PRELIMINARY HYDROLOGY AND HYDRAULICS STUDY FOR AIREF BEECH LOGISTICS CENTER LP

CITY OF FONTANA
CALIFORNIA

PREPARED BY:

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APRIL 11, 2022
REVISIONS:

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

Joseph L. Castaneda RCE 59835 Registered Civil Engineer	4/11/2022 Date	Seal

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I. INTRODUCTION

The Beech Avenue Industrial project is approximately 10 acre industrial site that is being developed. The development project will be constructing an industrial building that is 185,380 square feet. The project site is located at the northeast corner of the intersection of Beech Avenue and Pacific Electric Trail. The project site is currently an undeveloped site, see Figure 1. The purpose of this study is to determine the necessary storm drain infrastructure and best management practices (BMPs) required for the proposed project. The scope of work consists of the following:

1. Perform the post-project condition 100-year, 25-year and 10-year hydrology analyses for the overall project site utilizing the San Bernardino County Hydrology Manual.
2. Determine the necessary storm drain improvements to convey the post-project condition flow rate using the requirements outlined in the Preliminary Foothill Regional Storm Drain Drainage Report prepared by Madole & Associates.
3. Determine the subsurface storage system volume required to attenuate the water quality runoff generated by the project.
4. Prepare a preliminary hydrology and hydraulics which consists of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The Beech Avenue Industrial project is proposing a 185,380 square foot building as part of the development of an industrial site. The project site is bounded by Pacific Electric Trail to the north, an undeveloped site to the south, existing developed area to the west, and Beech Avenue to the south. The City of Fontana General Plan dated March 2, 2021 has identified the project area as light industrial.

The existing site topography currently trends to the south. The runoff produced by the watershed accumulates along Foothill Blvd. The runoff from the watershed area currently surface flows from east to west along Foothill Blvd. The watershed area used to study the surrounding area is bounded by Pacific Electric Trail to the north, Sultana Avenue to the east and Hemlock Avenue to the west and Foothill Blvd to the south, see Figure 2. The watershed area is controlled by storm drain infrastructure north of Pacific Electric Trail, catch basins at the intersection of Sultana Avenue and Foothill Blvd and existing catch basins at the intersection of Hemlock Avene and Foothill Blvd. There is an existing storm drain facility that is either a 36-inch or 42-inch storm drain along Foothill Blvd that extends from Hemlock Avenue to Sultana Avenue. The existing storm drain connects to a 66-inch storm drain west of Hemlock Avenue. The runoff from the watershed area

sheet flows in the southerly direction. However, there is only one grate inlet at Beech Avenue and Foothill Blvd that connect to the existing storm drain within Foothill Blvd that extends from Hemlock Avenue to Sultana Avenue

The proposed project is planning to construct an industrial site that has an impervious area percent of 90%. The existing topography indicates a change in vertical elevation of 10 feet between the northern property line and southern property line. The project is planning to construct a subsurface infiltration storage system and a 24-inch storm drain system that will convey flows to Foothill Blvd and Beech Avenue. In addition, the project will coordinate with the City of Fontana to implement the storm drain infrastructure planned as part of the Foothill Blvd and Beech Avenue roadway improvements that are part of a capital improvement project.

III. HYDROLOGY

The San Bernardino County Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the rational method. The calculations were performed using the computer program developed by Civil Cadd/Civil Design.

The existing hydrological soil type is Soil A which was obtained from the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) WebSoil Survey, see Excerpt A. The project soil composition (Soil A) is considered to have high infiltration potential. The soils type utilized in conjunction with the land covers for the pre-project and post-project conditions:

Pre-Development Condition

Land Cover	Corresponding Hydrology Manual Cover	Runoff Index – Soil C	Impervious Fraction
Undeveloped Fair Cover	Open Brush Fair Cover	46	0.00

Post-Development Condition

Land Cover	Corresponding Hydrology Manual Cover	Runoff Index – Soil C	Impervious Fraction
Paved and Building Area	Industrial/Commercial	32	0.90

To perform hydrology analyses, rainfall data is required as part of the input parameters required by the program. The rainfall depths (in inches) utilized in

the hydrology analyses were obtained from NOAA Atlas 14, see Excerpt B. As part of the rational method analyses an intensity-duration slope is required to compute the intensity for a given time of concentration. The analyses utilized a slope value 0.6 as required by the San Bernardino County Hydrology Manual.

The total watershed study area for the project site is approximately 42 acres. The watershed was broken up into two areas to determine peak flow rate within the watershed area. In the pre-project condition, the area analyzed Area A and Area B. Area A is the watershed area tributary to Foothill Blvd and Hemlock Avenue. Area B is tributary to Beech Avenue and Foothill Blvd. The purpose of the pre-project rational method analyses is used to develop peak flow rates to assess current flow rates at key intersections:

Table 1 – Pre-Project Flow Rate (ft^3/s) Results

Drainage Area	Intersection	100 Year Flow Rate	25 Year Flow Rate	10 Year Flow Rate
Area A	Foothill & Hemlock	41.2	20.5	12.0
Area A w/ Area B By-Pass	Foothill & Hemlock	63.4	33.4	21.9
Area B	Foothill & Beech	22.2	12.9	9.9

The pre-project rational method hydrology calculations have been included in Appendix A. The pre-project rational method hydrology map has been included as Exhibits A.

The same watershed area was developed for the post-project condition. However, the proposed storm drain system was represented in the hydrology model. The table below provides the flow rates

Table 2 – Post-Project Flow Rate (ft^3/s) Results

Drainage Area	Intersection	100 Year Flow Rate	25 Year Flow Rate	10 Year Flow Rate
Area A	Foothill & Hemlock	33.6	19.0	12.6
Area B	Foothill & Beech	22.1	6.1	22.4

The post-project rational method hydrology calculations have been included in Appendix B. The pre-project rational method hydrology map has been included as Exhibits B.

In addition, to the rational method analyses, a unit hydrograph analyses were performed for the 100-year and 25-year post project condition. The unit hydrgraph analyses was developed to determine the required the size of the subsurface system. The Drainage Study developed by Madole & Associates documented that a 8'h X 6'W RCB storm drain would be required along Foothill Blvd. The storm drain system would connect to an existing 66-inch storm drain located west of Hemlock Avenue. Furthermore, the study indicates that the during the interim condition the design flow rate should be for a 25-year storm frequency. Therefore, the project will be required to mitigate the 100-year peak flow rate to 25 year peak flow levels. The unit hydrographs have been included in Appendix C. The results in Table 3 provide the required storage volume and flow rate reduction required to meet the interim design criteria.

Table 3 – Post-Project Unit Hydrograph Results

Drainage Area	100 Year Flow Rate (ft^3/s)	25 Year Flow Rate (ft^3/s)	Subsurface System Outflow (ft^3/s)	Storage Required (ac-ft)
Project Site	31.2	23.7	17.3	0.6

IV. STORM DRAIN SYSTEM

The project will construct industrial building with an area of approximately 185,380 sf. The project will implement grate inlets, catch basins and storm drain system within the project site to collect and convey runoff into a subsurface storage system, which is required to mitigate water quality runoff and increase runoff to restrict flows to the 25 year peak flow rate condition.

Additionally, the project is required to implement Best Management Practices (BMPs) throughout the project site to ensure water quality mitigation meets the standards as outlined in the San Bernardino County Water Quality Technical Guidance Manual (TGM). The TGM provides a hierarchy of BMPs that are to be implemented on a project and are outlined as follows:

1. Priority No. 1 BMPs are infiltration BMPs that allow water quality runoff from the project to be captured and reintroduced into the groundwater.
2. Priority No. 2 BMPs are capture and storage BMPs that collect the water quality runoff. The water quality runoff volume is then used as part of the project daily operations such as toilet water, industrial uses, or other uses where water is needed. The reuse of the water quality runoff will be discharged into the local sewer system where it undergoes treatment.
3. Priority No. 3 BMPs will capture and store water quality runoff within a landscape basin area that incorporates a prescribed soil media. The vegetation

and soil media provide the treatment of the water quality runoff before releasing the runoff into the local storm drain system.

To begin the process of assessing the BMPs, the project must prepare a geotechnical and infiltration study for the project site. Based on the results of the study the project can assess the best BMP approach for the project site. Based on the results of the geotechnical and infiltration study, which is included as part of the WQMP, the project has infiltration rate sufficient to promote the use of infiltration based BMPs. The proposed location of the subsurface storage system has been located along the easterly side of the project site where infiltration test location I-1 & I-2 were taken, see Excerpt C Infiltration Report. The infiltration rate at this location is 12.1 in/hr. As part of the project preliminary design a value of 12.1 in/hr was utilized. Additionally, the preliminary analyses will use a safety factor of 5 to compute a flow rate per horizontal square foot.

The drainage facilities map shown in Exhibit C, provides the proposed drainage facilities for the project site. The drainage systems consist of drainage inlets, storm drain pipe and a subsurface storage system to mitigate water quality and increased runoff. Based on the hydrology the subsurface storage system must retain sufficient volume to treat water quality volume. Based on existing storm drain infrastructure, the project will be allowed to discharge the 25-year peak flows from the project site. The project is proposing the following improvements:

1. Proposed onsite storm drain to convey runoff into the proposed subsurface storage unit defined as Detention Basin A. The subsurface system will be a 5 barrel 96” subsurface system that is 52 ft wide and 195 ft long. The total infiltration surface area will be 10,140 sf.
2. Line A will convey onsite runoff from the project site and deliver the runoff into the Detention Basin A
3. The Beech Avenue Storm Drain will be the outlet system for Detention Basin A and will convey the runoff into the Foothill Blvd Storm Drain which is a 8’W x 6’H RCB system.

The subsurface storage system assessment was conducted for the proposed water quality volume of 39,644 ft^3. The following is a description of the analyses which accounts for the infiltration potential of the in-situ soil with a safety factor of 5:

1. The subsurface storage size evaluation began by sizing a subsurface system to ensure the water quality volume can be drained in less than 48 hours. The assessment had to perform an iterative process that determined a subsurface storage system horizontal area used to compute an infiltration flow rate based 12.1 in/hour and a basin bottom area of 10,140 ft^2. Using these two

parameters a flow rate for the subsurface system is 0.568 ft^3/s for the horizontal area.

2. The subsurface storage system will allow the water quality volume to be stored below elevation 1269.0 which will hold a total of 43,670.25 ft^3 of runoff volume. This is more than the minimum required volume of 39,644 ft^3.
3. Using a flow rate for the subsurface system of 0.568 ft^3/s for the horizontal area the storage volume of 43,670.25 ft^3 will take 21.5 hours to infiltrate.
4. The storage above elevation 1269.0 will be used to regulate the peak flow leaving the project site to be less than the 25 year peak flow rate. Based on the available storage volume shown on the table included in Appendix D, a total of 0.6 acre feet has been provided. This will limit the outflow to 17.3 ft^3/s.

The Drainage Facilities Map, Exhibit C includes the proposed storm drain system that will be constructed as part of this project which will meet the requirements outlined in the Preliminary Foothill Regional Storm Drain Drainage Report prepared by Madole & Associates.

V. CONCLUSION AND RECOMMENDATIONS

This preliminary hydrology and hydraulics study was prepared to determine the required improvements to address mitigation measures for the project site. Additionally, the project provides the required infrastructure to flood protect the project.

VI. REFERENCES

1. San Bernardino County Hydrology Manual, August 1986
2. Preliminary Foothill Regional Storm Drain Drainage Report prepared by Madole & Associates
3. Foothill Blvd and Beech Avenue Roadway Improvements

FIGURES

FIGURE 1: VICINITY MAP

VICINITY MAP

FIGURE 1

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FIGURE 2: WATERSHED STUDY AREA

WATERSHED STUDY AREA

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FIGURE 2

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APPENDICES

APPENDIX A: PRE-PROJECT RATIONAL METHOD HYDROLOGY ANALYSES

APPENDIX A.1: RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
100-YEAR RATIONAL TABLING METHOD FOR AREA A
PRE-PROJECT CONDITION
FN: ARAPRE100.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.510 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.532(In/Hr)
Initial subarea data:
Initial area flow distance = 569.000(Ft.)
Top (of initial area) elevation = 1288.000(Ft.)
Bottom (of initial area) elevation = 1275.400(Ft.)
Difference in elevation = 12.600(Ft.)
Slope = 0.02214 s(%)= 2.21
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.134 min.
Rainfall intensity = 2.998(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff = 8.964(CFS)
Total initial stream area = 4.040(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.532(In/Hr)

++
Process from Point/Station 102.000 to Point/Station 105.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.400(Ft.)
Downstream point elevation = 1262.700(Ft.)
Channel length thru subarea = 944.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 14.049(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 14.049(CFS)
Depth of flow = 0.338(Ft.), Average velocity = 1.902(Ft/s)

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Channel flow top width =   38.756(Ft.)
Flow Velocity =    1.90(Ft/s)
Travel time  =    8.27 min.
Time of concentration =   27.40 min.
Critical depth =      0.301(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.564(In/Hr)
Rainfall intensity =      2.416(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.694
Subarea runoff =     10.109(CFS) for    7.330(Ac.)
Total runoff =     19.073(CFS)
Effective area this stream =       11.37(Ac.)
Total Study Area (Main Stream No. 1) =       11.37(Ac.)
Area averaged Fm value =    0.553(In/Hr)
Depth of flow =   0.384(Ft.), Average velocity =   2.055(Ft/s)
Critical depth =      0.344(Ft.)


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Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.370(Ac.)
Runoff from this stream =     19.073(CFS)
Time of concentration =   27.40 min.
Rainfall intensity =     2.416(In/Hr)
Area averaged loss rate (Fm) =    0.5526(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9678
Program is now starting with Main Stream No. 2


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Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   779.000(Ft.)
Top (of initial area) elevation =  1289.000(Ft.)
Bottom (of initial area) elevation =  1274.700(Ft.)
Difference in elevation =    14.300(Ft.)
Slope =    0.01836  s(%)=       1.84
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.525 min.
Rainfall intensity =      2.718(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.724
Subarea runoff =      7.849(CFS)
Total initial stream area =        3.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  1274.700(Ft.)
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Downstream point elevation =  1262.700(Ft.)
Channel length thru subarea  =   707.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     11.879(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     11.879(CFS)
Depth of flow =   0.299(Ft.), Average velocity =   1.988(Ft/s)
Channel flow top width =   34.926(Ft.)
Flow Velocity =    1.99(Ft/s)
Travel time  =    5.93 min.
Time of concentration =   28.45 min.
Critical depth =      0.277(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.564(In/Hr)
Rainfall intensity =      2.363(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.690
Subarea runoff =      8.001(CFS) for    5.730(Ac.)
Total runoff =     15.850(CFS)
Effective area this stream =        9.72(Ac.)
Total Study Area (Main Stream No. 2) =       21.09(Ac.)
Area averaged Fm value =    0.551(In/Hr)
Depth of flow =   0.338(Ft.), Average velocity =   2.139(Ft/s)
Critical depth =      0.316(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.720(Ac.)
Runoff from this stream =     15.850(CFS)
Time of concentration =   28.45 min.
Rainfall intensity =     2.363(In/Hr)
Area averaged loss rate (Fm) =    0.5508(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9705
Summary of stream data:

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


1     19.07    11.370     27.40    0.553      2.416
2     15.85     9.720     28.45    0.551      2.363
Qmax(1) =
          1.000 *    1.000 *    19.073) +
          1.030 *    0.963 *    15.850) + =      34.793
Qmax(2) =
          0.971 *    1.000 *    19.073) +
          1.000 *    1.000 *    15.850) + =      34.373

Total of 2 main streams to confluence:
Flow rates before confluence point:
      20.073      16.850
Maximum flow rates at confluence using above data:
       34.793       34.373
Area of streams before confluence:
       11.370        9.720
Effective area values after confluence:
       20.732       21.090
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Results of confluence:
Total flow rate =     34.793(CFS)
Time of concentration =    27.404 min.
Effective stream area after confluence  =     20.732(Ac.)
Study area average Pervious fraction(Ap) =  0.969
Study area average soil loss rate(Fm) =    0.552(In/Hr)
Study area total =      21.09(Ac.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1262.700(Ft.)
Downstream point elevation =  1259.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     37.838(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     37.838(CFS)
Depth of flow =   0.584(Ft.), Average velocity =   1.893(Ft/s)
Channel flow top width =   63.421(Ft.)
Flow Velocity =    1.89(Ft/s)
Travel time  =    4.78 min.
Time of concentration =   32.18 min.
Critical depth =      0.465(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.534(In/Hr)
Rainfall intensity =      2.194(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.675
Subarea runoff =      6.000(CFS) for    6.790(Ac.)
Total runoff =     40.792(CFS)
Effective area this stream =       27.52(Ac.)
Total Study Area (Main Stream No. 1) =       27.88(Ac.)
Area averaged Fm value =    0.547(In/Hr)
Depth of flow =   0.602(Ft.), Average velocity =   1.929(Ft/s)
Critical depth =      0.480(Ft.)
End of computations, Total Study Area =           27.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.952
Area averaged SCS curve number =  47.2
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San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
100-YEAR RATIONAL TABLING METHOD FOR AREA B
PRE-PROJECT CONDITION
FN: ARBPRE100.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.510 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.532(In/Hr)
Initial subarea data:
Initial area flow distance = 565.000(Ft.)
Top (of initial area) elevation = 1287.000(Ft.)
Bottom (of initial area) elevation = 1275.000(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.02124 s(%)= 2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.240 min.
Rainfall intensity = 2.988(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff = 7.005(CFS)
Total initial stream area = 3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.532(In/Hr)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.000(Ft.)
Downstream point elevation = 1270.000(Ft.)
Channel length thru subarea = 388.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 10.138(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 10.138(CFS)
Depth of flow = 0.297(Ft.), Average velocity = 1.723(Ft/s)

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Channel flow top width =   34.663(Ft.)
Flow Velocity =    1.72(Ft/s)
Travel time  =    3.75 min.
Time of concentration =   22.99 min.
Critical depth =      0.258(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.564(In/Hr)
Rainfall intensity =      2.685(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.716
Subarea runoff =      6.199(CFS) for    3.700(Ac.)
Total runoff =     13.204(CFS)
Effective area this stream =        6.87(Ac.)
Total Study Area (Main Stream No. 1) =        6.87(Ac.)
Area averaged Fm value =    0.549(In/Hr)
Depth of flow =   0.332(Ft.), Average velocity =   1.843(Ft/s)
Critical depth =      0.291(Ft.)


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Process from Point/Station      203.000 to Point/Station      204.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1270.000(Ft.)
Downstream point elevation =  1269.000(Ft.)
Channel length thru subarea  =   255.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     18.711(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     18.711(CFS)
Depth of flow =   0.491(Ft.), Average velocity =   1.290(Ft/s)
Channel flow top width =   54.097(Ft.)
Flow Velocity =    1.29(Ft/s)
Travel time  =    3.30 min.
Time of concentration =   26.29 min.
Critical depth =      0.340(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9800     Max loss rate(Fm)=     0.581(In/Hr)
Rainfall intensity =      2.478(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.695
Subarea runoff =     10.920(CFS) for    7.150(Ac.)
Total runoff =     24.124(CFS)
Effective area this stream =       14.02(Ac.)
Total Study Area (Main Stream No. 1) =       14.02(Ac.)
Area averaged Fm value =    0.566(In/Hr)
Depth of flow =   0.544(Ft.), Average velocity =   1.375(Ft/s)
Critical depth =      0.383(Ft.)
End of computations, Total Study Area =           14.02 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.977
Area averaged SCS curve number =  46.9
```

APPENDIX A.2: RATIONAL METHOD ANALYSIS, 25-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
25-YEAR RATIONAL TABLING METHOD FOR AREA A
PRE-PROJECT CONDITION
FN: ARAPRE25.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.150 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 569.000(Ft.)
Top (of initial area) elevation = 1288.000(Ft.)
Bottom (of initial area) elevation = 1275.400(Ft.)
Difference in elevation = 12.600(Ft.)
Slope = 0.02214 s(%)= 2.21
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.134 min.
Rainfall intensity = 2.283(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.581
Subarea runoff = 5.358(CFS)
Total initial stream area = 4.040(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)

++
Process from Point/Station 102.000 to Point/Station 105.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.400(Ft.)
Downstream point elevation = 1262.700(Ft.)
Channel length thru subarea = 944.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 7.699(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 7.699(CFS)
Depth of flow = 0.261(Ft.), Average velocity = 1.633(Ft/s)
Channel flow top width = 31.113(Ft.)

```
Flow Velocity =    1.63(Ft/s)
Travel time  =    9.64 min.
Time of concentration =   28.77 min.
Critical depth =      0.227(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.787(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.491
Subarea runoff =      4.628(CFS) for    7.330(Ac.)
Total runoff =      9.986(CFS)
Effective area this stream =       11.37(Ac.)
Total Study Area (Main Stream No. 1) =       11.37(Ac.)
Area averaged Fm value =    0.812(In/Hr)
Depth of flow =   0.292(Ft.), Average velocity =   1.745(Ft/s)
Critical depth =      0.256(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.370(Ac.)
Runoff from this stream =      9.986(CFS)
Time of concentration =   28.77 min.
Rainfall intensity =     1.787(In/Hr)
Area averaged loss rate (Fm) =    0.8116(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9678
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   779.000(Ft.)
Top (of initial area) elevation =  1289.000(Ft.)
Bottom (of initial area) elevation =  1274.700(Ft.)
Difference in elevation =    14.300(Ft.)
Slope =    0.01836  s(%)=       1.84
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.525 min.
Rainfall intensity =      2.070(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.548
Subarea runoff =      4.527(CFS)
Total initial stream area =        3.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1274.700(Ft.)
Downstream point elevation =  1262.700(Ft.)
Channel length thru subarea  =   707.000(Ft.)
Channel base width     =    5.000(Ft.)
```

```
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =      6.474(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      6.474(CFS)
Depth of flow =   0.230(Ft.), Average velocity =   1.703(Ft/s)
Channel flow top width =   28.021(Ft.)
Flow Velocity =    1.70(Ft/s)
Travel time  =    6.92 min.
Time of concentration =   29.44 min.
Critical depth =      0.209(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.763(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.486
Subarea runoff =      3.796(CFS) for    5.730(Ac.)
Total runoff =      8.323(CFS)
Effective area this stream =        9.72(Ac.)
Total Study Area (Main Stream No. 2) =       21.09(Ac.)
Area averaged Fm value =    0.811(In/Hr)
Depth of flow =   0.257(Ft.), Average velocity =   1.816(Ft/s)
Critical depth =      0.234(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.720(Ac.)
Runoff from this stream =      8.323(CFS)
Time of concentration =   29.44 min.
Rainfall intensity =     1.763(In/Hr)
Area averaged loss rate (Fm) =    0.8114(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9705
Summary of stream data:

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


1      9.99    11.370     28.77    0.812      1.787
2      8.32     9.720     29.44    0.811      1.763
Qmax(1) =
          1.000 *    1.000 *     9.986) +
          1.026 *    0.977 *     8.323) + =      18.329
Qmax(2) =
          0.975 *    1.000 *     9.986) +
          1.000 *    1.000 *     8.323) + =      18.056

Total of 2 main streams to confluence:
Flow rates before confluence point:
      10.986       9.323
Maximum flow rates at confluence using above data:
       18.329       18.056
Area of streams before confluence:
       11.370        9.720
Effective area values after confluence:
       20.868       21.090


Results of confluence:
Total flow rate =     18.329(CFS)
Time of concentration =    28.769 min.
Effective stream area after confluence  =     20.868(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.969
Study area average soil loss rate(Fm) =    0.812(In/Hr)
Study area total =      21.09(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  1262.700(Ft.)
Downstream point elevation =  1259.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     19.199(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     19.199(CFS)
Depth of flow =   0.443(Ft.), Average velocity =   1.596(Ft/s)
Channel flow top width =   49.301(Ft.)
Flow Velocity =    1.60(Ft/s)
Travel time  =    5.67 min.
Time of concentration =   34.44 min.
Critical depth =      0.344(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.770(In/Hr)
Rainfall intensity =      1.605(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.451
Subarea runoff =      1.666(CFS) for    6.790(Ac.)
Total runoff =     19.994(CFS)
Effective area this stream =       27.66(Ac.)
Total Study Area (Main Stream No. 1) =       27.88(Ac.)
Area averaged Fm value =    0.801(In/Hr)
Depth of flow =   0.450(Ft.), Average velocity =   1.613(Ft/s)
Critical depth =      0.352(Ft.)
End of computations, Total Study Area =           27.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.952
Area averaged SCS curve number =  47.2
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
25-YEAR RATIONAL TABLING METHOD FOR AREA B
PRE-PROJECT CONDITION
FN: ARBPRE25.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.150 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 565.000(Ft.)
Top (of initial area) elevation = 1287.000(Ft.)
Bottom (of initial area) elevation = 1275.000(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.02124 s(%)= 2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.240 min.
Rainfall intensity = 2.275(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.580
Subarea runoff = 4.182(CFS)
Total initial stream area = 3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)

++

Process from Point/Station 202.000 to Point/Station 203.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.000(Ft.)
Downstream point elevation = 1270.000(Ft.)
Channel length thru subarea = 388.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 5.841(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 5.841(CFS)
Depth of flow = 0.234(Ft.), Average velocity = 1.498(Ft/s)
Channel flow top width = 28.375(Ft.)

```
Flow Velocity =    1.50(Ft/s)
Travel time  =    4.32 min.
Time of concentration =   23.56 min.
Critical depth =      0.199(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      2.015(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.538
Subarea runoff =      3.261(CFS) for    3.700(Ac.)
Total runoff =      7.444(CFS)
Effective area this stream =        6.87(Ac.)
Total Study Area (Main Stream No. 1) =        6.87(Ac.)
Area averaged Fm value =    0.811(In/Hr)
Depth of flow =   0.260(Ft.), Average velocity =   1.593(Ft/s)
Critical depth =      0.223(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1270.000(Ft.)
Downstream point elevation =  1269.000(Ft.)
Channel length thru subarea  =   255.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     10.168(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     10.168(CFS)
Depth of flow =   0.382(Ft.), Average velocity =   1.106(Ft/s)
Channel flow top width =   43.171(Ft.)
Flow Velocity =    1.11(Ft/s)
Travel time  =    3.84 min.
Time of concentration =   27.40 min.
Critical depth =      0.258(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9800     Max loss rate(Fm)=     0.838(In/Hr)
Rainfall intensity =      1.840(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.497
Subarea runoff =      5.368(CFS) for    7.150(Ac.)
Total runoff =     12.812(CFS)
Effective area this stream =       14.02(Ac.)
Total Study Area (Main Stream No. 1) =       14.02(Ac.)
Area averaged Fm value =    0.825(In/Hr)
Depth of flow =   0.420(Ft.), Average velocity =   1.172(Ft/s)
Critical depth =      0.287(Ft.)
End of computations, Total Study Area =           14.02 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.977
Area averaged SCS curve number =  46.9
```

APPENDIX A.3: RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
10-YEAR RATIONAL TABLING METHOD FOR AREA A
PRE-PROJECT CONDITION
FN: ARAPRE10.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.931 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 50.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)
Initial subarea data:
Initial area flow distance = 569.000(Ft.)
Top (of initial area) elevation = 1288.000(Ft.)
Bottom (of initial area) elevation = 1275.400(Ft.)
Difference in elevation = 12.600(Ft.)
Slope = 0.02214 s(%)= 2.21
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.134 min.
Rainfall intensity = 1.848(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.506
Subarea runoff = 3.777(CFS)
Total initial stream area = 4.040(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.810(In/Hr)

++

Process from Point/Station 102.000 to Point/Station 105.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.400(Ft.)
Downstream point elevation = 1262.700(Ft.)
Channel length thru subarea = 944.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 5.023(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 5.023(CFS)
Depth of flow = 0.217(Ft.), Average velocity = 1.464(Ft/s)
Channel flow top width = 26.667(Ft.)

```
Flow Velocity =    1.46(Ft/s)
Travel time  =   10.75 min.
Time of concentration =   29.88 min.
Critical depth =      0.186(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.415(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.384
Subarea runoff =      2.392(CFS) for    7.330(Ac.)
Total runoff =      6.169(CFS)
Effective area this stream =       11.37(Ac.)
Total Study Area (Main Stream No. 1) =       11.37(Ac.)
Area averaged Fm value =    0.812(In/Hr)
Depth of flow =   0.237(Ft.), Average velocity =   1.543(Ft/s)
Critical depth =      0.205(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.370(Ac.)
Runoff from this stream =      6.169(CFS)
Time of concentration =   29.88 min.
Rainfall intensity =     1.415(In/Hr)
Area averaged loss rate (Fm) =    0.8116(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9678
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   779.000(Ft.)
Top (of initial area) elevation =  1289.000(Ft.)
Bottom (of initial area) elevation =  1274.700(Ft.)
Difference in elevation =    14.300(Ft.)
Slope =    0.01836  s(%)=       1.84
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.525 min.
Rainfall intensity =      1.676(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.465
Subarea runoff =      3.111(CFS)
Total initial stream area =        3.990(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1274.700(Ft.)
Downstream point elevation =  1262.700(Ft.)
Channel length thru subarea  =   707.000(Ft.)
Channel base width     =    5.000(Ft.)
```

```
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =      4.193(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.193(CFS)
Depth of flow =   0.190(Ft.), Average velocity =   1.524(Ft/s)
Channel flow top width =   23.988(Ft.)
Flow Velocity =    1.52(Ft/s)
Travel time  =    7.73 min.
Time of concentration =   30.26 min.
Critical depth =      0.170(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.404(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.380
Subarea runoff =      2.071(CFS) for    5.730(Ac.)
Total runoff =      5.183(CFS)
Effective area this stream =        9.72(Ac.)
Total Study Area (Main Stream No. 2) =       21.09(Ac.)
Area averaged Fm value =    0.811(In/Hr)
Depth of flow =   0.209(Ft.), Average velocity =   1.609(Ft/s)
Critical depth =      0.188(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.720(Ac.)
Runoff from this stream =      5.183(CFS)
Time of concentration =   30.26 min.
Rainfall intensity =     1.404(In/Hr)
Area averaged loss rate (Fm) =    0.8114(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9705
Summary of stream data:

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


1      6.17    11.370     29.88    0.812      1.415
2      5.18     9.720     30.26    0.811      1.404
Qmax(1) =
          1.000 *    1.000 *     6.169) +
          1.018 *    0.987 *     5.183) + =      11.379
Qmax(2) =
          0.982 *    1.000 *     6.169) +
          1.000 *    1.000 *     5.183) + =      11.243

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.169       6.183
Maximum flow rates at confluence using above data:
       11.379       11.243
Area of streams before confluence:
       11.370        9.720
Effective area values after confluence:
       20.968       21.090


Results of confluence:
Total flow rate =     11.379(CFS)
Time of concentration =    29.881 min.
Effective stream area after confluence  =     20.968(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.969
Study area average soil loss rate(Fm) =    0.812(In/Hr)
Study area total =      21.09(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  1262.700(Ft.)
Downstream point elevation =  1259.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =     11.424(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     11.424(CFS)
Depth of flow =   0.357(Ft.), Average velocity =   1.400(Ft/s)
Channel flow top width =   40.702(Ft.)
Flow Velocity =    1.40(Ft/s)
Travel time  =    6.46 min.
Time of concentration =   36.34 min.
Critical depth =      0.273(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.770(In/Hr)
Rainfall intensity =      1.258(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.327
Subarea runoff =      0.021(CFS) for    6.790(Ac.)
Total runoff =     11.400(CFS)
Effective area this stream =       27.76(Ac.)
Total Study Area (Main Stream No. 1) =       27.88(Ac.)
Area averaged Fm value =    0.801(In/Hr)
Depth of flow =   0.357(Ft.), Average velocity =   1.400(Ft/s)
Critical depth =      0.273(Ft.)
End of computations, Total Study Area =           27.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.952
Area averaged SCS curve number =  47.2
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
10-YEAR RATIONAL TABLING METHOD FOR AREA B
PRE-PROJECT CONDITION
FN: ARBPRE10.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.931 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 84.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.301(In/Hr)
Initial subarea data:
Initial area flow distance = 565.000(Ft.)
Top (of initial area) elevation = 1287.000(Ft.)
Bottom (of initial area) elevation = 1275.000(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.02124 s(%)= 2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.240 min.
Rainfall intensity = 1.842(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.753
Subarea runoff = 4.398(CFS)
Total initial stream area = 3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.301(In/Hr)

++

Process from Point/Station 202.000 to Point/Station 203.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1275.000(Ft.)
Downstream point elevation = 1270.000(Ft.)
Channel length thru subarea = 388.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 50.000
Slope or 'Z' of right channel bank = 50.000
Estimated mean flow rate at midpoint of channel = 5.478(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 5.478(CFS)
Depth of flow = 0.227(Ft.), Average velocity = 1.473(Ft/s)
Channel flow top width = 27.726(Ft.)

```
Flow Velocity =    1.47(Ft/s)
Travel time  =    4.39 min.
Time of concentration =   23.63 min.
Critical depth =      0.193(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.628(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.581
Subarea runoff =      2.106(CFS) for    3.700(Ac.)
Total runoff =      6.504(CFS)
Effective area this stream =        6.87(Ac.)
Total Study Area (Main Stream No. 1) =        6.87(Ac.)
Area averaged Fm value =    0.576(In/Hr)
Depth of flow =   0.245(Ft.), Average velocity =   1.539(Ft/s)
Critical depth =      0.209(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1270.000(Ft.)
Downstream point elevation =  1269.000(Ft.)
Channel length thru subarea  =   255.000(Ft.)
Channel base width     =    5.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =      8.144(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      8.144(CFS)
Depth of flow =   0.348(Ft.), Average velocity =   1.046(Ft/s)
Channel flow top width =   39.783(Ft.)
Flow Velocity =    1.05(Ft/s)
Travel time  =    4.06 min.
Time of concentration =   27.69 min.
Critical depth =      0.232(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9800     Max loss rate(Fm)=     0.838(In/Hr)
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.468
Subarea runoff =      3.217(CFS) for    7.150(Ac.)
Total runoff =      9.722(CFS)
Effective area this stream =       14.02(Ac.)
Total Study Area (Main Stream No. 1) =       14.02(Ac.)
Area averaged Fm value =    0.710(In/Hr)
Depth of flow =   0.375(Ft.), Average velocity =   1.094(Ft/s)
Critical depth =      0.254(Ft.)
End of computations, Total Study Area =           14.02 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.977
Area averaged SCS curve number =  54.6
```

APPENDIX B: POST-PROJECT RATIONAL METHOD HYDROLOGY ANALYSES

APPENDIX B.1: RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
100-YEAR RATIONAL TABLING METHOD FOR AREA A
POST-PROJECT CONDITION
FN: ARAPOST100.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.510 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

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

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 745.000(Ft.)
Top (of initial area) elevation = 1285.000(Ft.)
Bottom (of initial area) elevation = 1276.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.359 min.
Rainfall intensity = 4.332(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 17.111(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1271.000(Ft.)
Downstream point/station elevation = 1270.700(Ft.)
Pipe length = 595.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 17.111(CFS)
Nearest computed pipe diameter = 39.00(In.)
Calculated individual pipe flow = 17.111(CFS)
Normal flow depth in pipe = 29.58(In.)
Flow top width inside pipe = 33.39(In.)
Critical Depth = 15.48(In.)
Pipe flow velocity = 2.54(Ft/s)
Travel time through pipe = 3.91 min.

```
Time of concentration (TC) =    14.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Time of concentration =    14.27 min.
Rainfall intensity =      3.575(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.880
Subarea runoff =      0.321(CFS) for    1.070(Ac.)
Total runoff =     17.432(CFS)
Effective area this stream =        5.54(Ac.)
Total Study Area (Main Stream No. 1) =        5.54(Ac.)
Area averaged Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1270.700(Ft.)
Downstream point/station elevation =  1270.500(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.432(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.432(CFS)
Normal flow depth in pipe =   18.28(In.)
Flow top width inside pipe =   20.45(In.)
Critical Depth =   18.06(In.)
Pipe flow velocity =      6.79(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    14.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Time of concentration =    14.34 min.
Rainfall intensity =      3.564(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.880
Subarea runoff =     10.581(CFS) for    3.390(Ac.)
Total runoff =     28.014(CFS)
Effective area this stream =        8.93(Ac.)
Total Study Area (Main Stream No. 1) =        8.93(Ac.)
Area averaged Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
```

```
Upstream point/station elevation =  1270.500(Ft.)
Downstream point/station elevation =  1268.000(Ft.)
Pipe length  =   155.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.014(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    28.014(CFS)
Normal flow depth in pipe =   19.15(In.)
Flow top width inside pipe =   19.28(In.)
Critical Depth =   21.95(In.)
Pipe flow velocity =     10.42(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    14.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1268.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =   795.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.014(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    28.014(CFS)
Normal flow depth in pipe =   27.33(In.)
Flow top width inside pipe =   35.72(In.)
Critical Depth =   20.02(In.)
Pipe flow velocity =      4.51(Ft/s)
Travel time through pipe =    2.94 min.
Time of concentration (TC) =    17.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.930(Ac.)
Runoff from this stream =     28.014(CFS)
Time of concentration =   17.53 min.
Rainfall intensity =     3.160(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   479.000(Ft.)
Top (of initial area) elevation =  1288.000(Ft.)
Bottom (of initial area) elevation =  1280.000(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.01670  s(%)=       1.67
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.137 min.
Rainfall intensity =      5.007(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff =      2.040(CFS)
Total initial stream area =        0.460(Ac.)
```

```
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1280.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   557.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.803(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   2.897(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.170(Ft.)
Flow velocity =   2.90(Ft/s)
Travel time =    3.20 min.     TC =   11.34  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Rainfall intensity =      4.103(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.883
Subarea runoff =      1.473(CFS) for    0.510(Ac.)
Total runoff =      3.513(CFS)
Effective area this stream =        0.97(Ac.)
Total Study Area (Main Stream No. 2) =        9.90(Ac.)
Area averaged Fm value =    0.079(In/Hr)
Street flow at end of street =      3.513(CFS)
Half street flow at end of street =      3.513(CFS)
Depth of flow =   0.329(Ft.), Average velocity =   3.049(Ft/s)
Flow width (from curb towards crown)=  10.127(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.513(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.513(CFS)
Normal flow depth in pipe =    8.55(In.)
Flow top width inside pipe =   14.85(In.)
Critical Depth =    9.08(In.)
Pipe flow velocity =      4.86(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    11.47 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.970(Ac.)
Runoff from this stream =      3.513(CFS)
Time of concentration =   11.47 min.
Rainfall intensity =     4.074(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   953.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1270.000(Ft.)
Difference in elevation =    17.000(Ft.)
Slope =    0.01784  s(%)=       1.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.557 min.
Rainfall intensity =      2.581(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.714
Subarea runoff =      8.665(CFS)
Total initial stream area =        4.700(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    64.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.665(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.665(CFS)
Normal flow depth in pipe =   14.19(In.)
Flow top width inside pipe =   19.66(In.)
Critical Depth =   13.11(In.)
Pipe flow velocity =      5.01(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    24.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      4.700(Ac.)
Runoff from this stream =      8.665(CFS)
Time of concentration =   24.77 min.
Rainfall intensity =     2.568(In/Hr)
```

```
Area averaged loss rate (Fm) =    0.5325(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     28.01     8.930     17.53    0.079      3.160
2      3.51     0.970     11.47    0.079      4.074
3      8.66     4.700     24.77    0.532      2.568
Qmax(1) =
          1.000 *    1.000 *    28.014) +
          0.771 *    1.000 *     3.513) +
          1.291 *    0.708 *     8.665) + =      38.638
Qmax(2) =
          1.297 *    0.655 *    28.014) +
          1.000 *    1.000 *     3.513) +
          1.740 *    0.463 *     8.665) + =      34.281
Qmax(3) =
          0.808 *    1.000 *    28.014) +
          0.623 *    1.000 *     3.513) +
          1.000 *    1.000 *     8.665) + =      33.483

Total of 3 main streams to confluence:
Flow rates before confluence point:
      29.014       4.513       9.665
Maximum flow rates at confluence using above data:
       38.638       34.281       33.483
Area of streams before confluence:
        8.930        0.970        4.700
Effective area values after confluence:
       13.226        8.994       14.600


Results of confluence:
Total flow rate =     38.638(CFS)
Time of concentration =    17.527 min.
Effective stream area after confluence  =     13.226(Ac.)
Study area average Pervious fraction(Ap) =  0.390
Study area average soil loss rate(Fm) =    0.225(In/Hr)
Study area total =      14.60(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    38.638(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    38.638(CFS)
Normal flow depth in pipe =   28.31(In.)
Flow top width inside pipe =   29.51(In.)
Critical Depth =   24.27(In.)
Pipe flow velocity =      6.48(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    17.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.226(Ac.)
Runoff from this stream =     38.638(CFS)
Time of concentration =   17.67 min.
```

```
Rainfall intensity =     3.145(In/Hr)
Area averaged loss rate (Fm) =    0.2247(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3897
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1275.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02124  s(%)=       2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   19.240 min.
Rainfall intensity =      2.988(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff =      7.005(CFS)
Total initial stream area =        3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1275.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   535.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.383(CFS)
Depth of flow =   0.500(Ft.), Average velocity =   3.147(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.01(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.683(Ft.)
Flow velocity =   3.15(Ft/s)
Travel time =    2.83 min.     TC =   22.07  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.564(In/Hr)
Rainfall intensity =      2.751(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.720
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Subarea runoff =      8.698(CFS) for    4.760(Ac.)
Total runoff =     15.703(CFS)
Effective area this stream =        7.93(Ac.)
Total Study Area (Main Stream No. 2) =       22.53(Ac.)
Area averaged Fm value =    0.551(In/Hr)
Street flow at end of street =     15.703(CFS)
Half street flow at end of street =     15.703(CFS)
Depth of flow =   0.557(Ft.), Average velocity =   3.257(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.28(Ft.)
Flow width (from curb towards crown)=  21.516(Ft.)


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Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.703(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    15.703(CFS)
Normal flow depth in pipe =   15.96(In.)
Flow top width inside pipe =   22.65(In.)
Critical Depth =   17.16(In.)
Pipe flow velocity =      7.08(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    22.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =   103.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.703(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    15.703(CFS)
Normal flow depth in pipe =   21.61(In.)
Flow top width inside pipe =   26.93(In.)
Critical Depth =   16.05(In.)
Pipe flow velocity =      4.15(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    22.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.930(Ac.)
Runoff from this stream =     15.703(CFS)
Time of concentration =   22.58 min.
Rainfall intensity =     2.714(In/Hr)
Area averaged loss rate (Fm) =    0.5512(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9700
Summary of stream data:

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


1     38.64    13.226     17.67    0.225      3.145
2     15.70     7.930     22.58    0.551      2.714
Qmax(1) =
          1.000 *    1.000 *    38.638) +
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```
          1.199 *    0.783 *    15.703) + =      53.370
Qmax(2) =
          0.853 *    1.000 *    38.638) +
          1.000 *    1.000 *    15.703) + =      48.649

Total of 2 main streams to confluence:
Flow rates before confluence point:
      39.638      16.703
Maximum flow rates at confluence using above data:
       53.370       48.649
Area of streams before confluence:
       13.226        7.930
Effective area values after confluence:
       19.431       21.156


Results of confluence:
Total flow rate =     53.370(CFS)
Time of concentration =    17.668 min.
Effective stream area after confluence  =     19.431(Ac.)
Study area average Pervious fraction(Ap) =  0.607
Study area average soil loss rate(Fm) =    0.347(In/Hr)
Study area total =      21.16(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.500(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =  1261.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    53.370(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    53.370(CFS)
Normal flow depth in pipe =   27.28(In.)
Flow top width inside pipe =   30.85(In.)
Critical Depth =   28.49(In.)
Pipe flow velocity =      9.30(Ft/s)
Travel time through pipe =    2.26 min.
Time of concentration (TC) =    19.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     19.431(Ac.)
Runoff from this stream =     53.370(CFS)
Time of concentration =   19.93 min.
Rainfall intensity =     2.925(In/Hr)
Area averaged loss rate (Fm) =    0.3470(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6072
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
```

```
Initial area flow distance =   406.000(Ft.)
Top (of initial area) elevation =  1279.000(Ft.)
Bottom (of initial area) elevation =  1271.800(Ft.)
Difference in elevation =     7.200(Ft.)
Slope =    0.01773  s(%)=       1.77
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.476 min.
Rainfall intensity =      3.165(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.749
Subarea runoff =      6.113(CFS)
Total initial stream area =        2.580(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      116.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1271.800(Ft.)
End of street segment elevation =  1262.700(Ft.)
Length of street segment  =   686.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.531(CFS)
Depth of flow =   0.465(Ft.), Average velocity =   3.526(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.912(Ft.)
Flow velocity =   3.53(Ft/s)
Travel time =    3.24 min.     TC =   20.72  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.564(In/Hr)
Rainfall intensity =      2.858(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.726
Subarea runoff =      8.764(CFS) for    4.590(Ac.)
Total runoff =     14.877(CFS)
Effective area this stream =        7.17(Ac.)
Total Study Area (Main Stream No. 2) =       29.70(Ac.)
Area averaged Fm value =    0.552(In/Hr)
Street flow at end of street =     14.877(CFS)
Half street flow at end of street =     14.877(CFS)
Depth of flow =   0.517(Ft.), Average velocity =   3.775(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.68(Ft.)
Flow width (from curb towards crown)=  19.514(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.170(Ac.)
Runoff from this stream =     14.877(CFS)
Time of concentration =   20.72 min.
```

```
Rainfall intensity =     2.858(In/Hr)
Area averaged loss rate (Fm) =    0.5524(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9680


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   796.000(Ft.)
Top (of initial area) elevation =  1276.000(Ft.)
Bottom (of initial area) elevation =  1262.700(Ft.)
Difference in elevation =    13.300(Ft.)
Slope =    0.01671  s(%)=       1.67
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.152 min.
Rainfall intensity =      2.674(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.721
Subarea runoff =      7.728(CFS)
Total initial stream area =        4.010(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.010(Ac.)
Runoff from this stream =      7.728(CFS)
Time of concentration =   23.15 min.
Rainfall intensity =     2.674(In/Hr)
Area averaged loss rate (Fm) =    0.5325(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     14.88     7.170     20.72    0.552      2.858
2      7.73     4.010     23.15    0.532      2.674
Qmax(1) =
          1.000 *    1.000 *    14.877) +
          1.086 *    0.895 *     7.728) + =      22.388
Qmax(2) =
          0.920 *    1.000 *    14.877) +
          1.000 *    1.000 *     7.728) + =      21.417

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.877       7.728
Maximum flow rates at confluence using above data:
       22.388       21.417
Area of streams before confluence:
        7.170        4.010
Effective area values after confluence:
       10.759       11.180
Results of confluence:
Total flow rate =     22.388(CFS)
Time of concentration =    20.719 min.
```

```
Effective stream area after confluence =     10.759(Ac.)
Study area average Pervious fraction(Ap) =  0.979
Study area average soil loss rate(Fm) =    0.545(In/Hr)
Study area total (this main stream) =      11.18(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      117.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1262.700(Ft.)
End of street segment elevation =  1260.300(Ft.)
Length of street segment  =   479.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     28.004(CFS)
Depth of flow =   0.712(Ft.), Average velocity =   3.090(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    8.48(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.000(Ft.)
Flow velocity =   3.09(Ft/s)
Travel time =    2.58 min.     TC =   23.30  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Adjusted SCS curve number for AMC 3 = 66.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.534(In/Hr)
Rainfall intensity =      2.663(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.717
Subarea runoff =     11.133(CFS) for    6.790(Ac.)
Total runoff =     33.521(CFS)
Effective area this stream =       17.55(Ac.)
Total Study Area (Main Stream No. 2) =       40.50(Ac.)
Area averaged Fm value =    0.541(In/Hr)
Street flow at end of street =     33.521(CFS)
Half street flow at end of street =     33.521(CFS)
Depth of flow =   0.751(Ft.), Average velocity =   3.257(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   10.05(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1257.300(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.521(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    33.521(CFS)
Normal flow depth in pipe =   18.91(In.)
Flow top width inside pipe =   24.73(In.)
Critical Depth =   23.77(In.)
```

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Pipe flow velocity =     11.26(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    23.33 min.


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Process from Point/Station      117.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     17.549(Ac.)
Runoff from this stream =     33.521(CFS)
Time of concentration =   23.33 min.
Rainfall intensity =     2.661(In/Hr)
Area averaged loss rate (Fm) =    0.5409(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9487
Summary of stream data:

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


1     53.37    19.431     19.93    0.347      2.925
2     33.52    17.549     23.33    0.541      2.661
Qmax(1) =
          1.000 *    1.000 *    53.370) +
          1.124 *    0.854 *    33.521) + =      85.568
Qmax(2) =
          0.898 *    1.000 *    53.370) +
          1.000 *    1.000 *    33.521) + =      81.429

Total of 2 main streams to confluence:
Flow rates before confluence point:
      54.370      34.521
Maximum flow rates at confluence using above data:
       85.568       81.429
Area of streams before confluence:
       19.431       17.549
Effective area values after confluence:
       34.422       36.980


Results of confluence:
Total flow rate =     85.568(CFS)
Time of concentration =    19.929 min.
Effective stream area after confluence  =     34.422(Ac.)
Study area average Pervious fraction(Ap) =  0.769
Study area average soil loss rate(Fm) =    0.439(In/Hr)
Study area total =      36.98(Ac.)
End of computations, Total Study Area =           40.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.752
Area averaged SCS curve number =  44.0
```

APPENDIX B.2: RATIONAL METHOD ANALYSIS, 25-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
25-YEAR RATIONAL TABLING METHOD FOR AREA A
POST-PROJECT CONDITION
FN: ARAPOST25.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 1.150 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

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

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 745.000(Ft.)
Top (of initial area) elevation = 1285.000(Ft.)
Bottom (of initial area) elevation = 1276.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.359 min.
Rainfall intensity = 3.299(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff = 12.879(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++

Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1271.000(Ft.)
Downstream point/station elevation = 1270.700(Ft.)
Pipe length = 595.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 12.879(CFS)
Nearest computed pipe diameter = 36.00(In.)
Calculated individual pipe flow = 12.879(CFS)
Normal flow depth in pipe = 25.73(In.)
Flow top width inside pipe = 32.51(In.)
Critical Depth = 13.67(In.)
Pipe flow velocity = 2.38(Ft/s)
Travel time through pipe = 4.16 min.
Time of concentration (TC) = 14.52 min.

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    14.52 min.
Rainfall intensity =      2.694(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.867
Subarea runoff =      0.066(CFS) for    1.070(Ac.)
Total runoff =     12.945(CFS)
Effective area this stream =        5.54(Ac.)
Total Study Area (Main Stream No. 1) =        5.54(Ac.)
Area averaged Fm value =    0.098(In/Hr)


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Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1270.700(Ft.)
Downstream point/station elevation =  1270.500(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.945(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.945(CFS)
Normal flow depth in pipe =   16.92(In.)
Flow top width inside pipe =   16.61(In.)
Critical Depth =   16.08(In.)
Pipe flow velocity =      6.24(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.60 min.


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Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    14.60 min.
Rainfall intensity =      2.685(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.867
Subarea runoff =      7.852(CFS) for    3.390(Ac.)
Total runoff =     20.796(CFS)
Effective area this stream =        8.93(Ac.)
Total Study Area (Main Stream No. 1) =        8.93(Ac.)
Area averaged Fm value =    0.098(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1270.500(Ft.)
Downstream point/station elevation =  1268.000(Ft.)
Pipe length  =   155.00(Ft.)   Manning's N = 0.013
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```
No. of pipes = 1  Required pipe flow  =    20.796(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    20.796(CFS)
Normal flow depth in pipe =   15.14(In.)
Flow top width inside pipe =   23.16(In.)
Critical Depth =   19.61(In.)
Pipe flow velocity =      9.97(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    14.86 min.


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Process from Point/Station      105.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1268.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =   795.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.796(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    20.796(CFS)
Normal flow depth in pipe =   26.25(In.)
Flow top width inside pipe =   26.62(In.)
Critical Depth =   18.07(In.)
Pipe flow velocity =      4.10(Ft/s)
Travel time through pipe =    3.23 min.
Time of concentration (TC) =    18.09 min.


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Process from Point/Station      105.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.930(Ac.)
Runoff from this stream =     20.796(CFS)
Time of concentration =   18.09 min.
Rainfall intensity =     2.361(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   479.000(Ft.)
Top (of initial area) elevation =  1288.000(Ft.)
Bottom (of initial area) elevation =  1280.000(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.01670  s(%)=       1.67
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.137 min.
Rainfall intensity =      3.813(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.877
Subarea runoff =      1.538(CFS)
Total initial stream area =        0.460(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)
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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1280.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   557.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.117(CFS)
Depth of flow =   0.288(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.066(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    3.41 min.     TC =   11.55  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Rainfall intensity =      3.091(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =      1.075(CFS) for    0.510(Ac.)
Total runoff =      2.613(CFS)
Effective area this stream =        0.97(Ac.)
Total Study Area (Main Stream No. 2) =        9.90(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Street flow at end of street =      2.613(CFS)
Half street flow at end of street =      2.613(CFS)
Depth of flow =   0.304(Ft.), Average velocity =   2.852(Ft/s)
Flow width (from curb towards crown)=   8.886(Ft.)


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Process from Point/Station      108.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.613(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.613(CFS)
Normal flow depth in pipe =    8.39(In.)
Flow top width inside pipe =   11.01(In.)
Critical Depth =    8.32(In.)
Pipe flow velocity =      4.45(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    11.69 min.


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Process from Point/Station      108.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
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In Main Stream number: 2
Stream flow area =      0.970(Ac.)
Runoff from this stream =      2.613(CFS)
Time of concentration =   11.69 min.
Rainfall intensity =     3.068(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   953.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1270.000(Ft.)
Difference in elevation =    17.000(Ft.)
Slope =    0.01784  s(%)=       1.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.557 min.
Rainfall intensity =      1.966(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.529
Subarea runoff =      4.890(CFS)
Total initial stream area =        4.700(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


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Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    64.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.890(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.890(CFS)
Normal flow depth in pipe =   10.89(In.)
Flow top width inside pipe =   17.60(In.)
Critical Depth =   10.20(In.)
Pipe flow velocity =      4.38(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    24.80 min.


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Process from Point/Station      110.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      4.700(Ac.)
Runoff from this stream =      4.890(CFS)
Time of concentration =   24.80 min.
Rainfall intensity =     1.954(In/Hr)
Area averaged loss rate (Fm) =    0.8095(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)
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```
1     20.80     8.930     18.09    0.098      2.361
2      2.61     0.970     11.69    0.098      3.068
3      4.89     4.700     24.80    0.810      1.954
Qmax(1) =
          1.000 *    1.000 *    20.796) +
          0.762 *    1.000 *     2.613) +
          1.356 *    0.729 *     4.890) + =      27.624
Qmax(2) =
          1.312 *    0.646 *    20.796) +
          1.000 *    1.000 *     2.613) +
          1.974 *    0.471 *     4.890) + =      24.802
Qmax(3) =
          0.820 *    1.000 *    20.796) +
          0.625 *    1.000 *     2.613) +
          1.000 *    1.000 *     4.890) + =      23.576

Total of 3 main streams to confluence:
Flow rates before confluence point:
      21.796       3.613       5.890
Maximum flow rates at confluence using above data:
       27.624       24.802       23.576
Area of streams before confluence:
        8.930        0.970        4.700
Effective area values after confluence:
       13.328        8.958       14.600


Results of confluence:
Total flow rate =     27.624(CFS)
Time of concentration =    18.087 min.
Effective stream area after confluence  =     13.328(Ac.)
Study area average Pervious fraction(Ap) =  0.390
Study area average soil loss rate(Fm) =    0.327(In/Hr)
Study area total =      14.60(Ac.)


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Process from Point/Station      111.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.624(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    27.624(CFS)
Normal flow depth in pipe =   23.72(In.)
Flow top width inside pipe =   29.67(In.)
Critical Depth =   20.93(In.)
Pipe flow velocity =      6.04(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    18.24 min.


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Process from Point/Station      111.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.328(Ac.)
Runoff from this stream =     27.624(CFS)
Time of concentration =   18.24 min.
Rainfall intensity =     2.350(In/Hr)
Area averaged loss rate (Fm) =    0.3269(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3897
Program is now starting with Main Stream No. 2
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Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1275.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02124  s(%)=       2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   19.240 min.
Rainfall intensity =      2.275(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.580
Subarea runoff =      4.182(CFS)
Total initial stream area =        3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


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Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1275.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   535.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.642(CFS)
Depth of flow =   0.429(Ft.), Average velocity =   2.762(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.095(Ft.)
Flow velocity =   2.76(Ft/s)
Travel time =    3.23 min.     TC =   22.47  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      2.073(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.548
Subarea runoff =      4.823(CFS) for    4.760(Ac.)
Total runoff =      9.005(CFS)
Effective area this stream =        7.93(Ac.)
Total Study Area (Main Stream No. 2) =       22.53(Ac.)
Area averaged Fm value =    0.811(In/Hr)
Street flow at end of street =      9.005(CFS)
Half street flow at end of street =      9.005(CFS)
Depth of flow =   0.467(Ft.), Average velocity =   2.973(Ft/s)
Flow width (from curb towards crown)=  17.036(Ft.)
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Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.005(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.005(CFS)
Normal flow depth in pipe =   14.20(In.)
Flow top width inside pipe =   14.69(In.)
Critical Depth =   13.94(In.)
Pipe flow velocity =      6.02(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    22.57 min.


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Process from Point/Station      204.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =   103.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.005(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =     9.005(CFS)
Normal flow depth in pipe =   17.86(In.)
Flow top width inside pipe =   20.94(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =      3.59(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =    23.05 min.


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Process from Point/Station      204.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.930(Ac.)
Runoff from this stream =      9.005(CFS)
Time of concentration =   23.05 min.
Rainfall intensity =     2.042(In/Hr)
Area averaged loss rate (Fm) =    0.8115(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9700
Summary of stream data:

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


1     27.62    13.328     18.24    0.327      2.350
2      9.01     7.930     23.05    0.811      2.042
Qmax(1) =
          1.000 *    1.000 *    27.624) +
          1.250 *    0.791 *     9.005) + =      36.533
Qmax(2) =
          0.848 *    1.000 *    27.624) +
          1.000 *    1.000 *     9.005) + =      32.423

Total of 2 main streams to confluence:
Flow rates before confluence point:
      28.624      10.005
Maximum flow rates at confluence using above data:
       36.533       32.423
Area of streams before confluence:
       13.328        7.930
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Effective area values after confluence:
       19.602       21.258


Results of confluence:
Total flow rate =     36.533(CFS)
Time of concentration =    18.239 min.
Effective stream area after confluence  =     19.602(Ac.)
Study area average Pervious fraction(Ap) =  0.606
Study area average soil loss rate(Fm) =    0.508(In/Hr)
Study area total =      21.26(Ac.)


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Process from Point/Station      112.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.500(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =  1261.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    36.533(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    36.533(CFS)
Normal flow depth in pipe =   22.24(In.)
Flow top width inside pipe =   30.94(In.)
Critical Depth =   24.16(In.)
Pipe flow velocity =      8.58(Ft/s)
Travel time through pipe =    2.45 min.
Time of concentration (TC) =    20.69 min.


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Process from Point/Station      112.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     19.602(Ac.)
Runoff from this stream =     36.533(CFS)
Time of concentration =   20.69 min.
Rainfall intensity =     2.178(In/Hr)
Area averaged loss rate (Fm) =    0.5077(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6062
Program is now starting with Main Stream No. 2


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Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   406.000(Ft.)
Top (of initial area) elevation =  1279.000(Ft.)
Bottom (of initial area) elevation =  1271.800(Ft.)
Difference in elevation =     7.200(Ft.)
Slope =    0.01773  s(%)=       1.77
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.476 min.
Rainfall intensity =      2.411(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.598
Subarea runoff =      3.718(CFS)
Total initial stream area =        2.580(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      116.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1271.800(Ft.)
End of street segment elevation =  1262.700(Ft.)
Length of street segment  =   686.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.204(CFS)
Depth of flow =   0.400(Ft.), Average velocity =   3.103(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.684(Ft.)
Flow velocity =   3.10(Ft/s)
Travel time =    3.68 min.     TC =   21.16  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      2.149(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.560
Subarea runoff =      4.914(CFS) for    4.590(Ac.)
Total runoff =      8.631(CFS)
Effective area this stream =        7.17(Ac.)
Total Study Area (Main Stream No. 2) =       29.70(Ac.)
Area averaged Fm value =    0.812(In/Hr)
Street flow at end of street =      8.631(CFS)
Half street flow at end of street =      8.631(CFS)
Depth of flow =   0.439(Ft.), Average velocity =   3.360(Ft/s)
Flow width (from curb towards crown)=  15.628(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.170(Ac.)
Runoff from this stream =      8.631(CFS)
Time of concentration =   21.16 min.
Rainfall intensity =     2.149(In/Hr)
Area averaged loss rate (Fm) =    0.8116(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9680


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Process from Point/Station      115.000 to Point/Station      116.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
```

```
Initial subarea data:
Initial area flow distance =   796.000(Ft.)
Top (of initial area) elevation =  1276.000(Ft.)
Bottom (of initial area) elevation =  1262.700(Ft.)
Difference in elevation =    13.300(Ft.)
Slope =    0.01671  s(%)=       1.67
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.152 min.
Rainfall intensity =      2.036(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.542
Subarea runoff =      4.427(CFS)
Total initial stream area =        4.010(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.010(Ac.)
Runoff from this stream =      4.427(CFS)
Time of concentration =   23.15 min.
Rainfall intensity =     2.036(In/Hr)
Area averaged loss rate (Fm) =    0.8095(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      8.63     7.170     21.16    0.812      2.149
2      4.43     4.010     23.15    0.810      2.036
Qmax(1) =
          1.000 *    1.000 *     8.631) +
          1.092 *    0.914 *     4.427) + =      13.050
Qmax(2) =
          0.916 *    1.000 *     8.631) +
          1.000 *    1.000 *     4.427) + =      12.330

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.631       4.427
Maximum flow rates at confluence using above data:
       13.050       12.330
Area of streams before confluence:
        7.170        4.010
Effective area values after confluence:
       10.835       11.180
Results of confluence:
Total flow rate =     13.050(CFS)
Time of concentration =    21.161 min.
Effective stream area after confluence =     10.835(Ac.)
Study area average Pervious fraction(Ap) =  0.979
Study area average soil loss rate(Fm) =    0.811(In/Hr)
Study area total (this main stream) =      11.18(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      117.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1262.700(Ft.)
End of street segment elevation =  1260.300(Ft.)
Length of street segment  =   479.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
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Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     15.981(CFS)
Depth of flow =   0.608(Ft.), Average velocity =   2.615(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.32(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.000(Ft.)
Flow velocity =   2.62(Ft/s)
Travel time =    3.05 min.     TC =   24.21  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.770(In/Hr)
Rainfall intensity =      1.982(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.539
Subarea runoff =      5.780(CFS) for    6.790(Ac.)
Total runoff =     18.831(CFS)
Effective area this stream =       17.63(Ac.)
Total Study Area (Main Stream No. 2) =       40.50(Ac.)
Area averaged Fm value =    0.795(In/Hr)
Street flow at end of street =     18.831(CFS)
Half street flow at end of street =     18.831(CFS)
Depth of flow =   0.636(Ft.), Average velocity =   2.748(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.43(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1257.300(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.831(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    18.831(CFS)
Normal flow depth in pipe =   15.89(In.)
Flow top width inside pipe =   18.02(In.)
Critical Depth =   18.82(In.)
Pipe flow velocity =      9.65(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    24.24 min.


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Process from Point/Station      117.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     17.625(Ac.)
Runoff from this stream =     18.831(CFS)
Time of concentration =   24.24 min.
Rainfall intensity =     1.981(In/Hr)
Area averaged loss rate (Fm) =    0.7951(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9489
Summary of stream data:
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```
Stream Flow rate    Area     TC      Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)     (In/Hr)


1     36.53    19.602     20.69    0.508      2.178
2     18.83    17.625     24.24    0.795      1.981
Qmax(1) =
          1.000 *    1.000 *    36.533) +
          1.167 *    0.853 *    18.831) + =      55.282
Qmax(2) =
          0.882 *    1.000 *    36.533) +
          1.000 *    1.000 *    18.831) + =      51.040

Total of 2 main streams to confluence:
Flow rates before confluence point:
      37.533      19.831
Maximum flow rates at confluence using above data:
       55.282       51.040
Area of streams before confluence:
       19.602       17.625
Effective area values after confluence:
       34.642       37.227


Results of confluence:
Total flow rate =     55.282(CFS)
Time of concentration =    20.689 min.
Effective stream area after confluence  =     34.642(Ac.)
Study area average Pervious fraction(Ap) =  0.768
Study area average soil loss rate(Fm) =    0.644(In/Hr)
Study area total =      37.23(Ac.)
End of computations, Total Study Area =           40.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.752
Area averaged SCS curve number =  44.0
```

APPENDIX B.3: RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 04/11/22

265.22.22
10-YEAR RATIONAL TABLING METHOD FOR AREA A
POST-PROJECT CONDITION
FN: ARAPOST10.RSB

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.931 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 745.000(Ft.)
Top (of initial area) elevation = 1285.000(Ft.)
Bottom (of initial area) elevation = 1276.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.359 min.
Rainfall intensity = 2.671(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.867
Subarea runoff = 10.351(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1271.000(Ft.)
Downstream point/station elevation = 1270.700(Ft.)
Pipe length = 595.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 10.351(CFS)
Nearest computed pipe diameter = 33.00(In.)
Calculated individual pipe flow = 10.351(CFS)
Normal flow depth in pipe = 23.86(In.)
Flow top width inside pipe = 29.54(In.)
Critical Depth = 12.53(In.)
Pipe flow velocity = 2.25(Ft/s)
Travel time through pipe = 4.40 min.
Time of concentration (TC) = 14.76 min.

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     10.281(CFS)
therefore the upstream flow rate of Q =     10.351(CFS) is being used
Time of concentration =    14.76 min.
Rainfall intensity =      2.160(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.859
Subarea runoff =      0.000(CFS) for    1.070(Ac.)
Total runoff =     10.351(CFS)
Effective area this stream =        5.54(Ac.)
Total Study Area (Main Stream No. 1) =        5.54(Ac.)
Area averaged Fm value =    0.098(In/Hr)


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Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1270.700(Ft.)
Downstream point/station elevation =  1270.500(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.351(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.351(CFS)
Normal flow depth in pipe =   14.04(In.)
Flow top width inside pipe =   19.77(In.)
Critical Depth =   14.39(In.)
Pipe flow velocity =      6.06(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.84 min.


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Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    14.84 min.
Rainfall intensity =      2.153(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.859
Subarea runoff =      6.164(CFS) for    3.390(Ac.)
Total runoff =     16.515(CFS)
Effective area this stream =        8.93(Ac.)
Total Study Area (Main Stream No. 1) =        8.93(Ac.)
Area averaged Fm value =    0.098(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
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Upstream point/station elevation =  1270.500(Ft.)
Downstream point/station elevation =  1268.000(Ft.)
Pipe length  =   155.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.515(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.515(CFS)
Normal flow depth in pipe =   14.48(In.)
Flow top width inside pipe =   19.43(In.)
Critical Depth =   17.93(In.)
Pipe flow velocity =      9.34(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    15.12 min.


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Process from Point/Station      105.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1268.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =   795.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.515(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    16.515(CFS)
Normal flow depth in pipe =   24.47(In.)
Flow top width inside pipe =   23.27(In.)
Critical Depth =   16.48(In.)
Pipe flow velocity =      3.85(Ft/s)
Travel time through pipe =    3.44 min.
Time of concentration (TC) =    18.56 min.


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Process from Point/Station      105.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.930(Ac.)
Runoff from this stream =     16.515(CFS)
Time of concentration =   18.56 min.
Rainfall intensity =     1.883(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   479.000(Ft.)
Top (of initial area) elevation =  1288.000(Ft.)
Bottom (of initial area) elevation =  1280.000(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.01670  s(%)=       1.67
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.137 min.
Rainfall intensity =      3.087(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.871
Subarea runoff =      1.238(CFS)
Total initial stream area =        0.460(Ac.)
Pervious area fraction = 0.100
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Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1280.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   557.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.694(CFS)
Depth of flow =   0.272(Ft.), Average velocity =   2.598(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.247(Ft.)
Flow velocity =   2.60(Ft/s)
Travel time =    3.57 min.     TC =   11.71  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Rainfall intensity =      2.482(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.865
Subarea runoff =      0.843(CFS) for    0.510(Ac.)
Total runoff =      2.081(CFS)
Effective area this stream =        0.97(Ac.)
Total Study Area (Main Stream No. 2) =        9.90(Ac.)
Area averaged Fm value =    0.098(In/Hr)
Street flow at end of street =      2.081(CFS)
Half street flow at end of street =      2.081(CFS)
Depth of flow =   0.287(Ft.), Average velocity =   2.714(Ft/s)
Flow width (from curb towards crown)=   8.001(Ft.)


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Process from Point/Station      108.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.081(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.081(CFS)
Normal flow depth in pipe =    7.16(In.)
Flow top width inside pipe =   11.77(In.)
Critical Depth =    7.40(In.)
Pipe flow velocity =      4.26(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    11.86 min.


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Process from Point/Station      108.000 to Point/Station      111.000
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**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.970(Ac.)
Runoff from this stream =      2.081(CFS)
Time of concentration =   11.86 min.
Rainfall intensity =     2.462(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   953.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1270.000(Ft.)
Difference in elevation =    17.000(Ft.)
Slope =    0.01784  s(%)=       1.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.557 min.
Rainfall intensity =      1.591(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.442
Subarea runoff =      3.307(CFS)
Total initial stream area =        4.700(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


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Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    64.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.307(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.307(CFS)
Normal flow depth in pipe =    9.67(In.)
Flow top width inside pipe =   14.36(In.)
Critical Depth =    8.80(In.)
Pipe flow velocity =      3.95(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    24.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      4.700(Ac.)
Runoff from this stream =      3.307(CFS)
Time of concentration =   24.83 min.
Rainfall intensity =     1.581(In/Hr)
Area averaged loss rate (Fm) =    0.8095(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:
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Stream Flow rate    Area     TC      Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)     (In/Hr)


1     16.52     8.930     18.56    0.098      1.883
2      2.08     0.970     11.86    0.098      2.462
3      3.31     4.700     24.83    0.810      1.581
Qmax(1) =
          1.000 *    1.000 *    16.515) +
          0.755 *    1.000 *     2.081) +
          1.391 *    0.747 *     3.307) + =      21.524
Qmax(2) =
          1.325 *    0.639 *    16.515) +
          1.000 *    1.000 *     2.081) +
          2.143 *    0.478 *     3.307) + =      19.453
Qmax(3) =
          0.831 *    1.000 *    16.515) +
          0.627 *    1.000 *     2.081) +
          1.000 *    1.000 *     3.307) + =      18.335

Total of 3 main streams to confluence:
Flow rates before confluence point:
      17.515       3.081       4.307
Maximum flow rates at confluence using above data:
       21.524       19.453       18.335
Area of streams before confluence:
        8.930        0.970        4.700
Effective area values after confluence:
       13.413        8.924       14.600


Results of confluence:
Total flow rate =     21.524(CFS)
Time of concentration =    18.556 min.
Effective stream area after confluence  =     13.413(Ac.)
Study area average Pervious fraction(Ap) =  0.390
Study area average soil loss rate(Fm) =    0.327(In/Hr)
Study area total =      14.60(Ac.)


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Process from Point/Station      111.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.524(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    21.524(CFS)
Normal flow depth in pipe =   21.66(In.)
Flow top width inside pipe =   26.88(In.)
Critical Depth =   18.91(In.)
Pipe flow velocity =      5.68(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    18.72 min.


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Process from Point/Station      111.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.413(Ac.)
Runoff from this stream =     21.524(CFS)
Time of concentration =   18.72 min.
Rainfall intensity =     1.873(In/Hr)
Area averaged loss rate (Fm) =    0.3269(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3897
```

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Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1287.000(Ft.)
Bottom (of initial area) elevation =  1275.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02124  s(%)=       2.12
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   19.240 min.
Rainfall intensity =      1.842(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.504
Subarea runoff =      2.946(CFS)
Total initial stream area =        3.170(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1275.000(Ft.)
End of street segment elevation =  1270.000(Ft.)
Length of street segment  =   535.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.562(CFS)
Depth of flow =   0.386(Ft.), Average velocity =   2.524(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.964(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    3.53 min.     TC =   22.77  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.665(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.461
Subarea runoff =      3.145(CFS) for    4.760(Ac.)
Total runoff =      6.091(CFS)
Effective area this stream =        7.93(Ac.)
Total Study Area (Main Stream No. 2) =       22.53(Ac.)
Area averaged Fm value =    0.811(In/Hr)
Street flow at end of street =      6.091(CFS)
Half street flow at end of street =      6.091(CFS)
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Depth of flow =   0.418(Ft.), Average velocity =   2.705(Ft/s)
Flow width (from curb towards crown)=  14.579(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1267.000(Ft.)
Downstream point/station elevation =  1266.700(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.091(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.091(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   17.72(In.)
Critical Depth =   11.43(In.)
Pipe flow velocity =      5.63(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    22.89 min.


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Process from Point/Station      204.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1266.700(Ft.)
Downstream point/station elevation =  1266.500(Ft.)
Pipe length  =   103.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.091(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.091(CFS)
Normal flow depth in pipe =   15.19(In.)
Flow top width inside pipe =   18.79(In.)
Critical Depth =   10.91(In.)
Pipe flow velocity =      3.27(Ft/s)
Travel time through pipe =    0.52 min.
Time of concentration (TC) =    23.41 min.


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Process from Point/Station      204.000 to Point/Station      112.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.930(Ac.)
Runoff from this stream =      6.091(CFS)
Time of concentration =   23.41 min.
Rainfall intensity =     1.638(In/Hr)
Area averaged loss rate (Fm) =    0.8115(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9700
Summary of stream data:

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


1     21.52    13.413     18.72    0.327      1.873
2      6.09     7.930     23.41    0.811      1.638
Qmax(1) =
          1.000 *    1.000 *    21.524) +
          1.285 *    0.800 *     6.091) + =      27.781
Qmax(2) =
          0.848 *    1.000 *    21.524) +
          1.000 *    1.000 *     6.091) + =      24.340

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.524       7.091
Maximum flow rates at confluence using above data:
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       27.781       24.340
Area of streams before confluence:
       13.413        7.930
Effective area values after confluence:
       19.754       21.343


Results of confluence:
Total flow rate =     27.781(CFS)
Time of concentration =    18.718 min.
Effective stream area after confluence  =     19.754(Ac.)
Study area average Pervious fraction(Ap) =  0.605
Study area average soil loss rate(Fm) =    0.507(In/Hr)
Study area total =      21.34(Ac.)


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Process from Point/Station      112.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1266.500(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =  1261.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.781(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    27.781(CFS)
Normal flow depth in pipe =   19.92(In.)
Flow top width inside pipe =   28.34(In.)
Critical Depth =   21.56(In.)
Pipe flow velocity =      8.02(Ft/s)
Travel time through pipe =    2.62 min.
Time of concentration (TC) =    21.34 min.


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Process from Point/Station      112.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     19.754(Ac.)
Runoff from this stream =     27.781(CFS)
Time of concentration =   21.34 min.
Rainfall intensity =     1.731(In/Hr)
Area averaged loss rate (Fm) =    0.5069(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6053
Program is now starting with Main Stream No. 2


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Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   406.000(Ft.)
Top (of initial area) elevation =  1279.000(Ft.)
Bottom (of initial area) elevation =  1271.800(Ft.)
Difference in elevation =     7.200(Ft.)
Slope =    0.01773  s(%)=       1.77
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.476 min.
Rainfall intensity =      1.951(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.527
Subarea runoff =      2.652(CFS)
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Total initial stream area =        2.580(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


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Process from Point/Station      114.000 to Point/Station      116.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1271.800(Ft.)
End of street segment elevation =  1262.700(Ft.)
Length of street segment  =   686.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.295(CFS)
Depth of flow =   0.362(Ft.), Average velocity =   2.844(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.761(Ft.)
Flow velocity =   2.84(Ft/s)
Travel time =    4.02 min.     TC =   21.50  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9500     Max loss rate(Fm)=     0.813(In/Hr)
Rainfall intensity =      1.724(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.476
Subarea runoff =      3.233(CFS) for    4.590(Ac.)
Total runoff =      5.885(CFS)
Effective area this stream =        7.17(Ac.)
Total Study Area (Main Stream No. 2) =       29.70(Ac.)
Area averaged Fm value =    0.812(In/Hr)
Street flow at end of street =      5.885(CFS)
Half street flow at end of street =      5.885(CFS)
Depth of flow =   0.395(Ft.), Average velocity =   3.064(Ft/s)
Flow width (from curb towards crown)=  13.393(Ft.)


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Process from Point/Station      114.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.170(Ac.)
Runoff from this stream =      5.885(CFS)
Time of concentration =   21.50 min.
Rainfall intensity =     1.724(In/Hr)
Area averaged loss rate (Fm) =    0.8116(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9680


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Process from Point/Station      115.000 to Point/Station      116.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   796.000(Ft.)
Top (of initial area) elevation =  1276.000(Ft.)
Bottom (of initial area) elevation =  1262.700(Ft.)
Difference in elevation =    13.300(Ft.)
Slope =    0.01671  s(%)=       1.67
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.152 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.458
Subarea runoff =      3.028(CFS)
Total initial stream area =        4.010(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.010(Ac.)
Runoff from this stream =      3.028(CFS)
Time of concentration =   23.15 min.
Rainfall intensity =     1.649(In/Hr)
Area averaged loss rate (Fm) =    0.8095(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      5.88     7.170     21.50    0.812      1.724
2      3.03     4.010     23.15    0.810      1.649
Qmax(1) =
          1.000 *    1.000 *     5.885) +
          1.089 *    0.928 *     3.028) + =       8.948
Qmax(2) =
          0.918 *    1.000 *     5.885) +
          1.000 *    1.000 *     3.028) + =       8.428

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.885       3.028
Maximum flow rates at confluence using above data:
        8.948        8.428
Area of streams before confluence:
        7.170        4.010
Effective area values after confluence:
       10.893       11.180
Results of confluence:
Total flow rate =      8.948(CFS)
Time of concentration =    21.496 min.
Effective stream area after confluence =     10.893(Ac.)
Study area average Pervious fraction(Ap) =  0.979
Study area average soil loss rate(Fm) =    0.811(In/Hr)
Study area total (this main stream) =      11.18(Ac.)


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Process from Point/Station      116.000 to Point/Station      117.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1262.700(Ft.)
End of street segment elevation =  1260.300(Ft.)
Length of street segment  =   479.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
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Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.745(CFS)
Depth of flow =   0.545(Ft.), Average velocity =   2.363(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    1.81(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.928(Ft.)
Flow velocity =   2.36(Ft/s)
Travel time =    3.38 min.     TC =   24.87  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 46.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.770(In/Hr)
Rainfall intensity =      1.579(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.447
Subarea runoff =      3.527(CFS) for    6.790(Ac.)
Total runoff =     12.475(CFS)
Effective area this stream =       17.68(Ac.)
Total Study Area (Main Stream No. 2) =       40.50(Ac.)
Area averaged Fm value =    0.795(In/Hr)
Street flow at end of street =     12.475(CFS)
Half street flow at end of street =     12.475(CFS)
Depth of flow =   0.570(Ft.), Average velocity =   2.424(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.81(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)


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Process from Point/Station      117.000 to Point/Station      118.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1257.300(Ft.)
Downstream point/station elevation =  1257.000(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.475(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.475(CFS)
Normal flow depth in pipe =   13.59(In.)
Flow top width inside pipe =   15.48(In.)
Critical Depth =   15.99(In.)
Pipe flow velocity =      8.71(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    24.91 min.


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Process from Point/Station      117.000 to Point/Station      118.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     17.683(Ac.)
Runoff from this stream =     12.475(CFS)
Time of concentration =   24.91 min.
Rainfall intensity =     1.578(In/Hr)
Area averaged loss rate (Fm) =    0.7952(In/Hr)
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Area averaged Pervious ratio (Ap) = 0.9490
Summary of stream data:

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


1     27.78    19.754     21.34    0.507      1.731
2     12.47    17.683     24.91    0.795      1.578
Qmax(1) =
          1.000 *    1.000 *    27.781) +
          1.196 *    0.857 *    12.475) + =      40.564
Qmax(2) =
          0.875 *    1.000 *    27.781) +
          1.000 *    1.000 *    12.475) + =      36.773

Total of 2 main streams to confluence:
Flow rates before confluence point:
      28.781      13.475
Maximum flow rates at confluence using above data:
       40.564       36.773
Area of streams before confluence:
       19.754       17.683
Effective area values after confluence:
       34.902       37.437


Results of confluence:
Total flow rate =     40.564(CFS)
Time of concentration =    21.339 min.
Effective stream area after confluence  =     34.902(Ac.)
Study area average Pervious fraction(Ap) =  0.768
Study area average soil loss rate(Fm) =    0.643(In/Hr)
Study area total =      37.44(Ac.)
End of computations, Total Study Area =           40.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.752
Area averaged SCS curve number =  44.0
```

APPENDIX C: POST-PROJECT UNIT HYDROGRAPH ANALYSES

APPENDIX C.1: 100-YEAR STORM EVENT

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

Study date 04/11/22

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6279

265.22.22
UNIT HYDROGRAPH FOR ONSITE AREA
POST-PROJECT CONDITION
FN: ARAPOST100

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
8.81	1	0.93
Rainfall data for year 2		
8.81	6	1.64
Rainfall data for year 2		
8.81	24	3.07
Rainfall data for year 100		
8.81	1	1.51
Rainfall data for year 100		
8.81	6	3.78
Rainfall data for year 100		
8.81	24	7.02

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
46.0	46.0	8.81	1.000	0.856	0.100	0.086

Area-averaged adjusted loss rate Fm (In/Hr) = 0.086

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.88	0.100	46.0	46.0	11.74	0.189
7.93	0.900	98.0	98.0	0.20	0.966

Area-averaged catchment yield fraction, Y = 0.888
Area-averaged low loss fraction, Yb = 0.112
User entry of time of concentration = 0.173 (hours)
++
Watershed area = 8.81(Ac.)
Catchment Lag time = 0.138 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 60.3340
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.086(In/Hr)
Average low loss rate fraction (Yb) = 0.112 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.559(In)
Computed peak 30-minute rainfall = 1.144(In)
Specified peak 1-hour rainfall = 1.510(In)
Computed peak 3-hour rainfall = 2.650(In)
Specified peak 6-hour rainfall = 3.780(In)
Specified peak 24-hour rainfall = 7.020(In)

Rainfall depth area reduction factors:
Using a total area of 8.81(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.559(In)
30-minute factor = 1.000 Adjusted rainfall = 1.144(In)
1-hour factor = 1.000 Adjusted rainfall = 1.509(In)
3-hour factor = 1.000 Adjusted rainfall = 2.650(In)
6-hour factor = 1.000 Adjusted rainfall = 3.780(In)
24-hour factor = 1.000 Adjusted rainfall = 7.020(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 106.55 (CFS))	
1	6.589	7.020
2	42.052	37.785
3	82.029	42.593
4	95.655	14.518
5	98.687	3.231
6	100.000	1.399

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5586	0.5586
2	0.7371	0.1785
3	0.8669	0.1298
4	0.9726	0.1057
5	1.0634	0.0908
6	1.1439	0.0805
7	1.2166	0.0728
8	1.2834	0.0668
9	1.3453	0.0619
10	1.4032	0.0579
11	1.4577	0.0545
12	1.5094	0.0516
13	1.5726	0.0632
14	1.6334	0.0609
15	1.6922	0.0588
16	1.7491	0.0569
17	1.8043	0.0552
18	1.8580	0.0536
19	1.9102	0.0522

20	1.9610	0.0509
21	2.0107	0.0496
22	2.0592	0.0485
23	2.1066	0.0474
24	2.1531	0.0465
25	2.1986	0.0455
26	2.2432	0.0446
27	2.2871	0.0438
28	2.3301	0.0430
29	2.3724	0.0423
30	2.4139	0.0416
31	2.4548	0.0409
32	2.4951	0.0403
33	2.5348	0.0397
34	2.5738	0.0391
35	2.6124	0.0385
36	2.6503	0.0380
37	2.6878	0.0375
38	2.7248	0.0370
39	2.7613	0.0365
40	2.7973	0.0360
41	2.8329	0.0356
42	2.8681	0.0352
43	2.9028	0.0348
44	2.9372	0.0344
45	2.9712	0.0340
46	3.0049	0.0336
47	3.0381	0.0333
48	3.0711	0.0329
49	3.1037	0.0326
50	3.1360	0.0323
51	3.1679	0.0320
52	3.1996	0.0317
53	3.2310	0.0314
54	3.2620	0.0311
55	3.2928	0.0308
56	3.3234	0.0305
57	3.3536	0.0303
58	3.3836	0.0300
59	3.4134	0.0298
60	3.4429	0.0295
61	3.4722	0.0293
62	3.5012	0.0290
63	3.5300	0.0288
64	3.5586	0.0286
65	3.5870	0.0284
66	3.6151	0.0282
67	3.6431	0.0280
68	3.6708	0.0277
69	3.6984	0.0275
70	3.7258	0.0274
71	3.7529	0.0272
72	3.7799	0.0270
73	3.8032	0.0234
74	3.8264	0.0232
75	3.8494	0.0230
76	3.8723	0.0228
77	3.8949	0.0227
78	3.9174	0.0225
79	3.9398	0.0223
80	3.9620	0.0222
81	3.9840	0.0220
82	4.0059	0.0219
83	4.0277	0.0217
84	4.0493	0.0216
85	4.0707	0.0215
86	4.0920	0.0213
87	4.1132	0.0212
88	4.1343	0.0210
89	4.1552	0.0209
90	4.1760	0.0208

91	4.1966	0.0207
92	4.2171	0.0205
93	4.2375	0.0204
94	4.2578	0.0203
95	4.2780	0.0202
96	4.2981	0.0201
97	4.3180	0.0199
98	4.3378	0.0198
99	4.3575	0.0197
100	4.3771	0.0196
101	4.3966	0.0195
102	4.4160	0.0194
103	4.4353	0.0193
104	4.4545	0.0192
105	4.4735	0.0191
106	4.4925	0.0190
107	4.5114	0.0189
108	4.5302	0.0188
109	4.5488	0.0187
110	4.5674	0.0186
111	4.5859	0.0185
112	4.6043	0.0184
113	4.6227	0.0183
114	4.6409	0.0182
115	4.6590	0.0181
116	4.6771	0.0180
117	4.6950	0.0180
118	4.7129	0.0179
119	4.7307	0.0178
120	4.7484	0.0177
121	4.7660	0.0176
122	4.7836	0.0175
123	4.8010	0.0175
124	4.8184	0.0174
125	4.8358	0.0173
126	4.8530	0.0172
127	4.8702	0.0172
128	4.8872	0.0171
129	4.9043	0.0170
130	4.9212	0.0169
131	4.9381	0.0169
132	4.9549	0.0168
133	4.9716	0.0167
134	4.9882	0.0167
135	5.0048	0.0166
136	5.0214	0.0165
137	5.0378	0.0165
138	5.0542	0.0164
139	5.0705	0.0163
140	5.0868	0.0163
141	5.1030	0.0162
142	5.1191	0.0161
143	5.1352	0.0161
144	5.1512	0.0160
145	5.1671	0.0159
146	5.1830	0.0159
147	5.1988	0.0158
148	5.2146	0.0158
149	5.2303	0.0157
150	5.2459	0.0156
151	5.2615	0.0156
152	5.2771	0.0155
153	5.2925	0.0155
154	5.3079	0.0154
155	5.3233	0.0154
156	5.3386	0.0153
157	5.3539	0.0153
158	5.3691	0.0152
159	5.3842	0.0151
160	5.3993	0.0151
161	5.4144	0.0150

162	5.4294	0.0150
163	5.4443	0.0149
164	5.4592	0.0149
165	5.4740	0.0148
166	5.4888	0.0148
167	5.5036	0.0147
168	5.5183	0.0147
169	5.5329	0.0146
170	5.5475	0.0146
171	5.5620	0.0145
172	5.5765	0.0145
173	5.5910	0.0145
174	5.6054	0.0144
175	5.6198	0.0144
176	5.6341	0.0143
177	5.6484	0.0143
178	5.6626	0.0142
179	5.6768	0.0142
180	5.6909	0.0141
181	5.7050	0.0141
182	5.7191	0.0141
183	5.7331	0.0140
184	5.7470	0.0140
185	5.7610	0.0139
186	5.7749	0.0139
187	5.7887	0.0138
188	5.8025	0.0138
189	5.8163	0.0138
190	5.8300	0.0137
191	5.8437	0.0137
192	5.8573	0.0136
193	5.8709	0.0136
194	5.8845	0.0136
195	5.8980	0.0135
196	5.9115	0.0135
197	5.9249	0.0134
198	5.9383	0.0134
199	5.9517	0.0134
200	5.9651	0.0133
201	5.9784	0.0133
202	5.9916	0.0133
203	6.0049	0.0132
204	6.0180	0.0132
205	6.0312	0.0132
206	6.0443	0.0131
207	6.0574	0.0131
208	6.0705	0.0131
209	6.0835	0.0130
210	6.0965	0.0130
211	6.1094	0.0129
212	6.1223	0.0129
213	6.1352	0.0129
214	6.1480	0.0128
215	6.1608	0.0128
216	6.1736	0.0128
217	6.1864	0.0127
218	6.1991	0.0127
219	6.2118	0.0127
220	6.2244	0.0127
221	6.2370	0.0126
222	6.2496	0.0126
223	6.2622	0.0126
224	6.2747	0.0125
225	6.2872	0.0125
226	6.2997	0.0125
227	6.3121	0.0124
228	6.3245	0.0124
229	6.3369	0.0124
230	6.3492	0.0123
231	6.3615	0.0123
232	6.3738	0.0123

233	6.3861	0.0123
234	6.3983	0.0122
235	6.4105	0.0122
236	6.4226	0.0122
237	6.4348	0.0121
238	6.4469	0.0121
239	6.4590	0.0121
240	6.4710	0.0121
241	6.4831	0.0120
242	6.4951	0.0120
243	6.5070	0.0120
244	6.5190	0.0119
245	6.5309	0.0119
246	6.5428	0.0119
247	6.5546	0.0119
248	6.5665	0.0118
249	6.5783	0.0118
250	6.5901	0.0118
251	6.6018	0.0118
252	6.6136	0.0117
253	6.6253	0.0117
254	6.6370	0.0117
255	6.6486	0.0117
256	6.6602	0.0116
257	6.6718	0.0116
258	6.6834	0.0116
259	6.6950	0.0116
260	6.7065	0.0115
261	6.7180	0.0115
262	6.7295	0.0115
263	6.7410	0.0115
264	6.7524	0.0114
265	6.7638	0.0114
266	6.7752	0.0114
267	6.7866	0.0114
268	6.7979	0.0113
269	6.8092	0.0113
270	6.8205	0.0113
271	6.8318	0.0113
272	6.8430	0.0112
273	6.8542	0.0112
274	6.8654	0.0112
275	6.8766	0.0112
276	6.8878	0.0112
277	6.8989	0.0111
278	6.9100	0.0111
279	6.9211	0.0111
280	6.9322	0.0111
281	6.9432	0.0110
282	6.9542	0.0110
283	6.9652	0.0110
284	6.9762	0.0110
285	6.9872	0.0110
286	6.9981	0.0109
287	7.0090	0.0109
288	7.0199	0.0109

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0109	0.0012	0.0097
2	0.0109	0.0012	0.0097
3	0.0110	0.0012	0.0097
4	0.0110	0.0012	0.0098
5	0.0110	0.0012	0.0098
6	0.0110	0.0012	0.0098
7	0.0111	0.0012	0.0098
8	0.0111	0.0012	0.0099
9	0.0112	0.0012	0.0099
10	0.0112	0.0012	0.0099

11	0.0112	0.0013	0.0100
12	0.0112	0.0013	0.0100
13	0.0113	0.0013	0.0100
14	0.0113	0.0013	0.0101
15	0.0114	0.0013	0.0101
16	0.0114	0.0013	0.0101
17	0.0114	0.0013	0.0102
18	0.0115	0.0013	0.0102
19	0.0115	0.0013	0.0102
20	0.0115	0.0013	0.0102
21	0.0116	0.0013	0.0103
22	0.0116	0.0013	0.0103
23	0.0117	0.0013	0.0104
24	0.0117	0.0013	0.0104
25	0.0117	0.0013	0.0104
26	0.0118	0.0013	0.0104
27	0.0118	0.0013	0.0105
28	0.0118	0.0013	0.0105
29	0.0119	0.0013	0.0106
30	0.0119	0.0013	0.0106
31	0.0120	0.0013	0.0106
32	0.0120	0.0013	0.0107
33	0.0121	0.0013	0.0107
34	0.0121	0.0013	0.0107
35	0.0121	0.0014	0.0108
36	0.0122	0.0014	0.0108
37	0.0122	0.0014	0.0109
38	0.0123	0.0014	0.0109
39	0.0123	0.0014	0.0109
40	0.0123	0.0014	0.0110
41	0.0124	0.0014	0.0110
42	0.0124	0.0014	0.0110
43	0.0125	0.0014	0.0111
44	0.0125	0.0014	0.0111
45	0.0126	0.0014	0.0112
46	0.0126	0.0014	0.0112
47	0.0127	0.0014	0.0113
48	0.0127	0.0014	0.0113
49	0.0128	0.0014	0.0114
50	0.0128	0.0014	0.0114
51	0.0129	0.0014	0.0114
52	0.0129	0.0014	0.0115
53	0.0130	0.0015	0.0115
54	0.0130	0.0015	0.0116
55	0.0131	0.0015	0.0116
56	0.0131	0.0015	0.0117
57	0.0132	0.0015	0.0117
58	0.0132	0.0015	0.0117
59	0.0133	0.0015	0.0118
60	0.0133	0.0015	0.0118
61	0.0134	0.0015	0.0119
62	0.0134	0.0015	0.0119
63	0.0135	0.0015	0.0120
64	0.0136	0.0015	0.0120
65	0.0136	0.0015	0.0121
66	0.0137	0.0015	0.0122
67	0.0138	0.0015	0.0122
68	0.0138	0.0015	0.0123
69	0.0139	0.0016	0.0123
70	0.0139	0.0016	0.0124
71	0.0140	0.0016	0.0124
72	0.0141	0.0016	0.0125
73	0.0141	0.0016	0.0126
74	0.0142	0.0016	0.0126
75	0.0143	0.0016	0.0127
76	0.0143	0.0016	0.0127
77	0.0144	0.0016	0.0128
78	0.0145	0.0016	0.0128
79	0.0145	0.0016	0.0129
80	0.0146	0.0016	0.0130
81	0.0147	0.0016	0.0131

82	0.0147	0.0016	0.0131
83	0.0148	0.0017	0.0132
84	0.0149	0.0017	0.0132
85	0.0150	0.0017	0.0133
86	0.0150	0.0017	0.0134
87	0.0151	0.0017	0.0135
88	0.0152	0.0017	0.0135
89	0.0153	0.0017	0.0136
90	0.0154	0.0017	0.0136
91	0.0155	0.0017	0.0137
92	0.0155	0.0017	0.0138
93	0.0156	0.0017	0.0139
94	0.0157	0.0018	0.0140
95	0.0158	0.0018	0.0141
96	0.0159	0.0018	0.0141
97	0.0160	0.0018	0.0142
98	0.0161	0.0018	0.0143
99	0.0162	0.0018	0.0144
100	0.0163	0.0018	0.0144
101	0.0164	0.0018	0.0146
102	0.0165	0.0018	0.0146
103	0.0166	0.0019	0.0147
104	0.0167	0.0019	0.0148
105	0.0168	0.0019	0.0149
106	0.0169	0.0019	0.0150
107	0.0170	0.0019	0.0151
108	0.0171	0.0019	0.0152
109	0.0172	0.0019	0.0153
110	0.0173	0.0019	0.0154
111	0.0175	0.0020	0.0155
112	0.0175	0.0020	0.0156
113	0.0177	0.0020	0.0157
114	0.0178	0.0020	0.0158
115	0.0180	0.0020	0.0160
116	0.0180	0.0020	0.0160
117	0.0182	0.0020	0.0162
118	0.0183	0.0020	0.0163
119	0.0185	0.0021	0.0164
120	0.0186	0.0021	0.0165
121	0.0188	0.0021	0.0167
122	0.0189	0.0021	0.0168
123	0.0191	0.0021	0.0169
124	0.0192	0.0021	0.0170
125	0.0194	0.0022	0.0172
126	0.0195	0.0022	0.0173
127	0.0197	0.0022	0.0175
128	0.0198	0.0022	0.0176
129	0.0201	0.0022	0.0178
130	0.0202	0.0023	0.0179
131	0.0204	0.0023	0.0181
132	0.0205	0.0023	0.0182
133	0.0208	0.0023	0.0185
134	0.0209	0.0023	0.0186
135	0.0212	0.0024	0.0188
136	0.0213	0.0024	0.0189
137	0.0216	0.0024	0.0192
138	0.0217	0.0024	0.0193
139	0.0220	0.0025	0.0196
140	0.0222	0.0025	0.0197
141	0.0225	0.0025	0.0200
142	0.0227	0.0025	0.0201
143	0.0230	0.0026	0.0204
144	0.0232	0.0026	0.0206
145	0.0270	0.0030	0.0240
146	0.0272	0.0030	0.0241
147	0.0275	0.0031	0.0245
148	0.0277	0.0031	0.0246
149	0.0282	0.0031	0.0250
150	0.0284	0.0032	0.0252
151	0.0288	0.0032	0.0256
152	0.0290	0.0032	0.0258

153	0.0295	0.0033	0.0262
154	0.0298	0.0033	0.0264
155	0.0303	0.0034	0.0269
156	0.0305	0.0034	0.0271
157	0.0311	0.0035	0.0276
158	0.0314	0.0035	0.0279
159	0.0320	0.0036	0.0284
160	0.0323	0.0036	0.0287
161	0.0329	0.0037	0.0293
162	0.0333	0.0037	0.0296
163	0.0340	0.0038	0.0302
164	0.0344	0.0038	0.0305
165	0.0352	0.0039	0.0313
166	0.0356	0.0040	0.0316
167	0.0365	0.0041	0.0324
168	0.0370	0.0041	0.0328
169	0.0380	0.0042	0.0337
170	0.0385	0.0043	0.0342
171	0.0397	0.0044	0.0352
172	0.0403	0.0045	0.0358
173	0.0416	0.0046	0.0369
174	0.0423	0.0047	0.0376
175	0.0438	0.0049	0.0389
176	0.0446	0.0050	0.0397
177	0.0465	0.0052	0.0413
178	0.0474	0.0053	0.0421
179	0.0496	0.0055	0.0441
180	0.0509	0.0057	0.0452
181	0.0536	0.0060	0.0476
182	0.0552	0.0062	0.0490
183	0.0588	0.0066	0.0522
184	0.0609	0.0068	0.0541
185	0.0516	0.0058	0.0459
186	0.0545	0.0061	0.0484
187	0.0619	0.0069	0.0550
188	0.0668	0.0071	0.0596
189	0.0805	0.0071	0.0733
190	0.0908	0.0071	0.0837
191	0.1298	0.0071	0.1227
192	0.1785	0.0071	0.1714
193	0.5586	0.0071	0.5515
194	0.1057	0.0071	0.0986
195	0.0728	0.0071	0.0656
196	0.0579	0.0065	0.0514
197	0.0632	0.0071	0.0561
198	0.0569	0.0064	0.0505
199	0.0522	0.0058	0.0464
200	0.0485	0.0054	0.0431
201	0.0455	0.0051	0.0404
202	0.0430	0.0048	0.0382
203	0.0409	0.0046	0.0363
204	0.0391	0.0044	0.0347
205	0.0375	0.0042	0.0333
206	0.0360	0.0040	0.0320
207	0.0348	0.0039	0.0309
208	0.0336	0.0038	0.0299
209	0.0326	0.0036	0.0290
210	0.0317	0.0035	0.0281
211	0.0308	0.0034	0.0274
212	0.0300	0.0034	0.0267
213	0.0293	0.0033	0.0260
214	0.0286	0.0032	0.0254
215	0.0280	0.0031	0.0248
216	0.0274	0.0031	0.0243
217	0.0234	0.0026	0.0207
218	0.0228	0.0026	0.0203
219	0.0223	0.0025	0.0199
220	0.0219	0.0024	0.0194
221	0.0215	0.0024	0.0191
222	0.0210	0.0024	0.0187
223	0.0207	0.0023	0.0183

224	0.0203	0.0023	0.0180
225	0.0199	0.0022	0.0177
226	0.0196	0.0022	0.0174
227	0.0193	0.0022	0.0171
228	0.0190	0.0021	0.0169
229	0.0187	0.0021	0.0166
230	0.0184	0.0021	0.0163
231	0.0181	0.0020	0.0161
232	0.0179	0.0020	0.0159
233	0.0176	0.0020	0.0157
234	0.0174	0.0019	0.0154
235	0.0172	0.0019	0.0152
236	0.0169	0.0019	0.0150
237	0.0167	0.0019	0.0149
238	0.0165	0.0018	0.0147
239	0.0163	0.0018	0.0145
240	0.0161	0.0018	0.0143
241	0.0159	0.0018	0.0142
242	0.0158	0.0018	0.0140
243	0.0156	0.0017	0.0138
244	0.0154	0.0017	0.0137
245	0.0153	0.0017	0.0136
246	0.0151	0.0017	0.0134
247	0.0149	0.0017	0.0133
248	0.0148	0.0017	0.0131
249	0.0146	0.0016	0.0130
250	0.0145	0.0016	0.0129
251	0.0144	0.0016	0.0128
252	0.0142	0.0016	0.0126
253	0.0141	0.0016	0.0125
254	0.0140	0.0016	0.0124
255	0.0138	0.0015	0.0123
256	0.0137	0.0015	0.0122
257	0.0136	0.0015	0.0121
258	0.0135	0.0015	0.0120
259	0.0134	0.0015	0.0119
260	0.0133	0.0015	0.0118
261	0.0132	0.0015	0.0117
262	0.0131	0.0015	0.0116
263	0.0129	0.0014	0.0115
264	0.0128	0.0014	0.0114
265	0.0127	0.0014	0.0113
266	0.0127	0.0014	0.0112
267	0.0126	0.0014	0.0112
268	0.0125	0.0014	0.0111
269	0.0124	0.0014	0.0110
270	0.0123	0.0014	0.0109
271	0.0122	0.0014	0.0108
272	0.0121	0.0014	0.0108
273	0.0120	0.0013	0.0107
274	0.0119	0.0013	0.0106
275	0.0119	0.0013	0.0105
276	0.0118	0.0013	0.0105
277	0.0117	0.0013	0.0104
278	0.0116	0.0013	0.0103
279	0.0116	0.0013	0.0103
280	0.0115	0.0013	0.0102
281	0.0114	0.0013	0.0101
282	0.0113	0.0013	0.0101
283	0.0113	0.0013	0.0100
284	0.0112	0.0013	0.0099
285	0.0111	0.0012	0.0099
286	0.0111	0.0012	0.0098
287	0.0110	0.0012	0.0098
288	0.0109	0.0012	0.0097

Total soil rain loss = 0.70(In)
Total effective rainfall = 6.32(In)
Peak flow rate in flood hydrograph = 30.98(CFS)

++

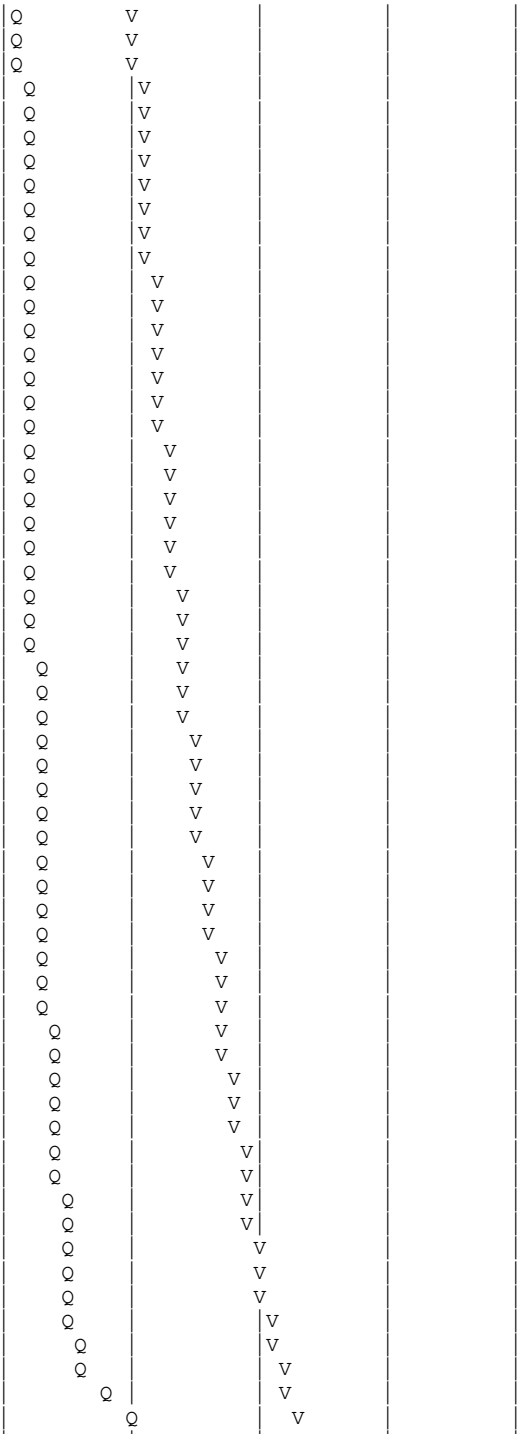
24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0005	0.07	Q				
0+10	0.0035	0.43	Q				
0+15	0.0093	0.85	Q				
0+20	0.0161	0.99	Q				
0+25	0.0232	1.02	VQ				
0+30	0.0303	1.04	VQ				
0+35	0.0375	1.04	VQ				
0+40	0.0447	1.05	VQ				
0+45	0.0519	1.05	VQ				
0+50	0.0592	1.05	VQ				
0+55	0.0665	1.06	VQ				
1+ 0	0.0738	1.06	VQ				
1+ 5	0.0811	1.06	VQ				
1+10	0.0884	1.07	VQ				
1+15	0.0958	1.07	VQ				
1+20	0.1032	1.07	VQ				
1+25	0.1106	1.08	VQ				
1+30	0.1180	1.08	|Q				
1+35	0.1255	1.08	|Q				
1+40	0.1329	1.09	|Q				
1+45	0.1404	1.09	|Q				
1+50	0.1480	1.09	|Q				
1+55	0.1555	1.10	|Q				
2+ 0	0.1631	1.10	|Q				
2+ 5	0.1707	1.10	|Q				
2+10	0.1783	1.11	|Q				
2+15	0.1860	1.11	|Q				
2+20	0.1936	1.11	|Q				
2+25	0.2013	1.12	|Q				
2+30	0.2091	1.12	|Q				
2+35	0.2168	1.13	|Q				
2+40	0.2246	1.13	|Q				
2+45	0.2324	1.13	|QV				
2+50	0.2402	1.14	|QV				
2+55	0.2481	1.14	|QV				
3+ 0	0.2560	1.15	|QV				
3+ 5	0.2639	1.15	|QV				
3+10	0.2718	1.15	|QV				
3+15	0.2798	1.16	|QV				
3+20	0.2878	1.16	|QV				
3+25	0.2958	1.17	|QV				
3+30	0.3039	1.17	|QV				
3+35	0.3120	1.17	|QV				
3+40	0.3201	1.18	|QV				
3+45	0.3283	1.18	|QV				
3+50	0.3364	1.19	|QV				
3+55	0.3446	1.19	|QV				
4+ 0	0.3529	1.20	|Q V				
4+ 5	0.3611	1.20	|Q V				
4+10	0.3694	1.21	|Q V				
4+15	0.3778	1.21	|Q V				
4+20	0.3861	1.21	|Q V				
4+25	0.3945	1.22	|Q V				
4+30	0.4030	1.22	|Q V				
4+35	0.4114	1.23	|Q V				
4+40	0.4199	1.23	|Q V				
4+45	0.4285	1.24	|Q V				
4+50	0.4370	1.24	|Q V				
4+55	0.4456	1.25	|Q V				
5+ 0	0.4543	1.25	|Q V				
5+ 5	0.4629	1.26	|Q V				
5+10	0.4716	1.26	|Q V				

5+15	0.4804	1.27	Q V				
5+20	0.4892	1.28	Q V				
5+25	0.4980	1.28	Q V				
5+30	0.5069	1.29	Q V				
5+35	0.5158	1.29	Q V				
5+40	0.5247	1.30	Q V				
5+45	0.5337	1.30	Q V				
5+50	0.5427	1.31	Q V				
5+55	0.5517	1.31	Q V				
6+ 0	0.5608	1.32	Q V				
6+ 5	0.5700	1.33	Q V				
6+10	0.5791	1.33	Q V				
6+15	0.5884	1.34	Q V				
6+20	0.5976	1.35	Q V				
6+25	0.6069	1.35	Q V				
6+30	0.6163	1.36	Q V				
6+35	0.6257	1.36	Q V				
6+40	0.6351	1.37	Q V				
6+45	0.6446	1.38	Q V				
6+50	0.6541	1.38	Q V				
6+55	0.6637	1.39	Q V				
7+ 0	0.6733	1.40	Q V				
7+ 5	0.6830	1.41	Q V				
7+10	0.6928	1.41	Q V				
7+15	0.7025	1.42	Q V				
7+20	0.7124	1.43	Q V				
7+25	0.7222	1.43	Q V				
7+30	0.7322	1.44	Q V				
7+35	0.7421	1.45	Q V				
7+40	0.7522	1.46	Q V				
7+45	0.7623	1.47	Q V				
7+50	0.7724	1.47	Q V				
7+55	0.7826	1.48	Q V				
8+ 0	0.7929	1.49	Q V				
8+ 5	0.8032	1.50	Q V				
8+10	0.8136	1.51	Q V				
8+15	0.8240	1.52	Q V				
8+20	0.8345	1.52	Q V				
8+25	0.8451	1.53	Q V				
8+30	0.8557	1.54	Q V				
8+35	0.8664	1.55	Q V				
8+40	0.8771	1.56	Q V				
8+45	0.8880	1.57	Q V				
8+50	0.8989	1.58	Q V				
8+55	0.9098	1.59	Q V				
9+ 0	0.9208	1.60	Q V				
9+ 5	0.9319	1.61	Q V				
9+10	0.9431	1.62	Q V				
9+15	0.9543	1.63	Q V				
9+20	0.9657	1.64	Q V				
9+25	0.9771	1.65	Q V				
9+30	0.9885	1.67	Q V				
9+35	1.0001	1.68	Q V				
9+40	1.0117	1.69	Q V				
9+45	1.0234	1.70	Q V				
9+50	1.0352	1.71	Q V				
9+55	1.0471	1.73	Q V				
10+ 0	1.0591	1.74	Q V				
10+ 5	1.0712	1.75	Q V				
10+10	1.0833	1.77	Q V				
10+15	1.0956	1.78	Q V				
10+20	1.1079	1.79	Q V				
10+25	1.1203	1.81	Q V				
10+30	1.1329	1.82	Q V				
10+35	1.1455	1.84	Q V				
10+40	1.1583	1.85	Q V				
10+45	1.1711	1.87	Q V				
10+50	1.1841	1.88	Q V				
10+55	1.1972	1.90	Q V				
11+ 0	1.2104	1.92	Q V				
11+ 5	1.2237	1.93	Q V				

11+10	1.2371	1.95	
11+15	1.2507	1.97	
11+20	1.2644	1.99	
11+25	1.2782	2.01	
11+30	1.2922	2.03	
11+35	1.3062	2.05	
11+40	1.3205	2.07	
11+45	1.3349	2.09	
11+50	1.3494	2.11	
11+55	1.3641	2.13	
12+ 0	1.3789	2.16	
12+ 5	1.3941	2.20	
12+10	1.4102	2.34	
12+15	1.4274	2.50	
12+20	1.4451	2.57	
12+25	1.4630	2.61	
12+30	1.4812	2.64	
12+35	1.4996	2.67	
12+40	1.5182	2.70	
12+45	1.5370	2.73	
12+50	1.5560	2.76	
12+55	1.5753	2.80	
13+ 0	1.5948	2.83	
13+ 5	1.6145	2.87	
13+10	1.6345	2.91	
13+15	1.6548	2.95	
13+20	1.6754	2.99	
13+25	1.6963	3.03	
13+30	1.7174	3.08	
13+35	1.7389	3.12	
13+40	1.7608	3.17	
13+45	1.7830	3.22	
13+50	1.8056	3.28	
13+55	1.8285	3.34	
14+ 0	1.8519	3.40	
14+ 5	1.8758	3.46	
14+10	1.9001	3.53	
14+15	1.9249	3.60	
14+20	1.9502	3.68	
14+25	1.9762	3.76	
14+30	2.0027	3.85	
14+35	2.0299	3.95	
14+40	2.0578	4.05	
14+45	2.0864	4.16	
14+50	2.1159	4.28	
14+55	2.1463	4.41	
15+ 0	2.1777	4.56	
15+ 5	2.2102	4.72	
15+10	2.2440	4.90	
15+15	2.2792	5.11	
15+20	2.3159	5.34	
15+25	2.3539	5.52	
15+30	2.3908	5.36	
15+35	2.4266	5.19	
15+40	2.4643	5.47	
15+45	2.5059	6.04	
15+50	2.5535	6.92	
15+55	2.6104	8.26	
16+ 0	2.6843	10.74	
16+ 5	2.8021	17.11	
16+10	3.0155	30.98	
16+15	3.2268	30.68	
16+20	3.3354	15.77	
16+25	3.3945	8.59	
16+30	3.4407	6.71	
16+35	3.4802	5.72	
16+40	3.5165	5.28	
16+45	3.5501	4.87	
16+50	3.5814	4.55	
16+55	3.6108	4.27	
17+ 0	3.6386	4.04	

17+ 5	3.6650	3.84	Q			V
17+10	3.6903	3.67	Q			V
17+15	3.7145	3.52	Q			V
17+20	3.7378	3.39	Q			V
17+25	3.7604	3.27	Q			V
17+30	3.7821	3.16	Q			V
17+35	3.8033	3.07	Q			V
17+40	3.8238	2.98	Q			V
17+45	3.8437	2.90	Q			V
17+50	3.8632	2.82	Q			V
17+55	3.8822	2.76	Q			V
18+ 0	3.9007	2.69	Q			V
18+ 5	3.9187	2.61	Q			V
18+10	3.9355	2.44	Q			V
18+15	3.9511	2.26	Q			V
18+20	3.9660	2.17	Q			V
18+25	3.9805	2.11	Q			V
18+30	3.9947	2.06	Q			V
18+35	4.0086	2.02	Q			V
18+40	4.0223	1.98	Q			V
18+45	4.0357	1.95	Q			V
18+50	4.0489	1.91	Q			V
18+55	4.0618	1.88	Q			V
19+ 0	4.0745	1.85	Q			V
19+ 5	4.0870	1.82	Q			V
19+10	4.0994	1.79	Q			V
19+15	4.1115	1.76	Q			V
19+20	4.1235	1.74	Q			V
19+25	4.1352	1.71	Q			V
19+30	4.1469	1.69	Q			V
19+35	4.1583	1.66	Q			V
19+40	4.1696	1.64	Q			V
19+45	4.1808	1.62	Q			V
19+50	4.1918	1.60	Q			V
19+55	4.2026	1.58	Q			V
20+ 0	4.2134	1.56	Q			V
20+ 5	4.2240	1.54	Q			V
20+10	4.2345	1.52	Q			V
20+15	4.2448	1.50	Q			V
20+20	4.2551	1.49	Q			V
20+25	4.2652	1.47	Q			V
20+30	4.2753	1.46	Q			V
20+35	4.2852	1.44	Q			V
20+40	4.2950	1.43	Q			V
20+45	4.3047	1.41	Q			V
20+50	4.3143	1.40	Q			V
20+55	4.3238	1.38	Q			V
21+ 0	4.3333	1.37	Q			V
21+ 5	4.3426	1.36	Q			V
21+10	4.3519	1.34	Q			V
21+15	4.3610	1.33	Q			V
21+20	4.3701	1.32	Q			V
21+25	4.3791	1.31	Q			V
21+30	4.3881	1.30	Q			V
21+35	4.3969	1.28	Q			V
21+40	4.4057	1.27	Q			V
21+45	4.4144	1.26	Q			V
21+50	4.4230	1.25	Q			V
21+55	4.4316	1.24	Q			V
22+ 0	4.4401	1.23	Q			V
22+ 5	4.4485	1.22	Q			V
22+10	4.4568	1.21	Q			V
22+15	4.4651	1.20	Q			V
22+20	4.4734	1.20	Q			V
22+25	4.4815	1.19	Q			V
22+30	4.4896	1.18	Q			V
22+35	4.4977	1.17	Q			V
22+40	4.5057	1.16	Q			V
22+45	4.5136	1.15	Q			V
22+50	4.5215	1.14	Q			V
22+55	4.5293	1.14	Q			V

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   23+ 0       4.5371      1.13  |Q        |         |         |        V|
   23+ 5       4.5448      1.12  |Q        |         |         |        V|
   23+10       4.5525      1.11  |Q        |         |         |        V|
   23+15       4.5601      1.11  |Q        |         |         |        V|
   23+20       4.5677      1.10  |Q        |         |         |        V|
   23+25       4.5752      1.09  |Q        |         |         |        V|
   23+30       4.5827      1.09  |Q        |         |         |        V|
   23+35       4.5901      1.08  |Q        |         |         |        V|
   23+40       4.5975      1.07  |Q        |         |         |        V|
   23+45       4.6048      1.06  |Q        |         |         |        V|
   23+50       4.6121      1.06  |Q        |         |         |        V|
   23+55       4.6193      1.05  |Q        |         |         |        V|
   24+ 0       4.6265      1.05  |Q        |         |         |        V|
   24+ 5       4.6332      0.97  Q         |         |         |        V|
   24+10       4.6374      0.60  Q         |         |         |        V|
   24+15       4.6387      0.19  Q         |         |         |        V|
   24+20       4.6390      0.05  Q         |         |         |        V|
   24+25       4.6391      0.01  Q         |         |         |        V|
-------------------------------------------------------------------------
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APPENDIX C.2: 25-YEAR STORM EVENT

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

Study date 04/11/22

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6279

265.22.22
UNIT HYDROGRAPH FOR ONSITE AREA
POST-PROJECT CONDITION
FN: ARAPOST25

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

	Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10			
	8.81	1	0.93
Rainfall data for year 2			
	8.81	6	1.64
Rainfall data for year 2			
	8.81	24	3.07
Rainfall data for year 100			
	8.81	1	1.51
Rainfall data for year 100			
	8.81	6	3.78
Rainfall data for year 100			
	8.81	24	7.02

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
46.0	46.0	8.81	1.000	0.856	0.100	0.086

Area-averaged adjusted loss rate Fm (In/Hr) = 0.086

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.88	0.100	46.0	46.0	11.74	0.127
7.93	0.900	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.875
Area-averaged low loss fraction, Yb = 0.125
User entry of time of concentration = 0.173 (hours)
++
Watershed area = 8.81(Ac.)
Catchment Lag time = 0.138 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 60.3340
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.086(In/Hr)
Average low loss rate fraction (Yb) = 0.125 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.430(In)
Computed peak 30-minute rainfall = 0.880(In)
Specified peak 1-hour rainfall = 1.161(In)
Computed peak 3-hour rainfall = 2.087(In)
Specified peak 6-hour rainfall = 3.022(In)
Specified peak 24-hour rainfall = 5.620(In)

Rainfall depth area reduction factors:
Using a total area of 8.81(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.430(In)
30-minute factor = 1.000 Adjusted rainfall = 0.880(In)
1-hour factor = 1.000 Adjusted rainfall = 1.161(In)
3-hour factor = 1.000 Adjusted rainfall = 2.087(In)
6-hour factor = 1.000 Adjusted rainfall = 3.022(In)
24-hour factor = 1.000 Adjusted rainfall = 5.620(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 106.55 (CFS))	
1	6.589	7.020
2	42.052	37.785
3	82.029	42.593
4	95.655	14.518
5	98.687	3.231
6	100.000	1.399

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4297	0.4297
2	0.5669	0.1373
3	0.6668	0.0998
4	0.7481	0.0813
5	0.8179	0.0698
6	0.8798	0.0619
7	0.9358	0.0560
8	0.9871	0.0513
9	1.0347	0.0476
10	1.0793	0.0445
11	1.1212	0.0419
12	1.1609	0.0397
13	1.2116	0.0507
14	1.2605	0.0489
15	1.3078	0.0473
16	1.3537	0.0459
17	1.3982	0.0445
18	1.4416	0.0433
19	1.4838	0.0422

20	1.5250	0.0412
21	1.5652	0.0403
22	1.6046	0.0394
23	1.6432	0.0385
24	1.6809	0.0378
25	1.7180	0.0370
26	1.7543	0.0364
27	1.7900	0.0357
28	1.8251	0.0351
29	1.8597	0.0345
30	1.8936	0.0340
31	1.9271	0.0334
32	1.9600	0.0329
33	1.9925	0.0325
34	2.0245	0.0320
35	2.0561	0.0316
36	2.0873	0.0312
37	2.1180	0.0307
38	2.1484	0.0304
39	2.1784	0.0300
40	2.2080	0.0296
41	2.2373	0.0293
42	2.2662	0.0290
43	2.2949	0.0286
44	2.3232	0.0283
45	2.3512	0.0280
46	2.3790	0.0277
47	2.4064	0.0275
48	2.4336	0.0272
49	2.4606	0.0269
50	2.4872	0.0267
51	2.5137	0.0264
52	2.5398	0.0262
53	2.5658	0.0260
54	2.5915	0.0257
55	2.6170	0.0255
56	2.6423	0.0253
57	2.6674	0.0251
58	2.6923	0.0249
59	2.7169	0.0247
60	2.7414	0.0245
61	2.7657	0.0243
62	2.7898	0.0241
63	2.8137	0.0239
64	2.8375	0.0237
65	2.8611	0.0236
66	2.8845	0.0234
67	2.9077	0.0232
68	2.9308	0.0231
69	2.9537	0.0229
70	2.9765	0.0228
71	2.9991	0.0226
72	3.0216	0.0225
73	3.0403	0.0187
74	3.0589	0.0186
75	3.0773	0.0184
76	3.0956	0.0183
77	3.1138	0.0182
78	3.1318	0.0180
79	3.1497	0.0179
80	3.1675	0.0178
81	3.1852	0.0177
82	3.2027	0.0175
83	3.2201	0.0174
84	3.2374	0.0173
85	3.2546	0.0172
86	3.2717	0.0171
87	3.2887	0.0170
88	3.3056	0.0169
89	3.3223	0.0168
90	3.3390	0.0167

91	3.3555	0.0166
92	3.3720	0.0165
93	3.3884	0.0164
94	3.4046	0.0163
95	3.4208	0.0162
96	3.4369	0.0161
97	3.4528	0.0160
98	3.4687	0.0159
99	3.4845	0.0158
100	3.5003	0.0157
101	3.5159	0.0156
102	3.5314	0.0155
103	3.5469	0.0155
104	3.5622	0.0154
105	3.5775	0.0153
106	3.5928	0.0152
107	3.6079	0.0151
108	3.6229	0.0151
109	3.6379	0.0150
110	3.6528	0.0149
111	3.6677	0.0148
112	3.6824	0.0148
113	3.6971	0.0147
114	3.7117	0.0146
115	3.7262	0.0145
116	3.7407	0.0145
117	3.7551	0.0144
118	3.7694	0.0143
119	3.7837	0.0143
120	3.7979	0.0142
121	3.8121	0.0141
122	3.8261	0.0141
123	3.8401	0.0140
124	3.8541	0.0139
125	3.8680	0.0139
126	3.8818	0.0138
127	3.8955	0.0138
128	3.9092	0.0137
129	3.9229	0.0136
130	3.9365	0.0136
131	3.9500	0.0135
132	3.9635	0.0135
133	3.9769	0.0134
134	3.9902	0.0134
135	4.0035	0.0133
136	4.0168	0.0132
137	4.0300	0.0132
138	4.0431	0.0131
139	4.0562	0.0131
140	4.0693	0.0130
141	4.0822	0.0130
142	4.0952	0.0129
143	4.1081	0.0129
144	4.1209	0.0128
145	4.1337	0.0128
146	4.1464	0.0127
147	4.1591	0.0127
148	4.1718	0.0126
149	4.1843	0.0126
150	4.1969	0.0125
151	4.2094	0.0125
152	4.2219	0.0125
153	4.2343	0.0124
154	4.2466	0.0124
155	4.2590	0.0123
156	4.2712	0.0123
157	4.2835	0.0122
158	4.2957	0.0122
159	4.3078	0.0121
160	4.3199	0.0121
161	4.3320	0.0121

162	4.3440	0.0120
163	4.3560	0.0120
164	4.3679	0.0119
165	4.3798	0.0119
166	4.3917	0.0119
167	4.4035	0.0118
168	4.4153	0.0118
169	4.4271	0.0117
170	4.4388	0.0117
171	4.4504	0.0117
172	4.4621	0.0116
173	4.4737	0.0116
174	4.4852	0.0116
175	4.4967	0.0115
176	4.5082	0.0115
177	4.5197	0.0114
178	4.5311	0.0114
179	4.5425	0.0114
180	4.5538	0.0113
181	4.5651	0.0113
182	4.5764	0.0113
183	4.5876	0.0112
184	4.5988	0.0112
185	4.6100	0.0112
186	4.6211	0.0111
187	4.6322	0.0111
188	4.6433	0.0111
189	4.6544	0.0110
190	4.6654	0.0110
191	4.6763	0.0110
192	4.6873	0.0109
193	4.6982	0.0109
194	4.7091	0.0109
195	4.7199	0.0109
196	4.7308	0.0108
197	4.7415	0.0108
198	4.7523	0.0108
199	4.7630	0.0107
200	4.7737	0.0107
201	4.7844	0.0107
202	4.7950	0.0106
203	4.8057	0.0106
204	4.8162	0.0106
205	4.8268	0.0106
206	4.8373	0.0105
207	4.8478	0.0105
208	4.8583	0.0105
209	4.8687	0.0104
210	4.8791	0.0104
211	4.8895	0.0104
212	4.8999	0.0104
213	4.9102	0.0103
214	4.9205	0.0103
215	4.9308	0.0103
216	4.9411	0.0103
217	4.9513	0.0102
218	4.9615	0.0102
219	4.9717	0.0102
220	4.9818	0.0101
221	4.9919	0.0101
222	5.0020	0.0101
223	5.0121	0.0101
224	5.0222	0.0100
225	5.0322	0.0100
226	5.0422	0.0100
227	5.0522	0.0100
228	5.0621	0.0100
229	5.0720	0.0099
230	5.0819	0.0099
231	5.0918	0.0099
232	5.1017	0.0099

233	5.1115	0.0098
234	5.1213	0.0098
235	5.1311	0.0098
236	5.1409	0.0098
237	5.1506	0.0097
238	5.1603	0.0097
239	5.1700	0.0097
240	5.1797	0.0097
241	5.1893	0.0097
242	5.1990	0.0096
243	5.2086	0.0096
244	5.2182	0.0096
245	5.2277	0.0096
246	5.2373	0.0095
247	5.2468	0.0095
248	5.2563	0.0095
249	5.2658	0.0095
250	5.2752	0.0095
251	5.2847	0.0094
252	5.2941	0.0094
253	5.3035	0.0094
254	5.3128	0.0094
255	5.3222	0.0094
256	5.3315	0.0093
257	5.3408	0.0093
258	5.3501	0.0093
259	5.3594	0.0093
260	5.3687	0.0093
261	5.3779	0.0092
262	5.3871	0.0092
263	5.3963	0.0092
264	5.4055	0.0092
265	5.4146	0.0092
266	5.4238	0.0091
267	5.4329	0.0091
268	5.4420	0.0091
269	5.4511	0.0091
270	5.4601	0.0091
271	5.4692	0.0090
272	5.4782	0.0090
273	5.4872	0.0090
274	5.4962	0.0090
275	5.5052	0.0090
276	5.5141	0.0090
277	5.5231	0.0089
278	5.5320	0.0089
279	5.5409	0.0089
280	5.5498	0.0089
281	5.5586	0.0089
282	5.5675	0.0088
283	5.5763	0.0088
284	5.5851	0.0088
285	5.5939	0.0088
286	5.6027	0.0088
287	5.6114	0.0088
288	5.6202	0.0087

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0087	0.0011	0.0076
2	0.0088	0.0011	0.0077
3	0.0088	0.0011	0.0077
4	0.0088	0.0011	0.0077
5	0.0088	0.0011	0.0077
6	0.0089	0.0011	0.0078
7	0.0089	0.0011	0.0078
8	0.0089	0.0011	0.0078
9	0.0090	0.0011	0.0078
10	0.0090	0.0011	0.0078

11	0.0090	0.0011	0.0079
12	0.0090	0.0011	0.0079
13	0.0091	0.0011	0.0079
14	0.0091	0.0011	0.0079
15	0.0091	0.0011	0.0080
16	0.0091	0.0011	0.0080
17	0.0092	0.0012	0.0080
18	0.0092	0.0012	0.0080
19	0.0092	0.0012	0.0081
20	0.0093	0.0012	0.0081
21	0.0093	0.0012	0.0081
22	0.0093	0.0012	0.0081
23	0.0094	0.0012	0.0082
24	0.0094	0.0012	0.0082
25	0.0094	0.0012	0.0082
26	0.0094	0.0012	0.0083
27	0.0095	0.0012	0.0083
28	0.0095	0.0012	0.0083
29	0.0095	0.0012	0.0083
30	0.0096	0.0012	0.0084
31	0.0096	0.0012	0.0084
32	0.0096	0.0012	0.0084
33	0.0097	0.0012	0.0085
34	0.0097	0.0012	0.0085
35	0.0097	0.0012	0.0085
36	0.0098	0.0012	0.0085
37	0.0098	0.0012	0.0086
38	0.0098	0.0012	0.0086
39	0.0099	0.0012	0.0086
40	0.0099	0.0012	0.0087
41	0.0100	0.0012	0.0087
42	0.0100	0.0013	0.0087
43	0.0100	0.0013	0.0088
44	0.0100	0.0013	0.0088
45	0.0101	0.0013	0.0088
46	0.0101	0.0013	0.0089
47	0.0102	0.0013	0.0089
48	0.0102	0.0013	0.0089
49	0.0103	0.0013	0.0090
50	0.0103	0.0013	0.0090
51	0.0103	0.0013	0.0090
52	0.0104	0.0013	0.0091
53	0.0104	0.0013	0.0091
54	0.0104	0.0013	0.0091
55	0.0105	0.0013	0.0092
56	0.0105	0.0013	0.0092
57	0.0106	0.0013	0.0093
58	0.0106	0.0013	0.0093
59	0.0107	0.0013	0.0093
60	0.0107	0.0013	0.0094
61	0.0108	0.0013	0.0094
62	0.0108	0.0014	0.0094
63	0.0109	0.0014	0.0095
64	0.0109	0.0014	0.0095
65	0.0109	0.0014	0.0096
66	0.0110	0.0014	0.0096
67	0.0110	0.0014	0.0097
68	0.0111	0.0014	0.0097
69	0.0111	0.0014	0.0097
70	0.0112	0.0014	0.0098
71	0.0112	0.0014	0.0098
72	0.0113	0.0014	0.0099
73	0.0113	0.0014	0.0099
74	0.0114	0.0014	0.0100
75	0.0114	0.0014	0.0100
76	0.0115	0.0014	0.0100
77	0.0116	0.0014	0.0101
78	0.0116	0.0015	0.0101
79	0.0117	0.0015	0.0102
80	0.0117	0.0015	0.0102
81	0.0118	0.0015	0.0103

82	0.0118	0.0015	0.0103
83	0.0119	0.0015	0.0104
84	0.0119	0.0015	0.0104
85	0.0120	0.0015	0.0105
86	0.0121	0.0015	0.0106
87	0.0121	0.0015	0.0106
88	0.0122	0.0015	0.0107
89	0.0123	0.0015	0.0107
90	0.0123	0.0015	0.0108
91	0.0124	0.0016	0.0109
92	0.0125	0.0016	0.0109
93	0.0125	0.0016	0.0110
94	0.0126	0.0016	0.0110
95	0.0127	0.0016	0.0111
96	0.0127	0.0016	0.0111
97	0.0128	0.0016	0.0112
98	0.0129	0.0016	0.0113
99	0.0130	0.0016	0.0114
100	0.0130	0.0016	0.0114
101	0.0131	0.0016	0.0115
102	0.0132	0.0017	0.0115
103	0.0133	0.0017	0.0116
104	0.0134	0.0017	0.0117
105	0.0135	0.0017	0.0118
106	0.0135	0.0017	0.0118
107	0.0136	0.0017	0.0119
108	0.0137	0.0017	0.0120
109	0.0138	0.0017	0.0121
110	0.0139	0.0017	0.0121
111	0.0140	0.0018	0.0123
112	0.0141	0.0018	0.0123
113	0.0142	0.0018	0.0124
114	0.0143	0.0018	0.0125
115	0.0144	0.0018	0.0126
116	0.0145	0.0018	0.0127
117	0.0146	0.0018	0.0128
118	0.0147	0.0018	0.0128
119	0.0148	0.0019	0.0130
120	0.0149	0.0019	0.0130
121	0.0151	0.0019	0.0132
122	0.0151	0.0019	0.0132
123	0.0153	0.0019	0.0134
124	0.0154	0.0019	0.0134
125	0.0155	0.0019	0.0136
126	0.0156	0.0020	0.0137
127	0.0158	0.0020	0.0138
128	0.0159	0.0020	0.0139
129	0.0161	0.0020	0.0141
130	0.0162	0.0020	0.0141
131	0.0164	0.0021	0.0143
132	0.0165	0.0021	0.0144
133	0.0167	0.0021	0.0146
134	0.0168	0.0021	0.0147
135	0.0170	0.0021	0.0148
136	0.0171	0.0021	0.0149
137	0.0173	0.0022	0.0151
138	0.0174	0.0022	0.0152
139	0.0177	0.0022	0.0154
140	0.0178	0.0022	0.0156
141	0.0180	0.0023	0.0158
142	0.0182	0.0023	0.0159
143	0.0184	0.0023	0.0161
144	0.0186	0.0023	0.0162
145	0.0225	0.0028	0.0197
146	0.0226	0.0028	0.0198
147	0.0229	0.0029	0.0200
148	0.0231	0.0029	0.0202
149	0.0234	0.0029	0.0205
150	0.0236	0.0030	0.0206
151	0.0239	0.0030	0.0209
152	0.0241	0.0030	0.0211

153	0.0245	0.0031	0.0214
154	0.0247	0.0031	0.0216
155	0.0251	0.0031	0.0219
156	0.0253	0.0032	0.0221
157	0.0257	0.0032	0.0225
158	0.0260	0.0033	0.0227
159	0.0264	0.0033	0.0231
160	0.0267	0.0033	0.0233
161	0.0272	0.0034	0.0238
162	0.0275	0.0034	0.0240
163	0.0280	0.0035	0.0245
164	0.0283	0.0036	0.0248
165	0.0290	0.0036	0.0253
166	0.0293	0.0037	0.0256
167	0.0300	0.0038	0.0262
168	0.0304	0.0038	0.0266
169	0.0312	0.0039	0.0273
170	0.0316	0.0040	0.0276
171	0.0325	0.0041	0.0284
172	0.0329	0.0041	0.0288
173	0.0340	0.0043	0.0297
174	0.0345	0.0043	0.0302
175	0.0357	0.0045	0.0312
176	0.0364	0.0046	0.0318
177	0.0378	0.0047	0.0330
178	0.0385	0.0048	0.0337
179	0.0403	0.0050	0.0352
180	0.0412	0.0052	0.0360
181	0.0433	0.0054	0.0379
182	0.0445	0.0056	0.0390
183	0.0473	0.0059	0.0414
184	0.0489	0.0061	0.0428
185	0.0397	0.0050	0.0347
186	0.0419	0.0053	0.0367
187	0.0476	0.0060	0.0416
188	0.0513	0.0064	0.0449
189	0.0619	0.0071	0.0548
190	0.0698	0.0071	0.0627
191	0.0998	0.0071	0.0927
192	0.1373	0.0071	0.1302
193	0.4297	0.0071	0.4225
194	0.0813	0.0071	0.0742
195	0.0560	0.0070	0.0489
196	0.0445	0.0056	0.0390
197	0.0507	0.0064	0.0443
198	0.0459	0.0057	0.0401
199	0.0422	0.0053	0.0369
200	0.0394	0.0049	0.0344
201	0.0370	0.0046	0.0324
202	0.0351	0.0044	0.0307
203	0.0334	0.0042	0.0293
204	0.0320	0.0040	0.0280
205	0.0307	0.0039	0.0269
206	0.0296	0.0037	0.0259
207	0.0286	0.0036	0.0250
208	0.0277	0.0035	0.0243
209	0.0269	0.0034	0.0236
210	0.0262	0.0033	0.0229
211	0.0255	0.0032	0.0223
212	0.0249	0.0031	0.0218
213	0.0243	0.0030	0.0212
214	0.0237	0.0030	0.0208
215	0.0232	0.0029	0.0203
216	0.0228	0.0029	0.0199
217	0.0187	0.0023	0.0164
218	0.0183	0.0023	0.0160
219	0.0179	0.0022	0.0157
220	0.0175	0.0022	0.0153
221	0.0172	0.0022	0.0150
222	0.0169	0.0021	0.0148
223	0.0166	0.0021	0.0145

224	0.0163	0.0020	0.0142
225	0.0160	0.0020	0.0140
226	0.0157	0.0020	0.0137
227	0.0155	0.0019	0.0135
228	0.0152	0.0019	0.0133
229	0.0150	0.0019	0.0131
230	0.0148	0.0018	0.0129
231	0.0145	0.0018	0.0127
232	0.0143	0.0018	0.0125
233	0.0141	0.0018	0.0124
234	0.0139	0.0017	0.0122
235	0.0138	0.0017	0.0120
236	0.0136	0.0017	0.0119
237	0.0134	0.0017	0.0117
238	0.0132	0.0017	0.0116
239	0.0131	0.0016	0.0114
240	0.0129	0.0016	0.0113
241	0.0128	0.0016	0.0112
242	0.0126	0.0016	0.0111
243	0.0125	0.0016	0.0109
244	0.0124	0.0016	0.0108
245	0.0122	0.0015	0.0107
246	0.0121	0.0015	0.0106
247	0.0120	0.0015	0.0105
248	0.0119	0.0015	0.0104
249	0.0117	0.0015	0.0103
250	0.0116	0.0015	0.0102
251	0.0115	0.0014	0.0101
252	0.0114	0.0014	0.0100
253	0.0113	0.0014	0.0099
254	0.0112	0.0014	0.0098
255	0.0111	0.0014	0.0097
256	0.0110	0.0014	0.0096
257	0.0109	0.0014	0.0095
258	0.0108	0.0014	0.0095
259	0.0107	0.0013	0.0094
260	0.0106	0.0013	0.0093
261	0.0106	0.0013	0.0092
262	0.0105	0.0013	0.0092
263	0.0104	0.0013	0.0091
264	0.0103	0.0013	0.0090
265	0.0102	0.0013	0.0089
266	0.0101	0.0013	0.0089
267	0.0101	0.0013	0.0088
268	0.0100	0.0013	0.0087
269	0.0099	0.0012	0.0087
270	0.0099	0.0012	0.0086
271	0.0098	0.0012	0.0086
272	0.0097	0.0012	0.0085
273	0.0097	0.0012	0.0084
274	0.0096	0.0012	0.0084
275	0.0095	0.0012	0.0083
276	0.0095	0.0012	0.0083
277	0.0094	0.0012	0.0082
278	0.0093	0.0012	0.0082
279	0.0093	0.0012	0.0081
280	0.0092	0.0012	0.0081
281	0.0092	0.0011	0.0080
282	0.0091	0.0011	0.0080
283	0.0090	0.0011	0.0079
284	0.0090	0.0011	0.0079
285	0.0089	0.0011	0.0078
286	0.0089	0.0011	0.0078
287	0.0088	0.0011	0.0077
288	0.0088	0.0011	0.0077

Total soil rain loss = 0.64(In)
Total effective rainfall = 4.98(In)
Peak flow rate in flood hydrograph = 23.65(CFS)

++

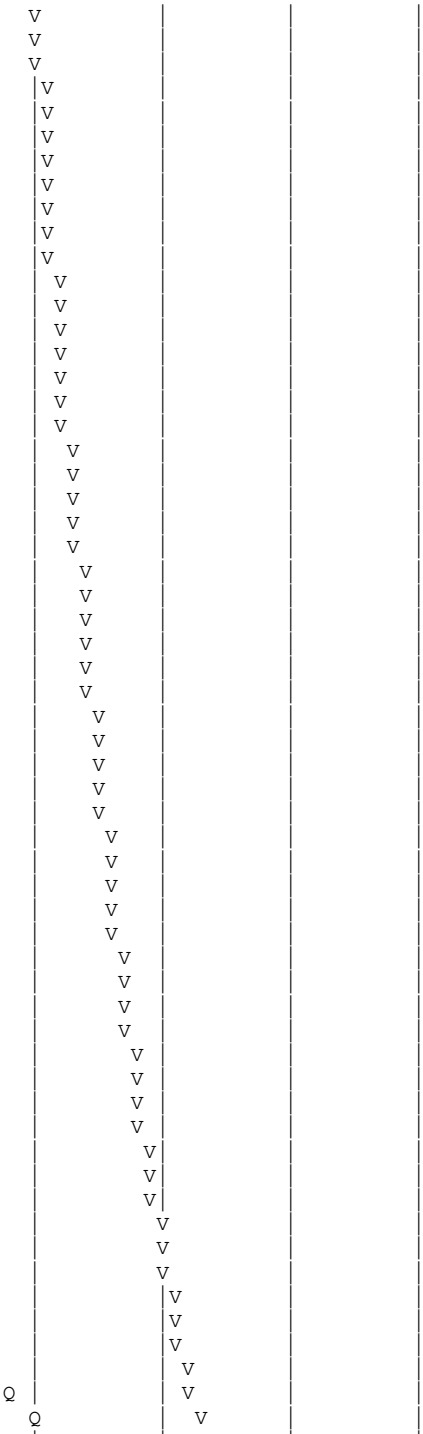
24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0004	0.05	Q				
0+10	0.0027	0.34	Q				
0+15	0.0073	0.67	Q				
0+20	0.0127	0.78	VQ				
0+25	0.0183	0.81	VQ				
0+30	0.0240	0.82	VQ				
0+35	0.0296	0.82	VQ				
0+40	0.0353	0.83	VQ				
0+45	0.0411	0.83	VQ				
0+50	0.0468	0.83	VQ				
0+55	0.0525	0.83	VQ				
1+ 0	0.0583	0.84	VQ				
1+ 5	0.0641	0.84	VQ				
1+10	0.0699	0.84	VQ				
1+15	0.0757	0.84	VQ				
1+20	0.0815	0.85	VQ				
1+25	0.0874	0.85	VQ				
1+30	0.0933	0.85	|Q				
1+35	0.0991	0.86	|Q				
1+40	0.1051	0.86	|Q				
1+45	0.1110	0.86	|Q				
1+50	0.1169	0.86	|Q				
1+55	0.1229	0.87	|Q				
2+ 0	0.1289	0.87	|Q				
2+ 5	0.1349	0.87	|Q				
2+10	0.1409	0.87	|Q				
2+15	0.1470	0.88	|Q				
2+20	0.1530	0.88	|Q				
2+25	0.1591	0.88	|Q				
2+30	0.1652	0.89	|Q				
2+35	0.1713	0.89	|Q				
2+40	0.1775	0.89	|Q				
2+45	0.1836	0.90	|QV				
2+50	0.1898	0.90	|QV				
2+55	0.1960	0.90	|QV				
3+ 0	0.2023	0.90	|QV				
3+ 5	0.2085	0.91	|QV				
3+10	0.2148	0.91	|QV				
3+15	0.2211	0.91	|QV				
3+20	0.2274	0.92	|QV				
3+25	0.2338	0.92	|QV				
3+30	0.2401	0.92	|QV				
3+35	0.2465	0.93	|QV				
3+40	0.2529	0.93	|QV				
3+45	0.2594	0.93	|QV				
3+50	0.2658	0.94	|QV				
3+55	0.2723	0.94	|QV				
4+ 0	0.2788	0.94	|Q V				
4+ 5	0.2853	0.95	|Q V				
4+10	0.2919	0.95	|Q V				
4+15	0.2985	0.96	|Q V				
4+20	0.3051	0.96	|Q V				
4+25	0.3117	0.96	|Q V				
4+30	0.3184	0.97	|Q V				
4+35	0.3251	0.97	|Q V				
4+40	0.3318	0.97	|Q V				
4+45	0.3385	0.98	|Q V				
4+50	0.3453	0.98	|Q V				
4+55	0.3521	0.99	|Q V				
5+ 0	0.3589	0.99	|Q V				
5+ 5	0.3658	0.99	|Q V				
5+10	0.3726	1.00	|Q V				

5+15	0.3795	1.00	Q V				
5+20	0.3865	1.01	Q V				
5+25	0.3935	1.01	Q V				
5+30	0.4005	1.02	Q V				
5+35	0.4075	1.02	Q V				
5+40	0.4145	1.02	Q V				
5+45	0.4216	1.03	Q V				
5+50	0.4287	1.03	Q V				
5+55	0.4359	1.04	Q V				
6+ 0	0.4431	1.04	Q V				
6+ 5	0.4503	1.05	Q V				
6+10	0.4575	1.05	Q V				
6+15	0.4648	1.06	Q V				
6+20	0.4721	1.06	Q V				
6+25	0.4795	1.07	Q V				
6+30	0.4869	1.07	Q V				
6+35	0.4943	1.08	Q V				
6+40	0.5018	1.08	Q V				
6+45	0.5092	1.09	Q V				
6+50	0.5168	1.09	Q V				
6+55	0.5243	1.10	Q V				
7+ 0	0.5319	1.10	Q V				
7+ 5	0.5396	1.11	Q V				
7+10	0.5473	1.12	Q V				
7+15	0.5550	1.12	Q V				
7+20	0.5628	1.13	Q V				
7+25	0.5706	1.13	Q V				
7+30	0.5784	1.14	Q V				
7+35	0.5863	1.14	Q V				
7+40	0.5942	1.15	Q V				
7+45	0.6022	1.16	Q V				
7+50	0.6102	1.16	Q V				
7+55	0.6182	1.17	Q V				
8+ 0	0.6264	1.18	Q V				
8+ 5	0.6345	1.18	Q V				
8+10	0.6427	1.19	Q V				
8+15	0.6509	1.20	Q V				
8+20	0.6592	1.20	Q V				
8+25	0.6676	1.21	Q V				
8+30	0.6760	1.22	Q V				
8+35	0.6844	1.23	Q V				
8+40	0.6929	1.23	Q V				
8+45	0.7014	1.24	Q V				
8+50	0.7100	1.25	Q V				
8+55	0.7187	1.26	Q V				
9+ 0	0.7274	1.26	Q V				
9+ 5	0.7361	1.27	Q V				
9+10	0.7450	1.28	Q V				
9+15	0.7538	1.29	Q V				
9+20	0.7628	1.30	Q V				
9+25	0.7718	1.31	Q V				
9+30	0.7808	1.32	Q V				
9+35	0.7899	1.32	Q V				
9+40	0.7991	1.33	Q V				
9+45	0.8084	1.34	Q V				
9+50	0.8177	1.35	Q V				
9+55	0.8271	1.36	Q V				
10+ 0	0.8365	1.37	Q V				
10+ 5	0.8460	1.38	Q V				
10+10	0.8556	1.39	Q V				
10+15	0.8653	1.40	Q V				
10+20	0.8751	1.42	Q V				
10+25	0.8849	1.43	Q V				
10+30	0.8948	1.44	Q V				
10+35	0.9048	1.45	Q V				
10+40	0.9148	1.46	Q V				
10+45	0.9250	1.47	Q V				
10+50	0.9352	1.49	Q V				
10+55	0.9455	1.50	Q V				
11+ 0	0.9560	1.51	Q V				
11+ 5	0.9665	1.53	Q V				

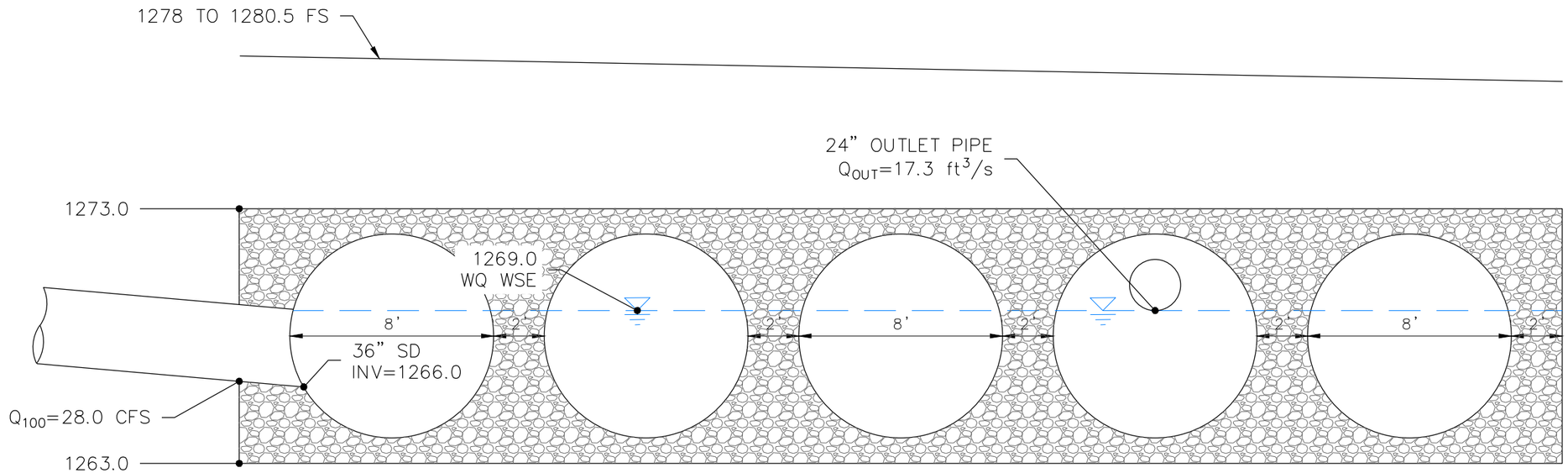
11+10	0.9771	1.54	
11+15	0.9878	1.55	
11+20	0.9986	1.57	
11+25	1.0095	1.58	
11+30	1.0205	1.60	
11+35	1.0316	1.61	
11+40	1.0428	1.63	
11+45	1.0542	1.65	
11+50	1.0656	1.66	
11+55	1.0772	1.68	
12+ 0	1.0890	1.70	
12+ 5	1.1010	1.74	
12+10	1.1139	1.88	
12+15	1.1279	2.04	
12+20	1.1424	2.10	
12+25	1.1571	2.13	
12+30	1.1720	2.16	
12+35	1.1870	2.18	
12+40	1.2022	2.21	
12+45	1.2176	2.23	
12+50	1.2331	2.26	
12+55	1.2489	2.28	
13+ 0	1.2648	2.31	
13+ 5	1.2809	2.34	
13+10	1.2972	2.37	
13+15	1.3138	2.40	
13+20	1.3305	2.43	
13+25	1.3475	2.47	
13+30	1.3647	2.50	
13+35	1.3822	2.54	
13+40	1.3999	2.58	
13+45	1.4180	2.62	
13+50	1.4363	2.66	
13+55	1.4549	2.70	
14+ 0	1.4738	2.75	
14+ 5	1.4931	2.80	
14+10	1.5128	2.85	
14+15	1.5328	2.91	
14+20	1.5533	2.97	
14+25	1.5742	3.03	
14+30	1.5955	3.10	
14+35	1.6174	3.17	
14+40	1.6398	3.25	
14+45	1.6628	3.34	
14+50	1.6864	3.43	
14+55	1.7108	3.53	
15+ 0	1.7359	3.65	
15+ 5	1.7618	3.77	
15+10	1.7887	3.91	
15+15	1.8167	4.06	
15+20	1.8459	4.24	
15+25	1.8759	4.36	
15+30	1.9046	4.17	
15+35	1.9320	3.97	
15+40	1.9605	4.15	
15+45	1.9919	4.56	
15+50	2.0277	5.19	
15+55	2.0703	6.19	
16+ 0	2.1260	8.09	
16+ 5	2.2154	12.98	
16+10	2.3784	23.65	
16+15	2.5397	23.42	
16+20	2.6221	11.97	
16+25	2.6668	6.49	
16+30	2.7023	5.16	
16+35	2.7332	4.49	
16+40	2.7620	4.18	
16+45	2.7888	3.88	
16+50	2.8138	3.63	
16+55	2.8374	3.42	
17+ 0	2.8597	3.24	

17+ 5	2.8810	3.09	Q			V
17+10	2.9014	2.96	Q			V
17+15	2.9210	2.84	Q			V
17+20	2.9399	2.74	Q			V
17+25	2.9581	2.65	Q			V
17+30	2.9758	2.57	Q			V
17+35	2.9930	2.49	Q			V
17+40	3.0097	2.43	Q			V
17+45	3.0260	2.36	Q			V
17+50	3.0419	2.31	Q			V
17+55	3.0574	2.25	Q			V
18+ 0	3.0725	2.20	Q			V
18+ 5	3.0872	2.13	Q			V
18+10	3.1008	1.97	Q			V
18+15	3.1132	1.80	Q			V
18+20	3.1250	1.71	Q			V
18+25	3.1364	1.67	Q			V
18+30	3.1476	1.63	Q			V
18+35	3.1586	1.60	Q			V
18+40	3.1694	1.57	Q			V
18+45	3.1800	1.54	Q			V
18+50	3.1904	1.51	Q			V
18+55	3.2006	1.48	Q			V
19+ 0	3.2107	1.46	Q			V
19+ 5	3.2205	1.44	Q			V
19+10	3.2303	1.41	Q			V
19+15	3.2399	1.39	Q			V
19+20	3.2493	1.37	Q			V
19+25	3.2586	1.35	Q			V
19+30	3.2678	1.33	Q			V
19+35	3.2768	1.31	Q			V
19+40	3.2857	1.30	Q			V
19+45	3.2945	1.28	Q			V
19+50	3.3032	1.26	Q			V
19+55	3.3118	1.25	Q			V
20+ 0	3.3203	1.23	Q			V
20+ 5	3.3287	1.22	Q			V
20+10	3.3369	1.20	Q			V
20+15	3.3451	1.19	Q			V
20+20	3.3532	1.17	Q			V
20+25	3.3612	1.16	Q			V
20+30	3.3691	1.15	Q			V
20+35	3.3770	1.14	Q			V
20+40	3.3847	1.13	Q			V
20+45	3.3924	1.11	Q			V
20+50	3.4000	1.10	Q			V
20+55	3.4075	1.09	Q			V
21+ 0	3.4150	1.08	Q			V
21+ 5	3.4223	1.07	Q			V
21+10	3.4296	1.06	Q			V
21+15	3.4369	1.05	Q			V
21+20	3.4441	1.04	Q			V
21+25	3.4512	1.03	Q			V
21+30	3.4582	1.02	Q			V
21+35	3.4652	1.01	Q			V
21+40	3.4721	1.01	Q			V
21+45	3.4790	1.00	Q			V
21+50	3.4858	0.99	Q			V
21+55	3.4926	0.98	Q			V
22+ 0	3.4993	0.97	Q			V
22+ 5	3.5060	0.97	Q			V
22+10	3.5126	0.96	Q			V
22+15	3.5191	0.95	Q			V
22+20	3.5256	0.94	Q			V
22+25	3.5321	0.94	Q			V
22+30	3.5385	0.93	Q			V
22+35	3.5448	0.92	Q			V
22+40	3.5511	0.92	Q			V
22+45	3.5574	0.91	Q			V
22+50	3.5636	0.90	Q			V
22+55	3.5698	0.90	Q			V

23+ 0	3.5760	0.89	|Q	|	|	|	V|
23+ 5	3.5821	0.89	|Q	|	|	|	V|
23+10	3.5881	0.88	|Q	|	|	|	V|
23+15	3.5941	0.87	|Q	|	|	|	V|
23+20	3.6001	0.87	|Q	|	|	|	V|
23+25	3.6061	0.86	|Q	|	|	|	V|
23+30	3.6120	0.86	|Q	|	|	|	V|
23+35	3.6178	0.85	|Q	|	|	|	V|
23+40	3.6237	0.85	|Q	|	|	|	V|
23+45	3.6295	0.84	|Q	|	|	|	V|
23+50	3.6352	0.84	|Q	|	|	|	V|
23+55	3.6410	0.83	|Q	|	|	|	V|
24+ 0	3.6466	0.83	|Q	|	|	|	V|
24+ 5	3.6519	0.77	|Q	|	|	|	V|
24+10	3.6552	0.48	Q	|	|	|	V|
24+15	3.6562	0.15	Q	|	|	|	V|
24+20	3.6565	0.04	Q	|	|	|	V|
24+25	3.6565	0.01	Q	|	|	|	V|

APPENDIX D: 96” CMP SUBSURFACE STORAGE SYSTEM

DETENTION BASIN A
96" SUBSURFACE STORAGE SYSTEM
WQ VOLUME = 39,644 CF
WQ VOLUME PROVIDE = 43,670 CF
INCREASE RUNOFF MITIGATION = 0.6 AC-FT
INFLOW Q_{100} = 28.0 CFS
OUTFLOW Q_{100} = 17.3 CFS



96" SUBSURFACE STORAGE SYSTEM

FIGURE 3

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

5 Barrell 96-Inch Subsurface Infiltration Basin Volume Calculations

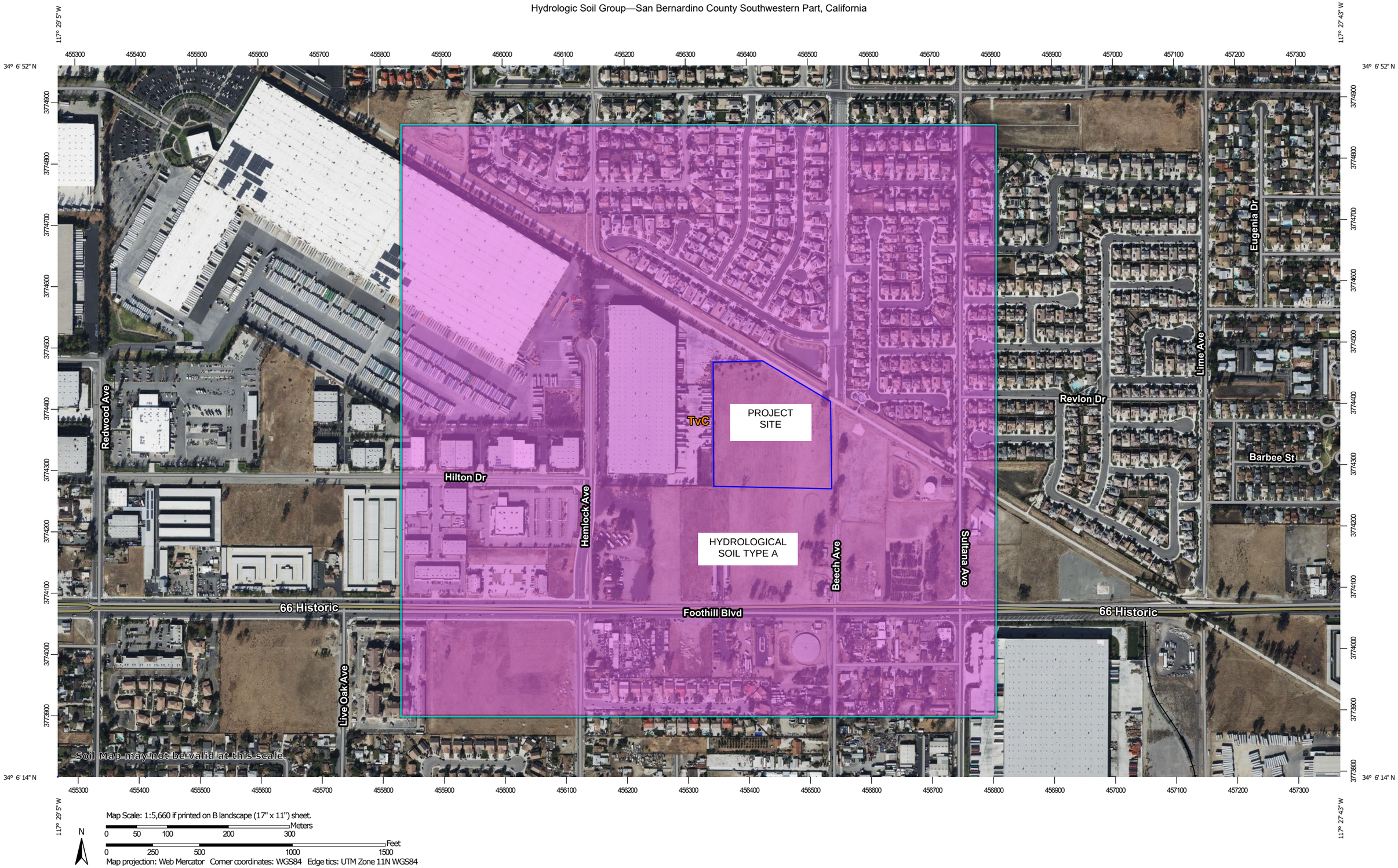
LENGTH OF SUBSURFACE SYSTEM (FT) = 195

Elevation	96" Pipe Area Each (ft^2)	Pipe Area Total (ft^2)	96" Pipe Total Gross Volume at Elev. (ft^3)	Gross Cross Sectional Area of System (ft^2)	Net Gravel Area (ft^2)	Gravel Volume (ft^3)	Cumulative Subsurface System Volume (ft^3)	Cumulative Subsurface System Volume (ac-ft)	Cumulative Subsurface System Volume above 1010.0 (ft^3)	Subsurface System Volume above 1010.0 (ac-ft)	
1263	0	0	0	0	0	0	0	0	0	0.000	
1263.5	0	0	0	26	26	2028	2028	0.0466	0.0000	0.000	
1264	0	0	0	52	52	4056	4056	0.0931	0.0000	0.000	
1264.5	1.31	6.55	1277.25	78	71.45	5573.1	6850.35	0.1573	0.0000	0.000	
1265	3.63	18.15	3539.25	104	85.85	6696.3	10235.55	0.2350	0.0000	0.000	
1265.5	6.52	32.6	6357	130	97.4	7597.2	13954.2	0.3203	0.0000	0.000	Storage Volume Below Orifice at 1269.0 43670.25 Cu. Ft.
1266	9.83	49.15	9584.25	156	106.85	8334.3	17918.55	0.4114	0.0000	0.000	
1266.5	13.42	67.1	13084.5	182	114.9	8962.2	22046.7	0.5061	0.00	0.000	
1267	17.22	86.1	16789.5	208	121.9	9508.2	26297.7	0.6037	0.00	0.000	
1267.5	21.14	105.7	20611.5	234	128.3	10007.4	30618.9	0.7029	0.00	0.000	
1268	25.13	125.65	24501.75	260	134.35	10479.3	34981.05	0.8031	0.00	0.000	
1268.5	29.12	145.6	28392	286	140.4	10951.2	39343.2	0.9032	4362.15	0.100	
1269	33.05	165.25	32223.75	312	146.75	11446.5	43670.25	1.0025	8689.20	0.199	
1269.5	36.85	184.25	35928.75	338	153.75	11992.5	47921.25	1.1001	12940.20	0.297	
1270	40.44	202.2	39429	364	161.8	12620.4	52049.4	1.1949	17068.35	0.392	
1270.5	43.74	218.7	42646.5	390	171.3	13361.4	56007.9	1.2858	21026.85	0.483	
1271	46.64	233.2	45474	416	182.8	14258.4	59732.4	1.3713	24751.35	0.568	
1271.5	48.96	244.8	47736	442	197.2	15381.6	63117.6	1.4490	28136.55	0.646	
1272	50.27	251.35	49013.25	468	216.65	16898.7	65911.95	1.5131	30930.90	0.710	
1272.5	50.27	0	0	494	242.65	18926.7	67939.95	1.5597	32958.90	0.757	
1273	50.27	0	0	520	268.65	20954.7	69967.95	1.6062	34986.90	0.803	

EXCERPTS

EXCERPT A: NRCS SOIL SURVEY HYDROLOGIC SOILS MAP

Hydrologic Soil Group—San Bernardino County Southwestern Part, California



Map Scale: 1:5,660 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	A	233.5	100.0%
Totals for Area of Interest			**233.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

EXCERPT B: NOAA ATLAS 14 RAINFALL

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NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation depth **Units:** English **Time series type:** Partial duration

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: Longitude: Submit

b) By station (list of CA stations): Select station

c) By address Search

2) Use map (if ESRI interactive map is not loading, try adding the host: **https://js.arcgis.com/** to the firewall, or contact us at hdsc.questions@noaa.gov):

a) Select location
Move crosshair or double click

b) Click on station icon
Show stations on map

Location information:
Name: Fontana, California, USA*
Latitude: 34.1092°
Longitude: -117.4724°
Elevation: 1284.36 ft **

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular PF graphical Supplementary information Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.117** (0.097-0.141)	**0.153** (0.128-0.186)	**0.203** (0.168-0.247)	**0.244** (0.201-0.300)	**0.302** (0.240-0.384)	**0.349** (0.271-0.453)	**0.397** (0.301-0.529)	**0.449** (0.331-0.615)	**0.522** (0.368-0.747)	**0.581** (0.396-0.862)
10-min	**0.167** (0.139-0.203)	**0.220** (0.183-0.267)	**0.291** (0.241-0.354)	**0.350** (0.288-0.430)	**0.433** (0.344-0.551)	**0.500** (0.389-0.649)	**0.569** (0.432-0.758)	**0.643** (0.474-0.882)	**0.748** (0.528-1.07)	**0.833** (0.567-1.24)
15-min	**0.202** (0.168-0.245)	**0.266** (0.221-0.323)	**0.352** (0.292-0.428)	**0.423** (0.348-0.520)	**0.524** (0.417-0.666)	**0.604** (0.470-0.785)	**0.688** (0.522-0.917)	**0.778** (0.573-1.07)	**0.904** (0.638-1.30)	**1.01** (0.686-1.49)
30-min	**0.300** (0.250-0.364)	**0.394** (0.328-0.479)	**0.522** (0.433-0.635)	**0.629** (0.517-0.772)	**0.778** (0.618-0.989)	**0.897** (0.698-1.17)	**1.02** (0.775-1.36)	**1.16** (0.850-1.58)	**1.34** (0.947-1.92)	**1.49** (1.02-2.22)
60-min	**0.444** (0.370-0.539)	**0.584** (0.486-0.709)	**0.773** (0.641-0.941)	**0.931** (0.766-1.14)	**1.15** (0.916-1.47)	**1.33** (1.03-1.73)	**1.51** (1.15-2.02)	**1.71** (1.26-2.35)	**1.99** (1.40-2.85)	**2.21** (1.51-3.28)
2-hr	**0.678** (0.565-0.822)	**0.881** (0.733-1.07)	**1.15** (0.953-1.40)	**1.37** (1.13-1.68)	**1.67** (1.33-2.13)	**1.91** (1.48-2.48)	**2.15** (1.63-2.86)	**2.40** (1.77-3.30)	**2.75** (1.94-3.94)	**3.03** (2.07-4.50)
3-hr	**0.872** (0.726-1.06)	**1.13** (0.939-1.37)	**1.46** (1.21-1.78)	**1.74** (1.43-2.13)	**2.10** (1.67-2.68)	**2.39** (1.86-3.10)	**2.68** (2.03-3.57)	**2.98** (2.19-4.09)	**3.39** (2.39-4.85)	**3.72** (2.53-5.51)
6-hr	**1.27** (1.06-1.54)	**1.64** (1.37-2.00)	**2.12** (1.76-2.58)	**2.50** (2.06-3.07)	**3.01** (2.39-3.83)	**3.39** (2.64-4.41)	**3.78** (2.87-5.04)	**4.18** (3.08-5.73)	**4.71** (3.32-6.74)	**5.12** (3.48-7.59)
12-hr	**1.71** (1.43-2.08)	**2.23** (1.85-2.70)	**2.87** (2.38-3.50)	**3.38** (2.78-4.16)	**4.05** (3.22-5.15)	**4.55** (3.54-5.91)	**5.04** (3.82-6.71)	**5.53** (4.07-7.58)	**6.17** (4.36-8.84)	**6.66** (4.54-9.88)
24-hr	**2.32** (2.06-2.68)	**3.07** (2.71-3.54)	**3.99** (3.52-4.62)	**4.72** (4.13-5.50)	**5.66** (4.79-6.81)	**6.34** (5.26-7.80)	**7.02** (5.68-8.84)	**7.69** (6.06-9.95)	**8.55** (6.47-11.5)	**9.20** (6.73-12.8)
2-day	**2.83** (2.50-3.26)	**3.82** (3.38-4.41)	**5.08** (4.48-5.87)	**6.07** (5.31-7.08)	**7.38** (6.25-8.90)	**8.37** (6.94-10.3)	**9.34** (7.56-11.8)	**10.3** (8.13-13.4)	**11.6** (8.79-15.7)	**12.6** (9.21-17.6)
3-day	**3.05** (2.70-3.51)	**4.18** (3.70-4.82)	**5.64** (4.97-6.53)	**6.82** (5.97-7.95)	**8.40** (7.12-10.1)	**9.61** (7.97-11.8)	**10.8** (8.77-13.6)	**12.1** (9.51-15.6)	**13.7** (10.4-18.5)	**15.0** (11.0-21.0)
4-day	**3.28** (2.90-3.78)	**4.55** (4.02-5.25)	**6.20** (5.47-7.17)	**7.54** (6.60-8.79)	**9.36** (7.93-11.3)	**10.8** (8.93-13.2)	**12.2** (9.87-15.4)	**13.7** (10.8-17.7)	**15.7** (11.8-21.1)	**17.2** (12.6-24.0)
7-day	**3.74** (3.31-4.31)	**5.27** (4.66-6.08)	**7.27** (6.41-8.41)	**8.92** (7.80-10.4)	**11.2** (9.46-13.5)	**12.9** (10.7-15.9)	**14.7** (11.9-18.5)	**16.6** (13.1-21.5)	**19.1** (14.5-25.8)	**21.2** (15.5-29.5)
10-day	**4.06** (3.60-4.68)	**5.76** (5.09-6.65)	**8.01** (7.07-9.27)	**9.87** (8.63-11.5)	**12.4** (10.5-15.0)	**14.4** (12.0-17.8)	**16.5** (13.4-20.8)	**18.7** (14.7-24.2)	**21.6** (16.4-29.2)	**24.0** (17.6-33.5)
20-day	**4.80** (4.25-5.53)	**6.90** (6.10-7.96)	**9.72** (8.57-11.2)	**12.1** (10.6-14.1)	**15.4** (13.0-18.6)	**18.0** (15.0-22.2)	**20.8** (16.8-26.2)	**23.7** (18.7-30.7)	**27.8** (21.0-37.5)	**31.1** (22.8-43.4)
30-day	**5.65** (5.00-6.51)	**8.11** (7.17-9.36)	**11.5** (10.1-13.3)	**14.3** (12.5-16.7)	**18.4** (15.6-22.1)	**21.6** (17.9-26.6)	**25.0** (20.3-31.5)	**28.7** (22.6-37.2)	**33.9** (25.7-45.8)	**38.2** (27.9-53.3)
45-day	**6.71** (5.95-7.74)	**9.56** (8.45-11.0)	**13.5** (11.9-15.6)	**16.8** (14.7-19.6)	**21.7** (18.3-26.1)	**25.6** (21.2-31.5)	**29.8** (24.1-37.5)	**34.3** (27.0-44.4)	**40.9** (30.9-55.1)	**46.3** (33.8-64.6)
60-day	**7.88** (6.97-9.08)	**11.1** (9.77-12.8)	**15.5** (13.7-17.9)	**19.3** (16.9-22.5)	**24.9** (21.0-29.9)	**29.4** (24.4-36.2)	**34.3** (27.8-43.2)	**39.7** (31.3-51.4)	**47.5** (35.9-64.1)	**54.0** (39.5-75.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in CSV format: Precipitation frequency estimates Submit

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EXCERPT C INFILTRATION REPORT

December 8, 2021

AIREF ACQUISITIONS, LLC
4675 MacArthur Court, Suite 625
Newport Beach, California 92660

Attention: Mr. Peter F. Schafer
AVP, Development

Project No.: **21G260-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
Beech Avenue, North of Foothill Boulevard
Fontana, California

Reference: Geotechnical Investigation, Proposed Warehouse, Beech Avenue, North of Foothill Boulevard, Fontana, California, prepared for AIREF ACQUISITIONS, LLC, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 21G260-1, dated December 7, 2021.

Dear Mr. Schafer:

In accordance with your request, we have conducted additional infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P453R, dated October 19, 2021. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The site is located on the west side of Beech Avenue, 330± feet north of Foothill Boulevard in Fontana, California. The site is bounded to the north by a vacant lot, to the west by an existing commercial/industrial building and a vacant lot, to the south by a single-family residence and a vacant lot, and to the east by the Beech Avenue easement. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of an irregular-shaped parcel, 8.38± acres in size. The site is presently vacant and undeveloped. Ground surface consists of exposed soil and cobbles with sparse grass and weed growth. One large tree is located in the central area of the site.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the overall site generally slopes downward to the south at a gradient of 1.5± percent.

Proposed Development

Based on a conceptual site plan provided to our office by the client, the site will be developed with one (1) new industrial building, 185,380± ft^2 in size, located in the west-central area of the site. Dock-high doors will be constructed along a portion of the east building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout. Beech Avenue will be paved with asphaltic concrete for this new development.

The proposed development will include on-site stormwater infiltration systems. We understand that the infiltration system will consist of a below-grade chamber system, located in the southern and northern regions of the site. The bottom of the below-grade chamber system is expected to be 10 to 12± feet below existing site grades.

Concurrent Study

Southern California Geotechnical, Inc. (SCG) concurrently conducted a geotechnical investigation at the subject site, referenced above. As a part of this study, seven (7) borings (identified as Boring Nos. B-1 through B-7) were advanced to depths of 5 to 25± feet below existing site grades.

Native alluvium was encountered at the ground surface of all boring locations, extending to at least the maximum depth explored of 25± feet below ground surface. The near-surface alluvial soils, within the upper 2½ to 4½± feet, generally consist of medium dense to dense silty fine sands and silty fine to coarse sands with varying cobble content. At depths greater than 4½± feet, the alluvial soils generally consist of medium dense to very dense fine to coarse sands with little fine to coarse gravel and occasional to abundant cobbles. Boring No. B-3 encountered gravelly fine to coarse sands from the ground surface, extending to 15± feet below ground surface.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. One monitoring well on record is located 5,121± feet north of the site. Water level readings within this monitoring well indicates a high groundwater level of 492± feet below ground surface in April 2016.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe-excavated trenches, extending to depths of 10 to 12± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Native alluvial soils were encountered at all of the trench locations, extending to the maximum explored depth of 12± feet below existing site grades. The alluvial soils within the upper 1-foot consists of medium dense silty sands. The alluvium encountered at greater depths consists of dense to very dense gravelly fine to coarse sands, with varying amounts of silt and occasional to extensive cobbles.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at both of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 6-minute increments. The water volume measurements are

presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	12	Gray Brown Gravelly fine to coarse Sand, trace Silt	20.2
I-2	10	Light Brown Gravelly fine to coarse Sand	12.1
I-3	10	Gray Brown Gravelly fine to coarse Sand	22.4
I-4	10	Light Brown Gravelly fine to coarse Sand, trace Silt	21.3

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Trench Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the base of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 through C-4 of this report.

Design Recommendations

Four (4) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 12.1 to 22.4 inches per hour. **Based on the results of infiltration testing, we recommend the following infiltration rate be used for the design of the proposed infiltration system:**

Infiltration Test No.	Location	Infiltration Rate (Inches per Hour)
I-1 & I-2	**Eastern System**	**12.1**
I-3 & I-4	**Southern Ssytem**	**21.3**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the infiltration basin. It should be confirmed that the soils at the base of the proposed infiltration system corresponds with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of the storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Fontana and/or County of San Bernardino guidelines. It is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rates recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rates are based on infiltration testing at four (4) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein was determined in accordance with the San Bernardino County guidelines and are considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the basins. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut

or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Infiltration Chamber Maintenance

The proposed project may include infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the chamber subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

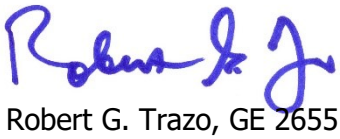
This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

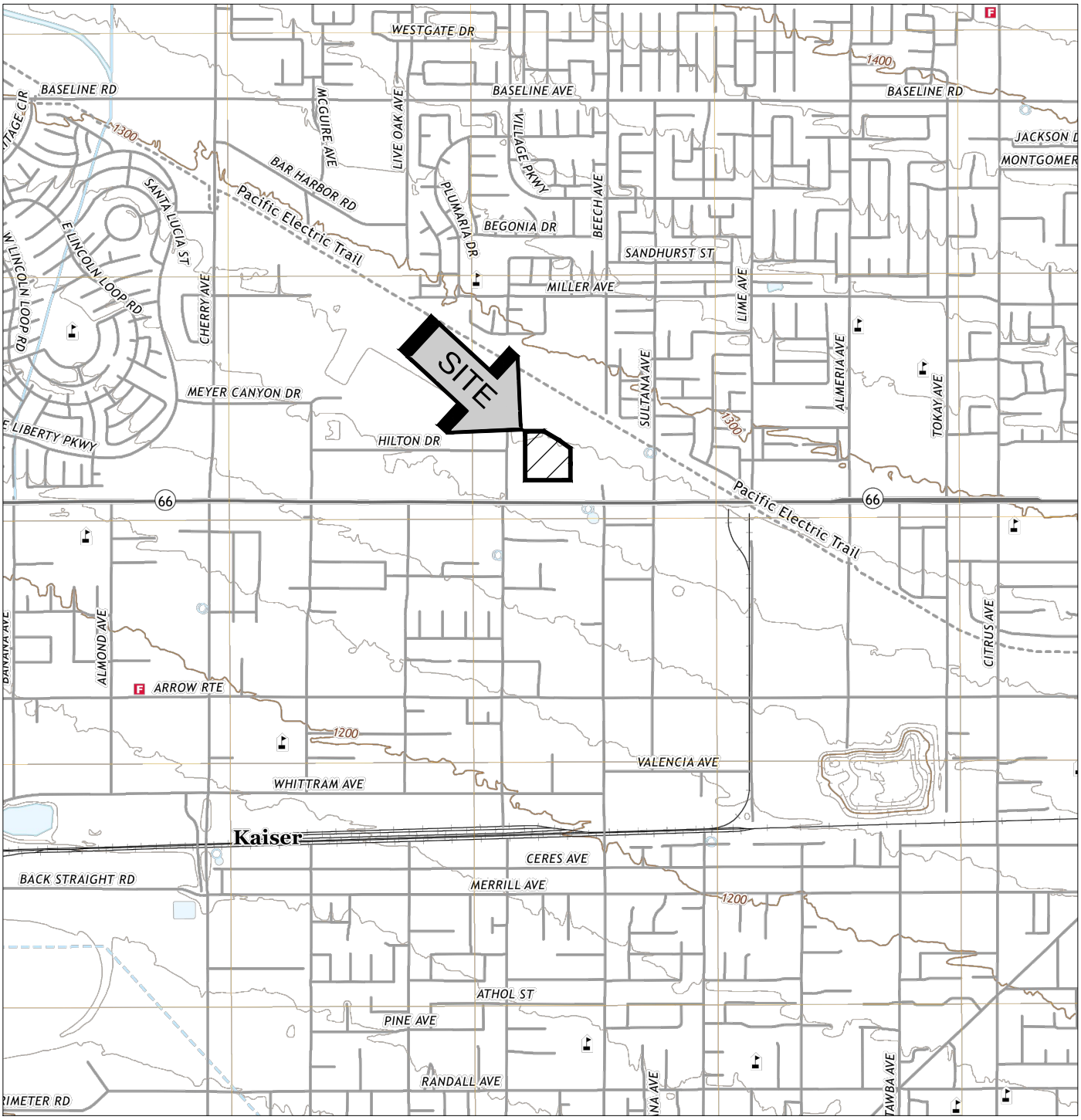
Ricardo Frias, RCE 91772
Project Engineer



Robert G. Trazo, GE 2655
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE FONTANA QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

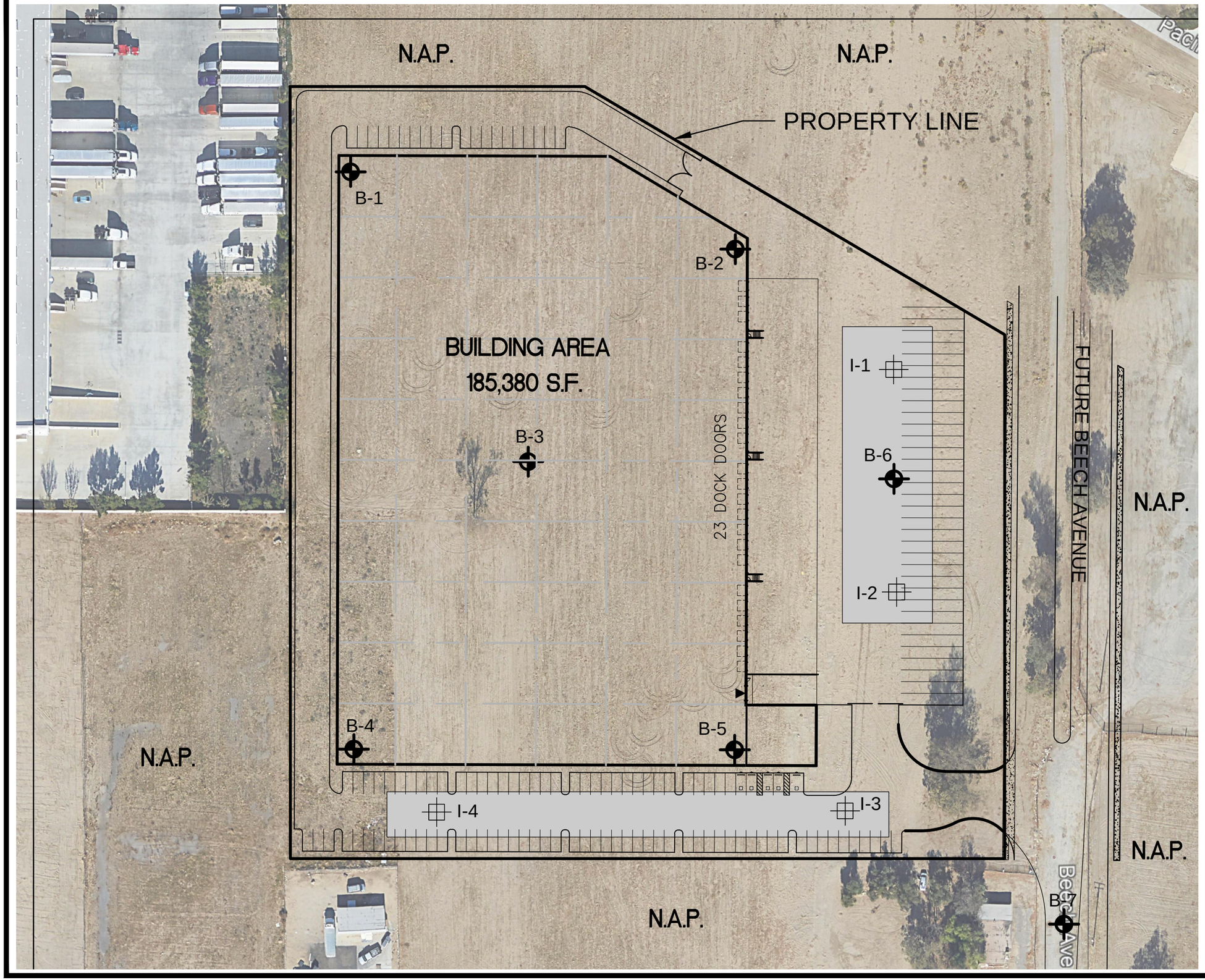
PROPOSED WAREHOUSE

FONTANA, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G260-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



NORTH
SoCalGeo

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION FROM CONCURRENT STUDY (SCG PROJECT NO. 21G260-1)
- APPROXIMATE UNDERGROUND CHAMBER SYSTEM LOCATION

NOTE: SITE PLAN PREPARED BY HPA ARCHITECTURE.
AERIAL PHOTO OBTAINED FROM GOOGLE EARTH.

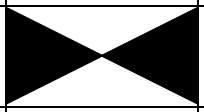
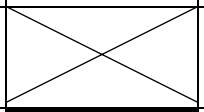
INFILTRATION TEST LOCATION PLAN

PROPOSED WAREHOUSE

FONTANA, CALIFORNIA

SCALE: 1" = 80'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G260-2	
PLATE 2	

TRENCH LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

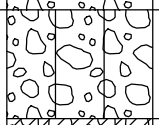
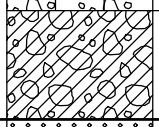
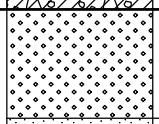
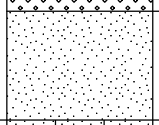
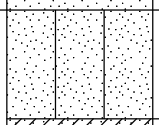
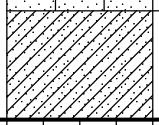
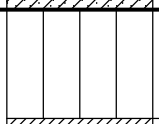
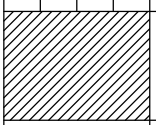
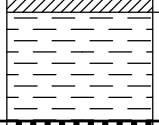
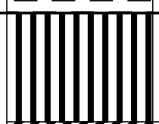
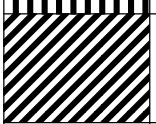
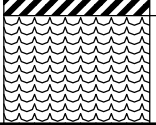
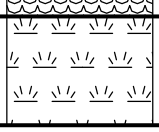
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-1

JOB NO.: 21G260-2
PROJECT: Proposed Warehouse
LOCATION: Fontana, California

EXCAVATION DATE: 11/9/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Light Brown Silty fine to coarse Sand, little fine Gravel, trace fine root fibers, medium dense-dry							
					Gray Brown Gravelly fine to coarse Sand, trace Silt, occasional to extensive Cobbles, dense to very dense-dry to damp							
5												
10												
							4			2		
					Trench Terminated at 12'							

TBL 21G260-2.GPJ SOCALGEO.GDT 12/8/21

TEST TRENCH LOG **PLATE B-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-2

JOB NO.: 21G260-2
PROJECT: Proposed Warehouse
LOCATION: Fontana, California

EXCAVATION DATE: 11/9/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: 10 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Light Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry							
					Light Brown Gravelly fine to coarse Sand, extensive Cobbles, dense to very dense-dry							
5												
10							1			1		
					Trench Terminated at 10'							

TBL 21G260-2.GPJ SOCALGEO.GDT 12/8/21

TEST TRENCH LOG **PLATE B-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-3

JOB NO.: 21G260-2
PROJECT: Proposed Warehouse
LOCATION: Fontana, California

EXCAVATION DATE: 11/9/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: 10 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Light Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, trace fine root fibers, medium dense-dry							
					Light Brown Gravelly fine to medium Sand, trace Silt, occasional Cobbles, dense-dry							
5												
					Gray Brown Gravelly fine to coarse Sand, occasional to extensive Cobbles, dense to very dense-dry							
							1			1		
10					Trench Terminated at 10'							

TBL 21G260-2.GPJ SOCALGEO.GDT 12/8/21

TEST TRENCH LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

TRENCH NO. I-4

JOB NO.: 21G260-2
PROJECT: Proposed Warehouse
LOCATION: Fontana, California

EXCAVATION DATE: 11/9/21
EXCAVATION METHOD: Backhoe
LOGGED BY: Caleb Brackett

WATER DEPTH: Dry
CAVE DEPTH: 10 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					ALLUVIUM: Light Brown Silty fine to coarse Sand, trace fine Gravel, trace fine root fibers, medium dense-dry							
					Light Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, dense to very dense-dry to damp							
5												
							3			3		
10					Trench Terminated at 10'							

TBL 21G260-2.GPJ SOCALGEO.GDT 12/8/21

TEST TRENCH LOG **PLATE B-4**

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Fontana, CA
Project Number	21G260-2
Engineer	Caleb Brackett

Infiltration Test No: I-1

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	7:10 AM	6	0	7000	0	24000	95.94	109.64	37.77	43.17
	Final	7:16 AM	**6**	7000		24000					
2	Initial	7:16 AM	6	0	6000	0	26000	82.23	118.78	32.38	46.76
	Final	7:22 AM	**12**	6000		26000					
3	Initial	7:22 AM	6	0	5500	0	24000	75.38	109.64	29.68	43.17
	Final	7:28 AM	**18**	5500		24000					
4	Initial	7:28 AM	6	0	4750	0	23000	65.10	105.08	25.63	41.37
	Final	7:34 AM	**24**	4750		23000					
5	Initial	7:34 AM	6	0	4250	0	22000	58.25	100.51	22.93	39.57
	Final	7:40 AM	**30**	4250		22000					
6	Initial	7:40 AM	6	0	4000	0	22000	54.82	100.51	21.58	39.57
	Final	7:46 AM	**36**	4000		22000					
7	Initial	7:46 AM	6	0	3750	0	22000	51.40	100.51	20.23	39.57
	Final	7:52 AM	**42**	3750		22000					
8	Initial	7:52 AM	6	0	3750	0	22000	51.40	100.51	20.23	39.57
	Final	7:58 AM	**48**	3750		22000					
9	Initial	7:58 AM	6	0	3750	0	22000	51.40	100.51	20.23	39.57
	Final	8:04 AM	**54**	3750		22000					
10	Initial	8:04 AM	6	0	3750	0	22000	51.40	100.51	20.23	39.57
	Final	8:10 AM	**60**	3750		22000					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Fontana, CA
Project Number	21G260-2
Engineer	Caleb Brackett

Infiltration Test No: I-2

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	8:30 AM	6	0	3500	0	11500	47.97	52.54	18.89	20.68
	Final	8:36 AM	**6**	3500		11500					
2	Initial	8:36 AM	6	0	3000	0	10000	41.12	45.68	16.19	17.99
	Final	8:42 AM	**12**	3000		10000					
3	Initial	8:42 AM	6	0	3000	0	9700	41.12	44.31	16.19	17.45
	Final	8:48 AM	**18**	3000		9700					
4	Initial	8:48 AM	6	0	2800	0	9400	38.38	42.94	15.11	16.91
	Final	8:54 AM	**24**	2800		9400					
5	Initial	8:54 AM	6	0	2600	0	9300	35.63	42.49	14.03	16.73
	Final	9:00 AM	**30**	2600		9300					
6	Initial	9:00 AM	6	0	2400	0	9400	32.89	42.94	12.95	16.91
	Final	9:06 AM	**36**	2400		9400					
7	Initial	9:06 AM	6	0	2250	0	9500	30.84	43.40	12.14	17.09
	Final	9:12 AM	**42**	2250		9500					
8	Initial	9:12 AM	6	0	2250	0	9400	30.84	42.94	12.14	16.91
	Final	9:18 AM	**48**	2250		9400					
9	Initial	9:18 AM	6	0	2250	0	9500	30.84	43.40	12.14	17.09
	Final	9:24 AM	**54**	2250		9500					
10	Initial	9:24 AM	6	0	2250	0	9500	30.84	43.40	12.14	17.09
	Final	9:30 AM	**60**	2250		9500					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Fontana, CA
Project Number	21G260-2
Engineer	Caleb Brackett

Infiltration Test No: I-3

Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:45 AM	6	0	5000	0	20000	68.53	91.37	26.98	35.97
	Final	9:51 AM	**6**	5000		20000					
2	Initial	9:51 AM	6	0	5000	0	20000	68.53	91.37	26.98	35.97
	Final	9:57 AM	**12**	5000		20000					
3	Initial	9:57 AM	6	0	4850	0	20000	66.47	91.37	26.17	35.97
	Final	10:03 AM	**18**	4850		20000					
4	Initial	10:03 AM	6	0	4700	0	18500	64.42	84.52	25.36	33.27
	Final	10:09 AM	**24**	4700		18500					
5	Initial	10:09 AM	6	0	4600	0	18500	63.05	84.52	24.82	33.27
	Final	10:15 AM	**30**	4600		18500					
6	Initial	10:15 AM	6	0	4400	0	18500	60.30	84.52	23.74	33.27
	Final	10:21 AM	**36**	4400		18500					
7	Initial	10:21 AM	6	0	4150	0	17000	56.88	77.66	22.39	30.58
	Final	10:27 AM	**42**	4150		17000					
8	Initial	10:27 AM	6	0	4150	0	17000	56.88	77.66	22.39	30.58
	Final	10:33 AM	**48**	4150		17000					
9	Initial	10:33 AM	6	0	4150	0	17000	56.88	77.66	22.39	30.58
	Final	10:39 AM	**54**	4150		17000					
10	Initial	10:39 AM	6	0	4150	0	17000	56.88	77.66	22.39	30.58
	Final	10:45 AM	**60**	4150		17000					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Fontana, CA
Project Number	21G260-2
Engineer	Caleb Brackett

Infiltration Test No: I-4

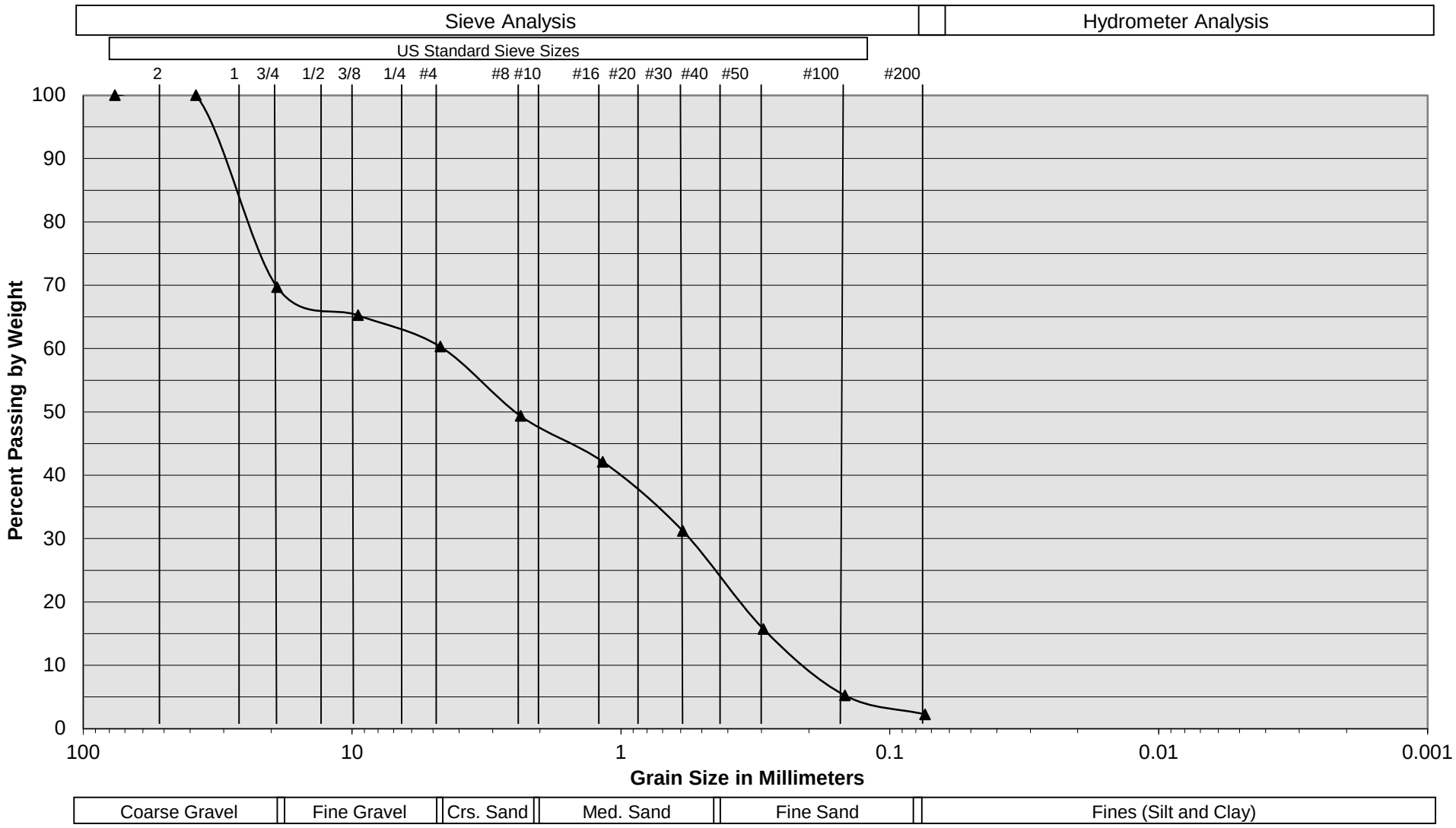
Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	11:30 AM	6	0	4850	0	20000	66.47	91.37	26.17	35.97
	Final	11:36 AM	**6**	4850		20000					
2	Initial	11:36 AM	6	0	4850	0	20000	66.47	91.37	26.17	35.97
	Final	11:42 AM	**12**	4850		20000					
3	Initial	11:42 AM	6	0	4600	0	20000	63.05	91.37	24.82	35.97
	Final	11:48 AM	**18**	4600		20000					
4	Initial	11:48 AM	6	0	4500	0	20000	61.67	91.37	24.28	35.97
	Final	11:54 AM	**24**	4500		20000					
5	Initial	11:54 AM	6	0	4250	0	19200	58.25	87.72	22.93	34.53
	Final	12:00 PM	**30**	4250		19200					
6	Initial	12:00 PM	6	0	4200	0	18000	57.56	82.23	22.66	32.38
	Final	12:06 PM	**36**	4200		18000					
7	Initial	12:06 PM	6	0	3950	0	16000	54.14	73.10	21.31	28.78
	Final	12:12 PM	**42**	3950		16000					
8	Initial	12:12 PM	6	0	3950	0	16000	54.14	73.10	21.31	28.78
	Final	12:18 PM	**48**	3950		16000					
9	Initial	12:18 PM	6	0	3950	0	15000	54.14	68.53	21.31	26.98
	Final	12:24 PM	**54**	3950		15000					
10	Initial	12:24 PM	6	0	3950	0	15000	54.14	68.53	21.31	26.98
	Final	12:30 PM	**60**	3950		15000					

Grain Size Distribution

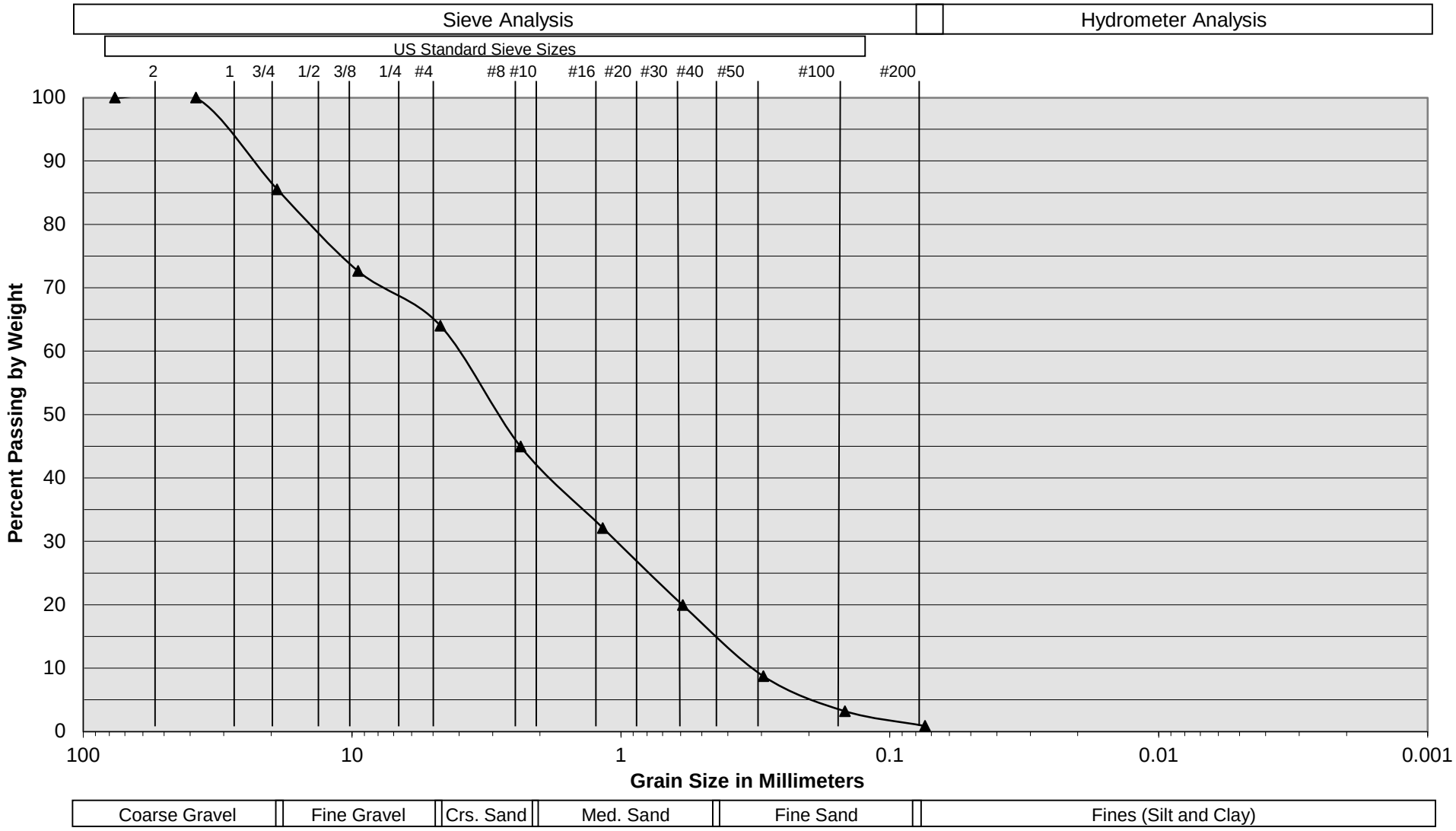


Sample Description	I-1 @ 12'
Soil Classification	Gray Brown Gravelly fine to coarse Sand, trace Silt

Proposed Warehouse
Fontana, California
Project No. 21G260-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-2 @ 10'
Soil Classification	Light Brown Gravelly fine to coarse Sand

Proposed Warehouse
Fontana, California
Project No. 21G260-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

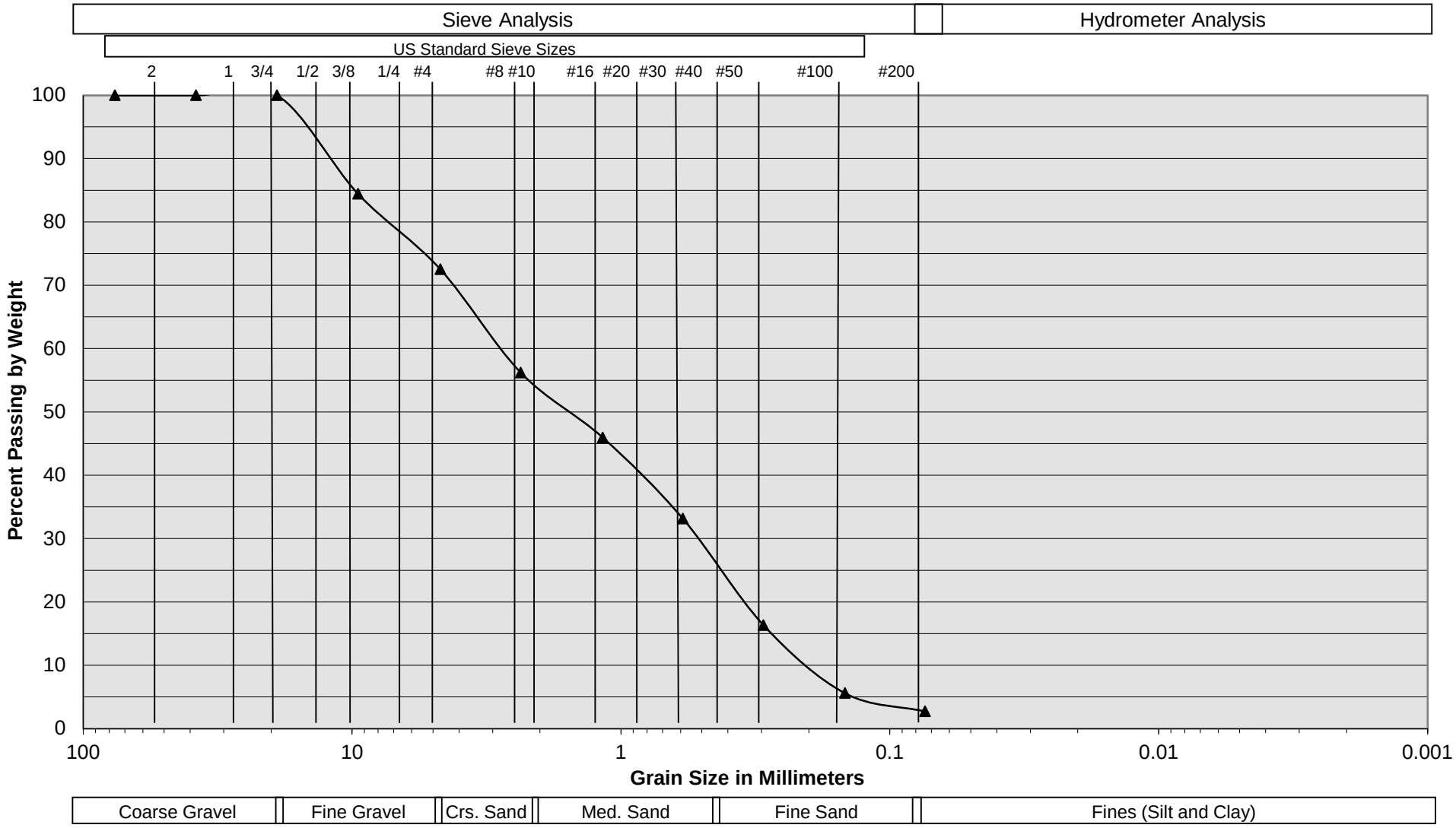
Grain Size Distribution

Sample Description	I-3 @ 10'
Soil Classification	Gray Brown Gravelly fine to coarse Sand

Proposed Warehouse
Fontana, California
Project No. 21G260-2
PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 10'
Soil Classification	Light Brown Gravelly fine to coarse Sand, trace Silt

Proposed Warehouse
Fontana, California
Project No. 21G260-2
PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

EXCERPT D PRELIMINARY FOOTHILL REGIONAL STORM DRAIN

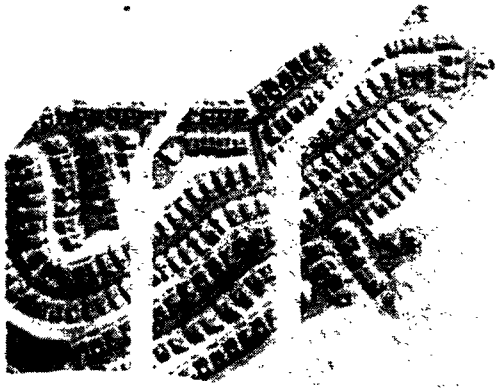
Preliminary Foothill Regional Storm Drain

Baseline Ave to Foothill Ave

CITY OF FONTANA

DRAINAGE STUDY

January 24, 2003



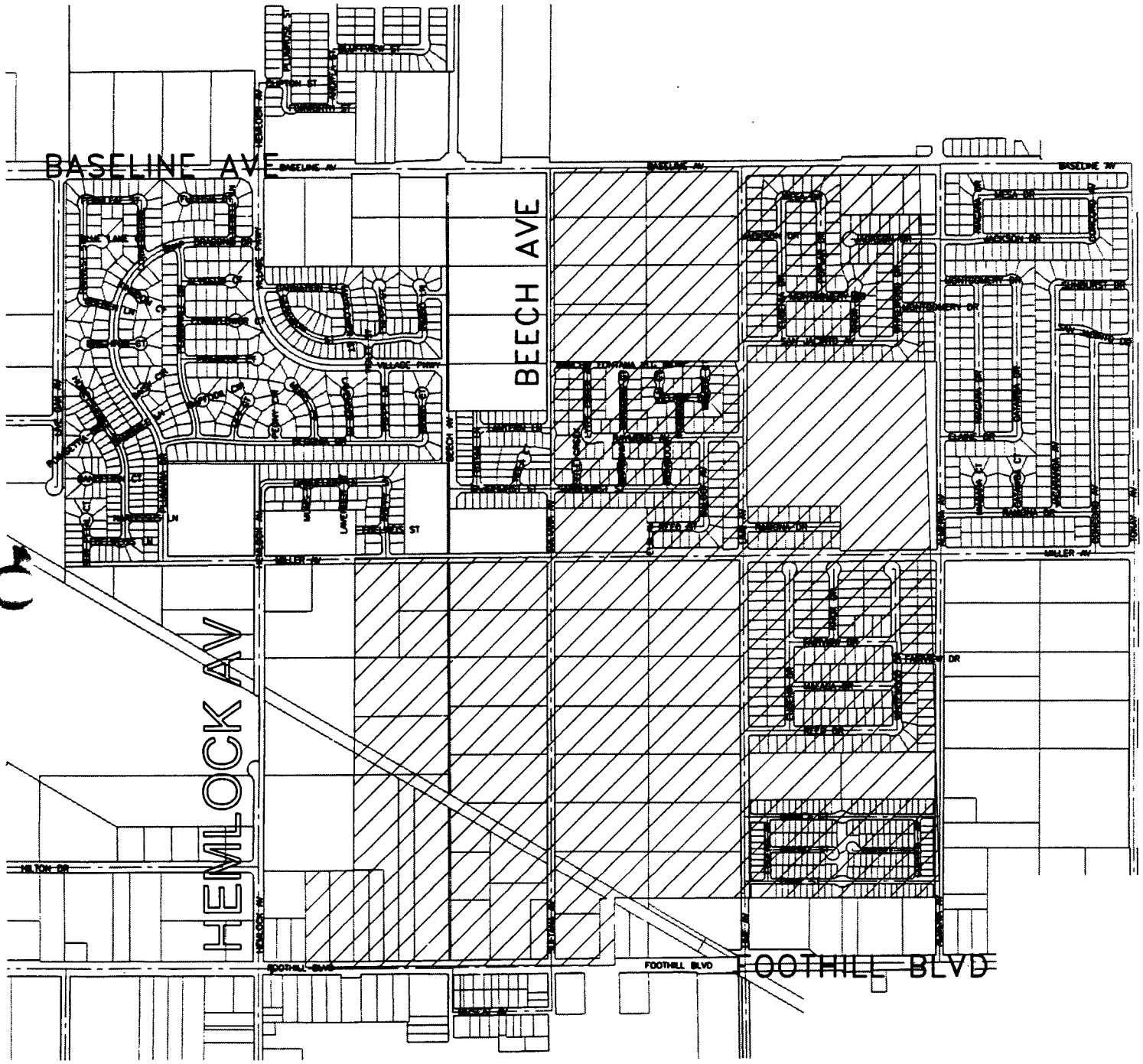
Reference (661-1677)

PREPARED BY:

Madole & Associates, Inc.
10601 Church Street, Suite 107
Rancho Cucamonga, CA 91730
(909) 948-1311
Fax 948-8464

Aaron T. Skeers Date
R.C.E. 62183 Exp. 9/30/05

CONTENTS



VICINITY MAP

DISCUSSION

Purpose

The purpose of this drainage study is to determine the drainage facility requirements for the interim and ultimate storm drain along Miller Ave., Beech Ave., Sultana Ave., and Foothill Blvd. Specifically, the subject area is located south of Baseline Ave., west of Almeria Ave, north of Foothill Blvd., and east of Hemlock Ave, in the City Fontana, County of San Bernardino, California.

Interim Condition

In the interim stage, a temporary 66" storm drain will be installed connecting the storm drain system east of Hemlock Avenue with the system west of Hemlock Avenue along Foothill Blvd. A hydraulic model was prepared for the interim drainage to determine the effect on the existing 72" RCP along Foothill Blvd. west of Hemlock Ave after the interim flow was added. However, this model does not directly add the existing design flow with the interim flow, since the existing design accounts for full development, which will not be the case in the interim condition. This model assumes half the tributary area to the existing line will be developed, therefore reducing the existing flow from 284 cfs to 192 cfs. The total flow will be 192 cfs plus the additional 206 cfs or 398 cfs.

The above referenced model covers a portion of the existing 72" line (stations 95+64 to 101+67) that appeared to be critical since the hydraulic grade line is shown to be near the existing ground. However, our analysis shows that even with the added interim flow, the HGL will remain under the existing ground elevation during a 25-year storm event.

Madole and Associates recommends that all existing detention basins remain in operation until the ultimate storm drain design is completed.

Ultimate Condition

The ultimate watershed will consist of mainly single-family residences on approximately 382 acres. The ultimate drainage facilities will consist of reinfored concrete boxes and pipes along Hemlock Avenue, Foothill Boulevard, Sultana Avenue and Miller Avenue with local lines connecting from Beech Avenue and Lime Avenue. The ultimate storm improvements will be installed with the interim system, with the exception of the 90-inch storm drain along Hemlock Avenue south of Foothill Avenue. The 90-inch storm drain will be installed later to complete the ultimate design. When this occurs, the temporary 66" storm drain line will be removed. The ultimate storm drain facilities will accommodate the developed 100-year flow consisting of 757 cfs. Altough, the facilities will be under pressure, all catch basins are expected to have at least 6-inches of freeboard.

The rational method hydrologic model, as defined by Flood Control for San Bernardino County, was followed in the determination of storm runoff. AES software was utilized for hydrology calculations. CivilDesign's WSPGW hydraulic software program was used to validate pipe sizes.

Q 25 INTERIM HYDROLOGY

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
      (c) Copyright 1983-2002 Advanced Engineering Software (aes)
          Ver. 8.0  Release Date: 01/01/2002  License ID 1251

                        Analysis prepared by:

                          MADOLE & ASSOCIATES
                       10601 CHURCH STREET, SUITE 107
                        RANCHO CUCAMONGA, CA 91730


 ************************* DESCRIPTION OF STUDY *************************
* Q25 INTERIM HYDROLOGY                                                 *
*                                                                       *
*                                                                       *
 *************************************************************************

  FILE NAME: P:\661-1677\Drainage\MSD-INT.DAT
  TIME/DATE OF STUDY: 17:20 01/17/2003
=========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1520
  SLOPE OF INTENSITY DURATION CURVE = 0.6000

  *ANTECEDENT MOISTURE CONDITION (AMC) II 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)  (FT)    (n)
===  =====  =========  ================  ======  =====  ======  =====  =======
  1   22.0     11.0    0.020/0.020/0.020   0.67    1.50  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     20.00 TO NODE     21.00 IS CODE =  21
--------------------------------------------------------------------------
```

```
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   930.00
 ELEVATION DATA: UPSTREAM(FEET) =   1375.00  DOWNSTREAM(FEET) =   1358.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.334
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.840
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       10.00      0.40       0.50     32   13.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     23.76
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     23.76

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1358.00  DOWNSTREAM ELEVATION(FEET) = 1337.00
 STREET LENGTH(FEET) =  1310.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 22.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
 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) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0199

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      52.46
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.63
   HALFSTREET FLOOD WIDTH(FEET) =   22.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.03
 STREET FLOW TRAVEL TIME(MIN.) =   4.52   Tc(MIN.) =  17.86
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.384
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       29.00      0.40       0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   29.00      SUBAREA RUNOFF(CFS) =   57.00
 EFFECTIVE AREA(ACRES) =   39.00    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   39.00        PEAK FLOW RATE(CFS) =      76.65
```

```
 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  23.20
 FLOW VELOCITY(FEET/SEC.) =  5.62   DEPTH*VELOCITY(FT*FT/SEC.) =   3.88
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =  2240.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1337.00  DOWNSTREAM(FEET) =  1301.00
 FLOW LENGTH(FEET) =  1320.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.22
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     76.65
 PIPE TRAVEL TIME(MIN.) =   1.36    Tc(MIN.) =  19.21
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =  3560.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 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.) =  19.21
 RAINFALL INTENSITY(INCH/HR) =   2.28
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =   39.00
 TOTAL STREAM AREA(ACRES) =   39.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     76.65

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 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) =   1348.00  DOWNSTREAM(FEET) =   1343.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.789
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.389
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       12.90      0.40       0.50     32   17.79
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     25.42
 TOTAL AREA(ACRES) =     12.90   PEAK FLOW RATE(CFS) =     25.42
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1333.00  DOWNSTREAM(FEET) =  1317.00
 FLOW LENGTH(FEET) =   802.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.05
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     25.42
 PIPE TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =  19.00
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     10.00 =  1802.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       16.90      0.40       0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   16.90      SUBAREA RUNOFF(CFS) =   31.89
 EFFECTIVE AREA(ACRES) =    29.80   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =    29.80       PEAK FLOW RATE(CFS) =      56.24

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1317.00  DOWNSTREAM(FEET) =  1301.00
 FLOW LENGTH(FEET) =  1305.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.95
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     56.24
 PIPE TRAVEL TIME(MIN.) =   1.99    Tc(MIN.) =  20.98
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     12.00 =  3107.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 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.) =  20.98
 RAINFALL INTENSITY(INCH/HR) =   2.16
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =   29.80
 TOTAL STREAM AREA(ACRES) =   29.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     56.24

 ** CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     76.65  19.21     2.281   0.40( 0.20) 0.50     39.0       20.00
     2     56.24  20.98     2.164   0.40( 0.20) 0.50     29.8       31.00

 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    131.22  19.21     2.281   0.40( 0.20) 0.50     66.3       20.00
     2 .  128.56  20.98     2.164   0.40( 0.20) 0.50     68.8       31.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    131.22    Tc(MIN.) =    19.21
 EFFECTIVE AREA(ACRES) =    66.28   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =     68.80
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =  3560.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1301.00  DOWNSTREAM(FEET) =  1288.00
 FLOW LENGTH(FEET) =  1008.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.81
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    131.22
 PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =  20.43
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     13.00 =  4568.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  20.43
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       14.10      0.40       0.50     32
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    14.10      SUBAREA RUNOFF(CFS) =    25.37
 EFFECTIVE AREA(ACRES) =    80.38    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =    82.90        PEAK FLOW RATE(CFS) =     144.61

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  20.43
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       10.80      0.40       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    10.80      SUBAREA RUNOFF(CFS) =    19.43
 EFFECTIVE AREA(ACRES) =    91.18    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =    93.70        PEAK FLOW RATE(CFS) =     164.04

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1288.00  DOWNSTREAM(FEET) =  1258.00
 FLOW LENGTH(FEET) =  1775.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.39
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    164.04
 PIPE TRAVEL TIME(MIN.) =   1.80    Tc(MIN.) =  22.23
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     15.00 =  6343.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  22.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.090
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       30.00      0.40       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    30.00      SUBAREA RUNOFF(CFS) =    51.03
 EFFECTIVE AREA(ACRES) =   121.18    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.50
```

```
 TOTAL AREA(ACRES) =   123.70       PEAK FLOW RATE(CFS) =     206.14

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1258.00  DOWNSTREAM(FEET) =  1247.50
 FLOW LENGTH(FEET) =  2015.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.99
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    206.14
 PIPE TRAVEL TIME(MIN.) =   3.06    Tc(MIN.) =  25.29
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     18.00 =  8358.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    123.70  TC(MIN.) =     25.29
 EFFECTIVE AREA(ACRES) =    121.18  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.50
 PEAK FLOW RATE(CFS)   =    206.14

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1    206.14  25.29    1.935  0.40( 0.20) 0.50   121.2      20.00
     2    199.91  27.07    1.857  0.40( 0.20) 0.50   123.7      31.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Q 25 HYDROLOGY

****

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 8.0 Release Date: 01/01/2002 License ID 1251

Analysis prepared by:

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********** DESCRIPTION OF STUDY **********
* Q25 HYDROLOGY FOOTHILL REGIONAL STORM DRAIN *
* ULTIMATE DESIGN *
*

FILE NAME: P:\661-1677\Drainage\MSDQ25.DAT
TIME/DATE OF STUDY: 14:55 01/23/2003

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

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

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.980
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.470
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 1.1520
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK-SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	40.0	20.0	0.020/0.020/0.020	0.67	1.50	0.0312	0.125	0.0150
2	20.0	10.0	0.020/0.020/0.020	0.50	1.50	0.0312	0.125	0.0150
3	20.0	10.0	0.020/0.020/0.020	0.67	1.50	0.0312	0.125	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)
*PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```
****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 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) =   1383.00  DOWNSTREAM(FEET) =   1363.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.482
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.822
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       20.30      0.98       0.50    32   13.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     42.65
 TOTAL AREA(ACRES) =     20.30   PEAK FLOW RATE(CFS) =     42.65

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1356.00  DOWNSTREAM(FEET) =  1333.00
 FLOW LENGTH(FEET) =  1166.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.59
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     42.65
 PIPE TRAVEL TIME(MIN.) =   1.54    Tc(MIN.) =  15.03
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =  2166.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  15.03
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.644
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       35.50      0.98       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   35.50     SUBAREA RUNOFF(CFS) =   68.90
 EFFECTIVE AREA(ACRES) =    55.80   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =    55.80      PEAK FLOW RATE(CFS) =     108.30

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     10.00 IS CODE =  31
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1333.00  DOWNSTREAM(FEET) =  1317.00
FLOW LENGTH(FEET) =   802.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.60
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    108.30
PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =  15.88
LONGEST FLOWPATH FROM NODE     30.00 TO NODE     10.00 =  2968.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  15.88
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.557
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        A       24.50      0.98       0.50     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
SUBAREA AREA(ACRES) =   24.50      SUBAREA RUNOFF(CFS) =   45.64
EFFECTIVE AREA(ACRES) =    80.30   AREA-AVERAGED Fm(INCH/HR) =  0.49
AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
TOTAL AREA(ACRES) =    80.30       PEAK FLOW RATE(CFS) =     149.59

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1317.00  DOWNSTREAM(FEET) =  1310.00
FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  14.67
ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    149.59
PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =  16.47
LONGEST FLOWPATH FROM NODE     30.00 TO NODE     11.00 =  3488.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  16.47
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.502
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
```

```
"5-7 DWELLINGS/ACRE"       A       31.10      0.98      0.50     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
SUBAREA AREA(ACRES) =   31.10      SUBAREA RUNOFF(CFS) =   56.38
EFFECTIVE AREA(ACRES) =   111.40   AREA-AVERAGED Fm(INCH/HR) =  0.49
AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
TOTAL AREA(ACRES) =   111.40       PEAK FLOW RATE(CFS) =     201.97

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1310.00  DOWNSTREAM(FEET) =  1301.00
 FLOW LENGTH(FEET) =   670.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.83
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    201.97
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  17.18
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     12.00 =  4158.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.18
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.440
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A       39.30      0.98      0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   39.30      SUBAREA RUNOFF(CFS) =   69.05
 EFFECTIVE AREA(ACRES) =   150.70   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   150.70       PEAK FLOW RATE(CFS) =     264.78

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1301.00  DOWNSTREAM(FEET) =  1288.00
 FLOW LENGTH(FEET) =  1008.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    264.78
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =  18.19
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.00 =  5166.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      13.00 TO NODE      13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  18.19
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.358
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       30.30      0.98        0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   30.30      SUBAREA RUNOFF(CFS) =   51.00
 EFFECTIVE AREA(ACRES) =   181.00   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   181.00       PEAK FLOW RATE(CFS) =     304.65

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE      13.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1288.00  DOWNSTREAM(FEET) =  1269.00
 FLOW LENGTH(FEET) =   980.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.83
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    304.65
 PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =  19.01
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.50 =  6146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      13.50 TO NODE      13.50 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.) =  19.01
 RAINFALL INTENSITY(INCH/HR) =   2.30
 AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =  181.00
 TOTAL STREAM AREA(ACRES) =  181.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    304.65

****************************************************************************
 FLOW PROCESS FROM NODE      20.00 TO NODE      21.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   970.00
 ELEVATION DATA: UPSTREAM(FEET) =   1317.00  DOWNSTREAM(FEET) =   1302.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.851
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.663
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       10.00      0.98       0.60    32   14.85
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA RUNOFF(CFS) =     18.70
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     18.70

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.85
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.663
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       10.00      0.98       0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =   10.00     SUBAREA RUNOFF(CFS) =   18.70
 EFFECTIVE AREA(ACRES) =    20.00   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =    20.00      PEAK FLOW RATE(CFS) =     37.40

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1294.00  DOWNSTREAM(FEET) =  1278.00
 FLOW LENGTH(FEET) =   920.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.38
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     37.40
 PIPE TRAVEL TIME(MIN.) =   1.35    Tc(MIN.) =  16.20
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =  1890.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.20
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.527
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```

```
"3-4 DWELLINGS/ACRE"       A       30.00      0.98      0.60     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
SUBAREA AREA(ACRES) =   30.00     SUBAREA RUNOFF(CFS) =   52.45
EFFECTIVE AREA(ACRES) =   50.00   AREA-AVERAGED Fm(INCH/HR) =  0.59
AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =   50.00       PEAK FLOW RATE(CFS) =      87.41

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     13.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1278.00  DOWNSTREAM(FEET) =  1269.00
 FLOW LENGTH(FEET) =   800.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.11
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     87.41
 PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =  17.30
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     13.50 =  2690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     13.50 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.) =  17.30
 RAINFALL INTENSITY(INCH/HR) =   2.43
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =   50.00
 TOTAL STREAM AREA(ACRES) =   50.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     87.41

 ** CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1    304.65  19.01     2.296   0.97( 0.49) 0.50    181.0      30.00
     2     87.41  17.30     2.430   0.98( 0.59) 0.60     50.0      20.00

 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    385.12  17.30     2.430   0.98( 0.51) 0.52    214.7      20.00
     2    385.71  19.01     2.296   0.98( 0.51) 0.52    231.0      30.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    385.71    Tc(MIN.) =    19.01
 EFFECTIVE AREA(ACRES) =   231.00   AREA-AVERAGED Fm(INCH/HR) =  0.51
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =    231.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.50 =  6146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1269.00  DOWNSTREAM(FEET) =  1264.00
 FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  51.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    385.71
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =  19.30
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     14.00 =  6476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.30
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.275
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       39.50      0.98       0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   39.50      SUBAREA RUNOFF(CFS) =   63.56
 EFFECTIVE AREA(ACRES) =   270.50   AREA-AVERAGED Fm(INCH/HR) =  0.51
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =   270.50       PEAK FLOW RATE(CFS) =     430.88

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)     NODE
     1    434.50  17.58    2.406  0.98( 0.51) 0.52   254.2       20.00
     2    430.88  19.30    2.275  0.98( 0.51) 0.52   270.5       30.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =    434.50  Tc(MIN.) =  17.58
 AREA-AVERAGED Fm(INCH/HR) =  0.51  AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.52  EFFECTIVE AREA(ACRES) =    254.19

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 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.) =  17.58
 RAINFALL INTENSITY(INCH/HR) =   2.41
 AREA-AVERAGED Fm(INCH/HR) =  0.51
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =  254.19
 TOTAL STREAM AREA(ACRES) =  270.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    434.50

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 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) =   1332.00  DOWNSTREAM(FEET) =   1318.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.479
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.703
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A        9.00      0.98       0.50    32   14.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     17.95
 TOTAL AREA(ACRES) =      9.00   PEAK FLOW RATE(CFS) =     17.95

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1318.00  DOWNSTREAM ELEVATION(FEET) = 1305.00
 STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0299

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.88
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.56
   HALFSTREET FLOOD WIDTH(FEET) =   20.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.39
 STREET FLOW TRAVEL TIME(MIN.) =   3.90   Tc(MIN.) =  18.38
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.343
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE                GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"          A       27.30       0.98        0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   27.30     SUBAREA RUNOFF(CFS) =   45.58
 EFFECTIVE AREA(ACRES) =   36.30   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98 AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   36.30       PEAK FLOW RATE(CFS) =      60.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  20.00
 FLOW VELOCITY(FEET/SEC.) =  4.98   DEPTH*VELOCITY(FT*FT/SEC.) =   3.11
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =  2000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1298.00  DOWNSTREAM(FEET) =  1280.00
 FLOW LENGTH(FEET) =   985.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.21
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     60.61
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =  19.63
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =  2985.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.63
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.252
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"          A       30.10       0.98        0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   30.10     SUBAREA RUNOFF(CFS) =   47.81
 EFFECTIVE AREA(ACRES) =   66.40   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98 AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   66.40       PEAK FLOW RATE(CFS) =     105.47

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1280.00  DOWNSTREAM(FEET) =  1264.00
 FLOW LENGTH(FEET) =  1320.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.6 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.79
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    105.47
 PIPE TRAVEL TIME(MIN.) =   1.72    Tc(MIN.) =  21.35
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     14.00 =  4305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 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.) =  21.35
 RAINFALL INTENSITY(INCH/HR) =   2.14
 AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =   66.40
 TOTAL STREAM AREA(ACRES) =   66.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.47

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     434.50  17.58     2.406   0.98( 0.51) 0.52    254.2      20.00
     1     430.88  19.30     2.275   0.98( 0.51) 0.52    270.5      30.00
     2     105.47  21.35     2.142   0.98( 0.49) 0.50     66.4      40.00

 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     535.26  17.58     2.406   0.97( 0.50) 0.52    308.9      20.00
     2     533.94  19.30     2.275   0.98( 0.50) 0.52    330.5      30.00
     3     503.81  21.35     2.142   0.98( 0.50) 0.51    336.9      40.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    535.26    Tc(MIN.) =    17.58
 EFFECTIVE AREA(ACRES) =   308.88   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =    336.90
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     14.00 =  6476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1264.00  DOWNSTREAM(FEET) =  1258.00
 FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  59.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.85
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =    535.26
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  17.97
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     15.00 =  6941.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.97
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.374
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A        4.60      0.98       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =     7.81
 EFFECTIVE AREA(ACRES) =   313.48   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =   341.50       PEAK FLOW RATE(CFS) =     535.26
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1258.00  DOWNSTREAM(FEET) =  1252.00
 FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.18
 ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    535.26
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =  18.64
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     16.00 =  7626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  18.64
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.323
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       15.00      0.98       0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =   15.00      SUBAREA RUNOFF(CFS) =    23.47
 EFFECTIVE AREA(ACRES) =   328.48   AREA-AVERAGED Fm(INCH/HR) =  0.51
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =   356.50       PEAK FLOW RATE(CFS) =     537.03
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1252.00  DOWNSTREAM(FEET) =  1249.00
 FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =   8.00   ESTIMATED BOX HEIGHT(FEET) =    7.16
 BOX-FLOW VELOCITY(FEET/SEC.) =   9.37
 BOX-FLOW(CFS) =    537.03
 BOX-FLOW TRAVEL TIME(MIN.) =   1.76    Tc(MIN.) =  20.40
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     17.00 =  8616.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  20.40
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.201
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A       25.00      0.98       0.10    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
 SUBAREA AREA(ACRES) =   25.00      SUBAREA RUNOFF(CFS) =   47.33
 EFFECTIVE AREA(ACRES) =   353.48   AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =   381.50       PEAK FLOW RATE(CFS) =     548.15

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1249.00  DOWNSTREAM(FEET) =  1247.50
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =   8.00   ESTIMATED BOX HEIGHT(FEET) =    5.98
 BOX-FLOW VELOCITY(FEET/SEC.) =  11.46
 BOX-FLOW(CFS) =    548.15
 BOX-FLOW TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =  20.82
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     18.00 =  8906.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    381.50  TC(MIN.) =     20.82
 EFFECTIVE AREA(ACRES) =    353.48  AREA-AVERAGED Fm(INCH/HR)=  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.49
 PEAK FLOW RATE(CFS)    =    548.15

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1    548.15  20.82    2.174  0.97( 0.48) 0.49   353.5      20.00
     2    546.38  22.54    2.073  0.98( 0.48) 0.49   375.1      30.00
     3    517.49  24.64    1.965  0.98( 0.48) 0.49   381.5      40.00
```

Q 100 HYDROLOGY

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 8.0  Release Date: 01/01/2002  License ID 1251

                          Analysis prepared by:

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                            RANCHO CUCAMONGA, CA 91730


 ************************** DESCRIPTION OF STUDY **************************
* Q100 HYDROLOGY FOR FOOTHILL REGIONAL STORM DRAIN                        *
* ULTIMATE DESIGN                                                         *
*                                                                         *
 **************************************************************************

  FILE NAME: P:\661-1677\Drainage\MSDQ100.DAT
  TIME/DATE OF STUDY: 14:55 01/23/2003
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE = 0.6000

  *ANTECEDENT MOISTURE CONDITION (AMC) II 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)  (FT)    (n)
===  =====  =========  ==================  ======  =====  ======  =====  =======
  1   40.0     20.0    0.020/0.020/0.020    0.67    1.50  0.0312  0.125  0.0150
  2   20.0     10.0    0.020/0.020/0.020    0.50    1.50  0.0312  0.125  0.0150
  3   20.0     10.0    0.020/0.020/0.020    0.67    1.50  0.0312  0.125  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)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
ELEVATION DATA: UPSTREAM(FEET) =  1333.00  DOWNSTREAM(FEET) =  1317.00
FLOW LENGTH(FEET) =   802.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    145.65
PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =  15.71
LONGEST FLOWPATH FROM NODE     30.00 TO NODE     10.00 =  2968.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  15.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.285
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        A       24.50      0.98       0.50     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
SUBAREA AREA(ACRES) =   24.50     SUBAREA RUNOFF(CFS) =   61.68
EFFECTIVE AREA(ACRES) =   80.30   AREA-AVERAGED Fm(INCH/HR) =  0.49
AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
TOTAL AREA(ACRES) =    80.30      PEAK FLOW RATE(CFS) =     202.17

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1317.00  DOWNSTREAM(FEET) =  1310.00
FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.84
ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =    202.17
PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  16.26
LONGEST FLOWPATH FROM NODE     30.00 TO NODE     11.00 =  3488.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  16.26
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
```

```
"5-7 DWELLINGS/ACRE"        A        31.10       0.98       0.50     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
SUBAREA AREA(ACRES) =   31.10     SUBAREA RUNOFF(CFS) =   76.43
EFFECTIVE AREA(ACRES) =   111.40   AREA-AVERAGED Fm(INCH/HR) =  0.49
AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
TOTAL AREA(ACRES) =   111.40      PEAK FLOW RATE(CFS) =    273.78

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1310.00  DOWNSTREAM(FEET) =  1301.00
 FLOW LENGTH(FEET) =   670.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.02
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    273.78
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =  16.91
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     12.00 =  4158.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.143
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A        39.30       0.98       0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   39.30     SUBAREA RUNOFF(CFS) =   93.91
 EFFECTIVE AREA(ACRES) =   150.70   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   150.70      PEAK FLOW RATE(CFS) =    360.12

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1301.00  DOWNSTREAM(FEET) =  1288.00
 FLOW LENGTH(FEET) =  1008.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.82
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    360.12
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =  17.85
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.00 =  5166.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  17.85
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.042
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       30.30      0.98        0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   30.30      SUBAREA RUNOFF(CFS) =   69.66
 EFFECTIVE AREA(ACRES) =   181.00   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   181.00       PEAK FLOW RATE(CFS) =    416.14

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1288.00  DOWNSTREAM(FEET) =  1269.00
 FLOW LENGTH(FEET) =   980.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.75
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    416.14
 PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =  18.60
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.50 =  6146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     13.50 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.) =  18.60
 RAINFALL INTENSITY(INCH/HR) =   2.97
 AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =  181.00
 TOTAL STREAM AREA(ACRES) =  181.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    416.14

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   970.00
 ELEVATION DATA: UPSTREAM(FEET) =   1317.00  DOWNSTREAM(FEET) =   1302.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.851
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.398
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       10.00      0.98       0.60    32   14.85
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA RUNOFF(CFS) =     25.31
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     25.31

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.85
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.398
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       10.00      0.98       0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =   10.00      SUBAREA RUNOFF(CFS) =   25.31
 EFFECTIVE AREA(ACRES) =    20.00   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =    20.00       PEAK FLOW RATE(CFS) =      50.63

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1294.00  DOWNSTREAM(FEET) =  1278.00
 FLOW LENGTH(FEET) =   920.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.23
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     50.63
 PIPE TRAVEL TIME(MIN.) =   1.25    Tc(MIN.) =  16.10
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =  1890.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.236
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```

```
"3-4 DWELLINGS/ACRE"       A       30.00      0.98      0.60     32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
SUBAREA AREA(ACRES) =    30.00      SUBAREA RUNOFF(CFS) =    71.58
EFFECTIVE AREA(ACRES) =    50.00    AREA-AVERAGED Fm(INCH/HR) =  0.59
AREA-AVERAGED Fp(INCH/HR) =  0.98   AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =    50.00        PEAK FLOW RATE(CFS) =     119.31

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     13.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1278.00  DOWNSTREAM(FEET) =  1269.00
 FLOW LENGTH(FEET) =   800.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.88
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    119.31
 PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =  17.14
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     13.50 =  2690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     13.50 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.) =  17.14
 RAINFALL INTENSITY(INCH/HR) =   3.12
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =   50.00
 TOTAL STREAM AREA(ACRES) =   50.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    119.31

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     416.14  18.60     2.968   0.97( 0.49) 0.50    181.0      30.00
     2     119.31  17.14     3.118   0.98( 0.59) 0.60     50.0      20.00

 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     525.81  17.14     3.118   0.98( 0.51) 0.52    216.7      20.00
     2     528.39  18.60     2.968   0.98( 0.51) 0.52    231.0      30.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    528.39    Tc(MIN.) =    18.60
 EFFECTIVE AREA(ACRES) =   231.00   AREA-AVERAGED Fm(INCH/HR) =  0.51
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =    231.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.50 =  6146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1269.00  DOWNSTREAM(FEET) =  1264.00
 FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  57.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.98
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    528.39
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  18.87
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     14.00 =  6476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  18.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       39.50      0.98       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   39.50      SUBAREA RUNOFF(CFS) =   87.29
 EFFECTIVE AREA(ACRES) =   270.50   AREA-AVERAGED Fm(INCH/HR) =  0.51
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =   270.50       PEAK FLOW RATE(CFS) =     593.40

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1    595.63  17.40    3.089  0.97( 0.51) 0.52   256.2       20.00
     2    593.40  18.87    2.943  0.98( 0.51) 0.52   270.5       30.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =    595.63  Tc(MIN.) =  17.40
 AREA-AVERAGED Fm(INCH/HR) =  0.51  AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.52  EFFECTIVE AREA(ACRES) =    256.24

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 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.) =  17.40
 RAINFALL INTENSITY(INCH/HR) =   3.09
 AREA-AVERAGED Fm(INCH/HR) =  0.51
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =  256.24
 TOTAL STREAM AREA(ACRES) =  270.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    595.63

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 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) =   1332.00  DOWNSTREAM(FEET) =   1318.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.479
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.450
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A        9.00      0.98       0.50    32   14.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     23.99
 TOTAL AREA(ACRES) =      9.00   PEAK FLOW RATE(CFS) =     23.99

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1318.00  DOWNSTREAM ELEVATION(FEET) = 1305.00
 STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 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) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0299

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      55.41
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.61
   HALFSTREET FLOOD WIDTH(FEET) =   20.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.81
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.92
 STREET FLOW TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =  17.95
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       27.30       0.98        0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   27.30      SUBAREA RUNOFF(CFS) =   62.53
 EFFECTIVE AREA(ACRES) =   36.30    AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   36.30        PEAK FLOW RATE(CFS) =      83.15

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  21.07
 FLOW VELOCITY(FEET/SEC.) =  5.65   DEPTH*VELOCITY(FT*FT/SEC.) =   3.88
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =  2000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1298.00  DOWNSTREAM(FEET) =  1280.00
 FLOW LENGTH(FEET) =   985.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.14
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     83.15
 PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =  19.11
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =  2985.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.11
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.921
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A       30.10       0.98        0.50     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =   30.10      SUBAREA RUNOFF(CFS) =   65.91
 EFFECTIVE AREA(ACRES) =   66.40    AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =   66.40        PEAK FLOW RATE(CFS) =     145.41

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1280.00  DOWNSTREAM(FEET) =  1264.00
 FLOW LENGTH(FEET) =  1320.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.1 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.95
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    145.41
 PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =  20.68
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     14.00 =  4305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 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.) =  20.68
 RAINFALL INTENSITY(INCH/HR) =   2.78
 AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =   66.40
 TOTAL STREAM AREA(ACRES) =   66.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.41

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     595.63  17.40     3.089   0.97( 0.51) 0.52    256.2      20.00
     1     593.40  18.87     2.943   0.98( 0.51) 0.52    270.5      30.00
     2     145.41  20.68     2.785   0.98( 0.49) 0.50     66.4      40.00

 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     734.15  17.40     3.089   0.97( 0.50) 0.52    312.1      20.00
     2     735.15  18.87     2.943   0.98( 0.50) 0.52    331.1      30.00
     3     700.33  20.68     2.785   0.98( 0.50) 0.51    336.9      40.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    735.15    Tc(MIN.) =    18.87
 EFFECTIVE AREA(ACRES) =   331.06   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =    336.90
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     14.00 =  6476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1264.00  DOWNSTREAM(FEET) =  1258.00
 FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  87.0 INCH PIPE IS  67.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.40
 ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =    735.15
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  19.23
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     15.00 =  6941.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.23
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.910
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        A        4.60      0.98       0.50    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =   10.03
 EFFECTIVE AREA(ACRES) =   335.66   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =   341.50       PEAK FLOW RATE(CFS) =     735.15
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1258.00  DOWNSTREAM(FEET) =  1252.00
 FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  93.0 INCH PIPE IS  73.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.46
 ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    735.15
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  19.85
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     16.00 =  7626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  19.85
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        A       15.00      0.98       0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =   15.00      SUBAREA RUNOFF(CFS) =   30.64
 EFFECTIVE AREA(ACRES) =   350.66   AREA-AVERAGED Fm(INCH/HR) =  0.51
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =   356.50       PEAK FLOW RATE(CFS) =     741.42
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1252.00  DOWNSTREAM(FEET) =  1249.00
 FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =   8.00   ESTIMATED BOX HEIGHT(FEET) =    9.12
 BOX-FLOW VELOCITY(FEET/SEC.) =  10.16
 BOX-FLOW(CFS) =    741.42
 BOX-FLOW TRAVEL TIME(MIN.) =   1.62    Tc(MIN.) =  21.47
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     17.00 =  8616.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  21.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A       25.00      0.98       0.10     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
 SUBAREA AREA(ACRES) =   25.00      SUBAREA RUNOFF(CFS) =   59.08
 EFFECTIVE AREA(ACRES) =   375.66   AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =   381.50       PEAK FLOW RATE(CFS) =     758.97

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  36
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED BOX SIZE (PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1249.00  DOWNSTREAM(FEET) =  1247.50
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 *GIVEN BOX BASEWIDTH(FEET) =   8.00   ESTIMATED BOX HEIGHT(FEET) =    7.59
 BOX-FLOW VELOCITY(FEET/SEC.) =  12.49
 BOX-FLOW(CFS) =    758.97
 BOX-FLOW TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =  21.86
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     18.00 =  8906.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    381.50  TC(MIN.) =     21.86
 EFFECTIVE AREA(ACRES) =    375.66  AREA-AVERAGED Fm(INCH/HR)=  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.49
 PEAK FLOW RATE(CFS)    =    758.97

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1    758.68  20.39    2.809  0.97( 0.48) 0.49   356.7      20.00
     2    758.97  21.86    2.694  0.98( 0.48) 0.49   375.7      30.00
     3    725.30  23.72    2.565  0.98( 0.48) 0.49   381.5      40.00
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END OF RATIONAL METHOD ANALYSIS

CONCEPTUAL
STORM DRAIN HYDRAULICS

FILE: FH-INT.WSW W S P G W - EDIT LISTING - Version 14.01 Date: 1-21-2003 Time:10:46:20

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		5.500														
CD	2	3	0	.000	6.000	8.000	.000	.000	.00										
CD	3	4	1		3.000														
CD	4	4	1		7.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

INTERIM Q25 FOOTHILL STORM DRAIN

HEADING LINE NO 2 IS -

EAST OF HEMLOCK AVE

HEADING LINE NO 3 IS -

W S P G W 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
	2108.580	1247.490	1	1253.690

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2159.580	1247.740	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	2183.580	1247.860	2	.013	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2455.000	1249.220	2	.013	.000	.000	.000	0

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
	2458.000	1249.300	2	3	0	.013	.010	.000	1250.800	.000	45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2461.000	1249.420	2	.013	.000	.000	.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2950.000	1251.870	2	.013	.000	.000	.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2956.000	1252.070	2	.013	.000	.000	.000	0

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

	3445.000	1254.510	2		.013			.000	.000	.000	0
ELEMENT NO 10 IS A JUNCTION	*	*	*	*		*		*		*	
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	3448.000	1254.610	2	3	0	.013	.010	.000	1256.100	.000	45.000	.000
									RADIUS	ANGLE		
									.000	.000		

WATER SURFACE PROFILE - ELEMENT CARD LISTING

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 11 IS A REACH	*	*	*				
U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3451.000	1254.710	4	.013	.000	.000	.000	0
ELEMENT NO 12 IS A REACH	*	*	*				
U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3940.000	1257.160	4	.013	.000	.000	.000	0
ELEMENT NO 13 IS A REACH	*	*	*				
U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3946.000	1257.360	4	.013	.000	.000	.000	0
ELEMENT NO 14 IS A REACH	*	*	*				
U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4123.490	1258.240	4	.013	.000	.000	.000	0
ELEMENT NO 15 IS A SYSTEM HEADWORKS			*	*				
U/S DATA	STATION	INVERT	SECT	W S ELEV				
	4123.490	1258.240	4	1258.240				

FILE: FH-INT.WSW

W S P G W - CIVILDESIGN Version 14.01

PAGE 1

Program Package Serial Number: 1296

WATER SURFACE PROFILE LISTING

Date: 1-21-2003 Time:10:46:24

INTERIM Q25 FOOTHILL STORM DRAIN
EAST OF HEMLOCK AVE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width / "N"	Height/ Dia.-FT or I.D. / X-Fall	Base Wt / ZR	ZL	No Wth Prs/Pip / Type Ch
2108.580	1247.490	6.200	1253.690	206.02	8.67	1.17	1254.86	.00	4.02	.00	5.500	.000	.00	1 .0
51.000	.0049					.0038	.19	6.20	.00	3.99	.013	.00	.00	PIPE
2159.580	1247.740	6.142	1253.882	206.02	8.67	1.17	1255.05	.00	4.02	.00	5.500	.000	.00	1 .0
TRANS STR	.0050					.0007	.02	6.14	.00		.013	.00	.00	PIPE
2183.580	1247.860	7.045	1254.905	206.02	4.29	.29	1255.19	.00	2.74	8.00	6.000	8.000	.00	0 .0
241.717	.0050					.0007	.17	7.05	.31	2.42	.013	.00	.00	BOX
2425.297	1249.071	6.000	1255.071	206.02	4.29	.29	1255.36	.00	2.74	8.00	6.000	8.000	.00	0 .0
29.703	.0050					.0004	.01	6.00	.31	2.42	.013	.00	.00	BOX
2455.000	1249.220	5.849	1255.069	206.02	4.40	.30	1255.37	.00	2.74	8.00	6.000	8.000	.00	0 .0
JUNCT STR	.0267					.0005	.00	5.85	.32		.013	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
2458.000	1249.300	5.761	1255.061	206.01	4.47	.31	1255.37	.00	2.74	8.00	6.000	8.000	.00	0 .0
3.000	.0400					.0005	.00	5.76	.33	1.19	.013	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
2461.000	1249.420	5.628	1255.048	206.01	4.58	.33	1255.37	.00	2.74	8.00	6.000	8.000	.00	0 .0
51.428	.0050					.0005	.03	5.63	.34	2.42	.013	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												

INTERIM Q25 FOOTHILL STORM DRAIN
EAST OF HEMLOCK AVE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2512.428	1249.678	5.366	1255.043	206.01	4.80	.36	1255.40	.00	2.74	8.00	6.000	8.000	.00	0 .0
48.750	.0050					.0006	.03	5.37	.37	2.42	.013	.00	.00	BOX
2561.178	1249.922	5.116	1255.038	206.01	5.03	.39	1255.43	.00	2.74	8.00	6.000	8.000	.00	0 .0
46.144	.0050					.0007	.03	5.12	.39	2.42	.013	.00	.00	BOX
2607.322	1250.153	4.878	1255.031	206.01	5.28	.43	1255.46	.00	2.74	8.00	6.000	8.000	.00	0 .0
43.597	.0050					.0007	.03	4.88	.42	2.42	.013	.00	.00	BOX
2650.919	1250.372	4.651	1255.022	206.01	5.54	.48	1255.50	.00	2.74	8.00	6.000	8.000	.00	0 .0
41.094	.0050					.0008	.03	4.65	.45	2.42	.013	.00	.00	BOX
2692.013	1250.578	4.434	1255.012	206.01	5.81	.52	1255.54	.00	2.74	8.00	6.000	8.000	.00	0 .0
38.617	.0050					.0010	.04	4.43	.49	2.42	.013	.00	.00	BOX
2730.630	1250.771	4.228	1254.999	206.01	6.09	.58	1255.58	.00	2.74	8.00	6.000	8.000	.00	0 .0
36.142	.0050					.0011	.04	4.23	.52	2.42	.013	.00	.00	BOX
2766.771	1250.952	4.031	1254.983	206.01	6.39	.63	1255.62	.00	2.74	8.00	6.000	8.000	.00	0 .0
33.639	.0050					.0012	.04	4.03	.56	2.42	.013	.00	.00	BOX
2800.411	1251.121	3.844	1254.964	206.01	6.70	.70	1255.66	.00	2.74	8.00	6.000	8.000	.00	0 .0
31.069	.0050					.0014	.04	3.84	.60	2.42	.013	.00	.00	BOX

INTERIM Q25 FOOTHILL STORM DRAIN
EAST OF HEMLOCK AVE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2831.480	1251.276	3.665	1254.941	206.01	7.03	.77	1255.71	.00	2.74	8.00	6.000	8.000	.00	0 .0
28.373	.0050					.0016	.05	3.66	.65	2.42	.013	.00	.00	BOX
2859.853	1251.418	3.494	1254.913	206.01	7.37	.84	1255.76	.00	2.74	8.00	6.000	8.000	.00	0 .0
25.464	.0050					.0018	.05	3.49	.69	2.42	.013	.00	.00	BOX
2885.317	1251.546	3.332	1254.878	206.01	7.73	.93	1255.81	.00	2.74	8.00	6.000	8.000	.00	0 .0
8.700	.0050					.0021	.02	3.33	.75	2.42	.013	.00	.00	BOX
2894.017	1251.590	3.274	1254.864	206.01	7.86	.96	1255.82	.00	2.74	8.00	6.000	8.000	.00	0 .0
HYDRAULIC JUMP														
2894.017	1251.590	2.268	1253.857	206.01	11.36	2.00	1255.86	.00	2.74	8.00	6.000	8.000	.00	0 .0
55.983	.0050					.0064	.36	2.27	1.33	2.42	.013	.00	.00	BOX
2950.000	1251.870	2.187	1254.057	206.01	11.78	2.15	1256.21	.00	2.74	8.00	6.000	8.000	.00	0 .0
.632	.0333					.0066	.00	2.19	1.40	1.27	.013	.00	.00	BOX
2950.632	1251.891	2.203	1254.094	206.01	11.69	2.12	1256.22	.00	2.74	8.00	6.000	8.000	.00	0 .0
3.135	.0333					.0061	.02	2.20	1.39	1.27	.013	.00	.00	BOX
2953.767	1251.995	2.311	1254.307	206.01	11.14	1.93	1256.23	.00	2.74	8.00	6.000	8.000	.00	0 .0
2.233	.0333					.0054	.01	2.31	1.29	1.27	.013	.00	.00	BOX
2956.000	1252.070	2.424	1254.494	206.01	10.62	1.75	1256.25	.00	2.74	8.00	6.000	8.000	.00	0 .0
327.055	.0050					.0050	1.63	2.42	1.20	2.42	.013	.00	.00	BOX

INTERIM Q25 FOOTHILL STORM DRAIN
EAST OF HEMLOCK AVE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
3283.055	1253.702	2.424	1256.126	206.01	10.62	1.75	1257.88	.00	2.74	8.00	6.000	8.000	.00	0 .0
161.945	.0050					.0051	.83	2.42	1.20	2.42	.013	.00	.00	BOX
3445.000	1254.510	2.375	1256.885	206.01	10.84	1.83	1258.71	.00	2.74	8.00	6.000	8.000	.00	0 .0
JUNCT STR	.0333					.0044	.01	2.38	1.24		.013	.00	.00	BOX
3448.000	1254.610	2.741	1257.351	206.00	9.40	1.37	1258.72	.00	2.74	8.00	6.000	8.000	.00	0 .0
3448.000	1254.610	3.095	1257.705	206.00	11.98	2.23	1259.93	.00	3.67	7.38	7.500	.000	.00	1 .0
3.000	.0333					.0053	.02	3.10	1.38	1.94	.013	.00	.00	PIPE
3451.000	1254.710	3.201	1257.911	206.00	11.45	2.04	1259.95	.00	3.67	7.42	7.500	.000	.00	1 .0
86.699	.0050					.0050	.43	3.20	1.30	3.20	.013	.00	.00	PIPE
3537.699	1255.144	3.201	1258.345	206.00	11.45	2.04	1260.38	.00	3.67	7.42	7.500	.000	.00	1 .0
249.145	.0050					.0052	1.29	3.20	1.30	3.20	.013	.00	.00	PIPE
3786.844	1256.393	3.150	1259.543	206.00	11.70	2.12	1261.67	.00	3.67	7.40	7.500	.000	.00	1 .0
153.156	.0050					.0057	.87	3.15	1.34	3.20	.013	.00	.00	PIPE
3940.000	1257.160	3.039	1260.199	206.00	12.27	2.34	1262.54	.00	3.67	7.36	7.500	.000	.00	1 .0
3.147	.0333					.0057	.02	3.04	1.43	1.94	.013	.00	.00	PIPE
3943.147	1257.265	3.132	1260.397	206.00	11.79	2.16	1262.55	.00	3.67	7.40	7.500	.000	.00	1 .0
2.853	.0333					.0051	.01	3.13	1.35	1.94	.013	.00	.00	PIPE

3946.000	1257.360	3.248	1260.607	206.00	11.24	1.96	1262.57	.00	3.67	7.43	7.500	.000	.00	1	.0				
68.095	.0050					.0047	.32	3.25	1.26	3.21	.013	.00	.00	PIPE					

Program Package Serial Number: 1296

WATER SURFACE PROFILE LISTING Date: 1-21-2003 Time:10:46:24

INTERIM Q25 FOOTHILL STORM DRAIN
EAST OF HEMLOCK AVE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4014.095	1257.698	3.282	1260.980	206.00	11.08	1.91	1262.89	.00	3.67	7.44	7.500	.000	.00	1 .0
77.818	.0050					.0043	.33	3.28	1.24	3.21	.013	.00	.00	PIPE
4091.913	1258.083	3.404	1261.487	206.00	10.56	1.73	1263.22	.00	3.67	7.47	7.500	.000	.00	1 .0
25.893	.0050					.0038	.10	3.40	1.15	3.21	.013	.00	.00	PIPE
4117.807	1258.212	3.531	1261.743	206.00	10.07	1.58	1263.32	.00	3.67	7.49	7.500	.000	.00	1 .0
5.684	.0050					.0033	.02	3.53	1.07	3.21	.013	.00	.00	PIPE
4123.490	1258.240	3.666	1261.906	206.00	9.60	1.43	1263.34	.00	3.67	7.50	7.500	.000	.00	1 .0

FILE: FH-ULT.WSW W S P G W - EDIT LISTING - Version 14.01 Date: 1-23-2003 Time: 4:12:43

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		7.500														
CD	2	3	0	.000	6.000	8.000	.000	.000	.00										
CD	3	4	1		3.000														
CD	4	4	1		8.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

ULTIMATE FOOTHILL STORM DRAIN Q100

HEADING LINE NO 2 IS -

EAST OF HEMLOCK AVE

HEADING LINE NO 3 IS -

W S P G W 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
	2108.580	1245.000	1	1245.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2159.580	1246.000	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	2183.580	1247.860	2	.013	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2455.000	1249.220	2	.013	.000	.000	.000	0

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
	2461.000	1249.420	2	3	0	.013	44.000	.000	1250.800	.000	45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2950.000	1251.870	2	.013	.000	.000	.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2956.000	1252.070	2	.013	.000	.000	.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3445.000	1254.510	2	.013	.000	.000	.000	0

ELEMENT NO 9 IS A JUNCTION * * * * * * *

	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
		3451.000	1254.710	4	3	0	.013	29.000	.000	1256.100	.000	45.000	.000
										RADIUS	ANGLE		
										.000	.000		

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3940.000	1257.160	4	.013	.000	.000	.000	0

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3946.000	1257.360	4	.013	.000	.000	.000	0

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	4123.490	1258.240	4	.013	.000	.000	.000	0

ELEMENT NO 13 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	4123.490	1258.240	4	1258.240

Program Package Serial Number: 1296

WATER SURFACE PROFILE LISTING Date: 1-23-2003 Time: 4:12:47

ULTIMATE FOOTHILL STORM DRAIN Q100

EAST OF HEMLOCK AVE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2108.580	1245.000	5.879	1250.879	757.00	20.37	6.45	1257.33	.00	6.84	6.17	7.500	.000	.00	1 .0
22.300	.0196					.0102	.23	5.88	1.46	4.64	.013	.00	.00	PIPE
2130.880	1245.437	6.091	1251.528	757.00	19.70	6.03	1257.55	.00	6.84	5.86	7.500	.000	.00	1 .0
20.771	.0196					.0095	.20	6.09	1.36	4.64	.013	.00	.00	PIPE
2151.651	1245.844	6.428	1252.273	757.00	18.78	5.48	1257.75	.00	6.84	5.25	7.500	.000	.00	1 .0
7.929	.0196					.0088	.07	6.43	1.19	4.64	.013	.00	.00	PIPE
2159.580	1246.000	6.841	1252.841	757.00	17.91	4.98	1257.82	.00	6.84	4.25	7.500	.000	.00	1 .0
TRANS STR	.0775					.0085	.20	6.84	1.00		.013	.00	.00	PIPE
2183.580	1247.860	6.422	1254.282	757.00	15.77	3.86	1258.14	.00	6.00	8.00	6.000	8.000	.00	0 .0
271.420	.0050					.0093	2.52	6.42	1.13	6.00	.013	.00	.00	BOX
2455.000	1249.220	7.580	1256.800	757.00	15.77	3.86	1260.66	.00	6.00	8.00	6.000	8.000	.00	0 .0
JUNCT STR	.0333					.0082	.05	7.58	1.13		.013	.00	.00	BOX
2461.000	1249.420	8.179	1257.599	713.00	14.85	3.43	1261.03	.00	6.00	8.00	6.000	8.000	.00	0 .0
489.000	.0050					.0082	4.02	8.18	1.07	6.00	.013	.00	.00	BOX
2950.000	1251.870	9.754	1261.624	713.00	14.85	3.43	1265.05	.00	6.00	8.00	6.000	8.000	.00	0 .0
6.000	.0333					.0082	.05	9.75	1.07	2.99	.013	.00	.00	BOX
2956.000	1252.070	9.603	1261.673	713.00	14.85	3.43	1265.10	.00	6.00	8.00	6.000	8.000	.00	0 .0
489.000	.0050					.0082	4.02	9.60	1.07	6.00	.013	.00	.00	BOX

Program Package Serial Number: 1296

WATER SURFACE PROFILE LISTING Date: 1-23-2003 Time: 4:12:47

ULTIMATE FOOTHILL STORM DRAIN Q100

EAST OF HEMLOCK AVE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3445.000	1254.510	11.188	1265.698	713.00	14.85	3.43	1269.12	.00	6.00	8.00	6.000	8.000	.00	0 .0
JUNCT STR	.0333					.0069	.04	11.19	1.07		.013	.00	.00	BOX
3451.000	1254.710	11.788	1266.498	684.00	13.61	2.88	1269.37	.00	6.62	.00	8.000	.000	.00	1 .0
489.000	.0050					.0056	2.75	11.79	.00	7.11	.013	.00	.00	PIPE
3940.000	1257.160	12.088	1269.248	684.00	13.61	2.88	1272.12	.00	6.62	.00	8.000	.000	.00	1 .0
6.000	.0333					.0056	.03	12.09	.00	3.57	.013	.00	.00	PIPE
3946.000	1257.360	11.922	1269.281	684.00	13.61	2.88	1272.16	.00	6.62	.00	8.000	.000	.00	1 .0
177.490	.0050					.0056	1.00	11.92	.00	7.19	.013	.00	.00	PIPE
4123.490	1258.240	12.040	1270.280	684.00	13.61	2.88	1273.16	.00	6.62	.00	8.000	.000	.00	1 .0

FILE: MODEL1.WSW W S P G W - EDIT LISTING - Version 14.01 Date: 1-23-2003 Time: 5:30:55

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

HYDRAULICS @ Q25 MODEL 1

HEADING LINE NO 2 IS -

INTERIM TRIBUTARY FLOW FROM BASELINE TO MILLER EAST OF HEMLOCK

HEADING LINE NO 3 IS -

W S P G W 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
	9564.550	1228.480	1	1238.910

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	9877.670	1230.610	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	10050.000	1231.760	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	10167.670	1232.580	1	.013	.000	.000	.000	0

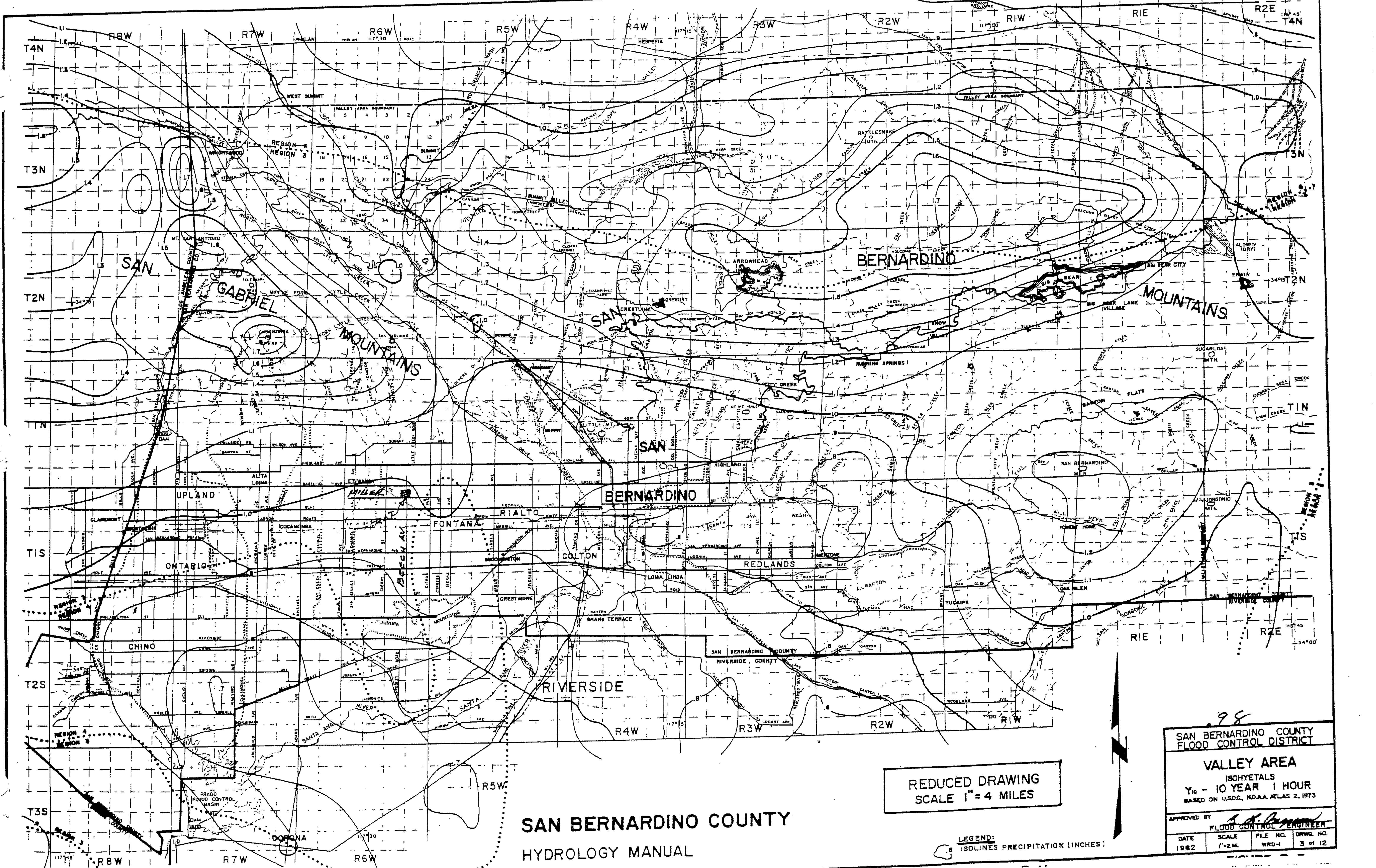
ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	10167.670	1232.580	1	1232.580

HYDRAULICS @ Q25 MODEL 1
INTERIM TRIBUTARY FLOW FROM BASELINE TO MILLER EAST OF HEMLOCK

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
9564.550	1228.480	10.430	1238.910	398.00	14.08	3.08	1241.99	.00	5.32	.00	6.000	.000	.00	1 .0
313.120	.0068					.0088	2.77	10.43	.00	6.00	.013	.00	.00	PIPE
9877.670	1230.610	11.065	1241.675	398.00	14.08	3.08	1244.75	.00	5.32	.00	6.000	.000	.00	1 .0
172.330	.0067					.0088	1.52	11.07	.00	6.00	.013	.00	.00	PIPE
10050.000	1231.760	11.437	1243.197	398.00	14.08	3.08	1246.27	.00	5.32	.00	6.000	.000	.00	1 .0
117.670	.0070					.0088	1.04	11.44	.00	6.00	.013	.00	.00	PIPE
10167.670	1232.580	11.657	1244.237	398.00	14.08	3.08	1247.31	.00	5.32	.00	6.000	.000	.00	1 .0

REFERENCES & MAPS



SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

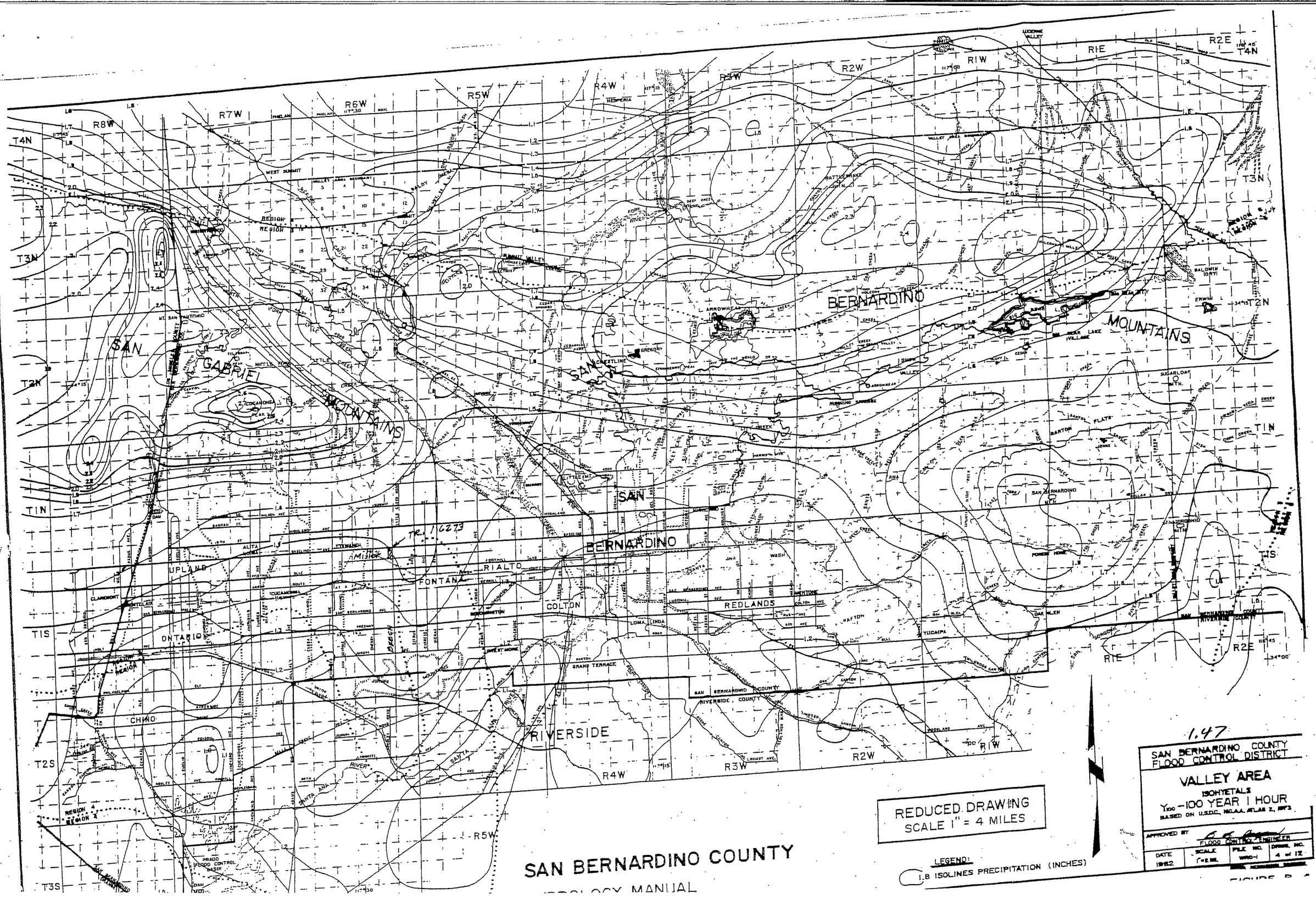
VALLEY AREA
ISOHYETALS
Y_{10} - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY [signature] FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	WRD-1	3 of 12

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

98



REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)

1.47

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

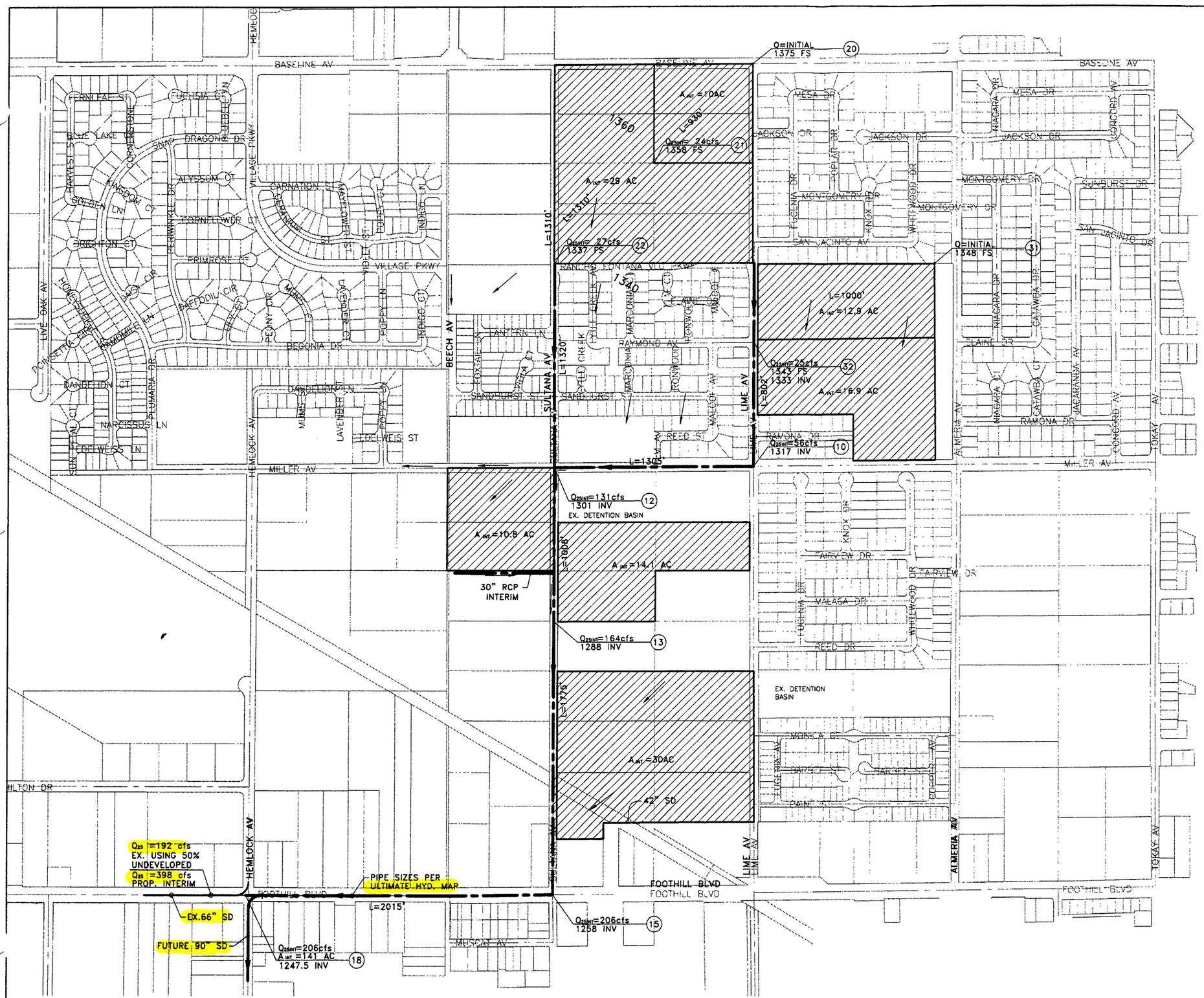
VALLEY AREA
ISOHYETALS
Y_{100} – 100 YEAR 1 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973

APPROVED BY _____
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRAWG. NO.
1982	1"=2 MI.	WRD-H	4 of 12

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

FIGURE B-4



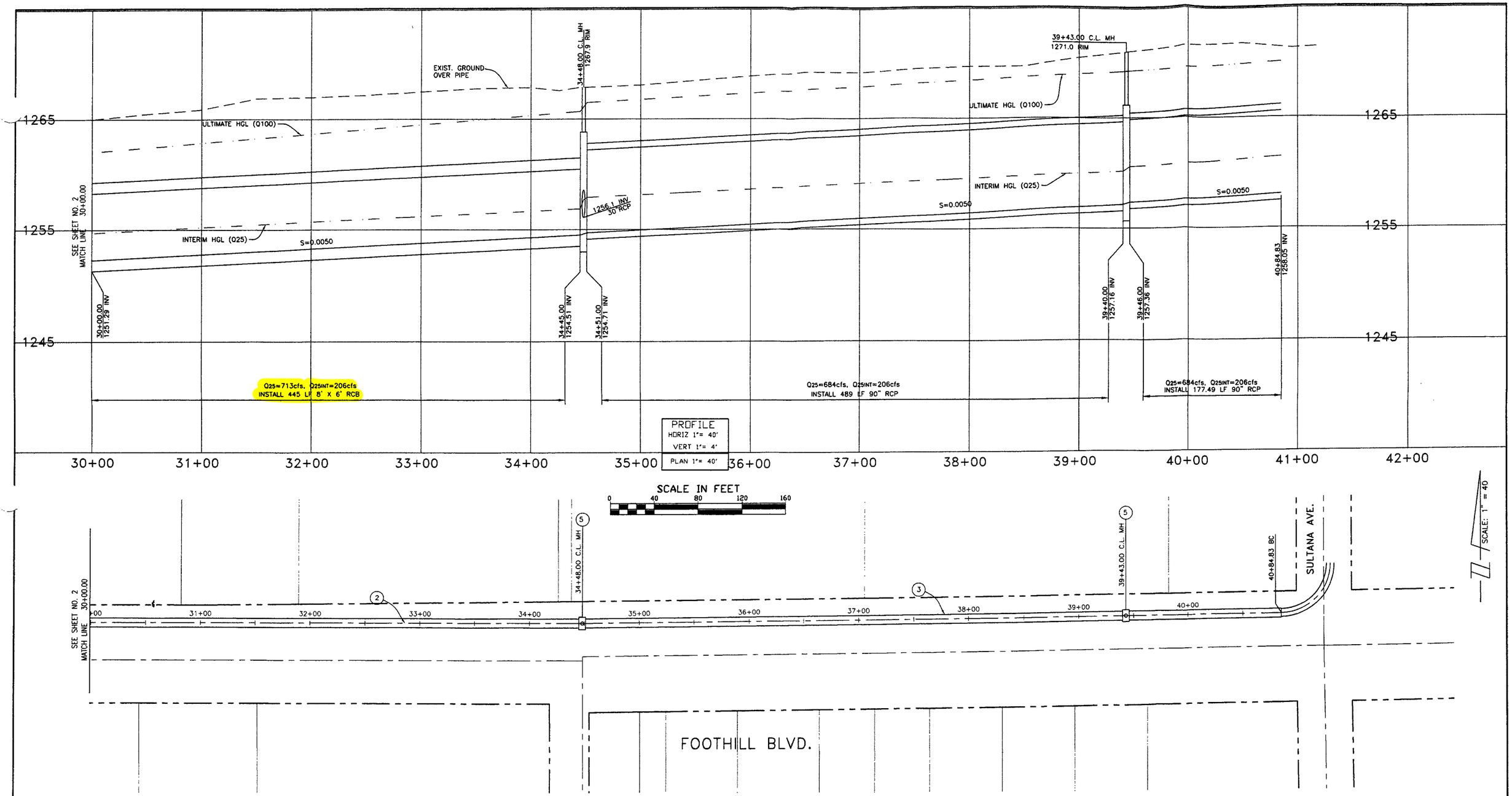
LEGEND

- INTERIM TRIBUTARY AREA
- SUBAREA BOUNDARY
- A_2 SUBAREA NUMBER
- A_{INT} INTERIM AREA
- L=500' DISTANCE BETWEEN NODES
- FLOW ARROW
- Q_{25INT} 25-YR STORM INTERIM FLOW TRIBUTARY TO EXIST. 66" RCP

PRELIMINARY REGIONAL INTERIM HYDROLOGY MAP

PLANS PREPARED BY
MADOLE & ASSOCIATES, INC.

CONSULTING CIVIL ENGINEERS
AND LAND PLANNERS
10601 CHURCH STREET, SUITE 107
RANCHO CUCAMONGA, CA 91730
(909) 948-1311



CONSTRUCTION NOTES

1. INSTALL 66" RCP, D-LOAD PER PROFILE
2. INSTALL 8' X 6' RCB
3. INSTALL 96" RCP, D-LOAD PER PROFILE
4. CONSTRUCT MANHOLE PER A.P.W.A. STD. 322-1.
5. CONSTRUCT MANHOLE PER A.P.W.A. STD. 320-1.

BENCH MARK: #

ELEVATION: #

BASIS OF BEARINGS:

PRELIMINARY - NOT FOR CONSTRUCTION

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REV	REVISION DESCRIPTION	DATE	ENGR	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

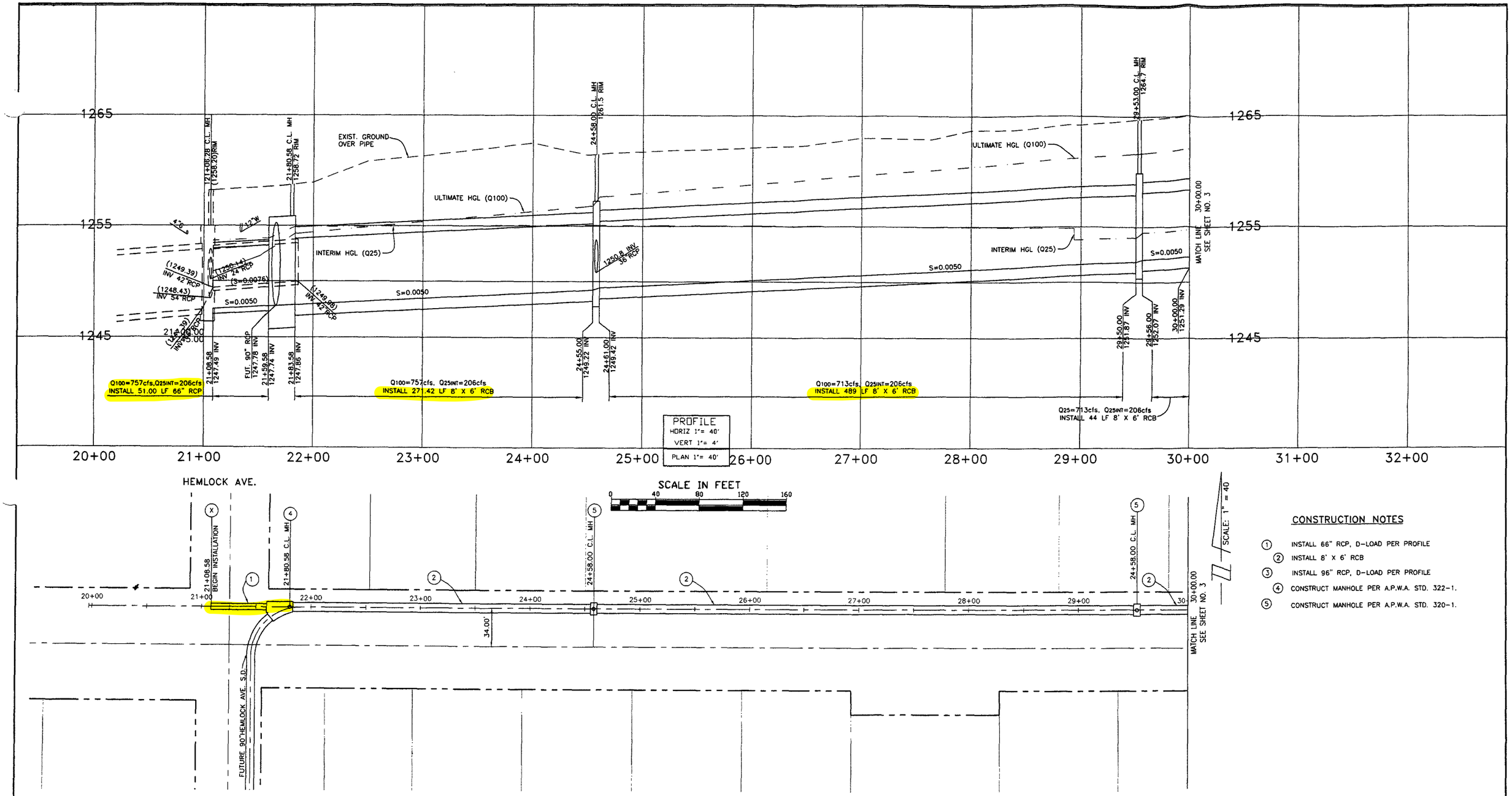
REGISTERED PROFESSIONAL ENGINEER MARION THOMAS SICKELS No. 62183 Exp 9-30-05 CIVIL STATE OF CALIFORNIA

Prepared Under The Supervision Of :
PREPARED IN THE OFFICE OF MADOLE AND ASSOCIATES, INC.
10801 CHURCH STREET , STE. 107
RANCHO CUCAMONGA, CA 91730
PHONE (909) 948-1311

Date :
RCE 62183 EXP. 9-30-05

CITY OF FONTANA, CALIFORNIA
STORM DRAIN CONCEPTUAL PLANS

DRAWN BY: JV	FOOTHILL BLVD. REGIONAL STORM EAST OF HEMLOCK	SCALE: 1"=40'
DESIGNED BY: MJG		DATE:
CHECKED BY: MJG	APPROVED BY: CITY ENGINEER R.C.E. 51152 DATE	DRAWING NO.: 2/2



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REV	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH CONDITIONS AND STANDARDS IN EFFECT.

BENCH MARK: #
ELEVATION: #
BASIS OF BEARINGS:

REGISTERED PROFESSIONAL ENGINEER RAMON THOMAS SILVERS No. 62183 Exp 9-30-05 CIVIL STATE OF CALIFORNIA

Prepared Under The Supervision Of :
PREPARED IN THE OFFICE OF
MADOLE AND ASSOCIATES, INC.
10801 CHURCH STREET, STE. 107
RANCHO CUCAMONGA, CA 91730
PHONE (909) 948-1311
Date :
RCE 62183 EXP. 9-30-05

PRELIMINARY - NOT FOR CONSTRUCTION

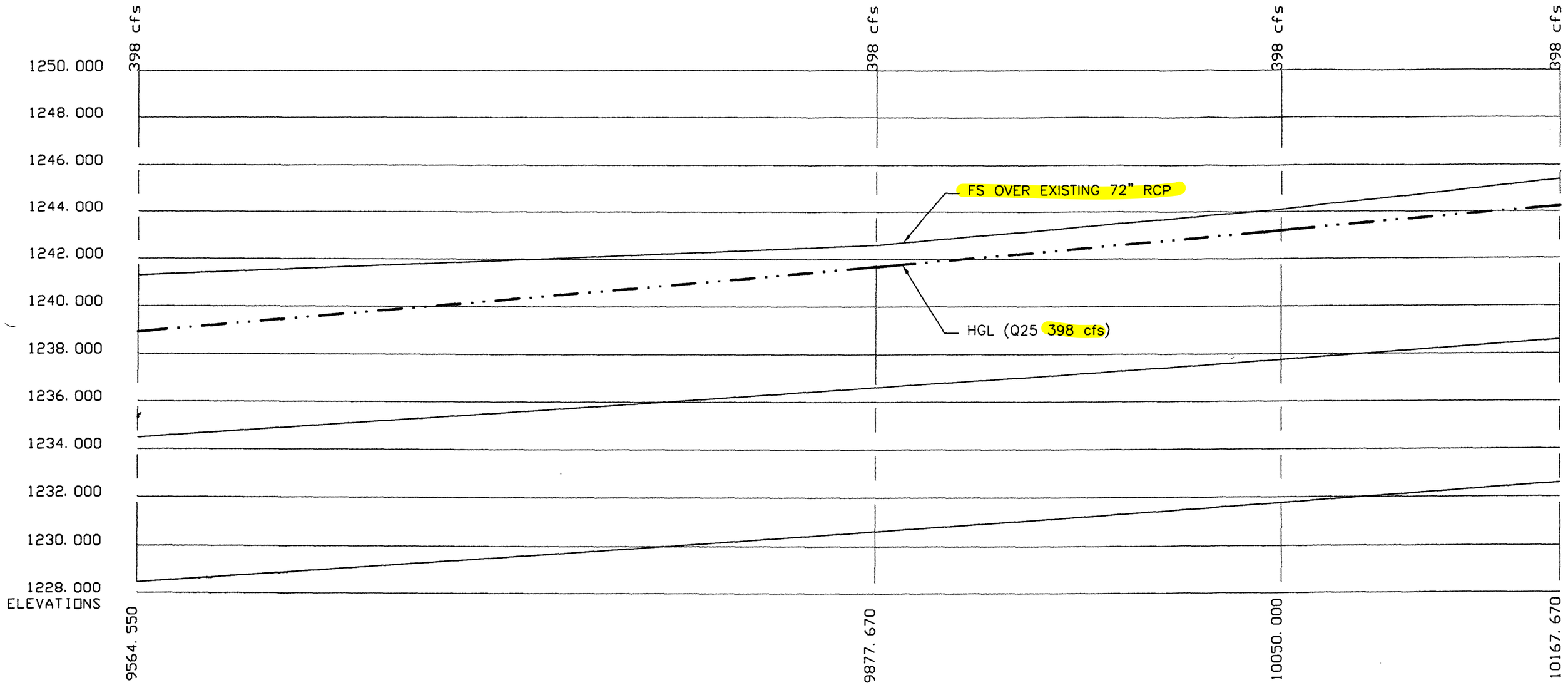
CITY OF FONTANA, CALIFORNIA

STORM DRAIN CONCEPTUAL PLANS

DRAWN BY: JV	FOOTHILL BLVD. REGIONAL STORM EAST OF HEMLOCK	SCALE: 1"=40'
DESIGNED BY: MJG		DATE:
CHECKED BY: MJG	APPROVED BY: CITY ENGINEER R.C.E. 51152 DATE	DRAWING NO.: 1/2

WATER SURFACE PRESSURE GRADIENT ANALYSIS

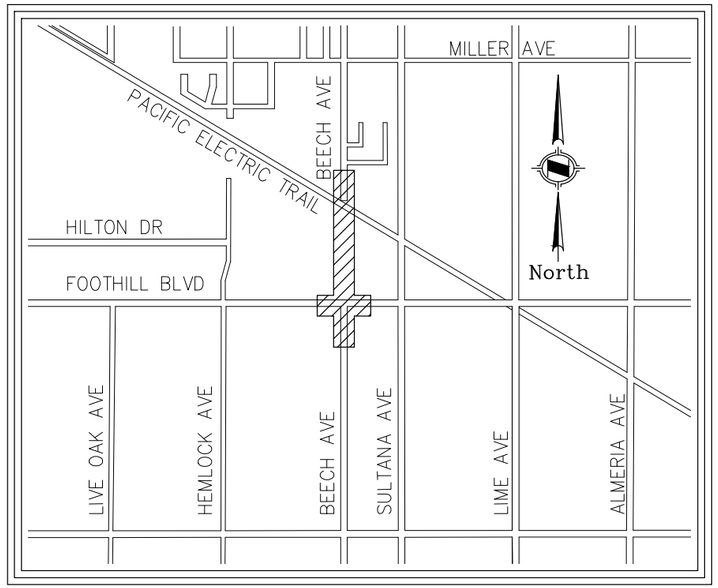
MODEL 1 HYDRAULIC EXHIBIT



EXCERPT E FOOTHILL BLVD & BEECH AVENUE IMPROVEMENT PLANS

CITY OF FONTANA

BEECH AVENUE - FOOTHILL BLVD TO P.E. TRAIL STREET IMPROVEMENTS



PROJECT SITE

VICINITY MAP

NOT TO SCALE

GENERAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THESE PLANS, THE CITY OF FONTANA STANDARD PLANS, THE CONTRACT PROVISIONS AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION ("GREEN BOOK"). ALL REFERENCE SPECIFICATIONS AND STANDARDS SHALL BE THE LATEST EDITION UNLESS OTHERWISE NOTED.
2. WHEN A TECHNICAL CONFLICT IS FOUND TO EXIST IN THE CONTRACT DOCUMENTS THAT CANNOT BE RESOLVED BY REFERENCE TO PRECEDENCE PROVISIONS IN THE "GREEN BOOK", THE CONTRACTOR SHALL IMMEDIATELY REPORT SAID CONFLICT TO THE CITY ENGINEER FOR RESOLUTION.
3. ALL MATERIALS AND METHODS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.
4. CONSTRUCTION PERMITS SHALL BE OBTAINED FROM THE CITY OF FONTANA COMMUNITY DEVELOPMENT DEPARTMENT, ENGINEERING DIVISION PRIOR TO THE START OF ANY WORK. INSPECTION COORDINATION SHALL BE REQUESTED AT LEAST TWO WORKING DAYS PRIOR TO THE START OF ANY WORK IN PUBLIC RIGHT-OF-WAY WITHIN THE CITY LIMITS. CALL (909) 350-7610.
5. THE CONTRACTOR SHALL CONFORM TO ALL TRAFFIC CONTROL POLICIES, METHODS AND PROCEDURES DESCRIBED IN THE STATE OF CALIFORNIA MANUAL OF TRAFFIC CONTROLS, LATEST NON-METRIC EDITION UNLESS OTHERWISE DIRECTED BY THE CITY TRAFFIC ENGINEER.
6. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN BARRICADES, DELINEATORS OR OTHER TRAFFIC CONTROL DEVICES AT ALL TIMES.
7. THE CONTRACTOR SHALL OBTAIN A PERMIT TO PERFORM EXCAVATION OR TRENCH WORK FOR TRENCHES 5 FEET OR GREATER IN DEPTH FROM THE CALIFORNIA STATE DIVISION OF INDUSTRIAL SAFETY.
8. THE WALLS AND FACES OF ALL EXCAVATIONS GREATER THAN FIVE (5) FEET IN DEPTH SHALL BE GUARDED BY SHORING, SLOPING OF THE GROUND OR OTHER APPROVED MEANS PURSUANT TO THE REQUIREMENTS OF THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA. TRENCHES LESS THAN FIVE (5) FEET SHALL ALSO BE GUARDED WHEN THE POTENTIAL EXISTS FOR GROUND MOVEMENT.
9. NO MATERIAL OR EQUIPMENT SHALL BE STORED IN THE PUBLIC RIGHT OF WAY WITHOUT OBTAINING A SEPARATE PERMIT FOR THAT PURPOSE.
10. THE LOCATIONS OF UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION, HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE, IN THE FIELD, THE TRUE LOCATION AND ELEVATION OF ANY EXISTING UTILITIES, AND TO EXERCISE PROPER PRECAUTION TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT AT 1-800-227-2600 TWO WORKING DAYS BEFORE EXCAVATION.
11. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION WITH ALL UTILITY COMPANIES INCLUDING, BUT NOT LIMITED TO, GAS, TELEPHONE, ELECTRIC, CABLE TELEVISION, LANDSCAPING, LANDSCAPE IRRIGATION, DOMESTIC WATER, RECLAIMED WATER, SEWER, STORM DRAIN, FLOOD CONTROL AND CALTRANS. ALL UTILITY COMPANIES SHALL BE GIVEN TWO WORKING DAYS NOTICE PRIOR TO WORK AROUND THEIR FACILITIES.
12. THE CONTRACTOR SHALL NOT OPERATE ANY FIRE HYDRANT OR WATER MAIN VALVES WITHOUT APPROPRIATE AGENCY AUTHORIZATION. CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE WATER COMPANY FOR AGENCY AUTHORIZATION. CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE WATER COMPANY FOR VALVE OPERATION AND WATER REQUIREMENTS.
13. CURVE DATA REFERS TO THE FACE OF CURB.
14. STATIONING REFERS TO THE CENTERLINE OF STREETS EXCEPT WHERE OTHERWISE NOTED.
15. ADEQUATE CONSTRUCTION CONTROL STAKES SHALL BE SET BY THE ENGINEER TO ENABLE THE CONTRACTOR TO CONSTRUCT THE WORK TO THE PLAN GRADES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF BENCHMARKS AND CONSTRUCTION CONTROL STAKING DURING CONSTRUCTION.
16. THE CONTRACTOR SHALL NOT DISTURB EXISTING SURVEY MONUMENTS, MONUMENT TIES OR BENCH MARKS WITHOUT PRIOR NOTIFICATION TO THE CITY ENGINEER.
17. REMOVAL AND REPLACEMENT OF EXISTING SURVEY CONTROL, INCLUDING SURVEY MONUMENTS, MONUMENT TIES AND BENCHMARKS, SHALL BE DONE BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR. SURVEY MONUMENTS THAT WILL BE DESTROYED AS A RESULT OF THIS CONSTRUCTION SHALL BE REPLACED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER ONE WEEK PRIOR TO CONSTRUCTION SO THAT TIES TO MONUMENTS CAN BE ESTABLISHED FOR LATER REPLACEMENT OF THE MONUMENT.
18. THE CONTRACTOR SHALL MAINTAIN ACCESS FOR LOCAL RESIDENTS AND BUSINESSES AT ALL TIMES. A MINIMUM 12-FOOT LANE SHALL BE MAINTAINED AT ALL TIMES IN THE CONSTRUCTION AREA FOR RESIDENTS AND EMERGENCY VEHICLES.
19. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AN EFFECTIVE MEANS OF DUST CONTROL, INCLUDING ADEQUATE WATERING, AT ALL TIMES.
20. ALL GRADING OPERATIONS SHALL BE DISCONTINUED WHEN SUSTAINED WIND VELOCITIES EXCEED 25 MILES PER HOUR.
21. THE CONTRACTOR SHALL NOT CAUSE ANY EXCAVATED MATERIAL, MUD, SILT OR DEBRIS TO BE DEPOSITED ONTO PUBLIC OR PRIVATE PROPERTY ADJACENT TO THE RIGHT OF WAY DURING CONSTRUCTION WITHOUT PRIOR WRITTEN APPROVAL.
22. NO TRENCH BACKFILL SHALL TAKE PLACE WITHOUT PRIOR APPROVAL OF THE CITY INSPECTOR.
23. A GEOTECHNICAL ENGINEER SHALL CERTIFY ALL BACKFILL COMPACTION. FAILURE TO OBTAIN THE REQUIRED DENSITY SHALL REQUIRE RE-WORKING OF THAT PORTION OF THE WORK UNTIL THE SPECIFIED DENSITY IS OBTAINED.
24. CARE SHOULD BE TAKEN TO PREVENT GRADES, DITCHES, AND SWALES FROM UNDERMINING STREET IMPROVEMENTS. UPON INSPECTION OF THE SITE, THE CITY ENGINEER MAY REQUIRE TEMPORARY NON-ERODEABLE SWALES ENTERING OR LEAVING IMPROVEMENTS.
25. THE FINAL LOCATION AND WIDTH OF DRIVEWAY APPROACH APRONS SHALL BE APPROVED AT THE TIME OF CONSTRUCTION AND SHALL CONFORM TO THE CITY OF FONTANA STANDARD DETAILS.
26. ALL EXPOSED CONCRETE SURFACES SHALL CONFORM IN GRADE, COLOR AND FINISH TO MATCH EXISTING CONCRETE.
27. THE SEWER CONTRACTOR SHALL STAMP "S" IN THE FACE OF THE CURB AT THE LOCATION OF THE AN SEWER LATERAL.
28. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACED, INSPECTED AND APPROVED.
29. ALL UNDERGROUND UTILITIES SHALL BE INSTALLED, TESTED AND APPROVED PRIOR TO PAVING OF STREETS.
30. APPROVED SOIL STERILANT IS REQUIRED UNDER ALL NEW ASPHALT PAVEMENT PRIOR TO PLACEMENT.

CONT. GENERAL NOTES:

31. PAVEMENT STRUCTURAL SECTIONS SHOWN ARE MINIMUM AND SUBJECT TO REVISION AND APPROVAL OF THE CITY ENGINEER AS DETERMINED BY SOILS TESTS TAKEN AFTER COMPLETION OF ROUGH GRADING.
32. ACTUAL THICKNESS OF A.C. PAVEMENT AND/OR BASE COURSE MATERIAL FOR STRUCTURAL STREET SECTIONS SHALL BE RECOMMENDED BY A GEOTECHNICAL REPORT AND SUBMITTED TO THE CITY OF FONTANA FOR APPROVAL UPON COMPLETION OF ROUGH GRADING.
33. ALL MANHOLES, CLEANOUT FRAMES, COVERS AND VALVE BOXES SHALL BE RAISED TO FINISHED GRADE BY THE PAVING CONTRACTOR UPON COMPLETION OF PAVING.
34. UPON COMPLETION OF CONSTRUCTION, CONTRACTOR SHALL RESTORE ALL SIGNING, STRIPING, BARRICADES, AND OTHER TRAFFIC CONTROL DEVICES TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
35. CONTRACTOR SHALL RELOCATE AND/OR REPLACE LANDSCAPING, SPRINKLERS AND SIDEWALKS AFFECTED BY THE CONSTRUCTION TO THE SATISFACTION OF THE CITY ENGINEER.
36. AS-BUILT DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER OF RECORD, WHO SHALL PROVIDE RECORD DRAWINGS TO THE CITY ENGINEER.

CONSTRUCTION NOTES AND QUANTITIES

		QTY
1	REMOVE EXISTING CURB, GUTTER, SIDEWALK, PCC PAVEMENT, FENCE, DRAINAGE GRATE INLET, INLET STRUCTURE, AND BUILDING.	LS
2	REMOVAL LIMIT. SAWCUT CONCRETE, ASPHALT, AND OTHER HARDSCAPE SURFACE AND REMOVE TO THE LIMITS SHOWN ON THIS PLAN. ALL REMOVALS SHALL BE DISPOSED OF BY THE CONTRACTOR, UNDER CLEARING AND GRUBBING.	LS
3	CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1003 OVER 12" MIN 95% COMPACTED NATIVE.	3 EA
4	CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1004 OVER 12" MIN 95% COMPACTED NATIVE.	1 EA
5	CONSTRUCT 8" CURB AND GUTTER OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000. VARY CURB TO MATCH CURB RAMP AND DRIVEWAYS.	3240 LF
6	CONSTRUCT 6.5" MIN AC PAVEMENT OVER 12" OF 95% COMPACTED NATIVE SUBGRADE PER CITY STD 400.	129,300 SF 5,250 TON
7	CONSTRUCT 4" THICK P.C.C. SIDEWALK OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1006.	15,700 SF
8	RELOCATE EXISTING FIRE HYDRANT.	1 EA
9	RELOCATE EXISTING UTILITY. (BY OTHERS)	N/A
10	REMOVE MAIL BOX AND POST. (TYP)	2 EA
11	INSTALL CHAIN LINK FENCE PER APWA STANDARD PLAN NO. 600-3.	570 LF
12	CONSTRUCT 6" THICK P.C.C. TRAIL TRANSITION OVER 12" MIN 95% COMPACTED NATIVE.	600 SF
13	RELOCATE EXISTING BOLLARDS.	1 LS
14	ADJUST UTILITY TO GRADE.	22 EA
15	CONSTRUCT 6" CURB OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000.	2,700 LF
16	CONSTRUCT LOCAL DEPRESSION PER CITY STD 3003 (CASE=C)	5 EA
17	CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STANDARD PLAN NO. 3004, W & V AS SHOWN ON PLANS, "V" SHALL MATCH PIPE INVERT ELEVATION. SEE STORM DRAIN PROFILE ON SHEET 6.	5 EA
18	REMOVE EXISTING TREE AND ROOTS.	3 EA
19	PROTECT IN PLACE.	N/A
20	GRIND AND OVERLAY EXISTING PAVEMENT WITH 0.10' AC MIN PER DETAIL "1" ON SHEET 2.	12,500 SF 94 TON
21	RELOCATE EXISTING LUMINARIE AND EQUIPMENT.	1 LS
22	CONSTRUCT 8" ASPHALT CONCRETE DIKE PER CITY OF FONTANA STANDARD PLAN NO. 1007.	725 LF
23	RELOCATE EXISTING FENCE.	210 LF
24	CONSTRUCT CURB RAMP PER CITY OF FONTANA MODIFIED STANDARD PLAN NO. 1003 OVER 12" MIN 95% COMPACTED NATIVE. SEE DETAILS "A" AND "B".	2 EA
25	CONSTRUCT 6" THICK P.C.C. DRIVEWAY OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1002.	340 SF
26	INSTALL GREEN REMOVABLE BOLLARDS SPACED 5' APART.	6 EA
27	REMOVE EXISTING LANDSCAPING / IRRIGATION AND REPLACE IN KIND.	LS
28	CONSTRUCT 24" REINFORCED CONCRETE PIPE.	185 LF
29	CONSTRUCT JUNCTION STRUCTURE PER CITY OF FONTANA STANDARD PLAN NO. 3011.	3 EA
30	RELOCATE EXISTING BACKFLOW AND EQUIPMENT.	1 LS
31	CONSTRUCT 6" THICK P.C.C. DRIVEWAY OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1001.	150 SF

DATUM STATEMENT

VERTICAL CONTROL
"ELEVATIONS SHOWN HEREON ARE IN TERMS WITH THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) BASED LOCALLY UPON THE FOLLOWING BENCHMARKS IN THE CITY OF FONTANA."

BENCHMARK NO.	ELEVATION
FONTANA #508	1342.37'

THESE PLANS ARE BASED UPON A SURVEY CONDUCTED ON MAY 25-30, 2016 BY RMD SURVEYING CORPORATION, RIALTO, CALIFORNIA

INDEX OF SHEETS:

UNDERGROUND SERVICE ALERT (USA)

IT'S THE LAW! DIAL BEFORE YOU DIG!

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

DIGALERT

811 Know what's below. Call before you dig.

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37

DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

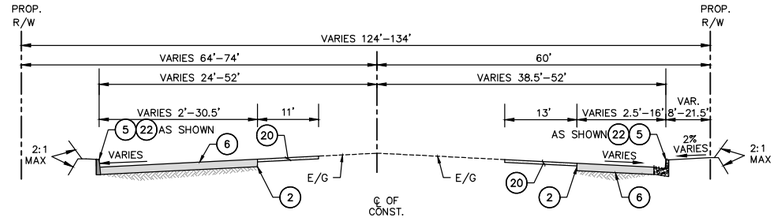
Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA

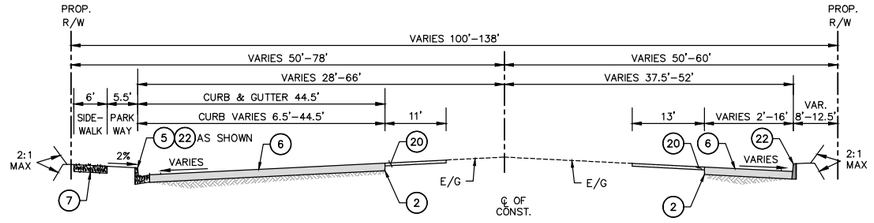
TITLE SHEET

DRAWN BY: DA	BEECH AVENUE (FOOTHILL BLVD TO P.E. TRAIL)	SCALE: As Noted
DESIGNED BY: AO		DATE:
CHECKED BY: MG	APPROVED BY: CITY ENGINEER DATE: R.C.E. 51152	DRAWING NO.: 5645 1/6



FOOTHILL BLVD

STA: 17+32.54 TO STA: 19+33.00



FOOTHILL BLVD

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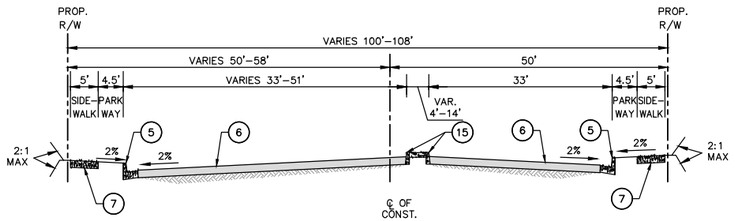
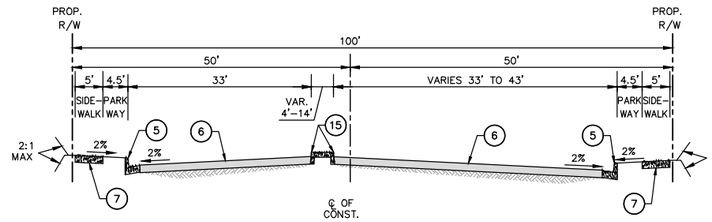


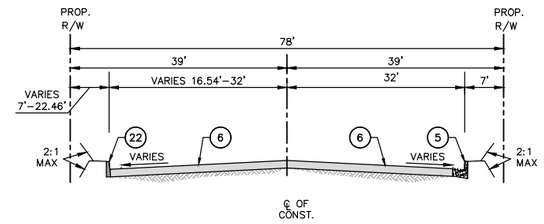
BEECH AVE

STA: 10+86.49 TO STA: 13+98.38



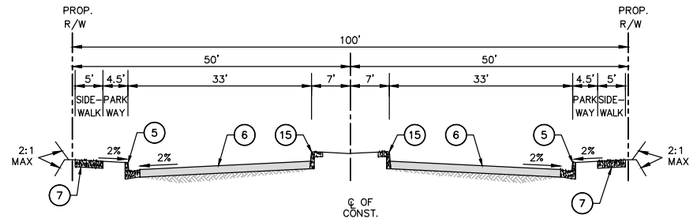
BEECH AVE

STA: 22+21.25 TO STA: 24+16.22



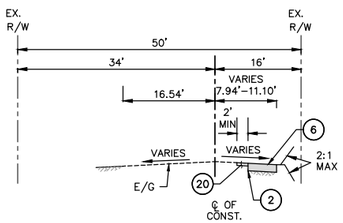
BEECH AVE

STA: 7+58.43 TO STA: 9+13.00



BEECH AVE

STA: 13+98.38 TO STA: 22+21.25



BEECH AVE

STA: 5+87.65 TO STA: 6+67.72

CONSTRUCTION NOTES

(2) REMOVAL LIMIT. SAWCUT CONCRETE, ASPHALT, AND OTHER HARDSCAPE SURFACE AND REMOVE TO THE LIMITS SHOWN ON THIS PLAN. ALL REMOVALS SHALL BE DISPOSED OF BY THE CONTRACTOR, UNDER CLEARING AND GRUBBING.

(5) CONSTRUCT 8" CURB AND GUTTER OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000. VARY CURB TO MATCH CURB RAMP AND DRIVEWAYS.

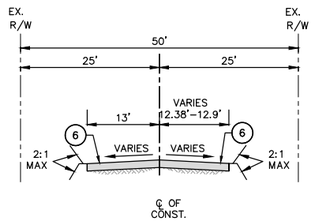
(6) CONSTRUCT 6.5" MIN AC PAVEMENT OVER 12" OF 95% COMPACTED NATIVE SUBGRADE PER CITY STD 400.

(7) CONSTRUCT 4" THICK P.C.C. SIDEWALK OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1006.

(15) CONSTRUCT 6" CURB OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000.

(20) GRIND AND OVERLAY EXISTING PAVEMENT WITH 0.10' AC MIN PER DETAIL "1".

(22) CONSTRUCT 8" ASPHALT CONCRETE DIKE PER CITY OF FONTANA STANDARD PLAN NO. 1007.



MUSCAT AVE

TYPICAL SECTION

LEGEND:

- PROPOSED GRIND AND OVERLAY
- CONSTRUCT P.C.C. SIDEWALK
- CONSTRUCT A.C PAVEMENT
- EXISTING RIGHT–OF–WAY
- PROPOSED RIGHT–OF–WAY
- CITY BOUNDARY
- EXISTING SIDEWALK
- REMOVE EXISTING SIDEWALK
- PROPOSED SIDEWALK
- EXISTING CHAINLINK FENCE
- REMOVE EXISTING CHAINLINK FENCE
- PROPOSED CHAINLINK FENCE
- EXISTING WALL
- REMOVE EXISTING WALL
- EXISTING CURB & GUTTER
- REMOVE EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING GAS LINE
- EXISTING WATER LINE
- EXISTING TELEPHONE LINE
- EXISTING OVERHEAD ELECTRIC
- EXISTING SEWER LINE
- EXISTING STORM DRAIN LINE
- EXISTING EDGE OF PAVEMENT
- REMOVE EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EX. TREES/LANDSCAPE
- EX. STREET LIGHT
- EX. SANITARY SEWER MANHOLE
- EX. WATER METER
- EX. SEWER METER
- EX. WATER VALVE
- EX. MAILBOX
- EX. FIRE HYDRANT
- EX. POWER POLE
- EX. STREET SIGN
- REMOVE TREES/LANDSCAPE
- REMOVE STREET LIGHT
- REMOVE POWER POLE
- REMOVE TELEPHONE PEDESTAL
- REMOVE MAIL BOX
- PROPOSED MAIL BOX
- PROPOSED STREET SIGN
- PROPOSED DETECTABLE WARNING SURFACES
- PROP. CURB RAMP STANDARD PLAN 1003.
- PROP. CURB RAMP STANDARD PLAN 1004.
- PROP. DRIVEWAY PER CITY OF FONTANA STD. NO. 1002.

UNDERGROUND SERVICE ALERT (USA)

IT'S THE LAW! DIAL BEFORE YOU DIG!

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

Know what's below. Call before you dig.

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER — MING GUAN — No. 75793 — EXP. 6/30/18 — CIVIL — STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37

DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA

CROSS SECTIONS

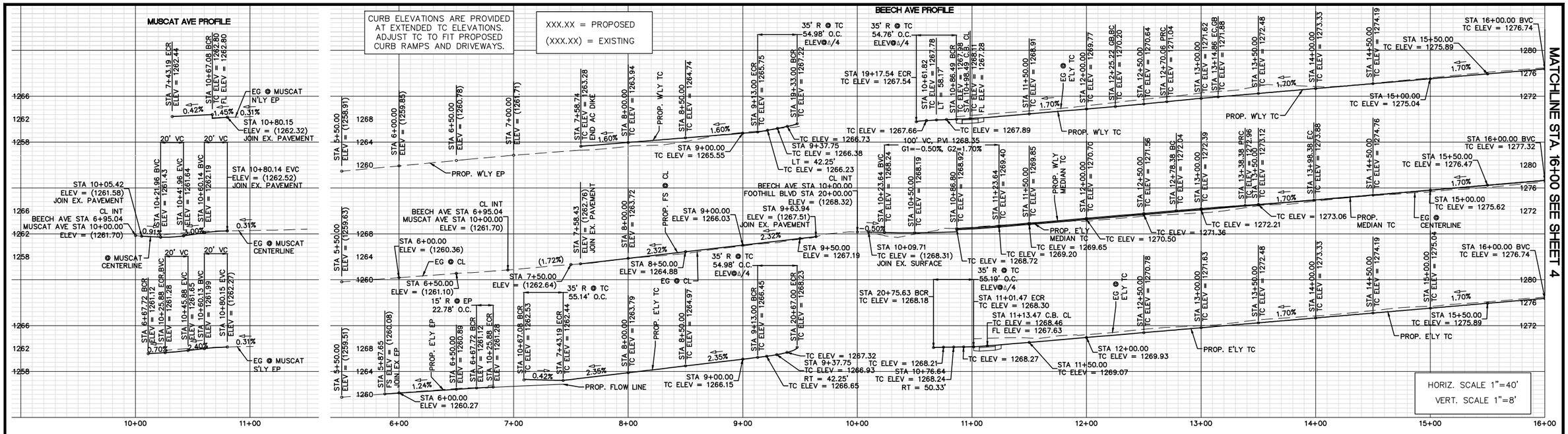
DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

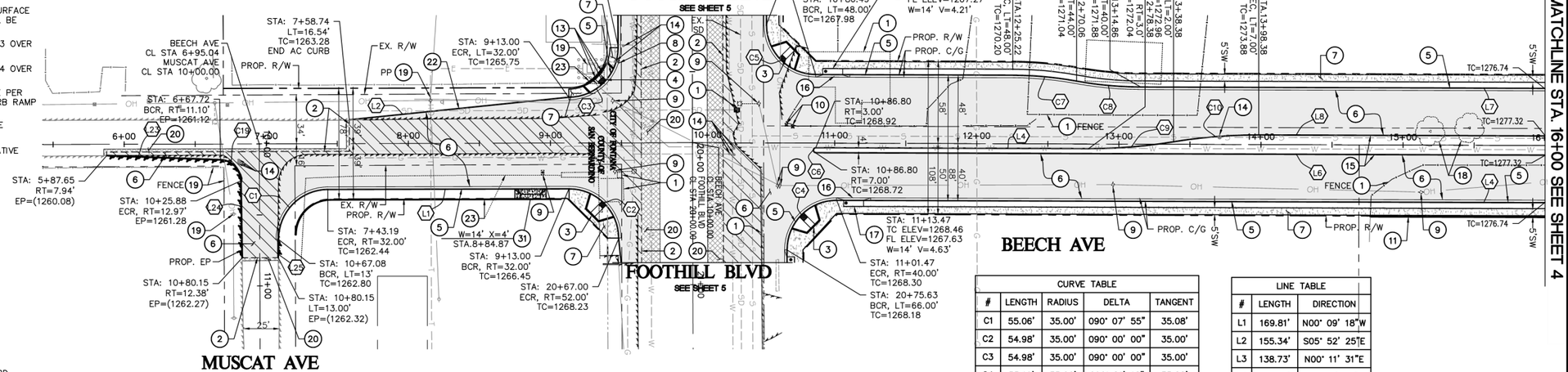
BEECH AVENUE (FOOTHILL BLVD TO P.E. TRAIL)

APPROVED BY:

CITY ENGINEER DATE: R.C.E. 51152

SCALE: As Noted
DATE:
DRAWING NO.: 5645 2/6





CONSTRUCTION NOTES

1. REMOVE EXISTING CURB, GUTTER, SIDEWALK, PCC PAVEMENT, FENCE, DRAINAGE GRATE INLET, INLET STRUCTURE, AND BUILDING.
2. REMOVAL LIMIT. SAWCUT CONCRETE, ASPHALT, AND OTHER HARDSCAPE SURFACE AND REMOVE TO THE LIMITS SHOWN ON THIS PLAN. ALL REMOVALS SHALL BE DISPOSED OF BY THE CONTRACTOR, UNDER CLEARING AND GRUBBING.
3. CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1003 OVER 12" MIN 95% COMPACTED NATIVE.
4. CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1004 OVER 12" MIN 95% COMPACTED NATIVE.
5. CONSTRUCT 8" CURB AND GUTTER OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000. VARY CURB TO MATCH CURB RAMP AND DRIVEWAYS.
6. CONSTRUCT 6.5" MIN AC PAVEMENT OVER 12" OF 95% COMPACTED NATIVE SUBGRADE PER CITY STD 400.
7. CONSTRUCT 4" THICK P.C.C. SIDEWALK OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1006.
8. RELOCATE EXISTING FIRE HYDRANT.
9. RELOCATE EXISTING UTILITY. (BY OTHERS)
10. REMOVE MAIL BOX AND POST. (TYP)
11. INSTALL CHAIN LINK FENCE PER APWA STANDARD PLAN NO. 600-3.
13. RELOCATE EXISTING BOLLARDS.
14. ADJUST UTILITY TO GRADE.
15. CONSTRUCT 6" CURB OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000.
16. CONSTRUCT LOCAL DEPRESSION PER CITY STD 3003 (CASE=C)
17. CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STANDARD PLAN NO. 3004, W & V AS SHOWN ON PLANS, "V" SHALL MATCH PIPE INVERT ELEVATION. SEE STORM DRAIN PROFILE ON SHEET 6.
18. REMOVE EXISTING TREE AND ROOTS.
19. PROTECT IN PLACE.
20. GRIND AND OVERLAY EXISTING PAVEMENT WITH 0.10' AC MIN PER DETAIL "1" ON SHEET 2.
22. CONSTRUCT 8" ASPHALT CONCRETE DIKE PER CITY OF FONTANA STANDARD PLAN NO. 1007.
23. RELOCATE EXISTING FENCE.
31. CONSTRUCT 6" THICK P.C.C. DRIVEWAY OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1001.

LEGEND:

- CONSTRUCT P.C.C. SIDEWALK
- CONSTRUCT A.C PAVEMENT
- PROPOSED GRIND AND OVERLAY
- REMOVE EXISTING PAVEMENT

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLAN CHECK COMPLETED

NAME DATE

CURVE TABLE				
#	LENGTH	RADIUS	DELTA	TANGENT
C1	55.06'	35.00'	090° 07' 55"	35.08'
C2	54.98'	35.00'	090° 00' 00"	35.00'
C3	54.98'	35.00'	090° 00' 00"	35.00'
C4	55.19'	35.00'	090° 21' 18"	35.22'
C5	54.76'	35.00'	089° 38' 42"	34.78'
C6	6.28'	2.00'	180° 00' 00"	INFINITY'
C7	45.06'	253.12'	010° 11' 58"	22.59'
C8	45.06'	253.12'	010° 11' 58"	22.59'
C9	60.28'	362.50'	009° 31' 39"	30.21'
C10	60.28'	362.50'	009° 31' 39"	30.21'
C19	22.78'	15.00'	087° 01' 45"	14.24'

LINE TABLE		
#	LENGTH	DIRECTION
L1	169.81'	N00° 09' 18"W
L2	155.34'	S05° 52' 25"E
L3	138.73'	N00° 11' 31"E
L4	191.58'	S00° 11' 32"W
L5	1309.74'	S00° 11' 31"W
L6	1134.43'	N00° 11' 31"E
L7	1101.35'	N00° 11' 31"E
L8	1010.83'	S00° 11' 31"W
L23	80.13'	S02° 06' 02"W
L24	54.27'	S89° 05' 37"W
L25	13.07'	N89° 51' 12"E

North
0 40 80
SCALE 1"=40'

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REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

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REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37
DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :
Date :
MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA
STREET IMPROVEMENTS PLAN

DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG
APPROVED BY:
CITY ENGINEER DATE: R.C.E. 51152

BEECH AVENUE
(FOOTHILL BLVD TO P.E. TRAIL)

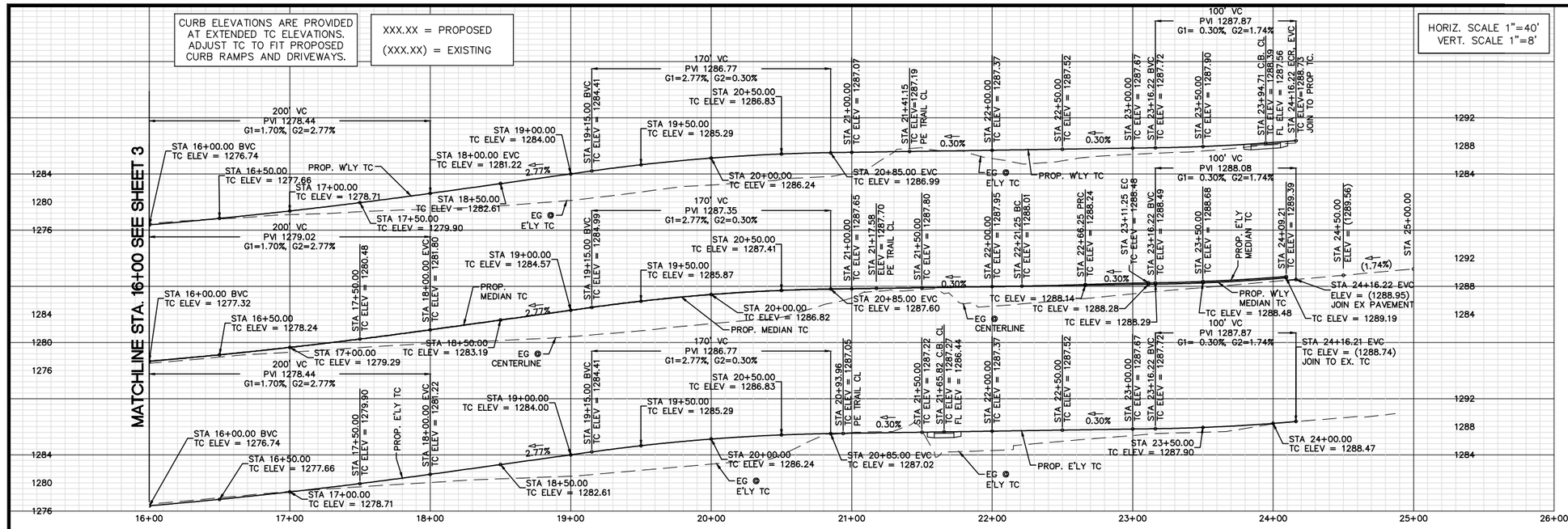
SCALE: As Noted
DATE:
DRAWING NO.: 5645 3/6

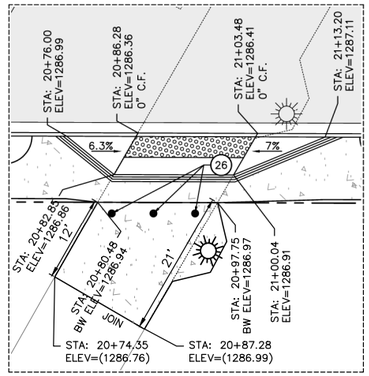
CURB ELEVATIONS ARE PROVIDED AT EXTENDED TC ELEVATIONS. ADJUST TC TO FIT PROPOSED CURB RAMPS AND DRIVEWAYS.

XXX.XX = PROPOSED

(XXX.XX) = EXISTING

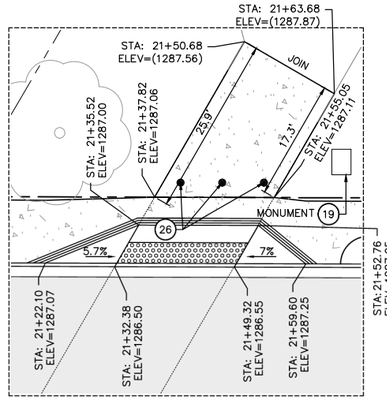
HORIZ. SCALE 1"=40'
VERT. SCALE 1"=8'





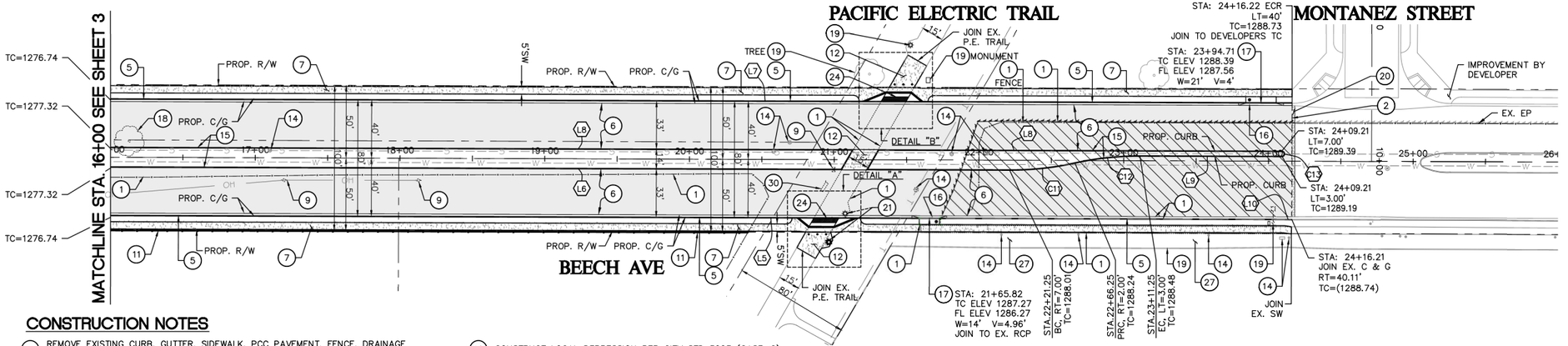
DETAIL "A"

NOT TO SCALE



DETAIL "B"

NOT TO SCALE



CONSTRUCTION NOTES

1. REMOVE EXISTING CURB, GUTTER, SIDEWALK, PCC PAVEMENT, FENCE, DRAINAGE GRATE INLET, AND EXISTING DRAINAGE INLET.
2. REMOVAL LIMIT. SAWCUT CONCRETE, ASPHALT, AND OTHER HARDSCAPE SURFACE AND REMOVE TO THE LIMITS SHOWN ON THIS PLAN. ALL REMOVALS SHALL BE DISPOSED OF BY THE CONTRACTOR, UNDER CLEARING AND GRUBBING.
5. CONSTRUCT 8" CURB AND GUTTER OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000. VARY CURB TO MATCH CURB RAMP AND DRIVEWAYS.
6. CONSTRUCT 6.5" MIN AC PAVEMENT OVER 12" OF 95% COMPACTED NATIVE SUBGRADE PER CITY STD 400.
7. CONSTRUCT 4" THICK P.C.C. SIDEWALK OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1006.
9. RELOCATE EXISTING UTILITY. (BY OTHERS)
11. INSTALL CHAIN LINK FENCE PER APWA STANDARD PLAN NO. 600-3.
12. CONSTRUCT 6" THICK P.C.C. TRAIL TRANSITION OVER 12" MIN 95% COMPACTED NATIVE.
14. ADJUST UTILITY TO GRADE.
15. CONSTRUCT 6" CURB OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000.
16. CONSTRUCT LOCAL DEPRESSION PER CITY STD 3003 (CASE=C)
17. CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STANDARD PLAN NO. 3004. W & V SHOWN ON PLANS. "V" SHALL MATCH PIPE INVERT ELEVATION. SEE STORM DRAIN PROFILE ON SHEET 6.
18. REMOVE EXISTING TREE AND ROOTS.
19. PROTECT IN PLACE.
20. GRIND AND OVERLAY EXISTING PAVEMENT WITH 0.10' AC MIN PER DETAIL "1" ON SHEET 2.
21. RELOCATE EXISTING LUMINARIE AND EQUIPMENT.
24. CONSTRUCT CURB RAMP PER CITY OF FONTANA MODIFIED STANDARD PLAN NO. 1003 OVER 12" MIN 95% COMPACTED NATIVE. SEE DETAILS "A" AND "B".
26. INSTALL GREEN REMOVABLE BOLLARDS SPACED 5' APART.
27. REMOVE EXISTING LANDSCAPING / IRRIGATION AND REPLACE IN KIND.
30. RELOCATE EXISTING BACKFLOW AND EQUIPMENT.

CURVE TABLE				
#	LENGTH	RADIUS	DELTA	TANGENT
C11	45.37'	205.00'	012° 40' 49"	22.78'
C12	45.37'	205.00'	012° 40' 49"	22.78'
C13	6.28'	2.00'	180° 00' 00"	INFINITY'

LINE TABLE		
#	LENGTH	DIRECTION
L5	1309.74'	S00° 11' 31"W
L6	1134.43'	N00° 11' 31"E
L7	1101.35'	N00° 11' 31"E
L8	1010.83'	S00° 11' 31"W
L9	97.98'	N00° 11' 31"E
L10	5.00'	S01° 31' 37"W

LEGEND:

- CONSTRUCT P.C.C. SIDEWALK
- CONSTRUCT A.C PAVEMENT
- PROPOSED GRIND AND OVERLAY
- REMOVE EXISTING PAVEMENT

North

0 40 80

SCALE 1"=40'

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REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37

DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA

STREET IMPROVEMENTS PLAN

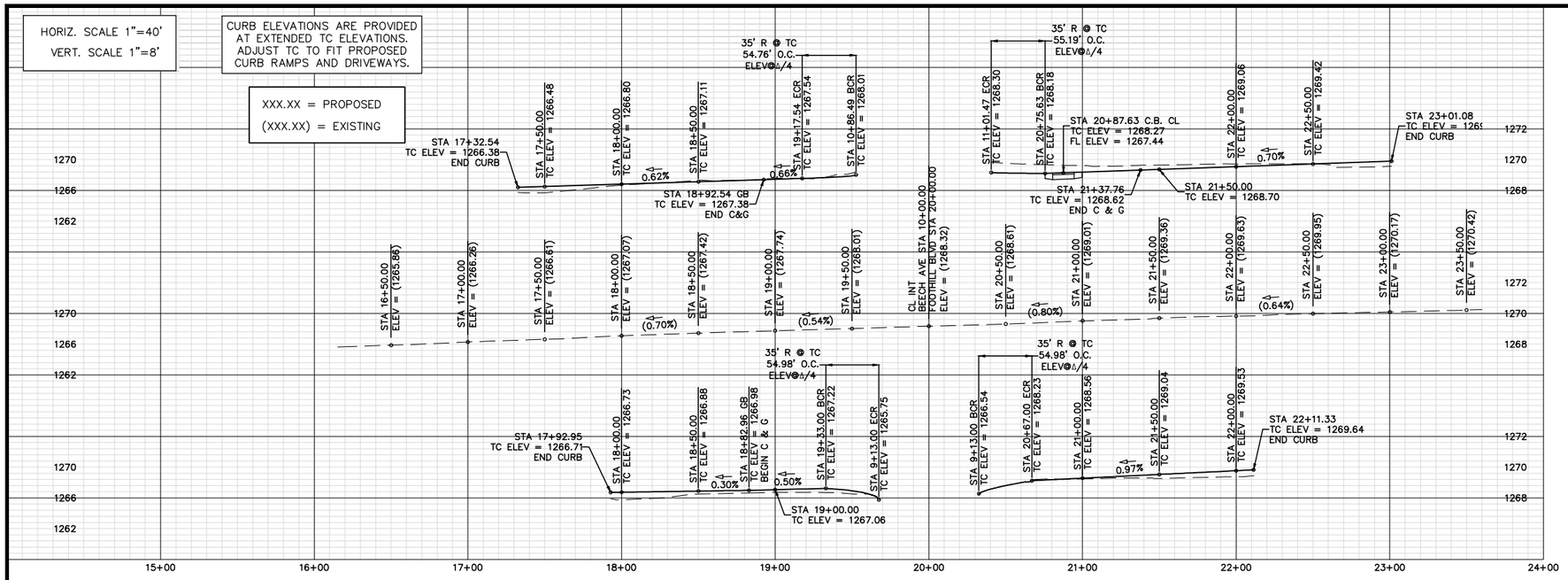
DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

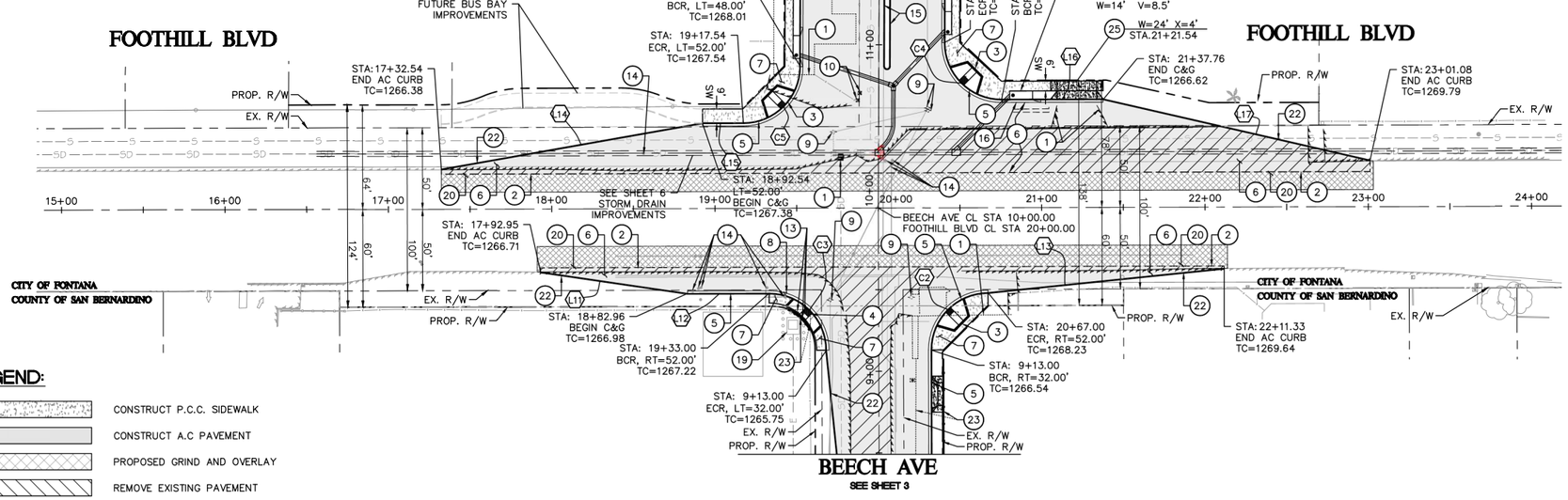
BEECH AVENUE (FOOTHILL BLVD TO P.E. TRAIL)

APPROVED BY:

CITY ENGINEER R.C.E. 51152 DATE:

SCALE: As Noted
DATE:
DRAWING NO.: 5645 4/6





CONSTRUCTION NOTES

1. REMOVE EXISTING CURB, GUTTER, SIDEWALK, PCC PAVEMENT, FENCE, DRAINAGE GRATE INLET, INLET STRUCTURE, AND BUILDING.
2. REMOVAL LIMIT. SAWCUT CONCRETE, ASPHALT, AND OTHER HARDSCAPE SURFACE AND REMOVE TO THE LIMITS SHOWN ON THIS PLAN. ALL REMOVALS SHALL BE DISPOSED OF BY THE CONTRACTOR, UNDER CLEARING AND GRUBBING.
3. CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1003 OVER 12" MIN 95% COMPACTED NATIVE.
4. CONSTRUCT CURB RAMP PER CITY OF FONTANA STANDARD PLAN NO. 1004 OVER 12" MIN 95% COMPACTED NATIVE.
5. CONSTRUCT 8" CURB AND GUTTER OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000. VARY CURB TO MATCH CURB RAMP AND DRIVEWAYS.
6. CONSTRUCT 6.5" MIN AC PAVEMENT OVER 12" OF 95% COMPACTED NATIVE SUBGRADE PER CITY STD 400.
7. CONSTRUCT 4" THICK P.C.C. SIDEWALK OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1006.
8. RELOCATE EXISTING FIRE HYDRANT.
9. RELOCATE EXISTING UTILITY. (BY OTHERS)
10. REMOVE MAIL BOX AND POST. (TYP)
13. RELOCATE EXISTING BOLLARDS.
14. ADJUST UTILITY TO GRADE.
15. CONSTRUCT 6" CURB OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1000.
16. CONSTRUCT LOCAL DEPRESSION PER CITY STD. 3003 (CASE=C).
17. CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STANDARD PLAN NO. 3004. W & V SHOWN ON PLANS. "V" SHALL MATCH PIPE INVERT ELEVATION. SEE STORM DRAIN PROFILE ON SHEET 6.
19. PROTECT IN PLACE.
20. GRIND AND OVERLAY EXISTING PAVEMENT WITH 0.10' AC MIN PER DETAIL "1" ON SHEET 2.
22. CONSTRUCT 8" ASPHALT CONCRETE DIKE PER CITY OF FONTANA STANDARD PLAN NO. 1007.
23. RELOCATE EXISTING FENCE.
25. CONSTRUCT 6" THICK P.C.C. DRIVEWAY OVER 12" MIN 95% COMPACTED NATIVE PER CITY OF FONTANA STANDARD PLAN NO. 1002.

CURVE TABLE				
#	LENGTH	RADIUS	DELTA	TANGENT
C2	54.98'	35.00'	090° 00' 00"	35.00'
C3	54.98'	35.00'	090° 00' 00"	35.00'
C4	55.19'	35.00'	090° 21' 18"	35.22'
C5	54.76'	35.00'	089° 38' 42"	34.78'

LINE TABLE		
#	LENGTH	DIRECTION
L11	90.97'	N81° 40' 55"W
L12	50.00'	S89° 50' 13"W
L13	145.35'	S84° 07' 35"W
L14	162.41'	N79° 57' 34"E
L15	25.00'	N89° 50' 13"E
L16	62.13'	N89° 50' 13"E
L17	167.71'	S77° 05' 12"E

LEGEND:

- CONSTRUCT P.C.C. SIDEWALK
- CONSTRUCT A.C PAVEMENT
- PROPOSED GRIND AND OVERLAY
- REMOVE EXISTING PAVEMENT

North

0 40 80

SCALE 1"=40'

UNDERGROUND SERVICE ALERT (USA)

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DIGALERT

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REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

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REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37

DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA

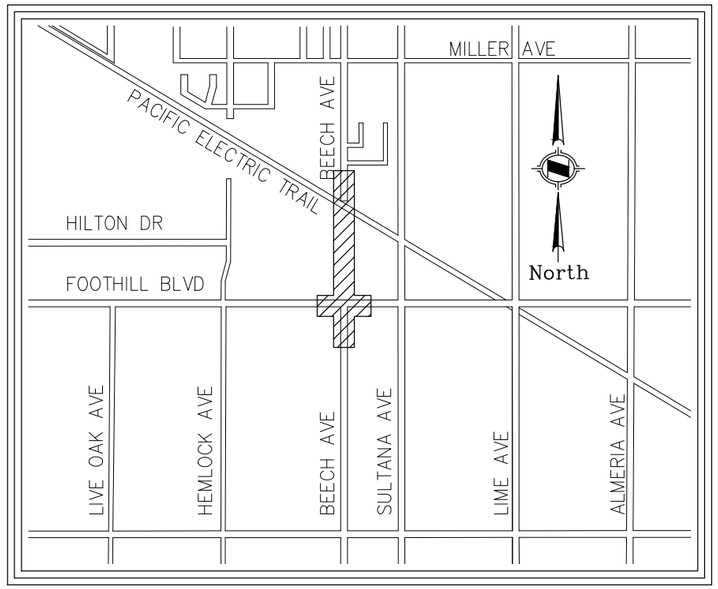
STREET IMPROVEMENTS PLAN

BEECH AVENUE (FOOTHILL BLVD TO P.E. TRAIL)

DRAWN BY:	DA
DESIGNED BY:	AO
CHECKED BY:	MG
APPROVED BY:	
CITY ENGINEER	DATE: R.C.E. 51152
SCALE:	As Noted
DATE:	
DRAWING NO.:	5645
	5 / 6

CITY OF FONTANA

FOOTHILL BOULEVARD AND BEECH AVENUE
SIGNING AND STRIPING



PROJECT SITE

VICINITY MAP
NOT TO SCALE

SIGNING AND STRIPING GENERAL NOTES

1. CONSTRUCTION PERMITS SHALL BE OBTAINED FROM THE CITY OF FONTANA DEPARTMENT OF ENGINEERING PRIOR TO THE START OF ANY WORK. INSPECTION COORDINATION SHALL BE REQUESTED AT LEAST TWO WORKING DAYS PRIOR TO THE START OF ANY WORK IN PUBLIC RIGHT-OF-WAY WITHIN THE CITY LIMITS. CALL (909) 350-7610.
2. ALL WORK, MATERIALS, EQUIPMENT AND TEMPORARY TRAFFIC CONTROL SHALL CONFORM TO THESE PLANS, THE CITY OF FONTANA STANDARD SPECIFICATIONS, THE STANDARD PLANS AND SPECIFICATIONS OF THE STATE OF CALIFORNIA, DATED 2015, AND THE CALIFORNIA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, DATED 2014.
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN TEMPORARY TRAFFIC CONTROL AT ALL TIMES.
4. ALL SIGNS SHALL BE INSTALLED PER CITY DESIGN STANDARD 4003, UNLESS OTHERWISE SHOWN ON THE PLANS.
5. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE ALKYD THERMOPLASTIC UNLESS OTHERWISE NOTED.
6. SUBSTITUTE TYPE "C" RAISED PAVEMENT MARKERS FOR TYPE "G" MARKERS ON DETAIL 38 STRIPING ON ROADWAYS WITH RAISED MEDIANS.
7. STRIPING AND PAVEMENT MARKINGS TO BE REMOVED SHALL BE REMOVED BY SANDBLASTING.
8. CONTROL POINTS OR "CAT TRACKING" SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO APPLICATION OF PAVEMENT STRIPING AND LEGENDS. NOTIFY THE CITY AT LEAST TWO DAYS PRIOR FOR APPROVAL OF "CAT TRACKING."
9. BLUE RAISED PAVEMENT MARKERS SHALL BE INSTALLED AT ALL FIRE HYDRANT LOCATIONS PER CITY STANDARD PLANS.
10. AS-BUILT DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER OF RECORD, WHO SHALL PROVIDE RECORD DRAWINGS AND ELECTRONIC AUTOCAD FILES TO THE CITY ENGINEER.

TRAFFIC CONTROL GENERAL NOTES

1. ALL SIGNING, STRIPING AND PAVEMENT MARKINGS SHALL BE IN CONFORMANCE WITH THE CALIFORNIA MUTCD LATEST EDITION.
2. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE PAINTED IN CONFORMANCE WITH THE CALTRANS STANDARD PLANS, DATED 2015.
3. ALL STRIPING (LONG LINE) AND PAVEMENT MARKINGS SHALL BE RETROREFLECTIVE PAINT.
4. ALL SIGNS SHALL BE OF HIGH INTENSITY (FHWA TYPE III/IV) RETROREFLECTIVE SHEETING EXCEPT:
   A. STOP SIGNS SHALL BE DIAMOND GRADE (FHWA TYPE VII IN RURAL SETTINGS AND TYPE IX IN URBAN SETTINGS) RETROREFLECTIVE SHEETING.
   B. "NO PARKING" SIGNS SHALL BE OF SUPER ENGINEERING GRADE (FHWA TYPE I I) RETRORETLECTIVE SHEETING.
   C. SCHOOL SIGNS SHALL BE OF DIAMOND GRADE (FHWA TYPE IX) FLUORESCENT YELLOW-GREEN (FYG) RETROREFLECTIVE SHEETING.
   D. STREET NAME MARKERS SHALL BE OF DIAMOND GRADE (FHWA TYPE IX) RETROREFLECTIVE SHEETING AND CONFORM TO COUNTY STANDARD 303.
   E. CONSTRUCTION SIGNS SHALL BE OF DIAMOND GRADE (FHWA TYPE IX) FLUORESCENT ORANGE RETROREFLECTIVE SHEETING.
5. ALL DELINEATORS, CHANNELIZERS, AND OBJECT MARKERS SHALL BE OFFHWA TYPE VII RETROREFLECTIVE SHEETING.
6. SIGNS SHALL BE MOUNTED ON METAL POSTS SIMILAR TO COUNTY STANDARDS 303(A) AND 303(B).
7. ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON PLANS SHALL BE REMOVED BY THE CONTRACTOR. REMOVAL SHALL BE ACCOMPLISHED BY SANDBLASTING, GRINDING, OR AS DIRECTED BY COUNTY REPRESENTATIVE.
8. ALL CONFLICTING SIGNS SHALL BE REMOVED, RELOCATED , OR COVERED BY THE CONTRACTOR. RELOCATABLE SIGNS SHALL BE INSTALLED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY COUNTY REPRESENTATIVE.
9. ALL UNPROTECTED LOCATIONS RESULTING IN ISOLATED ABRUPT DEPRESSIONS OR ELEVATED OBJECTS (I.E. CATCH BASINS, HEADWALLS, POWER POLES, END TREATMENT OF ASPHALT DIKES AND CONCRETE CURBS) SHALL BE PROTECTED BY DELINEATORS OR BARRIERS PER THE CALIFORNIA MUTCD LATEST EDITION.
10. ALL EXISTING SIGNING, STRIPING AND PAVEMENT MARKINGS (I.E. CROSS STREET STOP, STOP LIMIT LINE, AND CROSSWALK PAVEMENT MARKINGS) NOT SHOWN ON PLANS, IF REMOVED/OBLITERATED , SHALL BE REPLACED/RESTORED OF SAME KIND, AND IN CONFORMANCE WITH THE CALIFORNIA MUTCD LATEST EDITION.
11. THE CONTRACTOR SHALL NOTIFY COUNTY REPRESENTATIVE TO SCHEDULE A FINAL REVIEW (WALK THROUGH) WITH TRAFFIC DIVISION PERSONNEL FOR APPROVAL OF TRAFFIC CONTROL DEVICES PRIOR TO PROJECT ACCEPTANCE.

SIGNING AND STRIPING CONSTRUCTION NOTES

1. REMOVE CONFLICTING STRIPING/ MARKING BY SANDBLASTING.
2. REMOVE AND SALVAGE EXISTING SIGN AND POST TO THE CITY YARD IN A REUSABLE CONDITION.
3. INSTALL NEW ROADSIDE SIGN ON POST PER CITY DESIGN STANDARD 4003
4. APPLY WHITE 12" SOLID CROSSWALK AND/OR LIMIT LINE PER CALTRANS STD. PLAN A24E.
5. APPLY 4" DOUBLE YELLOW CENTERLINE PER CALTRANS STD. PLAN A20A, DETAIL. 22
6. APPLY 4" WHITE LANE DROP AT INTERSECTIONS LINE PER CALTRANS STD. PLAN A20C, DETAIL 37B.
7. APPLY 8" WHITE CHANNELIZING LINE PER CALTRANS STD. PLAN A20D, DETAIL 38.
8. APPLY WHITE "SIGNAL AHEAD" PAVEMENT WORD MARKING PER CALTRANS STD. PLAN NO. A24D.
9. APPLY 4" WHITE LANE LINE PER CALTRANS STD. PLAN A20A, DETAIL. 12
10. APPLY WHITE TYPE IV ARROW PER CALTRANS STD. PLAN A24A.
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15. RELOCATE EXISTING SIGNS PER THE CA MUTCD 2014 FIG. 2A-2(CA) FOR VERTICAL AND HORIZONTAL CLEARANCE OF SINGS.
16. APPLY 12" WHITE DIAGONAL STRIPES AS SHOWN 25' C-C.
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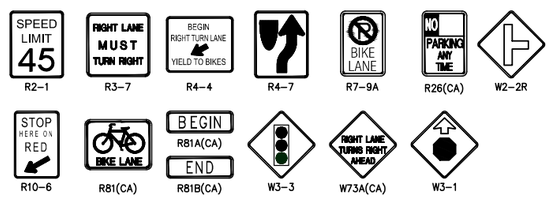
24. INSTALL NEW ROADSIDE SIGN ON POST PER COUNTY STANDARD 303(A) AND 303(B).
25. APPLY WHITE TYPE VII ARROW PER CALTRANS STD. PLAN A24A.

SIGN LEGEND:



LEGEND:

REMOVE	EXISTING	PROPOSED	
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		·	ROADSIDE SIGN
.....	———	———	TRAFFIC STRIPE OR MARKING

INDEX OF SHEETS:

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLAN CHECK COMPLETED

NAME _____ DATE _____

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REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37
DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

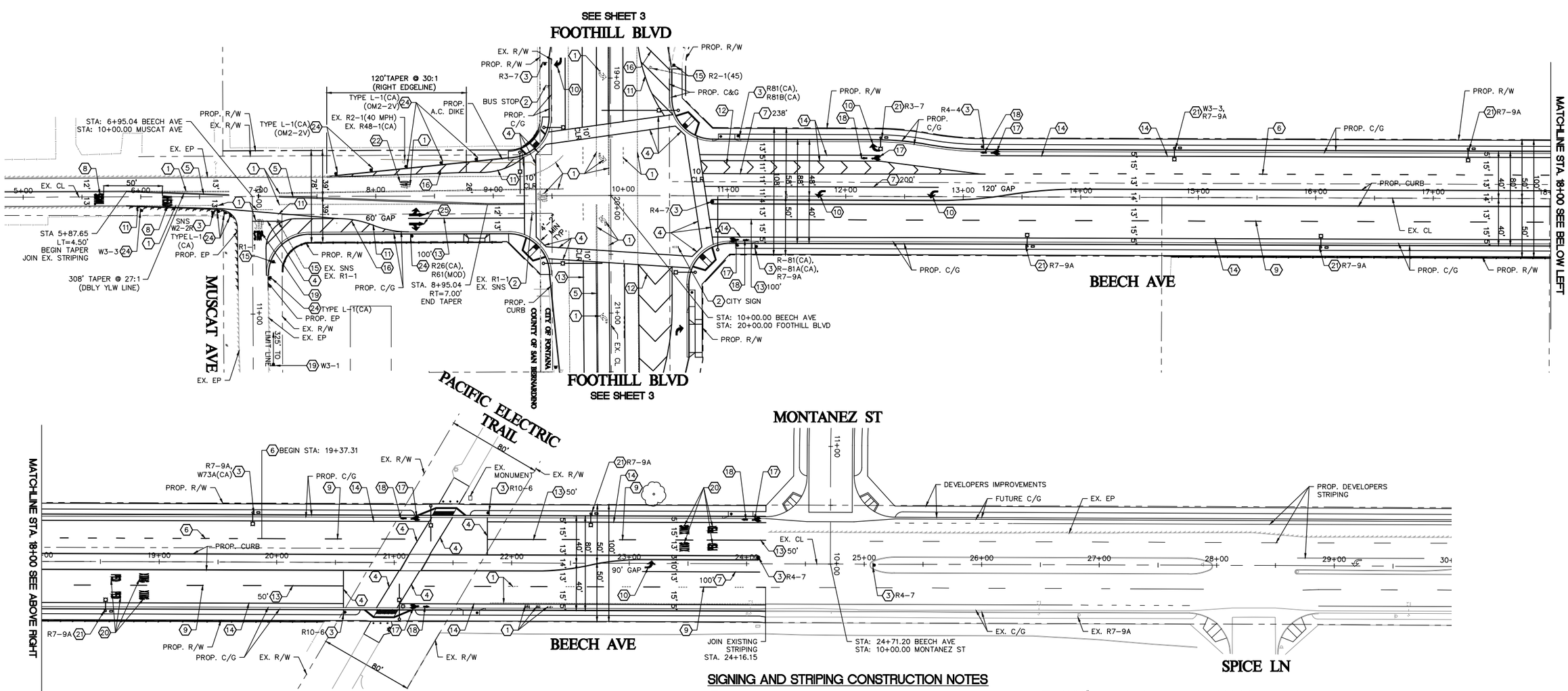
CITY OF FONTANA, CALIFORNIA
TITLE SHEET

DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

BEECH AVENUE
(FOOTHILL BLVD TO P.E. TRAIL)

APPROVED BY:
CITY ENGINEER DATE: R.C.E. 51152

SCALE: As Noted
DATE:
DRAWING NO.: 5661 1/3



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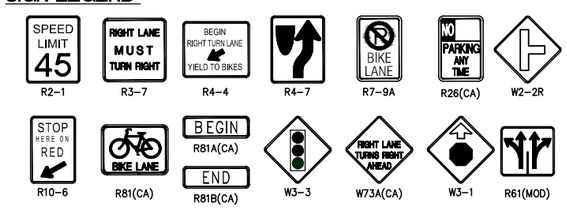

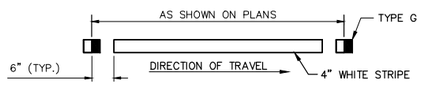

DETAIL "1"

LEGEND:

REMOVE	EXISTING	PROPOSED	
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			ROADSIDE SIGN
			TRAFFIC STRIPE OR MARKING

SIGNING AND STRIPING CONSTRUCTION NOTES

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25. APPLY WHITE TYPE VII ARROW PER CALTRANS STD. PLAN A24A AS SHOWN.

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLEASE CHECK COMPLETED
DATE

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Prepared Under The Supervision Of :
Date :
MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA
SIGNING AND STRIPING PLAN

DRAWN BY: DA	BEECH AVENUE (FOOTHILL BLVD TO P.E. TRAIL)	SCALE: As Noted
DESIGNED BY: AO		DATE:
CHECKED BY: MG	APPROVED BY: CITY ENGINEER DATE: R.C.E. 51152	DRAWING NO.: 5662 2/3

SIGNING AND STRIPING GENERAL NOTES

1. CONSTRUCTION PERMITS SHALL BE OBTAINED FROM THE CITY OF FONTANA DEPARTMENT OF ENGINEERING PRIOR TO THE START OF ANY WORK. INSPECTION COORDINATION SHALL BE REQUESTED AT LEAST TWO WORKING DAYS PRIOR TO THE START OF ANY WORK IN PUBLIC RIGHT-OF-WAY WITHIN THE CITY LIMITS. CALL (909) 350-7610.
2. ALL WORK, MATERIALS, EQUIPMENT AND TEMPORARY TRAFFIC CONTROL SHALL CONFORM TO THESE PLANS, THE CITY OF FONTANA STANDARD SPECIFICATIONS, THE STANDARD PLANS AND SPECIFICATIONS OF THE STATE OF CALIFORNIA, DATED 2015, AND THE CALIFORNIA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, DATED 2014.
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN TEMPORARY TRAFFIC CONTROL AT ALL TIMES.
4. ALL SIGNS SHALL BE INSTALLED PER CITY DESIGN STANDARD 4003, UNLESS OTHERWISE SHOWN ON THE PLANS.
5. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE ALKYD THERMOPLASTIC UNLESS OTHERWISE NOTED.
6. SUBSTITUTE TYPE "C" RAISED PAVEMENT MARKERS FOR TYPE "G" MARKERS ON DETAIL 38 STRIPING ON ROADWAYS WITH RAISED MEDIANS.
7. STRIPING AND PAVEMENT MARKINGS TO BE REMOVED SHALL BE REMOVED BY SANDBLASTING.
8. CONTROL POINTS OR "CAT TRACKING" SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO APPLICATION OF PAVEMENT STRIPING AND LEGENDS. NOTIFY THE CITY AT LEAST TWO DAYS PRIOR FOR APPROVAL OF "CAT TRACKING."
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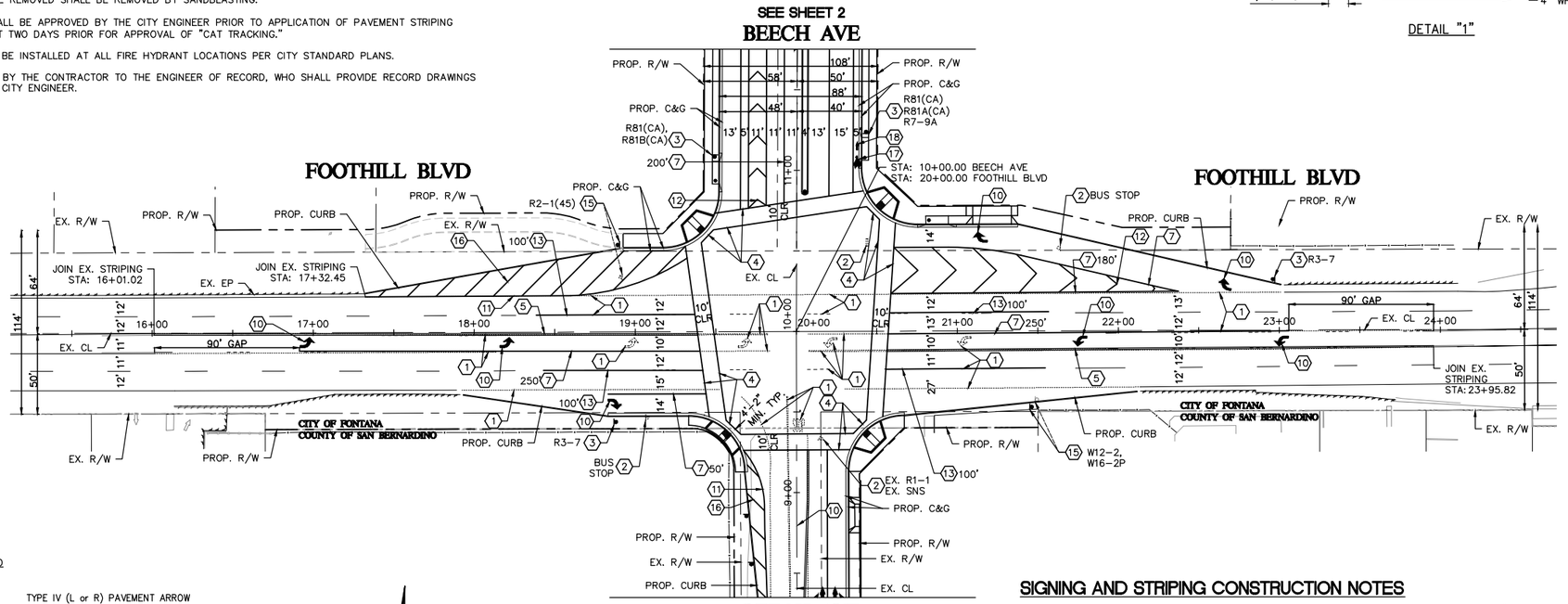

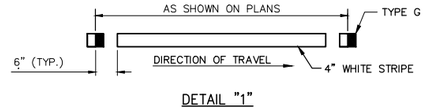

DETAIL "1"

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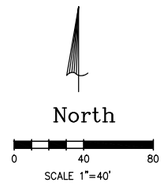

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8. APPLY TWO-WAY LEFT TURN LANE STRIPE PER CALTRANS STD. PLAN A20B, DETAIL 32.
9. APPLY 4" WHITE LANE LINE PER CALTRANS STD. PLAN A20A, DETAIL. 12
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COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLAN CHECK COMPLETED

NAME _____ DATE _____

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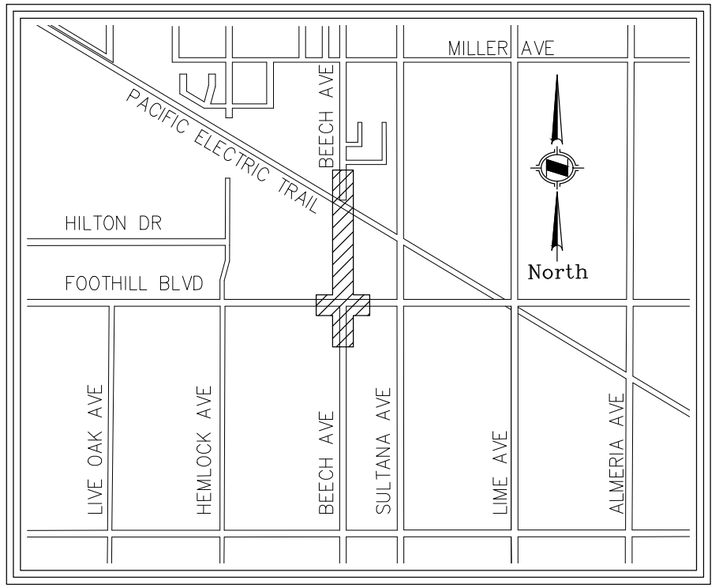
Prepared Under The Supervision Of :
Date :
MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA
SIGNING AND STRIPING PLAN

DRAWN BY: DA	FOOTHILL BOULEVARD AT BEECH AVENUE	SCALE: As Noted
DESIGNED BY: AO		DATE:
CHECKED BY: MG	APPROVED BY: DATE: CITY ENGINEER R.C.E. 51152	DRAWING NO.: 5663 3/3

CITY OF FONTANA

FOOTHILL BOULEVARD AND BEECH AVENUE
TRAFFIC SIGNAL PLANS



PROJECT SITE

VICINITY MAP
NOT TO SCALE

TRAFFIC SIGNAL GENERAL NOTES

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3. LOCATION OF ALL UNDERGROUND FACILITIES ARE APPROXIMATE. THE CONTRACTOR SHALL POTHOLE TO DETERMINE THE EXACT LOCATIONS AND VERIFY ALL CONDITIONS ON THE JOB SITE. HAND DIG FOUNDATIONS UNTIL CLEAR OF ANY OBSTRUCTIONS. PHONE UNDERGROUND SERVICE ALERT AT (800) 227-2600, TWO (2) WORKING DAYS BEFORE DIGGING.
4. CONTRACTOR SHALL FURNISH ALL EQUIPMENT, MATERIALS, AND HARDWARE TO CONSTRUCT THE TRAFFIC SIGNAL AND LIGHTING AS SHOWN ON THE PLANS, EXCEPT ANY CITY FURNISHED OR PROVIDED AS NOTED IN SECTION E.
5. ALL PULLBOXES SHALL BE No. 6 AND CONDUIT SHALL BE 3" RIGID METAL UNLESS OTHERWISE SHOWN.
6. CONTRACTOR SHALL MAKE APPLICATION FOR ELECTRIC SERVICE AND SCHEDULING WITH SOUTHERN CALIFORNIA EDISON COMPANY FOUR WEEKS IN ADVANCE OF NEED.
7. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER FOR EXACT EQUIPMENT LOCATIONS PRIOR TO FINAL PLACEMENT. SEE DETAIL ON THESE PLANS AND SECTION E.
8. CONTRACTOR SHALL RELOCATE AND/OR REPLACE LANDSCAPING, SPRINKLERS, AND SIDEWALK AFFECTED BY THE CONSTRUCTION TO THE SATISFACTION OF THE ENGINEER.
9. CONTROLLER AND SERVICE CABINETS SHALL NOT BE SUBJECTED TO WATER FROM SPRINKLERS. CONTRACTOR SHALL MODIFY SPRINKLERS SYSTEMS AS NECESSARY.
10. ANY EXISTING TRAFFIC SIGNALS AND LIGHTING SHALL REMAIN IN OPERATION UNTIL REPLACED WITH NEW TRAFFIC SIGNALS AND LIGHTING.
11. CONTRACTOR SHALL REFER TO THE CITY ENGINEER IN THE EVENT OF A CONFLICT OR POTENTIAL CONFLICT WITH THESE PLANS AND, OR SPECIFICATIONS FOR THIS PROJECT.
12. TRENCH REPAIRS SHALL BE PER SPECIAL PROVISIONS, SECTION E AND CITY STANDARD PLAN 1008.
13. AS-BUILT DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER OF RECORD, WHO SHALL PROVIDE RECORD DRAWINGS AND ELECTRONIC AUTOCAD FILES TO THE CITY ENGINEER.

LEGEND:

- PROPOSED SIGNAL EQUIPMENT
- PROPOSED TYPE E LOOP
- PROPOSED TYPE D LOOP
- PROPOSED TYPE D BIKE LOOP

INDEX OF SHEETS:

TRAFFIC SIGNAL CONSTRUCTION NOTES

NOTE: SEE SPECIAL PROVISIONS FOR ANY CITY SUPPLIED EQUIPMENT AND/OR MATERIALS.

1. INSTALL CITY FURNISHED TYPE 90 CONTROLLER EQUIPMENT PACKAGE INCLUDING TYPE "R" CABINET, LOOP DETECTION, AND APPURTENANT EQUIPMENT. CONTROLLER CABINET AND FOUNDATION SHALL BE INSTALLED PER CITY STANDARD PLAN 4001. CONTRACTOR SHALL FURNISH AND INSTALL ANY ADDITIONAL EQUIPMENT REQUIRED TO PROVIDE THE SIGNAL OPERATION AS SHOWN ON THE PLAN.
2. FURNISH AND INSTALL TYPE III-BF SERVICE EQUIPMENT ENCLOSURE PER CITY OF FONTANA AND SOUTHERN CALIFORNIA EDISON COMPANY REQUIREMENTS.
3. FURNISH & INSTALL 2"C, 2#6, 1#8 CONDUCTORS (SIGNAL SERVICE).
4. FURNISH & INSTALL 2"C, 2#10 CONDUCTORS (LUMINAIRES).
5. FURNISH AND INSTALL 3" PVC CONDUIT WITH ¼" POLY PULL ROPE PER SCE REQUIREMENTS. COORDINATE SERVICE WITH SCE PLANNING DEPARTMENT AT 909.357.6116. VERIFY PHONE NUMBERS AT TIME OF CONSTRUCTION.
6. REMOVE EXISTING LANDSCAPING AND MODIFY IRRIGATION SYSTEM AS NECESSARY. CONSTRUCT 4" THICK PCC PAD ON COMPACTED NATIVE AROUND PROPOSED SIGNAL CONTROLLER AND SERVICE CABINETS. SPRINKLERS SHALL NOT SPRAY ONTO CONTROLLER CABINET OR SERVICE PEDESTAL.
7. INSTALL CITY-FURNISHED UNI-DIRECTIONAL, SINGLE CHANNEL OPTICOM DETECTOR, AS DIRECTED BY THE ENGINEER.
8. INSTALL SIGN AND HARDWARE PER CALTRANS DETAIL "U", ES-7N.
9. INSTALL CITY FURNISHED ALPHA FXM 1100 QC BATTERY BACK-UP SYSTEM PER MANUFACTURERS REQUIREMENTS.
10. FURNISH AND INSTALL SIX(6) 1-1/2" HIGH DENSITY POLYETHYLENE (HDPE) CONDUITS BY DIRECTIONAL DRILL UNDER PAVEMENT OR SIDEWALK, OR BY TRENCH IN SOIL. CONDUITS SHALL BE COLOR CODED ORANGE, YELLOW, RED, BLACK, BLUE, AND GREEN. FURNISH AND INSTALL ONE POLYESTER MULE TAPE IN EACH EMPTY CONDUIT FOR FUTURE CABLE. CONDUIT SWEEP SHALL BE INSTALLED WITH A MINIMUM OF 10' RADIUS.
11. FURNISH AND INSTALL 96 STRAND FIBER IN ORANGE CONDUIT.
12. FURNISH AND INSTALL 1-6 PAIR #22 SIC IN BLUE CONDUIT.
13. FURNISH AND INSTALL P48 SPLICE VAULT EVERY 500', COIL 50' OF 96 STRAND SMFO CABLE IN EACH VAULT.
14. FURNISH AND INSTALL 2" CONDUIT WITH 1-12 STRAND SINGLE MODE FIBER OPTIC CABLE. FURNISH AND INSTALL SPLICE ENCLOSURE, TERMINATE 12 STRAND TO 96 STRAND SMFO PER SPLICE CHART PROVIDED BY CITY. LOOP 1-6 PAIR #22 SIC IN AND OUT OF CABINET. CONTINUE IN BLUE CONDUIT TO FOOTHILL/SULTANA.
15. TERMINATE 12 STRAND SMFO TO WALL INTERCONNECT PER SPLICE CHART.
16. FURNISH AND INSTALL P48 SPLICE VAULT. COIL 50' OF 96 STRAND SMFO AND 25' OF 12 STRAND SMFO CABLE.
17. FURNISH AND INSTALL 3" CONDUIT WITH 96 STRAND SMFO CABLE AND 1-6 PAIR #22 SIGNAL INTERCONNECT CABLE.
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20. FURNISH AND INSTALL 3" CONDUIT WITH 12 STRAND SMFO CABLE. LOOP 6-PAIR #22 SIC IN AND OUT OF CABINET. CONTINUE 6-PAIR #22 SIC TO BEECH/MILLER.
21. COIL ADDITIONAL 25' OF 12 STRAND SMFO CABLE IN BOX.
22. STUB OUT 2" CONDUIT RUNNING FROM 6E PULLBOX TO CABINET. PULL 12 STRAND SMFO CABLE INTO CABINET.
23. TERMINATE DESIGNATED FIBERS FROM 12 STRAND SMFO CABLE TO WALL INTERCONNECT UNIT INSIDE CONTROLLER CABINET.
24. FURNISH AND INSTALL CCTV CAMERA PER CITY STANDARD PLAN 4007 AND MANUFACTURE'S SPECIFICATIONS.
25. STUB OUT 2" CONDUIT RUNNING FROM SPLICE VAULT NORTHWEST CORNER FOOTHILL/SULTANA TO SIGNAL PULL BOX NORTHWEST CORNER
26. PULL 12 STRAND SMFO CABLE AND 6 PAIR #22 SIC THROUGH SIGNAL CONDUIT FROM NORTHWEST CORNER TO CONTROLLER CABINET ON SOUTHEAST CORNER. SUPPLY AND INSTALL WALL INTERCONNECT TERMINATE 12 STRAND SMFO TO WALL INTERCONNECT PER SPLICE CHART.

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLAN CHECK COMPLETED

NAME _____ DATE _____

UNDERGROUND SERVICE ALERT (USA)
IT'S THE LAW! DIAL BEFORE YOU DIG!
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG
DIGALERT
811 Know what's below. Call before you dig.

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75793 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37
DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA
TITLE SHEET

DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

BEECH AVENUE
(FOOTHILL BLVD TO P.E. TRAIL)

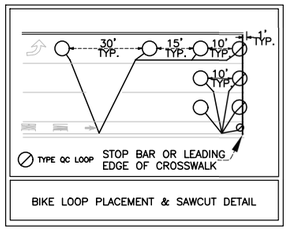
APPROVED BY: _____ DATE: _____
CITY ENGINEER R.C.E. 51152

SCALE: As Noted
DATE:
DRAWING NO.: 5664 1/3

CONDUCTOR TABLE

AWG.	CIRCUIT OR POLE	RUNS 1	2	3	4	5	6	7	8	9	10	11
3-12 CONDUCTOR CABLE	POLE (A)	1/1	1/1	1/1	1/1	1/1	1/1	–/–	–/–	–/–	–/–	–/–
	POLE (B)	–/–	1/1	1/1	1/1	1/1	1/1	–/–	–/–	–/–	–/–	–/–
	POLE (C)	–/–	–/–	1/1	1/1	1/1	1/1	–/–	–/–	–/–	–/–	–/–
	POLE (D)	–/–	–/–	–/–	1/1	1/1	1/1	–/–	–/–	–/–	–/–	–/–
	POLE (E)	–/–	–/–	–/–	–/–	1/1	–/–	–/–	1/1	–/–	–/–	–/–
	POLE (F)	–/–	–/–	–/–	–/–	1/1	–/–	–/–	1/1	1/1	–/–	–/–
	POLE (G)	–/–	–/–	–/–	–/–	1/1	–/–	–/–	1/1	1/1	1/1	–/–
	POLE (H)	–/–	–/–	–/–	–/–	1/1	–/–	–/–	1/1	1/1	1/1	1/1
	TOTAL	1/1	2/2	3/3	4/4	8/8	4/4	–/–	4/4	3/3	2/2	1/1
#10 LUMINAIRE		2	2	2	2	2	–	–	–	2	2	2
OPTICOM CABLE * *		1	1	2	2	4	–	4	–	1	1	–
CCTV ETHERNET CABLE		–	–	–	–	–	–	1	–	1	1	1
DLC	ø1 DETECTOR	–	–	–	–	9	–	9	–	9	–	–
	ø2 DETECTOR	–	6	6	6	6	–	6	–	–	–	–
	ø3 DETECTOR	–	–	–	–	3	–	3	–	3	3	3
	ø4 DETECTOR	–	–	–	4	4	–	4	–	–	–	–
	ø5 DETECTOR	–	–	–	–	–	–	–	–	–	–	–
	ø6 DETECTOR	–	–	–	–	–	–	–	–	–	–	–
	ø7 DETECTOR	–	–	–	3	3	–	3	–	–	–	–
	ø8 DETECTOR	–	–	–	–	4	–	4	–	4	4	4
	TOTAL	–	6	6	13	29	–	29	–	16	7	7
CONDUIT SIZE		2"	3"	4"	4"	2–4"	4"	4"	4"	4"	3"	3"
PERCENT FILL RATIO(%)		22	26	21	29	29	19	19	19	23	24	15

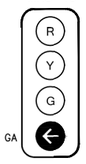
ALL CONDUITS AND CONDUCTORS SHALL BE NEW.
* * MODEL 138 OPTICOM CABLE



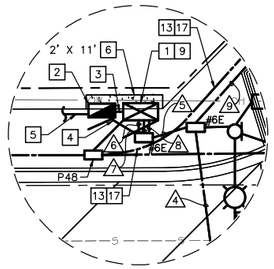
BIKE LOOP PLACEMENT & SAWCUT DETAIL

NOTE: SEE DRAWING No. 5662 FOR SIGNING AND STRIPING PLAN

MAS-4C



DETAIL "B"



DETAIL "A"

SCALE 1"=10'

POLE SCHEDULE

No.	STANDARD TYPE	HEIGHT	MAST ARM SIGNAL	MAST ARM LUM	LED LUMINAIRE	R.S.N.S.*	SIGNAL MTGS VEHICLE	SIGNAL MTGS MAST	SIGNAL MTGS PED	PED PUSH BTN PHASE	PED PUSH BTN QUAD	PED PUSH BTN ARW	LOCATION A	LOCATION B	REMARKS
(A)	29–5–100	30'	50'	15'	111W	SEE BELOW(A)	SV–1–T	3–MAS	SP–1–CS	2	W	←	9.5	4'	F=15'
(B)	1–A	10'	–	–	–	–	TV–2–T	–	SP–1–CS	4	N	→	10'	4'	
(C)	24–3–100	30'	35'	15'	111W	SEE BELOW(C)	SV–1–T	MAS 4C, MAS	SP–1–CS	4	N	←	9.5	5'	F=14
(D)	15TS	30'	–	15'	111W	–	SV–1–T	–	SP–1–CS	1	E	→	9'	5'	
(E)	61–5–100	30'	65'	15'	111W	SEE BELOW(E)	SV–1–T	3–MAS	SP–1–CS	1	E	←	10'	4'	F=15'
(F)	1–A	10'	–	–	–	–	TV–2–T	–	SP–1–CS	8	S	→	9'	4'	
(G)	24–4–100	30'	35'	15'	111W	SEE BELOW(G)	SV–1–T	MAS 4C, MAS	SP–1–CS	8	S	←	10'	4'	F=14'
(H)	15TS	30'	–	15'	111W	–	SV–1–T	–	SP–1–CS	2	W	→	10'	4'	

NOTES:
1. POTHOLING REQUIRED FOR ALL POLES.
2. ALL EQUIPMENT SHALL BE NEW.
3. * CONTRACTOR FURNISHED S.N.S. TO BE MOUNTED ON A SHAFT MOUNTED MAST ARM SUPPLIED BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.
4. SIGNAL POLES SHALL BE DECORATIVE. SEE SPECIAL PROVISIONS, SECTION E.

TRAFFIC SIGNAL CONSTRUCTION NOTES

NOTE: SEE SPECIAL PROVISIONS FOR ANY CITY SUPPLIED EQUIPMENT AND/OR MATERIALS.

1. INSTALL CITY FURNISHED TYPE 90 CONTROLLER EQUIPMENT PACKAGE INCLUDING TYPE "R" CABINET, LOOP DETECTION, AND APPURTENANT EQUIPMENT. CONTROLLER CABINET AND FOUNDATION SHALL BE INSTALLED PER CITY STANDARD PLAN 4001. CONTRACTOR SHALL FURNISH AND INSTALL ANY ADDITIONAL EQUIPMENT REQUIRED TO PROVIDE THE SIGNAL OPERATION AS SHOWN ON THE PLAN.
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3. FURNISH & INSTALL 2"C, 2#6, 1#8 CONDUCTORS (SIGNAL SERVICE).
4. FURNISH & INSTALL 2"C, 2#10 CONDUCTORS (LUMINAIRES).
5. FURNISH AND INSTALL 3" PVC CONDUIT WITH ¼" POLY PULL ROPE PER SCE REQUIREMENTS. COORDINATE SERVICE WITH SCE PLANNING DEPARTMENT AT 909.357.6116. VERIFY PHONE NUMBERS AT TIME OF CONSTRUCTION.
6. REMOVE EXISTING LANDSCAPING AND MODIFY IRRIGATION SYSTEM AS NECESSARY. CONSTRUCT 4" THICK PCC PAD ON COMPACTED NATIVE AROUND PROPOSED SIGNAL CONTROLLER AND SERVICE CABINETS. SPRINKLERS SHALL NOT SPRAY ONTO CONTROLLER CABINET OR SERVICE PEDESTAL.
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8. INSTALL SIGN AND HARDWARE PER CALTRANS DETAIL "U", ES–7N.
9. TERMINATE CCTV ETHERNET CABLE INSIDE CONTROLLER CABINET PER MANUFACTURE'S SPECIFICATIONS.
10. FURNISH AND INSTALL SIX(6) 1–1/2" HIGH DENSITY POLYETHYLENE (HDPE) CONDUITS BY DIRECTIONAL DRILL UNDER PAVEMENT OR SIDEWALK, OR BY TRENCH IN SOIL. CONDUITS SHALL BE COLOR CODED ORANGE, YELLOW, RED, BLACK, BLUE, AND GREEN. FURNISH AND INSTALL ONE POLYESTER MULE TAPE IN EACH EMPTY CONDUIT FOR FUTURE CABLE. CONDUIT SWEEP SHALL BE INSTALLED WITH A MINIMUM OF 10' RADIUS.
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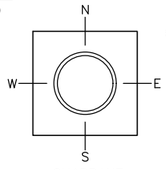
LEGEND:

- PROPOSED SIGNAL EQUIPMENT
- PROPOSED TYPE E LOOP
- PROPOSED TYPE QC LOOP
- PROPOSED TYPE QC BIKE LOOP



QUADRANT
PUSH BUTTON LOCATION
(TOP VIEW)

North

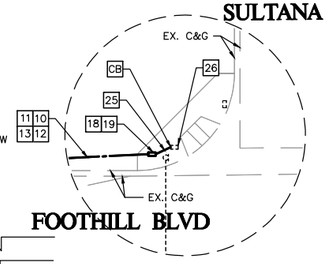
0 20 40
SCALE 1"=20'

SIGN LEGEND:

R3–4
36" X 36"

STREET NAME SIGN LEGEND:

- (A) Beech Ave 8100
- (C) Foothill Blvd 15200
- (E) Beech Ave 8000
- (G) Foothill Blvd 15300



NORTHWEST CORNER
FOOTHILL AND SULTANA

NTS

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS
PLAN CHECK COMPLETED

NAME DATE

PHASE DIAGRAM

ø1 & ø1P	ø2 & ø2P	ø3	ø4 & ø4P
NOT USED	NOT USED		
ø5	ø6	ø7	ø8 & ø8P

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REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER MING GUAN No. 75783 EXP. 6/30/18 CIVIL STATE OF CALIFORNIA

KOA
3190 C Shelby Street
Ontario, California 91764
Tel: (909) 890-9693 Fax: (909) 890-9694

BENCH MARK: B.M. NO. 508 ELEVATION=1342.37
DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA
TRAFFIC SIGNAL AND INTERCONNECT PLAN

DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

FOOTHILL BOULEVARD AT BEECH AVENUE

APPROVED BY:
CITY ENGINEER DATE: R.C.E. 51152

SCALE: As Noted
DATE:
DRAWING NO.: 5665 2/3

POLE SCHEDULE														
STANDARD			MAST ARM		LED LUMINAIRE	R.S.N.S.*	SIGNAL MTGS			PED PUSH BTN			LOCATION		REMARKS
No.	TYPE	HEIGHT	SIGNAL	LUM			VEHICLE	MAST	PED	PHASE	QUAD	ARM	A	B	
(A)	19-4-100	30'	30'	15'	125W	SEE BELOW(A)	SV-1-T	1-MAS	SP-1-CS	4	N	←	SEE PLAN	8.25'	
(B)	19-4-100	30'	30'	15'	125W	SEE BELOW(B)	SV-1-T	1-MAS	SP-1-CS	4	S	←	SEE PLAN	8.25'	

NOTES:
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CONDUCTOR TABLE				
AWG.	CIRCUIT OR POLE	RUNS 1	2	3
3C CABLE / 12C CABLE	POLE (A)	1/1	1/1	1/1
	POLE (B)	1/1	1/1	-/-
	TOTAL	2/2	2/2	1/1
DLC	#2 DETECTOR	1	1	-
	#6 DETECTOR	1	1	1
	TOTAL	2	2	1
#10	LUMINAIRE	2	2	2
CONDUIT SIZE		3"	3"	3"
PERCENT FILL RATIO(%)		18	18	10

ALL CONDUITS AND CONDUCTORS SHALL BE NEW.

TRAFFIC SIGNAL CONSTRUCTION NOTES

NOTE: SEE SPECIAL PROVISIONS FOR ANY CITY SUPPLIED EQUIPMENT AND/OR MATERIALS.

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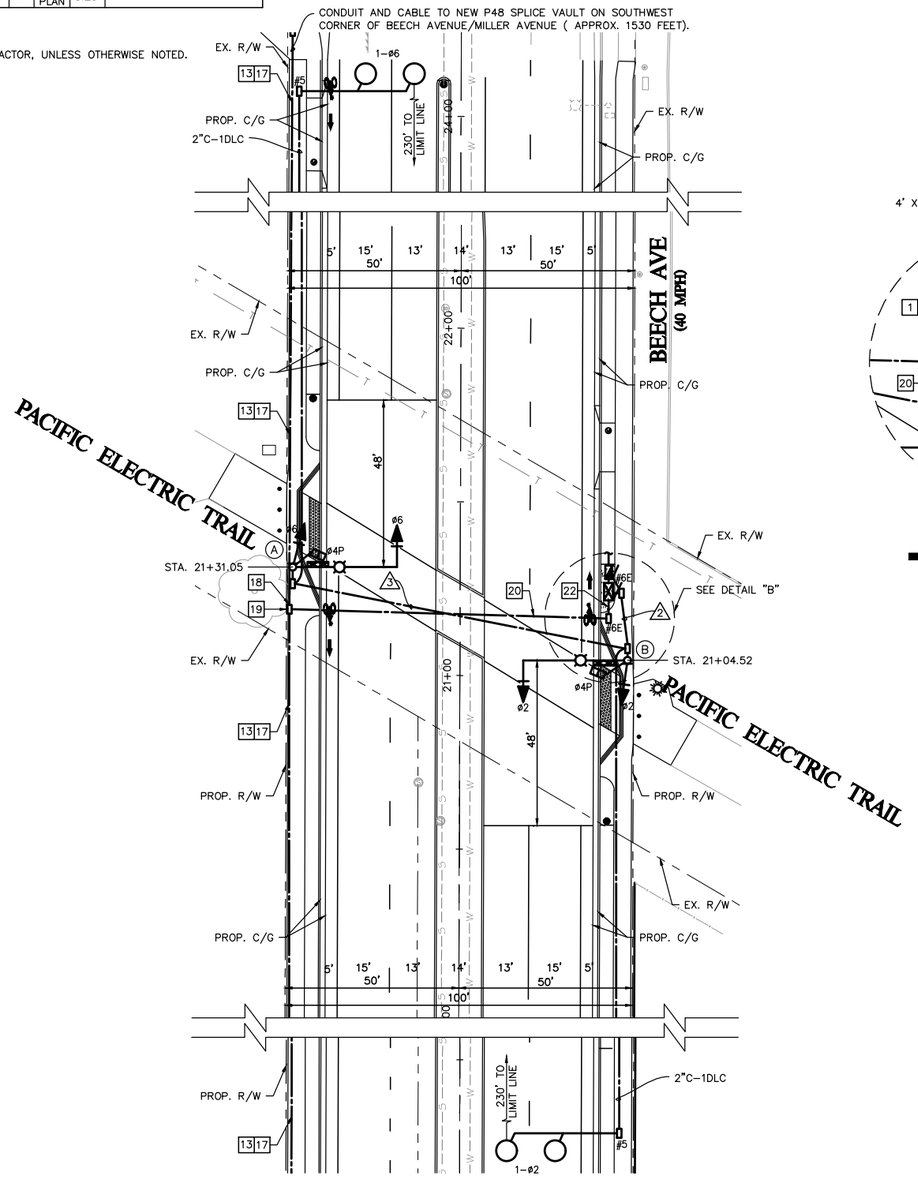
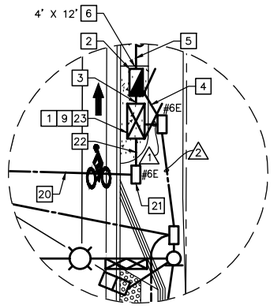
20. FURNISH AND INSTALL 3" CONDUIT WITH 12 STRAND SMFO CABLE. LOOP 6-PAIR #22 SIC IN AND OUT OF CABINET. CONTINUE 6-PAIR #22 SIC TO BEECH/MILLER.
21. COIL ADDITIONAL 25' OF 12 STRAND SMFO CABLE IN BOX.
22. STUB OUT 2" CONDUIT RUNNING FROM 6E PULLBOX TO CABINET. PULL 12 STRAND SMFO CABLE INTO CABINET.
23. TERMINATE DESIGNATED FIBERS FROM 12 STRAND SMFO CABLE TO WALL INTERCONNECT UNIT INSIDE CONTROLLER CABINET.





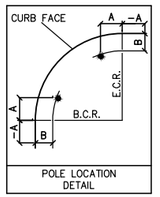
DETAIL "B"

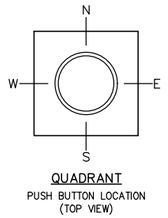
SCALE 1"=10'

STREET NAME SIGN LEGEND:

(A) Pacific Electric Tr

(B) Pacific Electric Tr





QUADRANT

PUSH BUTTON LOCATION (TOP VIEW)

PHASE DIAGRAM			
NOT USED	↑	NOT USED	🚶
ø1	ø2	ø3	ø4
NOT USED	↓	NOT USED	NOT USED
ø5	ø6	ø7	ø8

LEGEND:

PROPOSED SIGNAL EQUIPMENT

UNDERGROUND SERVICE ALERT (USA)

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DESCRIPTION: THE BENCHMARK FOR THIS SURVEY IS CITY OF FONTANA BENCHMARK NO 508 BEING A 1" IRON PIPE AT THE CENTERLINE INTERSECTION OF TOKAY AVENUE AND MILLER AVENUE.

Prepared Under The Supervision Of :

Date :

MING GUAN. R.C.E. 75793

CITY OF FONTANA, CALIFORNIA

TRAFFIC SIGNAL AND INTERCONNECT PLAN

DRAWN BY: DA
DESIGNED BY: AO
CHECKED BY: MG

BEECH AVENUE AT P.E. TRAIL

APPROVED BY:

CITY ENGINEER DATE: R.C.E. 51152

SCALE: As Noted
DATE:
DRAWING NO.: 5666 3/3

EXHIBITS

EXHIBIT A: PRE- PROJECT CONDITION RATIONAL METHOD HYDROLOGY MAP

SHEET 1 OF 1

BEECH STREET INDUSTRIAL SITE

IN THE CITY OF FONTANA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

PRE-PROJECT CONDITION SITE HYDROLOGY MAP

HYDROLOGY SUMMARY TABLE						
NODE TO NODE	Q_{100} (CFS)	T_C (MIN)	Q_{10} (CFS)	T_C (MIN)	Q_{25} (CFS)	T_C (MIN)
101-102	8.96	19.13	3.78	19.13	5.36	19.13
102-105	19.29	27.0	6.45	28.93	10.25	28.10
103-104	7.85	22.52	3.11	22.52	4.53	22.53
104-105	15.93	28.26	5.30	29.79	8.42	29.13
*104-105	35.06	27.0	11.81	28.93	18.70	28.10
105-106	41.18	31.69	12.0	35.10	20.51	33.59
210-202	70.0	19.24	4.40	19.24	4.18	19.24
202-203	13.24	22.91	6.57	23.37	7.49	23.42
203-204	22.23	26.14	9.91	27.23	12.94	27.16

* DENOTES CONFLUENCE POINT

LEGEND:

- X.X / X.X — NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
- XXXX.X — APPROXIMATE INVERT ELEVATION
- XXX / X.X — SUB AREA / ACRES
- L=XXX' — FLOW DISTANCE
- FLOW PATH
- WATERSHED SUB-BOUNDARY
- WATERSHED BOUNDARY

SCALE 1"=80'

80 40 0 80

SCALE: 1"=80'

JLC Engineering & Consulting, Inc.

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MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "A"

PRE-PROJECT CONDITION SITE HYDROLOGY MAP

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EXHIBIT B: POST- PROJECT CONDITION RATIONAL METHOD HYDROLOGY MAP

BEECH STREET INDUSTRIAL SITE

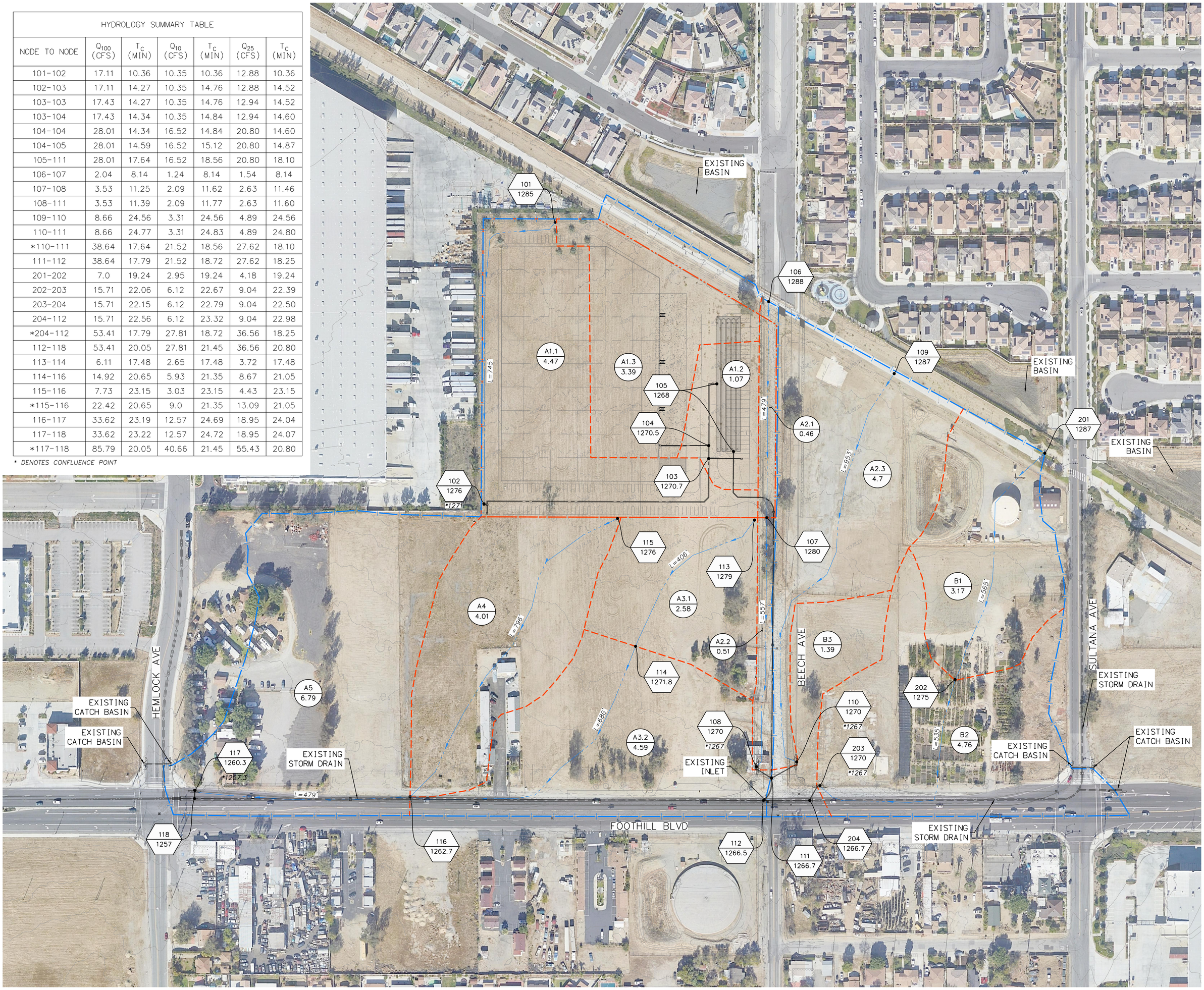
IN THE CITY OF FONTANA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

POST-PROJECT CONDITION SITE HYDROLOGY MAP

HYDROLOGY SUMMARY TABLE

NODE TO NODE	Q_{100} (CFS)	T_C (MIN)	Q_{10} (CFS)	T_C (MIN)	Q_{25} (CFS)	T_C (MIN)
101-102	17.11	10.36	10.35	10.36	12.88	10.36
102-103	17.11	14.27	10.35	14.76	12.88	14.52
103-103	17.43	14.27	10.35	14.76	12.94	14.52
103-104	17.43	14.34	10.35	14.84	12.94	14.60
104-104	28.01	14.34	16.52	14.84	20.80	14.60
104-105	28.01	14.59	16.52	15.12	20.80	14.87
105-111	28.01	17.64	16.52	18.56	20.80	18.10
106-107	2.04	8.14	1.24	8.14	1.54	8.14
107-108	3.53	11.25	2.09	11.62	2.63	11.46
108-111	3.53	11.39	2.09	11.77	2.63	11.60
109-110	8.66	24.56	3.31	24.56	4.89	24.56
110-111	8.66	24.77	3.31	24.83	4.89	24.80
*110-111	38.64	17.64	21.52	18.56	27.62	18.10
111-112	38.64	17.79	21.52	18.72	27.62	18.25
201-202	7.0	19.24	2.95	19.24	4.18	19.24
202-203	15.71	22.06	6.12	22.67	9.04	22.39
203-204	15.71	22.15	6.12	22.79	9.04	22.50
204-112	15.71	22.56	6.12	23.32	9.04	22.98
*204-112	53.41	17.79	27.81	18.72	36.56	18.25
112-118	53.41	20.05	27.81	21.45	36.56	20.80
113-114	6.11	17.48	2.65	17.48	3.72	17.48
114-116	14.92	20.65	5.93	21.35	8.67	21.05
115-116	7.73	23.15	3.03	23.15	4.43	23.15
*115-116	22.42	20.65	9.0	21.35	13.09	21.05
116-117	33.62	23.19	12.57	24.69	18.95	24.04
117-118	33.62	23.22	12.57	24.72	18.95	24.07
*117-118	85.79	20.05	40.66	21.45	55.43	20.80

** DENOTES CONFLUENCE POINT*



LEGEND:

X.X / X.X	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED SUB-BOUNDARY
	WATERSHED BOUNDARY

SCALE 1"=80'

80 40 0 80

SCALE: 1"=80'

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EXHIBIT "B"

POST-PROJECT CONDITION SITE HYDROLOGY MAP

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EXHIBIT C: DRAINAGE FACILITIES MAP

BEECH STREET INDUSTRIAL SITE

IN THE CITY OF FONTANA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

DRAINAGE FACILITIES MAP

DESIGN NOTES:

1. THE PROPOSED 6'X8' RCB IS A CITY OF FONTANA MASTER DRAINAGE PLAN SYSTEM. THE SYSTEM CAN ACCEPT THE 25-YR DEVELOPED FLOW RATE PER DRAINAGE STUDY PREPARED BY MADOLE & ASSOCIATED, DATED 1/2003.
2. THE PROPOSED 6'X8' RCB WILL INCLUDE THE EXTENSION OF AN INTERIM 66" RCP THAT WILL CONNECT TO EXISTING 66" STORM DRAIN LOCATED WEST OF HEMLOCK AVENUE.
3. THE PROPOSED 6'X8' RCB WILL CONNECT TO A FUTURE 90" RCP THAT WILL EXTEND ALONG HEMLOCK AVENUE SOUTH OF FOOTHILL BLVD. THE 90" RCP EXTENDING IN THE SOUTHERLY DIRECTION ALONG HEMLOCK AVENUE IS THE FUTURE CITY OF FONTANA MASTER DRAINAGE PLAN SYSTEM
4. BEECH STREET ROADWAY IMPROVEMENTS ARE PART OF THE CITY OF FONTANA IMPROVEMENTS THAT ARE BEING DEVELOPED BY KOA.

SCALE 1"=60'

60 30 0 60

SCALE: 1"=60'

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EXHIBIT "C"

DRAINAGE FACILITIES MAP

Drawing Name: O:\265.22.22\Engineering\Hydrology_Plan\Exhibits\265.22.21_EXHIBIT_C_Drainage_Facilities_Map.dwg
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