



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

HYDROLOGY & HYDRAULIC CALCULATIONS

FOR

HILLWOOD GATEWAY SOUTH BUILDING 8
NORMAN ROAD AND LENA ROAD
CITY OF SAN BERNARDINO, CALIFORNIA

PREPARED FOR

HILLWOOD INVESTMENTS
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MARCH 25, 2022

JOB NO. 3575

PREPARED BY

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**HYDROLOGY & HYDRAULIC
CALCULATIONS**

FOR

HILLWOOD GATEWAY SOUTH BUILDING 8

**PREPARED UNDER
THE SUPERVISION OF**

**REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/22**

INTRODUCTION

A: PROJECT LOCATION

The project site is located at the northwest corner of Norman Road and Lena Road in the City of San Bernardino. Please see next page for vicinity map.

B: STUDY PURPOSE

The purpose of this study is to determine peak flow rates from the project site and analyze the modifications to the existing detention basin.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil
James Wickenhaeuser



The logo for Thienes Engineering, Inc. consists of a large, bold, black 'T' and 'E' monogram where the two letters overlap. To the right of the monogram, the company name 'Thienes Engineering, Inc.' is written in a cursive script font. Below the monogram and company name, the business address and contact information are listed in a smaller, sans-serif font.

VICINITY MAP
FOR
HILLWOOD GATEWAY SOUTH BUILDING 8
SAN BERNARDINO, CA

Last Update: 1/12/22
O:\3500-3599\3575\3575VicMap.dwg

DISCUSSION

The project site encompasses approximately 15.2 acres. Proposed improvements include one warehouse building with approximately 304,588 square feet. There is a truck yard located on the northerly side of the building. There is vehicle parking on the westerly side of the site and additional parking at the northeasterly portion of the building. A portion of the site is an existing detention basin. This basin will be filled with the northeasterly portion to be redesigned as a detention basin with equivalent volume as the overall existing detention basin.

Master Plan of Drainage Hydrology

The project site is part of a previously approved Master Plan of Drainage. The easterly portion of the project site is an existing detention basin. Currently, there are two existing storm drain systems that discharge into the existing detention basin. The detention basin discharges flow to Norman Road. The remaining westerly portion of the site tends to drain westerly towards Foisy Road. The Master Plan of Drainage tables the site (and discharge from the detention basin) to the proposed storm drain system in Norman Road.

See Appendix “A” for portions of the Master Plan of Drainage and previously approved hydrology and basin routing calculations.

Proposed Condition

The layout of the proposed site will require the relocation of the existing detention basin. The northeasterly portion of the site will be the location of the new detention basin. While the basin footprint is smaller, the proposed basin is deeper and has a similar volume to the existing detention basin. A public storm drain will be designed from the detention basin through the site then to Norman Road. This storm drain continues westerly in Norman Road ultimately connecting to the recently built storm drain system in Waterman Avenue.

Runoff from the westerly parking areas (nodes 100-122) drain to grate inlets located in the parking areas. A proposed storm drain system will convey runoff easterly to the truck yard area. Runoff from the northerly half of the building and the truck yard area (nodes 130-133) drain to grate inlets at the westerly portion of the truck yard. Confluenced peak flows (at node 134) are then conveyed to the previously mentioned public storm drain system (at node 135). The 100-year peak flow for this portion of the site is approximately 31.7 cfs.

Runoff from the southerly portion of the proposed building (nodes 200-223) will discharge to Norman Road via 3 proposed parkway culverts. The respective 100-year peak flow rates are 4.0 cfs, 4.0 cfs and 2.8 cfs. Note that there is a low flow storm drain system that conveys the required water quality peak flow rate to the storage chambers located on the northerly portion of the site. once this drain is full, flow from the roof drains can discharge through the culverts.

A portion of Foisy Street (Nodes 300-301) will drain to a sump condition located on the south side of the westerly driveway. A temporary inlet will collect flows and conveyed them to the proposed onsite storm drain system. The peak flow rate to this temporary inlet is approximately 0.7 cfs.

The proposed public storm drain that will be built as part of this development is designed to carry the 100-year flows from the project site westerly down Norman Road towards City Creek and the Santa Ana River. This means there will not be any onsite stormwater detention to mitigate the peak flow rates.

See Appendix "B" for hydrology calculations and Appendix "F" for hydrology map.

Existing Basin Analysis

The existing detention basins were previously analyzed in a report by Thienes Engineering, Inc. (Hydrology and Hydraulic Calculations for Gateway North and Central Avenue Storm Drain, dated December 15, 2005). This study also provided Master Plan of Drainage for areas tributary to the basin. From this report, approximately 242 acres is tributary to the detention area. Note that several upstream areas of the Master Plan of Drainage were not tributary to the existing basin (27.0 acres at node 221, 20.0 acres at node 231 and 18 acres of 26.0 acres at node 341) at the time of the original study.

With the current basin, runoff is discharged to Norman Road in an amount less than the existing condition 100-year peak flow rate at the same location. Discharge from the basin is controlled by several 15" pipes at various elevations in the basin (6 pipes at elevation 1020.70, 6 pipes at elevation 1021.5 and 3 pipes at elevation 1022.5). From the original study, approximately 148.5 cfs discharged from the basin with a depth of 4.70' and a detained volume of about 17.61 acre-feet.

Existing condition rational method calculations for areas tributary to the basin as well as the Rational Method calculations for the entire Master Plan are unchanged from the original report. The existing condition 100-year Rational Method peak flow rate was 171.9 cfs while the proposed 100-year peak flow rate to the detention basin was 713.7 cfs.

See Appendix "A" for reference material from original hydrology study including Rational Method Calculations and hydrograph and basin routing. Also included are the construction plans for the basins.

Proposed Basin Analysis

The proposed project site will utilize a portion of the space currently occupied by the existing detention basin. To accommodate the proposed building, the detention basin will be relocated to the northeasterly portion of the site. Here, the proposed basin is deeper than the existing basin to hold approximately the same volume. In addition, the 27.0 acres at node 221 and the 20.0 acres at node 231, from the Master Plan hydrology map, will be included as commercial development. The total area to the new detention basin is

approximately 291.3 acres (approximately 15.5 acres less than the Master Plan of Drainage hydrology calculations due to some area at node 341 that cannot flow to the basin). Conservatively, all areas are considered as commercial development even though there are several areas of residential homes and vacant lots.

Discharge from the proposed basin is limited by a proposed 36" diameter C.M.P. riser. Discharge rates are based on the orifice equation with head equal to depths above the riser elevations. Runoff discharges to the proposed public storm drain system that traverses through the project site then downstream in Norman Road. The detention analysis shows that approximately 125.1 cfs can discharge from the detention basin. The detained volume is approximately 28.43 acre-feet at depth of about 14.50'.

This peak flow rate is less than the existing condition peak flow rate that currently discharges to Norman Road. The proposed detention basin and public storm drain system provides significant relief to Norman Road and adjacent areas. The basin has positive drainage and basin routing shows that the basin can drain within 24 hours after the peak flow rate is achieved.

See Appendix "D" for detention calculations.

Methodology

Hydrology calculations were computed using San Bernardino County Rational Method program (by AES Software). AES Software's Flood program was used for the detention analysis. The Soil type is "B" for the San Bernardino County Hydrology Manual. Rainfall values are from the San Bernardino County Hydrology Manual isohyetal maps.

| APPENDIX | DESCRIPTION |
|----------|--------------------------|
| A | REFERENCE MATERIALS |
| B | HYDROLOGY CALCULATIONS |
| C | HYDRAULIC CALCULATIONS |
| D | DETENTION CALCULATIONS |
| E | CATCH BASIN CALCULATIONS |
| F | HYDROLOGY MAP |

APPENDIX A

REFERENCE MATERIALS

HYDROLOGY & HYDRAULIC CALCULATIONS

FOR

GATEWAY NORTH & CENTRAL
AVENUE STORM DRAIN
CENTRAL AVENUE W/O TIPPECANOE AVNEUE
SAN BERNARDINO CALIFORNIA

PREPARED FOR

HILLWOOD INVESTMENTS
275 SOUTH MEMORIAL DRIVE
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(909) 382-0033

JULY 27, 2005
REVISED DECEMBER 15, 2005

JOB NO. 2537

PREPARED BY

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-99 Advanced Engineering Software (aes)
Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* MASTER PLANNED STORM DRAIN *
* 100-YEAR *
*

FILE NAME: C:\XDRIVE\2585\2585B.DAT
TIME/DATE OF STUDY: 16:35 12/14/2005

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

-- *TIME-OF-CONCENTRATION MODEL* --

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) VS. LOG(TC;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2800

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 214.00 TO NODE 214.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN.) = 16.56 RAINFALL INTENSITY(INCH/HR) = 2.77
EFFECTIVE AREA(ACRES) = 96.41
TOTAL AREA(ACRES) = 104.80 PEAK FLOW RATE(CFS) = 264.00
AREA-AVERAGED Fm(INCH/HR) = 0.09 AREA-AVERAGED Fp(INCH/HR) = 0.85
AREA-AVERAGED Ap = 0.10
NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
CONFLUENCE ANALYSES.

FLOW PROCESS FROM NODE 214.00 TO NODE 221.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1024.34 DOWNSTREAM(FEET) = 1022.45
FLOW LENGTH(FEET) = 448.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 58.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.81
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 264.00
PIPE TRAVEL TIME(MIN.) = 0.69 Tc(MIN.) = 17.25
LONGEST FLOWPATH FROM NODE 214.00 TO NODE 221.00 = 448.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 17.25
RAINFALL INTENSITY(INCH/HR) = 2.70
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.85
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 96.41

TOTAL STREAM AREA(ACRES) = 104.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 264.00

FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 2400.00
ELEVATION DATA: UPSTREAM(FEET) = 1049.00 DOWNSTREAM(FEET) = 1035.00

Tc = K*[(LENGTH**3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.133
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.541
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 27.00 0.80 0.10 52 19.13
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 59.82
TOTAL AREA(ACRES) = 27.00 PEAK FLOW RATE(CFS) = 59.82

FLOW PROCESS FROM NODE 221.00 TO NODE 221.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 19.13
RAINFALL INTENSITY(INCH/HR) = 2.54
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 27.00
TOTAL STREAM AREA(ACRES) = 27.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 59.82

** CONFLUENCE DATA **

| STREAM | Q | Tc | Intensity | Fp(Fm) | Ap | Ae | HEADWATER |
|--------|--------|--------|-----------|-------------|------|---------|-----------|
| NUMBER | (CFS) | (MIN.) | (INCH/HR) | (INCH/HR) | | (ACRES) | NODE |
| 1 | 264.00 | 17.25 | 2.704 | 0.85(0.08) | 0.10 | 96.4 | 214.00 |
| 2 | 59.82 | 19.13 | 2.541 | 0.80(0.08) | 0.10 | 27.0 | 220.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM | Q | Tc | Intensity | Fp(Fm) | Ap | Ae | HEADWATER |
|--------|--------|--------|-----------|-------------|------|---------|-----------|
| NUMBER | (CFS) | (MIN.) | (INCH/HR) | (INCH/HR) | | (ACRES) | NODE |
| 1 | 321.50 | 17.25 | 2.704 | 0.84(0.08) | 0.10 | 120.8 | 214.00 |
| 2 | 307.40 | 19.13 | 2.541 | 0.84(0.08) | 0.10 | 123.4 | 220.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 321.50 Tc(MIN.) = 17.25
EFFECTIVE AREA(ACRES) = 120.75 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.84 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 131.80
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 221.00 = 2400.00 FEET.

FLOW PROCESS FROM NODE 221.00 TO NODE 231.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1022.35 DOWNSTREAM(FEET) = 1019.75
FLOW LENGTH(FEET) = 600.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 78.0 INCH PIPE IS 61.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.54
ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 321.50
PIPE TRAVEL TIME(MIN.) = 0.87 Tc(MIN.) = 18.12
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 231.00 = 3000.00 FEET.

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 18.12
RAINFALL INTENSITY(INCH/HR) = 2.63
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.84
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 120.75
TOTAL STREAM AREA(ACRES) = 131.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 321.50

FLOW PROCESS FROM NODE 230.00 TO NODE 231.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 2100.00
ELEVATION DATA: UPSTREAM(FEET) = 1040.00 DOWNSTREAM(FEET) = 1029.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.532
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.590
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 20.00 0.80 0.10 52 18.53
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 45.19
TOTAL AREA(ACRES) = 20.00 PEAK FLOW RATE(CFS) = 45.19

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 18.53
RAINFALL INTENSITY(INCH/HR) = 2.59
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 20.00
TOTAL STREAM AREA(ACRES) = 20.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 45.19

** CONFLUENCE DATA **

| STREAM | Q | TC | Intensity | Fp(Fm) | Ap | Ae | HEADWATER |
|--------|--------|--------|-----------|-------------|---------|-------|-----------|
| NUMBER | (CFS) | (MIN.) | (INCH/HR) | (INCH/HR) | (ACRES) | | NODE |
| 1 | 321.50 | 18.12 | 2.626 | 0.84(0.08) | 0.10 | 120.8 | 214.00 |
| 1 | 307.40 | 20.00 | 2.474 | 0.84(0.08) | 0.10 | 123.4 | 220.00 |
| 2 | 45.19 | 18.53 | 2.590 | 0.80(0.08) | 0.10 | 20.0 | 230.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM | Q | TC | Intensity | Fp(Fm) | Ap | Ae | HEADWATER |
|--------|--------|--------|-----------|-------------|---------|-------|-----------|
| NUMBER | (CFS) | (MIN.) | (INCH/HR) | (INCH/HR) | (ACRES) | | NODE |
| 1 | 366.31 | 18.12 | 2.626 | 0.83(0.08) | 0.10 | 140.3 | 214.00 |
| 2 | 350.50 | 20.00 | 2.474 | 0.83(0.08) | 0.10 | 143.4 | 220.00 |
| 3 | 363.59 | 18.53 | 2.590 | 0.83(0.08) | 0.10 | 141.3 | 230.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 366.31 Tc(MIN.) = 18.12
EFFECTIVE AREA(ACRES) = 140.31 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 151.80
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 231.00 = 3000.00 FEET.

FLOW PROCESS FROM NODE 231.00 TO NODE 241.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1019.75 DOWNSTREAM(FEET) = 1017.56
 FLOW LENGTH(FEET) = 355.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 78.0 INCH PIPE IS 58.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.71
 ESTIMATED PIPE DIAMETER(INCH) = 78.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 366.31
 PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 18.55
 LONGEST FLOWPATH FROM NODE 220.00 TO NODE 241.00 = 3355.00 FEET.

 FLOW PROCESS FROM NODE 241.00 TO NODE 241.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 18.55
 RAINFALL INTENSITY(INCH/HR) = 2.59
 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.83
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 140.31
 TOTAL STREAM AREA(ACRES) = 151.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 366.31

 FLOW PROCESS FROM NODE 240.00 TO NODE 241.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1400.00
 ELEVATION DATA: UPSTREAM(FEET) = 1039.00 DOWNSTREAM(FEET) = 1029.00

Tc = K*((LENGTH** 3.00)/(ELEVATION CHANGE))**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.810
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.963
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN | Tc (MIN.) |
|-------------------------------|-------------------|-----------------|-----------------|-----------------|-----------|--------------|
| COMMERCIAL | A | 6.00 | 0.80 | 0.10 | 52 | 14.81 |

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
 SUBAREA RUNOFF(CFS) = 15.57
 TOTAL AREA(ACRES) = 6.00 PEAK FLOW RATE(CFS) = 15.57

 FLOW PROCESS FROM NODE 241.00 TO NODE 241.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 14.81
 RAINFALL INTENSITY(INCH/HR) = 2.96
 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.80
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 6.00
 TOTAL STREAM AREA(ACRES) = 6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.57

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 366.31 | 18.55 | 2.589 | 0.83(0.08) | 0.10 | 140.3 | 214.00 |
| 2 | 350.50 | 20.44 | 2.442 | 0.83(0.08) | 0.10 | 143.4 | 220.00 |
| 1 | 363.59 | 18.96 | 2.555 | 0.83(0.08) | 0.10 | 141.3 | 230.00 |
| 2 | 15.57 | 14.81 | 2.963 | 0.80(0.08) | 0.10 | 6.0 | 240.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 379.86 | 18.55 | 2.589 | 0.83(0.08) | 0.10 | 146.3 | 214.00 |

| | | | | | | | |
|---|--------|-------|-------|-------------|------|-------|--------|
| 2 | 376.96 | 18.96 | 2.555 | 0.83(0.08) | 0.10 | 147.3 | 230.00 |
| 3 | 363.26 | 20.44 | 2.442 | 0.83(0.08) | 0.10 | 149.4 | 220.00 |
| 4 | 351.74 | 14.81 | 2.963 | 0.83(0.08) | 0.10 | 118.0 | 240.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 379.86 Tc(MIN.) = 18.55
 EFFECTIVE AREA(ACRES) = 146.31 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 157.80
 LONGEST FLOWPATH FROM NODE 220.00 TO NODE 241.00 = 3355.00 FEET.

 FLOW PROCESS FROM NODE 241.00 TO NODE 251.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

 ELEVATION DATA: UPSTREAM(FEET) = 1017.06 DOWNSTREAM(FEET) = 1013.47
 FLOW LENGTH(FEET) = 704.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 81.0 INCH PIPE IS 62.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.82
 ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 379.86
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 19.46
 LONGEST FLOWPATH FROM NODE 220.00 TO NODE 251.00 = 4059.00 FEET.

 FLOW PROCESS FROM NODE 251.00 TO NODE 251.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.46
 RAINFALL INTENSITY(INCH/HR) = 2.52
 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.83
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 146.31
 TOTAL STREAM AREA(ACRES) = 157.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 379.86

 FLOW PROCESS FROM NODE 250.00 TO NODE 251.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

 INITIAL SUBAREA FLOW-LENGTH(FEET) = 1700.00
 ELEVATION DATA: UPSTREAM(FEET) = 1038.00 DOWNSTREAM(FEET) = 1025.00

 $Tc = K * [(Length^{** 3.00}) / (Elevation Change)]^{** 0.20}$
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.789
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.852
 SUBAREA Tc AND LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN | Tc (MIN.) |
|-------------------------------|-------------------|-----------------|-----------------|-----------------|-----------|--------------|
| COMMERCIAL | A | 33.00 | 0.80 | 0.10 | 52 | 15.79 |

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
 SUBAREA RUNOFF(CFS) = 82.33
 TOTAL AREA(ACRES) = 33.00 PEAK FLOW RATE(CFS) = 82.33

 FLOW PROCESS FROM NODE 251.00 TO NODE 251.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 15.79
 RAINFALL INTENSITY(INCH/HR) = 2.85
 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.80
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 33.00
 TOTAL STREAM AREA(ACRES) = 33.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 82.33

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|---------------|---------------|-------------------|
| 1 | 379.86 | 19.46 | 2.515 | 0.83(0.08) | 0.10 | 146.3 | 214.00 |
| 1 | 376.96 | 19.88 | 2.483 | 0.83(0.08) | 0.10 | 147.3 | 230.00 |
| 1 | 363.26 | 21.38 | 2.377 | 0.83(0.08) | 0.10 | 149.4 | 220.00 |
| 1 | 351.74 | 15.75 | 2.856 | 0.83(0.08) | 0.10 | 118.0 | 240.00 |
| 2 | 82.33 | 15.79 | 2.852 | 0.80(0.08) | 0.10 | 33.0 | 250.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|---------------|---------------|-------------------|
| 1 | 433.98 | 15.75 | 2.856 | 0.82(0.08) | 0.10 | 150.9 | 240.00 |
| 2 | 452.19 | 19.46 | 2.515 | 0.83(0.08) | 0.10 | 179.3 | 214.00 |
| 3 | 448.35 | 19.88 | 2.483 | 0.82(0.08) | 0.10 | 180.3 | 230.00 |
| 4 | 431.51 | 21.38 | 2.377 | 0.82(0.08) | 0.10 | 182.4 | 220.00 |
| 5 | 434.39 | 15.79 | 2.852 | 0.82(0.08) | 0.10 | 151.3 | 250.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 452.19 Tc(MIN.) = 19.46
EFFECTIVE AREA(ACRES) = 179.31 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.83 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 190.80
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 251.00 = 4059.00 FEET.

FLOW PROCESS FROM NODE 251.00 TO NODE 252.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.47 DOWNSTREAM(FEET) = 1011.30
FLOW LENGTH(FEET) = 153.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 81.0 INCH PIPE IS 60.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.66
ESTIMATED PIPE DIAMETER(INCH) = 81.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 452.19
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 19.63
LONGEST FLOWPATH FROM NODE 220.00 TO NODE 252.00 = 4212.00 FEET.

FLOW PROCESS FROM NODE 252.00 TO NODE 252.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<
=====

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1050.00
ELEVATION DATA: UPSTREAM(FEET) = 1056.00 DOWNSTREAM(FEET) = 1047.00

TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 12.727
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.245
SUBAREA TC AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 12.00 0.80 0.10 S2 12.73
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 34.19
TOTAL AREA(ACRES) = 12.00 PEAK FLOW RATE(CFS) = 34.19

FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 61

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>(STANDARD CURB SECTION USED)<<<
=====
UPSTREAM ELEVATION(FEET) = 1047.00 DOWNSTREAM ELEVATION(FEET) = 1040.00
STREET LENGTH(FEET) = 800.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 15.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0149
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 49.08
 STREET FLOWING FULL
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.65
 HALFSTREET FLOOD WIDTH(FEET) = 20.00
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.08
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.65
 STREET FLOW TRAVEL TIME(MIN.) = 3.26 Tc(MIN.) = 15.99
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.830
 SUBAREA LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN |
|----------------------------|----------------|--------------|--------------|--------------|--------|
| COMMERCIAL | A | 12.00 | 0.80 | 0.10 | 52 |

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
 SUBAREA AREA(ACRES) = 12.00 SUBAREA RUNOFF(CFS) = 29.70
 EFFECTIVE AREA(ACRES) = 24.00 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 24.00 PEAK FLOW RATE(CFS) = 59.40

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.69 HALFSTREET FLOOD WIDTH(FEET) = 20.96
 FLOW VELOCITY(FEET/SEC.) = 4.40 DEPTH*VELOCITY(FT*FT/SEC.) = 3.02
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 1850.00 FEET.

 FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
 ======
 ELEVATION DATA: UPSTREAM(FEET) = 1035.00 DOWNSTREAM(FEET) = 1033.50
 FLOW LENGTH(FEET) = 300.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.10
 ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 59.40
 PIPE TRAVEL TIME(MIN.) = 0.62 Tc(MIN.) = 16.61
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 2150.00 FEET.

 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<
 ======
 MAINLINE Tc(MIN) = 16.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.766
 SUBAREA LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN |
|----------------------------|----------------|--------------|--------------|--------------|--------|
| COMMERCIAL | A | 19.00 | 0.80 | 0.10 | 52 |

 SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
 SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
 SUBAREA AREA(ACRES) = 19.00 SUBAREA RUNOFF(CFS) = 45.94
 EFFECTIVE AREA(ACRES) = 43.00 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 43.00 PEAK FLOW RATE(CFS) = 103.97

 FLOW PROCESS FROM NODE 303.00 TO NODE 311.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
 ======
 ELEVATION DATA: UPSTREAM(FEET) = 1033.50 DOWNSTREAM(FEET) = 1031.50
 FLOW LENGTH(FEET) = 400.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 51.0 INCH PIPE IS 37.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.27
 ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 103.97
 PIPE TRAVEL TIME(MIN.) = 0.72 Tc(MIN.) = 17.33

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 311.00 = 2550.00 FEET.

FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 17.33

RAINFALL INTENSITY(INCH/HR) = 2.70

AREA-AVERAGED Fm(INCH/HR) = 0.08

AREA-AVERAGED Fp(INCH/HR) = 0.80

AREA-AVERAGED Ap = 0.10

EFFECTIVE STREAM AREA(ACRES) = 43.00

TOTAL STREAM AREA(ACRES) = 43.00

PEAK FLOW RATE(CFS) AT CONFLUENCE = 103.97

FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1400.00

ELEVATION DATA: UPSTREAM(FEET) = 1042.00 DOWNSTREAM(FEET) = 1038.00

Tc = K* [(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.788

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.655

SUBAREA TC AND LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN | Tc (MIN.) |
|----------------------------|----------------|--------------|--------------|--------------|--------|-----------|
| COMMERCIAL | A | 17.00 | 0.80 | 0.10 | 52 | 17.79 |

SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 39.40
TOTAL AREA(ACRES) = 17.00 PEAK FLOW RATE(CFS) = 39.40

FLOW PROCESS FROM NODE 311.00 TO NODE 311.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 17.79

RAINFALL INTENSITY(INCH/HR) = 2.65

AREA-AVERAGED Fm(INCH/HR) = 0.08

AREA-AVERAGED Fp(INCH/HR) = 0.80

AREA-AVERAGED Ap = 0.10

EFFECTIVE STREAM AREA(ACRES) = 17.00

TOTAL STREAM AREA(ACRES) = 17.00

PEAK FLOW RATE(CFS) AT CONFLUENCE = 39.40

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|--------------|------------|----------------|
| 1 | 103.97 | 17.33 | 2.697 | 0.80(0.08) | 0.10 | 43.0 | 300.00 |
| 2 | 39.40 | 17.79 | 2.655 | 0.80(0.08) | 0.10 | 17.0 | 310.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CPS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|--------------|------------|----------------|
| 1 | 142.98 | 17.33 | 2.697 | 0.80(0.08) | 0.10 | 59.6 | 300.00 |
| 2 | 141.70 | 17.79 | 2.655 | 0.80(0.08) | 0.10 | 60.0 | 310.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 142.98 Tc(MIN.) = 17.33

EFFECTIVE AREA(ACRES) = 59.56 AREA-AVERAGED Fm(INCH/HR) = 0.08

AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 60.00

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 311.00 = 2550.00 FEET.

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 31

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1031.50 DOWNSTREAM(FEET) = 1030.50
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.16
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 142.98
PIPE TRAVEL TIME(MIN.) = 0.22 Tc(MIN.) = 17.55
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 312.00 = 2700.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 81
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
```

```
=====
MAINLINE Tc(MIN) = 17.55
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.676
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.00 0.80 0.10 52
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.10
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 18.69
EFFECTIVE AREA(ACRES) = 67.56 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 68.00 PEAK FLOW RATE(CFS) = 157.88
```

```
*****
FLOW PROCESS FROM NODE 312.00 TO NODE 321.00 IS CODE = 31
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1030.50 DOWNSTREAM(FEET) = 1020.00
FLOW LENGTH(FEET) = 1200.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 39.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.72
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 157.88
PIPE TRAVEL TIME(MIN.) = 1.57 Tc(MIN.) = 19.12
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 321.00 = 3900.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 321.00 TO NODE 321.00 IS CODE = 1
```

```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
```

```
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.12
RAINFALL INTENSITY(INCH/HR) = 2.54
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 67.56
TOTAL STREAM AREA(ACRES) = 68.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 157.88
```

```
*****
FLOW PROCESS FROM NODE 320.00 TO NODE 321.00 IS CODE = 21
```

```
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 1042.00 DOWNSTREAM(FEET) = 1035.00
```

```
Tc = K* [(LENGTH** 3.00) / (ELEVATION CHANGE)] **0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 12.997
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.205
SUBAREA Tc AND LOSS RATE DATA(AMC IIII):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 11.00 0.80 0.10 52 13.00
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.10
```

SUBAREA RUNOFF(CFS) = 30.94
TOTAL AREA(ACRES) = 11.00 PEAK FLOW RATE(CFS) = 30.94

FLOW PROCESS FROM NODE 321.00 TO NODE 321.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 13.00
RAINFALL INTENSITY(INCH/HR) = 3.20
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 11.00
TOTAL STREAM AREA(ACRES) = 11.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.94

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|---------------|---------------|-------------------|
| 1 | 157.88 | 19.12 | 2.542 | 0.80(0.08) | 0.10 | 67.6 | 300.00 |
| 1 | 156.38 | 19.59 | 2.506 | 0.80(0.08) | 0.10 | 68.0 | 310.00 |
| 2 | 30.94 | 13.00 | 3.205 | 0.80(0.08) | 0.10 | 11.0 | 320.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|---------------|---------------|-------------------|
| 1 | 182.25 | 19.12 | 2.542 | 0.80(0.08) | 0.10 | 78.6 | 300.00 |
| 2 | 180.40 | 19.59 | 2.506 | 0.80(0.08) | 0.10 | 79.0 | 310.00 |
| 3 | 167.12 | 13.00 | 3.205 | 0.80(0.08) | 0.10 | 56.9 | 320.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 182.25 Tc(MIN.) = 19.12
EFFECTIVE AREA(ACRES) = 78.56 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 79.00
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 321.00 = 3900.00 FEET.

FLOW PROCESS FROM NODE 321.00 TO NODE 331.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 1020.00 DOWNSTREAM(FEET) = 1012.00
FLOW LENGTH(FEET) = 900.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 41.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.28
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 182.25
PIPE TRAVEL TIME(MIN.) = 1.13 Tc(MIN.) = 20.25
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 331.00 = 4800.00 FEET.

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.25
RAINFALL INTENSITY(INCH/HR) = 2.46
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 78.56
TOTAL STREAM AREA(ACRES) = 79.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 182.25

FLOW PROCESS FROM NODE 330.00 TO NODE 331.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 950.00
ELEVATION DATA: UPSTREAM(FEET) = 1033.00 DOWNSTREAM(FEET) = 1027.00
TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM TC(MIN.) = 12.998
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.205
SUBAREA TC AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA FP AP SCS TC
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL A 11.00 0.80 0.10 52 13.00
SUBAREA AVERAGE PVIOUS LOSS RATE, FP(INCH/HR) = 0.80
SUBAREA AVERAGE PVIOUS AREA FRACTION, AP = 0.10
SUBAREA RUNOFF(CFS) = 30.94
TOTAL AREA(ACRES) = 11.00 PEAK FLOW RATE(CFS) = 30.94

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 13.00
RAINFALL INTENSITY(INCH/HR) = 3.20
AREA-AVERAGED FM(INCH/HR) = 0.08
AREA-AVERAGED FP(INCH/HR) = 0.80
AREA-AVERAGED AP = 0.10
EFFECTIVE STREAM AREA(ACRES) = 11.00
TOTAL STREAM AREA(ACRES) = 11.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.94

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 182.25 | 20.25 | 2.456 | 0.80(0.08) | 0.10 | 78.6 | 300.00 |
| 1 | 180.40 | 20.75 | 2.421 | 0.80(0.08) | 0.10 | 79.0 | 310.00 |
| 1 | 167.12 | 14.16 | 3.044 | 0.80(0.08) | 0.10 | 56.9 | 320.00 |
| 2 | 30.94 | 13.00 | 3.205 | 0.80(0.08) | 0.10 | 11.0 | 330.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 196.47 | 14.16 | 3.044 | 0.80(0.08) | 0.10 | 67.9 | 320.00 |
| 2 | 205.78 | 20.25 | 2.456 | 0.80(0.08) | 0.10 | 89.6 | 300.00 |
| 3 | 203.57 | 20.75 | 2.421 | 0.80(0.08) | 0.10 | 90.0 | 310.00 |
| 4 | 192.65 | 13.00 | 3.205 | 0.80(0.08) | 0.10 | 63.2 | 330.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 205.78 TC(MIN.) = 20.25
EFFECTIVE AREA(ACRES) = 89.56 AREA-AVERAGED FM(INCH/HR) = 0.08
AREA-AVERAGED FP(INCH/HR) = 0.80 AREA-AVERAGED AP = 0.10
TOTAL AREA(ACRES) = 90.00
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 331.00 = 4800.00 FEET.

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 192.65 | 13.00 | 3.205 | 0.80(0.08) | 0.10 | 63.2 | 330.00 |
| 2 | 196.47 | 14.16 | 3.044 | 0.80(0.08) | 0.10 | 67.9 | 320.00 |
| 3 | 205.78 | 20.25 | 2.456 | 0.80(0.08) | 0.10 | 89.6 | 300.00 |
| 4 | 203.57 | 20.75 | 2.421 | 0.80(0.08) | 0.10 | 90.0 | 310.00 |

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 331.00 = 4800.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

| STREAM NUMBER | Q (CPS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|-----------------|---------------|-------------------|
| 1 | 433.98 | 15.91 | 2.838 | 0.82(0.08) | 0.10 | 150.9 | 240.00 |
| 2 | 434.39 | 15.96 | 2.834 | 0.82(0.08) | 0.10 | 151.3 | 250.00 |
| 3 | 452.19 | 19.63 | 2.503 | 0.83(0.08) | 0.10 | 179.3 | 214.00 |

| | | | | | | | |
|----------------------------|--------|-------|-------|--------------|----------|------------|--------|
| 4 | 448.35 | 20.04 | 2.471 | 0.82(0.08) | 0.10 | 180.3 | 230.00 |
| 5 | 431.51 | 21.55 | 2.366 | 0.82(0.08) | 0.10 | 182.4 | 220.00 |
| LONGEST FLOWPATH FROM NODE | | | | 0.00 TO NODE | 331.00 = | 0.00 FEET. | |

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) | Ap | Ae (ACRES) | HEADWATER NODE |
|----------------------|------------|--------------|------------------------|-------------|------|---------------|-------------------|
| 1 | 594.26 | 13.00 | 3.205 | 0.81(0.08) | 0.10 | 186.5 | 330.00 |
| 2 | 611.50 | 14.16 | 3.044 | 0.81(0.08) | 0.10 | 202.2 | 320.00 |
| 3 | 651.75 | 20.25 | 2.456 | 0.82(0.08) | 0.10 | 270.2 | 300.00 |
| 4 | 644.05 | 20.75 | 2.421 | 0.82(0.08) | 0.10 | 271.3 | 310.00 |
| 5 | 633.13 | 15.91 | 2.838 | 0.81(0.08) | 0.10 | 225.1 | 240.00 |
| 6 | 633.60 | 15.96 | 2.834 | 0.81(0.08) | 0.10 | 225.6 | 250.00 |
| 7 | 657.01 | 19.63 | 2.503 | 0.82(0.08) | 0.10 | 266.6 | 214.00 |
| 8 | 653.80 | 20.04 | 2.471 | 0.82(0.08) | 0.10 | 269.1 | 230.00 |
| 9 | 630.35 | 21.55 | 2.366 | 0.82(0.08) | 0.10 | 272.4 | 220.00 |
| TOTAL AREA (ACRES) = | | | | 280.80 | | | |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 657.01 Tc(MIN.) = 19.627
EFFECTIVE AREA(ACRES) = 266.64 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.82 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 280.80
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 331.00 = 4800.00 FEET.

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<

FLOW PROCESS FROM NODE 331.00 TO NODE 331.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.63
RAINFALL INTENSITY(INCH/HR) = 2.50
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.82
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 266.64
TOTAL STREAM AREA(ACRES) = 280.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 657.01

FLOW PROCESS FROM NODE 340.00 TO NODE 341.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1600.00
ELEVATION DATA: UPSTREAM(FEET) = 1027.00 DOWNSTREAM(FEET) = 1022.00

TC = K* [(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.431
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.599
SUBAREA TC AND LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN | Tc (MIN.) |
|-------------------------------|-------------------|-----------------|-----------------|-----------------|-----------|--------------|
| COMMERCIAL | A | 26.00 | 0.80 | 0.10 | 52 | 18.43 |

SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 58.95
TOTAL AREA(ACRES) = 26.00 PEAK FLOW RATE(CFS) = 58.95

FLOW PROCESS FROM NODE 341.00 TO NODE 341.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 18.43
RAINFALL INTENSITY(INCH/HR) = 2.60
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80

AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 26.00
 TOTAL STREAM AREA(ACRES) = 26.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.95

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|------------|------------|----------------|
| 1 | 594.26 | 13.00 | 3.205 | 0.81(0.08) | 0.10 | 186.5 | 330.00 |
| 1 | 611.50 | 14.16 | 3.044 | 0.81(0.08) | 0.10 | 202.2 | 320.00 |
| 1 | 651.75 | 20.25 | 2.456 | 0.82(0.08) | 0.10 | 270.2 | 300.00 |
| 1 | 644.05 | 20.75 | 2.421 | 0.82(0.08) | 0.10 | 271.3 | 310.00 |
| 1 | 633.13 | 15.91 | 2.838 | 0.81(0.08) | 0.10 | 225.1 | 240.00 |
| 1 | 633.60 | 15.96 | 2.834 | 0.81(0.08) | 0.10 | 225.6 | 250.00 |
| 1 | 657.01 | 19.63 | 2.503 | 0.82(0.08) | 0.10 | 266.6 | 214.00 |
| 1 | 653.80 | 20.04 | 2.471 | 0.82(0.08) | 0.10 | 269.1 | 230.00 |
| 1 | 630.35 | 21.55 | 2.366 | 0.82(0.08) | 0.10 | 272.4 | 220.00 |
| 2 | 58.95 | 18.43 | 2.599 | 0.80(0.08) | 0.10 | 26.0 | 340.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|------------|------------|----------------|
| 1 | 645.83 | 13.00 | 3.205 | 0.81(0.08) | 0.10 | 204.9 | 330.00 |
| 2 | 664.79 | 14.16 | 3.044 | 0.81(0.08) | 0.10 | 222.2 | 320.00 |
| 3 | 688.86 | 15.91 | 2.838 | 0.81(0.08) | 0.10 | 247.5 | 240.00 |
| 4 | 689.39 | 15.96 | 2.834 | 0.81(0.08) | 0.10 | 248.1 | 250.00 |
| 5 | 713.71 | 19.63 | 2.503 | 0.81(0.08) | 0.10 | 292.6 | 214.00 |
| 6 | 709.77 | 20.04 | 2.471 | 0.81(0.08) | 0.10 | 295.1 | 230.00 |
| 7 | 707.36 | 20.25 | 2.456 | 0.81(0.08) | 0.10 | 296.2 | 300.00 |
| 8 | 698.83 | 20.75 | 2.421 | 0.81(0.08) | 0.10 | 297.3 | 310.00 |
| 9 | 683.86 | 21.55 | 2.366 | 0.81(0.08) | 0.10 | 298.4 | 220.00 |
| 10 | 708.34 | 18.43 | 2.599 | 0.81(0.08) | 0.10 | 279.3 | 340.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 713.71 Tc(MIN.) = 19.63
 EFFECTIVE AREA(ACRES) = 292.64 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 306.80

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 341.00 = 4800.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 306.80 TC(MIN.) = 19.63
 EFFECTIVE AREA(ACRES) = 292.64 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.81 AREA-AVERAGED Ap = 0.10
 PEAK FLOW RATE(CFS) = 713.71

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (ACRES) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|------------|------------|----------------|
| 1 | 645.83 | 13.00 | 3.205 | 0.81(0.08) | 0.10 | 204.9 | 330.00 |
| 2 | 664.79 | 14.16 | 3.044 | 0.81(0.08) | 0.10 | 222.2 | 320.00 |
| 3 | 688.86 | 15.91 | 2.838 | 0.81(0.08) | 0.10 | 247.5 | 240.00 |
| 4 | 689.39 | 15.96 | 2.834 | 0.81(0.08) | 0.10 | 248.1 | 250.00 |
| 5 | 708.34 | 18.43 | 2.599 | 0.81(0.08) | 0.10 | 279.3 | 340.00 |
| 6 | 713.71 | 19.63 | 2.503 | 0.81(0.08) | 0.10 | 292.6 | 214.00 |
| 7 | 709.77 | 20.04 | 2.471 | 0.81(0.08) | 0.10 | 295.1 | 230.00 |
| 8 | 707.36 | 20.25 | 2.456 | 0.81(0.08) | 0.10 | 296.2 | 300.00 |
| 9 | 698.83 | 20.75 | 2.421 | 0.81(0.08) | 0.10 | 297.3 | 310.00 |
| 10 | 683.86 | 21.55 | 2.366 | 0.81(0.08) | 0.10 | 298.4 | 220.00 |

=====

=====

END OF RATIONAL METHOD ANALYSIS

FLOOD ROUTING ANALYSIS
USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* DETENTION BASIN SOUTH OF CENTRAL *
* WEST OF VALLEY VIEW *
* 100-YEAR INTERIM CONDITION *

FILE NAME: C:\XDRIVE\2585\BASIN.DAT
TIME/DATE OF STUDY: 13:54 07/25/2005

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 1

>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<

(UNIT-HYDROGRAPH ADDED TO STREAM #1)

WATERSHED AREA = 242.000 ACRES — DOES NOT INCLUDE 27.0 ACRES @ Node 221,
BASEFLOW = 0.000 CFS/SQUARE-MILE 20.0 Acres @ 221, + 18.0 ac (426) @ 341
*USER ENTERED "LAG" TIME = 0.270 HOURS
CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
VALLEY(DEVELOPED) S-GRAPH SELECTED
MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) = 0.074
LOW LOSS FRACITION = 0.127
HYDROGRAPH MODEL #1 SPECIFIED

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH) = 0.48
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH) = 1.00
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = 1.30
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 1.90
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 2.50
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 5.00

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.989
30-MINUTE FACTOR = 0.989
1-HOUR FACTOR = 0.989
3-HOUR FACTOR = 0.998
6-HOUR FACTOR = 0.999
24-HOUR FACTOR = 1.000

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 30.864

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

=====

UNIT HYDROGRAPH DETERMINATION

| INTERVAL NUMBER | "S" GRAPH MEAN VALUES | UNIT HYDROGRAPH ORDINATES (CFS) |
|-----------------|-----------------------|---------------------------------|
| 1 | 1.944 | 56.907 |
| 2 | 11.609 | 282.855 |
| 3 | 30.666 | 557.750 |
| 4 | 55.910 | 738.807 |
| 5 | 77.091 | 619.893 |

| | | |
|----|---------|---------|
| 6 | 88.842 | 343.931 |
| 7 | 94.763 | 173.269 |
| 8 | 97.587 | 82.650 |
| 9 | 98.513 | 27.097 |
| 10 | 99.091 | 16.937 |
| 11 | 99.637 | 15.955 |
| 12 | 99.909 | 7.977 |
| 13 | 100.000 | 2.659 |

TOTAL SOIL-LOSS VOLUME (ACRE-FEET) = 10.9651
TOTAL STORM RUNOFF VOLUME (ACRE-FEET) = 89.7728

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

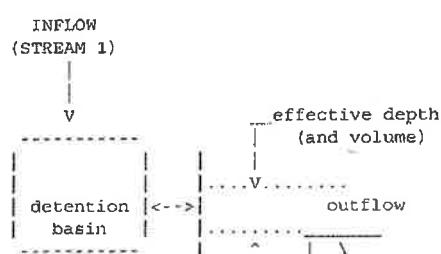
HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS (CFS)

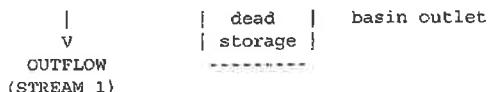
(Note: Time indicated is at END of Each Unit Intervals)

| TIME(HRS) | VOLUME(AF) | Q(CFS) | 0. | 150.0 | 300.0 | 450.0 | 600.0 |
|-----------|------------|--------|----|-------|-------|-------|-------|
| 14.000 | 35.0848 | 48.52 | . | Q | V | . | . |
| 14.083 | 35.4255 | 49.48 | . | Q | V | . | . |
| 14.167 | 35.7702 | 50.05 | . | Q | V | . | . |
| 14.250 | 36.1155 | 50.14 | . | Q | V | . | . |
| 14.333 | 36.4595 | 49.94 | . | Q | V | . | . |
| 14.417 | 36.8041 | 50.04 | . | Q | V | . | . |
| 14.500 | 37.1539 | 50.79 | . | Q | V | . | . |
| 14.583 | 37.5119 | 51.98 | . | Q | V | . | . |
| 14.667 | 37.8801 | 53.47 | . | Q | V | . | . |
| 14.750 | 38.2603 | 55.21 | . | Q | V | . | . |
| 14.833 | 38.6539 | 57.14 | . | Q | V | . | . |
| 14.917 | 39.0619 | 59.25 | . | Q | V | . | . |
| 15.000 | 39.4862 | 61.61 | . | Q | V | . | . |
| 15.083 | 39.9285 | 64.22 | . | Q | V | . | . |
| 15.167 | 40.3912 | 67.17 | . | Q | V | . | . |
| 15.250 | 40.8765 | 70.48 | . | Q | V | . | . |
| 15.333 | 41.3880 | 74.26 | . | Q | V | . | . |
| 15.417 | 41.9302 | 78.73 | . | Q | V | . | . |
| 15.500 | 42.5120 | 84.49 | . | Q | V | . | . |
| 15.583 | 43.1446 | 91.84 | . | Q | V | . | . |
| 15.667 | 43.8409 | 101.11 | . | Q | V | . | . |
| 15.750 | 44.6158 | 112.51 | . | Q | V | . | . |
| 15.833 | 45.4974 | 128.01 | . | Q | V | . | . |
| 15.917 | 46.5326 | 150.31 | . | Q | V | . | . |
| 16.000 | 47.8074 | 185.10 | . | Q | V | . | . |
| 16.083 | 49.5554 | 253.81 | . | Q | V | . | . |
| 16.167 | 52.1958 | 383.39 | . | Q | V | . | . |
| 16.250 | 55.7080 | 509.96 | . | Q | V | Q | . |
| 16.333 | 59.5874 | 563.30 | . | Q | V | Q | . |
| 16.417 | 62.8784 | 477.85 | . | Q | V | Q | . |
| 16.500 | 65.1316 | 327.16 | . | Q | V | . | . |
| 16.583 | 66.6454 | 219.80 | . | Q | V | . | . |
| 16.667 | 67.6995 | 153.05 | . | Q | V | . | . |
| 16.750 | 68.4606 | 110.51 | . | Q | V | . | . |
| 16.833 | 69.0934 | 91.89 | . | Q | V | . | . |
| 16.917 | 69.6509 | 80.95 | . | Q | V | . | . |
| 17.000 | 70.1335 | 70.07 | . | Q | V | . | . |
| 17.083 | 70.5607 | 62.04 | . | Q | V | . | . |
| 17.167 | 70.9520 | 56.81 | . | Q | V | . | . |
| 17.250 | 71.3242 | 54.05 | . | Q | V | . | . |
| 17.333 | 71.6847 | 52.33 | . | Q | V | . | . |
| 17.417 | 72.0347 | 50.83 | . | Q | V | . | . |
| 17.500 | 72.3730 | 49.12 | . | Q | V | . | . |
| 17.583 | 72.6990 | 47.34 | . | Q | V | . | . |
| 17.667 | 73.0131 | 45.61 | . | Q | V | . | . |
| 17.750 | 73.3158 | 43.95 | . | Q | V | . | . |
| 17.833 | 73.6081 | 42.44 | . | Q | V | . | . |
| 17.917 | 73.8910 | 41.07 | . | Q | V | . | . |
| 18.000 | 74.1650 | 39.79 | . | Q | V | . | . |

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 3.1

>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<





ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:

DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

| INTERVAL NUMBER | DEPTH (FT) | OUTFLOW (CFS) | STORAGE (AF) |
|--------------------|---------------|------------------|-----------------|
| 1 | 0.00 | 0.00 | 0.000 |
| 2 | 0.50 | 10.50 | 0.060 |
| 3 | 1.50 | 46.50 | 1.240 |
| 4 | 2.50 | 88.30 | 4.680 |
| 5 | 3.50 | 122.10 | 10.100 |
| 6 | 4.50 | 144.60 | 16.300 |
| 7 | 5.50 | 163.70 | 22.700 |
| 8 | 6.50 | 180.50 | 29.400 |

=====
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

| CLOCK TIME (HRS) | DEAD-STORAGE FILLED(AF) | INFLOW (CFS) | LOSS (CFS) | EFFECTIVE DEPTH(FT) | OUTFLOW (CFS) | MEAN EFFECTIVE VOLUME(AF) |
|------------------------|----------------------------|-----------------|---------------|------------------------|------------------|---------------------------------|
| 12.083 | 0.000 | 42.74 | 0.00 | 1.36 | 41.1 | 1.070 |
| 12.167 | 0.000 | 42.29 | 0.00 | 1.36 | 41.4 | 1.076 |
| 12.250 | 0.000 | 40.98 | 0.00 | 1.36 | 41.4 | 1.073 |
| 12.333 | 0.000 | 39.12 | 0.00 | 1.35 | 41.2 | 1.058 |
| 12.417 | 0.000 | 37.63 | 0.00 | 1.33 | 40.6 | 1.038 |
| 12.500 | 0.000 | 37.03 | 0.00 | 1.31 | 40.0 | 1.017 |
| 12.583 | 0.000 | 36.96 | 0.00 | 1.30 | 39.4 | 1.000 |
| 12.667 | 0.000 | 37.20 | 0.00 | 1.29 | 39.0 | 0.988 |
| 12.750 | 0.000 | 37.63 | 0.00 | 1.28 | 38.7 | 0.980 |
| 12.833 | 0.000 | 38.12 | 0.00 | 1.28 | 38.5 | 0.978 |
| 12.917 | 0.000 | 38.62 | 0.00 | 1.28 | 38.5 | 0.978 |
| 13.000 | 0.000 | 39.17 | 0.00 | 1.28 | 38.6 | 0.982 |
| 13.083 | 0.000 | 39.76 | 0.00 | 1.29 | 38.7 | 0.989 |
| 13.167 | 0.000 | 40.39 | 0.00 | 1.30 | 39.0 | 0.999 |
| 13.250 | 0.000 | 41.04 | 0.00 | 1.31 | 39.3 | 1.011 |
| 13.333 | 0.000 | 41.72 | 0.00 | 1.32 | 39.7 | 1.025 |
| 13.417 | 0.000 | 42.43 | 0.00 | 1.33 | 40.2 | 1.040 |
| 13.500 | 0.000 | 43.18 | 0.00 | 1.35 | 40.7 | 1.057 |
| 13.583 | 0.000 | 43.96 | 0.00 | 1.36 | 41.2 | 1.076 |
| 13.667 | 0.000 | 44.78 | 0.00 | 1.38 | 41.8 | 1.097 |
| 13.750 | 0.000 | 45.64 | 0.00 | 1.40 | 42.5 | 1.119 |
| 13.833 | 0.000 | 46.55 | 0.00 | 1.42 | 43.2 | 1.142 |
| 13.917 | 0.000 | 47.51 | 0.00 | 1.44 | 43.9 | 1.167 |
| 14.000 | 0.000 | 48.52 | 0.00 | 1.46 | 44.7 | 1.193 |
| 14.083 | 0.000 | 49.48 | 0.00 | 1.48 | 45.5 | 1.221 |
| 14.167 | 0.000 | 50.05 | 0.00 | 1.50 | 46.2 | 1.247 |
| 14.250 | 0.000 | 50.14 | 0.00 | 1.51 | 46.7 | 1.270 |
| 14.333 | 0.000 | 49.94 | 0.00 | 1.51 | 47.0 | 1.291 |
| 14.417 | 0.000 | 50.04 | 0.00 | 1.52 | 47.2 | 1.310 |
| 14.500 | 0.000 | 50.79 | 0.00 | 1.53 | 47.5 | 1.333 |
| 14.583 | 0.000 | 51.98 | 0.00 | 1.54 | 47.8 | 1.362 |
| 14.667 | 0.000 | 53.47 | 0.00 | 1.55 | 48.2 | 1.398 |
| 14.750 | 0.000 | 55.21 | 0.00 | 1.56 | 48.7 | 1.443 |
| 14.833 | 0.000 | 57.14 | 0.00 | 1.57 | 49.3 | 1.497 |
| 14.917 | 0.000 | 59.25 | 0.00 | 1.59 | 50.0 | 1.560 |
| 15.000 | 0.000 | 61.61 | 0.00 | 1.61 | 50.8 | 1.635 |
| 15.083 | 0.000 | 64.22 | 0.00 | 1.64 | 51.8 | 1.720 |
| 15.167 | 0.000 | 67.17 | 0.00 | 1.67 | 52.9 | 1.818 |
| 15.250 | 0.000 | 70.48 | 0.00 | 1.70 | 54.2 | 1.930 |
| 15.333 | 0.000 | 74.26 | 0.00 | 1.74 | 55.7 | 2.058 |
| 15.417 | 0.000 | 78.73 | 0.00 | 1.78 | 57.3 | 2.206 |

| | | | | | | |
|--------|-------|--------|------|------|-------|--------|
| 15.500 | 0.000 | 84.49 | 0.00 | 1.83 | 59.3 | 2.379 |
| 15.583 | 0.000 | 91.84 | 0.00 | 1.89 | 61.6 | 2.587 |
| 15.667 | 0.000 | 101.11 | 0.00 | 1.97 | 64.4 | 2.840 |
| 15.750 | 0.000 | 112.51 | 0.00 | 2.05 | 67.8 | 3.148 |
| 15.833 | 0.000 | 128.01 | 0.00 | 2.17 | 72.0 | 3.534 |
| 15.917 | 0.000 | 150.31 | 0.00 | 2.31 | 77.4 | 4.036 |
| 16.000 | 0.000 | 185.10 | 0.00 | 2.51 | 84.5 | 4.728 |
| 16.083 | 0.000 | 253.81 | 0.00 | 2.71 | 92.1 | 5.842 |
| 16.167 | 0.000 | 383.39 | 0.00 | 3.07 | 101.6 | 7.783 |
| 16.250 | 0.000 | 509.96 | 0.00 | 3.56 | 115.6 | 10.499 |
| 16.333 | 0.000 | 563.30 | 0.00 | 4.05 | 129.0 | 13.490 |
| 16.417 | 0.000 | 477.85 | 0.00 | 4.42 | 138.6 | 15.826 |
| 16.500 | 0.000 | 327.16 | 0.00 | 4.62 | 144.9 | 17.081 |
| 16.583 | 0.000 | 219.80 | 0.00 | 4.70 | 147.7 | 17.578 |
| 16.667 | 0.000 | 153.05 | 0.00 | 4.70 | 148.5 | 17.610 |
| 16.750 | 0.000 | 110.51 | 0.00 | 4.66 | 148.1 | 17.351 |
| 16.833 | 0.000 | 91.89 | 0.00 | 4.60 | 147.2 | 16.970 |
| 16.917 | 0.000 | 80.95 | 0.00 | 4.53 | 145.9 | 16.522 |
| 17.000 | 0.000 | 70.07 | 0.00 | 4.45 | 144.4 | 16.010 |
| 17.083 | 0.000 | 62.04 | 0.00 | 4.36 | 142.5 | 15.456 |
| 17.167 | 0.000 | 56.81 | 0.00 | 4.27 | 140.5 | 14.880 |
| 17.250 | 0.000 | 54.05 | 0.00 | 4.18 | 138.4 | 14.299 |
| 17.333 | 0.000 | 52.33 | 0.00 | 4.08 | 136.3 | 13.721 |
| 17.417 | 0.000 | 50.83 | 0.00 | 3.99 | 134.2 | 13.146 |
| 17.500 | 0.000 | 49.12 | 0.00 | 3.90 | 132.1 | 12.575 |
| 17.583 | 0.000 | 47.34 | 0.00 | 3.81 | 130.0 | 12.005 |
| 17.667 | 0.000 | 45.61 | 0.00 | 3.72 | 128.0 | 11.438 |
| 17.750 | 0.000 | 43.95 | 0.00 | 3.62 | 125.9 | 10.873 |
| 17.833 | 0.000 | 42.44 | 0.00 | 3.53 | 123.9 | 10.312 |
| 17.917 | 0.000 | 41.07 | 0.00 | 3.44 | 121.4 | 9.759 |
| 18.000 | 0.000 | 39.79 | 0.00 | 3.34 | 118.3 | 9.218 |

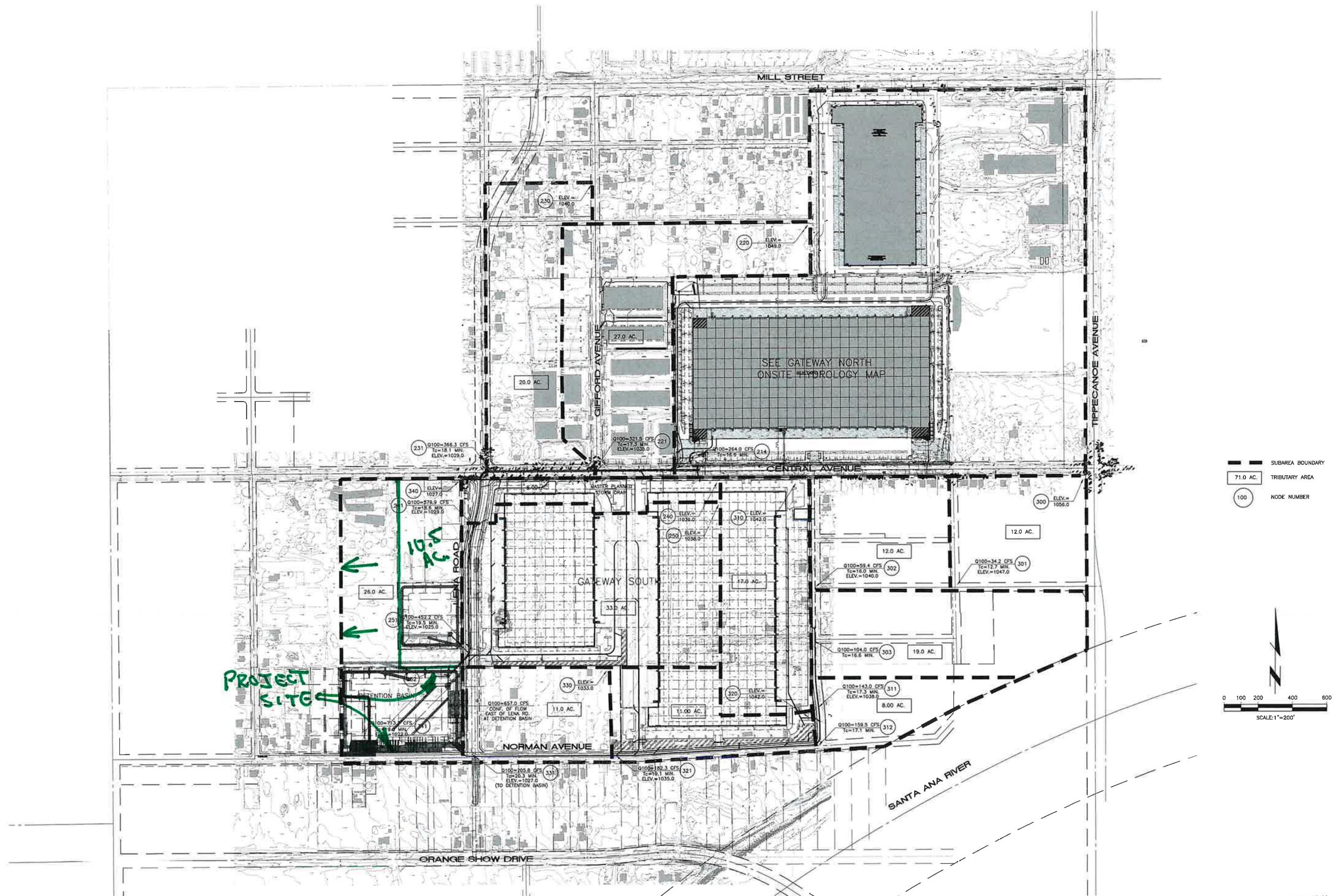
MAX Depth 4.70
= W.S.E 1025.2

PROCESS SUMMARY OF STORAGE:

INFLOW VOLUME = 89.773 AF
 BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
 OUTFLOW VOLUME = 89.773 AF
 LOSS VOLUME = 0.000 AF

=====

END OF FLOODSCx ROUTING ANALYSIS



TRACT No. _____

Thienes Engineering, Inc.

CIVIL ENGINEERING • LAND SURVEYING

| subject | by | date | job no. | sheet of |
|---------|----|------|---------|----------|
| | | | | |

OUTLET Q's @ DETENTION BASIN

USE 15" OUTLETS

$Q_{out} = .6(Area) \sqrt{64.4h}$ $h = \text{head}$ $\text{Area} = 1.23$

| | | |
|----------|-----------|--|
| $h = .5$ | $Q = 2.1$ | $(\text{Area} \approx \frac{1}{2} \text{ of } 1.23)$ |
| " 1.5 | " 7.2 | |
| " 2.5 | " 9.2 | |
| " 3.5 | 10.9 | |
| " 4.5 | 12.5 | |
| " 5.5 | 13.7 | |
| " 6.5 | 14.9 | |

Depth : .5' $2.1 \times 5 \text{ cfs out} = 10.5$

.5' $(7.2 \times 5) + (2.1 \times 5) = 46.5$

2.5' $(9.2 \times 5) + (5 \times 7.2) + (3 \times 2.1) = 46 + 36 + 6.3 = 88.3$

3.5' $(5 \times 10.9) + (5 \times 9.2) + (3 \times 7.2) = 54.5 + 46 + 21.6 = 122.1$

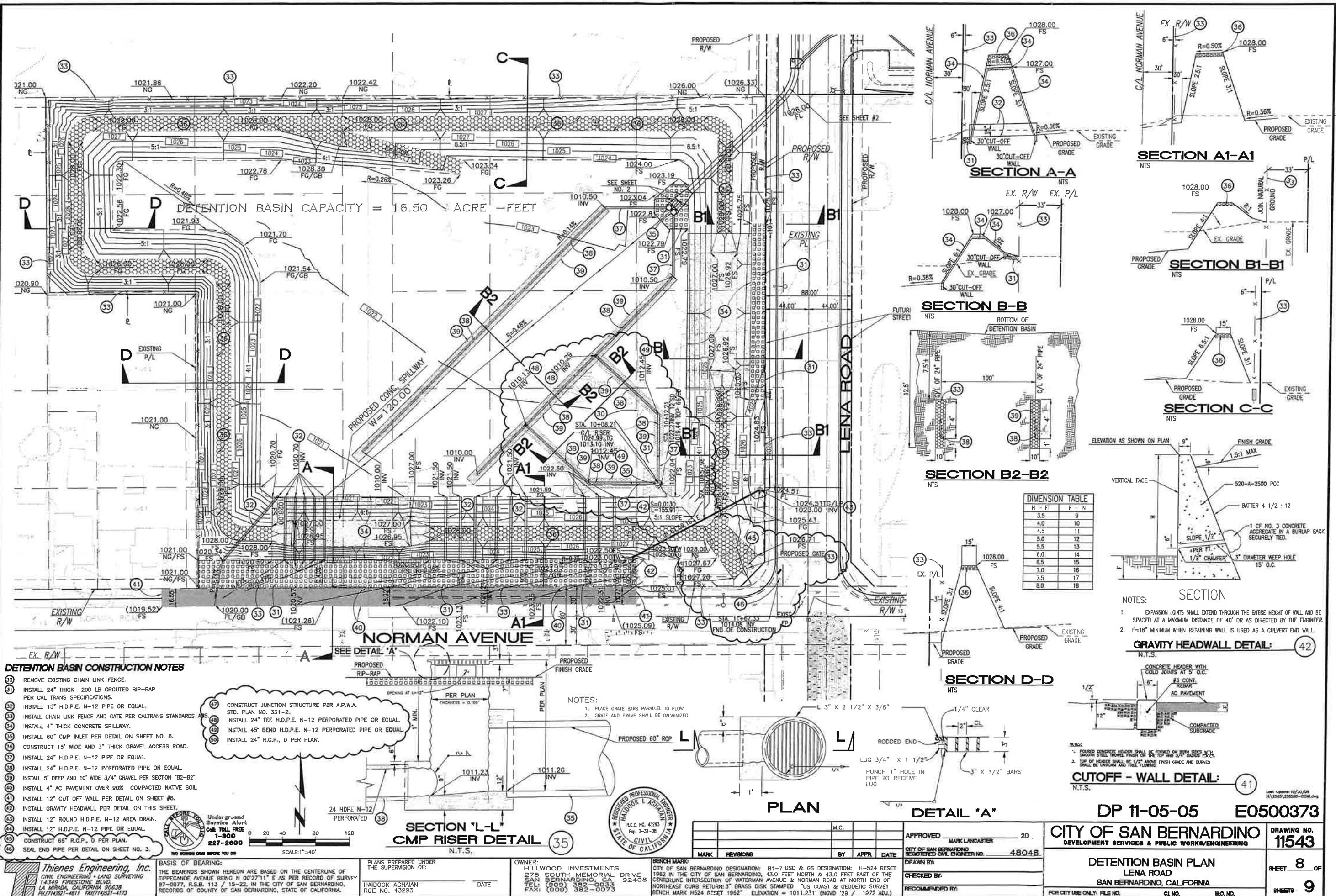
4.5' $(5 \times 12.5) + (5 \times 10.9) + (3 \times 9.2) = 62.5 + 54.5 + 27.6 = 144.6$

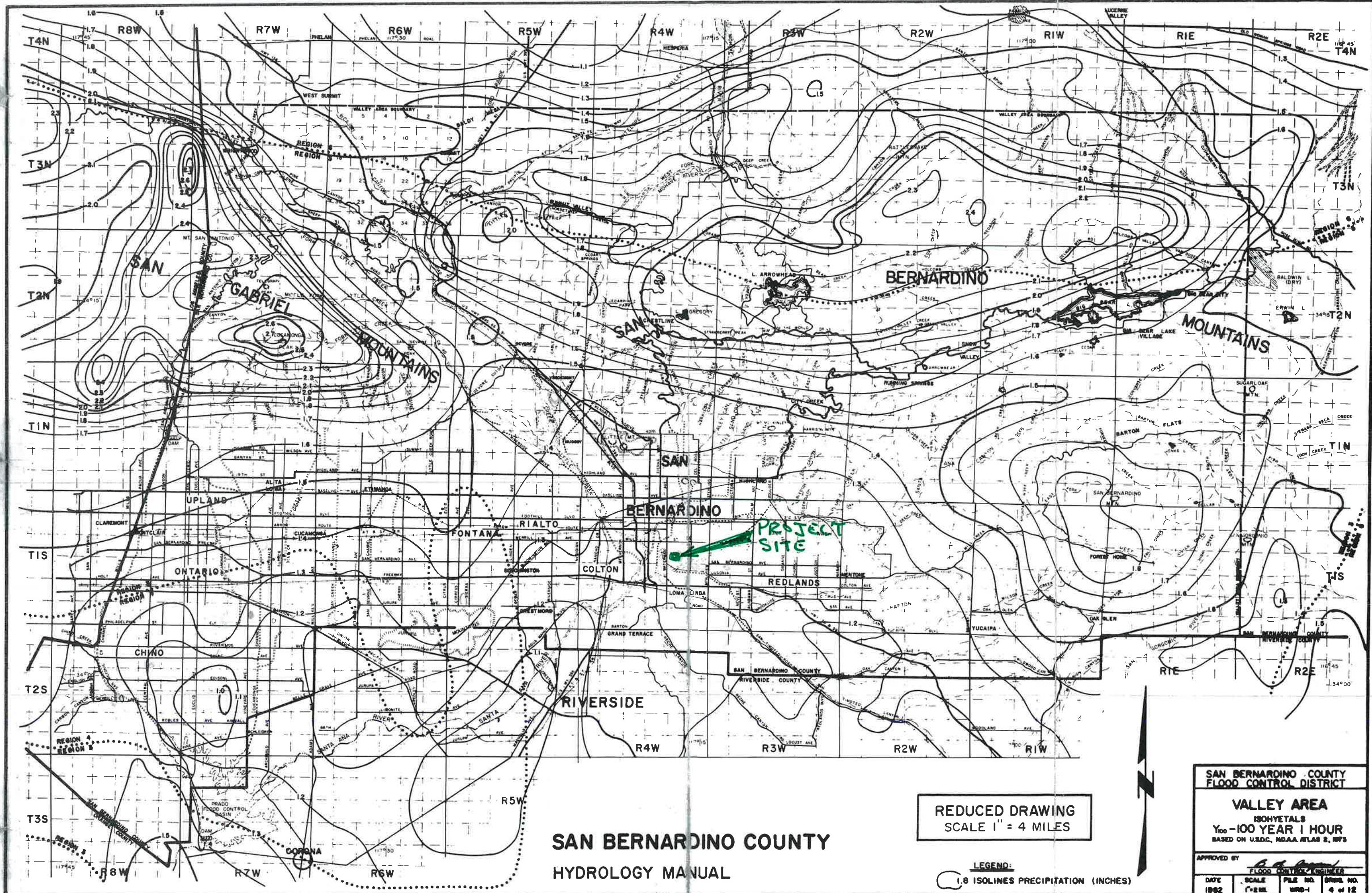
5.5' $(5 \times 13.7) + (5 \times 12.5) + (3 \times 10.9) = 68.5 + 62.5 + 32.7 = 163.7$

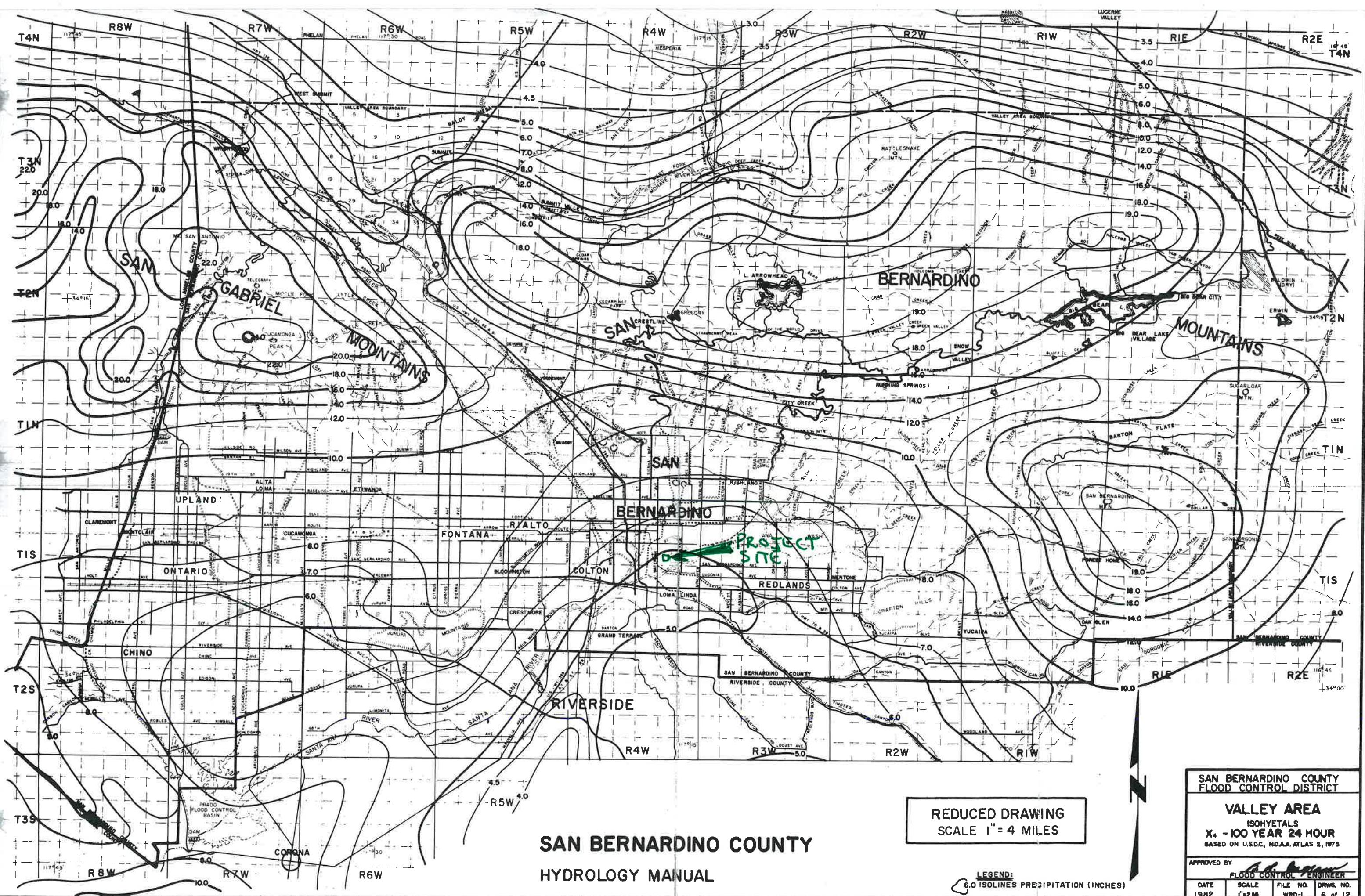
6.5' $(5 \times 14.9) + (5 \times 13.7) + (3 \times 12.5) = 74.5 + 68.5 + 37.5 = 180.5$

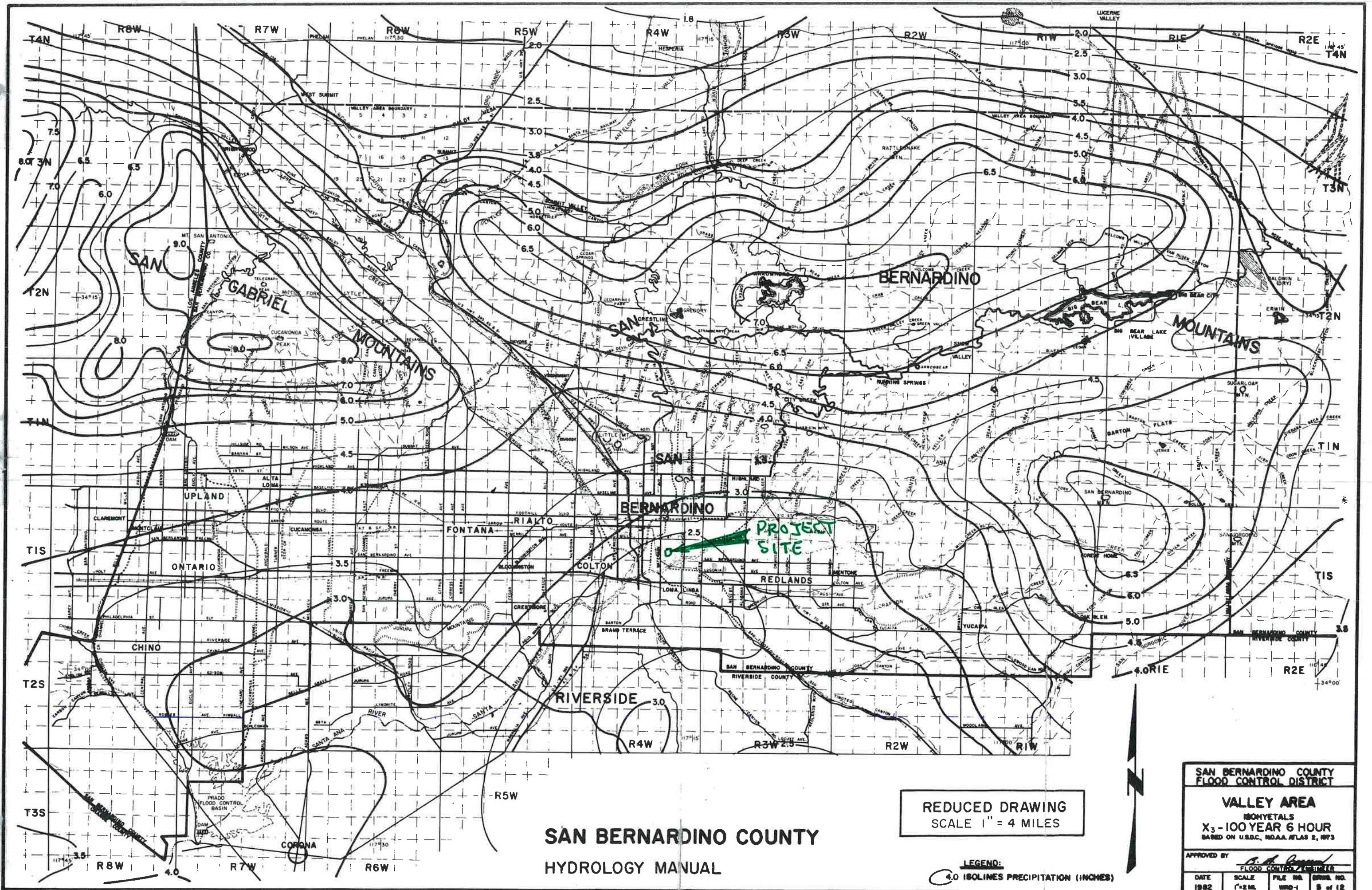
DETENTION BASIN VOLUME

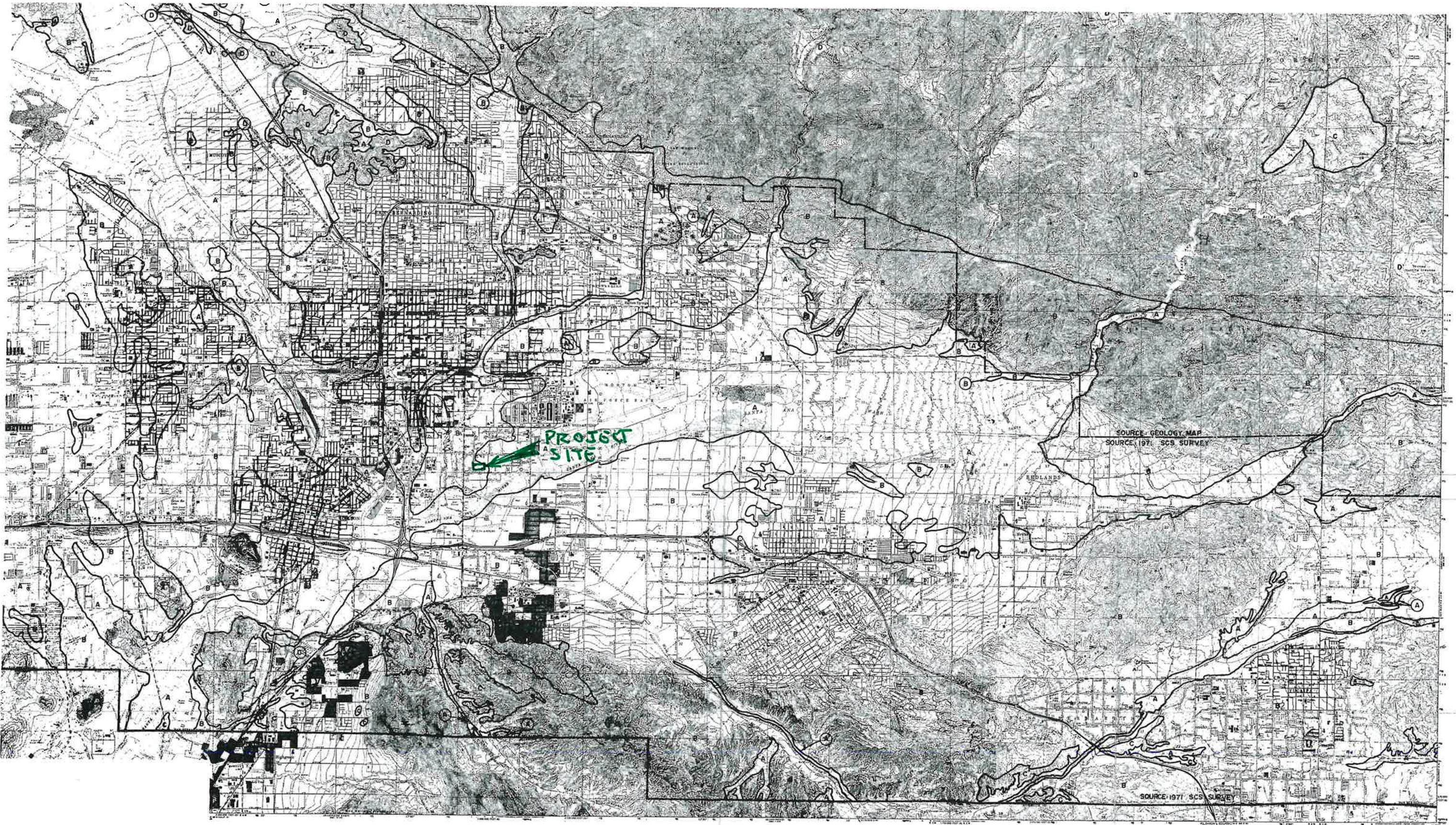
| Elevation | Depth (feet) | Area (sq. ft.) | Volume (c.f.) | Σ Volume (c.f.) | Σ Volume (ac-ft) | Q Discharge (cfs) |
|-----------|-----------------|-------------------|------------------|---------------------------|----------------------------|----------------------|
| 1020.50 | 0.00 | 0 | 2650 | 2650 | 0.06 | 10.5 |
| 1021.00 | 0.50 | 10600 | 51400 | 54050 | 1.24 | 46.5 |
| 1022.00 | 1.50 | 92200 | 149800 | 203850 | 4.68 | 88.3 |
| 1023.00 | 2.50 | 207400 | 235700 | 439550 | 10.09 | 122.1 |
| 1024.00 | 3.50 | 264000 | 269500 | 709050 | 16.28 | 144.6 |
| 1025.00 | 4.50 | 275000 | 280500 | 989550 | 22.72 | 163.7 |
| 1026.00 | 5.50 | 286000 | 291500 | 1281050 | 29.41 | 180.5 |
| 1027.00 | 6.50 | 297000 | | | | |



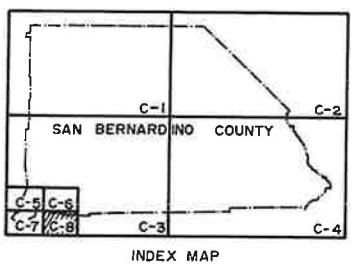








SAN BERNARDINO COUNTY HYDROLOGY MANUAL



LEGEND

— — — SOI: GROUP BOUNDARY

A SOI: GROUP DESIGNATION

— — — BOUNDARY OF INDICATED SOURCE

SCALE REDUCED BY 1/2

SCALE 1:48,000

**HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-D AREA**

APPENDIX B

HYDROLOGY CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD
LA MIRADA, CA 90638
714-521-4811

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3575 *
* PROPOSED CONDITIONS *
* 100-YEAR STORM EVENT *

FILE NAME: W:\3575\P100.DAT
TIME/DATE OF STUDY: 09:48 03/24/2022

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
===== --*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
NO. HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
(FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21
----->>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 296.00
ELEVATION DATA: UPSTREAM(FEET) = 1022.99 DOWNSTREAM(FEET) = 1016.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.299
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.911
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL B 0.50 0.42 0.100 76 6.30
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 2.19
TOTAL AREA(ACRES) = 0.50 PEAK FLOW RATE(CFS) = 2.19

FLOW PROCESS FROM NODE 101.00 TO NODE 123.00 IS CODE = 31
----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1012.51 DOWNSTREAM(FEET) = 1010.75
FLOW LENGTH(FEET) = 352.00 MANNING'S N = 0.012

DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.78
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.19
PIPE TRAVEL TIME(MIN.) = 1.55 Tc(MIN.) = 7.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 123.00 = 648.00 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 188.00
ELEVATION DATA: UPSTREAM(FEET) = 1023.00 DOWNSTREAM(FEET) = 1017.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.640
SUBAREA Tc AND LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL B 0.35 0.42 0.100 76 5.00
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 1.76
TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.76

FLOW PROCESS FROM NODE 111.00 TO NODE 122.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1015.00 DOWNSTREAM(FEET) = 1013.61
FLOW LENGTH(FEET) = 93.00 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.48
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.76
PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 5.28
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 122.00 = 281.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.28
RAINFALL INTENSITY(INCH/HR) = 5.46
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.35
TOTAL STREAM AREA(ACRES) = 0.35
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.76

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 274.00
ELEVATION DATA: UPSTREAM(FEET) = 1021.18 DOWNSTREAM(FEET) = 1015.86

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 6.315
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.903
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
 LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
 COMMERCIAL B 0.55 0.42 0.100 76 6.31
 SUBAREA AVERAGE PERVERSUS LOSS RATE, Fp(INCH/HR) = 0.42
 SUBAREA AVERAGE PERVERSUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 2.41
 TOTAL AREA(ACRES) = 0.55 PEAK FLOW RATE(CFS) = 2.41

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
 ELEVATION DATA: UPSTREAM(FEET) = 1014.05 DOWNSTREAM(FEET) = 1013.61
 FLOW LENGTH(FEET) = 88.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 3.83
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.41
 PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 6.70
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 362.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 6.70
 RAINFALL INTENSITY(INCH/HR) = 4.73
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.42
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.55
 TOTAL STREAM AREA(ACRES) = 0.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.41

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|--------------|------------|----------------|
| 1 | 1.76 | 5.28 | 5.457 | 0.42(0.04) | 0.10 | 0.3 | 110.00 |
| 2 | 2.41 | 6.70 | 4.733 | 0.42(0.04) | 0.10 | 0.6 | 120.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap (INCH/HR) | Ae (ACRES) | HEADWATER NODE |
|---------------|---------|-----------|---------------------|------------------|--------------|------------|----------------|
| 1 | 3.95 | 5.28 | 5.457 | 0.42(0.04) | 0.10 | 0.8 | 110.00 |
| 2 | 3.93 | 6.70 | 4.733 | 0.42(0.04) | 0.10 | 0.9 | 120.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 3.95 Tc(MIN.) = 5.28
 EFFECTIVE AREA(ACRES) = 0.78 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 0.9
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 362.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
 ELEVATION DATA: UPSTREAM(FEET) = 1013.61 DOWNSTREAM(FEET) = 1010.75
 FLOW LENGTH(FEET) = 125.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.83
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.95
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 5.55
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 123.00 = 487.00 FEET.

FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 11

```

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<
=====
** MAIN STREAM CONFLUENCE DATA **
STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
      1       3.95    5.55    5.298  0.42( 0.04)  0.10      0.8    110.00
      2       3.93    6.96    4.624  0.42( 0.04)  0.10      0.9    120.00
LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =    487.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
      1       2.19    7.85    4.303  0.42( 0.04)  0.10      0.5    100.00
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =    648.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
      1       5.86    5.55    5.298  0.42( 0.04)  0.10      1.1    110.00
      2       6.02    6.96    4.624  0.42( 0.04)  0.10      1.3    120.00
      3       5.85    7.85    4.303  0.42( 0.04)  0.10      1.4    100.00
TOTAL AREA(ACRES) =           1.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =        6.02  Tc(MIN.) =      6.964
EFFECTIVE AREA(ACRES) =      1.34  AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =          1.4
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =    648.00 FEET.

*****
FLOW PROCESS FROM NODE    123.00 TO NODE    134.00 IS CODE =  31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1010.75 DOWNSTREAM(FEET) = 1009.79
FLOW LENGTH(FEET) = 193.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.88
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.02
PIPE TRAVEL TIME(MIN.) = 0.66  Tc(MIN.) = 7.62
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =    841.00 FEET.

*****
FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.62
RAINFALL INTENSITY(INCH/HR) = 4.38
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.34
TOTAL STREAM AREA(ACRES) = 1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.02

*****
FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
ELEVATION DATA: UPSTREAM(FEET) = 1028.92 DOWNSTREAM(FEET) = 1023.52

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.959
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.077
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp      Ap      SCS    Tc
  LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
  COMMERCIAL             B       1.60     0.42     0.100    76   5.96

```

SUBAREA AVERAGE PVIOUS LOSS RATE, F_p (INCH/HR) = 0.42
 SUBAREA AVERAGE PVIOUS AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 7.25
 TOTAL AREA(ACRES) = 1.60 PEAK FLOW RATE(CFS) = 7.25

 FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 1023.52
 DOWNSTREAM NODE ELEVATION(FEET) = 1021.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 378.00
 "V" GUTTER WIDTH(FEET) = 3.00 GUTTER HIKE(FEET) = 0.170
 PAVEMENT LIP(FEET) = 0.013 MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
 MAXIMUM DEPTH(FEET) = 0.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.135
 SUBAREA LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | F_p (INCH/HR) | A_p (DECIMAL) | SCS CN |
|----------------------------|----------------|--------------|-----------------|-----------------|--------|
| COMMERCIAL | B | 2.65 | 0.42 | 0.100 | 76 |

 SUBAREA AVERAGE PVIOUS LOSS RATE, F_p (INCH/HR) = 0.42
 SUBAREA AVERAGE PVIOUS AREA FRACTION, A_p = 0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.59
 AVERAGE FLOW DEPTH(FEET) = 0.45 FLOOD WIDTH(FEET) = 29.76
 "V" GUTTER FLOW TRAVEL TIME(MIN.) = 2.43 Tc(MIN.) = 8.39
 SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 9.76
 EFFECTIVE AREA(ACRES) = 4.25 AREA-AVERAGED F_m (INCH/HR) = 0.04
 AREA-AVERAGED F_p (INCH/HR) = 0.42 AREA-AVERAGED A_p = 0.10
 TOTAL AREA(ACRES) = 4.2 PEAK FLOW RATE(CFS) = 15.65

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.48 FLOOD WIDTH(FEET) = 33.18
 FLOW VELOCITY(FEET/SEC.) = 2.72 DEPTH*VELOCITY(FT*FT/SEC) = 1.32
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 628.00 FEET.

 FLOW PROCESS FROM NODE 132.00 TO NODE 133.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 1021.00
 DOWNSTREAM NODE ELEVATION(FEET) = 1019.70
 CHANNEL LENGTH THRU SUBAREA(FEET) = 165.00
 "V" GUTTER WIDTH(FEET) = 3.00 GUTTER HIKE(FEET) = 0.170
 PAVEMENT LIP(FEET) = 0.013 MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
 MAXIMUM DEPTH(FEET) = 0.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.892
 SUBAREA LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ LAND USE | SCS SOIL GROUP | AREA (ACRES) | F_p (INCH/HR) | A_p (DECIMAL) | SCS CN |
|----------------------------|----------------|--------------|-----------------|-----------------|--------|
| COMMERCIAL | B | 3.25 | 0.42 | 0.100 | 76 |

 SUBAREA AVERAGE PVIOUS LOSS RATE, F_p (INCH/HR) = 0.42
 SUBAREA AVERAGE PVIOUS AREA FRACTION, A_p = 0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 21.28
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.09
 AVERAGE FLOW DEPTH(FEET) = 0.52 FLOOD WIDTH(FEET) = 36.42
 "V" GUTTER FLOW TRAVEL TIME(MIN.) = 0.89 Tc(MIN.) = 9.28
 SUBAREA AREA(ACRES) = 3.25 SUBAREA RUNOFF(CFS) = 11.26
 EFFECTIVE AREA(ACRES) = 7.50 AREA-AVERAGED F_m (INCH/HR) = 0.04
 AREA-AVERAGED F_p (INCH/HR) = 0.42 AREA-AVERAGED A_p = 0.10
 TOTAL AREA(ACRES) = 7.5 PEAK FLOW RATE(CFS) = 25.99

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.55 FLOOD WIDTH(FEET) = 39.47
 FLOW VELOCITY(FEET/SEC.) = 3.23 DEPTH*VELOCITY(FT*FT/SEC) = 1.77
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 133.00 = 793.00 FEET.

 FLOW PROCESS FROM NODE 133.00 TO NODE 134.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1015.70 DOWNSTREAM(FEET) = 1009.79
 FLOW LENGTH(FEET) = 25.00 MANNING'S N = 0.012

DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 29.91
 ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 25.99
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.29
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 134.00 = 818.00 FEET.

 FLOW PROCESS FROM NODE 134.00 TO NODE 134.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.29
 RAINFALL INTENSITY(INCH/HR) = 3.89
 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.42
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 7.50
 TOTAL STREAM AREA(ACRES) = 7.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.99

** CONFLUENCE DATA **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|------|---------------|-------------------|
| 1 | 5.86 | 6.21 | 4.952 | 0.42(0.04) | 0.10 | 1.1 | 110.00 |
| 1 | 6.02 | 7.62 | 4.380 | 0.42(0.04) | 0.10 | 1.3 | 120.00 |
| 1 | 5.85 | 8.51 | 4.099 | 0.42(0.04) | 0.10 | 1.4 | 100.00 |
| 2 | 25.99 | 9.29 | 3.889 | 0.42(0.04) | 0.10 | 7.5 | 130.00 |

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|------|---------------|-------------------|
| 1 | 28.04 | 6.21 | 4.952 | 0.42(0.04) | 0.10 | 6.1 | 110.00 |
| 2 | 30.06 | 7.62 | 4.380 | 0.42(0.04) | 0.10 | 7.5 | 120.00 |
| 3 | 30.95 | 8.51 | 4.099 | 0.42(0.04) | 0.10 | 8.3 | 100.00 |
| 4 | 31.53 | 9.29 | 3.889 | 0.42(0.04) | 0.10 | 8.9 | 130.00 |

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 31.53 Tc(MIN.) = 9.29
 EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR) = 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 8.9
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 134.00 = 841.00 FEET.

 FLOW PROCESS FROM NODE 134.00 TO NODE 135.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1009.79 DOWNSTREAM(FEET) = 1009.61
 FLOW LENGTH(FEET) = 36.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.38
 ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 31.53
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.37
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 877.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.9 TC(MIN.) = 9.37
 EFFECTIVE AREA(ACRES) = 8.90 AREA-AVERAGED Fm(INCH/HR)= 0.04
 AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.100
 PEAK FLOW RATE(CFS) = 31.53

** PEAK FLOW RATE TABLE **

| STREAM NUMBER | Q (CFS) | Tc (MIN.) | Intensity (INCH/HR) | Fp(Fm) (INCH/HR) | Ap | Ae (ACRES) | HEADWATER NODE |
|------------------|------------|--------------|------------------------|---------------------|------|---------------|-------------------|
| 1 | 28.04 | 6.30 | 4.912 | 0.42(0.04) | 0.10 | 6.1 | 110.00 |
| 2 | 30.06 | 7.71 | 4.351 | 0.42(0.04) | 0.10 | 7.5 | 120.00 |
| 3 | 30.95 | 8.59 | 4.075 | 0.42(0.04) | 0.10 | 8.3 | 100.00 |
| 4 | 31.53 | 9.37 | 3.868 | 0.42(0.04) | 0.10 | 8.9 | 130.00 |

=====

END OF RATIONAL METHOD ANALYSIS

^

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 23.0 Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD
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714-521-4811

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3575 *
* PROPOSED CONDITIONS *
* 100-YEAR STORM EVENT *

FILE NAME: W:\3575\P200.DAT
TIME/DATE OF STUDY: 11:31 03/09/2022

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
===== --*TIME-OF-CONCENTRATION MODEL--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
NO. HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
(FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 22

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<

=====
USER SPECIFIED Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.640
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.80 0.42 0.100 76
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.03
TOTAL AREA(ACRES) = 0.80 PEAK FLOW RATE(CFS) = 4.03
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.8 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.80 AREA-AVERAGED Fm(INCH/HR)= 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 4.03
=====

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3575 *
* PROPOSED CONDITION *
* 100-YEAR STORM EVENT *

FILE NAME: W:\3575\P210.DAT
TIME/DATE OF STUDY: 11:32 03/09/2022

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
===== --*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
NO. HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
(FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 22

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<

=====
USER SPECIFIED Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.640
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.90 0.42 0.100 76
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.53
TOTAL AREA(ACRES) = 0.90 PEAK FLOW RATE(CFS) = 4.53
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.9 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.90 AREA-AVERAGED Fm(INCH/HR)= 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 4.53
=====

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3575 *
* PROPOSED CONDITION *
* 100-YEAR STORM EVENT *

FILE NAME: W:\3575\P220.DAT
TIME/DATE OF STUDY: 11:33 03/09/2022

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
===== --*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
=====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 220.00 TO NODE 221.00 IS CODE = 22

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<

=====
USER SPECIFIED Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.640
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL B 0.70 0.42 0.100 76
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.53
TOTAL AREA(ACRES) = 0.70 PEAK FLOW RATE(CFS) = 3.53
=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.7 TC(MIN.) = 5.00
EFFECTIVE AREA(ACRES) = 0.70 AREA-AVERAGED Fm(INCH/HR)= 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 3.53
=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD
LA MIRIADA, CA 90638
714-521-4811

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3575 *
* FOISY STREET RUNOFF *
* 100-YEAR STORM EVENT *

FILE NAME: W:\3575\P300.DAT
TIME/DATE OF STUDY: 16:33 03/24/2022

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*-

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (n)
==== ===== ===== ===== ===== ===== =====
1 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 408.00
ELEVATION DATA: UPSTREAM(FEET) = 1018.18 DOWNSTREAM(FEET) = 1017.45

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.929

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.348

SUBAREA Tc AND LOSS RATE DATA(AMC III):

| DEVELOPMENT TYPE/ | SCS GROUP | SOIL AREA (ACRES) | Fp (INCH/HR) | Ap (DECIMAL) | SCS CN | Tc (MIN.) |
|-------------------|-----------|-------------------|--------------|--------------|--------|-----------|
| COMMERCIAL | B | 0.20 | 0.42 | 0.100 | 76 | 11.93 |

SUBAREA AVERAGE PERVERSUS LOSS RATE, Fp(INCH/HR) = 0.42
SUBAREA AVERAGE PERVERSUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.59
TOTAL AREA(ACRES) = 0.20 PEAK FLOW RATE(CFS) = 0.59

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.2 TC(MIN.) = 11.93
EFFECTIVE AREA(ACRES) = 0.20 AREA-AVERAGED Fm(INCH/HR)= 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.42 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 0.59

=====
END OF RATIONAL METHOD ANALYSIS

APPENDIX C

HYDRAULIC CALCULATIONS

DATE: 3/25/2022
TIME: 8:42

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|----|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | | | | DROP | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|----|----|---|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| CD | 24 | 4 | | | 2.00 | | | | | | | | | | | | | | |
| CD | 18 | 4 | | | 1.50 | | | | | | | | | | | | | | |
| CD | 30 | 4 | | | 2.50 | | | | | | | | | | | | | | |

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB 3575

HEADING LINE NO 2 IS -

LINE A

HEADING LINE NO 3 IS -

100-YEAR STORM

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| | | | | | | | | | | | | | | | | | | | |
|------------|-------------------------|---------|---------|------|-------|-------|-------|-----|-----|----------|----------|-------|-------|--|--|--|---|---|--|
| ELEMENT NO | 1 IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1004.52 | 1000.48 | 30 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 2 IS A REACH | * | * | * | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1035.85 | 1011.44 | 30 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 3 IS A JUNCTION | * | * | * | * | | | | | | | | | | | | * | * | |
| | U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 | | | | | | |
| | | 1040.18 | 1011.54 | 24 | 18 | 0 | 0.014 | 9.5 | 0.0 | 1011.69 | 0.00 | 90.00 | 0.00 | | | | | | |
| ELEMENT NO | 4 IS A REACH | * | * | * | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1057.85 | 1014.21 | 24 | | | | | | | | | | | | | | | |
| ELEMENT NO | 5 IS A REACH | * | * | * | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1064.39 | 1015.20 | 24 | | | | | | | | | | | | | | | |
| ELEMENT NO | 6 IS A SYSTEM HEADWORKS | * | | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1064.39 | 1015.20 | 24 | | | | | | | | | | | | | | | |

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB 3575
LINE A
100-YEAR STORM

| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|---------|--------|---------|------|---|-----|--------|---------|-------|----------|------|--------|----|------|
| AVBPR | ELEV | OF FLOW | ELEV | | | HEAD | GRD.EL. | ELEV | DEPTH | DIA | ID NO. | | PIER |
| L/ELEM | SO | | | | | SF AVE | HF | | | | | | ZR |

| | | | | | | | | | | | | | | |
|-------------------|---------|--------|----------|------|-------|---------|----------|------|-------|-------|------|------|---|--|
| 1004.52 | 1000.48 | 12.680 | 1013.160 | 35.5 | 7.23 | 0.812 | 1013.972 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 27.40 | 0.34982 | | | | | .007491 | 0.21 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1031.92 | 1010.06 | 3.304 | 1013.368 | 35.5 | 7.23 | 0.812 | 1014.180 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| HYDRAULIC JUMP | | | | | | | | | | | | | | |
| 1031.92 | 1010.06 | 1.197 | 1011.261 | 35.5 | 15.29 | 3.629 | 1014.890 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.02 | 0.34982 | | | | | .034708 | 0.00 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1031.94 | 1010.07 | 1.197 | 1011.269 | 35.5 | 15.28 | 3.623 | 1014.892 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.89 | 0.34982 | | | | | .032588 | 0.03 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1032.83 | 1010.38 | 1.243 | 1011.628 | 35.5 | 14.57 | 3.295 | 1014.923 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.79 | 0.34982 | | | | | .028697 | 0.02 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1033.62 | 1010.66 | 1.290 | 1011.950 | 35.5 | 13.89 | 2.995 | 1014.945 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.68 | 0.34982 | | | | | .025284 | 0.02 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1034.30 | 1010.90 | 1.340 | 1012.239 | 35.5 | 13.24 | 2.723 | 1014.962 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.60 | 0.34982 | | | | | .022305 | 0.01 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1034.90 | 1011.11 | 1.393 | 1012.500 | 35.5 | 12.62 | 2.475 | 1014.975 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.51 | 0.34982 | | | | | .019695 | 0.01 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1035.41 | 1011.29 | 1.448 | 1012.735 | 35.5 | 12.04 | 2.250 | 1014.985 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 0.44 | 0.34982 | | | | | .017411 | 0.01 | | | 0.644 | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1035.85 | 1011.44 | 1.507 | 1012.947 | 35.5 | 11.48 | 2.046 | 1014.993 | 0.00 | 2.022 | 2.50 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| JUNCT STR 0.02310 | | | | | | .045024 | 0.19 | | | | | 0.00 | | |
| | | | | | | | | | | | | | | |
| 1040.18 | 1011.54 | 0.958 | 1012.498 | 26.0 | 17.50 | 4.754 | 1017.252 | 0.00 | 1.786 | 2.00 | 0.00 | 0.00 | 0 | |
| 0.00 | | | | | | | | | | | | | | |
| 1.10 | 0.15110 | | | | | .060338 | 0.07 | | | 0.742 | | 0.00 | | |
| | | | | | | | | | | | | | | |

↑
LICENSEE: THIENES ENGINEERING
2

WATER SURFACE PROFILE LISTING

TEI JOB 3575
LINE A
100-YEAR STORM

| STATION AVBPR | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|------------------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR | | | | | | |
|-----------------|--|--------|----------|------------|-------|---------|----------|------|-------|------|------|
| ***** | | | | | | | | | | | |
| 1041.28 0.00 | 1011.71 | 0.966 | 1012.672 | 26.0 | 17.29 | 4.641 | 1017.313 | 0.00 | 1.786 | 2.00 | 0.00 |
| 4.04 | 0.15110 | | | | | .055837 | 0.23 | | 0.742 | | 0.00 |
| 1045.32 0.00 | 1012.32 | 1.003 | 1013.320 | 26.0 | 16.49 | 4.221 | 1017.541 | 0.00 | 1.786 | 2.00 | 0.00 |
| 3.39 | 0.15110 | | | | | .049174 | 0.17 | | 0.742 | | 0.00 |
| 1048.71 0.00 | 1012.83 | 1.041 | 1013.871 | 26.0 | 15.72 | 3.837 | 1017.708 | 0.00 | 1.786 | 2.00 | 0.00 |
| 2.87 | 0.15110 | | | | | .043327 | 0.12 | | 0.742 | | 0.00 |
| 1051.58 0.00 | 1013.26 | 1.081 | 1014.344 | 26.0 | 14.99 | 3.487 | 1017.831 | 0.00 | 1.786 | 2.00 | 0.00 |
| 2.43 | 0.15110 | | | | | .038224 | 0.09 | | 0.742 | | 0.00 |
| 1054.01 0.00 | 1013.63 | 1.124 | 1014.754 | 26.0 | 14.29 | 3.172 | 1017.926 | 0.00 | 1.786 | 2.00 | 0.00 |
| 2.07 | 0.15110 | | | | | .033766 | 0.07 | | 0.742 | | 0.00 |
| 1056.08 0.00 | 1013.94 | 1.169 | 1015.112 | 26.0 | 13.63 | 2.883 | 1017.995 | 0.00 | 1.786 | 2.00 | 0.00 |
| 1.77 | 0.15110 | | | | | .029863 | 0.05 | | 0.742 | | 0.00 |
| 1057.85 0.00 | 1014.21 | 1.217 | 1015.427 | 26.0 | 12.99 | 2.622 | 1018.049 | 0.00 | 1.786 | 2.00 | 0.00 |
| 0.34 | 0.15138 | | | | | .027683 | 0.01 | | 0.742 | | 0.00 |
| 1058.19 0.00 | 1014.26 | 1.227 | 1015.488 | 26.0 | 12.86 | 2.567 | 1018.055 | 0.00 | 1.786 | 2.00 | 0.00 |
| 1.45 | 0.15138 | | | | | .025774 | 0.04 | | 0.742 | | 0.00 |
| 1059.64 0.00 | 1014.48 | 1.278 | 1015.759 | 26.0 | 12.26 | 2.336 | 1018.095 | 0.00 | 1.786 | 2.00 | 0.00 |
| 1.23 | 0.15138 | | | | | .022870 | 0.03 | | 0.742 | | 0.00 |
| 1060.87 0.00 | 1014.67 | 1.332 | 1016.000 | 26.0 | 11.69 | 2.122 | 1018.122 | 0.00 | 1.786 | 2.00 | 0.00 |
| 1.03 | 0.15138 | | | | | .020335 | 0.02 | | 0.742 | | 0.00 |
| 1061.90 0.00 | 1014.82 | 1.390 | 1016.214 | 26.0 | 11.15 | 1.930 | 1018.144 | 0.00 | 1.786 | 2.00 | 0.00 |
| 0.85 | 0.15138 | | | | | .018135 | 0.02 | | 0.742 | | 0.00 |
| ▲ 3 | LICENSEE: THIENES ENGINEERING | | | | | F0515P | | | | | PAGE |
| | WATER SURFACE PROFILE LISTING | | | | | | | | | | |
| | TEI JOB 3575 LINE A 100-YEAR STORM | | | | | | | | | | |

| STATION AVBPR | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|------------------|--------|---------|------|---|-----|------|---------|-------|----------|------|--------|----|------|
| | ELEV | OF FLOW | ELEV | | | HEAD | GRD.EL. | ELEV | DEPTH | DIA | ID NO. | | PIER |

| L/ELEM | SO | | | | SF | AVE | HF | | | NORM DEPTH | | | ZR | | |
|------------------|---------|-------|----------|--|------|-------|---------|----------|------|------------|-------|------|------|------|---|
| 1062.75 0.00 | 1014.95 | 1.453 | 1016.404 | | 26.0 | 10.63 | 1.754 | 1018.158 | 0.00 | 1.786 | | 2.00 | 0.00 | 0.00 | 0 |
| 0.67 | 0.15138 | | | | | | .016237 | 0.01 | | | 0.742 | | | 0.00 | |
| 1063.42 0.00 | 1015.05 | 1.522 | 1016.575 | | 26.0 | 10.13 | 1.594 | 1018.169 | 0.00 | 1.786 | | 2.00 | 0.00 | 0.00 | 0 |
| 0.51 | 0.15138 | | | | | | .014608 | 0.01 | | | 0.742 | | | 0.00 | |
| 1063.93 0.00 | 1015.13 | 1.597 | 1016.727 | | 26.0 | 9.66 | 1.450 | 1018.177 | 0.00 | 1.786 | | 2.00 | 0.00 | 0.00 | 0 |
| 0.33 | 0.15138 | | | | | | .013241 | 0.00 | | | 0.742 | | | 0.00 | |
| 1064.26 0.00 | 1015.18 | 1.683 | 1016.864 | | 26.0 | 9.21 | 1.318 | 1018.182 | 0.00 | 1.786 | | 2.00 | 0.00 | 0.00 | 0 |
| 0.13 | 0.15138 | | | | | | .012167 | 0.00 | | | 0.742 | | | 0.00 | |
| 1064.39 0.00▲ | 1015.20 | 1.786 | 1016.986 | | 26.0 | 8.78 | 1.197 | 1018.183 | 0.00 | 1.786 | | 2.00 | 0.00 | 0.00 | 0 |

TEI JOB 3575
LINE A
100-YEAR STORM

| | I | C | H | | W | E | | R | | | | |
|---------|---|---|---|--|---|---|----|---|---|---|---|----|
| 1004.52 | . | I | | | | | | | | | | |
| 1005.65 | . | | H | | | | | | | | | |
| 1006.78 | . | | | | | | | | | | | |
| 1007.91 | . | | | | | | | | | | | |
| 1009.04 | . | | | | | | | | | | | |
| 1010.17 | . | | | | | | | | | | | |
| 1011.30 | . | | | | | | | | | | | |
| 1012.43 | . | | | | | | | | | | | |
| 1013.56 | . | | | | | | | | | | | |
| 1014.69 | . | | | | | | | | | | | |
| 1015.82 | . | | | | | | | | | | | |
| 1016.95 | . | | | | | | | | | | | |
| 1018.08 | . | | | | | | | | | | | |
| 1019.21 | . | | | | | | | | | | | |
| 1020.33 | . | | | | | | | | | | | |
| 1021.46 | . | | | | | | | | | | | |
| 1022.59 | . | | | | | | | | | | | |
| 1023.72 | . | | | | | | | | | | | |
| 1024.85 | . | | | | | | | | | | | |
| 1025.98 | . | | | | | | | | | | | |
| 1027.11 | . | | | | | | | | | | | |
| 1028.24 | . | | | | | | | | | | | |
| 1029.37 | . | | | | | | | | | | | |
| 1030.50 | . | | | | | | | | | | | |
| 1031.63 | . | | | | | | | | | | | |
| 1032.76 | . | | | | I | C | H | W | E | | | |
| 1033.89 | . | | | | I | W | C | H | | E | | |
| 1035.02 | . | | | | I | W | C | H | | E | | |
| 1036.15 | . | | | | I | W | C | H | | E | | |
| 1037.28 | . | | | | I | W | C | H | | E | | |
| 1038.41 | . | | | | I | W | C | H | | E | | |
| 1039.54 | . | | | | I | W | C | H | | E | | |
| 1040.67 | . | | | | I | W | C | H | | E | | |
| 1041.80 | . | | | | I | W | C | H | | E | | JX |
| 1042.93 | . | | | | I | W | CH | | | | E | |
| 1044.06 | . | | | | I | W | CH | | | | E | |
| 1045.19 | . | | | | | I | W | C | H | | E | |
| 1046.32 | . | | | | | | I | W | C | H | E | |
| 1047.45 | . | | | | | | | I | W | C | H | E |
| 1048.58 | . | | | | | | | | I | W | C | H |

| | | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| 1049.70 | . | I | W | C H | E | . | R | | | | |
| 1050.83 | . | I | W | C H | E | . | R | | | | |
| 1051.96 | . | I | W | C H | E | . | R | | | | |
| 1053.09 | . | I | W | C H | E | . | R | | | | |
| 1054.22 | . | I | W | C H | E | . | R | | | | |
| 1055.35 | . | I | W | C H | E | . | R | | | | |
| 1056.48 | . | I | W | C H | E | . | R | | | | |
| 1057.61 | . | I | W | C H | E | . | R | | | | |
| 1058.74 | . | I | W | C H | E | . | R | | | | |
| 1059.87 | . | I | W | C H | E | . | R | | | | |
| 1061.00 | . | I | W | C H | E | . | R | | | | |
| 1062.13 | . | I | W | C H | E | . | R | | | | |
| 1063.26 | . | I | W | C H | E | . | R | | | | |
| 1064.39 | . | I | W | C H | E | . | R | | | | |
| . | . | . | . | . | . | . | . | | | | |
| 1000.48 | 1002.25 | 1004.02 | 1005.79 | 1007.56 | 1009.33 | 1011.10 | 1012.87 | 1014.64 | 1016.41 | 1018.18 | |

N O T E S

1. GLOSSARY

I = INVERT ELEVATION
 C = CRITICAL DEPTH
 W = WATER SURFACE ELEVATION
 H = HEIGHT OF CHANNEL
 E = ENERGY GRADE LINE
 X = CURVES CROSSING OVER
 B = BRIDGE ENTRANCE OR EXIT
 Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

DATE: 3/25/2022
TIME: 8:47

F0515P

PAGE 1

CD 18 4 1.50

CD 12 4 1.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB 3575

HEADING LINE NO 2 IS -

LINE B

HEADING LINE NO 3 IS -

100-YEAR STORM

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *
U/S DATA STATION INVERT SECT
1001-75 1011-69 18
W S ELEV
1012-50

| | | | | | | | | | | | |
|------------|--------------|---------|--------|------|-------|--------|-------|--------|-------|--|--|
| ELEMENT NO | 2 IS A REACH | * | * | * | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H | | |
| | 1048.91 | 1011.92 | 18 | | 0.012 | 0.00 | 0.00 | 0.00 | 0 | | |

| | | | | | | | | | | | |
|------------|-----------------|---------|--------|------|-------|--------|-------|-----|----|-----|---|
| ELEMENT NO | 3 IS A REACH | * | * | * | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG | PT | MAN | H |
| | 1070 58 1013 02 | -18 | | | 0.013 | 23.59 | 15.89 | 0.8 | 00 | 1 | |

| | | | | | | | | | | | |
|-----------------|--------------|--------|------|---|--------|-------|--------|-------|--|--|--|
| ELEMENT NO | 4 IS A REACH | * | * | * | | | | | | | |
| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H | | | |
| 4100 70 1010 68 | 16 | 0.010 | | | 0.00 | 0.00 | 0.00 | 0.00 | | | |

| | | | | | | | | | | | | | | | |
|------------|-----------------|---------|--------|------|-------|-------|---|----|----|----------|----------|-------|-------|---|---|
| ELEMENT NO | 5 IS A JUNCTION | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 | | |

ELEMENT NO 6 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

ELEMENT NO 7 IS A JUNCTION * * * * * * * *
 U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INV
 1290.97 1012.94 18 12 0 0.014 2.4 0.0 1012.94
 THE ABOVE ELEMENT CONTAINED AN INVERT EI EV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT EI EV -WARNING

ELEMENT NO 8 IS A REACH * * *
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

ELEMENT NO 9 IS A REACH * * *
 U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H

| ELEMENT NO | 10 IS A REACH | * | * | * | * | N | RADIUS | ANGLE | ANG PT | MAN H |
|------------|---------------|---------|--------|------|---|---|--------|-------|--------|-------|
| | U/S DATA | STATION | INVERT | SECT | | | | | | |

ELEMENT NO 11 IS A SYSTEM HEADWORKS
 U/S DATA STATION INVERT SECT *
 1329.24 1013.47 18 *
 W S ELEV
 0.00

^ F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING
 NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
 ** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC ↑
 LICENSEE: THIENES ENGINEERING F0515P PAGE
 1

WATER SURFACE PROFILE LISTING

TEI JOB 3575
 LINE B
 100-YEAR STORM

| STATION AVBPR | INVERT ELEV | DEPTH OF FLOW | W.S. ELEV | Q | VEL HEAD | VEL GRD.EL. | ENERGY ELEV | SUPER DEPTH | CRITICAL DIA | HGT/ ID NO. | BASE/ PIER | ZL | NO |
|------------------|----------------|------------------|--------------|-----|-------------|----------------|----------------|----------------|-----------------|----------------|---------------|------|----|
| | | | | | | | | | | | | | |
| L/ELEM | SO | | | | SF AVE | HF | | NORM DEPTH | | | ZR | | |
| 1001.75 0.00 | 1011.69 | 1.173 | 1012.863 | 9.2 | 6.20 | 0.598 | 1013.461 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 2.94 | 0.00488 | | | | | .006830 | 0.02 | | | 1.500 | | 0.00 | |
| 1004.69 0.00 | 1011.70 | 1.233 | 1012.937 | 9.2 | 5.92 | 0.544 | 1013.481 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 15.23 | 0.00488 | | | | | .006229 | 0.09 | | | 1.500 | | 0.00 | |
| 1019.92 0.00 | 1011.78 | 1.303 | 1013.082 | 9.2 | 5.64 | 0.494 | 1013.576 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 28.99 | 0.00488 | | | | | .005837 | 0.17 | | | 1.500 | | 0.00 | |
| 1048.91 0.00 | 1011.92 | 1.364 | 1013.284 | 9.2 | 5.45 | 0.461 | 1013.745 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 21.67 | 0.00508 | | | | | .005686 | 0.12 | | | 1.500 | | 0.00 | |
| 1070.58 0.00 | 1012.03 | 1.388 | 1013.418 | 9.2 | 5.39 | 0.451 | 1013.869 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 79.39 | 0.00499 | | | | | .006027 | 0.48 | | | 1.500 | | 0.00 | |
| 1149.97 0.00 | 1012.43 | 1.500 | 1013.926 | 9.2 | 5.21 | 0.421 | 1014.347 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| 40.75 | 0.00499 | | | | | .006464 | 0.26 | | | 1.500 | | 0.00 | |
| 1190.72 0.00 | 1012.63 | 1.563 | 1014.193 | 9.2 | 5.21 | 0.421 | 1014.614 | 0.00 | 1.173 | 1.50 | 0.00 | 0.00 | 0 |
| JUNCT STR | 0.00462 | | | | | .005710 | 0.02 | | | | | 0.00 | |
| 1195.05 0.00 | 1012.65 | 2.170 | 1014.820 | 4.9 | 2.77 | 0.119 | 1014.939 | 0.00 | 0.851 | 1.50 | 0.00 | 0.00 | 0 |
| 95.92 | 0.00302 | | | | | .001854 | 0.18 | | | 1.000 | | 0.00 | |
| 1290.97 0.00 | 1012.94 | 2.058 | 1014.998 | 4.9 | 2.77 | 0.119 | 1015.117 | 0.00 | 0.851 | 1.50 | 0.00 | 0.00 | 0 |
| JUNCT STR | 0.00000 | | | | | .001591 | 0.00 | | | | | 0.00 | |

1290.97 1012.94 2.235 1015.175 2.5 1.41 0.031 1015.206 0.00 0.599 1.50 0.00 0.00 0
0.00

8.00 0.00250 .000483 0.00 0.700 0.00

1298.97 1012.96 2.219 1015.179 2.5 1.41 0.031 1015.210 0.00 0.599 1.50 0.00 0.00 0
0.00

17.67 0.01698 .000483 0.01 0.410 0.00

LICENSEE: THIENES ENGINEERING F0515P PAGE
2

WATER SURFACE PROFILE LISTING

TEI JOB 3575
LINE B
100-YEAR STORM

| STATION AVBPR | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|------------------|--------|---------|------|---|------|---------|--------|-------|----------|--------|-------|----|----|
| | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | DIA | ID NO. | PIER | | |

| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR |
|--------|----|--------|----|------------|----|
|--------|----|--------|----|------------|----|

1316.64 1013.26 1.932 1015.192 2.5 1.41 0.031 1015.223 0.00 0.599 1.50 0.00 0.00 0
0.00

12.60 0.01667 .000483 0.01 0.420 0.00

1329.24 1013.47 1.728 1015.198 2.5 1.41 0.031 1015.229 0.00 0.599 1.50 0.00 0.00 0
0.00

TEI JOB 3575
LINE B
100-YEAR STORM

| | | | | | | | | | | |
|---------|-----|---|---|-----|-----|-----|---|----|---|---|
| 1001.75 | .I | . | . | X | H | E | . | . | . | R |
| 1008.43 | .I | | | C W | H | E | . | . | . | R |
| 1015.12 | . | | | | | | . | . | . | |
| 1021.80 | . I | | | C | W | H | E | | . | R |
| 1028.48 | . | | | | | | . | . | . | |
| 1035.17 | . | | | | | | . | . | . | |
| 1041.85 | . | | | | | | . | . | . | |
| 1048.53 | . | | | | | | . | . | . | |
| 1055.22 | . | I | | C | W | H | E | | . | R |
| 1061.90 | . | | | C | W | H | E | | . | |
| 1068.58 | . | | | | | | . | . | . | |
| 1075.27 | . | I | | C | W | H | E | | . | R |
| 1081.95 | . | | | | | | . | . | . | |
| 1088.64 | . | | | | | | . | . | . | |
| 1095.32 | . | | | | | | . | . | . | |
| 1102.00 | . | | | | | | . | . | . | |
| 1108.69 | . | | | | | | . | . | . | |
| 1115.37 | . | | | | | | . | . | . | |
| 1122.05 | . | | | | | | . | . | . | |
| 1128.74 | . | | | | | | . | . | . | |
| 1135.42 | . | | | | | | . | . | . | |
| 1142.10 | . | | | | | | . | . | . | |
| 1148.79 | . | | | | | | . | . | . | |
| 1155.47 | . | I | | C | X | E | . | . | R | |
| 1162.15 | . | | | | | | . | . | . | |
| 1168.84 | . | | | | | | . | . | . | |
| 1175.52 | . | | | | | | . | . | . | |
| 1182.20 | . | | | | | | . | . | . | |
| 1188.89 | . | | | | | | . | . | . | |
| 1195.57 | . | I | | C | H W | E | . | JX | | |
| 1202.25 | . | I | | C | H | W E | . | R | . | |
| 1208.94 | . | | | | | | . | . | . | |
| 1215.62 | . | | | | | | . | . | . | |
| 1222.30 | . | | | | | | . | . | . | |
| 1228.99 | . | | | | | | . | . | . | |
| 1235.67 | . | | | | | | . | . | . | |
| 1242.35 | . | | | | | | . | . | . | |

| | | | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----|--|
| 1249.04 | . | | | | | | | | | | . | |
| 1255.72 | . | | | | | | | | | | . | |
| 1262.41 | . | | | | | | | | | | . | |
| 1269.09 | . | | | | | | | | | | . | |
| 1275.77 | . | | | | | | | | | | . | |
| 1282.46 | . | | | | | | | | | | . | |
| 1289.14 | . | | | | | | | | | | . | |
| 1295.82 | . | I | | C | | H | | W | E | . | JX | |
| 1302.51 | . | I | C | | H | | WE | . | R | | | |
| 1309.19 | . | I | C | | H | | WE | . | R | | | |
| 1315.87 | . | | | | | | | | | . | | |
| 1322.56 | . | I | C | | H | | WE | . | R | | | |
| 1329.24 | . | I | C | | H | X | . | R | | | | |
| . | . | . | . | . | . | . | . | . | . | . | | |
| 1011.69 | 1012.04 | 1012.40 | 1012.75 | 1013.11 | 1013.46 | 1013.81 | 1014.17 | 1014.52 | 1014.87 | 1015.23 | | |

N O T E S

1. GLOSSARY

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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

DATE: 3/25/2022
TIME: 8:50

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|----|----|------|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | | | DROP | | | | | | | | | | |

CD 12 4 1.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB NUMBER 3575

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL B1

HEADING LINE NO 3 IS -

100-YEAR

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | 1 IS A SYSTEM OUTLET | * | * | * | U/S DATA | STATION | INVERT | SECT | W S ELEV | | | |
|------------|-------------------------|---|---|---|----------|---------|--------|------|----------|-------|--------|-------|
| | | | | | 1000.75 | 1012.94 | | 12 | 1015.18 | | | |
| ELEMENT NO | 2 IS A REACH | * | * | * | U/S DATA | STATION | INVERT | SECT | RADIUS | ANGLE | ANG PT | MAN H |
| | | | | | 1034.49 | 1013.04 | | 12 | 0.00 | 0.00 | 0.00 | 0 |
| ELEMENT NO | 3 IS A REACH | * | * | * | U/S DATA | STATION | INVERT | SECT | RADIUS | ANGLE | ANG PT | MAN H |
| | | | | | 1061.98 | 1013.12 | | 12 | 22.50 | 45.00 | 0.00 | 0 |
| ELEMENT NO | 4 IS A REACH | * | * | * | U/S DATA | STATION | INVERT | SECT | RADIUS | ANGLE | ANG PT | MAN H |
| | | | | | 1092.28 | 1013.21 | | 12 | 0.00 | 0.00 | 0.00 | 0 |
| ELEMENT NO | 5 IS A SYSTEM HEADWORKS | * | * | * | U/S DATA | STATION | INVERT | SECT | W S ELEV | | | |
| | | | | | 1092.28 | 1013.21 | | 12 | 0.00 | | | |

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB NUMBER 3575
STORM DRAIN LATERAL B1
100-YEAR

| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|---------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

| | | | | | |
|--------|----|--------|----|------------|----|
| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR |
|--------|----|--------|----|------------|----|

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|-----|------|-------|----------|------|-------|------|------|------|---|
| 1000.75 | 1012.94 | 2.240 | 1015.180 | 2.4 | 3.06 | 0.145 | 1015.325 | 0.00 | 0.663 | 1.00 | 0.00 | 0.00 | 0 |
|---------|---------|-------|----------|-----|------|-------|----------|------|-------|------|------|------|---|

| | | | | | |
|-------|---------|---------|------|-------|------|
| 33.74 | 0.00296 | .003866 | 0.13 | 1.000 | 0.00 |
|-------|---------|---------|------|-------|------|

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|-----|------|---------|----------|------|-------|-------|------|------|------|
| 1034.49 | 1013.04 | 2.270 | 1015.310 | 2.4 | 3.06 | 0.145 | 1015.455 | 0.00 | 0.663 | 1.00 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 27.49 | 0.00291 | | | | | .003866 | 0.11 | | | 1.000 | | | 0.00 |
| 0.00 | | | | | | | | | | | | | |
| 1061.98 | 1013.12 | 2.317 | 1015.437 | 2.4 | 3.06 | 0.145 | 1015.582 | 0.00 | 0.663 | 1.00 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 30.30 | 0.00297 | | | | | .003866 | 0.12 | | | 1.000 | | | 0.00 |
| 0.00 | | | | | | | | | | | | | |
| 1092.28 | 1013.21 | 2.344 | 1015.554 | 2.4 | 3.06 | 0.145 | 1015.699 | 0.00 | 0.663 | 1.00 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |

TEI JOB NUMBER 3575
 STORM DRAIN LATERAL B1
 100-YEAR

| | | | | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000.75 | . | I | . | C | . | H | . | . | . | W | E | . | R |
| 1002.62 | . | | | | | | | | | | | . | |
| 1004.49 | . | | | | | | | | | | | . | |
| 1006.35 | . | | | | | | | | | | | . | |
| 1008.22 | . | | | | | | | | | | | . | |
| 1010.09 | . | | | | | | | | | | | . | |
| 1011.96 | . | | | | | | | | | | | . | |
| 1013.83 | . | | | | | | | | | | | . | |
| 1015.69 | . | | | | | | | | | | | . | |
| 1017.56 | . | | | | | | | | | | | . | |
| 1019.43 | . | | | | | | | | | | | . | |
| 1021.30 | . | | | | | | | | | | | . | |
| 1023.17 | . | | | | | | | | | | | . | |
| 1025.03 | . | | | C | | H | | | | W | E | . | R |
| 1026.90 | . | | | | | | | | | | | . | |
| 1028.77 | . | | | | | | | | | | | . | |
| 1030.64 | . | | | | | | | | | | | . | |
| 1032.51 | . | | | | | | | | | | | . | |
| 1034.37 | . | | | | | | | | | | | . | |
| 1036.24 | . | I | | C | | H | | | | W | E | . | R |
| 1038.11 | . | | | | | | | | | | | . | |
| 1039.98 | . | | | | | | | | | | | . | |
| 1041.85 | . | | | | | | | | | | | . | |
| 1043.71 | . | | | | | | | | | | | . | |
| 1045.58 | . | | | | | | | | | | | . | |
| 1047.45 | . | | | | | | | | | | | . | |
| 1049.32 | . | | | | | | | | | | | . | |
| 1051.18 | . | | | | | | | | | | | . | |
| 1053.05 | . | | | | | | | | | | | . | |
| 1054.92 | . | | | | | | | | | | | . | |
| 1056.79 | . | | | | | | | | | | | . | |
| 1058.66 | . | | | | | | | | | | | . | |
| 1060.52 | . | | | | | | | | | | | . | |
| 1062.39 | . | I | | C | | H | | | | W | E | . | R |
| 1064.26 | . | | | | | | | | | | | . | |
| 1066.13 | . | | | | | | | | | | | . | |
| 1068.00 | . | | | | | | | | | | | . | |
| 1069.86 | . | | | | | | | | | | | . | |
| 1071.73 | . | | | | | | | | | | | . | |
| 1073.60 | . | | | | | | | | | | | . | |
| 1075.47 | . | | | | | | | | | | | . | |
| 1077.34 | . | | | | | | | | | | | . | |
| 1079.20 | . | | | | | | | | | | | . | |
| 1081.07 | . | | | | | | | | | | | . | |
| 1082.94 | . | | | | | | | | | | | . | |
| 1084.81 | . | | | | | | | | | | | . | |
| 1086.68 | . | | | | | | | | | | | . | |
| 1088.54 | . | | | | | | | | | | | . | |
| 1090.41 | . | | | | | | | | | | | . | |
| 1092.28 | . | I | | C | | H | | | | W | E | . | R |
| . | . | | . | . | . | . | . | . | . | . | . | . | |

1012.94 1013.22 1013.49 1013.77 1014.04 1014.32 1014.60 1014.87 1015.15 1015.42 1015.70

N O T E S

1. GLOSSARY

I = INVERT ELEVATION

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H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|------|------|-------|----------|------|-------|------|------|------|---|
| 8.53 | 0.00394 | | .001259 | 0.01 | | 0.840 | | 0.00 | | | | | |
| 1333.85 | 1013.94 | 1.335 | 1015.275 | 4.3 | 2.59 | 0.104 | 1015.379 | 0.00 | 0.795 | 1.50 | 0.00 | 0.00 | 0 |
| 0.00▲ | | | | | | | | | | | | | |

TEI JOB 3575
LINE C
100-YEAR STORM

| | . | . | . | C | . | H | . | W | E | . | R |
|---------|---|---|---|---|---|---|---|---|----|----|---|
| 1001.75 | . | . | . | | | | | | | . | |
| 1008.53 | . | . | . | | | | | | | . | |
| 1015.31 | . | . | . | | | | | | | . | |
| 1022.08 | . | . | . | | | | | | | . | |
| 1028.86 | . | . | . | | | | | | | . | |
| 1035.64 | . | . | . | | | | | | | . | |
| 1042.42 | . | . | . | | | | | | | . | |
| 1049.19 | . | . | . | | | | | | | . | |
| 1055.97 | . | . | . | | | | | | | . | |
| 1062.75 | . | . | . | | | | | | | . | |
| 1069.53 | . | . | . | | | | | | | . | |
| 1076.30 | . | . | . | | | | | | | . | |
| 1083.08 | . | . | . | | | | | | | . | |
| 1089.86 | . | . | . | | | | | | | . | |
| 1096.64 | . | . | . | | | | | | | . | |
| 1103.41 | . | . | . | | | | | | | . | |
| 1110.19 | . | . | . | | | | | | | . | |
| 1116.97 | . | . | . | | | | | | | . | |
| 1123.75 | . | . | . | | | | | | | . | |
| 1130.52 | . | . | . | | | | | | | . | |
| 1137.30 | . | . | . | | | | | | | . | |
| 1144.08 | . | . | . | | | | | | | . | |
| 1150.86 | . | . | . | | | | | | | . | |
| 1157.63 | . | . | . | | | | | | | . | |
| 1164.41 | . | . | . | | | | | | | . | |
| 1171.19 | . | . | . | | | | | | | . | |
| 1177.97 | . | . | . | | | | | | | . | |
| 1184.74 | . | . | . | | | | | | | . | |
| 1191.52 | . | . | . | | | | | | | . | |
| 1198.30 | . | . | . | | | | | | | . | |
| 1205.08 | . | . | . | | | | | | | . | |
| 1211.85 | . | . | . | | | | | | | . | |
| 1218.63 | . | . | . | | | | | | | . | |
| 1225.41 | . | . | . | | | | | | | . | |
| 1232.19 | . | . | . | | | | | | | . | |
| 1238.96 | . | . | . | | | | | | | . | |
| 1245.74 | . | . | . | | | | | | | . | |
| 1252.52 | . | . | . | | | | | | | . | |
| 1259.30 | . | . | . | | | | | | | . | |
| 1266.07 | . | . | . | | | | | | | . | |
| 1272.85 | . | . | . | | | | | | | . | |
| 1279.63 | . | . | . | I | . | C | . | X | E | . | R |
| 1286.41 | . | . | . | | | | | | | . | |
| 1293.18 | . | . | . | | | | | | | . | |
| 1299.96 | . | . | . | | | | | | | . | |
| 1306.74 | . | . | . | | | | | | | . | |
| 1313.52 | . | . | . | | | | | | | . | |
| 1320.29 | . | . | . | | | | | | | . | |
| 1327.07 | . | . | . | I | . | C | . | W | EH | . | R |
| 1333.85 | . | . | . | I | . | C | . | W | E | H. | R |
| . | . | . | . | . | . | . | . | . | . | . | . |

1012.63 1012.91 1013.19 1013.47 1013.75 1014.04 1014.32 1014.60 1014.88 1015.16 1015.44

NOTE S

1. GLOSSARY

I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

DATE: 3/25/2022
TIME: 8:52

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|----|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | | | | DROP | | | | | | | | | |

CD 12 4 1.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB NUMBER 3575

HEADING LINE NO 2 IS -

STORM DRAIN LATERAL C1

HEADING LINE NO 3 IS -

100-YEAR

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *
U/S DATA STATION INVERT SECT
1001.75 1013.98 12

W S ELEV
1015.28

ELEMENT NO 2 IS A REACH * * *
U/S DATA STATION INVERT SECT
1018.46 1014.04 12

N
0.012

RADIUS ANGLE ANG PT MAN H
0.00 0.00 0.00 0

ELEMENT NO 3 IS A SYSTEM HEADWORKS * * *
U/S DATA STATION INVERT SECT
1018.46 1014.01 12

W S ELEV
0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB NUMBER 3575
STORM DRAIN LATERAL C1
100-YEAR

| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|---------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

L/ELEM SO SF AVE HF NORM DEPTH ZR

1001.75 1013.98 1.300 1015.280 2.2 2.80 0.122 1015.402 0.00 0.634 1.00 0.00 0.00 0
0.00

16.71 0.00359 .003249 0.05 0.770 0.00

1018.46 1014.04 1.294 1015.334 2.2 2.80 0.122 1015.456 0.00 0.634 1.00 0.00 0.00 0
0.00

** WARNING NO. 22 ** - NO PLOT GENERATED, BAD DATA OR NOT ENOUGH POINTS, 3 OR LESS

PUBA

DATE: 1/13/2022
TIME: 8:35

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|----|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

| | | | |
|----|----|---|------|
| CD | 54 | 4 | 4.50 |
| CD | 48 | 4 | 4.00 |
| CD | 24 | 4 | 2.00 |

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB 3575

HEADING LINE NO 2 IS -

PUBLIC STORM DRAIN

HEADING LINE NO 3 IS -

100-YEAR STORM

F 0 5 1 5 P

▲

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| ELEMENT NO | 1 IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | | | |
|------------|----------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| ELEMENT NO | 1 IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1000.00 | 995.93 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 2 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1019.34 | 995.97 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 3 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1042.46 | 996.01 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 4 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1137.05 | 996.20 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 5 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1160.61 | 996.25 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 6 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1182.49 | 996.29 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 7 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1205.72 | 996.34 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 8 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 1995.30 | 997.92 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 9 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | 2030.64 | 997.99 | 54 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| ELEMENT NO | 10 IS A REACH | * | * | * | | | | | | | | | | | | | | | | |
| | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|------------|------------------|---------|--------|-------|-------|---------|-------|--------|----------|----------|---------|-------|
| | | | | PUBA | | | | | | | | |
| | | 2466.43 | 998.86 | 54 | 0.013 | | | | 0.00 | 0.00 | 0.00 | 0 |
| ELEMENT NO | 11 IS A REACH | * | * | * | | | | | | | | |
| U/S DATA | STATION | INVERT | SECT | | N | RADIUS | ANGLE | ANG PT | MAN H | | | |
| | 2537.12 | 999.02 | 54 | | 0.013 | 45.00 | 90.00 | 0.00 | 0 | | | |
| ELEMENT NO | 12 IS A REACH | * | * | * | | | | | | | | |
| U/S DATA | STATION | INVERT | SECT | | N | RADIUS | ANGLE | ANG PT | MAN H | | | |
| | 2651.63 | 999.02 | 54 | | 0.012 | 0.00 | 0.00 | 0.00 | 0 | | | |
| ELEMENT NO | 13 IS A JUNCTION | * | * | * | * | * | * | * | * | | | |
| U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
| | 2651.63 | 999.23 | 54 | 24 | 0 | 0.014 | 31.7 | 0.0 | 1000.48 | 0.00 | 45.00 | 0.00 |
| | | | | F | O | 5 1 5 P | | | | | PAGE NO | 3 |

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| | | | | | | | | | | | | |
|------------|--------------------------|---------|------|---|-------|----------|-------|--------|-------|--|--|--|
| ELEMENT NO | 14 IS A REACH | * | * | * | | | | | | | | |
| U/S DATA | STATION | INVERT | SECT | | N | RADIUS | ANGLE | ANG PT | MAN H | | | |
| | 3199.19 | 1000.33 | 54 | | 0.013 | 0.00 | 0.00 | 0.00 | 2 | | | |
| ELEMENT NO | 15 IS A SYSTEM HEADWORKS | * | * | * | | | | | | | | |
| U/S DATA | STATION | INVERT | SECT | | | W S ELEV | | | | | | |
| | 3199.19 | 1000.33 | 54 | | | 0.00 | | | | | | |

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC ↑
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB 3575
PUBLIC STORM DRAIN
100-YEAR STORM

| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|---------|---------|---------|----------|-------|---------|---------|----------|-------|------------|------|--------|------|------|
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |
| L/ELEM | SO | | | | SF AVE | HF | | | NORM DEPTH | | | ZR | |
| ***** | | | | | | | | | | | | | |
| 1000.00 | 995.93 | 3.735 | 999.665 | 163.5 | 11.59 | 2.085 | 1001.750 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 6.23 | 0.00207 | | | | .006498 | 0.04 | | | 4.500 | | | 0.00 | |
| 1006.23 | 995.94 | 3.952 | 999.895 | 163.5 | 11.05 | 1.895 | 1001.790 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 13.11 | 0.00207 | | | | .006127 | 0.08 | | | 4.500 | | | 0.00 | |
| 1019.34 | 995.97 | 4.114 | 1000.084 | 163.5 | 10.73 | 1.786 | 1001.870 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 23.12 | 0.00173 | | | | .006016 | 0.14 | | | 4.500 | | | 0.00 | |
| 1042.46 | 996.01 | 4.310 | 1000.320 | 163.5 | 10.43 | 1.690 | 1002.010 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 32.05 | 0.00201 | | | | .006419 | 0.21 | | | 4.500 | | | 0.00 | |
| 1074.51 | 996.07 | 4.500 | 1000.574 | 163.5 | 10.28 | 1.641 | 1002.215 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 62.54 | 0.00201 | | | | .006869 | 0.43 | | | 4.500 | | | 0.00 | |
| 1137.05 | 996.20 | 4.807 | 1001.007 | 163.5 | 10.28 | 1.641 | 1002.648 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 23.56 | 0.00212 | | | | .006913 | 0.16 | | | 4.500 | | | 0.00 | |

PUBA

| | | | | | | | | | | | | | |
|-----------------|---------|-------|----------|-------|-------|---------|----------|------|-------|-------|------|------|---|
| 1160.61 0.00 | 996.25 | 5.109 | 1001.359 | 163.5 | 10.28 | 1.641 | 1003.000 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 21.88 | 0.00183 | | | | | .006913 | 0.15 | | | 4.500 | | 0.00 | |
| 1182.49 0.00 | 996.29 | 5.220 | 1001.510 | 163.5 | 10.28 | 1.641 | 1003.151 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 23.23 | 0.00215 | | | | | .006913 | 0.16 | | | 4.500 | | 0.00 | |
| 1205.72 0.00 | 996.34 | 5.331 | 1001.671 | 163.5 | 10.28 | 1.641 | 1003.312 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 789.58 | 0.00200 | | | | | .006913 | 5.46 | | | 4.500 | | 0.00 | |
| 1995.30 0.00 | 997.92 | 9.455 | 1007.375 | 163.5 | 10.28 | 1.641 | 1009.016 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 35.34 | 0.00198 | | | | | .006913 | 0.24 | | | 4.500 | | 0.00 | |
| 2030.64 0.00 | 997.99 | 9.958 | 1007.948 | 163.5 | 10.28 | 1.641 | 1009.589 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 435.79 | 0.00200 | | | | | .006913 | 3.01 | | | 4.500 | | 0.00 | |

LICENSEE: THIENES ENGINEERING **F0515P** **PAGE**
2

WATER SURFACE PROFILE LISTING

TEI JOB 3575
PUBLIC STORM DRAIN
100-YEAR STORM

| STATION AVBPR | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
|------------------|---------|---------|----------|-------|---------|-------|----------|-------|------------|-------|-------|------|----|
| | ELEV | OF FLOW | ELEV | | | | | | | | | | |
| L/ELEM | SO | | | | SF AVE | HF | | | NORM DEPTH | | | ZR | |
| ***** | | | | | | | | | | | | | |
| 2466.43 0.00 | 998.86 | 12.100 | 1010.960 | 163.5 | 10.28 | 1.641 | 1012.601 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 70.69 | 0.00226 | | | | .006913 | 0.49 | | | | 4.500 | | 0.00 | |
| 2537.12 0.00 | 999.02 | 12.757 | 1011.777 | 163.5 | 10.28 | 1.641 | 1013.418 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| 114.51 | 0.00000 | | | | .005890 | 0.67 | | | | 0.000 | | 0.00 | |
| 2651.63 0.00 | 999.02 | 13.432 | 1012.452 | 163.5 | 10.28 | 1.641 | 1014.093 | 0.00 | 3.735 | 4.50 | 0.00 | 0.00 | 0 |
| JUNCT STR | 0.00000 | | | | .006613 | 0.00 | | | | | | 0.00 | |
| 2651.63 0.00 | 999.23 | 13.929 | 1013.159 | 131.8 | 8.29 | 1.066 | 1014.225 | 0.00 | 3.379 | 4.50 | 0.00 | 0.00 | 0 |
| 547.56 | 0.00201 | | | | .004492 | 2.46 | | | | 4.500 | | 0.00 | |
| 3199.19 0.00 | 1000.33 | 15.396 | 1015.726 | 131.8 | 8.29 | 1.066 | 1016.792 | 0.00 | 3.379 | 4.50 | 0.00 | 0.00 | 0 |

TEI JOB 3575
PUBLIC STORM DRAIN
100-YEAR STORM

PUBA

| | | | | | | | | | | | | | | |
|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---|---|----|---|
| 1000.00 | . | | X | H | E | . | . | . | . | . | . | . | R | |
| 1044.88 | . | I | C | W | H | E | . | . | . | . | . | . | R | |
| 1089.76 | . | I | CW | H | E | . | . | . | . | . | . | . | R | |
| 1134.64 | . | I | C | X | E | . | . | . | . | . | . | . | R | |
| 1179.53 | . | I | C | X | E | . | . | . | . | . | . | . | R | |
| 1224.41 | . | I | C | H | W | E | . | . | . | . | . | . | R | |
| 1269.29 | . | I | C | H | W | E | . | . | . | . | . | . | R | |
| 1314.17 | . | I | C | H | W | E | . | . | . | . | . | . | R | |
| 1359.05 | . | I | C | H | W | E | . | . | . | . | . | . | R | |
| 1403.93 | . | | | | | | . | . | . | . | . | . | | |
| 1448.81 | . | | | | | | . | . | . | . | . | . | | |
| 1493.70 | . | | | | | | . | . | . | . | . | . | | |
| 1538.58 | . | | | | | | . | . | . | . | . | . | | |
| 1583.46 | . | | | | | | . | . | . | . | . | . | | |
| 1628.34 | . | | | | | | . | . | . | . | . | . | | |
| 1673.22 | . | | | | | | . | . | . | . | . | . | | |
| 1718.10 | . | | | | | | . | . | . | . | . | . | | |
| 1762.98 | . | | | | | | . | . | . | . | . | . | | |
| 1807.87 | . | | | | | | . | . | . | . | . | . | | |
| 1852.75 | . | | | | | | . | . | . | . | . | . | | |
| 1897.63 | . | | | | | | . | . | . | . | . | . | | |
| 1942.51 | . | | | | | | . | . | . | . | . | . | | |
| 1987.39 | . | | | | | | . | . | . | . | . | . | | |
| 2032.27 | . | I | C | H | | | W | | E | | . | . | R | |
| 2077.15 | . | I | C | H | | | W | W | E | E | . | . | R | |
| 2122.04 | . | | | | | | | | | | . | . | | |
| 2166.92 | . | | | | | | | | | | . | . | | |
| 2211.80 | . | | | | | | | | | | . | . | | |
| 2256.68 | . | | | | | | | | | | . | . | | |
| 2301.56 | . | | | | | | | | | | . | . | | |
| 2346.44 | . | | | | | | | | | | . | . | | |
| 2391.32 | . | | | | | | | | | | . | . | | |
| 2436.21 | . | | | | | | | | | | . | . | | |
| 2481.09 | . | I | C | H | | | | W | | E | | . | R | |
| 2525.97 | . | | | | | | | | | | . | . | | |
| 2570.85 | . | I | C | H | | | | W | | E | | . | R | |
| 2615.73 | . | | | | | | | | | | . | . | | |
| 2660.61 | . | I | C | H | | | | W | | E | | . | JX | |
| 2705.49 | . | I | C | H | | | | W | W | E | | . | R | |
| 2750.38 | . | | | | | | | | | | . | . | | |
| 2795.26 | . | | | | | | | | | | . | . | | |
| 2840.14 | . | | | | | | | | | | . | . | | |
| 2885.02 | . | | | | | | | | | | . | . | | |
| 2929.90 | . | | | | | | | | | | . | . | | |
| 2974.78 | . | | | | | | | | | | . | . | | |
| 3019.66 | . | | | | | | | | | | . | . | | |
| 3064.55 | . | | | | | | | | | | . | . | | |
| 3109.43 | . | | | | | | | | | | . | . | | |
| 3154.31 | . | | | | | | | | | | . | . | | |
| 3199.19 | . | | I | C | H | | | | | | W | E | . | R |
| . | . | . | . | . | . | . | . | . | . | . | . | . | . | |
| 995.93 | 998.02 | 1000.10 | 1002.19 | 1004.27 | 1006.36 | 1008.45 | 1010.53 | 1012.62 | 1014.71 | 1016.79 | | | | |

NOTES

1. GLOSSARY

I = INVERT ELEVATION
 C = CRITICAL DEPTH
 W = WATER SURFACE ELEVATION
 H = HEIGHT OF CHANNEL
 E = ENERGY GRADE LINE
 X = CURVES CROSSING OVER
 B = BRIDGE ENTRANCE OR EXIT
 Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

ONSITE

DATE: 3/ 9/2022
TIME: 13:33

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|------|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | DROP | | | | | | | | | | | | |

CD 1 3 0 0.00 0.33 3.00 0.00 0.00 0.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB NUMBER 3575

HEADING LINE NO 2 IS -

PARKWAY CULVERT 1

HEADING LINE NO 3 IS -

100-YEAR

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|--------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 1 | IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1000.00 | 1023.79 | | 1 | | | | | | | | | | | | | | | |

W S ELEV
1024.12

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 2 | IS A REACH | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1011.50 | 1024.02 | | 1 | | | | | | | | | | | | | | | |

RADIUS ANGLE ANG PT MAN H
0.00 0.00 0.00 0

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|-----------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 3 | IS A SYSTEM HEADWORKS | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1011.50 | 1024.02 | | 1 | | | | | | | | | | | | | | | |

W S ELEV
0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB NUMBER 3575
PARKWAY CULVERT 1
100-YEAR

| | | | | | | | | | | | | | |
|---------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

| | | | | | |
|--------|----|--------|----|------------|----|
| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR |
|--------|----|--------|----|------------|----|

1000.00 1023.79 0.271 1024.061 4.0 4.91 0.375 1024.436 0.00 0.330 0.33 3.00 0.00 0
0.00
0.57 0.02000 .017441 0.01 0.260 0.00
1000.57 1023.80 0.272 1024.073 4.0 4.90 0.373 1024.446 0.00 0.330 0.33 3.00 0.00 0
0.00
5.40 0.02000 .016168 0.09 0.260 0.00
1005.97 1023.91 0.285 1024.194 4.0 4.67 0.339 1024.533 0.00 0.330 0.33 3.00 0.00 0
0.00

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|---------|------|-------|----------|-------|-------|------|------|------|---|
| 2.79 | 0.02000 | | | .013933 | 0.04 | | | 0.260 | | 0.00 | | | |
| 1008.76 | 1023.97 | 0.299 | 1024.264 | 4.0 | 4.46 | 0.309 | 1024.573 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 1.68 | 0.02000 | | | .012013 | 0.02 | | | 0.260 | | 0.00 | | | |
| 1010.44 | 1024.00 | 0.314 | 1024.313 | 4.0 | 4.25 | 0.281 | 1024.594 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 1.06 | 0.02000 | | | .010317 | 0.01 | | | 0.260 | | 0.00 | | | |
| 1011.50 | 1024.02 | 0.330 | 1024.350 | 4.0 | 4.04 | 0.253 | 1024.603 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |

TEI JOB NUMBER 3575
 PARKWAY CULVERT 1
 100-YEAR

| | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|----|---|---|
| 1000.00 | . | . | . | W | X | . | . | E | . | R |
| 1000.23 | . | | | | | | | | | |
| 1000.47 | . | | | | | | | | | |
| 1000.70 | . | I | | W | X | | | E | | R |
| 1000.94 | . | | | | | | | | | |
| 1001.17 | . | | | | | | | | | |
| 1001.41 | . | | | | | | | | | |
| 1001.64 | . | | | | | | | | | |
| 1001.88 | . | | | | | | | | | |
| 1002.11 | . | | | | | | | | | |
| 1002.35 | . | | | | | | | | | |
| 1002.58 | . | | | | | | | | | |
| 1002.82 | . | | | | | | | | | |
| 1003.05 | . | | | | | | | | | |
| 1003.29 | . | | | | | | | | | |
| 1003.52 | . | | | | | | | | | |
| 1003.76 | . | | | | | | | | | |
| 1003.99 | . | | | | | | | | | |
| 1004.22 | . | | | | | | | | | |
| 1004.46 | . | | | | | | | | | |
| 1004.69 | . | | | | | | | | | |
| 1004.93 | . | | | | | | | | | |
| 1005.16 | . | | | | | | | | | |
| 1005.40 | . | | | | | | | | | |
| 1005.63 | . | | | | | | | | | |
| 1005.87 | . | | | | | | | | | |
| 1006.10 | . | I | | W | X | | | E | . | R |
| 1006.34 | . | | | | | | | | | |
| 1006.57 | . | | | | | | | | | |
| 1006.81 | . | | | | | | | | | |
| 1007.04 | . | | | | | | | | | |
| 1007.28 | . | | | | | | | | | |
| 1007.51 | . | | | | | | | | | |
| 1007.74 | . | | | | | | | | | |
| 1007.98 | . | | | | | | | | | |
| 1008.21 | . | | | | | | | | | |
| 1008.45 | . | | | | | | | | | |
| 1008.68 | . | | | | | | | | | |
| 1008.92 | . | I | | W | X | | | E | . | R |
| 1009.15 | . | | | | | | | | | |
| 1009.39 | . | | | | | | | | | |
| 1009.62 | . | | | | | | | | | |
| 1009.86 | . | | | | | | | | | |
| 1010.09 | . | | | | | | | | | |
| 1010.33 | . | | | | | | | | | |
| 1010.56 | . | I | | W | X | | | E | . | R |
| 1010.80 | . | | | | | | | | | |
| 1011.03 | . | | | | | | | | | |
| 1011.27 | . | | | | | | | | | |
| 1011.50 | . | I | | X | | | | E. | R | |
| . | . | . | . | . | . | . | . | . | . | |

1023.79 1023.87 1023.95 1024.03 1024.12 1024.20 1024.28 1024.36 1024.44 1024.52 1024.60

N O T E S

1. GLOSSARY

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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

DATE: 3/ 9/2022
TIME: 13:33

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|----|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | | | | DROP | | | | | | | | | |

CD 1 3 0 0.00 0.33 3.00 0.00 0.00 0.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB NUMBER 3575

HEADING LINE NO 2 IS -

PARKWAY CULVERT 2

HEADING LINE NO 3 IS -

100-YEAR

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| | | | | | | | | | | | | | | | | | | | |
|------------|---|--------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 1 | IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | |
| | | 1000.00 | 1019.87 | | 1 | | | | | | | | | | | | | | |

W S ELEV
1020.20

| | | | | | | | | | | | | | | | | | | | |
|------------|---|------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 2 | IS A REACH | * | * | * | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | |
| | | 1011.50 | 1020.10 | | 1 | | | | | | | | | | | | | | |

RADIUS ANGLE ANG PT MAN H
0.00 0.00 0.00 0

| | | | | | | | | | | | | | | | | | | | |
|------------|---|-----------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 3 | IS A SYSTEM HEADWORKS | * | * | * | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | |
| | | 1011.50 | 1020.10 | | 1 | | | | | | | | | | | | | | |

W S ELEV
0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB NUMBER 3575
PARKWAY CULVERT 2
100-YEAR

| | | | | | | | | | | | | | |
|---------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

| | | | | | |
|--------|----|--------|----|------------|----|
| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR |
|--------|----|--------|----|------------|----|

1000.00 1019.87 0.270 1020.140 4.5 5.56 0.479 1020.619 0.00 0.330 0.33 3.00 0.00 0
0.00
0.82 0.02000 .014221 0.01 0.241 0.00
1000.82 1019.89 0.272 1020.158 4.5 5.51 0.472 1020.630 0.00 0.330 0.33 3.00 0.00 0
0.00
4.30 0.02000 .013096 0.06 0.241 0.00
1005.12 1019.97 0.285 1020.257 4.5 5.26 0.429 1020.686 0.00 0.330 0.33 3.00 0.00 0
0.00

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|---------|------|-------|----------|-------|-------|------|------|------|---|
| 2.88 | 0.02000 | | | .011286 | 0.03 | | | 0.241 | | 0.00 | | | |
| 1008.00 | 1020.03 | 0.299 | 1020.329 | 4.5 | 5.02 | 0.391 | 1020.720 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 2.04 | 0.02000 | | | .009731 | 0.02 | | | 0.241 | | 0.00 | | | |
| 1010.04 | 1020.07 | 0.314 | 1020.385 | 4.5 | 4.78 | 0.355 | 1020.740 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 1.46 | 0.02000 | | | .008357 | 0.01 | | | 0.241 | | 0.00 | | | |
| 1011.50 | 1020.10 | 0.330 | 1020.430 | 4.5 | 4.55 | 0.321 | 1020.751 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |

TEI JOB NUMBER 3575
 PARKWAY CULVERT 2
 100-YEAR

| | | | | | | | | | | | | |
|---------|---|---|---|---|---|----|---|---|---|---|---|---|
| 1000.00 | . | I | | | W | X | | | | E | . | R |
| 1000.23 | . | | | | | | | | | | . | |
| 1000.47 | . | | | | | | | | | | . | |
| 1000.70 | . | | | | | | | | | | . | |
| 1000.94 | . | I | | | W | X | | | | E | . | R |
| 1001.17 | . | | | | | | | | | | . | |
| 1001.41 | . | | | | | | | | | | . | |
| 1001.64 | . | | | | | | | | | | . | |
| 1001.88 | . | | | | | | | | | | . | |
| 1002.11 | . | | | | | | | | | | . | |
| 1002.35 | . | | | | | | | | | | . | |
| 1002.58 | . | | | | | | | | | | . | |
| 1002.82 | . | | | | | | | | | | . | |
| 1003.05 | . | | | | | | | | | | . | |
| 1003.29 | . | | | | | | | | | | . | |
| 1003.52 | . | | | | | | | | | | . | |
| 1003.76 | . | | | | | | | | | | . | |
| 1003.99 | . | | | | | | | | | | . | |
| 1004.22 | . | | | | | | | | | | . | |
| 1004.46 | . | | | | | | | | | | . | |
| 1004.69 | . | | | | | | | | | | . | |
| 1004.93 | . | | | | | | | | | | . | |
| 1005.16 | . | I | | | W | HC | | | | E | . | R |
| 1005.40 | . | | | | | | | | | | . | |
| 1005.63 | . | | | | | | | | | | . | |
| 1005.87 | . | | | | | | | | | | . | |
| 1006.10 | . | | | | | | | | | | . | |
| 1006.34 | . | | | | | | | | | | . | |
| 1006.57 | . | | | | | | | | | | . | |
| 1006.81 | . | | | | | | | | | | . | |
| 1007.04 | . | | | | | | | | | | . | |
| 1007.28 | . | | | | | | | | | | . | |
| 1007.51 | . | | | | | | | | | | . | |
| 1007.74 | . | | | | | | | | | | . | |
| 1007.98 | . | | | | | | | | | | . | |
| 1008.21 | . | I | | | W | X | | | | E | . | R |
| 1008.45 | . | | | | | | | | | | . | |
| 1008.68 | . | | | | | | | | | | . | |
| 1008.92 | . | | | | | | | | | | . | |
| 1009.15 | . | | | | | | | | | | . | |
| 1009.39 | . | | | | | | | | | | . | |
| 1009.62 | . | | | | | | | | | | . | |
| 1009.86 | . | | | | | | | | | | . | |
| 1010.09 | . | I | | | W | X | | | | E | . | R |
| 1010.33 | . | | | | | | | | | | . | |
| 1010.56 | . | | | | | | | | | | . | |
| 1010.80 | . | | | | | | | | | | . | |
| 1011.03 | . | | | | | | | | | | . | |
| 1011.27 | . | | | | | | | | | | . | |
| 1011.50 | . | I | | | W | X | | | | E | . | R |
| . | . | . | . | . | . | . | . | . | . | . | . | |

1019.87 1019.96 1020.05 1020.13 1020.22 1020.31 1020.40 1020.49 1020.57 1020.66 1020.75

N O T E S

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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

DATE: 3/ 9/2022
TIME: 13:33

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

| CARD | SECT | CHN | NO OF | AVE PIER | HEIGHT 1 | BASE | ZL | ZR | INV | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|------|------|------|-------|----------|----------|-------|------|----|-----|------|------|------|------|------|------|------|------|------|-------|
| CODE | NO | TYPE | PIERS | WIDTH | DIAMETER | WIDTH | DROP | | | | | | | | | | | | |

CD 1 3 0 0.00 0.33 3.00 0.00 0.00 0.00

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

TEI JOB NUMBER 3575

HEADING LINE NO 2 IS -

PARKWAY CULVERT 3

HEADING LINE NO 3 IS -

100-YEAR

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|--------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 1 | IS A SYSTEM OUTLET | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1000.00 | 1018.03 | | 1 | | | | | | | | | | | | | | | |

W S ELEV
1018.36

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 2 | IS A REACH | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1011.50 | 1018.26 | | 1 | | | | | | | | | | | | | | | |

RADIUS ANGLE ANG PT MAN H
0.00 0.00 0.00 0

| | | | | | | | | | | | | | | | | | | | | |
|------------|---|-----------------------|---------|--------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT NO | 3 | IS A SYSTEM HEADWORKS | * | * | * | | | | | | | | | | | | | | | |
| | | U/S DATA | STATION | INVERT | SECT | | | | | | | | | | | | | | | |
| | | 1011.50 | 1018.26 | | 1 | | | | | | | | | | | | | | | |

W S ELEV
0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE

1

WATER SURFACE PROFILE LISTING

TEI JOB NUMBER 3575
PARKWAY CULVERT 3
100-YEAR

| | | | | | | | | | | | | | |
|---------|--------|---------|------|---|------|---------|--------|-------|----------|------|--------|----|------|
| STATION | INVERT | DEPTH | W.S. | Q | VEL | VEL | ENERGY | SUPER | CRITICAL | HGT/ | BASE/ | ZL | NO |
| AVBPR | ELEV | OF FLOW | ELEV | | HEAD | GRD.EL. | ELEV | DEPTH | | DIA | ID NO. | | PIER |

| | | | | | |
|--------|----|--------|----|------------|----|
| L/ELEM | SO | SF AVE | HF | NORM DEPTH | ZR |
|--------|----|--------|----|------------|----|

1000.00 1018.03 0.248 1018.278 3.5 4.70 0.343 1018.621 0.00 0.330 0.33 3.00 0.00 0
0.00
4.97 0.02000 .016541 0.08 0.240 0.00
1004.97 1018.13 0.259 1018.388 3.5 4.50 0.314 1018.702 0.00 0.330 0.33 3.00 0.00 0
0.00
2.83 0.02000 .014369 0.04 0.240 0.00
1007.80 1018.19 0.272 1018.458 3.5 4.29 0.286 1018.744 0.00 0.330 0.33 3.00 0.00 0
0.00

| | | | | | | | | | | | | | |
|---------|---------|-------|----------|---------|------|-------|----------|-------|-------|------|------|------|---|
| 1.67 | 0.02000 | | | .012379 | 0.02 | | | 0.240 | | 0.00 | | | |
| 1009.47 | 1018.22 | 0.285 | 1018.504 | 3.5 | 4.09 | 0.260 | 1018.764 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 1.04 | 0.02000 | | | .010668 | 0.01 | | | 0.240 | | 0.00 | | | |
| 1010.51 | 1018.24 | 0.299 | 1018.539 | 3.5 | 3.90 | 0.236 | 1018.775 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 0.64 | 0.02000 | | | .009198 | 0.01 | | | 0.240 | | 0.00 | | | |
| 1011.15 | 1018.25 | 0.314 | 1018.567 | 3.5 | 3.72 | 0.215 | 1018.782 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | | | | | | | | | | | | | |
| 0.35 | 0.02000 | | | .007899 | 0.00 | | | 0.240 | | 0.00 | | | |
| 1011.50 | 1018.26 | 0.330 | 1018.590 | 3.5 | 3.54 | 0.194 | 1018.784 | 0.00 | 0.330 | 0.33 | 3.00 | 0.00 | 0 |
| 0.00 | ▲ | | | | | | | | | | | | |

TEI JOB NUMBER 3575
 PARKWAY CULVERT 3
 100-YEAR

| | . | I | W | X | . | E | . | R |
|---------|---|---|---|----|---|---|---|---|
| 1000.00 | . | . | W | X | . | E | . | R |
| 1000.23 | . | | | | | | | |
| 1000.47 | . | | | | | | | |
| 1000.70 | . | | | | | | | |
| 1000.94 | . | | | | | | | |
| 1001.17 | . | | | | | | | |
| 1001.41 | . | | | | | | | |
| 1001.64 | . | | | | | | | |
| 1001.88 | . | | | | | | | |
| 1002.11 | . | | | | | | | |
| 1002.35 | . | | | | | | | |
| 1002.58 | . | | | | | | | |
| 1002.82 | . | | | | | | | |
| 1003.05 | . | | | | | | | |
| 1003.29 | . | | | | | | | |
| 1003.52 | . | | | | | | | |
| 1003.76 | . | | | | | | | |
| 1003.99 | . | | | | | | | |
| 1004.22 | . | | | | | | | |
| 1004.46 | . | | | | | | | |
| 1004.69 | . | | | | | | | |
| 1004.93 | . | | | | | | | |
| 1005.16 | . | I | W | CH | | E | . | R |
| 1005.40 | . | | | | | | | |
| 1005.63 | . | | | | | | | |
| 1005.87 | . | | | | | | | |
| 1006.10 | . | | | | | | | |
| 1006.34 | . | | | | | | | |
| 1006.57 | . | | | | | | | |
| 1006.81 | . | | | | | | | |
| 1007.04 | . | | | | | | | |
| 1007.28 | . | | | | | | | |
| 1007.51 | . | | | | | | | |
| 1007.74 | . | I | W | X | | E | . | R |
| 1007.98 | . | | | | | | | |
| 1008.21 | . | | | | | | | |
| 1008.45 | . | | | | | | | |
| 1008.68 | . | | | | | | | |
| 1008.92 | . | | | | | | | |
| 1009.15 | . | | | | | | | |
| 1009.39 | . | | | | | | | |
| 1009.62 | . | I | W | X | | E | . | R |
| 1009.86 | . | | | | | | | |
| 1010.09 | . | | | | | | | |
| 1010.33 | . | | | | | | | |
| 1010.56 | . | I | W | X | | E | . | R |
| 1010.80 | . | | | | | | | |
| 1011.03 | . | | | | | | | |

| | | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1011.27 | . | I | | WHC | | E . | R | | | |
| 1011.50 | . | I | . | X | . | E. | R | | | |
| | . | . | . | . | . | . | . | | | |
| 1018.03 | 1018.11 | 1018.18 | 1018.26 | 1018.33 | 1018.41 | 1018.48 | 1018.56 | 1018.63 | 1018.71 | 1018.78 |

N O T E S

1. GLOSSARY

I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY▲

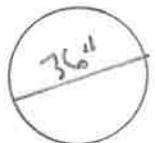
APPENDIX D

DETENTION CALCULATIONS

TRUCK YARD STORAGE

| ELEVATION | DEPTH | VOLUME (C.F.) | VOLUME (AC-FT) | DISCHARGE (cfs) |
|-----------|-------|------------------|-------------------|--------------------|
| 1006 | 0 | 0 | 0 | 0.00 |
| 1007 | 1 | 41247 | 0.95 | 0.60 |
| 1008 | 2 | 112387 | 2.58 | 34.00 |
| 1009 | 3 | 186178 | 4.27 | 48.10 |
| 1010 | 4 | 262640 | 6.03 | 59.00 |
| 1011 | 5 | 341811 | 7.85 | 68.10 |
| 1012 | 6 | 423730 | 9.73 | 76.10 |
| 1013 | 7 | 508435 | 11.67 | 83.40 |
| 1014 | 8 | 595963 | 13.68 | 90.10 |
| 1015 | 9 | 686963 | 15.77 | 96.30 |
| 1016 | 10 | 779646 | 17.90 | 102.10 |
| 1017 | 11 | 875877 | 20.11 | 107.60 |
| 1018 | 12 | 975085 | 22.38 | 112.90 |
| 1019 | 13 | 1077309 | 24.73 | 117.00 |
| 1020 | 14 | 1182586 | 27.15 | 122.70 |
| 1021 | 15 | 1290956 | 29.64 | 127.40 |
| 1022 | 16 | 1402456 | 32.20 | 131.80 |

holes @
Bottom of
RISER



$$\text{AREA} = \pi r^2 = \pi (18)^2 = 1017.8 \text{ in}^2$$

$$Q = A \cdot V = 1017.8 \cdot 64.4 \cdot h = 64400 \cdot h$$

$$h = 1 \quad Q = 64400 \cdot 1 = 64400 \text{ cfs}$$

$$h = 2 \quad Q = 64400 \cdot 2 = 128800 \text{ cfs}$$

$$h = 15 \quad Q = 64400 \cdot 15 = 966000 \text{ cfs}$$

FLOOD ROUTING ANALYSIS
USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
(c) Copyright 1989-99 Advanced Engineering Software (aes)
Ver. 7.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****

* LENA AND NORMAN
* PROPOSED BASIN
* 100-YEAR

FILE NAME: C:\XDRIVE\3575\BASINB.DAT
TIME/DATE OF STUDY: 16:51 06/23/2021

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 1

>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<

(UNIT-HYDROGRAPH ADDED TO STREAM #1)

WATERSHED AREA = 291.300 ACRES
BASEFLOW = 0.000 CFS/SQUARE-MILE
*USER ENTERED "LAG" TIME = 0.230 HOURS
CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
VALLEY (DEVELOPED) S-GRAFH SELECTED
MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) = 0.074
LOW LOSS FRACTION = 0.127
HYDROGRAPH MODEL #1 SPECIFIED

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH)= 0.48
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)= 1.00
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = 1.30
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 1.90
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 2.50
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 5.00

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:

5-MINUTE FACTOR = 0.987
30-MINUTE FACTOR = 0.987
1-HOUR FACTOR = 0.987
3-HOUR FACTOR = 0.998
6-HOUR FACTOR = 0.999
24-HOUR FACTOR = 0.999

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 36.232

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

=====

UNIT HYDROGRAPH DETERMINATION

| INTERVAL NUMBER | "S" GRAPH MEAN VALUES | UNIT HYDROGRAPH ORDINATES(CFS) |
|-----------------|-----------------------|--------------------------------|
| 1 | 2.466 | 86.871 |
| 2 | 16.085 | 479.801 |
| 3 | 41.283 | 887.674 |
| 4 | 69.788 | 1004.224 |
| 5 | 86.806 | 599.512 |
| 6 | 94.520 | 271.764 |
| 7 | 97.754 | 113.944 |
| 8 | 98.689 | 32.926 |
| 9 | 99.338 | 22.862 |
| 10 | 99.735 | 13.998 |
| 11 | 99.934 | 6.999 |
| 12 | 100.000 | 2.333 |

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 13.2053
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 108.0428

□

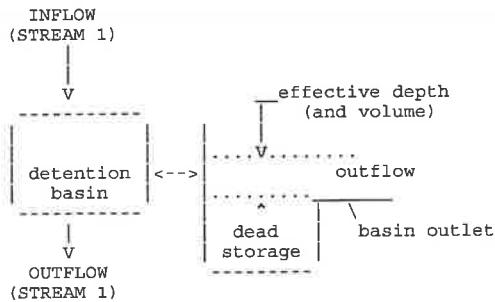
24 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS (CFS)
(Note: Time indicated is at END of Each Unit Intervals)

| TIME (HRS) | VOLUME (AF) | Q (CFS) | 0. | 200.0 | 400.0 | 600.0 | 800.0 |
|------------|-------------|---------|----|-------|-------|-------|-------|
| 14.000 | 42.4381 | 59.04 | . | Q | . | V | . |
| 14.083 | 42.8526 | 60.19 | . | Q | . | V | . |
| 14.167 | 43.2706 | 60.69 | . | Q | . | V | . |
| 14.250 | 43.6869 | 60.45 | . | Q | . | V | . |
| 14.333 | 44.1009 | 60.11 | . | Q | . | V | . |
| 14.417 | 44.5183 | 60.60 | . | Q | . | V | . |
| 14.500 | 44.9444 | 61.87 | . | Q | . | V | . |
| 14.583 | 45.3821 | 63.55 | . | Q | . | V | . |
| 14.667 | 45.8337 | 65.57 | . | Q | . | V | . |
| 14.750 | 46.3003 | 67.76 | . | Q | . | V | . |
| 14.833 | 46.7839 | 70.22 | . | Q | . | V | . |
| 14.917 | 47.2859 | 72.88 | . | Q | . | V | . |
| 15.000 | 47.8086 | 75.90 | . | Q | . | V | . |
| 15.083 | 48.3540 | 79.19 | . | Q | . | V | . |
| 15.167 | 48.9253 | 82.96 | . | Q | . | V | . |
| 15.250 | 49.5254 | 87.14 | . | Q | . | V | . |
| 15.333 | 50.1591 | 92.01 | . | Q | . | V | . |
| 15.417 | 50.8321 | 97.72 | . | Q | . | V | . |
| 15.500 | 51.5579 | 105.39 | . | Q | . | V | . |
| 15.583 | 52.3509 | 115.14 | . | Q | . | V | . |
| 15.667 | 53.2276 | 127.29 | . | Q | . | V | . |
| 15.750 | 54.2046 | 141.86 | . | Q | . | V | . |
| 15.833 | 55.3272 | 163.00 | . | Q | . | V | . |
| 15.917 | 56.6626 | 193.91 | . | Q | . | V | . |
| 16.000 | 58.3361 | 242.98 | . | Q | . | V | . |
| 16.083 | 60.6893 | 341.69 | . | Q | . | V | . |
| 16.167 | 64.4292 | 543.03 | . | Q | . | V | . |
| 16.250 | 69.2968 | 706.77 | . | Q | . | V | . |
| 16.333 | 74.1662 | 707.03 | . | Q | . | V | . |
| 16.417 | 77.5741 | 494.83 | . | Q | . | V | . |
| 16.500 | 79.7107 | 310.23 | . | Q | . | V | . |
| 16.583 | 81.1094 | 203.09 | . | Q | . | V | . |
| 16.667 | 82.0824 | 141.29 | . | Q | . | V | . |
| 16.750 | 82.8842 | 116.42 | . | Q | . | V | . |
| 16.833 | 83.5667 | 99.09 | . | Q | . | V | . |
| 16.917 | 84.1603 | 86.19 | . | Q | . | V | . |
| 17.000 | 84.6883 | 76.67 | . | Q | . | V | . |
| 17.083 | 85.1697 | 69.91 | . | Q | . | V | . |
| 17.167 | 85.6240 | 65.96 | . | Q | . | V | . |
| 17.250 | 86.0622 | 63.63 | . | Q | . | V | . |
| 17.333 | 86.4900 | 62.11 | . | Q | . | V | . |
| 17.417 | 86.9049 | 60.24 | . | Q | . | V | . |
| 17.500 | 87.3049 | 58.08 | . | Q | . | V | . |
| 17.583 | 87.6899 | 55.91 | . | Q | . | V | . |
| 17.667 | 88.0607 | 53.83 | . | Q | . | V | . |
| 17.750 | 88.4184 | 51.94 | . | Q | . | V | . |
| 17.833 | 88.7641 | 50.20 | . | Q | . | V | . |
| 17.917 | 89.0989 | 48.61 | . | Q | . | V | . |
| 18.000 | 89.4235 | 47.13 | . | Q | . | V | . |

FLOW PROCESS FROM NODE 231.00 TO NODE 231.00 IS CODE = 3.1

>>>> FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE (AF) = 0.000
SPECIFIED DEAD STORAGE (AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME (AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE (CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

| INTERVAL NUMBER | DEPTH (FT) | OUTFLOW (CFS) | STORAGE (AF) |
|-----------------|------------|---------------|--------------|
| 1 | 0.00 | 0.00 | 0.000 |
| 2 | 1.00 | 0.60 | 0.950 |
| 3 | 2.00 | 34.00 | 2.580 |
| 4 | 3.00 | 48.10 | 4.270 |
| 5 | 4.00 | 59.00 | 6.030 |

| | | | |
|----|-------|--------|--------|
| 6 | 5.00 | 68.10 | 7.850 |
| 7 | 6.00 | 76.10 | 9.730 |
| 8 | 7.00 | 83.40 | 11.670 |
| 9 | 8.00 | 90.10 | 13.680 |
| 10 | 9.00 | 96.30 | 15.770 |
| 11 | 10.00 | 102.10 | 17.900 |
| 12 | 11.00 | 107.60 | 20.110 |
| 13 | 12.00 | 112.90 | 22.380 |
| 14 | 13.00 | 117.90 | 24.730 |
| 15 | 14.00 | 122.70 | 27.150 |
| 16 | 15.00 | 127.40 | 29.640 |
| 17 | 16.00 | 131.80 | 32.200 |

=====
 MODIFIED-PULS BASIN ROUTING MODEL RESULTS (5-MINUTE COMPUTATION INTERVALS):
 (Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
 MEAN OUTFLOW is the average value during the unit interval.)

| CLOCK TIME (HRS) | DEAD-STORAGE FILLED (AF) | INFLOW (CFS) | LOSS (CFS) | EFFECTIVE DEPTH(FT) | OUTFLOW (CFS) | EFFECTIVE VOLUME(AF) |
|------------------------|-----------------------------|-----------------|---------------|------------------------|------------------|-------------------------|
| 12.083 | 0.000 | 51.64 | 0.00 | 2.84 | 45.7 | 4.002 |
| 12.167 | 0.000 | 50.67 | 0.00 | 2.86 | 46.0 | 4.034 |
| 12.250 | 0.000 | 48.43 | 0.00 | 2.87 | 46.2 | 4.050 |
| 12.333 | 0.000 | 45.84 | 0.00 | 2.87 | 46.3 | 4.047 |
| 12.417 | 0.000 | 44.52 | 0.00 | 2.86 | 46.2 | 4.035 |
| 12.500 | 0.000 | 44.25 | 0.00 | 2.85 | 46.1 | 4.023 |
| 12.583 | 0.000 | 44.48 | 0.00 | 2.85 | 46.0 | 4.012 |
| 12.667 | 0.000 | 44.99 | 0.00 | 2.84 | 45.9 | 4.006 |
| 12.750 | 0.000 | 45.54 | 0.00 | 2.84 | 45.9 | 4.004 |
| 12.833 | 0.000 | 46.16 | 0.00 | 2.84 | 45.9 | 4.005 |
| 12.917 | 0.000 | 46.81 | 0.00 | 2.85 | 45.9 | 4.012 |
| 13.000 | 0.000 | 47.52 | 0.00 | 2.85 | 46.0 | 4.022 |
| 13.083 | 0.000 | 48.25 | 0.00 | 2.86 | 46.1 | 4.037 |
| 13.167 | 0.000 | 49.02 | 0.00 | 2.87 | 46.2 | 4.056 |
| 13.250 | 0.000 | 49.81 | 0.00 | 2.89 | 46.4 | 4.079 |
| 13.333 | 0.000 | 50.66 | 0.00 | 2.90 | 46.6 | 4.107 |
| 13.417 | 0.000 | 51.53 | 0.00 | 2.92 | 46.9 | 4.139 |
| 13.500 | 0.000 | 52.45 | 0.00 | 2.94 | 47.2 | 4.176 |
| 13.583 | 0.000 | 53.41 | 0.00 | 2.97 | 47.5 | 4.217 |
| 13.667 | 0.000 | 54.43 | 0.00 | 3.00 | 47.8 | 4.262 |
| 13.750 | 0.000 | 55.48 | 0.00 | 3.02 | 48.2 | 4.312 |
| 13.833 | 0.000 | 56.61 | 0.00 | 3.06 | 48.5 | 4.368 |
| 13.917 | 0.000 | 57.78 | 0.00 | 3.09 | 48.9 | 4.429 |
| 14.000 | 0.000 | 59.04 | 0.00 | 3.13 | 49.3 | 4.496 |
| 14.083 | 0.000 | 60.19 | 0.00 | 3.17 | 49.7 | 4.568 |
| 14.167 | 0.000 | 60.69 | 0.00 | 3.21 | 50.2 | 4.641 |
| 14.250 | 0.000 | 60.45 | 0.00 | 3.25 | 50.6 | 4.708 |
| 14.333 | 0.000 | 60.11 | 0.00 | 3.28 | 51.0 | 4.771 |
| 14.417 | 0.000 | 60.60 | 0.00 | 3.32 | 51.4 | 4.834 |
| 14.500 | 0.000 | 61.87 | 0.00 | 3.36 | 51.8 | 4.904 |
| 14.583 | 0.000 | 63.55 | 0.00 | 3.40 | 52.3 | 4.981 |
| 14.667 | 0.000 | 65.57 | 0.00 | 3.45 | 52.8 | 5.070 |
| 14.750 | 0.000 | 67.76 | 0.00 | 3.51 | 53.4 | 5.169 |
| 14.833 | 0.000 | 70.22 | 0.00 | 3.57 | 54.0 | 5.280 |
| 14.917 | 0.000 | 72.88 | 0.00 | 3.65 | 54.7 | 5.405 |
| 15.000 | 0.000 | 75.90 | 0.00 | 3.72 | 55.6 | 5.545 |
| 15.083 | 0.000 | 79.19 | 0.00 | 3.81 | 56.5 | 5.702 |
| 15.167 | 0.000 | 82.96 | 0.00 | 3.91 | 57.5 | 5.877 |
| 15.250 | 0.000 | 87.14 | 0.00 | 4.02 | 58.6 | 6.073 |
| 15.333 | 0.000 | 92.01 | 0.00 | 4.15 | 59.8 | 6.295 |
| 15.417 | 0.000 | 97.72 | 0.00 | 4.28 | 61.0 | 6.548 |
| 15.500 | 0.000 | 105.39 | 0.00 | 4.45 | 62.3 | 6.845 |
| 15.583 | 0.000 | 115.14 | 0.00 | 4.64 | 64.0 | 7.197 |
| 15.667 | 0.000 | 127.29 | 0.00 | 4.87 | 65.9 | 7.620 |
| 15.750 | 0.000 | 141.86 | 0.00 | 5.15 | 68.1 | 8.128 |
| 15.833 | 0.000 | 163.00 | 0.00 | 5.49 | 70.6 | 8.764 |
| 15.917 | 0.000 | 193.91 | 0.00 | 5.93 | 73.8 | 9.592 |
| 16.000 | 0.000 | 242.98 | 0.00 | 6.52 | 77.7 | 10.730 |
| 16.083 | 0.000 | 341.69 | 0.00 | 7.42 | 83.0 | 12.512 |
| 16.167 | 0.000 | 543.03 | 0.00 | 8.93 | 91.0 | 15.625 |
| 16.250 | 0.000 | 706.77 | 0.00 | 10.86 | 101.3 | 19.794 |
| 16.333 | 0.000 | 707.03 | 0.00 | 12.65 | 111.5 | 23.896 |
| 16.417 | 0.000 | 494.83 | 0.00 | 13.73 | 118.8 | 26.486 |
| 16.500 | 0.000 | 310.23 | 0.00 | 14.25 | 122.6 | 27.778 |
| 16.583 | 0.000 | 203.09 | 0.00 | 14.47 | 124.4 | 28.320 |
| 16.667 | 0.000 | 141.29 | 0.00 | 14.51 | 125.0 | 28.432 |
| 16.750 | 0.000 | 116.42 | 0.00 | 14.49 | 125.1 | 28.372 |
| 16.833 | 0.000 | 99.09 | 0.00 | 14.42 | 124.8 | 28.195 |
| 16.917 | 0.000 | 86.19 | 0.00 | 14.31 | 124.4 | 27.932 |
| 17.000 | 0.000 | 76.67 | 0.00 | 14.18 | 123.9 | 27.607 |
| 17.083 | 0.000 | 69.91 | 0.00 | 14.04 | 123.2 | 27.240 |
| 17.167 | 0.000 | 65.96 | 0.00 | 13.88 | 122.5 | 26.850 |
| 17.250 | 0.000 | 63.63 | 0.00 | 13.71 | 121.7 | 26.450 |
| 17.333 | 0.000 | 62.11 | 0.00 | 13.54 | 120.9 | 26.045 |
| 17.417 | 0.000 | 60.24 | 0.00 | 13.37 | 120.1 | 25.633 |
| 17.500 | 0.000 | 58.08 | 0.00 | 13.20 | 119.3 | 25.212 |
| 17.583 | 0.000 | 55.91 | 0.00 | 13.02 | 118.4 | 24.781 |
| 17.667 | 0.000 | 53.83 | 0.00 | 12.84 | 117.5 | 24.342 |
| 17.750 | 0.000 | 51.94 | 0.00 | 12.65 | 116.6 | 23.897 |
| 17.833 | 0.000 | 50.20 | 0.00 | 12.45 | 115.6 | 23.446 |
| 17.917 | 0.000 | 48.61 | 0.00 | 12.26 | 114.7 | 22.991 |
| 18.000 | 0.000 | 47.13 | 0.00 | 12.06 | 113.7 | 22.533 |
| 18.083 | 0.000 | 46.04 | 0.00 | 11.86 | 112.7 | 22.073 |
| 18.167 | 0.000 | 46.27 | 0.00 | 11.67 | 111.7 | 21.623 |
| 18.250 | 0.000 | 47.85 | 0.00 | 11.48 | 110.6 | 21.191 |
| 18.333 | 0.000 | 49.86 | 0.00 | 11.29 | 109.6 | 20.779 |

| | | | | | | |
|--------|-------|-------|------|-------|-------|--------|
| 18.417 | 0.000 | 50.67 | 0.00 | 11.12 | 108.7 | 20.379 |
| 18.500 | 0.000 | 50.52 | 0.00 | 10.94 | 107.8 | 19.985 |
| 18.583 | 0.000 | 49.92 | 0.00 | 10.77 | 106.8 | 19.594 |
| 18.667 | 0.000 | 49.13 | 0.00 | 10.59 | 105.8 | 19.203 |
| 18.750 | 0.000 | 48.34 | 0.00 | 10.41 | 104.9 | 18.814 |
| 18.833 | 0.000 | 47.58 | 0.00 | 10.24 | 103.9 | 18.426 |
| 18.917 | 0.000 | 46.83 | 0.00 | 10.06 | 102.9 | 18.040 |
| 19.000 | 0.000 | 46.10 | 0.00 | 9.88 | 101.9 | 17.655 |
| 19.083 | 0.000 | 45.40 | 0.00 | 9.71 | 100.9 | 17.273 |
| 19.167 | 0.000 | 44.73 | 0.00 | 9.53 | 99.9 | 16.893 |
| 19.250 | 0.000 | 44.09 | 0.00 | 9.35 | 98.8 | 16.516 |
| 19.333 | 0.000 | 43.47 | 0.00 | 9.17 | 97.8 | 16.142 |
| 19.417 | 0.000 | 42.89 | 0.00 | 9.00 | 96.8 | 15.770 |
| 19.500 | 0.000 | 42.32 | 0.00 | 8.82 | 95.8 | 15.402 |
| 19.583 | 0.000 | 41.78 | 0.00 | 8.65 | 94.7 | 15.038 |
| 19.667 | 0.000 | 41.25 | 0.00 | 8.48 | 93.6 | 14.677 |
| 19.750 | 0.000 | 40.75 | 0.00 | 8.31 | 92.5 | 14.321 |
| 19.833 | 0.000 | 40.26 | 0.00 | 8.14 | 91.5 | 13.968 |
| 19.917 | 0.000 | 39.79 | 0.00 | 7.97 | 90.4 | 13.619 |
| 20.000 | 0.000 | 39.34 | 0.00 | 7.80 | 89.3 | 13.275 |
| 20.083 | 0.000 | 38.90 | 0.00 | 7.63 | 88.2 | 12.936 |
| 20.167 | 0.000 | 38.48 | 0.00 | 7.46 | 87.1 | 12.601 |
| 20.250 | 0.000 | 38.07 | 0.00 | 7.30 | 86.0 | 12.271 |
| 20.333 | 0.000 | 37.67 | 0.00 | 7.14 | 84.9 | 11.946 |
| 20.417 | 0.000 | 37.29 | 0.00 | 6.98 | 83.8 | 11.626 |
| 20.500 | 0.000 | 36.91 | 0.00 | 6.82 | 82.6 | 11.311 |
| 20.583 | 0.000 | 36.55 | 0.00 | 6.66 | 81.5 | 11.002 |
| 20.667 | 0.000 | 36.20 | 0.00 | 6.50 | 80.3 | 10.698 |
| 20.750 | 0.000 | 35.86 | 0.00 | 6.35 | 79.2 | 10.400 |
| 20.833 | 0.000 | 35.53 | 0.00 | 6.19 | 78.1 | 10.107 |
| 20.917 | 0.000 | 35.20 | 0.00 | 6.05 | 77.0 | 9.819 |
| 21.000 | 0.000 | 34.89 | 0.00 | 5.90 | 75.9 | 9.537 |
| 21.083 | 0.000 | 34.58 | 0.00 | 5.75 | 74.7 | 9.261 |
| 21.167 | 0.000 | 34.28 | 0.00 | 5.61 | 73.5 | 8.990 |
| 21.250 | 0.000 | 33.99 | 0.00 | 5.47 | 72.4 | 8.726 |
| 21.333 | 0.000 | 33.71 | 0.00 | 5.33 | 71.3 | 8.467 |
| 21.417 | 0.000 | 33.43 | 0.00 | 5.19 | 70.2 | 8.214 |
| 21.500 | 0.000 | 33.16 | 0.00 | 5.06 | 69.1 | 7.966 |
| 21.583 | 0.000 | 32.90 | 0.00 | 4.93 | 68.0 | 7.724 |
| 21.667 | 0.000 | 32.64 | 0.00 | 4.80 | 66.9 | 7.489 |
| 21.750 | 0.000 | 32.39 | 0.00 | 4.68 | 65.7 | 7.259 |
| 21.833 | 0.000 | 32.14 | 0.00 | 4.55 | 64.6 | 7.036 |
| 21.917 | 0.000 | 31.90 | 0.00 | 4.43 | 63.5 | 6.818 |
| 22.000 | 0.000 | 31.67 | 0.00 | 4.32 | 62.4 | 6.606 |
| 22.083 | 0.000 | 31.44 | 0.00 | 4.20 | 61.4 | 6.400 |
| 22.167 | 0.000 | 31.22 | 0.00 | 4.09 | 60.3 | 6.200 |
| 22.250 | 0.000 | 31.00 | 0.00 | 3.99 | 59.3 | 6.004 |
| 22.333 | 0.000 | 30.78 | 0.00 | 3.88 | 58.3 | 5.815 |
| 22.417 | 0.000 | 30.57 | 0.00 | 3.77 | 57.1 | 5.632 |
| 22.500 | 0.000 | 30.36 | 0.00 | 3.67 | 56.0 | 5.456 |
| 22.583 | 0.000 | 30.16 | 0.00 | 3.58 | 54.9 | 5.285 |
| 22.667 | 0.000 | 29.96 | 0.00 | 3.48 | 53.9 | 5.121 |
| 22.750 | 0.000 | 29.77 | 0.00 | 3.39 | 52.9 | 4.961 |
| 22.833 | 0.000 | 29.58 | 0.00 | 3.31 | 51.9 | 4.808 |
| 22.917 | 0.000 | 29.39 | 0.00 | 3.22 | 51.0 | 4.659 |
| 23.000 | 0.000 | 29.21 | 0.00 | 3.14 | 50.1 | 4.515 |
| 23.083 | 0.000 | 29.02 | 0.00 | 3.06 | 49.2 | 4.377 |
| 23.167 | 0.000 | 28.85 | 0.00 | 2.98 | 48.3 | 4.242 |
| 23.250 | 0.000 | 28.67 | 0.00 | 2.91 | 47.3 | 4.114 |
| 23.333 | 0.000 | 28.50 | 0.00 | 2.84 | 46.3 | 3.991 |
| 23.417 | 0.000 | 28.34 | 0.00 | 2.77 | 45.3 | 3.875 |
| 23.500 | 0.000 | 28.17 | 0.00 | 2.70 | 44.3 | 3.763 |
| 23.583 | 0.000 | 28.01 | 0.00 | 2.64 | 43.4 | 3.657 |
| 23.667 | 0.000 | 27.85 | 0.00 | 2.58 | 42.6 | 3.556 |
| 23.750 | 0.000 | 27.69 | 0.00 | 2.52 | 41.7 | 3.459 |
| 23.833 | 0.000 | 27.54 | 0.00 | 2.47 | 40.9 | 3.367 |
| 23.917 | 0.000 | 27.39 | 0.00 | 2.41 | 40.2 | 3.279 |
| 24.000 | 0.000 | 27.24 | 0.00 | 2.36 | 39.5 | 3.194 |
| 24.083 | 0.000 | 26.44 | 0.00 | 2.31 | 38.8 | 3.109 |
| 24.167 | 0.000 | 22.66 | 0.00 | 2.25 | 38.0 | 3.004 |
| 24.250 | 0.000 | 15.82 | 0.00 | 2.16 | 36.9 | 2.858 |
| 24.333 | 0.000 | 8.13 | 0.00 | 2.05 | 35.5 | 2.670 |
| 24.417 | 0.000 | 3.55 | 0.00 | 1.93 | 33.2 | 2.466 |
| 24.500 | 0.000 | 1.48 | 0.00 | 1.81 | 29.7 | 2.271 |
| 24.583 | 0.000 | 0.61 | 0.00 | 1.70 | 25.9 | 2.097 |
| 24.667 | 0.000 | 0.35 | 0.00 | 1.61 | 22.5 | 1.944 |
| 24.750 | 0.000 | 0.18 | 0.00 | 1.53 | 19.6 | 1.811 |
| 24.833 | 0.000 | 0.07 | 0.00 | 1.46 | 17.0 | 1.694 |
| 24.917 | 0.000 | 0.02 | 0.00 | 1.39 | 14.8 | 1.592 |
| 25.000 | 0.000 | 0.00 | 0.00 | 1.34 | 12.8 | 1.503 |
| 25.083 | 0.000 | 0.00 | 0.00 | 1.29 | 11.2 | 1.427 |
| 25.167 | 0.000 | 0.00 | 0.00 | 1.25 | 9.7 | 1.360 |
| 25.250 | 0.000 | 0.00 | 0.00 | 1.22 | 8.4 | 1.302 |
| 25.333 | 0.000 | 0.00 | 0.00 | 1.19 | 7.3 | 1.252 |
| 25.417 | 0.000 | 0.00 | 0.00 | 1.16 | 6.3 | 1.208 |
| 25.500 | 0.000 | 0.00 | 0.00 | 1.14 | 5.5 | 1.170 |
| 25.583 | 0.000 | 0.00 | 0.00 | 1.11 | 4.8 | 1.137 |
| 25.667 | 0.000 | 0.00 | 0.00 | 1.10 | 4.1 | 1.109 |
| 25.750 | 0.000 | 0.00 | 0.00 | 1.08 | 3.6 | 1.084 |
| 25.833 | 0.000 | 0.00 | 0.00 | 1.07 | 3.1 | 1.062 |
| 25.917 | 0.000 | 0.00 | 0.00 | 1.06 | 2.7 | 1.044 |
| 26.000 | 0.000 | 0.00 | 0.00 | 1.05 | 2.4 | 1.028 |
| 26.083 | 0.000 | 0.00 | 0.00 | 1.04 | 2.0 | 1.013 |
| 26.167 | 0.000 | 0.00 | 0.00 | 1.03 | 1.8 | 1.001 |
| 26.250 | 0.000 | 0.00 | 0.00 | 1.02 | 1.5 | 0.991 |
| 26.333 | 0.000 | 0.00 | 0.00 | 1.02 | 1.3 | 0.981 |
| 26.417 | 0.000 | 0.00 | 0.00 | 1.01 | 1.2 | 0.973 |
| 26.500 | 0.000 | 0.00 | 0.00 | 1.01 | 1.0 | 0.966 |
| 26.583 | 0.000 | 0.00 | 0.00 | 1.01 | 0.9 | 0.960 |

| | | | | | | |
|--------|-------|------|------|------|-----|-------|
| 26.667 | 0.000 | 0.00 | 0.00 | 1.00 | 0.8 | 0.955 |
| 26.750 | 0.000 | 0.00 | 0.00 | 1.00 | 0.7 | 0.951 |
| 26.833 | 0.000 | 0.00 | 0.00 | 1.00 | 0.6 | 0.946 |
| 26.917 | 0.000 | 0.00 | 0.00 | 0.99 | 0.6 | 0.942 |
| 27.000 | 0.000 | 0.00 | 0.00 | 0.99 | 0.6 | 0.938 |
| 27.083 | 0.000 | 0.00 | 0.00 | 0.98 | 0.6 | 0.934 |
| 27.167 | 0.000 | 0.00 | 0.00 | 0.98 | 0.6 | 0.930 |
| 27.250 | 0.000 | 0.00 | 0.00 | 0.97 | 0.6 | 0.926 |
| 27.333 | 0.000 | 0.00 | 0.00 | 0.97 | 0.6 | 0.922 |
| 27.417 | 0.000 | 0.00 | 0.00 | 0.97 | 0.6 | 0.918 |
| 27.500 | 0.000 | 0.00 | 0.00 | 0.96 | 0.6 | 0.914 |
| 27.583 | 0.000 | 0.00 | 0.00 | 0.96 | 0.6 | 0.910 |
| 27.667 | 0.000 | 0.00 | 0.00 | 0.95 | 0.6 | 0.906 |
| 27.750 | 0.000 | 0.00 | 0.00 | 0.95 | 0.6 | 0.902 |
| 27.833 | 0.000 | 0.00 | 0.00 | 0.95 | 0.6 | 0.898 |
| 27.917 | 0.000 | 0.00 | 0.00 | 0.94 | 0.6 | 0.894 |
| 28.000 | 0.000 | 0.00 | 0.00 | 0.94 | 0.6 | 0.891 |
| 28.083 | 0.000 | 0.00 | 0.00 | 0.93 | 0.6 | 0.887 |
| 28.167 | 0.000 | 0.00 | 0.00 | 0.93 | 0.6 | 0.883 |
| 28.250 | 0.000 | 0.00 | 0.00 | 0.93 | 0.6 | 0.879 |
| 28.333 | 0.000 | 0.00 | 0.00 | 0.92 | 0.6 | 0.875 |
| 28.417 | 0.000 | 0.00 | 0.00 | 0.92 | 0.6 | 0.871 |
| 28.500 | 0.000 | 0.00 | 0.00 | 0.91 | 0.5 | 0.868 |
| 28.583 | 0.000 | 0.00 | 0.00 | 0.91 | 0.5 | 0.864 |
| 28.667 | 0.000 | 0.00 | 0.00 | 0.91 | 0.5 | 0.860 |
| 28.750 | 0.000 | 0.00 | 0.00 | 0.90 | 0.5 | 0.856 |
| 28.833 | 0.000 | 0.00 | 0.00 | 0.90 | 0.5 | 0.853 |
| 28.917 | 0.000 | 0.00 | 0.00 | 0.89 | 0.5 | 0.849 |
| 29.000 | 0.000 | 0.00 | 0.00 | 0.89 | 0.5 | 0.845 |
| 29.083 | 0.000 | 0.00 | 0.00 | 0.89 | 0.5 | 0.842 |
| 29.167 | 0.000 | 0.00 | 0.00 | 0.88 | 0.5 | 0.838 |
| 29.250 | 0.000 | 0.00 | 0.00 | 0.88 | 0.5 | 0.834 |
| 29.333 | 0.000 | 0.00 | 0.00 | 0.87 | 0.5 | 0.831 |
| 29.417 | 0.000 | 0.00 | 0.00 | 0.87 | 0.5 | 0.827 |
| 29.500 | 0.000 | 0.00 | 0.00 | 0.87 | 0.5 | 0.824 |
| 29.583 | 0.000 | 0.00 | 0.00 | 0.86 | 0.5 | 0.820 |
| 29.667 | 0.000 | 0.00 | 0.00 | 0.86 | 0.5 | 0.816 |
| 29.750 | 0.000 | 0.00 | 0.00 | 0.86 | 0.5 | 0.813 |
| 29.833 | 0.000 | 0.00 | 0.00 | 0.85 | 0.5 | 0.809 |
| 29.917 | 0.000 | 0.00 | 0.00 | 0.85 | 0.5 | 0.806 |
| 30.000 | 0.000 | 0.00 | 0.00 | 0.84 | 0.5 | 0.802 |
| 30.083 | 0.000 | 0.00 | 0.00 | 0.84 | 0.5 | 0.799 |
| 30.167 | 0.000 | 0.00 | 0.00 | 0.84 | 0.5 | 0.795 |
| 30.250 | 0.000 | 0.00 | 0.00 | 0.83 | 0.5 | 0.792 |
| 30.333 | 0.000 | 0.00 | 0.00 | 0.83 | 0.5 | 0.788 |
| 30.417 | 0.000 | 0.00 | 0.00 | 0.83 | 0.5 | 0.785 |
| 30.500 | 0.000 | 0.00 | 0.00 | 0.82 | 0.5 | 0.782 |
| 30.583 | 0.000 | 0.00 | 0.00 | 0.82 | 0.5 | 0.778 |
| 30.667 | 0.000 | 0.00 | 0.00 | 0.82 | 0.5 | 0.775 |
| 30.750 | 0.000 | 0.00 | 0.00 | 0.81 | 0.5 | 0.771 |
| 30.833 | 0.000 | 0.00 | 0.00 | 0.81 | 0.5 | 0.768 |
| 30.917 | 0.000 | 0.00 | 0.00 | 0.81 | 0.5 | 0.765 |
| 31.000 | 0.000 | 0.00 | 0.00 | 0.80 | 0.5 | 0.761 |
| 31.083 | 0.000 | 0.00 | 0.00 | 0.80 | 0.5 | 0.758 |
| 31.167 | 0.000 | 0.00 | 0.00 | 0.79 | 0.5 | 0.755 |
| 31.250 | 0.000 | 0.00 | 0.00 | 0.79 | 0.5 | 0.752 |
| 31.333 | 0.000 | 0.00 | 0.00 | 0.79 | 0.5 | 0.748 |
| 31.417 | 0.000 | 0.00 | 0.00 | 0.78 | 0.5 | 0.745 |
| 31.500 | 0.000 | 0.00 | 0.00 | 0.78 | 0.5 | 0.742 |
| 31.583 | 0.000 | 0.00 | 0.00 | 0.78 | 0.5 | 0.739 |
| 31.667 | 0.000 | 0.00 | 0.00 | 0.77 | 0.5 | 0.735 |
| 31.750 | 0.000 | 0.00 | 0.00 | 0.77 | 0.5 | 0.732 |
| 31.833 | 0.000 | 0.00 | 0.00 | 0.77 | 0.5 | 0.729 |
| 31.917 | 0.000 | 0.00 | 0.00 | 0.76 | 0.5 | 0.726 |
| 32.000 | 0.000 | 0.00 | 0.00 | 0.76 | 0.5 | 0.723 |
| 32.083 | 0.000 | 0.00 | 0.00 | 0.76 | 0.5 | 0.720 |
| 32.167 | 0.000 | 0.00 | 0.00 | 0.75 | 0.5 | 0.716 |
| 32.250 | 0.000 | 0.00 | 0.00 | 0.75 | 0.5 | 0.713 |
| 32.333 | 0.000 | 0.00 | 0.00 | 0.75 | 0.4 | 0.710 |
| 32.417 | 0.000 | 0.00 | 0.00 | 0.74 | 0.4 | 0.707 |
| 32.500 | 0.000 | 0.00 | 0.00 | 0.74 | 0.4 | 0.704 |
| 32.583 | 0.000 | 0.00 | 0.00 | 0.74 | 0.4 | 0.701 |
| 32.667 | 0.000 | 0.00 | 0.00 | 0.73 | 0.4 | 0.698 |
| 32.750 | 0.000 | 0.00 | 0.00 | 0.73 | 0.4 | 0.695 |
| 32.833 | 0.000 | 0.00 | 0.00 | 0.73 | 0.4 | 0.692 |
| 32.917 | 0.000 | 0.00 | 0.00 | 0.73 | 0.4 | 0.689 |
| 33.000 | 0.000 | 0.00 | 0.00 | 0.72 | 0.4 | 0.686 |
| 33.083 | 0.000 | 0.00 | 0.00 | 0.72 | 0.4 | 0.683 |
| 33.167 | 0.000 | 0.00 | 0.00 | 0.72 | 0.4 | 0.680 |
| 33.250 | 0.000 | 0.00 | 0.00 | 0.71 | 0.4 | 0.677 |
| 33.333 | 0.000 | 0.00 | 0.00 | 0.71 | 0.4 | 0.674 |
| 33.417 | 0.000 | 0.00 | 0.00 | 0.71 | 0.4 | 0.671 |
| 33.500 | 0.000 | 0.00 | 0.00 | 0.70 | 0.4 | 0.668 |
| 33.583 | 0.000 | 0.00 | 0.00 | 0.70 | 0.4 | 0.665 |
| 33.667 | 0.000 | 0.00 | 0.00 | 0.70 | 0.4 | 0.663 |
| 33.750 | 0.000 | 0.00 | 0.00 | 0.69 | 0.4 | 0.660 |
| 33.833 | 0.000 | 0.00 | 0.00 | 0.69 | 0.4 | 0.657 |
| 33.917 | 0.000 | 0.00 | 0.00 | 0.69 | 0.4 | 0.654 |
| 34.000 | 0.000 | 0.00 | 0.00 | 0.69 | 0.4 | 0.651 |
| 34.083 | 0.000 | 0.00 | 0.00 | 0.68 | 0.4 | 0.648 |
| 34.167 | 0.000 | 0.00 | 0.00 | 0.68 | 0.4 | 0.645 |
| 34.250 | 0.000 | 0.00 | 0.00 | 0.68 | 0.4 | 0.643 |
| 34.333 | 0.000 | 0.00 | 0.00 | 0.67 | 0.4 | 0.640 |
| 34.417 | 0.000 | 0.00 | 0.00 | 0.67 | 0.4 | 0.637 |
| 34.500 | 0.000 | 0.00 | 0.00 | 0.67 | 0.4 | 0.634 |
| 34.583 | 0.000 | 0.00 | 0.00 | 0.66 | 0.4 | 0.632 |
| 34.667 | 0.000 | 0.00 | 0.00 | 0.66 | 0.4 | 0.629 |
| 34.750 | 0.000 | 0.00 | 0.00 | 0.66 | 0.4 | 0.626 |
| 34.833 | 0.000 | 0.00 | 0.00 | 0.66 | 0.4 | 0.623 |

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|--------|-------|------|------|------|-----|-------|
| 34.917 | 0.000 | 0.00 | 0.00 | 0.65 | 0.4 | 0.621 |
| 35.000 | 0.000 | 0.00 | 0.00 | 0.65 | 0.4 | 0.618 |
| 35.083 | 0.000 | 0.00 | 0.00 | 0.65 | 0.4 | 0.615 |
| 35.167 | 0.000 | 0.00 | 0.00 | 0.64 | 0.4 | 0.613 |
| 35.250 | 0.000 | 0.00 | 0.00 | 0.64 | 0.4 | 0.610 |
| 35.333 | 0.000 | 0.00 | 0.00 | 0.64 | 0.4 | 0.607 |
| 35.417 | 0.000 | 0.00 | 0.00 | 0.64 | 0.4 | 0.605 |
| 35.500 | 0.000 | 0.00 | 0.00 | 0.63 | 0.4 | 0.602 |
| 35.583 | 0.000 | 0.00 | 0.00 | 0.63 | 0.4 | 0.599 |
| 35.667 | 0.000 | 0.00 | 0.00 | 0.63 | 0.4 | 0.597 |
| 35.750 | 0.000 | 0.00 | 0.00 | 0.63 | 0.4 | 0.594 |
| 35.833 | 0.000 | 0.00 | 0.00 | 0.62 | 0.4 | 0.592 |
| 35.917 | 0.000 | 0.00 | 0.00 | 0.62 | 0.4 | 0.589 |
| 36.000 | 0.000 | 0.00 | 0.00 | 0.62 | 0.4 | 0.587 |
| 36.083 | 0.000 | 0.00 | 0.00 | 0.61 | 0.4 | 0.584 |
| 36.167 | 0.000 | 0.00 | 0.00 | 0.61 | 0.4 | 0.581 |
| 36.250 | 0.000 | 0.00 | 0.00 | 0.61 | 0.4 | 0.579 |
| 36.333 | 0.000 | 0.00 | 0.00 | 0.61 | 0.4 | 0.576 |
| 36.417 | 0.000 | 0.00 | 0.00 | 0.60 | 0.4 | 0.574 |
| 36.500 | 0.000 | 0.00 | 0.00 | 0.60 | 0.4 | 0.571 |
| 36.583 | 0.000 | 0.00 | 0.00 | 0.60 | 0.4 | 0.569 |
| 36.667 | 0.000 | 0.00 | 0.00 | 0.60 | 0.4 | 0.567 |
| 36.750 | 0.000 | 0.00 | 0.00 | 0.59 | 0.4 | 0.564 |
| 36.833 | 0.000 | 0.00 | 0.00 | 0.59 | 0.4 | 0.562 |
| 36.917 | 0.000 | 0.00 | 0.00 | 0.59 | 0.4 | 0.559 |
| 37.000 | 0.000 | 0.00 | 0.00 | 0.59 | 0.4 | 0.557 |
| 37.083 | 0.000 | 0.00 | 0.00 | 0.58 | 0.4 | 0.554 |
| 37.167 | 0.000 | 0.00 | 0.00 | 0.58 | 0.3 | 0.552 |
| 37.250 | 0.000 | 0.00 | 0.00 | 0.58 | 0.3 | 0.550 |
| 37.333 | 0.000 | 0.00 | 0.00 | 0.58 | 0.3 | 0.547 |
| 37.417 | 0.000 | 0.00 | 0.00 | 0.57 | 0.3 | 0.545 |
| 37.500 | 0.000 | 0.00 | 0.00 | 0.57 | 0.3 | 0.542 |
| 37.583 | 0.000 | 0.00 | 0.00 | 0.57 | 0.3 | 0.540 |
| 37.667 | 0.000 | 0.00 | 0.00 | 0.57 | 0.3 | 0.538 |
| 37.750 | 0.000 | 0.00 | 0.00 | 0.56 | 0.3 | 0.535 |
| 37.833 | 0.000 | 0.00 | 0.00 | 0.56 | 0.3 | 0.533 |
| 37.917 | 0.000 | 0.00 | 0.00 | 0.56 | 0.3 | 0.531 |
| 38.000 | 0.000 | 0.00 | 0.00 | 0.56 | 0.3 | 0.528 |
| 38.083 | 0.000 | 0.00 | 0.00 | 0.55 | 0.3 | 0.526 |
| 38.167 | 0.000 | 0.00 | 0.00 | 0.55 | 0.3 | 0.524 |
| 38.250 | 0.000 | 0.00 | 0.00 | 0.55 | 0.3 | 0.522 |
| 38.333 | 0.000 | 0.00 | 0.00 | 0.55 | 0.3 | 0.519 |
| 38.417 | 0.000 | 0.00 | 0.00 | 0.54 | 0.3 | 0.517 |
| 38.500 | 0.000 | 0.00 | 0.00 | 0.54 | 0.3 | 0.515 |
| 38.583 | 0.000 | 0.00 | 0.00 | 0.54 | 0.3 | 0.513 |
| 38.667 | 0.000 | 0.00 | 0.00 | 0.54 | 0.3 | 0.510 |
| 38.750 | 0.000 | 0.00 | 0.00 | 0.53 | 0.3 | 0.508 |
| 38.833 | 0.000 | 0.00 | 0.00 | 0.53 | 0.3 | 0.506 |
| 38.917 | 0.000 | 0.00 | 0.00 | 0.53 | 0.3 | 0.504 |
| 39.000 | 0.000 | 0.00 | 0.00 | 0.53 | 0.3 | 0.502 |
| 39.083 | 0.000 | 0.00 | 0.00 | 0.53 | 0.3 | 0.499 |
| 39.167 | 0.000 | 0.00 | 0.00 | 0.52 | 0.3 | 0.497 |
| 39.250 | 0.000 | 0.00 | 0.00 | 0.52 | 0.3 | 0.495 |
| 39.333 | 0.000 | 0.00 | 0.00 | 0.52 | 0.3 | 0.493 |
| 39.417 | 0.000 | 0.00 | 0.00 | 0.52 | 0.3 | 0.491 |
| 39.500 | 0.000 | 0.00 | 0.00 | 0.51 | 0.3 | 0.489 |
| 39.583 | 0.000 | 0.00 | 0.00 | 0.51 | 0.3 | 0.487 |
| 39.667 | 0.000 | 0.00 | 0.00 | 0.51 | 0.3 | 0.484 |
| 39.750 | 0.000 | 0.00 | 0.00 | 0.51 | 0.3 | 0.482 |
| 39.833 | 0.000 | 0.00 | 0.00 | 0.51 | 0.3 | 0.480 |
| 39.917 | 0.000 | 0.00 | 0.00 | 0.50 | 0.3 | 0.478 |
| 40.000 | 0.000 | 0.00 | 0.00 | 0.50 | 0.3 | 0.476 |
| 40.083 | 0.000 | 0.00 | 0.00 | 0.50 | 0.3 | 0.474 |
| 40.167 | 0.000 | 0.00 | 0.00 | 0.50 | 0.3 | 0.472 |
| 40.250 | 0.000 | 0.00 | 0.00 | 0.49 | 0.3 | 0.470 |
| 40.333 | 0.000 | 0.00 | 0.00 | 0.49 | 0.3 | 0.468 |
| 40.417 | 0.000 | 0.00 | 0.00 | 0.49 | 0.3 | 0.466 |
| 40.500 | 0.000 | 0.00 | 0.00 | 0.49 | 0.3 | 0.464 |
| 40.583 | 0.000 | 0.00 | 0.00 | 0.49 | 0.3 | 0.462 |
| 40.667 | 0.000 | 0.00 | 0.00 | 0.48 | 0.3 | 0.460 |
| 40.750 | 0.000 | 0.00 | 0.00 | 0.48 | 0.3 | 0.458 |
| 40.833 | 0.000 | 0.00 | 0.00 | 0.48 | 0.3 | 0.456 |
| 40.917 | 0.000 | 0.00 | 0.00 | 0.48 | 0.3 | 0.454 |
| 41.000 | 0.000 | 0.00 | 0.00 | 0.48 | 0.3 | 0.452 |
| 41.083 | 0.000 | 0.00 | 0.00 | 0.47 | 0.3 | 0.450 |
| 41.167 | 0.000 | 0.00 | 0.00 | 0.47 | 0.3 | 0.448 |
| 41.250 | 0.000 | 0.00 | 0.00 | 0.47 | 0.3 | 0.446 |
| 41.333 | 0.000 | 0.00 | 0.00 | 0.47 | 0.3 | 0.444 |
| 41.417 | 0.000 | 0.00 | 0.00 | 0.47 | 0.3 | 0.442 |
| 41.500 | 0.000 | 0.00 | 0.00 | 0.46 | 0.3 | 0.440 |
| 41.583 | 0.000 | 0.00 | 0.00 | 0.46 | 0.3 | 0.438 |
| 41.667 | 0.000 | 0.00 | 0.00 | 0.46 | 0.3 | 0.436 |
| 41.750 | 0.000 | 0.00 | 0.00 | 0.46 | 0.3 | 0.434 |
| 41.833 | 0.000 | 0.00 | 0.00 | 0.46 | 0.3 | 0.433 |
| 41.917 | 0.000 | 0.00 | 0.00 | 0.45 | 0.3 | 0.431 |
| 42.000 | 0.000 | 0.00 | 0.00 | 0.45 | 0.3 | 0.429 |
| 42.083 | 0.000 | 0.00 | 0.00 | 0.45 | 0.3 | 0.427 |
| 42.167 | 0.000 | 0.00 | 0.00 | 0.45 | 0.3 | 0.425 |
| 42.250 | 0.000 | 0.00 | 0.00 | 0.45 | 0.3 | 0.423 |
| 42.333 | 0.000 | 0.00 | 0.00 | 0.44 | 0.3 | 0.421 |
| 42.417 | 0.000 | 0.00 | 0.00 | 0.44 | 0.3 | 0.420 |
| 42.500 | 0.000 | 0.00 | 0.00 | 0.44 | 0.3 | 0.418 |
| 42.583 | 0.000 | 0.00 | 0.00 | 0.44 | 0.3 | 0.416 |
| 42.667 | 0.000 | 0.00 | 0.00 | 0.44 | 0.3 | 0.414 |
| 42.750 | 0.000 | 0.00 | 0.00 | 0.43 | 0.3 | 0.412 |
| 42.833 | 0.000 | 0.00 | 0.00 | 0.43 | 0.3 | 0.411 |
| 42.917 | 0.000 | 0.00 | 0.00 | 0.43 | 0.3 | 0.409 |
| 43.000 | 0.000 | 0.00 | 0.00 | 0.43 | 0.3 | 0.407 |
| 43.083 | 0.000 | 0.00 | 0.00 | 0.43 | 0.3 | 0.405 |

| | | | | | | |
|--------|-------|------|------|------|-----|-------|
| 43.167 | 0.000 | 0.00 | 0.00 | 0.42 | 0.3 | 0.404 |
| 43.250 | 0.000 | 0.00 | 0.00 | 0.42 | 0.3 | 0.402 |
| 43.333 | 0.000 | 0.00 | 0.00 | 0.42 | 0.3 | 0.400 |
| 43.417 | 0.000 | 0.00 | 0.00 | 0.42 | 0.3 | 0.398 |
| 43.500 | 0.000 | 0.00 | 0.00 | 0.42 | 0.3 | 0.397 |
| 43.583 | 0.000 | 0.00 | 0.00 | 0.42 | 0.2 | 0.395 |
| 43.667 | 0.000 | 0.00 | 0.00 | 0.41 | 0.2 | 0.393 |
| 43.750 | 0.000 | 0.00 | 0.00 | 0.41 | 0.2 | 0.391 |
| 43.833 | 0.000 | 0.00 | 0.00 | 0.41 | 0.2 | 0.390 |
| 43.917 | 0.000 | 0.00 | 0.00 | 0.41 | 0.2 | 0.388 |
| 44.000 | 0.000 | 0.00 | 0.00 | 0.41 | 0.2 | 0.386 |
| 44.083 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.385 |
| 44.167 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.383 |
| 44.250 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.381 |
| 44.333 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.380 |
| 44.417 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.378 |
| 44.500 | 0.000 | 0.00 | 0.00 | 0.40 | 0.2 | 0.376 |
| 44.583 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.375 |
| 44.667 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.373 |
| 44.750 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.372 |
| 44.833 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.370 |
| 44.917 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.368 |
| 45.000 | 0.000 | 0.00 | 0.00 | 0.39 | 0.2 | 0.367 |
| 45.083 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.365 |
| 45.167 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.364 |
| 45.250 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.362 |
| 45.333 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.360 |
| 45.417 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.359 |
| 45.500 | 0.000 | 0.00 | 0.00 | 0.38 | 0.2 | 0.357 |
| 45.583 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.356 |
| 45.667 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.354 |
| 45.750 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.353 |
| 45.833 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.351 |
| 45.917 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.350 |
| 46.000 | 0.000 | 0.00 | 0.00 | 0.37 | 0.2 | 0.348 |
| 46.083 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.347 |
| 46.167 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.345 |
| 46.250 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.344 |
| 46.333 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.342 |
| 46.417 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.341 |
| 46.500 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.339 |
| 46.583 | 0.000 | 0.00 | 0.00 | 0.36 | 0.2 | 0.338 |
| 46.667 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.336 |
| 46.750 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.335 |
| 46.833 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.333 |
| 46.917 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.332 |
| 47.000 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.330 |
| 47.083 | 0.000 | 0.00 | 0.00 | 0.35 | 0.2 | 0.329 |
| 47.167 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.327 |
| 47.250 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.326 |
| 47.333 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.325 |
| 47.417 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.323 |
| 47.500 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.322 |
| 47.583 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.320 |
| 47.667 | 0.000 | 0.00 | 0.00 | 0.34 | 0.2 | 0.319 |
| 47.750 | 0.000 | 0.00 | 0.00 | 0.33 | 0.2 | 0.318 |
| 47.833 | 0.000 | 0.00 | 0.00 | 0.33 | 0.2 | 0.316 |
| 47.917 | 0.000 | 0.00 | 0.00 | 0.33 | 0.2 | 0.315 |
| 48.000 | 0.000 | 0.00 | 0.00 | 0.33 | 0.2 | 0.314 |

PROCESS SUMMARY OF STORAGE:

INFLOW VOLUME = 108.043 AF
 BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
 OUTFLOW VOLUME = 108.042 AF
 LOSS VOLUME = 0.000 AF

=====

END OF FLOODSCx ROUTING ANALYSIS



APPENDIX E

CATCH BASIN CALCULATIONS

CURB OPENING BASIN CALCULATION SHEET

Basin Located At 111

h = height of catch basin opening .54,

H = Maximum depth of ponding at catch basin .56,

$$H/h = \frac{.56}{.54} = 1.0$$

Use Table "L" to yield 1.3 cfs/l.f.

$$Q_{100} \text{ at } 111 = 1.8 \text{ cfs}$$

$(Q_{100}) / (\text{Table "L" result}) = \frac{1.8}{1.3} = 1.4$ = minimum length of opening required to intercept Q .

Length of Catch Basin Recommended = 3.5,

Basin Located At

h = height of catch basin opening _____,

H = Maximum depth of ponding at catch basin _____,

$$H/h = \frac{\text{_____}}{\text{_____}} = \frac{\text{_____}}{\text{_____}}$$

Use Table "L" to yield _____ cfs/l.f.

$$Q_{\text{_____}} \text{ at } \text{_____} = \text{_____} \text{ cfs}$$

$(Q_{\text{_____}}) / (\text{Table "L" result}) = \frac{\text{_____}}{\text{_____}} = \text{_____}$ = minimum length of opening required to intercept Q .

Length of Catch Basin Recommended = _____,

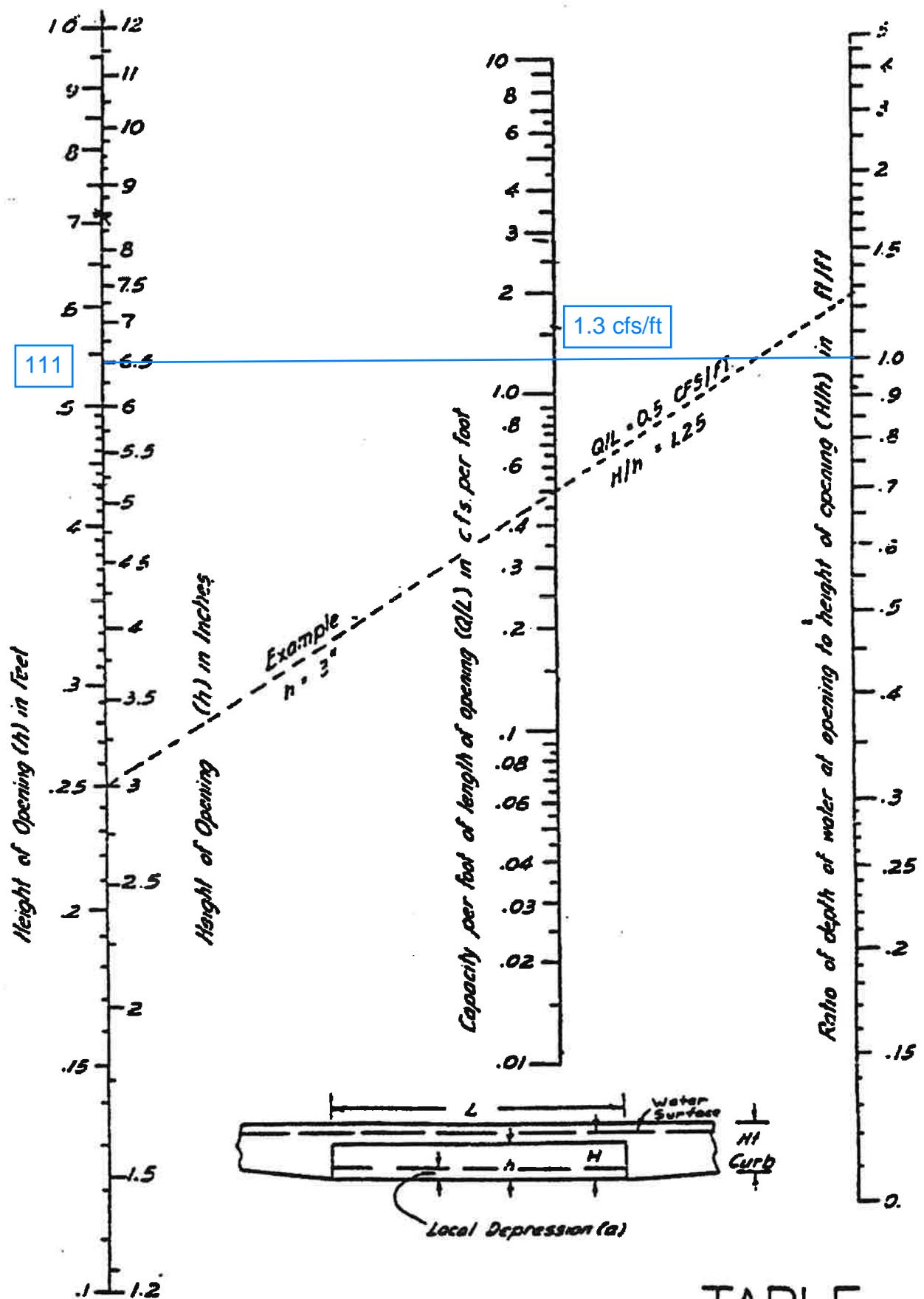


TABLE L

GRATE INLET CALCULATION SHEET

Grate at 101

Use S.P.P.W.C Standard Plan No. 305-2

$$Q/P = 3.0(H)^{3/2}$$

$$P = \text{Perimeter} = 14.48'$$

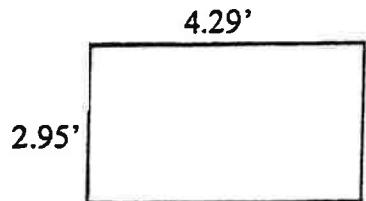
$$H = \text{Maximum depth of ponding at grate} = \underline{.40}'$$

$$Q_{max} = 3.0(P)(H)^{3/2} = 3.0(14.48)(\underline{.40})^{3/2} = \underline{11.0} \text{ cfs}$$

Assume 50% clogging implies 5.5 cfs

$$\underline{Q_{100}} \text{ at } \underline{101} = \underline{4.3} \text{ cfs} < \underline{5.5} \text{ cfs}$$

1 grate O.K.



Grate at 130

Use S.P.P.W.C Standard Plan No. 305-2

$$Q/P = 3.0(H)^{3/2}$$

$$P = \text{Perimeter} = 14.48$$

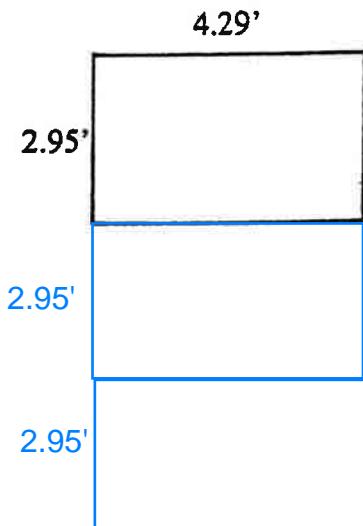
$$H = \text{Maximum depth of ponding at grate} = \underline{0.8}'$$

$$Q_{max} = 3.0(P)(H)^{3/2} = 3.0 \underline{26.28} (\underline{0.8})^{3/2} = \underline{56.4} \text{ cfs}$$

Assume 50% clogging implies 28.2 cfs

$$\underline{Q_{100}} \text{ at } \underline{130} = \underline{7.3} \text{ cfs} < \underline{28.2} \text{ cfs}$$

1 grate O.K.



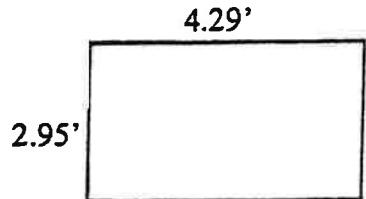
GRATE INLET CALCULATION SHEET

Grate at 121

Use S.P.P.W.C Standard Plan No. 305-2

$$Q/P = 3.0(H)^{3/2}$$

$$P = \text{Perimeter} = 14.48'$$



$$H = \text{Maximum depth of ponding at grate} = \underline{.50} \text{ '}$$

$$Q_{\max} = 3.0(P)(H)^{3/2} = 3.0(14.48)(\underline{.50})^{3/2} = \underline{15.4} \text{ cfs}$$

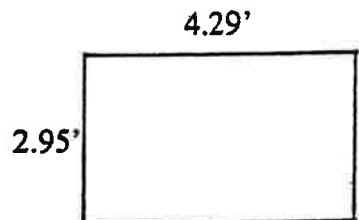
Assume 50% clogging implies 7.7 cfs

$$Q_{100} \text{ at } \underline{110} = \underline{2.4} \text{ cfs} < \underline{7.7} \text{ cfs}$$

1 grate O.K.

Grate at

Use S.P.P.W.C Standard Plan No. 305-2



$$Q/P = 3.0(H)^{3/2}$$

$$P = \text{Perimeter} = 14.48$$

$$H = \text{Maximum depth of ponding at grate} = \underline{\quad} \text{ '}$$

$$Q_{\max} = 3.0(P)(H)^{3/2} = 3.0(14.48)(\underline{\quad})^{3/2} = \underline{\quad} \text{ cfs}$$

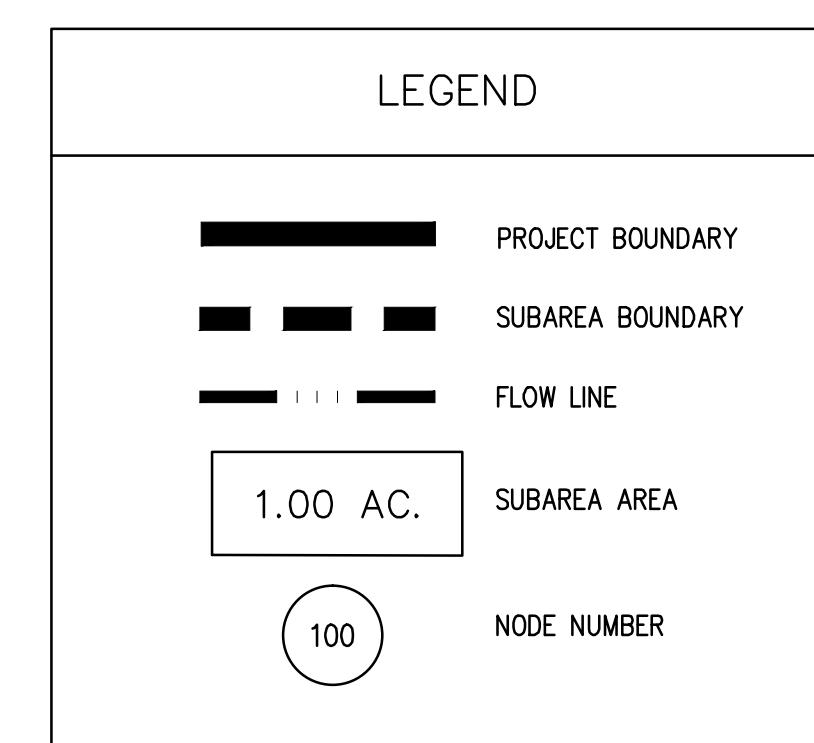
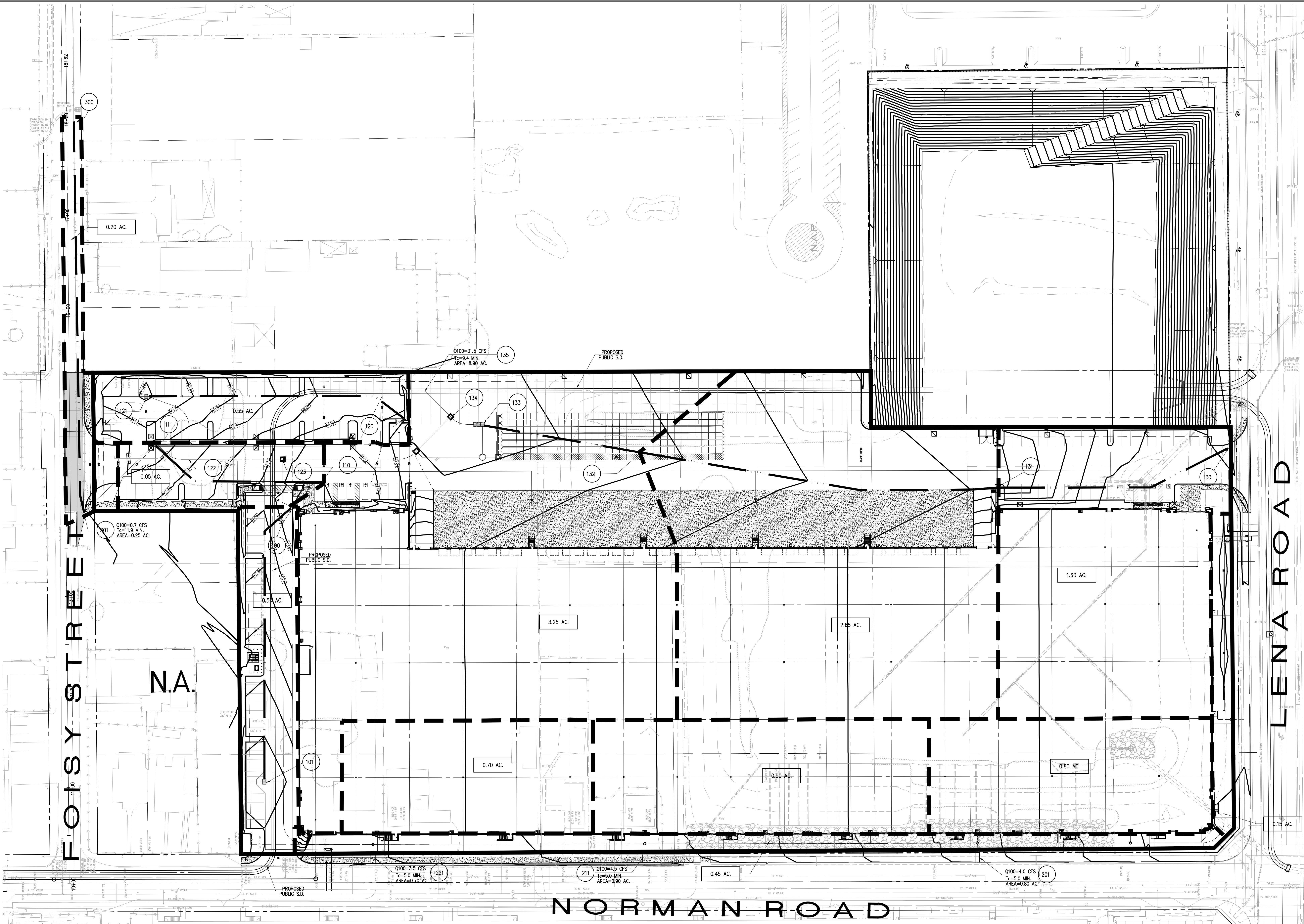
Assume 50% clogging implies cfs

$$Q_{100} \text{ at } \underline{\quad} = \underline{\quad} \text{ cfs} < \underline{\quad} \text{ cfs}$$

1 grate O.K.

APPENDIX F

HYDROLOGY MAP



SCALE: 1"=40'

PREPARED FOR:

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| | |
|-------------------|-------------------|
| Designed by _____ | Approved by _____ |
| Date _____ | Date _____ |
| Checked by _____ | _____ |
| Date _____ | _____ |
| Designed by _____ | _____ |
| Date _____ | _____ |
| Checked by _____ | _____ |
| Date _____ | _____ |

CITY OF SAN BERNARDINO
PUBLIC WORKS DEPARTMENT

HYDROLOGY MAP
HILLWOOD GATEWAY SOUTH
BUILDING 8
N/W CORNER OF NORMAN RD.
AND LENA RD.,
SAN BERNARDINO, CA

