 165 | 3.6606 | 0.0081 |
| 166 | 3.6687 | 0.0081 |
| 167 | 3.6767 | 0.0081 |
| 168 | 3.6848 | 0.0080 |
| 169 | 3.6928 | 0.0080 |
| 170 | 3.7007 | 0.0080 |
| 171 | 3.7087 | 0.0079 |
| 172 | 3.7166 | 0.0079 |
| 173 | 3.7244 | 0.0079 |
| 174 | 3.7323 | 0.0078 |
| 175 | 3.7401 | 0.0078 |
| 176 | 3.7479 | 0.0078 |
| 177 | 3.7557 | 0.0078 |
| 178 | 3.7634 | 0.0077 |
| 179 | 3.7711 | 0.0077 |
| 180 | 3.7788 | 0.0077 |
| 181 | 3.7864 | 0.0077 |
| 182 | 3.7940 | 0.0076 |
| 183 | 3.8016 | 0.0076 |
| 184 | 3.8092 | 0.0076 |
| 185 | 3.8168 | 0.0075 |
| 186 | 3.8243 | 0.0075 |
| 187 | 3.8318 | 0.0075 |
| 188 | 3.8392 | 0.0075 |
| 189 | 3.8467 | 0.0074 |
| 190 | 3.8541 | 0.0074 |
| 191 | 3.8615 | 0.0074 |
| 192 | 3.8689 | 0.0074 |
| 193 | 3.8762 | 0.0073 |
| 194 | 3.8835 | 0.0073 |
| 195 | 3.8908 | 0.0073 |
| 196 | 3.8981 | 0.0073 |
| 197 | 3.9054 | 0.0072 |
| 198 | 3.9126 | 0.0072 |
| 199 | 3.9198 | 0.0072 |
| 200 | 3.9270 | 0.0072 |
| 201 | 3.9341 | 0.0072 |

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| 202 | 3.9413 | 0.0071 |
| 203 | 3.9484 | 0.0071 |
| 204 | 3.9555 | 0.0071 |
| 205 | 3.9625 | 0.0071 |
| 206 | 3.9696 | 0.0070 |
| 207 | 3.9766 | 0.0070 |
| 208 | 3.9836 | 0.0070 |
| 209 | 3.9906 | 0.0070 |
| 210 | 3.9976 | 0.0070 |
| 211 | 4.0045 | 0.0069 |
| 212 | 4.0114 | 0.0069 |
| 213 | 4.0183 | 0.0069 |
| 214 | 4.0252 | 0.0069 |
| 215 | 4.0320 | 0.0069 |
| 216 | 4.0389 | 0.0068 |
| 217 | 4.0457 | 0.0068 |
| 218 | 4.0525 | 0.0068 |
| 219 | 4.0593 | 0.0068 |
| 220 | 4.0660 | 0.0068 |
| 221 | 4.0728 | 0.0067 |
| 222 | 4.0795 | 0.0067 |
| 223 | 4.0862 | 0.0067 |
| 224 | 4.0929 | 0.0067 |
| 225 | 4.0995 | 0.0067 |
| 226 | 4.1062 | 0.0066 |
| 227 | 4.1128 | 0.0066 |
| 228 | 4.1194 | 0.0066 |
| 229 | 4.1260 | 0.0066 |
| 230 | 4.1326 | 0.0066 |
| 231 | 4.1391 | 0.0066 |
| 232 | 4.1457 | 0.0065 |
| 233 | 4.1522 | 0.0065 |
| 234 | 4.1587 | 0.0065 |
| 235 | 4.1651 | 0.0065 |
| 236 | 4.1716 | 0.0065 |
| 237 | 4.1781 | 0.0064 |
| 238 | 4.1845 | 0.0064 |
| 239 | 4.1909 | 0.0064 |
| 240 | 4.1973 | 0.0064 |
| 241 | 4.2037 | 0.0064 |
| 242 | 4.2100 | 0.0064 |
| 243 | 4.2164 | 0.0063 |
| 244 | 4.2227 | 0.0063 |
| 245 | 4.2290 | 0.0063 |
| 246 | 4.2353 | 0.0063 |
| 247 | 4.2416 | 0.0063 |
| 248 | 4.2478 | 0.0063 |
| 249 | 4.2541 | 0.0062 |
| 250 | 4.2603 | 0.0062 |
| 251 | 4.2665 | 0.0062 |
| 252 | 4.2727 | 0.0062 |
| 253 | 4.2789 | 0.0062 |
| 254 | 4.2851 | 0.0062 |
| 255 | 4.2912 | 0.0062 |
| 256 | 4.2974 | 0.0061 |
| 257 | 4.3035 | 0.0061 |
| 258 | 4.3096 | 0.0061 |
| 259 | 4.3157 | 0.0061 |
| 260 | 4.3218 | 0.0061 |
| 261 | 4.3278 | 0.0061 |
| 262 | 4.3339 | 0.0060 |
| 263 | 4.3399 | 0.0060 |
| 264 | 4.3459 | 0.0060 |
| 265 | 4.3519 | 0.0060 |
| 266 | 4.3579 | 0.0060 |
| 267 | 4.3639 | 0.0060 |
| 268 | 4.3699 | 0.0060 |
| 269 | 4.3758 | 0.0059 |
| 270 | 4.3817 | 0.0059 |
| 271 | 4.3877 | 0.0059 |
| 272 | 4.3936 | 0.0059 |
| 273 | 4.3994 | 0.0059 |
| 274 | 4.4053 | 0.0059 |

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| 275 | 4.4112 | 0.0059 |
| 276 | 4.4170 | 0.0059 |
| 277 | 4.4229 | 0.0058 |
| 278 | 4.4287 | 0.0058 |
| 279 | 4.4345 | 0.0058 |
| 280 | 4.4403 | 0.0058 |
| 281 | 4.4461 | 0.0058 |
| 282 | 4.4519 | 0.0058 |
| 283 | 4.4576 | 0.0058 |
| 284 | 4.4634 | 0.0057 |
| 285 | 4.4691 | 0.0057 |
| 286 | 4.4748 | 0.0057 |
| 287 | 4.4805 | 0.0057 |
| 288 | 4.4862 | 0.0057 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0057 | 0.0024 | 0.0033 |
| 2 | 0.0057 | 0.0024 | 0.0033 |
| 3 | 0.0057 | 0.0025 | 0.0033 |
| 4 | 0.0057 | 0.0025 | 0.0033 |
| 5 | 0.0058 | 0.0025 | 0.0033 |
| 6 | 0.0058 | 0.0025 | 0.0033 |
| 7 | 0.0058 | 0.0025 | 0.0033 |
| 8 | 0.0058 | 0.0025 | 0.0033 |
| 9 | 0.0059 | 0.0025 | 0.0033 |
| 10 | 0.0059 | 0.0025 | 0.0034 |
| 11 | 0.0059 | 0.0025 | 0.0034 |
| 12 | 0.0059 | 0.0025 | 0.0034 |
| 13 | 0.0059 | 0.0025 | 0.0034 |
| 14 | 0.0059 | 0.0025 | 0.0034 |
| 15 | 0.0060 | 0.0026 | 0.0034 |
| 16 | 0.0060 | 0.0026 | 0.0034 |
| 17 | 0.0060 | 0.0026 | 0.0034 |
| 18 | 0.0060 | 0.0026 | 0.0034 |
| 19 | 0.0061 | 0.0026 | 0.0035 |
| 20 | 0.0061 | 0.0026 | 0.0035 |
| 21 | 0.0061 | 0.0026 | 0.0035 |
| 22 | 0.0061 | 0.0026 | 0.0035 |
| 23 | 0.0062 | 0.0026 | 0.0035 |
| 24 | 0.0062 | 0.0026 | 0.0035 |
| 25 | 0.0062 | 0.0027 | 0.0035 |
| 26 | 0.0062 | 0.0027 | 0.0036 |
| 27 | 0.0062 | 0.0027 | 0.0036 |
| 28 | 0.0063 | 0.0027 | 0.0036 |
| 29 | 0.0063 | 0.0027 | 0.0036 |
| 30 | 0.0063 | 0.0027 | 0.0036 |
| 31 | 0.0063 | 0.0027 | 0.0036 |
| 32 | 0.0064 | 0.0027 | 0.0036 |
| 33 | 0.0064 | 0.0027 | 0.0037 |
| 34 | 0.0064 | 0.0027 | 0.0037 |
| 35 | 0.0064 | 0.0028 | 0.0037 |
| 36 | 0.0065 | 0.0028 | 0.0037 |
| 37 | 0.0065 | 0.0028 | 0.0037 |
| 38 | 0.0065 | 0.0028 | 0.0037 |
| 39 | 0.0066 | 0.0028 | 0.0037 |
| 40 | 0.0066 | 0.0028 | 0.0038 |
| 41 | 0.0066 | 0.0028 | 0.0038 |
| 42 | 0.0066 | 0.0028 | 0.0038 |
| 43 | 0.0067 | 0.0029 | 0.0038 |
| 44 | 0.0067 | 0.0029 | 0.0038 |
| 45 | 0.0067 | 0.0029 | 0.0038 |
| 46 | 0.0067 | 0.0029 | 0.0039 |
| 47 | 0.0068 | 0.0029 | 0.0039 |
| 48 | 0.0068 | 0.0029 | 0.0039 |
| 49 | 0.0068 | 0.0029 | 0.0039 |
| 50 | 0.0069 | 0.0029 | 0.0039 |
| 51 | 0.0069 | 0.0030 | 0.0039 |
| 52 | 0.0069 | 0.0030 | 0.0040 |
| 53 | 0.0070 | 0.0030 | 0.0040 |
| 54 | 0.0070 | 0.0030 | 0.0040 |

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|-----|--------|--------|--------|
| 55 | 0.0070 | 0.0030 | 0.0040 |
| 56 | 0.0070 | 0.0030 | 0.0040 |
| 57 | 0.0071 | 0.0030 | 0.0041 |
| 58 | 0.0071 | 0.0030 | 0.0041 |
| 59 | 0.0072 | 0.0031 | 0.0041 |
| 60 | 0.0072 | 0.0031 | 0.0041 |
| 61 | 0.0072 | 0.0031 | 0.0041 |
| 62 | 0.0072 | 0.0031 | 0.0041 |
| 63 | 0.0073 | 0.0031 | 0.0042 |
| 64 | 0.0073 | 0.0031 | 0.0042 |
| 65 | 0.0074 | 0.0032 | 0.0042 |
| 66 | 0.0074 | 0.0032 | 0.0042 |
| 67 | 0.0074 | 0.0032 | 0.0043 |
| 68 | 0.0075 | 0.0032 | 0.0043 |
| 69 | 0.0075 | 0.0032 | 0.0043 |
| 70 | 0.0075 | 0.0032 | 0.0043 |
| 71 | 0.0076 | 0.0033 | 0.0043 |
| 72 | 0.0076 | 0.0033 | 0.0044 |
| 73 | 0.0077 | 0.0033 | 0.0044 |
| 74 | 0.0077 | 0.0033 | 0.0044 |
| 75 | 0.0078 | 0.0033 | 0.0044 |
| 76 | 0.0078 | 0.0033 | 0.0045 |
| 77 | 0.0078 | 0.0034 | 0.0045 |
| 78 | 0.0079 | 0.0034 | 0.0045 |
| 79 | 0.0079 | 0.0034 | 0.0045 |
| 80 | 0.0080 | 0.0034 | 0.0046 |
| 81 | 0.0080 | 0.0034 | 0.0046 |
| 82 | 0.0081 | 0.0034 | 0.0046 |
| 83 | 0.0081 | 0.0035 | 0.0046 |
| 84 | 0.0081 | 0.0035 | 0.0047 |
| 85 | 0.0082 | 0.0035 | 0.0047 |
| 86 | 0.0082 | 0.0035 | 0.0047 |
| 87 | 0.0083 | 0.0036 | 0.0048 |
| 88 | 0.0083 | 0.0036 | 0.0048 |
| 89 | 0.0084 | 0.0036 | 0.0048 |
| 90 | 0.0084 | 0.0036 | 0.0048 |
| 91 | 0.0085 | 0.0036 | 0.0049 |
| 92 | 0.0086 | 0.0037 | 0.0049 |
| 93 | 0.0086 | 0.0037 | 0.0049 |
| 94 | 0.0087 | 0.0037 | 0.0050 |
| 95 | 0.0087 | 0.0037 | 0.0050 |
| 96 | 0.0088 | 0.0038 | 0.0050 |
| 97 | 0.0089 | 0.0038 | 0.0051 |
| 98 | 0.0089 | 0.0038 | 0.0051 |
| 99 | 0.0090 | 0.0038 | 0.0051 |
| 100 | 0.0090 | 0.0039 | 0.0052 |
| 101 | 0.0091 | 0.0039 | 0.0052 |
| 102 | 0.0091 | 0.0039 | 0.0052 |
| 103 | 0.0092 | 0.0039 | 0.0053 |
| 104 | 0.0093 | 0.0040 | 0.0053 |
| 105 | 0.0094 | 0.0040 | 0.0053 |
| 106 | 0.0094 | 0.0040 | 0.0054 |
| 107 | 0.0095 | 0.0041 | 0.0054 |
| 108 | 0.0095 | 0.0041 | 0.0055 |
| 109 | 0.0096 | 0.0041 | 0.0055 |
| 110 | 0.0097 | 0.0041 | 0.0055 |
| 111 | 0.0098 | 0.0042 | 0.0056 |
| 112 | 0.0098 | 0.0042 | 0.0056 |
| 113 | 0.0099 | 0.0043 | 0.0057 |
| 114 | 0.0100 | 0.0043 | 0.0057 |
| 115 | 0.0101 | 0.0043 | 0.0058 |
| 116 | 0.0102 | 0.0044 | 0.0058 |
| 117 | 0.0103 | 0.0044 | 0.0059 |
| 118 | 0.0103 | 0.0044 | 0.0059 |
| 119 | 0.0104 | 0.0045 | 0.0060 |
| 120 | 0.0105 | 0.0045 | 0.0060 |
| 121 | 0.0106 | 0.0046 | 0.0061 |
| 122 | 0.0107 | 0.0046 | 0.0061 |
| 123 | 0.0108 | 0.0046 | 0.0062 |
| 124 | 0.0109 | 0.0047 | 0.0062 |
| 125 | 0.0110 | 0.0047 | 0.0063 |
| 126 | 0.0111 | 0.0048 | 0.0063 |
| 127 | 0.0112 | 0.0048 | 0.0064 |

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| 128 | 0.0113 | 0.0048 | 0.0065 |
| 129 | 0.0115 | 0.0049 | 0.0066 |
| 130 | 0.0115 | 0.0049 | 0.0066 |
| 131 | 0.0117 | 0.0050 | 0.0067 |
| 132 | 0.0118 | 0.0050 | 0.0067 |
| 133 | 0.0119 | 0.0051 | 0.0068 |
| 134 | 0.0120 | 0.0052 | 0.0069 |
| 135 | 0.0122 | 0.0052 | 0.0070 |
| 136 | 0.0123 | 0.0053 | 0.0070 |
| 137 | 0.0125 | 0.0053 | 0.0071 |
| 138 | 0.0126 | 0.0054 | 0.0072 |
| 139 | 0.0128 | 0.0055 | 0.0073 |
| 140 | 0.0129 | 0.0055 | 0.0074 |
| 141 | 0.0131 | 0.0056 | 0.0075 |
| 142 | 0.0132 | 0.0057 | 0.0075 |
| 143 | 0.0134 | 0.0057 | 0.0077 |
| 144 | 0.0135 | 0.0058 | 0.0077 |
| 145 | 0.0183 | 0.0078 | 0.0105 |
| 146 | 0.0184 | 0.0079 | 0.0105 |
| 147 | 0.0187 | 0.0080 | 0.0107 |
| 148 | 0.0188 | 0.0081 | 0.0108 |
| 149 | 0.0191 | 0.0082 | 0.0109 |
| 150 | 0.0193 | 0.0083 | 0.0110 |
| 151 | 0.0196 | 0.0084 | 0.0112 |
| 152 | 0.0198 | 0.0085 | 0.0113 |
| 153 | 0.0201 | 0.0086 | 0.0115 |
| 154 | 0.0203 | 0.0087 | 0.0116 |
| 155 | 0.0206 | 0.0088 | 0.0118 |
| 156 | 0.0208 | 0.0089 | 0.0119 |
| 157 | 0.0212 | 0.0091 | 0.0121 |
| 158 | 0.0214 | 0.0092 | 0.0123 |
| 159 | 0.0219 | 0.0094 | 0.0125 |
| 160 | 0.0221 | 0.0095 | 0.0126 |
| 161 | 0.0226 | 0.0097 | 0.0129 |
| 162 | 0.0228 | 0.0098 | 0.0130 |
| 163 | 0.0233 | 0.0100 | 0.0133 |
| 164 | 0.0236 | 0.0101 | 0.0135 |
| 165 | 0.0242 | 0.0104 | 0.0138 |
| 166 | 0.0245 | 0.0105 | 0.0140 |
| 167 | 0.0251 | 0.0108 | 0.0144 |
| 168 | 0.0255 | 0.0109 | 0.0146 |
| 169 | 0.0271 | 0.0116 | 0.0155 |
| 170 | 0.0275 | 0.0118 | 0.0157 |
| 171 | 0.0283 | 0.0121 | 0.0162 |
| 172 | 0.0288 | 0.0123 | 0.0165 |
| 173 | 0.0297 | 0.0127 | 0.0170 |
| 174 | 0.0302 | 0.0130 | 0.0173 |
| 175 | 0.0314 | 0.0134 | 0.0179 |
| 176 | 0.0320 | 0.0137 | 0.0183 |
| 177 | 0.0333 | 0.0143 | 0.0190 |
| 178 | 0.0340 | 0.0146 | 0.0195 |
| 179 | 0.0356 | 0.0153 | 0.0204 |
| 180 | 0.0365 | 0.0157 | 0.0209 |
| 181 | 0.0386 | 0.0165 | 0.0221 |
| 182 | 0.0397 | 0.0170 | 0.0227 |
| 183 | 0.0424 | 0.0181 | 0.0242 |
| 184 | 0.0439 | 0.0187 | 0.0252 |
| 185 | 0.0383 | 0.0164 | 0.0219 |
| 186 | 0.0405 | 0.0173 | 0.0231 |
| 187 | 0.0459 | 0.0187 | 0.0273 |
| 188 | 0.0495 | 0.0187 | 0.0308 |
| 189 | 0.0640 | 0.0187 | 0.0454 |
| 190 | 0.0718 | 0.0187 | 0.0531 |
| 191 | 0.1006 | 0.0187 | 0.0819 |
| 192 | 0.1358 | 0.0187 | 0.1172 |
| 193 | 0.3874 | 0.0187 | 0.3687 |
| 194 | 0.0829 | 0.0187 | 0.0642 |
| 195 | 0.0539 | 0.0187 | 0.0353 |
| 196 | 0.0430 | 0.0184 | 0.0246 |
| 197 | 0.0456 | 0.0187 | 0.0270 |
| 198 | 0.0410 | 0.0175 | 0.0234 |
| 199 | 0.0375 | 0.0161 | 0.0215 |
| 200 | 0.0348 | 0.0149 | 0.0199 |

| | | | |
|-----|--------|--------|--------|
| 201 | 0.0326 | 0.0140 | 0.0186 |
| 202 | 0.0308 | 0.0132 | 0.0176 |
| 203 | 0.0292 | 0.0125 | 0.0167 |
| 204 | 0.0279 | 0.0119 | 0.0160 |
| 205 | 0.0258 | 0.0111 | 0.0148 |
| 206 | 0.0248 | 0.0106 | 0.0142 |
| 207 | 0.0239 | 0.0102 | 0.0137 |
| 208 | 0.0231 | 0.0099 | 0.0132 |
| 209 | 0.0223 | 0.0096 | 0.0128 |
| 210 | 0.0216 | 0.0093 | 0.0124 |
| 211 | 0.0210 | 0.0090 | 0.0120 |
| 212 | 0.0205 | 0.0088 | 0.0117 |
| 213 | 0.0199 | 0.0085 | 0.0114 |
| 214 | 0.0194 | 0.0083 | 0.0111 |
| 215 | 0.0190 | 0.0081 | 0.0109 |
| 216 | 0.0186 | 0.0079 | 0.0106 |
| 217 | 0.0137 | 0.0058 | 0.0078 |
| 218 | 0.0133 | 0.0057 | 0.0076 |
| 219 | 0.0130 | 0.0056 | 0.0074 |
| 220 | 0.0127 | 0.0054 | 0.0072 |
| 221 | 0.0124 | 0.0053 | 0.0071 |
| 222 | 0.0121 | 0.0052 | 0.0069 |
| 223 | 0.0119 | 0.0051 | 0.0068 |
| 224 | 0.0116 | 0.0050 | 0.0066 |
| 225 | 0.0114 | 0.0049 | 0.0065 |
| 226 | 0.0112 | 0.0048 | 0.0064 |
| 227 | 0.0110 | 0.0047 | 0.0063 |
| 228 | 0.0108 | 0.0046 | 0.0062 |
| 229 | 0.0106 | 0.0045 | 0.0060 |
| 230 | 0.0104 | 0.0044 | 0.0059 |
| 231 | 0.0102 | 0.0044 | 0.0058 |
| 232 | 0.0100 | 0.0043 | 0.0057 |
| 233 | 0.0099 | 0.0042 | 0.0057 |
| 234 | 0.0097 | 0.0042 | 0.0056 |
| 235 | 0.0096 | 0.0041 | 0.0055 |
| 236 | 0.0094 | 0.0040 | 0.0054 |
| 237 | 0.0093 | 0.0040 | 0.0053 |
| 238 | 0.0092 | 0.0039 | 0.0052 |
| 239 | 0.0091 | 0.0039 | 0.0052 |
| 240 | 0.0089 | 0.0038 | 0.0051 |
| 241 | 0.0088 | 0.0038 | 0.0050 |
| 242 | 0.0087 | 0.0037 | 0.0050 |
| 243 | 0.0086 | 0.0037 | 0.0049 |
| 244 | 0.0085 | 0.0036 | 0.0048 |
| 245 | 0.0084 | 0.0036 | 0.0048 |
| 246 | 0.0083 | 0.0035 | 0.0047 |
| 247 | 0.0082 | 0.0035 | 0.0047 |
| 248 | 0.0081 | 0.0035 | 0.0046 |
| 249 | 0.0080 | 0.0034 | 0.0046 |
| 250 | 0.0079 | 0.0034 | 0.0045 |
| 251 | 0.0078 | 0.0033 | 0.0045 |
| 252 | 0.0077 | 0.0033 | 0.0044 |
| 253 | 0.0077 | 0.0033 | 0.0044 |
| 254 | 0.0076 | 0.0032 | 0.0043 |
| 255 | 0.0075 | 0.0032 | 0.0043 |
| 256 | 0.0074 | 0.0032 | 0.0042 |
| 257 | 0.0073 | 0.0031 | 0.0042 |
| 258 | 0.0073 | 0.0031 | 0.0042 |
| 259 | 0.0072 | 0.0031 | 0.0041 |
| 260 | 0.0071 | 0.0031 | 0.0041 |
| 261 | 0.0071 | 0.0030 | 0.0040 |
| 262 | 0.0070 | 0.0030 | 0.0040 |
| 263 | 0.0069 | 0.0030 | 0.0040 |
| 264 | 0.0069 | 0.0029 | 0.0039 |
| 265 | 0.0068 | 0.0029 | 0.0039 |
| 266 | 0.0068 | 0.0029 | 0.0039 |
| 267 | 0.0067 | 0.0029 | 0.0038 |
| 268 | 0.0066 | 0.0028 | 0.0038 |
| 269 | 0.0066 | 0.0028 | 0.0038 |
| 270 | 0.0065 | 0.0028 | 0.0037 |
| 271 | 0.0065 | 0.0028 | 0.0037 |
| 272 | 0.0064 | 0.0028 | 0.0037 |
| 273 | 0.0064 | 0.0027 | 0.0036 |

| | | | |
|-----|--------|--------|--------|
| 274 | 0.0063 | 0.0027 | 0.0036 |
| 275 | 0.0063 | 0.0027 | 0.0036 |
| 276 | 0.0062 | 0.0027 | 0.0036 |
| 277 | 0.0062 | 0.0026 | 0.0035 |
| 278 | 0.0061 | 0.0026 | 0.0035 |
| 279 | 0.0061 | 0.0026 | 0.0035 |
| 280 | 0.0060 | 0.0026 | 0.0035 |
| 281 | 0.0060 | 0.0026 | 0.0034 |
| 282 | 0.0060 | 0.0026 | 0.0034 |
| 283 | 0.0059 | 0.0025 | 0.0034 |
| 284 | 0.0059 | 0.0025 | 0.0034 |
| 285 | 0.0058 | 0.0025 | 0.0033 |
| 286 | 0.0058 | 0.0025 | 0.0033 |
| 287 | 0.0058 | 0.0025 | 0.0033 |
| 288 | 0.0057 | 0.0024 | 0.0033 |

Total soil rain loss = 1.66(In)
Total effective rainfall = 2.82(In)
Peak flow rate in flood hydrograph = 909.86(CFS)

+++++
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 250.0 | 500.0 | 750.0 | 1000.0 |
|-----------|--------------|--------|----|-------|-------|-------|--------|
| 0+ 5 | 0.0018 | 0.26 | Q | | | | |
| 0+10 | 0.0082 | 0.93 | Q | | | | |
| 0+15 | 0.0213 | 1.90 | Q | | | | |
| 0+20 | 0.0433 | 3.19 | Q | | | | |
| 0+25 | 0.0785 | 5.11 | Q | | | | |
| 0+30 | 0.1341 | 8.08 | Q | | | | |
| 0+35 | 0.2255 | 13.26 | Q | | | | |
| 0+40 | 0.3358 | 16.01 | Q | | | | |
| 0+45 | 0.4580 | 17.76 | Q | | | | |
| 0+50 | 0.5897 | 19.12 | Q | | | | |
| 0+55 | 0.7288 | 20.20 | Q | | | | |
| 1+ 0 | 0.8747 | 21.18 | Q | | | | |
| 1+ 5 | 1.0264 | 22.02 | Q | | | | |
| 1+10 | 1.1831 | 22.75 | Q | | | | |
| 1+15 | 1.3443 | 23.41 | Q | | | | |
| 1+20 | 1.5096 | 24.00 | Q | | | | |
| 1+25 | 1.6786 | 24.54 | Q | | | | |
| 1+30 | 1.8509 | 25.02 | VQ | | | | |
| 1+35 | 2.0262 | 25.45 | VQ | | | | |
| 1+40 | 2.2042 | 25.85 | VQ | | | | |
| 1+45 | 2.3848 | 26.21 | VQ | | | | |
| 1+50 | 2.5675 | 26.53 | VQ | | | | |
| 1+55 | 2.7522 | 26.82 | VQ | | | | |
| 2+ 0 | 2.9387 | 27.08 | VQ | | | | |
| 2+ 5 | 3.1270 | 27.33 | VQ | | | | |
| 2+10 | 3.3167 | 27.54 | VQ | | | | |
| 2+15 | 3.5075 | 27.71 | VQ | | | | |
| 2+20 | 3.6994 | 27.86 | VQ | | | | |
| 2+25 | 3.8923 | 28.02 | VQ | | | | |
| 2+30 | 4.0863 | 28.16 | Q | | | | |
| 2+35 | 4.2813 | 28.31 | Q | | | | |
| 2+40 | 4.4772 | 28.46 | Q | | | | |
| 2+45 | 4.6742 | 28.60 | Q | | | | |
| 2+50 | 4.8721 | 28.73 | Q | | | | |
| 2+55 | 5.0709 | 28.87 | Q | | | | |
| 3+ 0 | 5.2707 | 29.01 | Q | | | | |
| 3+ 5 | 5.4715 | 29.15 | Q | | | | |
| 3+10 | 5.6732 | 29.30 | Q | | | | |
| 3+15 | 5.8760 | 29.45 | Q | | | | |
| 3+20 | 6.0797 | 29.58 | Q | | | | |
| 3+25 | 6.2844 | 29.71 | Q | | | | |
| 3+30 | 6.4899 | 29.85 | Q | | | | |
| 3+35 | 6.6964 | 29.98 | Q | | | | |

| | | | | | | | |
|------|---------|-------|-----|--|--|--|--|
| 3+40 | 6.9038 | 30.11 | Q | | | | |
| 3+45 | 7.1120 | 30.24 | Q | | | | |
| 3+50 | 7.3212 | 30.37 | Q | | | | |
| 3+55 | 7.5312 | 30.49 | Q | | | | |
| 4+ 0 | 7.7420 | 30.62 | Q | | | | |
| 4+ 5 | 7.9538 | 30.75 | QV | | | | |
| 4+10 | 8.1664 | 30.87 | QV | | | | |
| 4+15 | 8.3800 | 31.01 | QV | | | | |
| 4+20 | 8.5944 | 31.14 | QV | | | | |
| 4+25 | 8.8098 | 31.27 | QV | | | | |
| 4+30 | 9.0261 | 31.40 | QV | | | | |
| 4+35 | 9.2433 | 31.54 | QV | | | | |
| 4+40 | 9.4615 | 31.68 | QV | | | | |
| 4+45 | 9.6806 | 31.82 | QV | | | | |
| 4+50 | 9.9007 | 31.96 | QV | | | | |
| 4+55 | 10.1218 | 32.10 | QV | | | | |
| 5+ 0 | 10.3439 | 32.25 | QV | | | | |
| 5+ 5 | 10.5670 | 32.40 | QV | | | | |
| 5+10 | 10.7911 | 32.54 | QV | | | | |
| 5+15 | 11.0163 | 32.69 | QV | | | | |
| 5+20 | 11.2425 | 32.84 | QV | | | | |
| 5+25 | 11.4697 | 33.00 | QV | | | | |
| 5+30 | 11.6980 | 33.15 | QV | | | | |
| 5+35 | 11.9274 | 33.31 | Q V | | | | |
| 5+40 | 12.1579 | 33.46 | Q V | | | | |
| 5+45 | 12.3895 | 33.63 | Q V | | | | |
| 5+50 | 12.6222 | 33.79 | Q V | | | | |
| 5+55 | 12.8560 | 33.96 | Q V | | | | |
| 6+ 0 | 13.0910 | 34.12 | Q V | | | | |
| 6+ 5 | 13.3272 | 34.29 | Q V | | | | |
| 6+10 | 13.5645 | 34.46 | Q V | | | | |
| 6+15 | 13.8031 | 34.64 | Q V | | | | |
| 6+20 | 14.0428 | 34.81 | Q V | | | | |
| 6+25 | 14.2838 | 34.99 | Q V | | | | |
| 6+30 | 14.5260 | 35.17 | Q V | | | | |
| 6+35 | 14.7695 | 35.35 | Q V | | | | |
| 6+40 | 15.0142 | 35.54 | Q V | | | | |
| 6+45 | 15.2602 | 35.73 | Q V | | | | |
| 6+50 | 15.5076 | 35.91 | Q V | | | | |
| 6+55 | 15.7563 | 36.11 | Q V | | | | |
| 7+ 0 | 16.0063 | 36.30 | Q V | | | | |
| 7+ 5 | 16.2577 | 36.50 | Q V | | | | |
| 7+10 | 16.5105 | 36.70 | Q V | | | | |
| 7+15 | 16.7647 | 36.91 | Q V | | | | |
| 7+20 | 17.0203 | 37.11 | Q V | | | | |
| 7+25 | 17.2773 | 37.33 | Q V | | | | |
| 7+30 | 17.5359 | 37.54 | Q V | | | | |
| 7+35 | 17.7959 | 37.76 | Q V | | | | |
| 7+40 | 18.0574 | 37.97 | Q V | | | | |
| 7+45 | 18.3205 | 38.20 | Q V | | | | |
| 7+50 | 18.5851 | 38.42 | Q V | | | | |
| 7+55 | 18.8514 | 38.66 | Q V | | | | |
| 8+ 0 | 19.1192 | 38.89 | Q V | | | | |
| 8+ 5 | 19.3886 | 39.13 | Q V | | | | |
| 8+10 | 19.6597 | 39.36 | Q V | | | | |
| 8+15 | 19.9326 | 39.61 | Q V | | | | |
| 8+20 | 20.2071 | 39.86 | Q V | | | | |
| 8+25 | 20.4833 | 40.12 | Q V | | | | |
| 8+30 | 20.7614 | 40.37 | Q V | | | | |
| 8+35 | 21.0412 | 40.63 | Q V | | | | |
| 8+40 | 21.3228 | 40.89 | Q V | | | | |
| 8+45 | 21.6064 | 41.17 | Q V | | | | |
| 8+50 | 21.8918 | 41.44 | Q V | | | | |
| 8+55 | 22.1792 | 41.73 | Q V | | | | |
| 9+ 0 | 22.4684 | 42.00 | Q V | | | | |
| 9+ 5 | 22.7598 | 42.30 | Q V | | | | |
| 9+10 | 23.0531 | 42.59 | Q V | | | | |
| 9+15 | 23.3485 | 42.90 | Q V | | | | |
| 9+20 | 23.6460 | 43.20 | Q V | | | | |
| 9+25 | 23.9457 | 43.51 | Q V | | | | |
| 9+30 | 24.2475 | 43.82 | Q V | | | | |
| 9+35 | 24.5516 | 44.16 | Q V | | | | |
| 9+40 | 24.8579 | 44.48 | Q V | | | | |

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|-------|---------|--------|---|---|--|--|--|--|
| 9+45 | 25.1666 | 44.82 | Q | V | | | | |
| 9+50 | 25.4776 | 45.16 | Q | V | | | | |
| 9+55 | 25.7911 | 45.51 | Q | V | | | | |
| 10+ 0 | 26.1070 | 45.86 | Q | V | | | | |
| 10+ 5 | 26.4254 | 46.24 | Q | V | | | | |
| 10+10 | 26.7463 | 46.60 | Q | V | | | | |
| 10+15 | 27.0699 | 46.99 | Q | V | | | | |
| 10+20 | 27.3962 | 47.37 | Q | V | | | | |
| 10+25 | 27.7252 | 47.77 | Q | V | | | | |
| 10+30 | 28.0569 | 48.17 | Q | V | | | | |
| 10+35 | 28.3916 | 48.59 | Q | V | | | | |
| 10+40 | 28.7291 | 49.01 | Q | V | | | | |
| 10+45 | 29.0696 | 49.45 | Q | V | | | | |
| 10+50 | 29.4131 | 49.88 | Q | V | | | | |
| 10+55 | 29.7599 | 50.34 | Q | V | | | | |
| 11+ 0 | 30.1097 | 50.80 | Q | V | | | | |
| 11+ 5 | 30.4629 | 51.28 | Q | V | | | | |
| 11+10 | 30.8194 | 51.76 | Q | V | | | | |
| 11+15 | 31.1794 | 52.27 | Q | V | | | | |
| 11+20 | 31.5428 | 52.77 | Q | V | | | | |
| 11+25 | 31.9100 | 53.31 | Q | V | | | | |
| 11+30 | 32.2807 | 53.84 | Q | V | | | | |
| 11+35 | 32.6554 | 54.40 | Q | V | | | | |
| 11+40 | 33.0339 | 54.96 | Q | V | | | | |
| 11+45 | 33.4165 | 55.55 | Q | V | | | | |
| 11+50 | 33.8031 | 56.14 | Q | V | | | | |
| 11+55 | 34.1941 | 56.77 | Q | V | | | | |
| 12+ 0 | 34.5894 | 57.39 | Q | V | | | | |
| 12+ 5 | 34.9907 | 58.27 | Q | V | | | | |
| 12+10 | 35.4002 | 59.46 | Q | V | | | | |
| 12+15 | 35.8198 | 60.93 | Q | V | | | | |
| 12+20 | 36.2513 | 62.66 | Q | V | | | | |
| 12+25 | 36.6985 | 64.93 | Q | V | | | | |
| 12+30 | 37.1670 | 68.03 | Q | V | | | | |
| 12+35 | 37.6693 | 72.93 | Q | V | | | | |
| 12+40 | 38.1921 | 75.90 | Q | V | | | | |
| 12+45 | 38.7302 | 78.14 | Q | V | | | | |
| 12+50 | 39.2816 | 80.07 | Q | V | | | | |
| 12+55 | 39.8453 | 81.85 | Q | V | | | | |
| 13+ 0 | 40.4207 | 83.54 | Q | V | | | | |
| 13+ 5 | 41.0074 | 85.19 | Q | V | | | | |
| 13+10 | 41.6048 | 86.75 | Q | V | | | | |
| 13+15 | 42.2132 | 88.34 | Q | V | | | | |
| 13+20 | 42.8321 | 89.86 | Q | V | | | | |
| 13+25 | 43.4618 | 91.44 | Q | V | | | | |
| 13+30 | 44.1021 | 92.97 | Q | V | | | | |
| 13+35 | 44.7534 | 94.57 | Q | V | | | | |
| 13+40 | 45.4155 | 96.14 | Q | V | | | | |
| 13+45 | 46.0889 | 97.79 | Q | V | | | | |
| 13+50 | 46.7736 | 99.41 | Q | V | | | | |
| 13+55 | 47.4702 | 101.14 | Q | V | | | | |
| 14+ 0 | 48.1785 | 102.86 | Q | V | | | | |
| 14+ 5 | 48.9000 | 104.75 | Q | V | | | | |
| 14+10 | 49.6348 | 106.69 | Q | V | | | | |
| 14+15 | 50.3842 | 108.82 | Q | V | | | | |
| 14+20 | 51.1486 | 111.00 | Q | V | | | | |
| 14+25 | 51.9301 | 113.48 | Q | V | | | | |
| 14+30 | 52.7301 | 116.15 | Q | V | | | | |
| 14+35 | 53.5524 | 119.40 | Q | V | | | | |
| 14+40 | 54.3947 | 122.31 | Q | V | | | | |
| 14+45 | 55.2580 | 125.34 | Q | V | | | | |
| 14+50 | 56.1421 | 128.37 | Q | V | | | | |
| 14+55 | 57.0492 | 131.70 | Q | V | | | | |
| 15+ 0 | 57.9797 | 135.12 | Q | V | | | | |
| 15+ 5 | 58.9367 | 138.95 | Q | V | | | | |
| 15+10 | 59.9210 | 142.92 | Q | V | | | | |
| 15+15 | 60.9363 | 147.42 | Q | V | | | | |
| 15+20 | 61.9842 | 152.16 | Q | V | | | | |
| 15+25 | 63.0669 | 157.21 | Q | V | | | | |
| 15+30 | 64.1823 | 161.96 | Q | V | | | | |
| 15+35 | 65.3351 | 167.38 | Q | V | | | | |
| 15+40 | 66.5279 | 173.20 | Q | V | | | | |
| 15+45 | 67.7725 | 180.71 | Q | V | | | | |

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|-------|----------|--------|--|--|--|--|
| 15+50 | 69.0781 | 189.58 | | | | |
| 15+55 | 70.4606 | 200.74 | | | | |
| 16+ 0 | 72.0110 | 225.12 | | | | |
| 16+ 5 | 73.9661 | 283.88 | | | | |
| 16+10 | 76.4529 | 361.08 | | | | |
| 16+15 | 79.4640 | 437.22 | | | | |
| 16+20 | 83.0123 | 515.21 | | | | |
| 16+25 | 87.3282 | 626.67 | | | | |
| 16+30 | 92.5299 | 755.28 | | | | |
| 16+35 | 98.7961 | 909.86 | | | | |
| 16+40 | 103.2193 | 642.24 | | | | |
| 16+45 | 106.6162 | 493.23 | | | | |
| 16+50 | 109.5024 | 419.09 | | | | |
| 16+55 | 112.0690 | 372.67 | | | | |
| 17+ 0 | 114.4267 | 342.33 | | | | |
| 17+ 5 | 116.5695 | 311.14 | | | | |
| 17+10 | 118.5375 | 285.75 | | | | |
| 17+15 | 120.3622 | 264.96 | | | | |
| 17+20 | 122.0562 | 245.96 | | | | |
| 17+25 | 123.6378 | 229.65 | | | | |
| 17+30 | 125.1088 | 213.60 | | | | |
| 17+35 | 126.4810 | 199.24 | | | | |
| 17+40 | 127.7698 | 187.13 | | | | |
| 17+45 | 128.9715 | 174.48 | | | | |
| 17+50 | 130.0940 | 162.99 | | | | |
| 17+55 | 131.1479 | 153.03 | | | | |
| 18+ 0 | 132.1405 | 144.13 | | | | |
| 18+ 5 | 133.0729 | 135.37 | | | | |
| 18+10 | 133.9396 | 125.85 | | | | |
| 18+15 | 134.7375 | 115.85 | | | | |
| 18+20 | 135.4885 | 109.05 | | | | |
| 18+25 | 136.2050 | 104.03 | | | | |
| 18+30 | 136.8814 | 98.21 | | | | |
| 18+35 | 137.5078 | 90.95 | | | | |
| 18+40 | 138.1008 | 86.10 | | | | |
| 18+45 | 138.6640 | 81.77 | | | | |
| 18+50 | 139.1987 | 77.64 | | | | |
| 18+55 | 139.7147 | 74.93 | | | | |
| 19+ 0 | 140.2154 | 72.70 | | | | |
| 19+ 5 | 140.7044 | 70.99 | | | | |
| 19+10 | 141.1782 | 68.80 | | | | |
| 19+15 | 141.6352 | 66.36 | | | | |
| 19+20 | 142.0702 | 63.16 | | | | |
| 19+25 | 142.4898 | 60.93 | | | | |
| 19+30 | 142.8967 | 59.08 | | | | |
| 19+35 | 143.2888 | 56.94 | | | | |
| 19+40 | 143.6684 | 55.11 | | | | |
| 19+45 | 144.0376 | 53.61 | | | | |
| 19+50 | 144.3950 | 51.89 | | | | |
| 19+55 | 144.7412 | 50.27 | | | | |
| 20+ 0 | 145.0797 | 49.16 | | | | |
| 20+ 5 | 145.4114 | 48.16 | | | | |
| 20+10 | 145.7367 | 47.24 | | | | |
| 20+15 | 146.0562 | 46.39 | | | | |
| 20+20 | 146.3703 | 45.60 | | | | |
| 20+25 | 146.6792 | 44.85 | | | | |
| 20+30 | 146.9831 | 44.13 | | | | |
| 20+35 | 147.2823 | 43.44 | | | | |
| 20+40 | 147.5769 | 42.78 | | | | |
| 20+45 | 147.8672 | 42.15 | | | | |
| 20+50 | 148.1534 | 41.55 | | | | |
| 20+55 | 148.4356 | 40.97 | | | | |
| 21+ 0 | 148.7139 | 40.42 | | | | |
| 21+ 5 | 148.9885 | 39.87 | | | | |
| 21+10 | 149.2595 | 39.34 | | | | |
| 21+15 | 149.5270 | 38.83 | | | | |
| 21+20 | 149.7911 | 38.35 | | | | |
| 21+25 | 150.0520 | 37.88 | | | | |
| 21+30 | 150.3098 | 37.43 | | | | |
| 21+35 | 150.5646 | 37.00 | | | | |
| 21+40 | 150.8165 | 36.58 | | | | |
| 21+45 | 151.0656 | 36.17 | | | | |
| 21+50 | 151.3120 | 35.78 | | | | |

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|-------|----------|-------|---|---|
| 21+55 | 151.5558 | 35.40 | Q | V |
| 22+ 0 | 151.7970 | 35.03 | Q | V |
| 22+ 5 | 152.0358 | 34.67 | Q | V |
| 22+10 | 152.2721 | 34.32 | Q | V |
| 22+15 | 152.5062 | 33.98 | Q | V |
| 22+20 | 152.7379 | 33.65 | Q | V |
| 22+25 | 152.9674 | 33.33 | Q | V |
| 22+30 | 153.1948 | 33.01 | Q | V |
| 22+35 | 153.4200 | 32.70 | Q | V |
| 22+40 | 153.6432 | 32.40 | Q | V |
| 22+45 | 153.8643 | 32.11 | Q | V |
| 22+50 | 154.0835 | 31.82 | Q | V |
| 22+55 | 154.3007 | 31.54 | Q | V |
| 23+ 0 | 154.5161 | 31.27 | Q | V |
| 23+ 5 | 154.7296 | 31.00 | Q | V |
| 23+10 | 154.9414 | 30.74 | Q | V |
| 23+15 | 155.1513 | 30.49 | Q | V |
| 23+20 | 155.3596 | 30.24 | Q | V |
| 23+25 | 155.5661 | 29.99 | Q | V |
| 23+30 | 155.7710 | 29.75 | Q | V |
| 23+35 | 155.9743 | 29.52 | Q | V |
| 23+40 | 156.1760 | 29.29 | Q | V |
| 23+45 | 156.3762 | 29.06 | Q | V |
| 23+50 | 156.5748 | 28.84 | Q | V |
| 23+55 | 156.7719 | 28.62 | Q | V |
| 24+ 0 | 156.9676 | 28.41 | Q | V |
| 24+ 5 | 157.1601 | 27.94 | Q | V |
| 24+10 | 157.3465 | 27.07 | Q | V |
| 24+15 | 157.5250 | 25.91 | Q | V |
| 24+20 | 157.6933 | 24.45 | Q | V |
| 24+25 | 157.8474 | 22.37 | Q | V |
| 24+30 | 157.9800 | 19.26 | Q | V |
| 24+35 | 158.0763 | 13.98 | Q | V |
| 24+40 | 158.1533 | 11.18 | Q | V |
| 24+45 | 158.2182 | 9.42 | Q | V |
| 24+50 | 158.2736 | 8.05 | Q | V |
| 24+55 | 158.3216 | 6.97 | Q | V |
| 25+ 0 | 158.3630 | 6.01 | Q | V |
| 25+ 5 | 158.3988 | 5.20 | Q | V |
| 25+10 | 158.4299 | 4.51 | Q | V |
| 25+15 | 158.4567 | 3.90 | Q | V |
| 25+20 | 158.4799 | 3.36 | Q | V |
| 25+25 | 158.4998 | 2.89 | Q | V |
| 25+30 | 158.5168 | 2.47 | Q | V |
| 25+35 | 158.5314 | 2.11 | Q | V |
| 25+40 | 158.5436 | 1.78 | Q | V |
| 25+45 | 158.5540 | 1.50 | Q | V |
| 25+50 | 158.5627 | 1.27 | Q | V |
| 25+55 | 158.5701 | 1.07 | Q | V |
| 26+ 0 | 158.5762 | 0.89 | Q | V |
| 26+ 5 | 158.5813 | 0.74 | Q | V |
| 26+10 | 158.5855 | 0.62 | Q | V |
| 26+15 | 158.5893 | 0.55 | Q | V |
| 26+20 | 158.5927 | 0.49 | Q | V |
| 26+25 | 158.5957 | 0.44 | Q | V |
| 26+30 | 158.5984 | 0.39 | Q | V |
| 26+35 | 158.6008 | 0.35 | Q | V |
| 26+40 | 158.6029 | 0.30 | Q | V |
| 26+45 | 158.6048 | 0.27 | Q | V |
| 26+50 | 158.6064 | 0.24 | Q | V |
| 26+55 | 158.6079 | 0.21 | Q | V |
| 27+ 0 | 158.6092 | 0.19 | Q | V |
| 27+ 5 | 158.6102 | 0.15 | Q | V |
| 27+10 | 158.6110 | 0.12 | Q | V |
| 27+15 | 158.6116 | 0.09 | Q | V |
| 27+20 | 158.6121 | 0.07 | Q | V |
| 27+25 | 158.6124 | 0.05 | Q | V |
| 27+30 | 158.6127 | 0.03 | Q | V |
| 27+35 | 158.6128 | 0.02 | Q | V |
| 27+40 | 158.6129 | 0.01 | Q | V |
| 27+45 | 158.6129 | 0.00 | Q | V |

Unit Hydrograph Analysis

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Study date 08/04/15 File Name CieloVistaPrWshdAUH10.out

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Orange County Unit Hydrograph Hydrology Method
 Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

 WATERSHED A
 PROPOSED CONDITIONS - CREEK A
 10-YEAR STORM
 BY FUSCOE ENGINEERING

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

***** Area-averaged max loss rate, Fm *****

| SCS curve No. (AMCII) | Area (Ac.) | Area Fraction | Soil Group | Fp (In/Hr) | Ap (dec.) | Fm (In/Hr) |
|-----------------------|------------|---------------|------------|------------|-----------|------------|
| 82.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 72.0 | 0.2 | 0.00 | B | 0.300 | 1.000 | 0.300 |
| 79.0 | 365.1 | 0.54 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 264.3 | 0.39 | D | 0.200 | 1.000 | 0.200 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 56.0 | 2.5 | 0.00 | B | 0.300 | 0.600 | 0.180 |
| 79.0 | 3.7 | 0.01 | C | 0.250 | 1.000 | 0.250 |
| 84.0 | 8.0 | 0.01 | D | 0.200 | 1.000 | 0.200 |
| 75.0 | 15.1 | 0.02 | D | 0.200 | 0.600 | 0.120 |
| 75.0 | 13.0 | 0.02 | D | 0.200 | 0.600 | 0.120 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

***** Area-Averaged low loss rate fraction, Yb *****

| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC2) | S | Pervious Yield Fr |
|------------|------------|---------------|---------------|------|-------------------|
| 0.20 | 0.000 | 82.0 | 82.0 | 2.20 | 0.525 |
| 0.20 | 0.000 | 72.0 | 72.0 | 3.89 | 0.337 |
| 365.10 | 0.541 | 79.0 | 79.0 | 2.66 | 0.464 |
| 264.30 | 0.392 | 84.0 | 84.0 | 1.90 | 0.568 |
| 1.50 | 0.002 | 56.0 | 56.0 | 7.86 | 0.121 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.936 |
| 1.50 | 0.002 | 56.0 | 56.0 | 7.86 | 0.121 |
| 1.00 | 0.001 | 98.0 | 98.0 | 0.20 | 0.936 |
| 3.70 | 0.005 | 79.0 | 79.0 | 2.66 | 0.464 |
| 8.00 | 0.012 | 84.0 | 84.0 | 1.90 | 0.568 |
| 9.06 | 0.013 | 75.0 | 75.0 | 3.33 | 0.389 |
| 6.04 | 0.009 | 98.0 | 98.0 | 0.20 | 0.936 |

| | | | | | |
|------|-------|------|------|------|-------|
| 7.80 | 0.012 | 75.0 | 75.0 | 3.33 | 0.389 |
| 5.20 | 0.008 | 98.0 | 98.0 | 0.20 | 0.936 |

Area-averaged catchment yield fraction, Y = 0.512
Area-averaged low loss fraction, Yb = 0.488
++++
User entry of time of concentration = 0.723 (hours)
Watershed area = 674.60(Ac.)
Catchment Lag time = 0.578 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 14.4115
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
Average low loss rate fraction (Yb) = 0.488 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.340(In)
Computed peak 30-minute rainfall = 0.720(In)
Specified peak 1-hour rainfall = 0.950(In)
Computed peak 3-hour rainfall = 1.590(In)
Specified peak 6-hour rainfall = 2.200(In)
Specified peak 24-hour rainfall = 3.680(In)

Rainfall depth area reduction factors:
Using a total area of 674.60(Ac.) (Ref: fig. E-4)

| | |
|--------------------------|-------------------------------|
| 5-minute factor = 0.968 | Adjusted rainfall = 0.329(In) |
| 30-minute factor = 0.968 | Adjusted rainfall = 0.697(In) |
| 1-hour factor = 0.968 | Adjusted rainfall = 0.920(In) |
| 3-hour factor = 0.996 | Adjusted rainfall = 1.584(In) |
| 6-hour factor = 0.998 | Adjusted rainfall = 2.195(In) |
| 24-hour factor = 0.999 | Adjusted rainfall = 3.677(In) |

Unit Hydrograph
++++

| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|
| | (K = | 8158.44 (CFS)) |
| 1 | 0.913 | 74.465 |
| 2 | 3.173 | 184.424 |
| 3 | 6.383 | 261.880 |
| 4 | 10.595 | 343.641 |
| 5 | 16.518 | 483.220 |
| 6 | 24.901 | 683.876 |
| 7 | 40.633 | 1283.475 |
| 8 | 55.356 | 1201.228 |
| 9 | 62.562 | 587.889 |
| 10 | 67.895 | 435.110 |
| 11 | 72.147 | 346.860 |
| 12 | 75.613 | 282.772 |
| 13 | 78.739 | 255.029 |
| 14 | 81.394 | 216.614 |
| 15 | 83.691 | 187.427 |
| 16 | 85.741 | 167.190 |
| 17 | 87.535 | 146.384 |
| 18 | 89.191 | 135.078 |
| 19 | 90.595 | 114.574 |
| 20 | 91.881 | 104.945 |
| 21 | 93.031 | 93.808 |
| 22 | 94.030 | 81.521 |
| 23 | 94.929 | 73.355 |
| 24 | 95.656 | 59.296 |
| 25 | 96.319 | 54.039 |
| 26 | 96.900 | 47.415 |
| 27 | 97.393 | 40.266 |
| 28 | 97.790 | 32.362 |
| 29 | 98.029 | 19.478 |
| 30 | 98.202 | 14.109 |
| 31 | 98.375 | 14.109 |

| | | |
|----|---------|--------|
| 32 | 98.539 | 13.403 |
| 33 | 98.684 | 11.817 |
| 34 | 98.828 | 11.758 |
| 35 | 98.969 | 11.538 |
| 36 | 99.070 | 8.188 |
| 37 | 99.156 | 7.055 |
| 38 | 99.243 | 7.055 |
| 39 | 99.339 | 7.877 |
| 40 | 99.454 | 9.375 |
| 41 | 99.569 | 9.406 |
| 42 | 99.681 | 9.090 |
| 43 | 99.750 | 5.646 |
| 44 | 99.808 | 4.703 |
| 45 | 99.865 | 4.703 |
| 46 | 99.911 | 3.756 |
| 47 | 99.940 | 2.364 |
| 48 | 99.969 | 2.352 |
| 49 | 100.000 | 1.176 |

| Peak Unit Number | Adjusted mass rainfall (In) | Unit rainfall (In) |
|---------------------|-----------------------------------|-----------------------|
| 1 | 0.3292 | 0.3292 |
| 2 | 0.4401 | 0.1109 |
| 3 | 0.5216 | 0.0814 |
| 4 | 0.5884 | 0.0668 |
| 5 | 0.6460 | 0.0576 |
| 6 | 0.6972 | 0.0513 |
| 7 | 0.7416 | 0.0443 |
| 8 | 0.7822 | 0.0407 |
| 9 | 0.8200 | 0.0377 |
| 10 | 0.8553 | 0.0353 |
| 11 | 0.8885 | 0.0332 |
| 12 | 0.9200 | 0.0315 |
| 13 | 0.9571 | 0.0371 |
| 14 | 0.9928 | 0.0357 |
| 15 | 1.0273 | 0.0344 |
| 16 | 1.0606 | 0.0333 |
| 17 | 1.0928 | 0.0323 |
| 18 | 1.1242 | 0.0313 |
| 19 | 1.1546 | 0.0305 |
| 20 | 1.1843 | 0.0297 |
| 21 | 1.2132 | 0.0289 |
| 22 | 1.2414 | 0.0282 |
| 23 | 1.2690 | 0.0276 |
| 24 | 1.2960 | 0.0270 |
| 25 | 1.3224 | 0.0264 |
| 26 | 1.3483 | 0.0259 |
| 27 | 1.3737 | 0.0254 |
| 28 | 1.3986 | 0.0249 |
| 29 | 1.4231 | 0.0245 |
| 30 | 1.4471 | 0.0241 |
| 31 | 1.4708 | 0.0237 |
| 32 | 1.4940 | 0.0233 |
| 33 | 1.5170 | 0.0229 |
| 34 | 1.5395 | 0.0226 |
| 35 | 1.5617 | 0.0222 |
| 36 | 1.5836 | 0.0219 |
| 37 | 1.6042 | 0.0206 |
| 38 | 1.6245 | 0.0203 |
| 39 | 1.6445 | 0.0200 |
| 40 | 1.6642 | 0.0197 |
| 41 | 1.6837 | 0.0195 |
| 42 | 1.7029 | 0.0192 |
| 43 | 1.7219 | 0.0190 |
| 44 | 1.7407 | 0.0188 |
| 45 | 1.7592 | 0.0185 |
| 46 | 1.7775 | 0.0183 |
| 47 | 1.7956 | 0.0181 |
| 48 | 1.8135 | 0.0179 |
| 49 | 1.8313 | 0.0177 |
| 50 | 1.8488 | 0.0175 |
| 51 | 1.8661 | 0.0173 |
| 52 | 1.8833 | 0.0172 |

| | | |
|-----|--------|--------|
| 53 | 1.9002 | 0.0170 |
| 54 | 1.9170 | 0.0168 |
| 55 | 1.9337 | 0.0166 |
| 56 | 1.9502 | 0.0165 |
| 57 | 1.9665 | 0.0163 |
| 58 | 1.9827 | 0.0162 |
| 59 | 1.9987 | 0.0160 |
| 60 | 2.0146 | 0.0159 |
| 61 | 2.0304 | 0.0158 |
| 62 | 2.0460 | 0.0156 |
| 63 | 2.0615 | 0.0155 |
| 64 | 2.0768 | 0.0154 |
| 65 | 2.0921 | 0.0152 |
| 66 | 2.1072 | 0.0151 |
| 67 | 2.1222 | 0.0150 |
| 68 | 2.1370 | 0.0149 |
| 69 | 2.1518 | 0.0148 |
| 70 | 2.1664 | 0.0146 |
| 71 | 2.1809 | 0.0145 |
| 72 | 2.1954 | 0.0144 |
| 73 | 2.2067 | 0.0113 |
| 74 | 2.2179 | 0.0112 |
| 75 | 2.2290 | 0.0111 |
| 76 | 2.2400 | 0.0110 |
| 77 | 2.2509 | 0.0109 |
| 78 | 2.2617 | 0.0108 |
| 79 | 2.2725 | 0.0107 |
| 80 | 2.2831 | 0.0107 |
| 81 | 2.2937 | 0.0106 |
| 82 | 2.3042 | 0.0105 |
| 83 | 2.3146 | 0.0104 |
| 84 | 2.3249 | 0.0103 |
| 85 | 2.3352 | 0.0103 |
| 86 | 2.3454 | 0.0102 |
| 87 | 2.3555 | 0.0101 |
| 88 | 2.3655 | 0.0100 |
| 89 | 2.3755 | 0.0100 |
| 90 | 2.3854 | 0.0099 |
| 91 | 2.3952 | 0.0098 |
| 92 | 2.4050 | 0.0098 |
| 93 | 2.4147 | 0.0097 |
| 94 | 2.4243 | 0.0096 |
| 95 | 2.4338 | 0.0096 |
| 96 | 2.4433 | 0.0095 |
| 97 | 2.4528 | 0.0094 |
| 98 | 2.4622 | 0.0094 |
| 99 | 2.4715 | 0.0093 |
| 100 | 2.4807 | 0.0093 |
| 101 | 2.4899 | 0.0092 |
| 102 | 2.4991 | 0.0091 |
| 103 | 2.5082 | 0.0091 |
| 104 | 2.5172 | 0.0090 |
| 105 | 2.5262 | 0.0090 |
| 106 | 2.5351 | 0.0089 |
| 107 | 2.5440 | 0.0089 |
| 108 | 2.5528 | 0.0088 |
| 109 | 2.5616 | 0.0088 |
| 110 | 2.5703 | 0.0087 |
| 111 | 2.5789 | 0.0087 |
| 112 | 2.5876 | 0.0086 |
| 113 | 2.5961 | 0.0086 |
| 114 | 2.6047 | 0.0085 |
| 115 | 2.6131 | 0.0085 |
| 116 | 2.6216 | 0.0084 |
| 117 | 2.6299 | 0.0084 |
| 118 | 2.6383 | 0.0083 |
| 119 | 2.6466 | 0.0083 |
| 120 | 2.6548 | 0.0083 |
| 121 | 2.6630 | 0.0082 |
| 122 | 2.6712 | 0.0082 |
| 123 | 2.6793 | 0.0081 |
| 124 | 2.6874 | 0.0081 |
| 125 | 2.6955 | 0.0080 |

| | | |
|-----|--------|--------|
| 126 | 2.7035 | 0.0080 |
| 127 | 2.7114 | 0.0080 |
| 128 | 2.7193 | 0.0079 |
| 129 | 2.7272 | 0.0079 |
| 130 | 2.7351 | 0.0078 |
| 131 | 2.7429 | 0.0078 |
| 132 | 2.7507 | 0.0078 |
| 133 | 2.7584 | 0.0077 |
| 134 | 2.7661 | 0.0077 |
| 135 | 2.7737 | 0.0077 |
| 136 | 2.7814 | 0.0076 |
| 137 | 2.7890 | 0.0076 |
| 138 | 2.7965 | 0.0076 |
| 139 | 2.8040 | 0.0075 |
| 140 | 2.8115 | 0.0075 |
| 141 | 2.8190 | 0.0075 |
| 142 | 2.8264 | 0.0074 |
| 143 | 2.8338 | 0.0074 |
| 144 | 2.8411 | 0.0074 |
| 145 | 2.8485 | 0.0073 |
| 146 | 2.8558 | 0.0073 |
| 147 | 2.8630 | 0.0073 |
| 148 | 2.8703 | 0.0072 |
| 149 | 2.8775 | 0.0072 |
| 150 | 2.8846 | 0.0072 |
| 151 | 2.8918 | 0.0071 |
| 152 | 2.8989 | 0.0071 |
| 153 | 2.9060 | 0.0071 |
| 154 | 2.9130 | 0.0071 |
| 155 | 2.9200 | 0.0070 |
| 156 | 2.9270 | 0.0070 |
| 157 | 2.9340 | 0.0070 |
| 158 | 2.9409 | 0.0069 |
| 159 | 2.9478 | 0.0069 |
| 160 | 2.9547 | 0.0069 |
| 161 | 2.9616 | 0.0069 |
| 162 | 2.9684 | 0.0068 |
| 163 | 2.9752 | 0.0068 |
| 164 | 2.9820 | 0.0068 |
| 165 | 2.9887 | 0.0068 |
| 166 | 2.9955 | 0.0067 |
| 167 | 3.0022 | 0.0067 |
| 168 | 3.0088 | 0.0067 |
| 169 | 3.0155 | 0.0067 |
| 170 | 3.0221 | 0.0066 |
| 171 | 3.0287 | 0.0066 |
| 172 | 3.0353 | 0.0066 |
| 173 | 3.0418 | 0.0066 |
| 174 | 3.0484 | 0.0065 |
| 175 | 3.0549 | 0.0065 |
| 176 | 3.0614 | 0.0065 |
| 177 | 3.0678 | 0.0065 |
| 178 | 3.0743 | 0.0064 |
| 179 | 3.0807 | 0.0064 |
| 180 | 3.0871 | 0.0064 |
| 181 | 3.0934 | 0.0064 |
| 182 | 3.0998 | 0.0063 |
| 183 | 3.1061 | 0.0063 |
| 184 | 3.1124 | 0.0063 |
| 185 | 3.1187 | 0.0063 |
| 186 | 3.1250 | 0.0063 |
| 187 | 3.1312 | 0.0062 |
| 188 | 3.1374 | 0.0062 |
| 189 | 3.1436 | 0.0062 |
| 190 | 3.1498 | 0.0062 |
| 191 | 3.1559 | 0.0062 |
| 192 | 3.1621 | 0.0061 |
| 193 | 3.1682 | 0.0061 |
| 194 | 3.1743 | 0.0061 |
| 195 | 3.1804 | 0.0061 |
| 196 | 3.1864 | 0.0061 |
| 197 | 3.1925 | 0.0060 |
| 198 | 3.1985 | 0.0060 |

| | | |
|-----|--------|--------|
| 199 | 3.2045 | 0.0060 |
| 200 | 3.2105 | 0.0060 |
| 201 | 3.2164 | 0.0060 |
| 202 | 3.2224 | 0.0059 |
| 203 | 3.2283 | 0.0059 |
| 204 | 3.2342 | 0.0059 |
| 205 | 3.2401 | 0.0059 |
| 206 | 3.2460 | 0.0059 |
| 207 | 3.2518 | 0.0059 |
| 208 | 3.2577 | 0.0058 |
| 209 | 3.2635 | 0.0058 |
| 210 | 3.2693 | 0.0058 |
| 211 | 3.2751 | 0.0058 |
| 212 | 3.2808 | 0.0058 |
| 213 | 3.2866 | 0.0057 |
| 214 | 3.2923 | 0.0057 |
| 215 | 3.2980 | 0.0057 |
| 216 | 3.3037 | 0.0057 |
| 217 | 3.3094 | 0.0057 |
| 218 | 3.3151 | 0.0057 |
| 219 | 3.3207 | 0.0056 |
| 220 | 3.3263 | 0.0056 |
| 221 | 3.3320 | 0.0056 |
| 222 | 3.3376 | 0.0056 |
| 223 | 3.3431 | 0.0056 |
| 224 | 3.3487 | 0.0056 |
| 225 | 3.3543 | 0.0056 |
| 226 | 3.3598 | 0.0055 |
| 227 | 3.3653 | 0.0055 |
| 228 | 3.3708 | 0.0055 |
| 229 | 3.3763 | 0.0055 |
| 230 | 3.3818 | 0.0055 |
| 231 | 3.3873 | 0.0055 |
| 232 | 3.3927 | 0.0054 |
| 233 | 3.3981 | 0.0054 |
| 234 | 3.4036 | 0.0054 |
| 235 | 3.4090 | 0.0054 |
| 236 | 3.4144 | 0.0054 |
| 237 | 3.4197 | 0.0054 |
| 238 | 3.4251 | 0.0054 |
| 239 | 3.4304 | 0.0053 |
| 240 | 3.4358 | 0.0053 |
| 241 | 3.4411 | 0.0053 |
| 242 | 3.4464 | 0.0053 |
| 243 | 3.4517 | 0.0053 |
| 244 | 3.4570 | 0.0053 |
| 245 | 3.4622 | 0.0053 |
| 246 | 3.4675 | 0.0053 |
| 247 | 3.4727 | 0.0052 |
| 248 | 3.4779 | 0.0052 |
| 249 | 3.4832 | 0.0052 |
| 250 | 3.4884 | 0.0052 |
| 251 | 3.4935 | 0.0052 |
| 252 | 3.4987 | 0.0052 |
| 253 | 3.5039 | 0.0052 |
| 254 | 3.5090 | 0.0051 |
| 255 | 3.5141 | 0.0051 |
| 256 | 3.5193 | 0.0051 |
| 257 | 3.5244 | 0.0051 |
| 258 | 3.5295 | 0.0051 |
| 259 | 3.5346 | 0.0051 |
| 260 | 3.5396 | 0.0051 |
| 261 | 3.5447 | 0.0051 |
| 262 | 3.5497 | 0.0050 |
| 263 | 3.5548 | 0.0050 |
| 264 | 3.5598 | 0.0050 |
| 265 | 3.5648 | 0.0050 |
| 266 | 3.5698 | 0.0050 |
| 267 | 3.5748 | 0.0050 |
| 268 | 3.5798 | 0.0050 |
| 269 | 3.5847 | 0.0050 |
| 270 | 3.5897 | 0.0050 |
| 271 | 3.5946 | 0.0049 |

| | | |
|-----|--------|--------|
| 272 | 3.5995 | 0.0049 |
| 273 | 3.6045 | 0.0049 |
| 274 | 3.6094 | 0.0049 |
| 275 | 3.6143 | 0.0049 |
| 276 | 3.6191 | 0.0049 |
| 277 | 3.6240 | 0.0049 |
| 278 | 3.6289 | 0.0049 |
| 279 | 3.6337 | 0.0049 |
| 280 | 3.6386 | 0.0048 |
| 281 | 3.6434 | 0.0048 |
| 282 | 3.6482 | 0.0048 |
| 283 | 3.6530 | 0.0048 |
| 284 | 3.6578 | 0.0048 |
| 285 | 3.6626 | 0.0048 |
| 286 | 3.6674 | 0.0048 |
| 287 | 3.6721 | 0.0048 |
| 288 | 3.6769 | 0.0048 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0048 | 0.0023 | 0.0024 |
| 2 | 0.0048 | 0.0023 | 0.0024 |
| 3 | 0.0048 | 0.0023 | 0.0024 |
| 4 | 0.0048 | 0.0023 | 0.0025 |
| 5 | 0.0048 | 0.0024 | 0.0025 |
| 6 | 0.0048 | 0.0024 | 0.0025 |
| 7 | 0.0049 | 0.0024 | 0.0025 |
| 8 | 0.0049 | 0.0024 | 0.0025 |
| 9 | 0.0049 | 0.0024 | 0.0025 |
| 10 | 0.0049 | 0.0024 | 0.0025 |
| 11 | 0.0049 | 0.0024 | 0.0025 |
| 12 | 0.0049 | 0.0024 | 0.0025 |
| 13 | 0.0050 | 0.0024 | 0.0025 |
| 14 | 0.0050 | 0.0024 | 0.0025 |
| 15 | 0.0050 | 0.0024 | 0.0026 |
| 16 | 0.0050 | 0.0024 | 0.0026 |
| 17 | 0.0050 | 0.0025 | 0.0026 |
| 18 | 0.0050 | 0.0025 | 0.0026 |
| 19 | 0.0051 | 0.0025 | 0.0026 |
| 20 | 0.0051 | 0.0025 | 0.0026 |
| 21 | 0.0051 | 0.0025 | 0.0026 |
| 22 | 0.0051 | 0.0025 | 0.0026 |
| 23 | 0.0051 | 0.0025 | 0.0026 |
| 24 | 0.0051 | 0.0025 | 0.0026 |
| 25 | 0.0052 | 0.0025 | 0.0026 |
| 26 | 0.0052 | 0.0025 | 0.0027 |
| 27 | 0.0052 | 0.0025 | 0.0027 |
| 28 | 0.0052 | 0.0025 | 0.0027 |
| 29 | 0.0053 | 0.0026 | 0.0027 |
| 30 | 0.0053 | 0.0026 | 0.0027 |
| 31 | 0.0053 | 0.0026 | 0.0027 |
| 32 | 0.0053 | 0.0026 | 0.0027 |
| 33 | 0.0053 | 0.0026 | 0.0027 |
| 34 | 0.0053 | 0.0026 | 0.0027 |
| 35 | 0.0054 | 0.0026 | 0.0028 |
| 36 | 0.0054 | 0.0026 | 0.0028 |
| 37 | 0.0054 | 0.0026 | 0.0028 |
| 38 | 0.0054 | 0.0027 | 0.0028 |
| 39 | 0.0055 | 0.0027 | 0.0028 |
| 40 | 0.0055 | 0.0027 | 0.0028 |
| 41 | 0.0055 | 0.0027 | 0.0028 |
| 42 | 0.0055 | 0.0027 | 0.0028 |
| 43 | 0.0056 | 0.0027 | 0.0028 |
| 44 | 0.0056 | 0.0027 | 0.0029 |
| 45 | 0.0056 | 0.0027 | 0.0029 |
| 46 | 0.0056 | 0.0027 | 0.0029 |
| 47 | 0.0056 | 0.0028 | 0.0029 |
| 48 | 0.0057 | 0.0028 | 0.0029 |
| 49 | 0.0057 | 0.0028 | 0.0029 |
| 50 | 0.0057 | 0.0028 | 0.0029 |
| 51 | 0.0057 | 0.0028 | 0.0029 |

| | | | |
|-----|--------|--------|--------|
| 52 | 0.0058 | 0.0028 | 0.0030 |
| 53 | 0.0058 | 0.0028 | 0.0030 |
| 54 | 0.0058 | 0.0028 | 0.0030 |
| 55 | 0.0059 | 0.0029 | 0.0030 |
| 56 | 0.0059 | 0.0029 | 0.0030 |
| 57 | 0.0059 | 0.0029 | 0.0030 |
| 58 | 0.0059 | 0.0029 | 0.0030 |
| 59 | 0.0060 | 0.0029 | 0.0031 |
| 60 | 0.0060 | 0.0029 | 0.0031 |
| 61 | 0.0060 | 0.0029 | 0.0031 |
| 62 | 0.0060 | 0.0029 | 0.0031 |
| 63 | 0.0061 | 0.0030 | 0.0031 |
| 64 | 0.0061 | 0.0030 | 0.0031 |
| 65 | 0.0061 | 0.0030 | 0.0031 |
| 66 | 0.0062 | 0.0030 | 0.0032 |
| 67 | 0.0062 | 0.0030 | 0.0032 |
| 68 | 0.0062 | 0.0030 | 0.0032 |
| 69 | 0.0063 | 0.0031 | 0.0032 |
| 70 | 0.0063 | 0.0031 | 0.0032 |
| 71 | 0.0063 | 0.0031 | 0.0032 |
| 72 | 0.0063 | 0.0031 | 0.0032 |
| 73 | 0.0064 | 0.0031 | 0.0033 |
| 74 | 0.0064 | 0.0031 | 0.0033 |
| 75 | 0.0065 | 0.0032 | 0.0033 |
| 76 | 0.0065 | 0.0032 | 0.0033 |
| 77 | 0.0065 | 0.0032 | 0.0033 |
| 78 | 0.0066 | 0.0032 | 0.0034 |
| 79 | 0.0066 | 0.0032 | 0.0034 |
| 80 | 0.0066 | 0.0032 | 0.0034 |
| 81 | 0.0067 | 0.0033 | 0.0034 |
| 82 | 0.0067 | 0.0033 | 0.0034 |
| 83 | 0.0068 | 0.0033 | 0.0035 |
| 84 | 0.0068 | 0.0033 | 0.0035 |
| 85 | 0.0068 | 0.0033 | 0.0035 |
| 86 | 0.0069 | 0.0033 | 0.0035 |
| 87 | 0.0069 | 0.0034 | 0.0035 |
| 88 | 0.0069 | 0.0034 | 0.0036 |
| 89 | 0.0070 | 0.0034 | 0.0036 |
| 90 | 0.0070 | 0.0034 | 0.0036 |
| 91 | 0.0071 | 0.0035 | 0.0036 |
| 92 | 0.0071 | 0.0035 | 0.0036 |
| 93 | 0.0072 | 0.0035 | 0.0037 |
| 94 | 0.0072 | 0.0035 | 0.0037 |
| 95 | 0.0073 | 0.0035 | 0.0037 |
| 96 | 0.0073 | 0.0036 | 0.0037 |
| 97 | 0.0074 | 0.0036 | 0.0038 |
| 98 | 0.0074 | 0.0036 | 0.0038 |
| 99 | 0.0075 | 0.0036 | 0.0038 |
| 100 | 0.0075 | 0.0037 | 0.0038 |
| 101 | 0.0076 | 0.0037 | 0.0039 |
| 102 | 0.0076 | 0.0037 | 0.0039 |
| 103 | 0.0077 | 0.0037 | 0.0039 |
| 104 | 0.0077 | 0.0038 | 0.0039 |
| 105 | 0.0078 | 0.0038 | 0.0040 |
| 106 | 0.0078 | 0.0038 | 0.0040 |
| 107 | 0.0079 | 0.0038 | 0.0040 |
| 108 | 0.0079 | 0.0039 | 0.0041 |
| 109 | 0.0080 | 0.0039 | 0.0041 |
| 110 | 0.0080 | 0.0039 | 0.0041 |
| 111 | 0.0081 | 0.0040 | 0.0042 |
| 112 | 0.0082 | 0.0040 | 0.0042 |
| 113 | 0.0083 | 0.0040 | 0.0042 |
| 114 | 0.0083 | 0.0040 | 0.0042 |
| 115 | 0.0084 | 0.0041 | 0.0043 |
| 116 | 0.0084 | 0.0041 | 0.0043 |
| 117 | 0.0085 | 0.0042 | 0.0044 |
| 118 | 0.0086 | 0.0042 | 0.0044 |
| 119 | 0.0087 | 0.0042 | 0.0044 |
| 120 | 0.0087 | 0.0043 | 0.0045 |
| 121 | 0.0088 | 0.0043 | 0.0045 |
| 122 | 0.0089 | 0.0043 | 0.0045 |
| 123 | 0.0090 | 0.0044 | 0.0046 |
| 124 | 0.0090 | 0.0044 | 0.0046 |

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|-----|--------|--------|--------|
| 125 | 0.0091 | 0.0045 | 0.0047 |
| 126 | 0.0092 | 0.0045 | 0.0047 |
| 127 | 0.0093 | 0.0045 | 0.0048 |
| 128 | 0.0094 | 0.0046 | 0.0048 |
| 129 | 0.0095 | 0.0046 | 0.0049 |
| 130 | 0.0096 | 0.0047 | 0.0049 |
| 131 | 0.0097 | 0.0047 | 0.0050 |
| 132 | 0.0098 | 0.0048 | 0.0050 |
| 133 | 0.0099 | 0.0048 | 0.0051 |
| 134 | 0.0100 | 0.0049 | 0.0051 |
| 135 | 0.0101 | 0.0049 | 0.0052 |
| 136 | 0.0102 | 0.0050 | 0.0052 |
| 137 | 0.0103 | 0.0050 | 0.0053 |
| 138 | 0.0104 | 0.0051 | 0.0053 |
| 139 | 0.0106 | 0.0052 | 0.0054 |
| 140 | 0.0107 | 0.0052 | 0.0055 |
| 141 | 0.0108 | 0.0053 | 0.0055 |
| 142 | 0.0109 | 0.0053 | 0.0056 |
| 143 | 0.0111 | 0.0054 | 0.0057 |
| 144 | 0.0112 | 0.0055 | 0.0057 |
| 145 | 0.0144 | 0.0070 | 0.0074 |
| 146 | 0.0145 | 0.0071 | 0.0074 |
| 147 | 0.0148 | 0.0072 | 0.0076 |
| 148 | 0.0149 | 0.0073 | 0.0076 |
| 149 | 0.0151 | 0.0074 | 0.0077 |
| 150 | 0.0152 | 0.0074 | 0.0078 |
| 151 | 0.0155 | 0.0076 | 0.0079 |
| 152 | 0.0156 | 0.0076 | 0.0080 |
| 153 | 0.0159 | 0.0078 | 0.0081 |
| 154 | 0.0160 | 0.0078 | 0.0082 |
| 155 | 0.0163 | 0.0080 | 0.0084 |
| 156 | 0.0165 | 0.0080 | 0.0084 |
| 157 | 0.0168 | 0.0082 | 0.0086 |
| 158 | 0.0170 | 0.0083 | 0.0087 |
| 159 | 0.0173 | 0.0085 | 0.0089 |
| 160 | 0.0175 | 0.0085 | 0.0090 |
| 161 | 0.0179 | 0.0087 | 0.0092 |
| 162 | 0.0181 | 0.0088 | 0.0093 |
| 163 | 0.0185 | 0.0090 | 0.0095 |
| 164 | 0.0188 | 0.0092 | 0.0096 |
| 165 | 0.0192 | 0.0094 | 0.0098 |
| 166 | 0.0195 | 0.0095 | 0.0100 |
| 167 | 0.0200 | 0.0098 | 0.0102 |
| 168 | 0.0203 | 0.0099 | 0.0104 |
| 169 | 0.0219 | 0.0107 | 0.0112 |
| 170 | 0.0222 | 0.0108 | 0.0114 |
| 171 | 0.0229 | 0.0112 | 0.0117 |
| 172 | 0.0233 | 0.0114 | 0.0119 |
| 173 | 0.0241 | 0.0117 | 0.0123 |
| 174 | 0.0245 | 0.0119 | 0.0125 |
| 175 | 0.0254 | 0.0124 | 0.0130 |
| 176 | 0.0259 | 0.0126 | 0.0133 |
| 177 | 0.0270 | 0.0132 | 0.0138 |
| 178 | 0.0276 | 0.0135 | 0.0141 |
| 179 | 0.0289 | 0.0141 | 0.0148 |
| 180 | 0.0297 | 0.0145 | 0.0152 |
| 181 | 0.0313 | 0.0153 | 0.0160 |
| 182 | 0.0323 | 0.0158 | 0.0165 |
| 183 | 0.0344 | 0.0168 | 0.0176 |
| 184 | 0.0357 | 0.0174 | 0.0183 |
| 185 | 0.0315 | 0.0154 | 0.0161 |
| 186 | 0.0332 | 0.0162 | 0.0170 |
| 187 | 0.0377 | 0.0184 | 0.0193 |
| 188 | 0.0407 | 0.0187 | 0.0220 |
| 189 | 0.0513 | 0.0187 | 0.0326 |
| 190 | 0.0576 | 0.0187 | 0.0390 |
| 191 | 0.0814 | 0.0187 | 0.0628 |
| 192 | 0.1109 | 0.0187 | 0.0922 |
| 193 | 0.3292 | 0.0187 | 0.3106 |
| 194 | 0.0668 | 0.0187 | 0.0481 |
| 195 | 0.0443 | 0.0187 | 0.0257 |
| 196 | 0.0353 | 0.0172 | 0.0181 |
| 197 | 0.0371 | 0.0181 | 0.0190 |

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|-----|--------|--------|--------|
| 198 | 0.0333 | 0.0163 | 0.0170 |
| 199 | 0.0305 | 0.0149 | 0.0156 |
| 200 | 0.0282 | 0.0138 | 0.0144 |
| 201 | 0.0264 | 0.0129 | 0.0135 |
| 202 | 0.0249 | 0.0122 | 0.0128 |
| 203 | 0.0237 | 0.0115 | 0.0121 |
| 204 | 0.0226 | 0.0110 | 0.0115 |
| 205 | 0.0206 | 0.0100 | 0.0105 |
| 206 | 0.0197 | 0.0096 | 0.0101 |
| 207 | 0.0190 | 0.0093 | 0.0097 |
| 208 | 0.0183 | 0.0089 | 0.0094 |
| 209 | 0.0177 | 0.0086 | 0.0091 |
| 210 | 0.0172 | 0.0084 | 0.0088 |
| 211 | 0.0166 | 0.0081 | 0.0085 |
| 212 | 0.0162 | 0.0079 | 0.0083 |
| 213 | 0.0158 | 0.0077 | 0.0081 |
| 214 | 0.0154 | 0.0075 | 0.0079 |
| 215 | 0.0150 | 0.0073 | 0.0077 |
| 216 | 0.0146 | 0.0071 | 0.0075 |
| 217 | 0.0113 | 0.0055 | 0.0058 |
| 218 | 0.0110 | 0.0054 | 0.0056 |
| 219 | 0.0107 | 0.0052 | 0.0055 |
| 220 | 0.0105 | 0.0051 | 0.0054 |
| 221 | 0.0103 | 0.0050 | 0.0053 |
| 222 | 0.0100 | 0.0049 | 0.0051 |
| 223 | 0.0098 | 0.0048 | 0.0050 |
| 224 | 0.0096 | 0.0047 | 0.0049 |
| 225 | 0.0094 | 0.0046 | 0.0048 |
| 226 | 0.0093 | 0.0045 | 0.0047 |
| 227 | 0.0091 | 0.0044 | 0.0047 |
| 228 | 0.0089 | 0.0044 | 0.0046 |
| 229 | 0.0088 | 0.0043 | 0.0045 |
| 230 | 0.0086 | 0.0042 | 0.0044 |
| 231 | 0.0085 | 0.0041 | 0.0043 |
| 232 | 0.0083 | 0.0041 | 0.0043 |
| 233 | 0.0082 | 0.0040 | 0.0042 |
| 234 | 0.0081 | 0.0039 | 0.0041 |
| 235 | 0.0080 | 0.0039 | 0.0041 |
| 236 | 0.0078 | 0.0038 | 0.0040 |
| 237 | 0.0077 | 0.0038 | 0.0040 |
| 238 | 0.0076 | 0.0037 | 0.0039 |
| 239 | 0.0075 | 0.0037 | 0.0039 |
| 240 | 0.0074 | 0.0036 | 0.0038 |
| 241 | 0.0073 | 0.0036 | 0.0037 |
| 242 | 0.0072 | 0.0035 | 0.0037 |
| 243 | 0.0071 | 0.0035 | 0.0037 |
| 244 | 0.0071 | 0.0034 | 0.0036 |
| 245 | 0.0070 | 0.0034 | 0.0036 |
| 246 | 0.0069 | 0.0034 | 0.0035 |
| 247 | 0.0068 | 0.0033 | 0.0035 |
| 248 | 0.0067 | 0.0033 | 0.0034 |
| 249 | 0.0067 | 0.0032 | 0.0034 |
| 250 | 0.0066 | 0.0032 | 0.0034 |
| 251 | 0.0065 | 0.0032 | 0.0033 |
| 252 | 0.0064 | 0.0031 | 0.0033 |
| 253 | 0.0064 | 0.0031 | 0.0033 |
| 254 | 0.0063 | 0.0031 | 0.0032 |
| 255 | 0.0062 | 0.0030 | 0.0032 |
| 256 | 0.0062 | 0.0030 | 0.0032 |
| 257 | 0.0061 | 0.0030 | 0.0031 |
| 258 | 0.0061 | 0.0030 | 0.0031 |
| 259 | 0.0060 | 0.0029 | 0.0031 |
| 260 | 0.0059 | 0.0029 | 0.0030 |
| 261 | 0.0059 | 0.0029 | 0.0030 |
| 262 | 0.0058 | 0.0028 | 0.0030 |
| 263 | 0.0058 | 0.0028 | 0.0030 |
| 264 | 0.0057 | 0.0028 | 0.0029 |
| 265 | 0.0057 | 0.0028 | 0.0029 |
| 266 | 0.0056 | 0.0027 | 0.0029 |
| 267 | 0.0056 | 0.0027 | 0.0029 |
| 268 | 0.0055 | 0.0027 | 0.0028 |
| 269 | 0.0055 | 0.0027 | 0.0028 |
| 270 | 0.0054 | 0.0027 | 0.0028 |

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|-----|--------|--------|--------|
| 271 | 0.0054 | 0.0026 | 0.0028 |
| 272 | 0.0054 | 0.0026 | 0.0027 |
| 273 | 0.0053 | 0.0026 | 0.0027 |
| 274 | 0.0053 | 0.0026 | 0.0027 |
| 275 | 0.0052 | 0.0026 | 0.0027 |
| 276 | 0.0052 | 0.0025 | 0.0027 |
| 277 | 0.0052 | 0.0025 | 0.0026 |
| 278 | 0.0051 | 0.0025 | 0.0026 |
| 279 | 0.0051 | 0.0025 | 0.0026 |
| 280 | 0.0050 | 0.0025 | 0.0026 |
| 281 | 0.0050 | 0.0024 | 0.0026 |
| 282 | 0.0050 | 0.0024 | 0.0025 |
| 283 | 0.0049 | 0.0024 | 0.0025 |
| 284 | 0.0049 | 0.0024 | 0.0025 |
| 285 | 0.0049 | 0.0024 | 0.0025 |
| 286 | 0.0048 | 0.0024 | 0.0025 |
| 287 | 0.0048 | 0.0023 | 0.0025 |
| 288 | 0.0048 | 0.0023 | 0.0024 |

Total soil rain loss = 1.56(In)
Total effective rainfall = 2.11(In)
Peak flow rate in flood hydrograph = 672.83(CFS)

+++++
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 175.0 | 350.0 | 525.0 | 700.0 |
|-----------|--------------|--------|----|-------|-------|-------|-------|
| 0+ 5 | 0.0012 | 0.18 | Q | | | | |
| 0+10 | 0.0056 | 0.63 | Q | | | | |
| 0+15 | 0.0143 | 1.27 | Q | | | | |
| 0+20 | 0.0289 | 2.11 | Q | | | | |
| 0+25 | 0.0515 | 3.29 | Q | | | | |
| 0+30 | 0.0857 | 4.97 | Q | | | | |
| 0+35 | 0.1416 | 8.11 | Q | | | | |
| 0+40 | 0.2177 | 11.05 | Q | | | | |
| 0+45 | 0.3039 | 12.52 | Q | | | | |
| 0+50 | 0.3978 | 13.62 | Q | | | | |
| 0+55 | 0.4977 | 14.51 | Q | | | | |
| 1+ 0 | 0.6027 | 15.25 | Q | | | | |
| 1+ 5 | 0.7123 | 15.92 | Q | | | | |
| 1+10 | 0.8260 | 16.50 | Q | | | | |
| 1+15 | 0.9431 | 17.01 | Q | | | | |
| 1+20 | 1.0635 | 17.48 | Q | | | | |
| 1+25 | 1.1867 | 17.89 | VQ | | | | |
| 1+30 | 1.3126 | 18.28 | VQ | | | | |
| 1+35 | 1.4409 | 18.62 | VQ | | | | |
| 1+40 | 1.5714 | 18.94 | VQ | | | | |
| 1+45 | 1.7039 | 19.24 | VQ | | | | |
| 1+50 | 1.8382 | 19.51 | VQ | | | | |
| 1+55 | 1.9743 | 19.75 | VQ | | | | |
| 2+ 0 | 2.1118 | 19.97 | VQ | | | | |
| 2+ 5 | 2.2507 | 20.17 | VQ | | | | |
| 2+10 | 2.3909 | 20.36 | VQ | | | | |
| 2+15 | 2.5323 | 20.53 | VQ | | | | |
| 2+20 | 2.6747 | 20.68 | VQ | | | | |
| 2+25 | 2.8180 | 20.80 | VQ | | | | |
| 2+30 | 2.9620 | 20.91 | VQ | | | | |
| 2+35 | 3.1068 | 21.03 | Q | | | | |
| 2+40 | 3.2524 | 21.14 | Q | | | | |
| 2+45 | 3.3987 | 21.24 | Q | | | | |
| 2+50 | 3.5458 | 21.35 | Q | | | | |
| 2+55 | 3.6936 | 21.46 | Q | | | | |
| 3+ 0 | 3.8421 | 21.56 | Q | | | | |
| 3+ 5 | 3.9912 | 21.66 | Q | | | | |
| 3+10 | 4.1411 | 21.76 | Q | | | | |
| 3+15 | 4.2917 | 21.87 | Q | | | | |
| 3+20 | 4.4430 | 21.97 | Q | | | | |

| | | | |
|------|---------|-------|-----|
| 3+25 | 4.5951 | 22.08 | Q |
| 3+30 | 4.7479 | 22.19 | Q |
| 3+35 | 4.9015 | 22.29 | Q |
| 3+40 | 5.0557 | 22.39 | Q |
| 3+45 | 5.2106 | 22.49 | Q |
| 3+50 | 5.3662 | 22.59 | Q |
| 3+55 | 5.5225 | 22.69 | Q |
| 4+ 0 | 5.6794 | 22.79 | Q |
| 4+ 5 | 5.8370 | 22.89 | Q |
| 4+10 | 5.9953 | 22.98 | QV |
| 4+15 | 6.1542 | 23.08 | QV |
| 4+20 | 6.3138 | 23.17 | QV |
| 4+25 | 6.4741 | 23.27 | QV |
| 4+30 | 6.6350 | 23.37 | QV |
| 4+35 | 6.7966 | 23.47 | QV |
| 4+40 | 6.9590 | 23.57 | QV |
| 4+45 | 7.1220 | 23.67 | QV |
| 4+50 | 7.2857 | 23.78 | QV |
| 4+55 | 7.4502 | 23.88 | QV |
| 5+ 0 | 7.6154 | 23.99 | QV |
| 5+ 5 | 7.7813 | 24.09 | QV |
| 5+10 | 7.9480 | 24.20 | QV |
| 5+15 | 8.1154 | 24.31 | QV |
| 5+20 | 8.2836 | 24.42 | QV |
| 5+25 | 8.4526 | 24.53 | QV |
| 5+30 | 8.6223 | 24.65 | QV |
| 5+35 | 8.7929 | 24.76 | QV |
| 5+40 | 8.9642 | 24.88 | Q V |
| 5+45 | 9.1364 | 25.00 | Q V |
| 5+50 | 9.3093 | 25.11 | Q V |
| 5+55 | 9.4831 | 25.24 | Q V |
| 6+ 0 | 9.6578 | 25.36 | Q V |
| 6+ 5 | 9.8332 | 25.48 | Q V |
| 6+10 | 10.0096 | 25.61 | Q V |
| 6+15 | 10.1868 | 25.73 | Q V |
| 6+20 | 10.3649 | 25.86 | Q V |
| 6+25 | 10.5439 | 25.99 | Q V |
| 6+30 | 10.7239 | 26.12 | Q V |
| 6+35 | 10.9047 | 26.26 | Q V |
| 6+40 | 11.0865 | 26.39 | Q V |
| 6+45 | 11.2692 | 26.53 | Q V |
| 6+50 | 11.4529 | 26.67 | Q V |
| 6+55 | 11.6375 | 26.81 | Q V |
| 7+ 0 | 11.8231 | 26.95 | Q V |
| 7+ 5 | 12.0098 | 27.10 | Q V |
| 7+10 | 12.1974 | 27.25 | Q V |
| 7+15 | 12.3861 | 27.39 | Q V |
| 7+20 | 12.5758 | 27.55 | Q V |
| 7+25 | 12.7666 | 27.70 | Q V |
| 7+30 | 12.9584 | 27.86 | Q V |
| 7+35 | 13.1513 | 28.01 | Q V |
| 7+40 | 13.3454 | 28.17 | Q V |
| 7+45 | 13.5405 | 28.34 | Q V |
| 7+50 | 13.7368 | 28.50 | Q V |
| 7+55 | 13.9343 | 28.67 | Q V |
| 8+ 0 | 14.1329 | 28.84 | Q V |
| 8+ 5 | 14.3327 | 29.01 | Q V |
| 8+10 | 14.5337 | 29.19 | Q V |
| 8+15 | 14.7360 | 29.37 | Q V |
| 8+20 | 14.9395 | 29.55 | Q V |
| 8+25 | 15.1442 | 29.73 | Q V |
| 8+30 | 15.3503 | 29.92 | Q V |
| 8+35 | 15.5577 | 30.11 | Q V |
| 8+40 | 15.7664 | 30.30 | Q V |
| 8+45 | 15.9765 | 30.50 | Q V |
| 8+50 | 16.1879 | 30.70 | Q V |
| 8+55 | 16.4008 | 30.91 | Q V |
| 9+ 0 | 16.6150 | 31.11 | Q V |
| 9+ 5 | 16.8308 | 31.32 | Q V |
| 9+10 | 17.0480 | 31.54 | Q V |
| 9+15 | 17.2667 | 31.76 | Q V |
| 9+20 | 17.4869 | 31.98 | Q V |
| 9+25 | 17.7087 | 32.21 | Q V |

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|-------|---------|--------|---|---|--|--|--|--|
| 9+30 | 17.9321 | 32.44 | Q | V | | | | |
| 9+35 | 18.1572 | 32.67 | Q | V | | | | |
| 9+40 | 18.3838 | 32.91 | Q | V | | | | |
| 9+45 | 18.6122 | 33.16 | Q | V | | | | |
| 9+50 | 18.8423 | 33.41 | Q | V | | | | |
| 9+55 | 19.0741 | 33.66 | Q | V | | | | |
| 10+ 0 | 19.3077 | 33.92 | Q | V | | | | |
| 10+ 5 | 19.5431 | 34.18 | Q | V | | | | |
| 10+10 | 19.7804 | 34.45 | Q | V | | | | |
| 10+15 | 20.0196 | 34.73 | Q | V | | | | |
| 10+20 | 20.2607 | 35.01 | Q | V | | | | |
| 10+25 | 20.5039 | 35.30 | Q | V | | | | |
| 10+30 | 20.7490 | 35.59 | Q | V | | | | |
| 10+35 | 20.9962 | 35.89 | Q | V | | | | |
| 10+40 | 21.2455 | 36.20 | Q | V | | | | |
| 10+45 | 21.4970 | 36.51 | Q | V | | | | |
| 10+50 | 21.7506 | 36.83 | Q | V | | | | |
| 10+55 | 22.0066 | 37.16 | Q | V | | | | |
| 11+ 0 | 22.2648 | 37.50 | Q | V | | | | |
| 11+ 5 | 22.5255 | 37.84 | Q | V | | | | |
| 11+10 | 22.7885 | 38.20 | Q | V | | | | |
| 11+15 | 23.0541 | 38.56 | Q | V | | | | |
| 11+20 | 23.3222 | 38.93 | Q | V | | | | |
| 11+25 | 23.5929 | 39.31 | Q | V | | | | |
| 11+30 | 23.8663 | 39.70 | Q | V | | | | |
| 11+35 | 24.1424 | 40.10 | Q | V | | | | |
| 11+40 | 24.4214 | 40.51 | Q | V | | | | |
| 11+45 | 24.7033 | 40.93 | Q | V | | | | |
| 11+50 | 24.9882 | 41.36 | Q | V | | | | |
| 11+55 | 25.2761 | 41.81 | Q | V | | | | |
| 12+ 0 | 25.5672 | 42.27 | Q | V | | | | |
| 12+ 5 | 25.8623 | 42.85 | Q | V | | | | |
| 12+10 | 26.1628 | 43.63 | Q | V | | | | |
| 12+15 | 26.4695 | 44.53 | Q | V | | | | |
| 12+20 | 26.7834 | 45.58 | Q | V | | | | |
| 12+25 | 27.1062 | 46.87 | Q | V | | | | |
| 12+30 | 27.4401 | 48.48 | Q | V | | | | |
| 12+35 | 27.7917 | 51.05 | Q | V | | | | |
| 12+40 | 28.1603 | 53.51 | Q | V | | | | |
| 12+45 | 28.5395 | 55.06 | Q | V | | | | |
| 12+50 | 28.9278 | 56.38 | Q | V | | | | |
| 12+55 | 29.3245 | 57.60 | Q | V | | | | |
| 13+ 0 | 29.7290 | 58.74 | Q | V | | | | |
| 13+ 5 | 30.1413 | 59.86 | Q | V | | | | |
| 13+10 | 30.5611 | 60.95 | Q | V | | | | |
| 13+15 | 30.9883 | 62.03 | Q | V | | | | |
| 13+20 | 31.4229 | 63.11 | Q | V | | | | |
| 13+25 | 31.8650 | 64.19 | Q | V | | | | |
| 13+30 | 32.3146 | 65.28 | Q | V | | | | |
| 13+35 | 32.7717 | 66.38 | Q | V | | | | |
| 13+40 | 33.2366 | 67.50 | Q | V | | | | |
| 13+45 | 33.7094 | 68.65 | Q | V | | | | |
| 13+50 | 34.1903 | 69.83 | Q | V | | | | |
| 13+55 | 34.6796 | 71.04 | Q | V | | | | |
| 14+ 0 | 35.1774 | 72.28 | Q | V | | | | |
| 14+ 5 | 35.6844 | 73.61 | Q | V | | | | |
| 14+10 | 36.2012 | 75.05 | Q | V | | | | |
| 14+15 | 36.7287 | 76.59 | Q | V | | | | |
| 14+20 | 37.2674 | 78.22 | Q | V | | | | |
| 14+25 | 37.8183 | 80.00 | Q | V | | | | |
| 14+30 | 38.3827 | 81.95 | Q | V | | | | |
| 14+35 | 38.9634 | 84.32 | Q | V | | | | |
| 14+40 | 39.5608 | 86.74 | Q | V | | | | |
| 14+45 | 40.1736 | 88.98 | Q | V | | | | |
| 14+50 | 40.8021 | 91.25 | Q | V | | | | |
| 14+55 | 41.4470 | 93.64 | Q | V | | | | |
| 15+ 0 | 42.1092 | 96.15 | Q | V | | | | |
| 15+ 5 | 42.7900 | 98.85 | Q | V | | | | |
| 15+10 | 43.4907 | 101.74 | Q | V | | | | |
| 15+15 | 44.2131 | 104.89 | Q | V | | | | |
| 15+20 | 44.9590 | 108.31 | Q | V | | | | |
| 15+25 | 45.7293 | 111.84 | Q | V | | | | |
| 15+30 | 46.5237 | 115.35 | Q | V | | | | |

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|-------|----------|--------|--|--|--|--|
| 15+35 | 47.3442 | 119.14 | | | | |
| 15+40 | 48.1936 | 123.33 | | | | |
| 15+45 | 49.0790 | 128.56 | | | | |
| 15+50 | 50.0103 | 135.22 | | | | |
| 15+55 | 50.9992 | 143.59 | | | | |
| 16+ 0 | 52.0936 | 158.91 | | | | |
| 16+ 5 | 53.4738 | 200.41 | | | | |
| 16+10 | 55.2270 | 254.57 | | | | |
| 16+15 | 57.3393 | 306.70 | | | | |
| 16+20 | 59.8397 | 363.06 | | | | |
| 16+25 | 62.8586 | 438.35 | | | | |
| 16+30 | 66.4956 | 528.09 | | | | |
| 16+35 | 71.1294 | 672.83 | | | | |
| 16+40 | 75.3526 | 613.20 | | | | |
| 16+45 | 78.2340 | 418.38 | | | | |
| 16+50 | 80.5970 | 343.11 | | | | |
| 16+55 | 82.6597 | 299.51 | | | | |
| 17+ 0 | 84.5119 | 268.94 | | | | |
| 17+ 5 | 86.2206 | 248.10 | | | | |
| 17+10 | 87.7806 | 226.52 | | | | |
| 17+15 | 89.2166 | 208.50 | | | | |
| 17+20 | 90.5517 | 193.87 | | | | |
| 17+25 | 91.7923 | 180.13 | | | | |
| 17+30 | 92.9570 | 169.12 | | | | |
| 17+35 | 94.0341 | 156.39 | | | | |
| 17+40 | 95.0451 | 146.80 | | | | |
| 17+45 | 95.9932 | 137.67 | | | | |
| 17+50 | 96.8799 | 128.75 | | | | |
| 17+55 | 97.7139 | 121.09 | | | | |
| 18+ 0 | 98.4895 | 112.61 | | | | |
| 18+ 5 | 99.2226 | 106.45 | | | | |
| 18+10 | 99.9118 | 100.06 | | | | |
| 18+15 | 100.5560 | 93.55 | | | | |
| 18+20 | 101.1543 | 86.87 | | | | |
| 18+25 | 101.7014 | 79.43 | | | | |
| 18+30 | 102.2126 | 74.23 | | | | |
| 18+35 | 102.6940 | 69.91 | | | | |
| 18+40 | 103.1473 | 65.81 | | | | |
| 18+45 | 103.5786 | 62.63 | | | | |
| 18+50 | 103.9927 | 60.13 | | | | |
| 18+55 | 104.3908 | 57.79 | | | | |
| 19+ 0 | 104.7694 | 54.98 | | | | |
| 19+ 5 | 105.1341 | 52.95 | | | | |
| 19+10 | 105.4887 | 51.49 | | | | |
| 19+15 | 105.8356 | 50.37 | | | | |
| 19+20 | 106.1760 | 49.42 | | | | |
| 19+25 | 106.5071 | 48.07 | | | | |
| 19+30 | 106.8276 | 46.54 | | | | |
| 19+35 | 107.1331 | 44.35 | | | | |
| 19+40 | 107.4285 | 42.90 | | | | |
| 19+45 | 107.7160 | 41.74 | | | | |
| 19+50 | 107.9944 | 40.42 | | | | |
| 19+55 | 108.2633 | 39.06 | | | | |
| 20+ 0 | 108.5255 | 38.07 | | | | |
| 20+ 5 | 108.7795 | 36.87 | | | | |
| 20+10 | 109.0259 | 35.78 | | | | |
| 20+15 | 109.2674 | 35.06 | | | | |
| 20+20 | 109.5044 | 34.42 | | | | |
| 20+25 | 109.7374 | 33.83 | | | | |
| 20+30 | 109.9665 | 33.27 | | | | |
| 20+35 | 110.1920 | 32.74 | | | | |
| 20+40 | 110.4140 | 32.23 | | | | |
| 20+45 | 110.6326 | 31.75 | | | | |
| 20+50 | 110.8481 | 31.28 | | | | |
| 20+55 | 111.0604 | 30.84 | | | | |
| 21+ 0 | 111.2699 | 30.41 | | | | |
| 21+ 5 | 111.4765 | 30.00 | | | | |
| 21+10 | 111.6805 | 29.61 | | | | |
| 21+15 | 111.8818 | 29.23 | | | | |
| 21+20 | 112.0806 | 28.86 | | | | |
| 21+25 | 112.2768 | 28.50 | | | | |
| 21+30 | 112.4707 | 28.15 | | | | |
| 21+35 | 112.6623 | 27.82 | | | | |

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|-------|----------|-------|---|---|
| 21+40 | 112.8517 | 27.50 | Q | V |
| 21+45 | 113.0390 | 27.19 | Q | V |
| 21+50 | 113.2242 | 26.89 | Q | V |
| 21+55 | 113.4074 | 26.60 | Q | V |
| 22+ 0 | 113.5886 | 26.32 | Q | V |
| 22+ 5 | 113.7680 | 26.04 | Q | V |
| 22+10 | 113.9455 | 25.78 | Q | V |
| 22+15 | 114.1213 | 25.52 | Q | V |
| 22+20 | 114.2954 | 25.27 | Q | V |
| 22+25 | 114.4678 | 25.03 | Q | V |
| 22+30 | 114.6385 | 24.79 | Q | V |
| 22+35 | 114.8077 | 24.56 | Q | V |
| 22+40 | 114.9753 | 24.34 | Q | V |
| 22+45 | 115.1414 | 24.12 | Q | V |
| 22+50 | 115.3060 | 23.90 | Q | V |
| 22+55 | 115.4691 | 23.69 | Q | V |
| 23+ 0 | 115.6308 | 23.48 | Q | V |
| 23+ 5 | 115.7912 | 23.28 | Q | V |
| 23+10 | 115.9502 | 23.09 | Q | V |
| 23+15 | 116.1079 | 22.90 | Q | V |
| 23+20 | 116.2643 | 22.71 | Q | V |
| 23+25 | 116.4194 | 22.52 | Q | V |
| 23+30 | 116.5733 | 22.34 | Q | V |
| 23+35 | 116.7259 | 22.17 | Q | V |
| 23+40 | 116.8774 | 21.99 | Q | V |
| 23+45 | 117.0277 | 21.82 | Q | V |
| 23+50 | 117.1769 | 21.66 | Q | V |
| 23+55 | 117.3249 | 21.50 | Q | V |
| 24+ 0 | 117.4719 | 21.34 | Q | V |
| 24+ 5 | 117.6165 | 21.00 | Q | V |
| 24+10 | 117.7570 | 20.40 | Q | V |
| 24+15 | 117.8921 | 19.62 | Q | V |
| 24+20 | 118.0205 | 18.64 | Q | V |
| 24+25 | 118.1399 | 17.34 | Q | V |
| 24+30 | 118.2470 | 15.56 | Q | V |
| 24+35 | 118.3319 | 12.33 | Q | V |
| 24+40 | 118.3962 | 9.33 | Q | V |
| 24+45 | 118.4501 | 7.83 | Q | V |
| 24+50 | 118.4964 | 6.72 | Q | V |
| 24+55 | 118.5365 | 5.83 | Q | V |
| 25+ 0 | 118.5717 | 5.10 | Q | V |
| 25+ 5 | 118.6023 | 4.45 | Q | V |
| 25+10 | 118.6291 | 3.89 | Q | V |
| 25+15 | 118.6525 | 3.40 | Q | V |
| 25+20 | 118.6730 | 2.97 | Q | V |
| 25+25 | 118.6909 | 2.60 | Q | V |
| 25+30 | 118.7064 | 2.25 | Q | V |
| 25+35 | 118.7199 | 1.96 | Q | V |
| 25+40 | 118.7315 | 1.69 | Q | V |
| 25+45 | 118.7415 | 1.45 | Q | V |
| 25+50 | 118.7500 | 1.24 | Q | V |
| 25+55 | 118.7573 | 1.05 | Q | V |
| 26+ 0 | 118.7635 | 0.90 | Q | V |
| 26+ 5 | 118.7688 | 0.77 | Q | V |
| 26+10 | 118.7732 | 0.64 | Q | V |
| 26+15 | 118.7770 | 0.54 | Q | V |
| 26+20 | 118.7801 | 0.46 | Q | V |
| 26+25 | 118.7829 | 0.41 | Q | V |
| 26+30 | 118.7855 | 0.37 | Q | V |
| 26+35 | 118.7878 | 0.34 | Q | V |
| 26+40 | 118.7899 | 0.30 | Q | V |
| 26+45 | 118.7917 | 0.27 | Q | V |
| 26+50 | 118.7934 | 0.24 | Q | V |
| 26+55 | 118.7948 | 0.21 | Q | V |
| 27+ 0 | 118.7961 | 0.19 | Q | V |
| 27+ 5 | 118.7973 | 0.17 | Q | V |
| 27+10 | 118.7983 | 0.15 | Q | V |
| 27+15 | 118.7992 | 0.13 | Q | V |
| 27+20 | 118.8000 | 0.11 | Q | V |
| 27+25 | 118.8005 | 0.08 | Q | V |
| 27+30 | 118.8010 | 0.06 | Q | V |
| 27+35 | 118.8013 | 0.05 | Q | V |
| 27+40 | 118.8015 | 0.04 | Q | V |

| | | | | | | | |
|-------|----------|------|---|--|--|--|---|
| 27+45 | 118.8017 | 0.02 | Q | | | | V |
| 27+50 | 118.8018 | 0.01 | Q | | | | V |
| 27+55 | 118.8019 | 0.01 | Q | | | | V |
| 28+ 0 | 118.8019 | 0.00 | Q | | | | V |

Creek "F" (at Property Line)
Proposed Rational Method Calculations
10, 25 & 100-Year Storms

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/07/15 File Name: PA2RAT.roc

PLANNING AREA 2
PROPOSED CONDITIONS
100-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 304.000 to Point/Station 304.000
*** USER DEFINED FLOW INFORMATION AT A POINT ***

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2) = 75.95
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 2.748(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 20.61 min. Rain intensity = 2.75(In/Hr)
Total area = 621.43(Ac.) Total runoff = 1409.64(CFS)

Process from Point/Station 304.000 to Point/Station 305.000
*** IRREGULAR CHANNEL FLOW TRAVEL TIME ***

Estimated mean flow rate at midpoint of channel = 1409.682(CFS)
Depth of flow = 6.172(Ft.), Average velocity = 13.169(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 1409.683(CFS)
' ' flow top width = 29.688(Ft.)
' ' velocity= 13.169(Ft/s)
' ' area = 107.048(Sq.Ft)
' ' Froude number = 1.222

Upstream point elevation = 665.000(Ft.)
Downstream point elevation = 647.500(Ft.)
Flow length = 435.000(Ft.)
Travel time = 0.55 min.
Time of concentration = 21.16 min.

Depth of flow = 6.172(Ft.)
 Average velocity = 13.169(Ft/s)
 Total irregular channel flow = 1409.682(CFS)
 Irregular channel normal depth above invert elev. = 6.172(Ft.)
 Average velocity of channel(s) = 13.169(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.210
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.790
 SCS curve number for soil(AMC 2) = 76.01
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.221(In/Hr)
 Max Catchment Loss (Fm) = 0.221(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 1409.637(CFS) is being used
 Rainfall intensity = 2.707(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.823
 Subarea runoff = 0.000(CFS) for 10.220(Ac.)
 Total runoff = 1409.637(CFS) Total area = 631.65(Ac.)
 Area averaged Fm value = 0.232(In/Hr)
 Depth of flow = 6.172(Ft.), Average velocity = 13.169(Ft/s)

 Process from Point/Station 305.000 to Point/Station 501.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 1409.684(CFS)
 Depth of flow = 6.295(Ft.), Average velocity = 12.733(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 50.00 |
| 2 | 100.00 | 0.00 |
| 3 | 105.00 | 0.00 |
| 4 | 205.00 | 50.00 |

 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 1409.683(CFS)
 ' ' flow top width = 30.178(Ft.)
 ' ' velocity = 12.732(Ft/s)
 ' ' area = 110.715(Sq.Ft)
 ' ' Froude number = 1.171

Upstream point elevation = 647.500(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 1020.000(Ft.)
 Travel time = 1.34 min.
 Time of concentration = 22.50 min.
 Depth of flow = 6.295(Ft.)
 Average velocity = 12.733(Ft/s)
 Total irregular channel flow = 1409.684(CFS)
 Irregular channel normal depth above invert elev. = 6.295(Ft.)
 Average velocity of channel(s) = 12.733(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.201
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.799
 SCS curve number for soil(AMC 2) = 76.18
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.220(In/Hr)
 Max Catchment Loss (Fm) = 0.220(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 1409.637(CFS) is being used
 Rainfall intensity = 2.614(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.820

Subarea runoff = 0.000(CFS) for 10.850(Ac.)
Total runoff = 1409.637(CFS) Total area = 642.50(Ac.)
Area averaged Fm value = 0.232(In/Hr)
Depth of flow = 6.294(Ft.), Average velocity = 12.732(Ft/s)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 642.500(Ac.)
Runoff from this stream = 1409.637(CFS)
Time of concentration = 22.50 min.
Rainfall intensity = 2.614(In/Hr)
Area averaged loss rate (Fm) = 0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000

Process from Point/Station 193.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2) = 69.40
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.141(In/Hr)
Rainfall intensity = 2.519(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 24.00 min. Rain intensity = 2.52(In/Hr)
Total area = 435.56(Ac.) Total runoff = 1580.77(CFS)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 435.560(Ac.)
Runoff from this stream = 1580.770(CFS)
Time of concentration = 24.00 min.
Rainfall intensity = 2.519(In/Hr)
Area averaged loss rate (Fm) = 0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000

Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2) = 61.51
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.271(In/Hr)
Max Catchment Loss (Fm) = 0.163(In/Hr)
Initial subarea data:
Initial area flow distance = 222.220(Ft.)
Top (of initial area) elevation = 678.000(Ft.)
Bottom (of initial area) elevation = 675.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.01350 s(%) = 1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.463 min.
Rainfall intensity = 4.576(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KClA) is C = 0.868
Subarea runoff = 1.748(CFS)

Total initial stream area = 0.440(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 675.000(Ft.)
End of street segment elevation = 647.200(Ft.)
Length of street segment = 503.480(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 22.000(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 [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.025
Gutter width = 2.000(Ft.)
Gutter hike from flowline = 2.000(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 = 0.0150
Estimated mean flow rate at midpoint of street = 13.837(CFS)
Depth of flow = 0.340(Ft.), Average velocity = 5.492(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 10.644(Ft.)
Flow velocity = 5.49(Ft/s)
Travel time = 1.53 min. TC = 9.99 min.
Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2) = 62.46
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.266(In/Hr)
Max Catchment Loss (Fm) = 0.160(In/Hr)
Rainfall intensity = 4.161(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.865
Subarea runoff = 24.002(CFS) for 6.710(Ac.)
Total runoff = 25.750(CFS) Total area = 7.15(Ac.)
Area averaged Fm value = 0.160(In/Hr)
Street flow at end of street = 25.750(CFS)
Half street flow at end of street = 12.875(CFS)
Depth of flow = 0.402(Ft.), Average velocity = 6.357(Ft/s)
Flow width (from curb towards crown)= 13.779(Ft.)

Process from Point/Station 203.000 to Point/Station 204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 641.200(Ft.)
Downstream point/station elevation = 612.000(Ft.)
Pipe length = 421.79(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 25.750(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 25.750(CFS)
Normal flow depth in pipe = 13.76(In.)
Flow top width inside pipe = 15.28(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.77(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 10.39 min.

Process from Point/Station 204.000 to Point/Station 501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 1.091(Ft.), Average velocity = 3.287(Ft/s)

***** Irregular Channel Data *****

 Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 25.750(CFS)
 ' flow top width = 9.363(Ft.)
 ' velocity= 3.287(Ft/s)
 ' area = 7.833(Sq.Ft)
 ' Froude number = 0.633

Upstream point elevation = 612.000(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 120.000(Ft.)
 Travel time = 0.61 min.
 Time of concentration = 11.00 min.
 Depth of flow = 1.091(Ft.)
 Average velocity = 3.287(Ft/s)
 Total irregular channel flow = 25.750(CFS)
 Irregular channel normal depth above invert elev. = 1.091(Ft.)
 Average velocity of channel(s) = 3.287(Ft/s)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 3
 Stream flow area = 7.150(Ac.)
 Runoff from this stream = 25.750(CFS)
 Time of concentration = 11.00 min.
 Rainfall intensity = 3.939(In/Hr)
 Area averaged loss rate (Fm) = 0.1598(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.6000

 Process from Point/Station 240.000 to Point/Station 501.000
 **** USER DEFINED FLOW INFORMATION AT A POINT ****

 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.584
 Decimal fraction soil group D = 0.416
 SCS curve number for soil(AMC 2) = 76.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.229(In/Hr)
 Max Catchment Loss (Fm) = 0.229(In/Hr)
 Rainfall intensity = 2.545(In/Hr) for a 100.0 year storm
 User specified values are as follows:
 TC = 23.56 min. Rain intensity = 2.55(In/Hr)
 Total area = 217.68(Ac.) Total runoff = 453.76(CFS)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 4
 Stream flow area = 217.680(Ac.)
 Runoff from this stream = 453.760(CFS)
 Time of concentration = 23.56 min.
 Rainfall intensity = 2.545(In/Hr)
 Area averaged loss rate (Fm) = 0.2292(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream | Area | Flow rate | TC | Fm | Rainfall Intensity |
|--------|------|-----------|----|----|--------------------|
|--------|------|-----------|----|----|--------------------|

| No. | (Ac.) | (CFS) | (min) | (In/Hr) | (In/Hr) |
|-----|--------|----------|-------|---------|---------|
| 1 | 642.50 | 1409.637 | 22.50 | 0.232 | 2.614 |
| 2 | 435.56 | 1580.770 | 24.00 | 0.141 | 2.519 |
| 3 | 7.15 | 25.750 | 11.00 | 0.160 | 3.939 |
| 4 | 217.68 | 453.760 | 23.56 | 0.229 | 2.545 |

Qmax(1) =
 1.000 * 1.000 * 1409.637) +
 1.040 * 0.937 * 1580.770) +
 0.649 * 1.000 * 25.750) +
 1.029 * 0.955 * 453.760) + = 3413.463

Qmax(2) =
 0.960 * 1.000 * 1409.637) +
 1.000 * 1.000 * 1580.770) +
 0.624 * 1.000 * 25.750) +
 0.988 * 1.000 * 453.760) + = 3398.735

Qmax(3) =
 1.557 * 0.489 * 1409.637) +
 1.597 * 0.458 * 1580.770) +
 1.000 * 1.000 * 25.750) +
 1.602 * 0.467 * 453.760) + = 2594.211

Qmax(4) =
 0.971 * 1.000 * 1409.637) +
 1.011 * 0.982 * 1580.770) +
 0.631 * 1.000 * 25.750) +
 1.000 * 1.000 * 453.760) + = 3408.605

Total of 4 streams to confluence:
 Flow rates before confluence point:
 1409.637 1580.770 25.750 453.760
 Maximum flow rates at confluence using above data:
 3413.463 3398.735 2594.211 3408.605
 Area of streams before confluence:
 642.500 435.560 7.150 217.680
 Effective area values after confluence:
 1265.811 1302.890 622.298 1294.905
 Results of confluence:
 Total flow rate = 3413.463(CFS)
 Time of concentration = 22.498 min.
 Effective stream area after confluence = 1265.811(Ac.)
 Study area average Pervious fraction(Ap) = 0.864
 Study area average soil loss rate(Fm) = 0.201(In/Hr)
 Study area total (this main stream) = 1302.89(Ac.)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 1265.811(Ac.)
 Runoff from this stream = 3413.463(CFS)
 Time of concentration = 22.50 min.
 Rainfall intensity = 2.614(In/Hr)
 Area averaged loss rate (Fm) = 0.2006(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.8641
 Program is now starting with Main Stream No. 2
 End of computations, total study area = 1302.89 (Ac.)

The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
 Area averaged SCS curve number (AMC 2) = 73.8

Orange County Rational Hydrology Program
(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/07/15 File Name: PA2RAT25.roc

PLANNING AREA 2
PROPOSED CONDITIONS
25-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 25.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 304.000 to Point/Station 304.000
*** USER DEFINED FLOW INFORMATION AT A POINT ***

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2) = 75.95
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 2.114(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 21.48 min. Rain intensity = 2.11(In/Hr)
Total area = 621.43(Ac.) Total runoff = 1054.86(CFS)

Process from Point/Station 304.000 to Point/Station 305.000
*** IRREGULAR CHANNEL FLOW TRAVEL TIME ***

Estimated mean flow rate at midpoint of channel = 1054.890(CFS)
Depth of flow = 5.433(Ft.), Average velocity = 12.239(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 1054.890(CFS)
' ' flow top width = 26.730(Ft.)
' ' velocity= 12.239(Ft/s)
' ' area = 86.188(Sq.Ft)
' ' Froude number = 1.201

Upstream point elevation = 665.000(Ft.)
Downstream point elevation = 647.500(Ft.)
Flow length = 435.000(Ft.)
Travel time = 0.59 min.
Time of concentration = 22.07 min.

Depth of flow = 5.433(Ft.)
 Average velocity = 12.239(Ft/s)
 Total irregular channel flow = 1054.890(CFS)
 Irregular channel normal depth above invert elev. = 5.433(Ft.)
 Average velocity of channel(s) = 12.239(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.210
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.790
 SCS curve number for soil(AMC 2) = 76.01
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.221(In/Hr)
 Max Catchment Loss (Fm) = 0.221(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 1054.856(CFS) is being used
 Rainfall intensity = 2.082(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.800
 Subarea runoff = 0.000(CFS) for 10.220(Ac.)
 Total runoff = 1054.856(CFS) Total area = 631.65(Ac.)
 Area averaged Fm value = 0.232(In/Hr)
 Depth of flow = 5.432(Ft.), Average velocity = 12.239(Ft/s)

 Process from Point/Station 305.000 to Point/Station 501.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 1054.891(CFS)
 Depth of flow = 5.542(Ft.), Average velocity = 11.834(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 50.00 |
| 2 | 100.00 | 0.00 |
| 3 | 105.00 | 0.00 |
| 4 | 205.00 | 50.00 |

 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 1054.891(CFS)
 ' ' flow top width = 27.168(Ft.)
 ' ' velocity= 11.834(Ft/s)
 ' ' area = 89.138(Sq.Ft)
 ' ' Froude number = 1.151

Upstream point elevation = 647.500(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 1020.000(Ft.)
 Travel time = 1.44 min.
 Time of concentration = 23.50 min.
 Depth of flow = 5.542(Ft.)
 Average velocity = 11.834(Ft/s)
 Total irregular channel flow = 1054.891(CFS)
 Irregular channel normal depth above invert elev. = 5.542(Ft.)
 Average velocity of channel(s) = 11.834(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.201
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.799
 SCS curve number for soil(AMC 2) = 76.18
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.220(In/Hr)
 Max Catchment Loss (Fm) = 0.220(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 1054.856(CFS) is being used
 Rainfall intensity = 2.009(In/Hr) for a 25.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.796

Subarea runoff = 0.000(CFS) for 10.850(Ac.)
Total runoff = 1054.856(CFS) Total area = 642.50(Ac.)
Area averaged Fm value = 0.232(In/Hr)
Depth of flow = 5.542(Ft.), Average velocity = 11.834(Ft/s)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 642.500(Ac.)
Runoff from this stream = 1054.856(CFS)
Time of concentration = 23.50 min.
Rainfall intensity = 2.009(In/Hr)
Area averaged loss rate (Fm) = 0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000

Process from Point/Station 193.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2) = 69.40
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.141(In/Hr)
Rainfall intensity = 1.985(In/Hr) for a 25.0 year storm
User specified values are as follows:
TC = 24.00 min. Rain intensity = 1.99(In/Hr)
Total area = 435.56(Ac.) Total runoff = 1160.74(CFS)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 435.560(Ac.)
Runoff from this stream = 1160.740(CFS)
Time of concentration = 24.00 min.
Rainfall intensity = 1.985(In/Hr)
Area averaged loss rate (Fm) = 0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000

Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2) = 61.51
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.271(In/Hr)
Max Catchment Loss (Fm) = 0.163(In/Hr)
Initial subarea data:
Initial area flow distance = 222.220(Ft.)
Top (of initial area) elevation = 678.000(Ft.)
Bottom (of initial area) elevation = 675.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.01350 s(%)= 1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.463 min.
Rainfall intensity = 3.581(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KClA) is C = 0.859
Subarea runoff = 1.354(CFS)

Total initial stream area = 0.440(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 675.000(Ft.)
End of street segment elevation = 647.200(Ft.)
Length of street segment = 503.480(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 22.000(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 [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.025
Gutter width = 2.000(Ft.)
Gutter hike from flowline = 2.000(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 = 0.0150
Estimated mean flow rate at midpoint of street = 10.668(CFS)
Depth of flow = 0.317(Ft.), Average velocity = 5.175(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 9.508(Ft.)
Flow velocity = 5.18(Ft/s)
Travel time = 1.62 min. TC = 10.08 min.
Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2) = 62.46
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.266(In/Hr)
Max Catchment Loss (Fm) = 0.160(In/Hr)
Rainfall intensity = 3.243(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.856
Subarea runoff = 18.486(CFS) for 6.710(Ac.)
Total runoff = 19.839(CFS) Total area = 7.15(Ac.)
Area averaged Fm value = 0.160(In/Hr)
Street flow at end of street = 19.839(CFS)
Half street flow at end of street = 9.920(CFS)
Depth of flow = 0.374(Ft.), Average velocity = 5.975(Ft/s)
Flow width (from curb towards crown)= 12.383(Ft.)

Process from Point/Station 203.000 to Point/Station 204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 641.200(Ft.)
Downstream point/station elevation = 612.000(Ft.)
Pipe length = 421.79(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 19.839(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 19.839(CFS)
Normal flow depth in pipe = 11.29(In.)
Flow top width inside pipe = 17.41(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.01(Ft/s)
Travel time through pipe = 0.41 min.
Time of concentration (TC) = 10.50 min.

Process from Point/Station 204.000 to Point/Station 501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 0.946(Ft.), Average velocity = 3.043(Ft/s)

***** Irregular Channel Data *****

 Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 19.839(CFS)
 ' ' flow top width = 8.784(Ft.)
 ' ' velocity = 3.043(Ft/s)
 ' ' area = 6.520(Sq.Ft)
 ' ' Froude number = 0.622

Upstream point elevation = 612.000(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 120.000(Ft.)
 Travel time = 0.66 min.
 Time of concentration = 11.16 min.
 Depth of flow = 0.946(Ft.)
 Average velocity = 3.043(Ft/s)
 Total irregular channel flow = 19.839(CFS)
 Irregular channel normal depth above invert elev. = 0.946(Ft.)
 Average velocity of channel(s) = 3.043(Ft/s)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 3
 Stream flow area = 7.150(Ac.)
 Runoff from this stream = 19.839(CFS)
 Time of concentration = 11.16 min.
 Rainfall intensity = 3.063(In/Hr)
 Area averaged loss rate (Fm) = 0.1598(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.6000

 Process from Point/Station 240.000 to Point/Station 501.000
 **** USER DEFINED FLOW INFORMATION AT A POINT ****

 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.584
 Decimal fraction soil group D = 0.416
 SCS curve number for soil(AMC 2) = 76.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.229(In/Hr)
 Max Catchment Loss (Fm) = 0.229(In/Hr)
 Rainfall intensity = 1.957(In/Hr) for a 25.0 year storm
 User specified values are as follows:
 TC = 24.61 min. Rain intensity = 1.96(In/Hr)
 Total area = 217.68(Ac.) Total runoff = 338.53(CFS)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 4
 Stream flow area = 217.680(Ac.)
 Runoff from this stream = 338.534(CFS)
 Time of concentration = 24.61 min.
 Rainfall intensity = 1.957(In/Hr)
 Area averaged loss rate (Fm) = 0.2292(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream | Area | Flow rate | TC | Fm | Rainfall Intensity |
|--------|------|-----------|----|----|--------------------|
|--------|------|-----------|----|----|--------------------|

| No. | (Ac.) | (CFS) | (min) | (In/Hr) | (In/Hr) |
|-----|--------|----------|-------|---------|---------|
| 1 | 642.50 | 1054.856 | 23.50 | 0.232 | 2.009 |
| 2 | 435.56 | 1160.740 | 24.00 | 0.141 | 1.985 |
| 3 | 7.15 | 19.839 | 11.16 | 0.160 | 3.063 |
| 4 | 217.68 | 338.534 | 24.61 | 0.229 | 1.957 |

Qmax(1) =
 1.000 * 1.000 * 1054.856) +
 1.013 * 0.979 * 1160.740) +
 0.637 * 1.000 * 19.839) +
 1.030 * 0.955 * 338.534) + = 2551.789

Qmax(2) =
 0.987 * 1.000 * 1054.856) +
 1.000 * 1.000 * 1160.740) +
 0.629 * 1.000 * 19.839) +
 1.016 * 0.975 * 338.534) + = 2549.576

Qmax(3) =
 1.593 * 0.475 * 1054.856) +
 1.584 * 0.465 * 1160.740) +
 1.000 * 1.000 * 19.839) +
 1.640 * 0.453 * 338.534) + = 1923.875

Qmax(4) =
 0.971 * 1.000 * 1054.856) +
 0.985 * 1.000 * 1160.740) +
 0.619 * 1.000 * 19.839) +
 1.000 * 1.000 * 338.534) + = 2518.178

Total of 4 streams to confluence:
 Flow rates before confluence point:
 1054.856 1160.740 19.839 338.534
 Maximum flow rates at confluence using above data:
 2551.789 2549.576 1923.875 2518.178
 Area of streams before confluence:
 642.500 435.560 7.150 217.680
 Effective area values after confluence:
 1284.129 1297.494 613.200 1302.890
 Results of confluence:
 Total flow rate = 2551.789(CFS)
 Time of concentration = 23.505 min.
 Effective stream area after confluence = 1284.129(Ac.)
 Study area average Pervious fraction(Ap) = 0.864
 Study area average soil loss rate(Fm) = 0.201(In/Hr)
 Study area total (this main stream) = 1302.89(Ac.)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 1284.129(Ac.)
 Runoff from this stream = 2551.789(CFS)
 Time of concentration = 23.50 min.
 Rainfall intensity = 2.009(In/Hr)
 Area averaged loss rate (Fm) = 0.2006(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.8641
 Program is now starting with Main Stream No. 2
 End of computations, total study area = 1302.89 (Ac.)

The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
 Area averaged SCS curve number (AMC 2) = 73.8

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 8.0
Rational Hydrology Study, Date: 08/07/15 File Name: PA2RAT10.roc

PLANNING AREA 2
PROPOSED CONDITIONS
10-YEAR STORM
BY FUSCOE ENGINEERING

Program License Serial Number 6049

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

Rational hydrology study storm event year is 10.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

Process from Point/Station 304.000 to Point/Station 304.000
*** USER DEFINED FLOW INFORMATION AT A POINT ***

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2) = 75.95
Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.232(In/Hr)
Max Catchment Loss (Fm) = 0.232(In/Hr)
Rainfall intensity = 1.728(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 22.19 min. Rain intensity = 1.73(In/Hr)
Total area = 621.43(Ac.) Total runoff = 841.46(CFS)

Process from Point/Station 304.000 to Point/Station 305.000
*** IRREGULAR CHANNEL FLOW TRAVEL TIME ***

Estimated mean flow rate at midpoint of channel = 841.483(CFS)
Depth of flow = 4.912(Ft.), Average velocity = 11.558(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 50.00
2 100.00 0.00
3 105.00 0.00
4 205.00 50.00
Manning's 'N' friction factor = 0.050

Sub-Channel flow = 841.483(CFS)
' ' flow top width = 24.646(Ft.)
' ' velocity= 11.558(Ft/s)
' ' area = 72.804(Sq.Ft)
' ' Froude number = 1.185

Upstream point elevation = 665.000(Ft.)
Downstream point elevation = 647.500(Ft.)
Flow length = 435.000(Ft.)
Travel time = 0.63 min.
Time of concentration = 22.82 min.

Depth of flow = 4.912(Ft.)
 Average velocity = 11.558(Ft/s)
 Total irregular channel flow = 841.483(CFS)
 Irregular channel normal depth above invert elev. = 4.912(Ft.)
 Average velocity of channel(s) = 11.558(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.210
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.790
 SCS curve number for soil(AMC 2) = 76.01
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.221(In/Hr)
 Max Catchment Loss (Fm) = 0.221(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 841.456(CFS) is being used
 Rainfall intensity = 1.701(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.777
 Subarea runoff = 0.000(CFS) for 10.220(Ac.)
 Total runoff = 841.456(CFS) Total area = 631.65(Ac.)
 Area averaged Fm value = 0.232(In/Hr)
 Depth of flow = 4.911(Ft.), Average velocity = 11.558(Ft/s)

 Process from Point/Station 305.000 to Point/Station 501.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

 Estimated mean flow rate at midpoint of channel = 841.484(CFS)
 Depth of flow = 5.012(Ft.), Average velocity = 11.176(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

 Sub-Channel flow = 841.484(CFS)
 ' ' flow top width = 25.047(Ft.)
 ' ' velocity= 11.176(Ft/s)
 ' ' area = 75.292(Sq.Ft)
 ' ' Froude number = 1.136

Upstream point elevation = 647.500(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 1020.000(Ft.)
 Travel time = 1.52 min.
 Time of concentration = 24.34 min.
 Depth of flow = 5.012(Ft.)
 Average velocity = 11.176(Ft/s)
 Total irregular channel flow = 841.484(CFS)
 Irregular channel normal depth above invert elev. = 5.012(Ft.)
 Average velocity of channel(s) = 11.176(Ft/s)
 Adding area flow to channel
 UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.201
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.799
 SCS curve number for soil(AMC 2) = 76.18
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.220(In/Hr)
 Max Catchment Loss (Fm) = 0.220(In/Hr)
 The area added to the existing stream with this TC
 does not add flow per Para 6b, Page D-15 of the OCHM,
 therefore the upstream flow rate of Q = 841.456(CFS) is being used
 Rainfall intensity = 1.639(In/Hr) for a 10.0 year storm
 Effective runoff coefficient used for area,(total area with modified
 rational method)(Q=KCIA) is C = 0.773

Subarea runoff = 0.000(CFS) for 10.850(Ac.)
Total runoff = 841.456(CFS) Total area = 642.50(Ac.)
Area averaged Fm value = 0.232(In/Hr)
Depth of flow = 5.012(Ft.), Average velocity = 11.176(Ft/s)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 642.500(Ac.)
Runoff from this stream = 841.456(CFS)
Time of concentration = 24.34 min.
Rainfall intensity = 1.639(In/Hr)
Area averaged loss rate (Fm) = 0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000

Process from Point/Station 193.000 to Point/Station 501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2) = 69.40
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.235(In/Hr)
Max Catchment Loss (Fm) = 0.141(In/Hr)
Rainfall intensity = 1.652(In/Hr) for a 10.0 year storm
User specified values are as follows:
TC = 24.00 min. Rain intensity = 1.65(In/Hr)
Total area = 435.56(Ac.) Total runoff = 946.00(CFS)

Process from Point/Station 501.000 to Point/Station 501.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 435.560(Ac.)
Runoff from this stream = 946.000(CFS)
Time of concentration = 24.00 min.
Rainfall intensity = 1.652(In/Hr)
Area averaged loss rate (Fm) = 0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000

Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2) = 61.51
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.271(In/Hr)
Max Catchment Loss (Fm) = 0.163(In/Hr)
Initial subarea data:
Initial area flow distance = 222.220(Ft.)
Top (of initial area) elevation = 678.000(Ft.)
Bottom (of initial area) elevation = 675.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.01350 s(%) = 1.35
TC = $k(0.412)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 8.463 min.
Rainfall intensity = 3.003(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KClA) is C = 0.851
Subarea runoff = 1.125(CFS)

Total initial stream area = 0.440(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 675.000(Ft.)
End of street segment elevation = 647.200(Ft.)
Length of street segment = 503.480(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 22.000(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 [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.025
Gutter width = 2.000(Ft.)
Gutter hike from flowline = 2.000(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 = 0.0150
Estimated mean flow rate at midpoint of street = 8.814(CFS)
Depth of flow = 0.301(Ft.), Average velocity = 4.959(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 8.730(Ft.)
Flow velocity = 4.96(Ft/s)
Travel time = 1.69 min. TC = 10.16 min.
Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2) = 62.46
Pervious ratio(Ap) = 0.6000 Max loss rate(Fp)= 0.266(In/Hr)
Max Catchment Loss (Fm) = 0.160(In/Hr)
Rainfall intensity = 2.705(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.847
Subarea runoff = 15.253(CFS) for 6.710(Ac.)
Total runoff = 16.377(CFS) Total area = 7.15(Ac.)
Area averaged Fm value = 0.160(In/Hr)
Street flow at end of street = 16.377(CFS)
Half street flow at end of street = 8.189(CFS)
Depth of flow = 0.355(Ft.), Average velocity = 5.712(Ft/s)
Flow width (from curb towards crown)= 11.433(Ft.)

Process from Point/Station 203.000 to Point/Station 204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 641.200(Ft.)
Downstream point/station elevation = 612.000(Ft.)
Pipe length = 421.79(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.377(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 16.377(CFS)
Normal flow depth in pipe = 11.83(In.)
Flow top width inside pipe = 12.25(In.)
Critical depth could not be calculated.
Pipe flow velocity = 15.78(Ft/s)
Travel time through pipe = 0.45 min.
Time of concentration (TC) = 10.60 min.

Process from Point/Station 204.000 to Point/Station 501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 0.851(Ft.), Average velocity = 2.872(Ft/s)

***** Irregular Channel Data *****

 Information entered for subchannel number 1 :
 Point number 'X' coordinate 'Y' coordinate
 1 0.00 50.00
 2 100.00 0.00
 3 105.00 0.00
 4 205.00 50.00
 Manning's 'N' friction factor = 0.050

Sub-Channel flow = 16.377(CFS)
 ' flow top width = 8.404(Ft.)
 ' velocity= 2.872(Ft/s)
 ' area = 5.702(Sq.Ft)
 ' Froude number = 0.614

Upstream point elevation = 612.000(Ft.)
 Downstream point elevation = 610.000(Ft.)
 Flow length = 120.000(Ft.)
 Travel time = 0.70 min.
 Time of concentration = 11.30 min.
 Depth of flow = 0.851(Ft.)
 Average velocity = 2.872(Ft/s)
 Total irregular channel flow = 16.377(CFS)
 Irregular channel normal depth above invert elev. = 0.851(Ft.)
 Average velocity of channel(s) = 2.872(Ft/s)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
 Stream flow area = 7.150(Ac.)
 Runoff from this stream = 16.377(CFS)
 Time of concentration = 11.30 min.
 Rainfall intensity = 2.545(In/Hr)
 Area averaged loss rate (Fm) = 0.1598(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.6000

 Process from Point/Station 240.000 to Point/Station 501.000
 **** USER DEFINED FLOW INFORMATION AT A POINT ****

UNDEVELOPED (dense cover) subarea
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.584
 Decimal fraction soil group D = 0.416
 SCS curve number for soil(AMC 2) = 76.50
 Pervious ratio(Ap) = 1.0000 Max loss rate(Fp)= 0.229(In/Hr)
 Max Catchment Loss (Fm) = 0.229(In/Hr)
 Rainfall intensity = 1.596(In/Hr) for a 10.0 year storm
 User specified values are as follows:
 TC = 25.49 min. Rain intensity = 1.60(In/Hr)
 Total area = 217.68(Ac.) Total runoff = 267.82(CFS)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 4
 Stream flow area = 217.680(Ac.)
 Runoff from this stream = 267.820(CFS)
 Time of concentration = 25.49 min.
 Rainfall intensity = 1.596(In/Hr)
 Area averaged loss rate (Fm) = 0.2292(In/Hr)
 Area averaged Pervious ratio (Ap) = 1.0000
 Summary of stream data:

| Stream Area | Flow rate | TC | Fm | Rainfall Intensity |
|-------------|-----------|----|----|--------------------|
|-------------|-----------|----|----|--------------------|

| No. | (Ac.) | (CFS) | (min) | (In/Hr) | (In/Hr) |
|-----|--------|---------|-------|---------|---------|
| 1 | 642.50 | 841.456 | 24.34 | 0.232 | 1.639 |
| 2 | 435.56 | 946.000 | 24.00 | 0.141 | 1.652 |
| 3 | 7.15 | 16.377 | 11.30 | 0.160 | 2.545 |
| 4 | 217.68 | 267.820 | 25.49 | 0.229 | 1.596 |

Qmax(1) =
 1.000 * 1.000 * 841.456) +
 0.991 * 1.000 * 946.000) +
 0.620 * 1.000 * 16.377) +
 1.031 * 0.955 * 267.820) + = 2053.047
 Qmax(2) =
 1.009 * 0.986 * 841.456) +
 1.000 * 1.000 * 946.000) +
 0.626 * 1.000 * 16.377) +
 1.041 * 0.942 * 267.820) + = 2056.273
 Qmax(3) =
 1.643 * 0.464 * 841.456) +
 1.590 * 0.471 * 946.000) +
 1.000 * 1.000 * 16.377) +
 1.694 * 0.443 * 267.820) + = 1567.428
 Qmax(4) =
 0.970 * 1.000 * 841.456) +
 0.963 * 1.000 * 946.000) +
 0.602 * 1.000 * 16.377) +
 1.000 * 1.000 * 267.820) + = 2004.478

Total of 4 streams to confluence:
 Flow rates before confluence point:
 841.456 946.000 16.377 267.820
 Maximum flow rates at confluence using above data:
 2053.047 2056.273 1567.428 2004.478
 Area of streams before confluence:
 642.500 435.560 7.150 217.680
 Effective area values after confluence:
 1293.072 1281.182 606.877 1302.890
 Results of confluence:
 Total flow rate = 2056.273(CFS)
 Time of concentration = 24.000 min.
 Effective stream area after confluence = 1281.182(Ac.)
 Study area average Pervious fraction(Ap) = 0.864
 Study area average soil loss rate(Fm) = 0.201(In/Hr)
 Study area total (this main stream) = 1302.89(Ac.)

 Process from Point/Station 501.000 to Point/Station 501.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 1281.182(Ac.)
 Runoff from this stream = 2056.273(CFS)
 Time of concentration = 24.00 min.
 Rainfall intensity = 1.652(In/Hr)
 Area averaged loss rate (Fm) = 0.2006(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.8641
 Program is now starting with Main Stream No. 2
 End of computations, total study area = 1302.89 (Ac.)

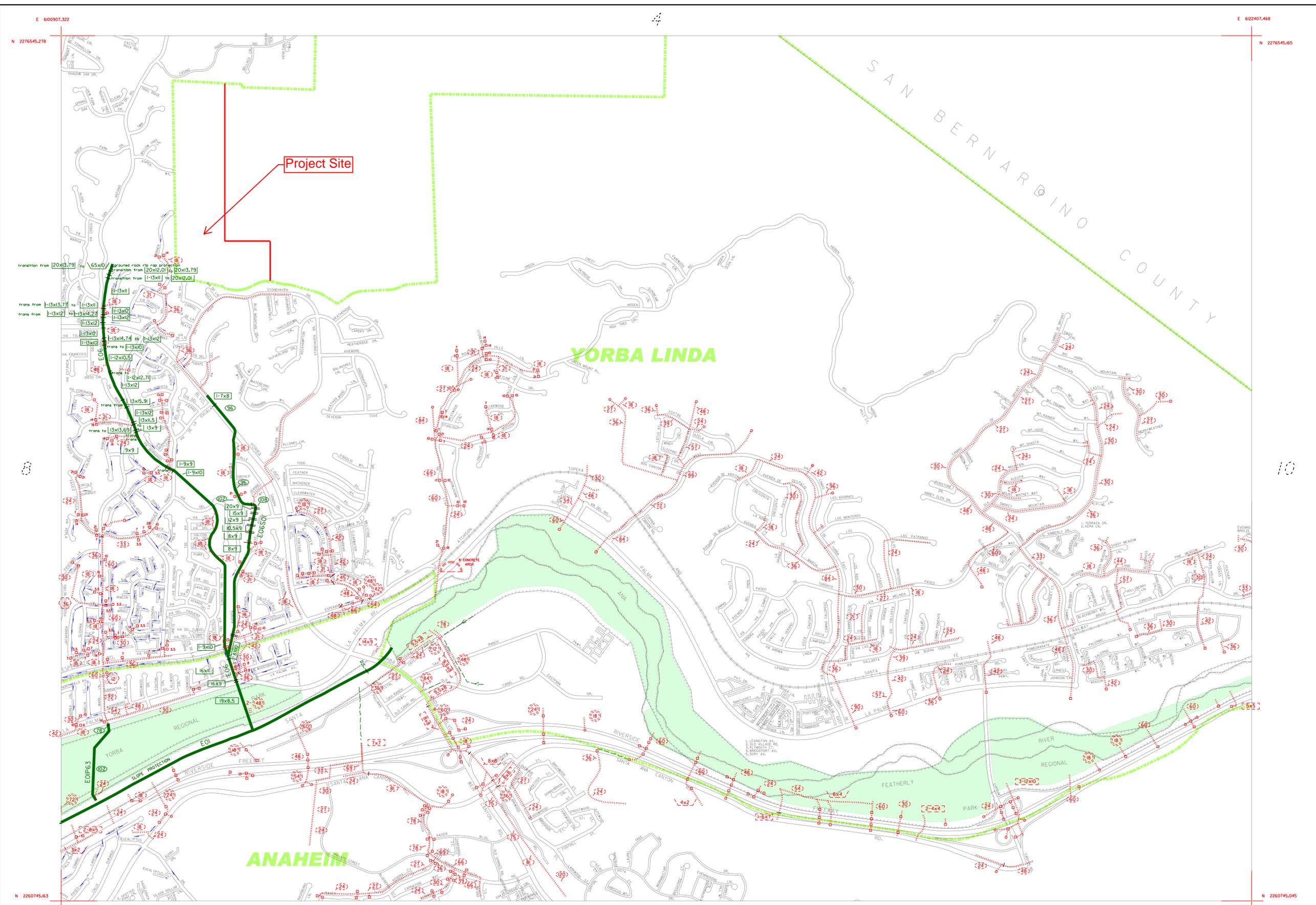
The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
 Area averaged SCS curve number (AMC 2) = 73.8

APPENDIX D:

Preliminary Drainage Reports for Esperanza Hills Property
Prepared By KWC Engineers dated May 2013

APPENDIX E:
Existing Storm Drain Plans/Exhibits



Project Site

YORBA LINDA

ANAHEIM

SAN BERNARDINO COUNTY

NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for accuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION: S. GUTIERREZ DATE: JAN/2/2000 SHEET NO: 9 DWG. NO: MAPS-113-3

EXISTING FACILITIES

O.C.F.C.D. LOCAL

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- Greenbelt
- Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership: (If other than City or County): Private = P State = S Federal = F

- Earth Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Trapezoidal Channel (base width by height in feet)
- Reinforced Concrete Rectangular Channel (base width by height in feet)
- Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
- Reinforced Concrete Pipe (RCP) (diameter in inches)
- Metal Sheet Channel (MSC) (base width by pile height in feet-Sheet pile total length)
- Corrugated Metal Pipe (CMP) (diameter in inches)
- Concrete Pipe (diameter in inches)
- Concrete Oval Pipe (width by height in inches)
- Steel Pipe (diameter in inches)
- Reinforced Concrete Arch (base span by height in inches)
- Corrugated Metal Arch (base span by height in inches)



9

9

16

10

E 600907.322
N 2276545.278
E 600907.413
N 2260745.363

E 602407.468
N 2276545.865
E 602407.550
N 2260745.045

Storm Drain Inlet at
San Antonio Road (Esperanza Channel)

WEST CURB PROFILE

CENTERLINE PROFILE

EAST CURB PROFILE

PROFILE SCALES
HORIZ 1" = 40'
VERT 1" = 8'

DOUBLE VERT. SCALES

540

540

540

540

540

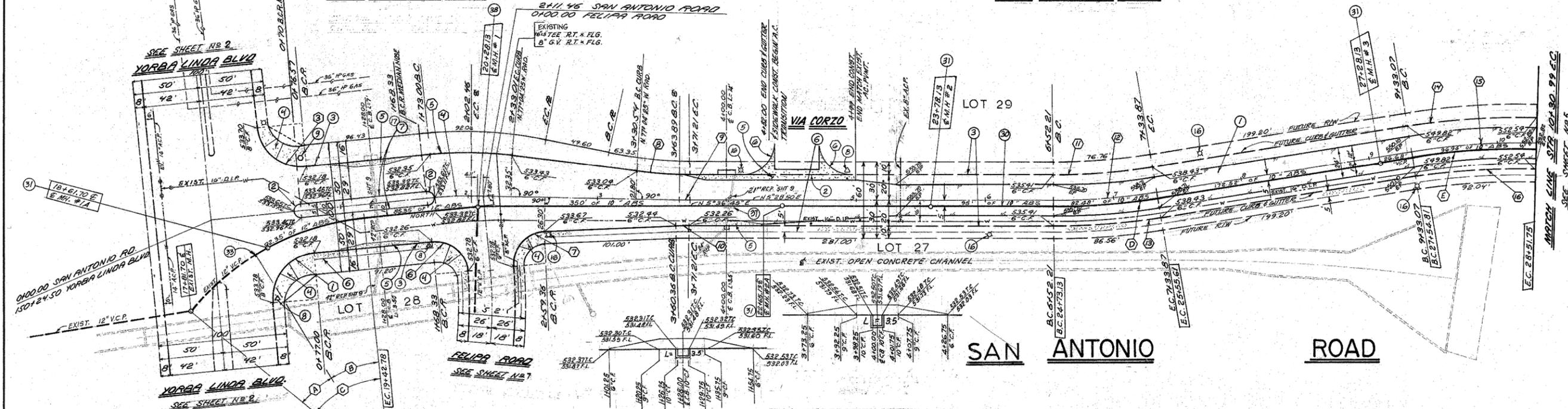
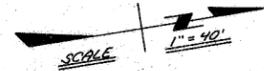
540

SEWER CURVE DATA

| ID | Δ | R | L | T |
|-----|-----------|------|---------|--------|
| (A) | 19°41'23" | 200' | 68.73' | 34.70' |
| (B) | 26°27'32" | 200' | 92.35' | 47.02' |
| (C) | 46°08'55" | 200' | 161.08' | 85.20' |
| (D) | 9°21'27" | 505' | 82.48' | 41.33' |
| (E) | 11°13'14" | 495' | 96.94' | 48.62' |

LOCAL DEPRESSION DETAIL

LOCAL DEPRESSION DETAIL



STREET CURVE DATA

| NO. | Δ | R | L | T | NO. | Δ | R | L | T | NO. | Δ | R | L | T |
|------|------------|------|--------|--------|------|-----------|------|---------|--------|------|-----------|------|---------|--------|
| (6) | 90°00'00" | 25' | 37.27' | 25.00' | (16) | 9°21'27" | 500' | 81.66' | 40.92' | (26) | 11°13'14" | 500' | 97.92' | 49.18' |
| (7) | 12°55'35" | 284' | 64.07' | 32.17' | (17) | 9°21'27" | 480' | 78.39' | 39.28' | (27) | 7°26'45" | 310' | 40.28' | 20.17' |
| (8) | 6°45'05" | 250' | 29.96' | 14.75' | (18) | 2°05'29" | 310' | 11.32' | 5.65' | (28) | 93°18'25" | 25' | 10.71' | 26.79' |
| (9) | 89°10'03" | 35' | 54.47' | 34.50' | (19) | 1°18'15" | 330' | 7.32' | 3.66' | (29) | 9°21'27" | 520' | 101.83' | 51.08' |
| (10) | 180°00'00" | 5' | 15.71' | — | (20) | 11°13'14" | 520' | 101.83' | 51.08' | (30) | 9°21'27" | 520' | 101.83' | 51.08' |
| (11) | 90°00'00" | 35' | 54.98' | 35.00' | (21) | 9°21'27" | 520' | 101.83' | 51.08' | (31) | 9°21'27" | 520' | 101.83' | 51.08' |

- LOCAL DEPRESSION DETAIL**
- (2) CONST. SLOTTED CROSSGUTTER PER D.C.M.A. STD. PLAN NO. 208 AND DETAIL ON SHEET NO. 1
 - (7) CONST. TYPICAL PAVEMENT SECTION AT MEDIAN CURB PER D.C.E.M.A. STD. PLAN 114.
 - (16) INSTALL STREET LIGHT, 5000 LUMEN
 - (19) INSTALL STOP SIGN
 - (27) INSTALL STREET WARE SIGN PER CITY OF YORBA LINDA STD.
 - (28) CONST. 6" CONC. CURB & GUTTER TYPE "A" PER D.C.E.M.A. STD. PLAN NO. 20 (MODIFIED)
 - (29) CONST. CONC. SIDEWALK PER D.C.E.M.A. STD. PLAN NO. 205.
 - (30) CONST. LOCAL DEPRESSION PER D.C.E.M.A. STD. PLAN NO. 308.
 - (31) CONST. ACCESS RAMP PER D.C.E.M.A. STD. PLAN NO. 111.
 - (32) CONST. 5" CONC. CURB & GUTTER TYPE "D" PER D.C.E.M.A. STD. PLAN NO. 201.
 - (33) CONST. R.C. PAVEMENT AND BASE PER F.V.D. SECTION ON SHEET NO. 1.

- SEWER CONSTRUCTION NOTES**
- (6) CONST. STD. M.H. WITH 1 ECCENTRIC FLAT TOP OPENING TO BE REINFORCED TO THE TOP PER D.C.E.M.A. STD. PLAN NO. 505
 - (7) INSTALL FIRE HYDRANT ASSEMBLY
 - (8) CONST. 60" I.D. MANHOLE PER Y.C.C.M.D. STD. PLAN NO. 8-A
 - (9) REMOVE PLUG & JOIN EXIST.
 - (10) CONST. 4" ABS HOUSE LATERALS
 - (11) CONST. STANDARD MANHOLE PER Y.C.C.M.D. STD. PLAN NO. 3
 - (12) CONST. ABS. SEWER MAIN PER Y.C.C.M.D. STD. PLAN NO. 3-A

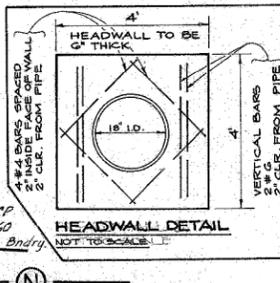
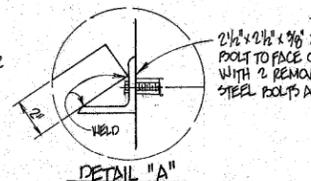
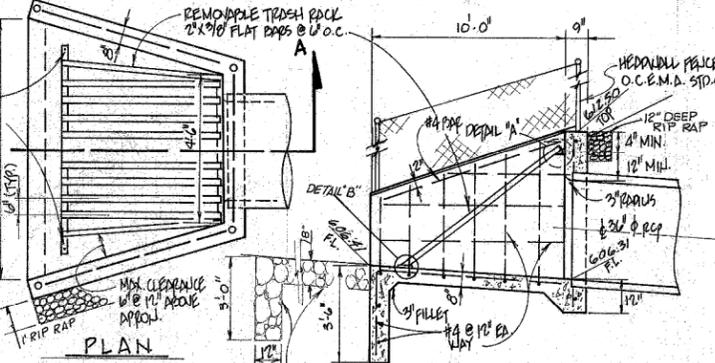
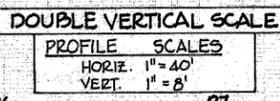
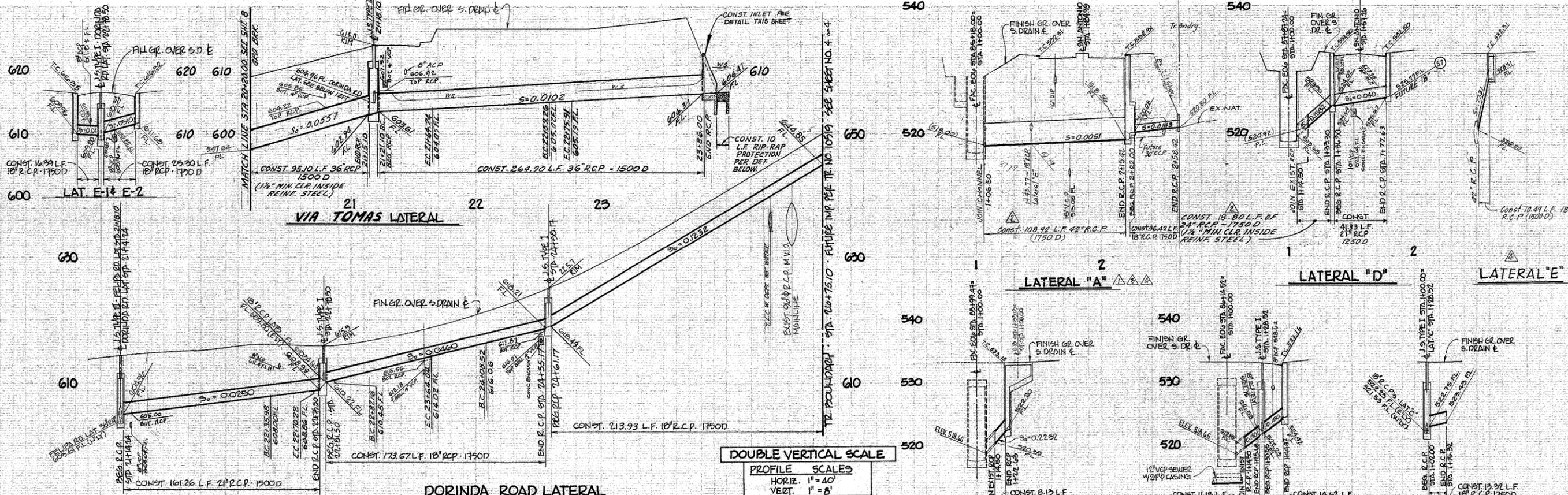
- WATER CONSTRUCTION NOTES**
- (1) INSTALL GATE VALVE
 - (2) CONST. ALUM. WATER MAIN

| NO. | REVISIONS |
|-----|---|
| 0 | RECORD DRAWINGS |
| 1 | FUTURE R/W C & G, PROFILE FUTURE REVISED STREET NORTH OF STA. 4+32, 12' LAMES |

TRACT No. 10517
SAN ANTONIO RD.

SHEET 4 OF 9 SHEETS

Storm Drain Inlet at
Dorinda Road (36-Inch RCP)



| TABLE OF HYDRAULIC ELEMENTS | | | | | | | | | | | |
|--------------------------------|-------|----------------|----------------|----------------|----------------|----------------|----------------|--|--|--|--|
| LAT. E-2 | 425 | 18" RCP | 0.0510 | 0.43 | 10.14 | 0.79 | 4.50 | | | | |
| LAT. E-1 | 1.61 | 18" RCP | 0.0100 | 0.40 | 4.29 | 0.48 | 3.30 | | | | |
| 1436.30 - 1477.63 | 21.71 | 24" RCP | 0.0400 | 0.0400 | 2.0779 | 1.63 | 9.10 | | | | |
| LAT. D 1106.50 - 1139.30 | 22.70 | 24" RCP | 0.1584 | Full S | 0.0000 | 1.65 | 7.66 | | | | |
| 1450.75 - 2119.25 | 27.71 | 36" RCP | 0.0500 | Full S | 0.0000 | 1.87 | 9.23 | | | | |
| LAT. D 1144.90 - 1147.43 | 73.00 | 36" RCP | 0.0620 | Full S | 0.0000 | 1.98 | 8.75 | | | | |
| 244.6117 - 244.7810 | 19.71 | 18" RCP | 0.1232 | 64 | 19.22 | 1.37 | 8.09 | | | | |
| 224.8150 - 244.4317 | 19.71 | 18" RCP | 0.0460 | 85 | 13.35 | 1.37 | 8.09 | | | | |
| DORINDA LAT. 2114.24 - 2119.50 | 4.26 | 24" RCP | 0.0250 | 114 | 11.40 | 1.57 | 8.31 | | | | |
| 217.2110 - 234.8230 | 46.87 | 36" RCP | 0.0180 | 133 | 12.77 | 2.25 | 0.32 | | | | |
| 20120.00 - 2114.10 | 61.85 | 36" RCP | 0.0557 | 1.31 | 20.83 | 2.34 | 8.70 | | | | |
| STA. - STA. Q | 517EE | S ₀ | V _n | V _n | V _c | V _c | V _c | | | | |



MATCH LINE - STA. 20+20.00 SEE SHEET NO. 8

| CURVE DATA | | | | |
|------------|-------------|--------|--------|--------|
| NO. | Δ | R | L | T |
| 1 | 40° 11' 15" | 305.00 | 213.93 | 111.58 |
| 2 | 8° 45' 48" | 306.00 | 46.65 | 23.37 |
| 3 | 17° 58' 44" | 245.00 | 76.88 | 30.76 |
| 4 | 87° 11' 29" | 22.50 | 24.24 | 21.42 |
| 5 | 10° 25' 59" | 90.00 | 16.65 | 8.35 |
| 6 | 54° 56' 00" | 45.00 | 40.14 | 23.99 |

VIA TOMAS & DORINDA RD. LATERALS

SEE SPECIAL M.W.O. NOTES ON SHEET NO. 5

| NO. | REVISIONS |
|-----|---|
| 1 | ADDED 33" WATER TO PLAN & PROFILE |
| 2 | ADDED RIM ELEVATIONS |
| 3 | ADDED NOTE 6.5 & REVISED ALL O.C.E.M.A. 21 MAR 04 |
| 4 | RECORD DRAWINGS |

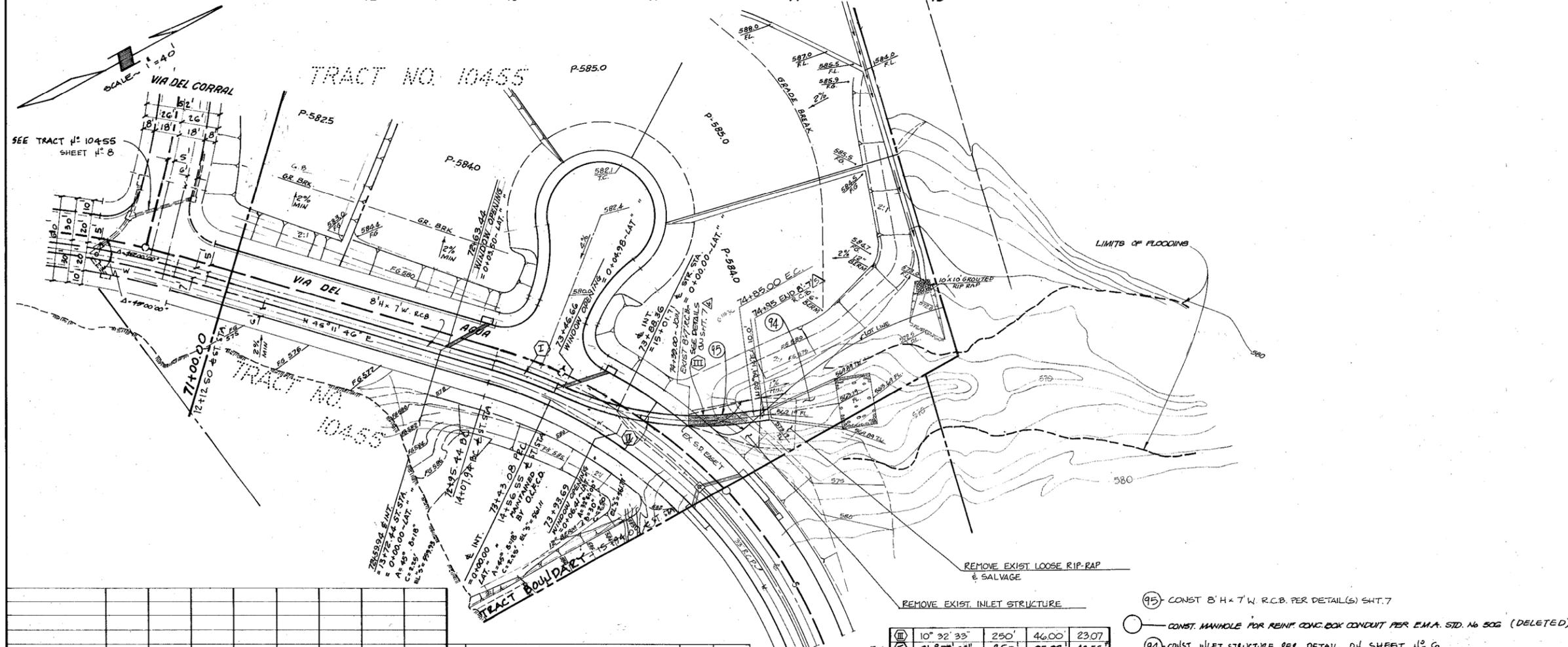
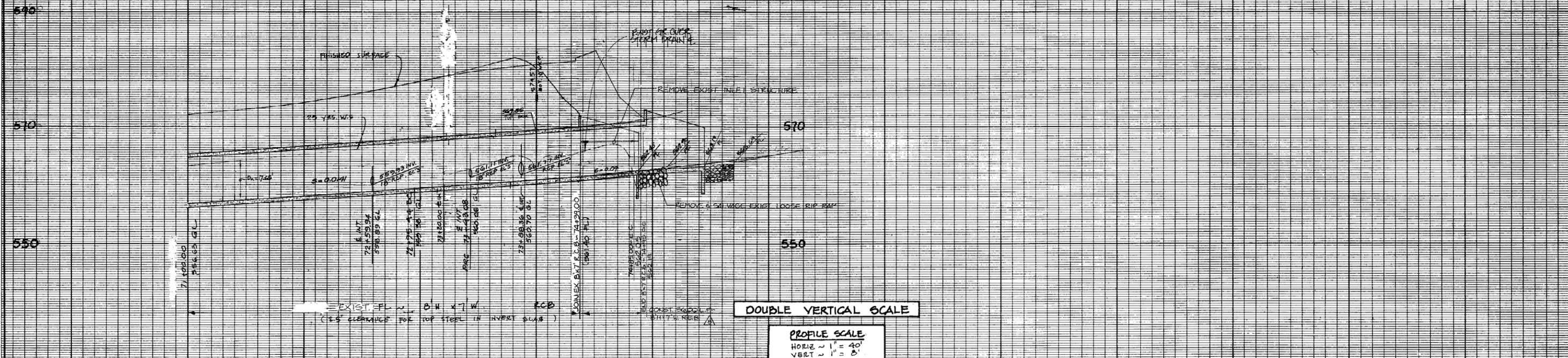
- CONSTRUCTION NOTES**
- BACKFILL TRENCHES ADJACENT TO CHANNEL WITH A 2 SACK CEMENT SLURRY. SLURRY BACKFILL SHALL EXTEND 5' MIN. AWAY FROM CHANNEL AND TO TOP OF IT. ANY EXISTING UTILITY TRENCH CONSTRUCTED ADJACENT TO CHANNEL SHALL BE SLURRY BACKFILLED. ANY EXISTING BACKFILL FOR UTILITIES PREVIOUSLY CONSTRUCTED BY THESE PLANS ADJACENT TO THE O.C.E.M.A. CHANNEL SHALL BE REMOVED & REPLACED BY SLURRY BACKFILL.
 - CONSTRUCT J.5 TYPE IV PER O.C.E.M.A. STD. PLAN 313 (A=711', C=330').
 - CONSTRUCT HEADWALL PER DETAIL HEREON.
 - CONSTRUCT AUTOMATIC FLAPGATE, NO SEATING HEAD, PER LACFD STD. DWG. 8-D192 MODIFIED TO CATCH BASIN.
 - CONSTRUCT OPENING FOR PIPE PER PROFILE & CAP W/BRICK & MORTAR TO SATISFACTION OF FIELD INSPECTOR.
 - CONSTRUCT INLET STRUCTURE PER DETAILS ON THIS SHEET.
 - CONSTRUCT JUNCTION STRUCTURE TYPE III PER O.C.E.M.A. STD. PLAN 312.
 - CONSTRUCT BRICK & MORTAR SEAL.
 - CONNECT RCP TO EXIST. CHANNEL PER O.C.E.M.A. STD. PLAN 314.
 - CONSTRUCT JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. PLAN 310.
 - CONSTRUCT INLET TYPE II PER O.C.E.M.A. STD. PLAN 302.
 - CONSTRUCT INLET TYPE I PER O.C.E.M.A. STD. PLAN 301.

SAN ANTONIO ROAD LATERALS

NOTE: ALL INSTALLATIONS AND WORK AFFECTING COUNTY PROPERTIES OR FACILITIES SHALL CONFORM WITH STANDARD SPECIFICATIONS AND WITH THE PROVISIONS OF THE CONSTRUCTION PERMIT GRANTED BY COUNTY CENTRAL PERMIT DIVISION. CONTRACTOR SHALL MAINTAIN A COPY OF SAID PERMIT AND STAMPED PLANS ON THE JOB SITE. USE OF COUNTY PROPERTY AND CONFORMANCE WITH THE ABOVE SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY COUNTY'S DULY ASSIGNED INSPECTOR.

TRACT No. 10517
STORM DRAIN

Storm Drain Inlet at
Stonehaven Drive (8' x 7' RCB)



| STA. TO STA. | Q | n | Sf | S | Dn | Vn | Dc | Vc |
|---------------------|------|-------|----|--------|-------|-------|------|-------|
| 71+00.00 - 74+59.00 | 1200 | 0.014 | - | 0.0205 | 7.65' | 22.61 | FULL | 21.40 |

HYDRAULIC DATA

| NO. | REVISION DESCRIPTION | DATE | APP. |
|-----|--|------|------|
| 1 | EXTENDED R.C.B. 10' @ 24" R.C.B. - FULL. ADDED SHOTS G47 1115-88-FULL. | | |

| EX | IN | ANGLE | CHORD | ARC LENGTH | AREA | TANGENT |
|----|-------------|-------|--------|------------|------|---------|
| EX | 10° 22' 33" | 290' | 46.00' | 23.07' | | |
| EX | 21° 57' 00" | 250' | 35.92' | 48.56' | | |
| EX | 7° 57' 27" | 343' | 47.64' | 23.86' | | |
| EX | 10° | A | R | L | T | |

± R.C.B. CURVE DATA

- CONSTRUCTION NOTES**
- 95 - CONST 8" H x 7" W R.C.B. PER DETAIL(S) SH. 7
 - 96 - CONST. MANHOLE FOR REIN. CONC. BOX CONDUIT PER E.M.A. STD. NO 506 (DELETED)
 - 94 - CONST. INLET STRUCTURE PER DETAIL OF SHEET #2 G
 - 97 - CONST. INJECTION STRUCTURE TYPE II PER E.M.A. STD. NO 314 WITH 4" LF. R.C.P. (SIDE PER PLAN) STUB OUT AND SEAL WITH MORTAR AND BRICK.

DRAWING OF RECORD

James H. Pardue 4-20-90
 JAMES H. PARDUE, P.E. 42788 - DATE J-8636
 EXP. 3-31-91

TR 13500 IMP'S
STORM DRAIN PLAN
 EXTENSION
 DWG. NO. E06501-701-2

SHEET 6 OF 7 SHEETS

Storm Drain Maintenance
Correspondence

Craig Kwasniewski

From: Puneet Comar
Sent: Monday, August 10, 2015 5:40 PM
To: Craig Kwasniewski
Subject: As-Built Storm Drain Plan Request

From: Armando Jaime [<mailto:AJaime@yorba-linda.org>]
Sent: Wednesday, July 15, 2015 1:17 PM
To: Puneet Comar; Fredy Castillo; Lynnae Sisemore
Subject: RE: As-Built Storm Drain Plan Request

Hi Puneet,

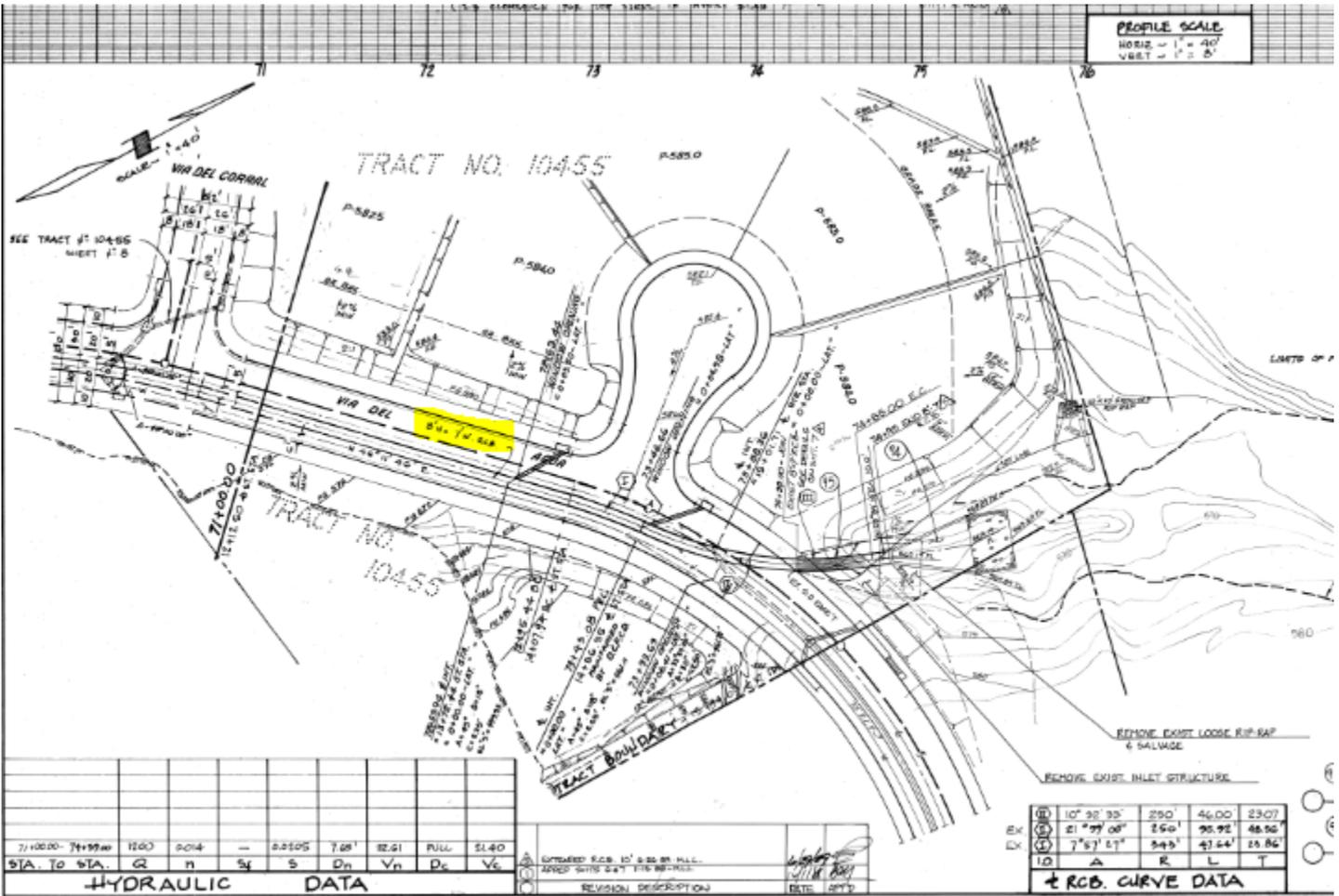
Yes the City maintains this portion of storm drain.

Armando

From: Puneet Comar [<mailto:pcomar@fuscoe.com>]
Sent: Wednesday, July 15, 2015 8:35 AM
To: Fredy Castillo; Lynnae Sisemore
Cc: Armando Jaime
Subject: RE: As-Built Storm Drain Plan Request

Hi Fred, thank you for the follow up!

Just to confirm, we are talking about the storm drain system shown in the attached plan - DWG No. E06501-701-2



Puneet Comar, P.E., Q.S.D
 Senior Project Manager
pcomar@fuscoe.com

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From: Fredy Castillo [<mailto:fcastillo@yorba-linda.org>]
Sent: Wednesday, July 15, 2015 8:02 AM

To: Lynnae Sisemore; Puneet Comar
Subject: RE: As-Built Storm Drain Plan Request

Thankee!

From: Lynnae Sisemore
Sent: Wednesday, July 15, 2015 8:02 AM
To: Puneet Comar
Cc: Fredy Castillo
Subject: FW: As-Built Storm Drain Plan Request

FYI

From: Armando Jaime
Sent: Wednesday, July 15, 2015 6:48 AM
To: Fredy Castillo
Subject: RE: As-Built Storm Drain Plan Request

Hi Fredy,
Yes it will be maintained by the City.

Armando

From: Fredy Castillo
Sent: Thursday, July 09, 2015 1:55 PM
To: Puneet Comar
Cc: Lynnae Sisemore; Armando Jaime; Eric Lissner
Subject: RE: As-Built Storm Drain Plan Request

Armando should be able to provide this for you upon his return.

-Fredy

From: Puneet Comar [<mailto:pcomar@fuscoe.com>]
Sent: Thursday, July 09, 2015 1:52 PM
To: Fredy Castillo
Cc: Lynnae Sisemore; Armando Jaime; Eric Lissner
Subject: RE: As-Built Storm Drain Plan Request

Hi Fred,

Thanks for the follow up, the county has confirmed to us that they do not maintain the storm drain within Via Del Aqua. Therefore I am requesting a statement or documentation from the city that it is, or will be maintained by the city of Yorba Linda Please.

Puneet Comar, P.E., Q.S.D
Senior Project Manager
pcomar@fuscoe.com

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From: Fredy Castillo [<mailto:fcastillo@yorba-linda.org>]
Sent: Thursday, July 09, 2015 1:46 PM
To: Puneet Comar
Cc: Lynnae Sisemore; Armando Jaime
Subject: FW: As-Built Storm Drain Plan Request

Puneet,

The last conversation I had with our public works superintendent, Armando Jaime was that as long as the below information was confirmed with the County then he would add the remaining portion of the SD to his maintenance list. He was under the impression that the entire stretch was the County's. Armando is currently on vacation but he will be back on the 15th if you would like to discuss this further with him. His phone number is 714-961-7170.

Thank you,

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [<mailto:elissner@fuscoe.com>]
Sent: Friday, June 12, 2015 2:49 PM
To: Fredy Castillo; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Fredy,

Our discussions with the county and the associated map on the county's website indicate that the county's responsibility for the line in Via del Agua does not begin until Yorba Linda Blvd. Can you please confirm?

Eric Lissner, P.E.
Engineer
elissner@fuscoe.com

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tel 949.474.1960

fax 949.474.5315
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From: Fredy Castillo [<mailto:fcastillo@yorba-linda.org>]
Sent: Tuesday, June 09, 2015 2:22 PM
To: Eric Lissner; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Eric,

Sorry I haven't followed up I spoke with Armando about this a few days ago and he mentioned the Via del Agua facility is maintained by the County. The storm drain on Dorinda is maintained by the City.

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [<mailto:elissner@fuscoe.com>]
Sent: Tuesday, June 09, 2015 9:45 AM
To: Fredy Castillo; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Armando,

Can you please confirm maintenance of the storm drain lines on the attached map? See below.

Fredy, thank you for the as-built plans.

Thanks!

Eric Lissner, P.E.
Engineer
elissner@fuscoe.com

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From: Fredy Castillo [<mailto:fcastillo@yorba-linda.org>]
Sent: Monday, June 01, 2015 9:50 AM
To: Eric Lissner; Armando Jaime

Cc: Jeff Davis

Subject: RE: As-Built Storm Drain Plan Request

Eric,

The plans you requested have been uploaded to this link: <https://app.box.com/s/72km7j5jiwlrkjlvn6kb9vzu0q3jo1bg>

As far as I know the City maintains the lines in the area you highlighted.

Armando,

Can you confirm if we maintain the SD lines in the area highlighted on the attached map.

Thank you,

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [<mailto:elissner@fuscoe.com>]
Sent: Wednesday, May 27, 2015 4:33 PM
To: Fredy Castillo
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Fredy,

As a followup to my previous email, we have an added request (see attached). We'd also like the as-built storm drain plans for the main in Dorinda Road and Via Tomas and its connection to the main in Yorba Linda Boulevard.

Additionally, can you please include information on which agency maintains each line?

Eric Lissner
Engineer
elissner@fuscoe.com

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fax 949.474.5315
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From: Eric Lissner
Sent: Wednesday, May 27, 2015 11:52 AM

To: 'fcastillo@yorba-linda.org'
Cc: Jeff Davis
Subject: As-Built Storm Drain Plan Request

Hi Fredy,

Per our phone conversation this morning, please see the attached exhibit with a request for as-built storm drain plans.

We're interested in plans for the mainline storm drain in Via Del Agua/Stonehaven and Yorba Linda Blvd until it becomes a county-maintained line downstream in Yorba Linda Blvd. We believe the storm drain has an 8'Hx7'W RCB cross-section for the majority of this stretch.

When we spoke on the phone, you mentioned that you would be able to provide us these plans by Friday or Monday. Thanks for your help!

Eric Lissner
Engineer
elissner@fuscoe.com

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