PRELIMINARY HYDROLOGY STUDY
251-271 AND 341-351 W. IMPERIAL HWY
LA HABRA, CA
TTM No. 19143

Project Address:

251-271 and 341-351 W. Imperial Hwy
La Habra, CA 90631

Prepared For:

The Olson Company
3010 Old Ranch Pkwy, Suite 100
Seal Beach, Ca 90740

Prepared By:

C&V Consulting Inc.
9830 Irvine Center Drive
Irvine, CA 92618
Contact: Ryan Bittner, P.E.
(949) 916-3800

Prepared: March 2021
Revised: May 2021

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Preliminary Hydrology Study
For
251-271 and 341-351 W. Imperial Hwy
TR 19143, La Habra

This Preliminary Hydrology Study was prepared by C&V Consulting, Inc. under the supervision of Ryan J. Bittner, P.E.

Ryan J. Bittner, R.C.E. 68167
Principal, C&V Consulting, Inc.

5/17/21
Date

1.0 SITE DESCRIPTION:

The proposed site is located at 251-271 and 341-351 W. Imperial Highway, in the City of La Habra, County of Orange. It encompasses two parcels APN 019-041-21 and APN 019-042-24. The site is currently occupied by several commercial and industrial businesses including used car dealers, a wooden pallet manufacturer, and a gymnastics center. The site is bounded by single family homes to the north, commercial development to the east and west, and W. Imperial Highway to the south. Per the City of La Habra General Plan 2035, Land Use Plan Diagram the site is located within the Residential Multi-Family 1 category.

2.0 PURPOSE OF STUDY:

The purpose of this report is to provide quantitative information to verify the design of the storm drain infrastructure and hydrologic methodology of the project site. The values and statements within confirm the subject site is designed and planned in accordance with the Orange County Hydrology Manual and the City of La Habra drainage requirements.

3.0 EXISTING CONDITIONS:

The existing site consists of 6 industrial buildings and warehouses. A semi-subterranean truck loading dock is located at the central portion of the site. Vegetation on-site is sparse and located within planters adjacent to the buildings. The existing building coverage is approximately 65,031 square feet, the existing landscaping coverage is approximately 4,275 square feet, and the AC coverage is approximately 144,465 square feet.

The site generally sheet flows overland in the southwesterly direction toward W. Imperial Highway. There is approximately 7’ of fall in the westerly direction across the northern property line. There is approximately 8’ of fall in the westerly direction along Imperial Highway. There is approximately 10’ of fall in the southerly direction along the west and east property lines.

Along the rear of the site there are significant down slopes in the private yards of the single-family homes above. The slopes range in height from approximately 13’ to 25’. There are a combination of timber and other “random material” retaining devices in the slope or at the bottom of slope, all of which are in relatively poor condition. At the northwesterly corner of the site, this slope encroaches into the site up to 20’ horizontally. Accordingly, the single-family home rear yards are draining onto the project site.

There does not appear to be any significant on-site storm drain facilities. There are a couple of small drop inlet catch basins that appear to outlet to W. Imperial Highway through parkway culverts. The site generally drains overland to W. Imperial Highway and those flows are carried westerly in the W. Imperial Highway curb and gutter to 3 catch basins that are owned and maintained by Caltrans. There is a grated inlet catch basin at the center of the project frontage which drains directly south across Imperial Highway via a 24” HDPE. There is a curb inlet catch basin located approx. 60’ from the easterly property line which drains directly south across Imperial Highway via a 24” HDPE. There is a third catch basin approximately 30’ west of the westerly property line which drains directly across W. Imperial Highway via a 24” ACP. There do not appear to be any storm drain facilities running east/west, parallel to the site frontage. All flows in the immediate project vicinity ultimately drain and/or connect directly to the Imperial Channel, which is an Orange County Flood Control facility, located on the south side of W. Imperial Highway behind a large screen wall. Runoff continues west in the Imperial Channel to the Coyote Creek Channel. The Coyote Creek Channel

confluences with the San Gabriel River before discharging into the Pacific Ocean just north of the Anaheim Bay.

Refer to the Existing Conditions Hydrology Map located within Appendix A of this report for additional information.

4.0 PROPOSED CONDITIONS:

The proposed development will consist of 21 buildings consisting of 2- story triplexes and 3 story townhomes for a total of 117 units. Both building types will have side-by-side or tandem garage parking. The proposed building coverage is approximately 120,779 square feet, the drive aisle and open parking coverage is approximately 58,682 square feet, and the open space (public and private) lot coverage is approximately 34,310 square feet. Based on the proposed land use of the residential lot, the imperviousness was assumed to be 85% per the Orange County Hydrology Manual, Figure C-4. Actual imperviousness will be calculated during final engineering, and hydrology calculations will be updated.

The project proposes onsite private drive aisles, parking areas, hardscape, and landscaped areas, and is accessed by one entrance along Imperial Highway. Drive aisles and parking areas will consist of asphalt concrete pavement and sidewalks comprised of Portland concrete cement (PCC). Decorative hardscape is proposed within the walkways, common areas and portions of the drive aisles. Landscaping will be incorporated in open space areas including vegetation and street trees. The site proposes 28 open parking spaces and 234 garage parking spaces. The open space areas will be maintained by the appointed Homeowners Association (HOA).

The proposed residential development will be divided into fourteen (14) Drainage Areas which will be graded to match the existing drainage condition. The storm water will be collected and conveyed by a series of area drains and street surface flow, towards curb opening catch basins & bio-filtration devices. These devices will be sized to treat the required water quality stormwater runoff flow rate and have been designed conservatively. The bio-filtration chambers will contain a d-vert by-pass system and overflow pipe to allow the conveyance of larger storm events. At catch basin #3 in sub-area P4 and at catch basin #7 in sub-area P12, runoff will be conveyed into the proposed catch basin which will direct low flows into the biofiltration vaults. When the storm event exceeds the biofiltration treatment capacity, runoff will overflow in the proposed catch basin and be conveyed offsite via proposed parkway culverts that outlet to W. Imperial Highway. In subareas P6 and P8 (catch basins #4 and #5 accordingly) runoff will be conveyed into the proposed catch basin which will direct low flows into the biofiltration vaults. When the storm event exceeds the biofiltration vault treatment capacity, flows will be diverted into the proposed junction structure and then through a proposed parkway culvert that will discharge onto W. Imperial Highway. In sub-area P10, Catch Basin #6, runoff will be conveyed into the proposed catch basin. Low flows will be routed into the biofiltration vaults. When the treatment capacity of the biofiltration vaults is exceeded, runoff will be directed into a proposed stormwater sump pump system where it will be pumped into W. Imperial Highway via a proposed parkway culvert. Runoff that enters W. Imperial Highway will drain into the Coyote Creek Channel and eventually the Pacific Ocean.

Along the northern property line of the site there are significant down slopes in the private yards of the single-family homes to the north of the site. The slopes range in height from approximately 13’ to 25’. There are a combination of timber and other “random material” retaining devices in the slope or at the bottom of slope, all of which are in relatively poor condition.

At the northwesterly corner of the site, this slope encroaches into the site up to 20' horizontally. Accordingly, the single-family home rear yards are draining onto the project site. A proposed catch basin and concrete drainage swale along the northern property line have been incorporated into the design in order to collect and convey offsite run-on from the slope to the northwesterly corner of the site. These flows will be conveyed through the site in a separate underground storm drain system. The existing slope will not be altered in the proposed condition. The offsite drainage has been quantified in the existing and proposed condition as drainage area X1. This drainage area consists of 0.11 ac of the proposed site area and 1.29 ac of offsite area. Near the northeast corner of the site, there is additional offsite run-on from an existing alley which is quantified in the existing and proposed condition as drainage area X2. This drainage area consists of 0.17 ac of offsite area. Another proposed catch basin will collect this run-on and will convey the flows through the site in a separate underground storm drain pipe. All offsite run-on flows will not co-mingle with any onsite flows.
Refer to the Proposed Conditions Hydrology Map located within Appendix A of the report.

5.0 METHODOLOGY:

The existing/proposed subarea was analyzed for acreage, land-use, soil type, peak flow rate, and time of concentration according to the Rational Method.

A perviousness value was calculated for the existing subarea based on site topography, and the proposed condition was assumed an 85% imperviousness based on residential land use.

6.0 RESULTS:

Existing Conditions					
Drainage Area	**Area (ac)**	**Q10 (cfs)**	**Q25 (cfs)**	**Q100 (cfs)**	**T_c (min)**
X1 (offsite)	1.40	4.96	5.93	7.64	5.00
X2 (offsite)	0.17	0.46	0.55	0.71	7.86
X3	0.30	1.09	1.30	1.67	5.00
X4	1.33	3.71	4.55	6.0	10.20
X5	0.15	0.48	0.57	0.73	6.32
X6	1.67	3.44	4.22	5.58	14.02
X7	0.11	0.40	0.48	0.61	5.00
X8	1.24	2.65	3.27	4.33	13.22
Total (Including offsite runon)	**4.80 (6.36*)**	**9.80 (15.22)**	**12.04 (18.52)**	**15.91 (24.25)**	

Proposed Conditions					
Drainage Area	**Area (ac)**	**Q10 (cfs)**	**Q25 (cfs)**	**Q100 (cfs)**	**T_c (min)**
X1 (offsite)	1.40	4.96	5.93	7.64	5.00
P3	0.06	0.22	0.26	0.33	5.00
P4	1.50	2.39	2.98	3.99	17.75
Total at Catch Basin #3/ Parkway Culvert #1 (Including offsite runon)	**1.56 (2.96*)**	**2.49 (7.45)**	**3.10 (9.03)**	**4.15 (11.79)**	**17.75**
P5	0.03	0.11	0.13	0.17	5.00

P6	0.64	1.21	1.48	1.97	13.79
Total at Catch Basin #4	**0.67**	**1.27**	**1.55**	**2.06**	**13.79**
P7	0.11	0.40	0.47	0.61	5.00
P8	0.95	1.61	2.01	2.68	16.03
Total at Catch Basin #5	**1.06**	**1.80**	**2.24**	**2.99**	**16.03**
Total at Proposed JS/ Parkway Culvert #2	**1.73**	**2.93**	**3.65**	**4.88**	**16.32**
P9	0.05	0.18	0.22	0.28	5.00
P10	0.55	1.32	1.58	2.02	10.14
Total at Catch Basin #6/ Parkway Culvert #3	**0.60**	**1.44**	**1.72**	**2.21**	**10.14**
P11	0.22	0.79	0.94	1.21	5.06
P12	0.68	1.40	1.72	2.28	11.86
Total at Catch Basin #7/ Parkway Culvert #4 (Including offsite runon)	**0.90 (1.07)**	**1.85 (2.31)**	**2.28 (2.83)**	**3.01 (3.74)**	**11.86**
Total	**4.80 (6.36*)**	**14.13**	**17.23**	**22.62**	**--**

Note: All time of concentrations indicated above refer to the 100-year storm event.
*Area includes offsite drainage areas

Catch Basin Sizing
Catch basin Sizing was analyzed for the 100-year storm event peak flow. Refer to Appendix C for Catch Basin Sizing.

Pipe Sizing
Onsite underground storm drain pipe will be analyzed for the 100-year storm event peak flow rate utilizing WSPG software and provided during final engineering.

Parkway Culvert Sizing
Parkway Culvert Sizing was analyzed for the 100-year storm event peak flow, including offsite runon areas. Refer to Appendix C for Parkway Culvert Sizing.

Wall Knockout Sizing
Wall knockouts will provide an emergency overland escape route during larger storm events. Calculations for one half block (8" x 8") knockout are provided in Appendix C.

Drainage Area	Q100 (cfs)	Knockout Size
P4	4.15	3 Blocks
P6	2.06	2 Blocks
P8	2.98	3 Blocks
P12	3.03	3 Blocks

100-Year Water Surface Ponding Exhibit/ Calculations
Water surface elevations for the 100-year storm event peak flow rates will verify that the proposed finish floor elevations are set at least 1 foot above the water surface elevation. A ponding exhibit has

been prepared based on the 100-year water surface elevation tributary to each subarea. Refer to Appendix C.

7.0 CONCLUSION:

The results from this hydrology study demonstrate that the proposed condition of the site will generate a lower peak runoff flowrate than the existing condition of the site. This is a result of the increase in pervious area in the proposed condition. Since the peak flows are decreased in the proposed condition, no onsite detention is required. Existing historic drainage patterns and discharge location will be preserved and has been incorporated into the proposed drainage design.

8.0 DESIGN PARAMETERS:

1. The onsite drainage area was analyzed for a 10, 25, 100-Year storm event using Rational Method Analysis per the County of Orange Hydrology Manual.

2. The drainage area is located in Soil Groups D per the Orange County Public Works Technical Guidance Document (TGD).

3. The infiltration rate for the pervious area as a function of soil group, Fp, is 0.20 inches/hour, according to page C-13 of the Hydrology Manual.

4. Onsite overflow structures have been designed for a 100-Year storm event.

5. An estimated 85% impervious coverage was assigned to the proposed condition of the project site. Existing impervious coverage was calculated to be approximately 98% utilizing field survey topography.

6. Time of concentration Tc were calculated by using the County of Orange Hydrology Manual to calculate flow rates and volume amounts.

7. There is offsite run-on tributary to the site.

9.0 REFERENCES:

1. Orange County Hydrology Manual dated October 1986

2. Hydraflow Express Extension for Autodesk AutoCAD Civil 3D

3. Existing Storm Drain As-Built Plans

4. Orange County Technical Guidance Document Figure XVI-2a, NRCS Hydrologic Soils Groups

APPENDIX A
HYDROLOGY MAPS

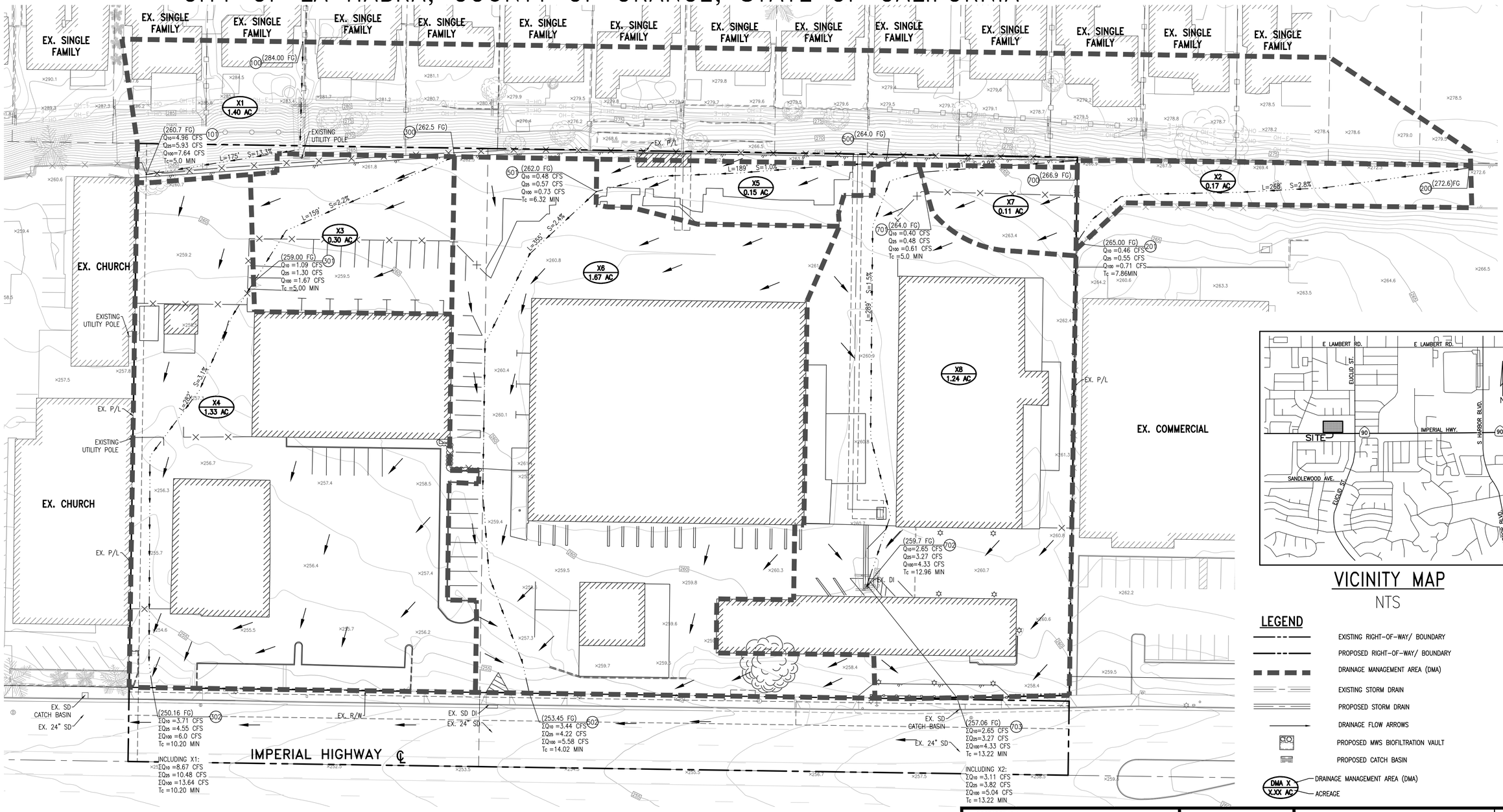
Existing Conditions Hydrology Map

EXISTING CONDITIONS HYDROLOGY MAP

TR 19143

251–271 AND 341–351 IMPERIAL HIGHWAY

CITY OF LA HABRA, COUNTY OF ORANGE, STATE OF CALIFORNIA



VICINITY MAP

NTS

LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- PROPOSED RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- DRAINAGE FLOW ARROWS
- PROPOSED MWS BIOFILTRATION VAULT
- PROPOSED CATCH BASIN
- DMA X / X.XX AC — DRAINAGE MANAGEMENT AREA (DMA) / ACREAGE

1" = 30'

0 15 30 60

PREPARED BY :

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING

9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

REGISTERED PROFESSIONAL ENGINEER
RYAN J. BITTINGER
No. 68167
CIVIL
STATE OF CALIFORNIA

TENTATIVE TRACT NO. 19143
EXISTING CONDITIONS HYDROLOGY MAP

DATE: 3/1/2021

SHEET 1 OF 1

SCALE: AS SHOWN | DRAWN BY: SP | CHECKED BY: JH

CITY OF LA HABRA

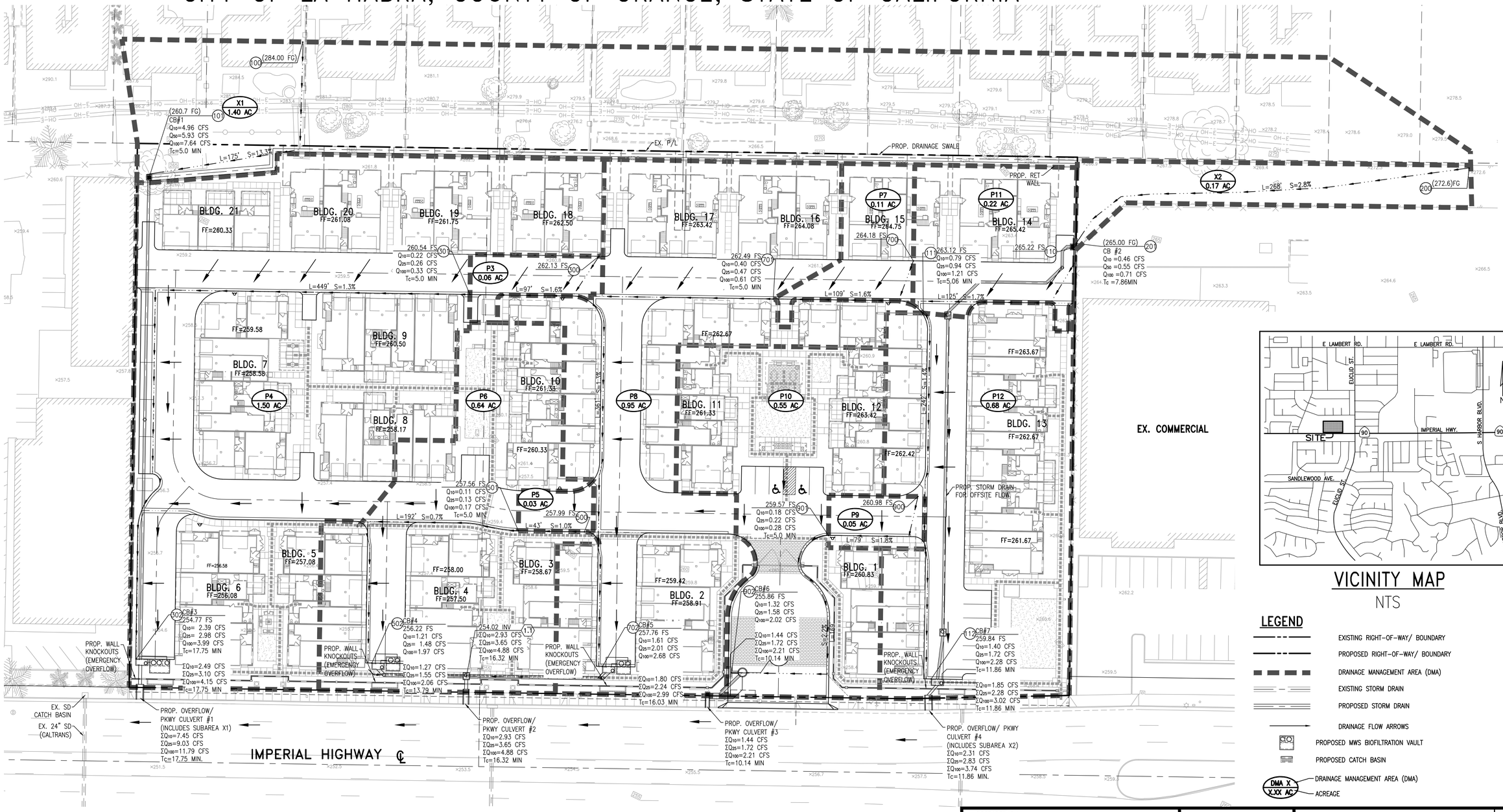
Proposed Conditions Hydrology Map

PROPOSED CONDITIONS HYDROLOGY MAP

TR 19143

251–271 AND 341–351 IMPERIAL HIGHWAY

CITY OF LA HABRA, COUNTY OF ORANGE, STATE OF CALIFORNIA



VICINITY MAP

NTS

LEGEND

- EXISTING RIGHT–OF–WAY/ BOUNDARY
- PROPOSED RIGHT–OF–WAY/ BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- DRAINAGE FLOW ARROWS
- PROPOSED MWS BIOFILTRATION VAULT
- PROPOSED CATCH BASIN
- DMA X / X.XX AC — DRAINAGE MANAGEMENT AREA (DMA) / ACREAGE

PREPARED BY :

C&V CONSULTING, INC.
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9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

REGISTERED PROFESSIONAL ENGINEER
RYAN J. BITTNER
No. 68167
CIVIL
STATE OF CALIFORNIA

TENTATIVE TRACT NO. 19143
PROPOSED CONDITIONS HYDROLOGY MAP

DATE: 5/17/2021

SHEET 1 OF 1

SCALE: AS SHOWN | DRAWN BY: SP | CHECKED BY: JH

CITY OF LA HABRA

APPENDIX B
HYDROLOGY CALCULATIONS

Existing Conditions Hydrology Calculations
(10, 25, 100-year Storm Event)

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_____
*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLS0109                                                               *
* PRELIM                                                                *
* EXISTING Q10                                                          *
 *************************************************************************

  FILE NAME: OL109X10.DAT
  TIME/DATE OF STUDY: 07:04 03/01/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      4.96
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      4.96

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.50  DOWNSTREAM(FEET) =    259.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.30      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.09

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.00  DOWNSTREAM ELEVATION(FEET) =  250.16
  STREET LENGTH(FEET) =   282.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.29
  STREET FLOW TRAVEL TIME(MIN.) =   6.25   Tc(MIN.) =   11.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.550
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.33      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      1.63    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       3.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.86   DEPTH*VELOCITY(FT*FT/SEC.) =   0.36
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   198.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.00  DOWNSTREAM(FEET) =    262.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.319
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.550
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.15      0.20     0.100    57    6.32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  253.45
  STREET LENGTH(FEET) =   355.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.13
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.24
  STREET FLOW TRAVEL TIME(MIN.) =   9.25   Tc(MIN.) =   15.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.117
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.67      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.67      SUBAREA RUNOFF(CFS) =    3.15
  EFFECTIVE AREA(ACRES) =      1.82    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       3.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.33
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.00
  ELEVATION DATA: UPSTREAM(FEET) =    266.90  DOWNSTREAM(FEET) =    264.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.11      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  259.70
```

```
 STREET LENGTH(FEET) =   289.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.50
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.19
 STREET FLOW TRAVEL TIME(MIN.) =   9.55   Tc(MIN.) =   14.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.201
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        1.24      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    2.43
 EFFECTIVE AREA(ACRES) =      1.35    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       2.65

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  12.00
 FLOW VELOCITY(FEET/SEC.) =  0.60   DEPTH*VELOCITY(FT*FT/SEC.) =   0.25
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   256.70  DOWNSTREAM(FEET) =   255.78
 FLOW LENGTH(FEET) =    92.50   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.65
```

```
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   14.85
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     482.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     14.85
  EFFECTIVE AREA(ACRES) =      1.35  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       2.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

↟

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_____
*****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLS0109                                                               *
* PRELIM                                                                *
* EXISTING Q25                                                          *
 *************************************************************************

  FILE NAME: OL109X25.DAT
  TIME/DATE OF STUDY: 07:06 03/01/2021
=============================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      5.93
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      5.93

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.733
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.50  DOWNSTREAM(FEET) =    259.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.30      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.30
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.30

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.00  DOWNSTREAM ELEVATION(FEET) =  250.16
  STREET LENGTH(FEET) =   282.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.21
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.33
  STREET FLOW TRAVEL TIME(MIN.) =   5.78   Tc(MIN.) =   10.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.123
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.33      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.71
  EFFECTIVE AREA(ACRES) =      1.63    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       4.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.41
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   198.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.00  DOWNSTREAM(FEET) =    262.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.319
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.225
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.15      0.20     0.100    57    6.32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  253.45
  STREET LENGTH(FEET) =   355.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.27
  STREET FLOW TRAVEL TIME(MIN.) =   8.60   Tc(MIN.) =   14.92
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.598
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.67      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.67      SUBAREA RUNOFF(CFS) =    3.87
  EFFECTIVE AREA(ACRES) =      1.82    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.37
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.00
  ELEVATION DATA: UPSTREAM(FEET) =    266.90  DOWNSTREAM(FEET) =    264.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.11      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  259.70
```

```
 STREET LENGTH(FEET) =   289.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.07
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   12.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.54
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.21
 STREET FLOW TRAVEL TIME(MIN.) =   8.85   Tc(MIN.) =   13.85
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.709
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        1.24      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    3.00
 EFFECTIVE AREA(ACRES) =      1.35    AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       3.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  12.00
 FLOW VELOCITY(FEET/SEC.) =  0.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.29
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   256.70  DOWNSTREAM(FEET) =   255.78
 FLOW LENGTH(FEET) =    92.50   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.27
```

```
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   14.14
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     482.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     14.14
  EFFECTIVE AREA(ACRES) =      1.35  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       3.27
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLS0109                                                               *
* PRELIM                                                                *
* EXISTING Q100                                                         *
 ************************************************************************

  FILE NAME: O109X100.DAT
  TIME/DATE OF STUDY: 07:08 03/01/2021
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      7.64
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      7.64

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.773
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.50  DOWNSTREAM(FEET) =    259.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.30      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.67
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.67

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.00  DOWNSTREAM ELEVATION(FEET) =  250.16
  STREET LENGTH(FEET) =   282.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.18
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
  STREET FLOW TRAVEL TIME(MIN.) =   5.20   Tc(MIN.) =   10.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.113
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.33      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    4.90
  EFFECTIVE AREA(ACRES) =      1.63    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       6.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  1.04   DEPTH*VELOCITY(FT*FT/SEC.) =   0.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   198.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.00  DOWNSTREAM(FEET) =    262.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.319
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.410
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.15      0.20     0.100    57    6.32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.73
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.73

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  262.00  DOWNSTREAM ELEVATION(FEET) =  253.45
  STREET LENGTH(FEET) =   355.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  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) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.77
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.32
  STREET FLOW TRAVEL TIME(MIN.) =   7.70   Tc(MIN.) =   14.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.427
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.67      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.67      SUBAREA RUNOFF(CFS) =    5.12
  EFFECTIVE AREA(ACRES) =      1.82    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.45
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   101.00
  ELEVATION DATA: UPSTREAM(FEET) =    266.90  DOWNSTREAM(FEET) =    264.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.11      0.20     0.100    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  264.00  DOWNSTREAM ELEVATION(FEET) =  259.70
```

```
  STREET LENGTH(FEET) =   289.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.71
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   12.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.61
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.26
  STREET FLOW TRAVEL TIME(MIN.) =   7.96   Tc(MIN.) =   12.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.586
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.24      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      1.35    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  12.00
  FLOW VELOCITY(FEET/SEC.) =  0.73   DEPTH*VELOCITY(FT*FT/SEC.) =   0.35
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   256.70  DOWNSTREAM(FEET) =   255.78
  FLOW LENGTH(FEET) =    92.50   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
```

```
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   13.22
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    703.00 =     482.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     13.22
  EFFECTIVE AREA(ACRES) =      1.35  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       4.33
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Conditions Hydrology Calculations
(10, 25, 100-year Storm Event)

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLSO109                                                               *
* PRELIM                                                                *
* PROPOSED Q10                                                          *
 ************************************************************************

  FILE NAME: O109P10.DAT
  TIME/DATE OF STUDY: 14:35 03/09/2021
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      4.96
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      4.96

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    97.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.13  DOWNSTREAM(FEET) =    260.54
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.06      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  260.54  DOWNSTREAM ELEVATION(FEET) =  254.77
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.55
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.18
  STREET FLOW TRAVEL TIME(MIN.) =  15.44   Tc(MIN.) =   20.44
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.812
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        1.50      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    2.39
```

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  EFFECTIVE AREA(ACRES) =      1.56    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       2.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.58   DEPTH*VELOCITY(FT*FT/SEC.) =   0.24
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.00
  ELEVATION DATA: UPSTREAM(FEET) =    265.22  DOWNSTREAM(FEET) =    263.12

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.061
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.031
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.22      0.20     0.200    57    5.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  263.12  DOWNSTREAM ELEVATION(FEET) =  259.84
  STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.52
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.49
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.18
  STREET FLOW TRAVEL TIME(MIN.) =   8.17   Tc(MIN.) =   13.23
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.68      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.53   DEPTH*VELOCITY(FT*FT/SEC.) =   0.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
  ELEVATION DATA: UPSTREAM(FEET) =    260.98  DOWNSTREAM(FEET) =    259.57

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.05      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  61
```

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----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.57  DOWNSTREAM ELEVATION(FEET) =  255.86
  STREET LENGTH(FEET) =   170.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.84
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.35   FLOOD WIDTH(FEET) =   11.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    0.55
    SPLIT DEPTH(FEET) =    0.21   SPLIT FLOOD WIDTH(FEET) =    4.09
    SPLIT FLOW(CFS) =    0.11   SPLIT VELOCITY(FEET/SEC.) =    0.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.19
  STREET FLOW TRAVEL TIME(MIN.) =   5.14   Tc(MIN.) =   10.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.708
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.55      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    1.32
  EFFECTIVE AREA(ACRES) =      0.60    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.19
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    902.00 =     249.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.18  DOWNSTREAM(FEET) =    262.49

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.11      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.40

********************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  262.49  DOWNSTREAM ELEVATION(FEET) =  257.76
  STREET LENGTH(FEET) =   359.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.28
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.16
  STREET FLOW TRAVEL TIME(MIN.) =  13.40   Tc(MIN.) =   18.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.924
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.95      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    1.61
  EFFECTIVE AREA(ACRES) =      1.06    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       1.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.20
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.75  DOWNSTREAM(FEET) =   254.02
  FLOW LENGTH(FEET) =    87.47   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.80
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   18.74
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    43.00
  ELEVATION DATA: UPSTREAM(FEET) =    257.99  DOWNSTREAM(FEET) =    257.56

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.03      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.03   PEAK FLOW RATE(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  257.56  DOWNSTREAM ELEVATION(FEET) =  256.22
  STREET LENGTH(FEET) =   192.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.75
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.35   FLOOD WIDTH(FEET) =   11.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    0.31
    SPLIT DEPTH(FEET) =    0.33   SPLIT FLOOD WIDTH(FEET) =   10.10
    SPLIT FLOW(CFS) =    0.34   SPLIT VELOCITY(FEET/SEC.) =    0.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.11
  STREET FLOW TRAVEL TIME(MIN.) =  10.26   Tc(MIN.) =   15.26
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.142
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
```

```
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       1.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.14
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.84  DOWNSTREAM(FEET) =   254.02
  FLOW LENGTH(FEET) =    62.59   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.27
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   15.48
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.27   15.48    2.124  0.20( 0.04) 0.20       0.7     500.00
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.80   18.74    1.904  0.20( 0.04) 0.20       1.1     700.00
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.93   15.48    2.124  0.20( 0.04) 0.20       1.5     500.00
      2        2.93   18.74    1.904  0.20( 0.04) 0.20       1.7     700.00
    TOTAL AREA(ACRES) =         1.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        2.93  Tc(MIN.) =   18.742
```

```
  EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.7
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     18.74
  EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR)=  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       2.93

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.93   15.48    2.124  0.20( 0.04) 0.20       1.5     500.00
      2        2.93   18.74    1.904  0.20( 0.04) 0.20       1.7     700.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLSO109                                                                *
* LA HABRA                                                               *
* PROPOSED Q25                                                           *
 ************************************************************************

  FILE NAME: O109P25.DAT
  TIME/DATE OF STUDY: 14:37 03/09/2021
==============================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      5.93
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      5.93

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.733
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    97.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.13  DOWNSTREAM(FEET) =    260.54
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.06      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  260.54  DOWNSTREAM ELEVATION(FEET) =  254.77
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.90
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.20
  STREET FLOW TRAVEL TIME(MIN.) =  14.22   Tc(MIN.) =   19.22
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        1.50      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    2.98
```

```
  EFFECTIVE AREA(ACRES) =      1.56    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       3.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.00
  ELEVATION DATA: UPSTREAM(FEET) =    265.22  DOWNSTREAM(FEET) =    263.12

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.061
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.791
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.22      0.20     0.200    57    5.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.94
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.94

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  263.12  DOWNSTREAM ELEVATION(FEET) =  259.84
  STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   11.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.52
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.20
  STREET FLOW TRAVEL TIME(MIN.) =   7.57   Tc(MIN.) =   12.63
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.854
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.68      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.72
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.23
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
  ELEVATION DATA: UPSTREAM(FEET) =    260.98  DOWNSTREAM(FEET) =    259.57

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.05      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  61
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.57  DOWNSTREAM ELEVATION(FEET) =  255.86
  STREET LENGTH(FEET) =   170.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.01
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.35   FLOOD WIDTH(FEET) =   11.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    0.55
    SPLIT DEPTH(FEET) =    0.27   SPLIT FLOOD WIDTH(FEET) =    7.09
    SPLIT FLOW(CFS) =    0.27   SPLIT VELOCITY(FEET/SEC.) =    0.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.19
  STREET FLOW TRAVEL TIME(MIN.) =   5.14   Tc(MIN.) =   10.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.234
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.55      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    1.58
  EFFECTIVE AREA(ACRES) =      0.60    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.59   DEPTH*VELOCITY(FT*FT/SEC.) =   0.21
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    902.00 =     249.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.18  DOWNSTREAM(FEET) =    262.49

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.11      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.47

********************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  262.49  DOWNSTREAM ELEVATION(FEET) =  257.76
  STREET LENGTH(FEET) =   359.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.56
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.49
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.18
  STREET FLOW TRAVEL TIME(MIN.) =  12.33   Tc(MIN.) =   17.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.387
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.95      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    2.01
  EFFECTIVE AREA(ACRES) =      1.06    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       2.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.56   DEPTH*VELOCITY(FT*FT/SEC.) =   0.23
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.75  DOWNSTREAM(FEET) =   254.02
  FLOW LENGTH(FEET) =    87.47   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.61
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   17.64
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    43.00
  ELEVATION DATA: UPSTREAM(FEET) =    257.99  DOWNSTREAM(FEET) =    257.56

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.03      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.03   PEAK FLOW RATE(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  257.56  DOWNSTREAM ELEVATION(FEET) =  256.22
  STREET LENGTH(FEET) =   192.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.92
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.33
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.12
  STREET FLOW TRAVEL TIME(MIN.) =   9.80   Tc(MIN.) =   14.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.610
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       1.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  11.00
```

```
  FLOW VELOCITY(FEET/SEC.) =  0.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.16
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.84  DOWNSTREAM(FEET) =   254.02
  FLOW LENGTH(FEET) =    62.59   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.55
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   15.01
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.55   15.01    2.589  0.20( 0.04) 0.20       0.7     500.00
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.24   17.64    2.363  0.20( 0.04) 0.20       1.1     700.00
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.64   15.01    2.589  0.20( 0.04) 0.20       1.6     500.00
      2        3.65   17.64    2.363  0.20( 0.04) 0.20       1.7     700.00
    TOTAL AREA(ACRES) =         1.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        3.65  Tc(MIN.) =   17.641
  EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.7
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.
```

```
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     17.64
  EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR)=  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       3.65

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.64   15.01    2.589  0.20( 0.04) 0.20       1.6     500.00
      2        3.65   17.64    2.363  0.20( 0.04) 0.20       1.7     700.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* OLSO109                                                               *
* LA HABRA                                                              *
* PROPOSED Q100                                                         *
 ************************************************************************

  FILE NAME: O109P100.DAT
  TIME/DATE OF STUDY: 14:38 03/09/2021
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    284.00  DOWNSTREAM(FEET) =    260.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        1.40      0.20     0.600    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      7.64
  TOTAL AREA(ACRES) =      1.40   PEAK FLOW RATE(CFS) =      7.64

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   268.00
  ELEVATION DATA: UPSTREAM(FEET) =    272.60  DOWNSTREAM(FEET) =    265.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.863
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.773
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       D        0.17      0.20     0.600    57    7.86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    97.00
  ELEVATION DATA: UPSTREAM(FEET) =    262.13  DOWNSTREAM(FEET) =    260.54
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.06      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  260.54  DOWNSTREAM ELEVATION(FEET) =  254.77
  STREET LENGTH(FEET) =   447.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.52
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.25
  STREET FLOW TRAVEL TIME(MIN.) =  12.75   Tc(MIN.) =   17.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.994
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        1.50      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.99
```

```
  EFFECTIVE AREA(ACRES) =      1.56    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       4.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.35
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     544.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.00
  ELEVATION DATA: UPSTREAM(FEET) =    265.22  DOWNSTREAM(FEET) =    263.12

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.061
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.144
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.22      0.20     0.200    57    5.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.21
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      1.21

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  263.12  DOWNSTREAM ELEVATION(FEET) =  259.84
  STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.39
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.24
  STREET FLOW TRAVEL TIME(MIN.) =   6.80   Tc(MIN.) =   11.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.68      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    2.28
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    79.00
  ELEVATION DATA: UPSTREAM(FEET) =    260.98  DOWNSTREAM(FEET) =    259.57

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.05      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.05   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  61
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  259.57  DOWNSTREAM ELEVATION(FEET) =  255.86
  STREET LENGTH(FEET) =   170.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.35   FLOOD WIDTH(FEET) =   11.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    0.55
    SPLIT DEPTH(FEET) =    0.32   SPLIT FLOOD WIDTH(FEET) =    9.93
    SPLIT FLOW(CFS) =    0.58   SPLIT VELOCITY(FEET/SEC.) =    0.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.19
  STREET FLOW TRAVEL TIME(MIN.) =   5.14   Tc(MIN.) =   10.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.127
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.55      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    2.02
  EFFECTIVE AREA(ACRES) =      0.60    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.25
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    902.00 =     249.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
  ELEVATION DATA: UPSTREAM(FEET) =    264.18  DOWNSTREAM(FEET) =    262.49

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.11      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.61

********************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  262.49  DOWNSTREAM ELEVATION(FEET) =  257.76
  STREET LENGTH(FEET) =   359.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.22
  STREET FLOW TRAVEL TIME(MIN.) =  11.03   Tc(MIN.) =   16.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.174
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.95      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      1.06    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       2.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  0.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     468.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   254.75  DOWNSTREAM(FEET) =   254.02
  FLOW LENGTH(FEET) =    87.47   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.99
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   16.32
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    43.00
  ELEVATION DATA: UPSTREAM(FEET) =    257.99  DOWNSTREAM(FEET) =    257.56

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.03      0.20     0.200    57    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.03   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  257.56  DOWNSTREAM ELEVATION(FEET) =  256.22
  STREET LENGTH(FEET) =   192.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0950
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   11.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.14
  STREET FLOW TRAVEL TIME(MIN.) =   8.79   Tc(MIN.) =   13.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.460
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      0.67    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       2.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  11.00
```

```
 FLOW VELOCITY(FEET/SEC.) =  0.45   DEPTH*VELOCITY(FT*FT/SEC.) =   0.19
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     235.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE      1.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   254.84  DOWNSTREAM(FEET) =   254.02
 FLOW LENGTH(FEET) =    62.59   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.06
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.99
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      1.10 TO NODE      1.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.06   13.99    3.432  0.20( 0.04) 0.20       0.7     500.00
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE      1.10 =     297.59 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.99   16.32    3.141  0.20( 0.04) 0.20       1.1     700.00
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.86   13.99    3.432  0.20( 0.04) 0.20       1.6     500.00
     2        4.88   16.32    3.141  0.20( 0.04) 0.20       1.7     700.00
   TOTAL AREA(ACRES) =         1.7

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        4.88  Tc(MIN.) =   16.322
 EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE      1.10 =     555.47 FEET.
```

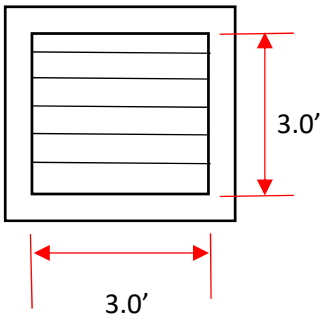
```
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     16.32
  EFFECTIVE AREA(ACRES) =      1.73  AREA-AVERAGED Fm(INCH/HR)=  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       4.88

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.86   13.99    3.432  0.20( 0.04) 0.20       1.6     500.00
      2        4.88   16.32    3.141  0.20( 0.04) 0.20       1.7     700.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C
HYDRAULIC CALCULATIONS

100-Year Catch Basin Sizing

GRATE INLET CAPACITY CALCULATIONS

CB #1 & 3 – Refer to Proposed Conditions Hydrology Map for Catch Basin locations.



~REFER TO THE URBAN DRAINAGE DESIGN MANUAL,
UNITED STATES DEPARTMENT OF TRANSPORTATION

Ponding Depth, H = 0.25 (3")

Perimeter, P = 12' (flows enter all sides)

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

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

$Q = 3.0(0.25)^{3/2}(12.0)$

Q = 4.50 cfs

50% Clogging Factor = 0.5(4.50) = **2.25 cfs**

CB #1 – Q25 = **0.83 cfs < 2.25 cfs** ✓

CB #3 – Q25 = **1.33 cfs < 2.25 cfs** ✓

Inlet Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 1 2021

CB #3 Sizing Q100

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= 3.00
Grate Length (ft)	= 3.00

Gutter

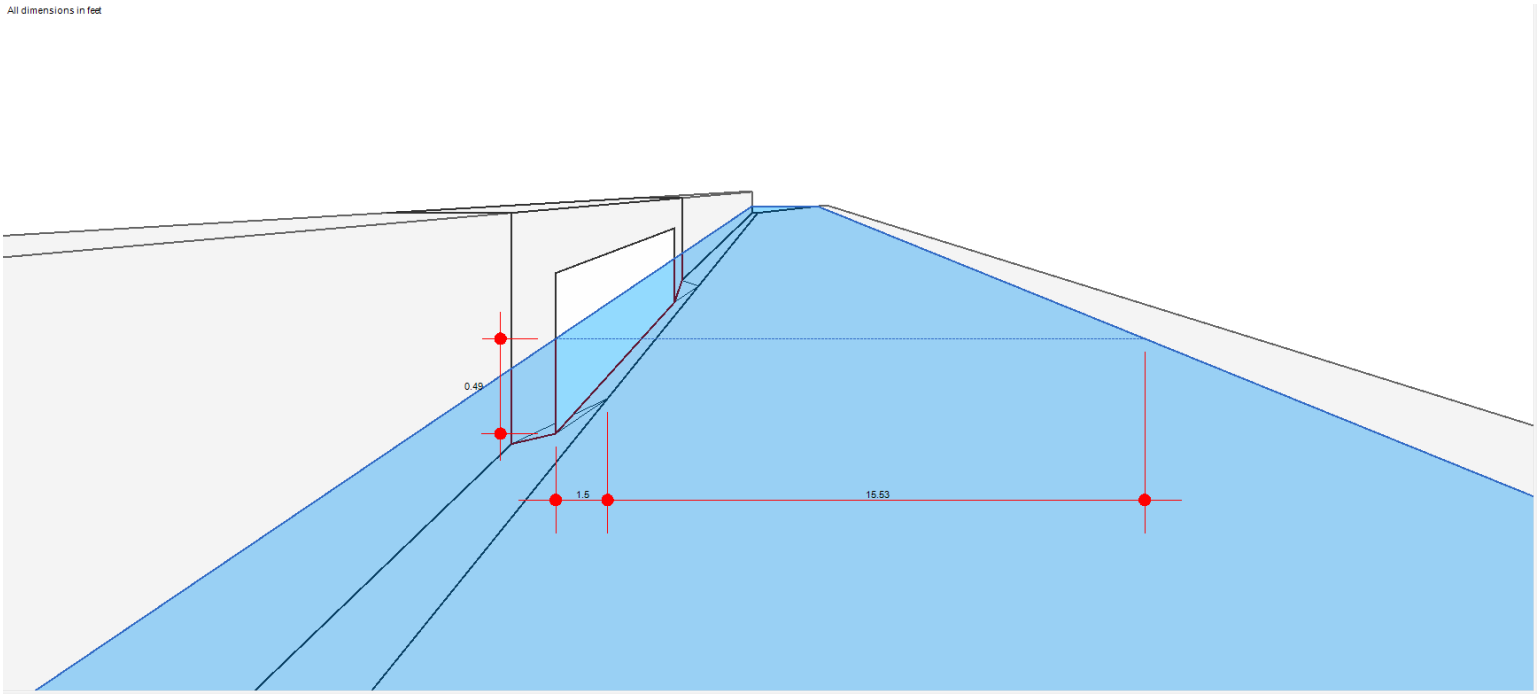
Slope, Sw (ft/ft)	= 0.010
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 4.15

Highlighted

Q Total (cfs)	= 4.15
Q Capt (cfs)	= 4.15
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 5.91
Efficiency (%)	= 100
Gutter Spread (ft)	= 17.03
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 1 2021

CB #4 Sizing Q100

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

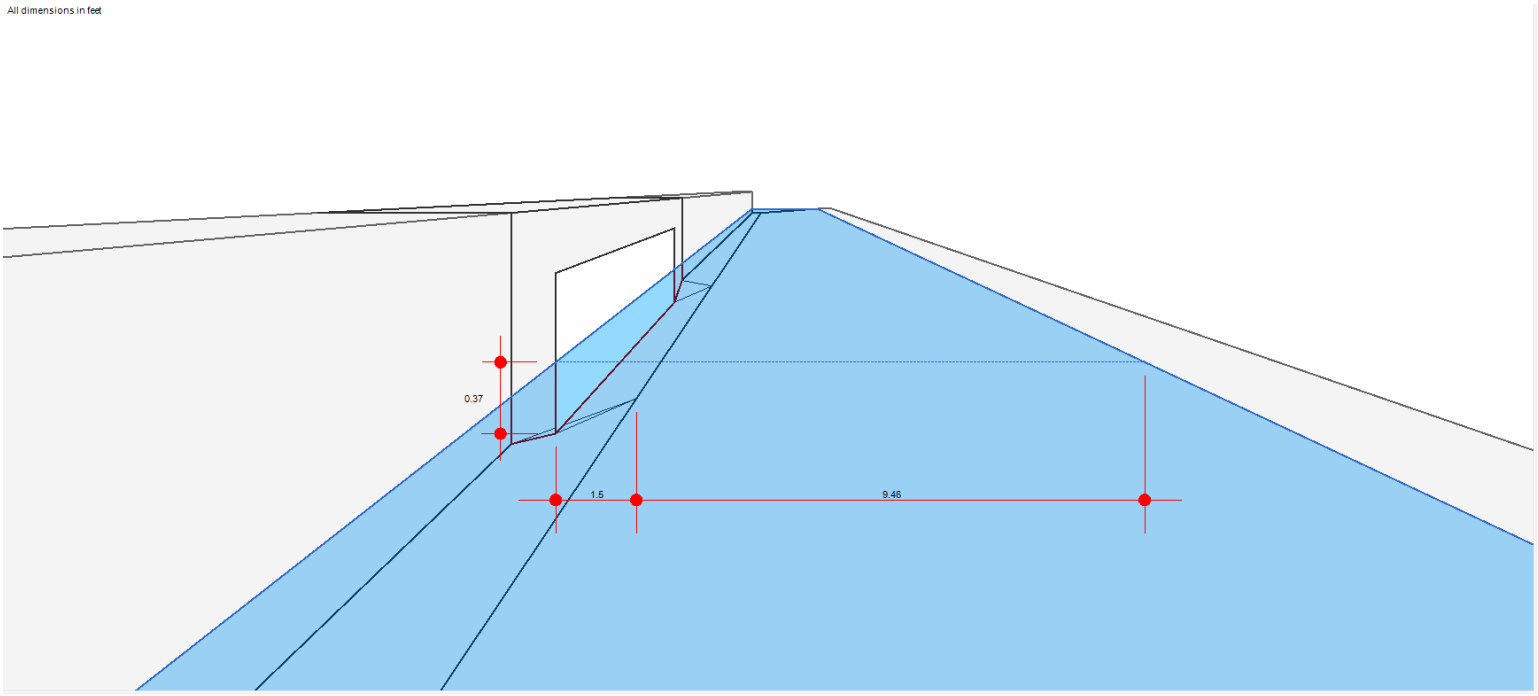
Slope, Sw (ft/ft)	= 0.010
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 2.06

Highlighted

Q Total (cfs)	= 2.06
Q Capt (cfs)	= 2.06
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 4.45
Efficiency (%)	= 100
Gutter Spread (ft)	= 10.96
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

CB #5 Sizing Q100

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

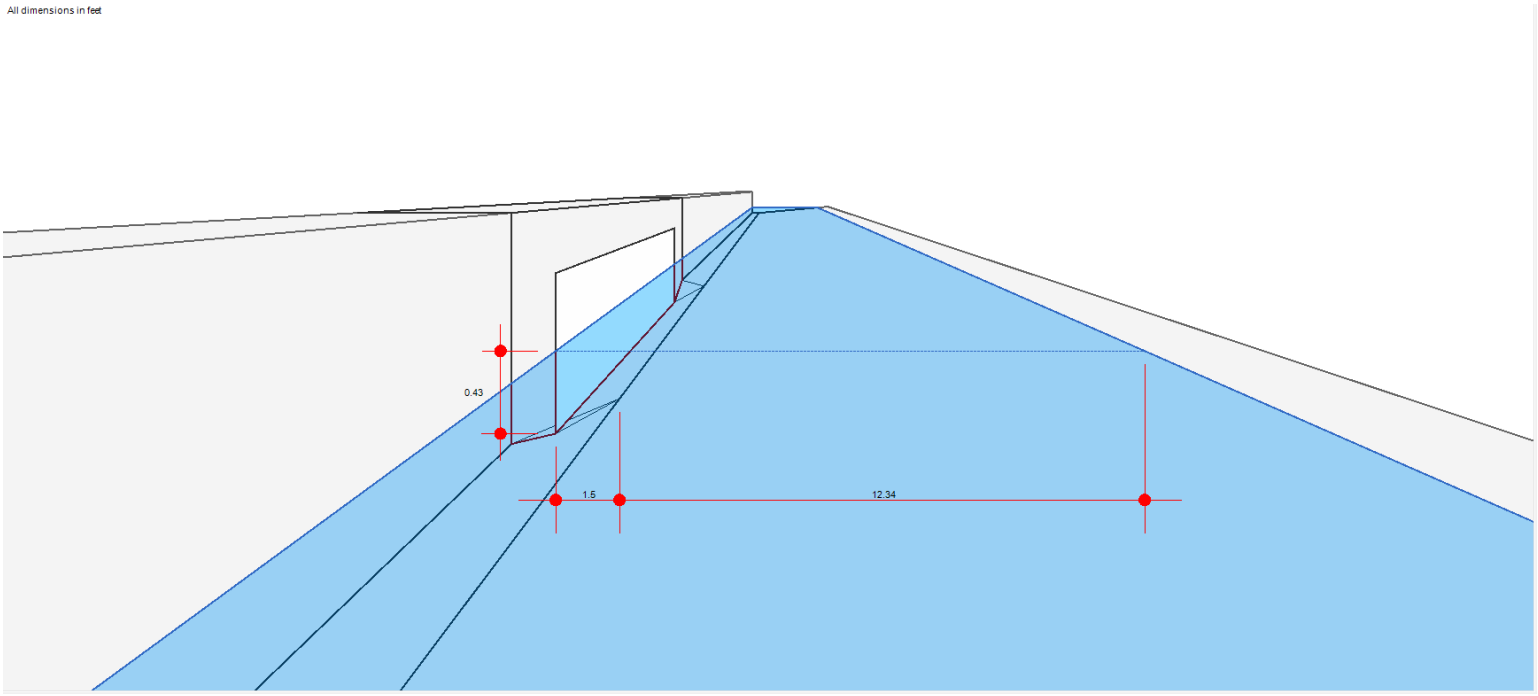
Slope, Sw (ft/ft)	= 0.010
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 2.99

Highlighted

Q Total (cfs)	= 2.99
Q Capt (cfs)	= 2.99
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 5.14
Efficiency (%)	= 100
Gutter Spread (ft)	= 13.84
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

CB #6 Sizing Q100

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

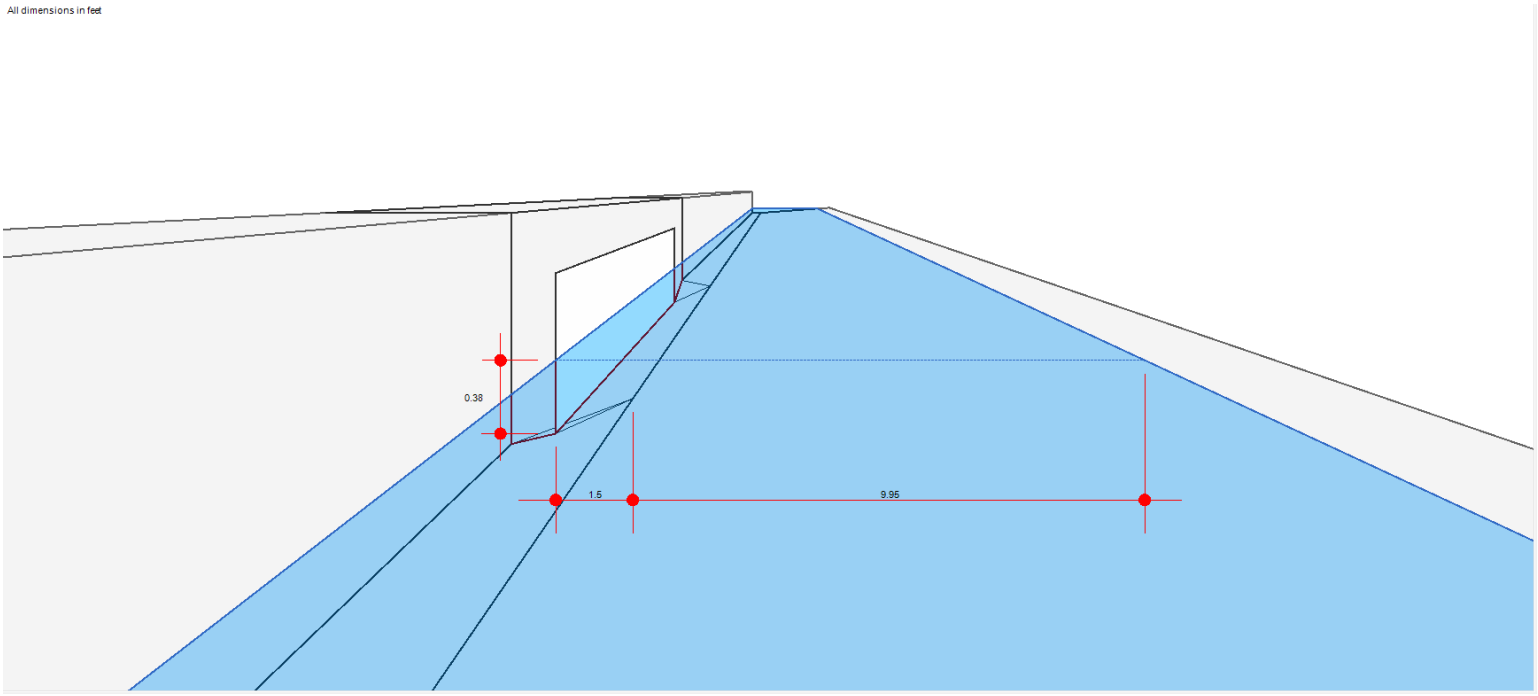
Slope, Sw (ft/ft)	= 0.010
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 2.21

Highlighted

Q Total (cfs)	= 2.21
Q Capt (cfs)	= 2.21
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 4.57
Efficiency (%)	= 100
Gutter Spread (ft)	= 11.45
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

CB #7 Sizing Q100

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

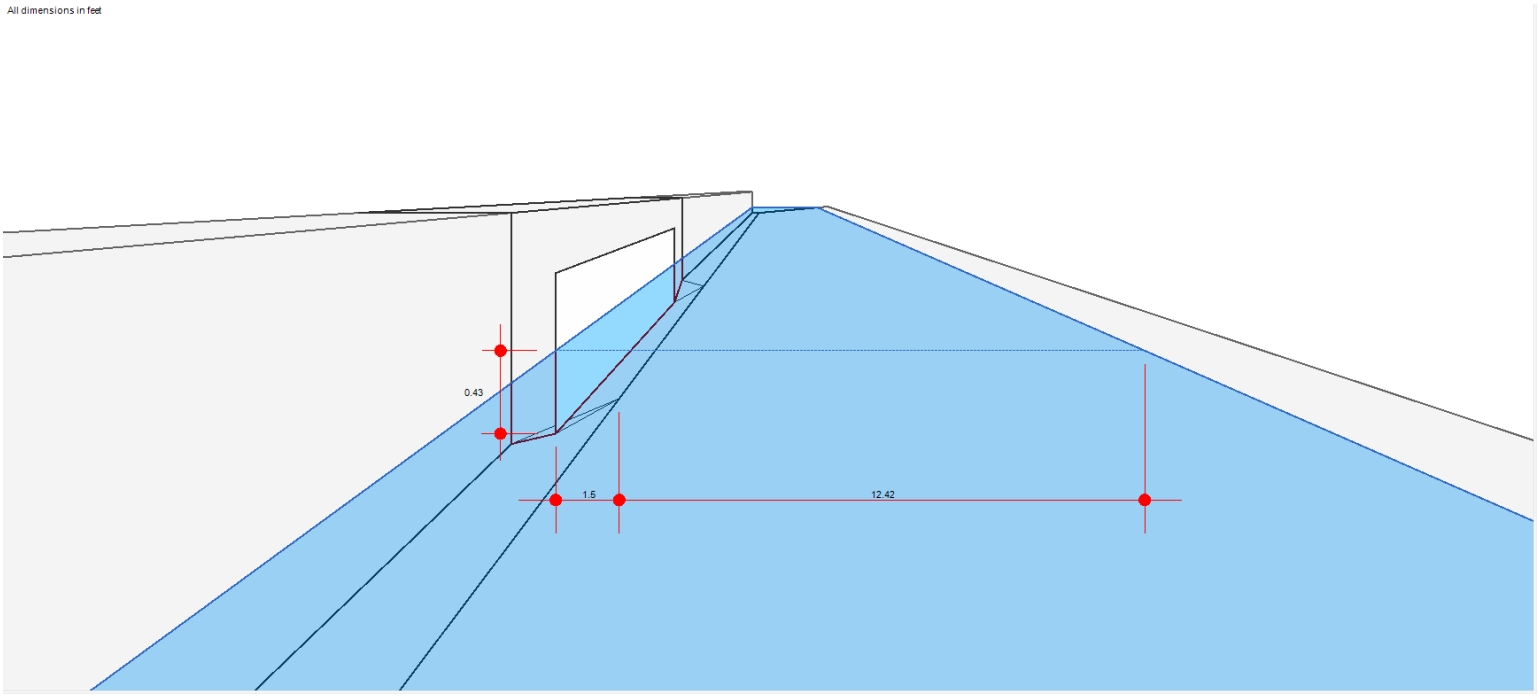
Slope, Sw (ft/ft)	= 0.010
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 3.02

Highlighted

Q Total (cfs)	= 3.02
Q Capt (cfs)	= 3.02
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 5.16
Efficiency (%)	= 100
Gutter Spread (ft)	= 13.92
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Pipe Sizing

(To be provided during Final Engineering)

Parkway Culvert Sizing

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, May 17 2021

Parkway Culvert #1_Q100

Rectangular

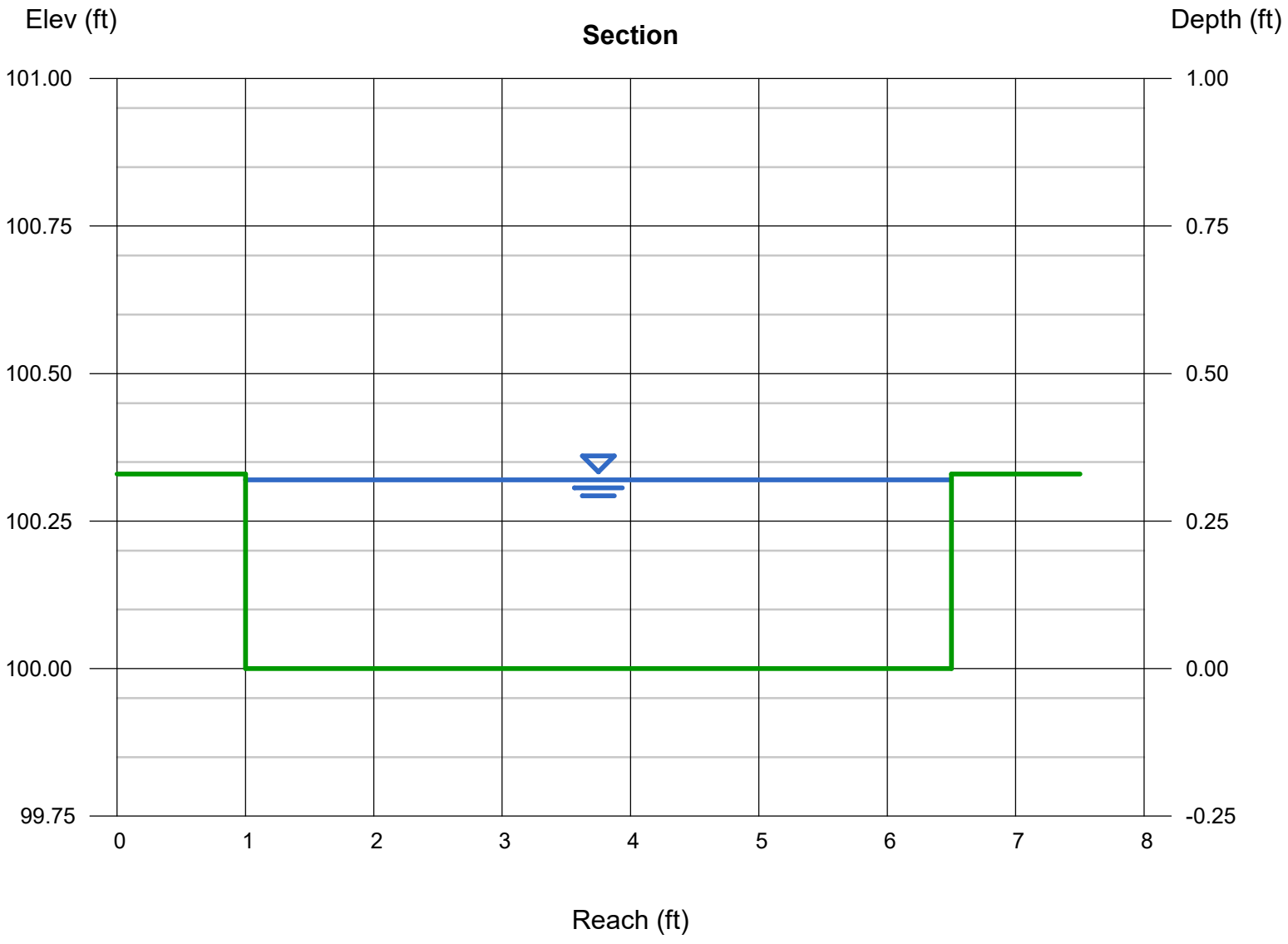
Bottom Width (ft)	= 5.50
Total Depth (ft)	= 0.33
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 11.79

Highlighted

Depth (ft)	= 0.32
Q (cfs)	= 11.79
Area (sqft)	= 1.76
Velocity (ft/s)	= 6.70
Wetted Perim (ft)	= 6.14
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 5.50
EGL (ft)	= 1.02



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, May 17 2021

Parkway Culvert #2_Q100

Rectangular

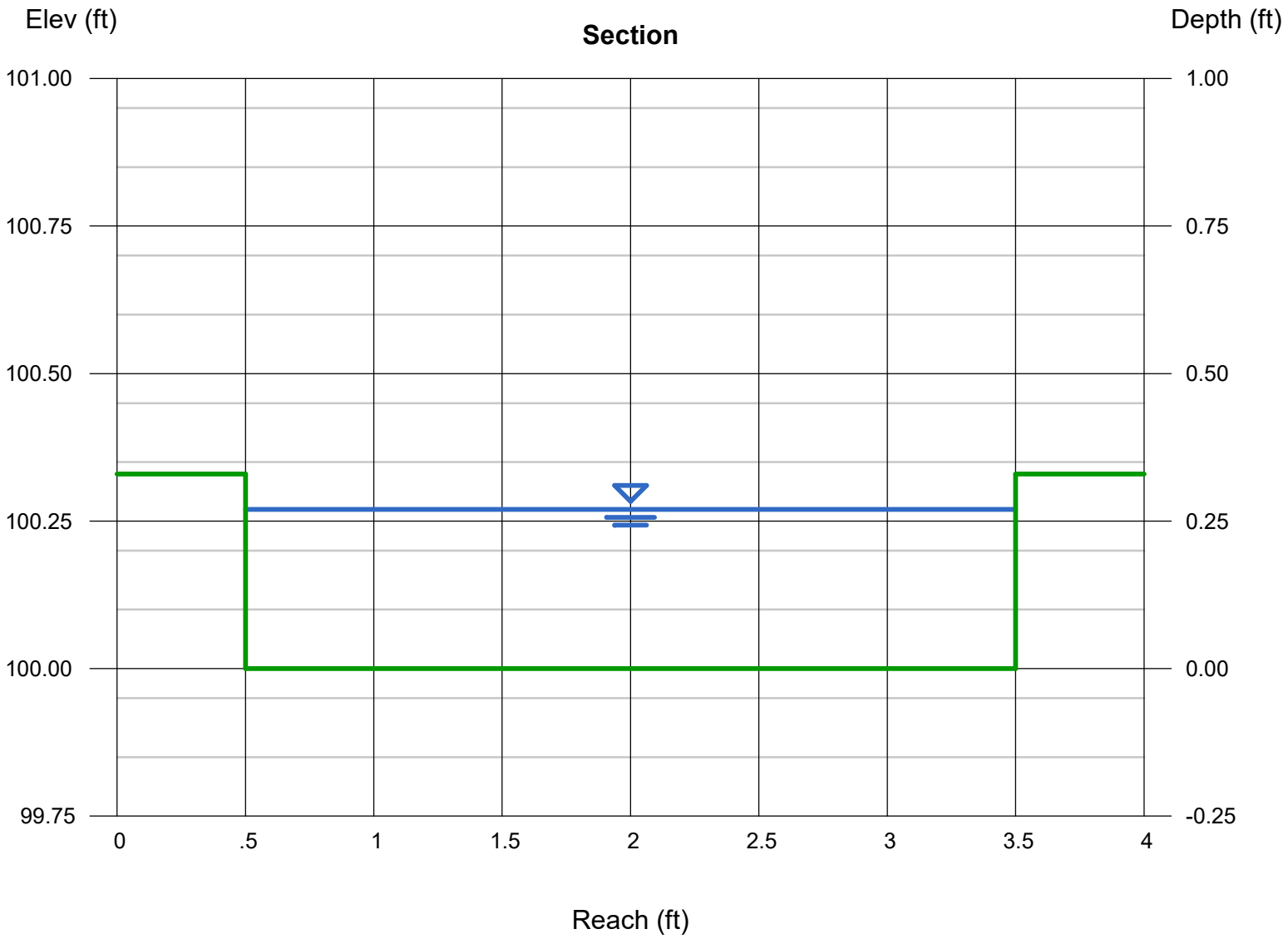
Bottom Width (ft)	= 3.00
Total Depth (ft)	= 0.33
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.88

Highlighted

Depth (ft)	= 0.27
Q (cfs)	= 4.880
Area (sqft)	= 0.81
Velocity (ft/s)	= 6.02
Wetted Perim (ft)	= 3.54
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 3.00
EGL (ft)	= 0.83



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, May 17 2021

Parkway Culvert #3_Q100

Rectangular

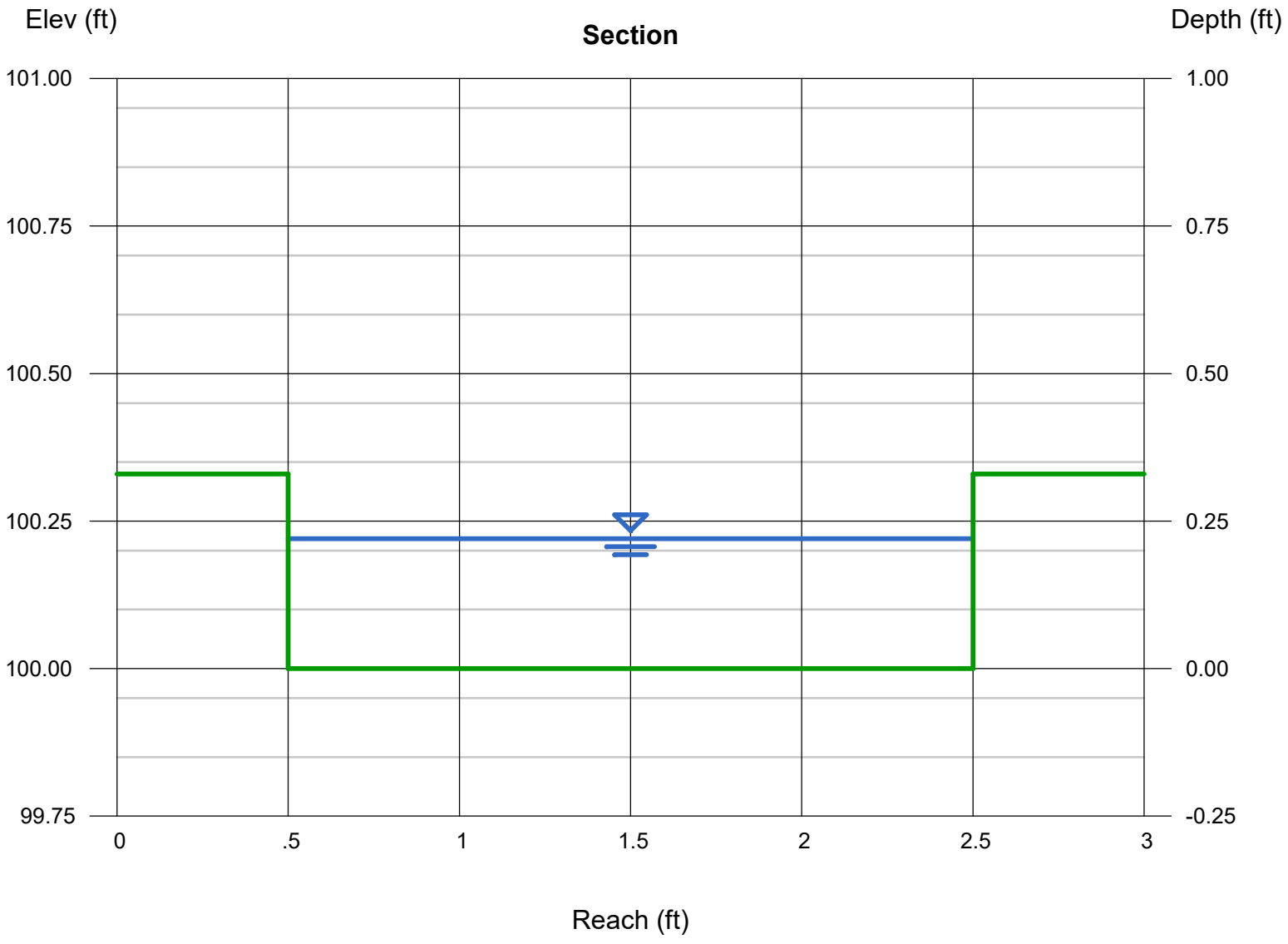
Bottom Width (ft)	= 2.00
Total Depth (ft)	= 0.33
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.21

Highlighted

Depth (ft)	= 0.22
Q (cfs)	= 2.210
Area (sqft)	= 0.44
Velocity (ft/s)	= 5.02
Wetted Perim (ft)	= 2.44
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 2.00
EGL (ft)	= 0.61



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, May 17 2021

Parkway Culvert #4_Q100

Rectangular

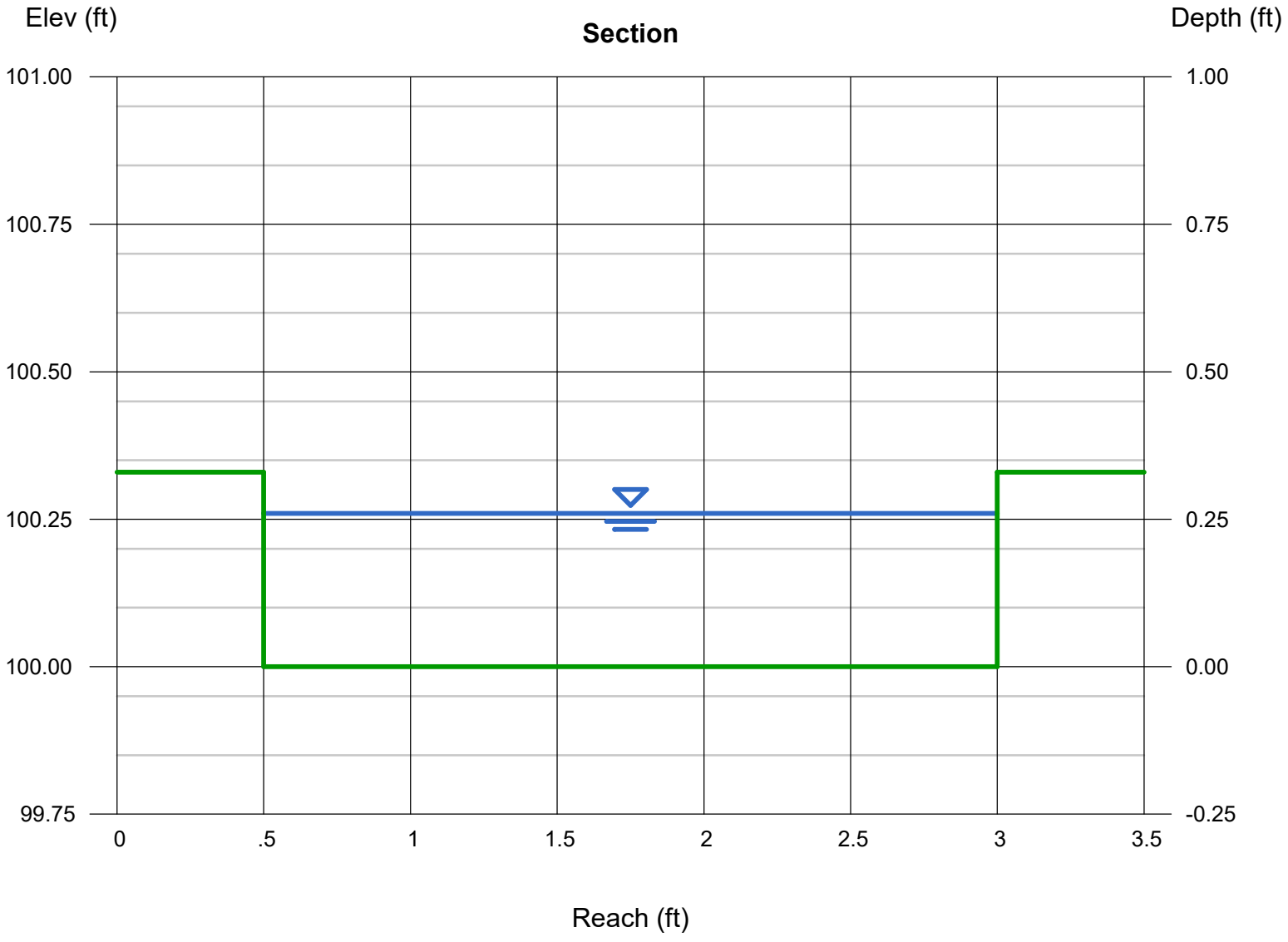
Bottom Width (ft)	= 2.50
Total Depth (ft)	= 0.33
Invert Elev (ft)	= 100.00
Slope (%)	= 2.00
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.74

Highlighted

Depth (ft)	= 0.26
Q (cfs)	= 3.740
Area (sqft)	= 0.65
Velocity (ft/s)	= 5.75
Wetted Perim (ft)	= 3.02
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 2.50
EGL (ft)	= 0.77



Wall Knockout Sizing

Weir Report

Wall Knockout

Rectangular Weir

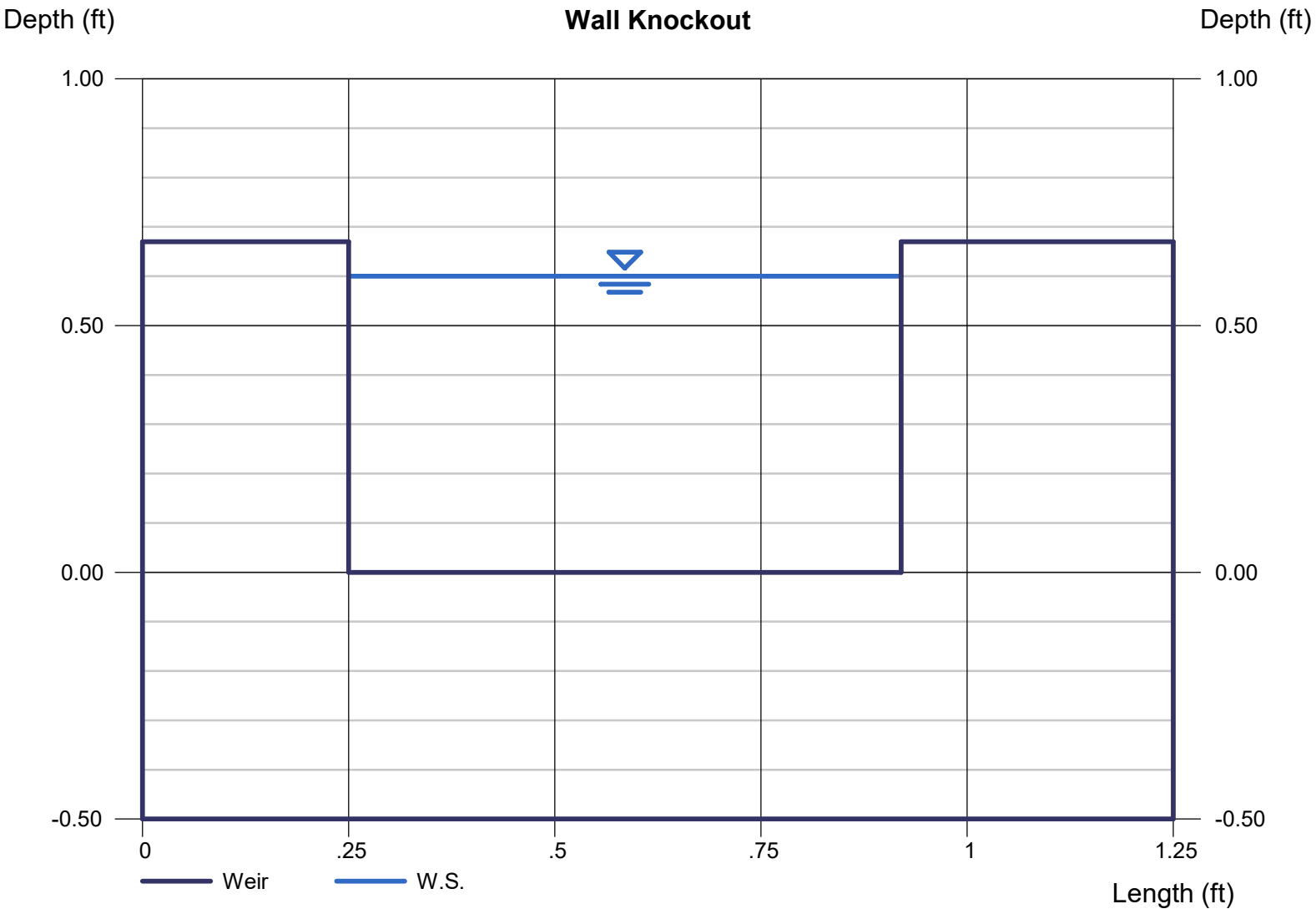
Crest	= Sharp
Bottom Length (ft)	= 0.67
Total Depth (ft)	= 0.67

Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Known Depth
Known Depth (ft)	= 0.60

Highlighted

Depth (ft)	= 0.60
Q (cfs)	= 1.037
Area (sqft)	= 0.40
Velocity (ft/s)	= 2.58
Top Width (ft)	= 0.67



100-Year Water Surface Ponding Calculations

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 1 2021

Q100_CB # 3 Depth of Flow

User-defined

Invert Elev (ft)	= 254.60
Slope (%)	= 0.80
N-Value	= 0.013

Calculations

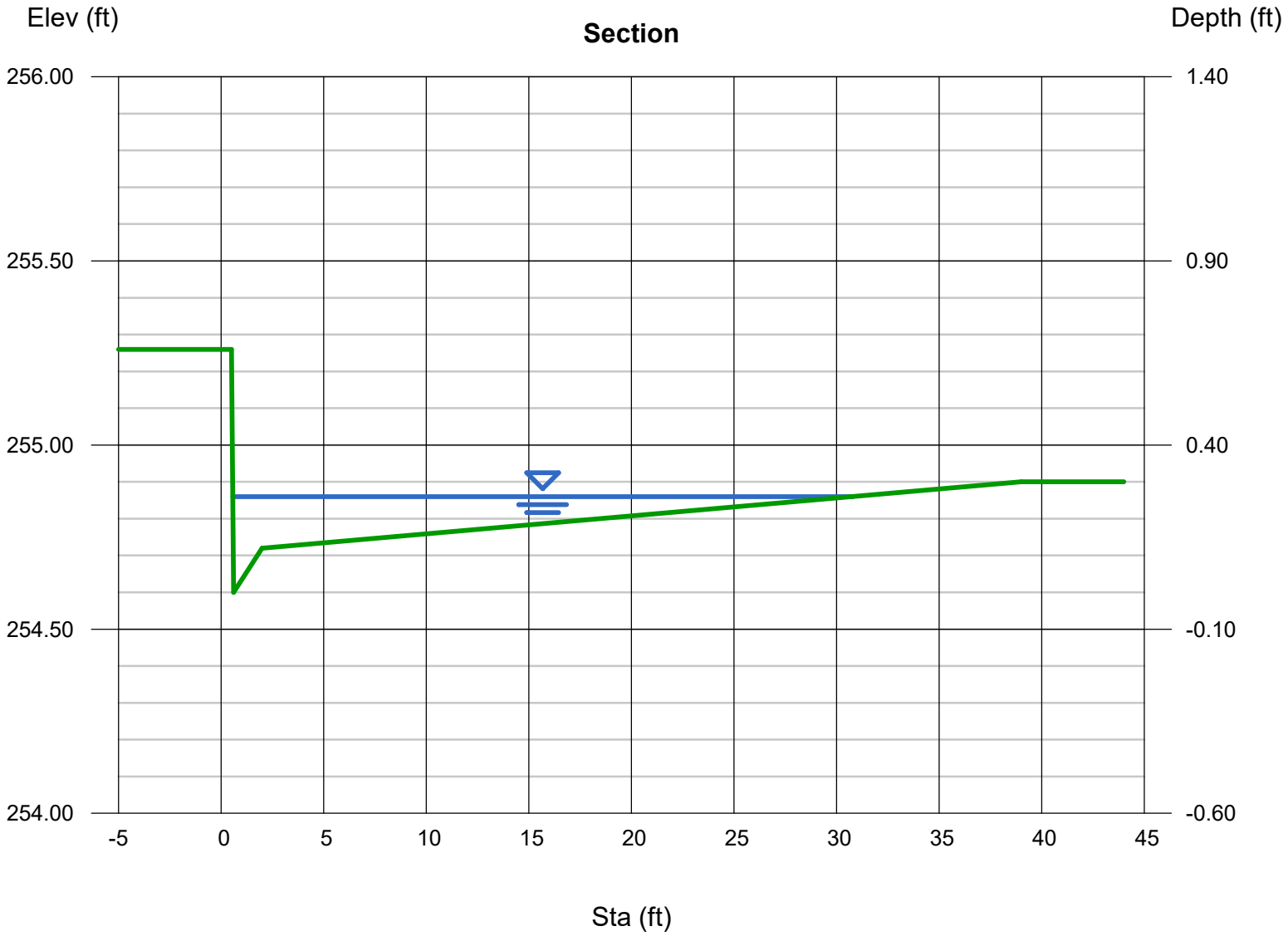
Compute by:	Known Q
Known Q (cfs)	= 4.15

Highlighted

Depth (ft)	= 0.26
Q (cfs)	= 4.150
Area (sqft)	= 2.30
Velocity (ft/s)	= 1.81
Wetted Perim (ft)	= 30.44
Crit Depth, Yc (ft)	= 0.27
Top Width (ft)	= 30.21
EGL (ft)	= 0.31

(Sta, El, n)-(Sta, El, n)...

(0.00, 255.26)-(0.50, 255.26, 0.013)-(0.61, 254.60, 0.013)-(2.00, 254.72, 0.013)-(39.00, 254.90, 0.013)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 1 2021

Q100_CB # 4 Depth of Flow

User-defined

Invert Elev (ft)	= 256.05
Slope (%)	= 0.80
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.06

Highlighted

Depth (ft)	= 0.23
Q (cfs)	= 2.060
Area (sqft)	= 1.42
Velocity (ft/s)	= 1.45
Wetted Perim (ft)	= 23.05
Crit Depth, Yc (ft)	= 0.24
Top Width (ft)	= 22.85
EGL (ft)	= 0.26

(Sta, El, n)-(Sta, El, n)...

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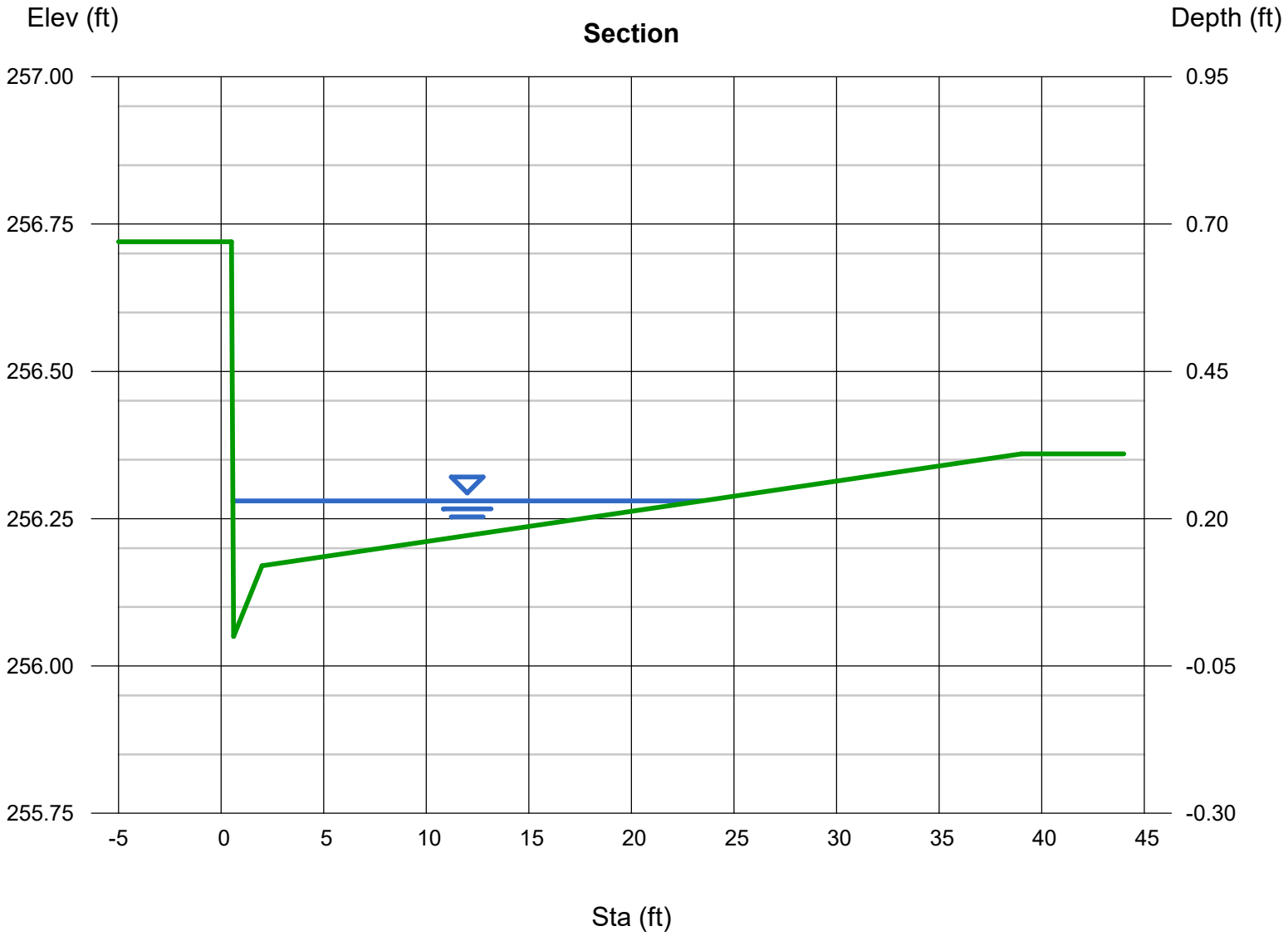

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Mar 9 2021

Q100_CB #5 Depth of Flow

User-defined

Invert Elev (ft)	= 257.59
Slope (%)	= 0.80
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.99

Highlighted

Depth (ft)	= 0.25
Q (cfs)	= 2.990
Area (sqft)	= 1.92
Velocity (ft/s)	= 1.56
Wetted Perim (ft)	= 26.97
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 26.75
EGL (ft)	= 0.29

(Sta, El, n)-(Sta, El, n)...

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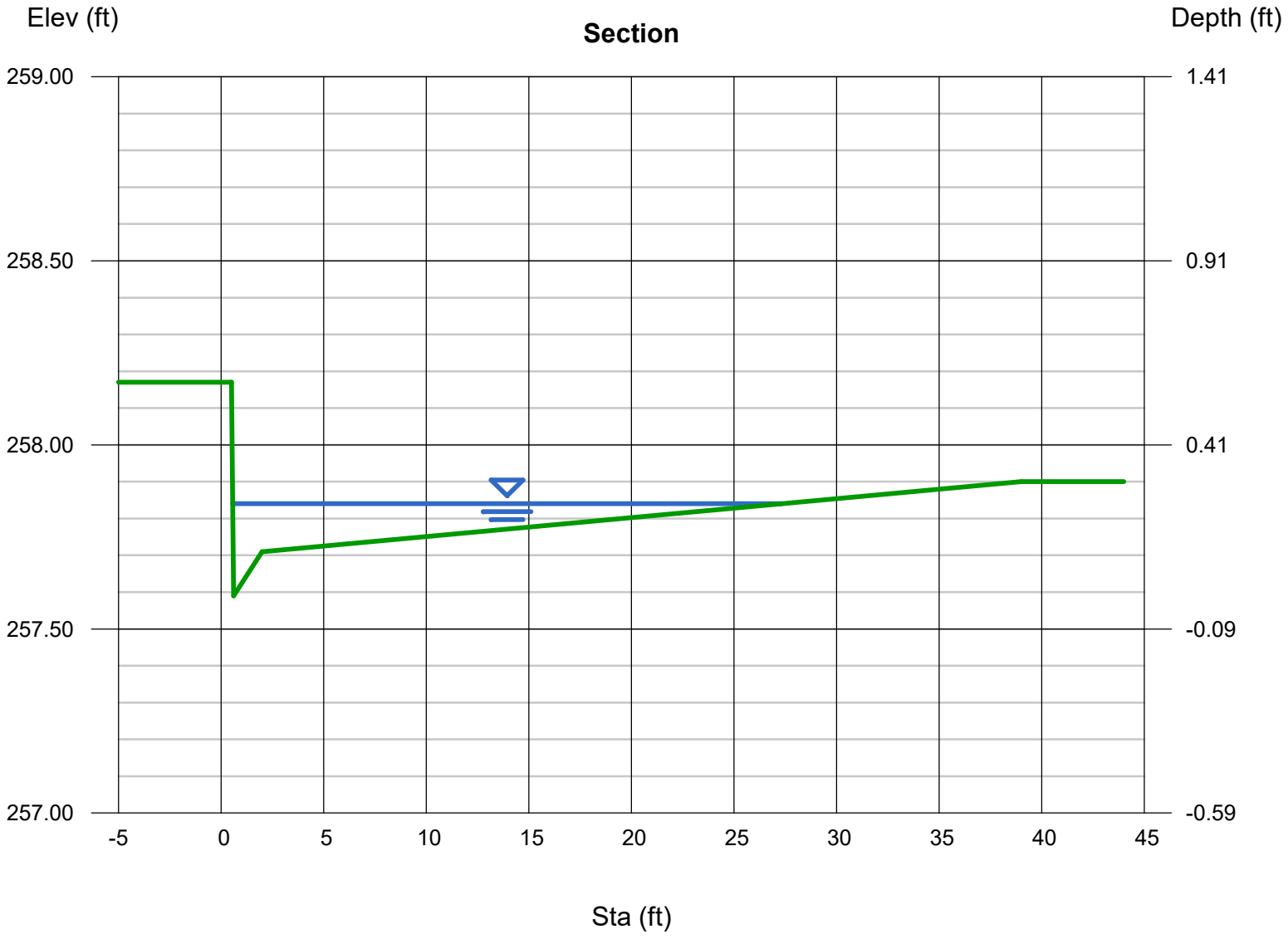

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 1 2021

CB #6 Depth of Flow

User-defined

Invert Elev (ft)	= 255.71
Slope (%)	= 0.80
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.21

Highlighted

Depth (ft)	= 0.37
Q (cfs)	= 2.210
Area (sqft)	= 1.17
Velocity (ft/s)	= 1.89
Wetted Perim (ft)	= 12.66
Crit Depth, Yc (ft)	= 0.38
Top Width (ft)	= 12.28
EGL (ft)	= 0.43

(Sta, El, n)-(Sta, El, n)...

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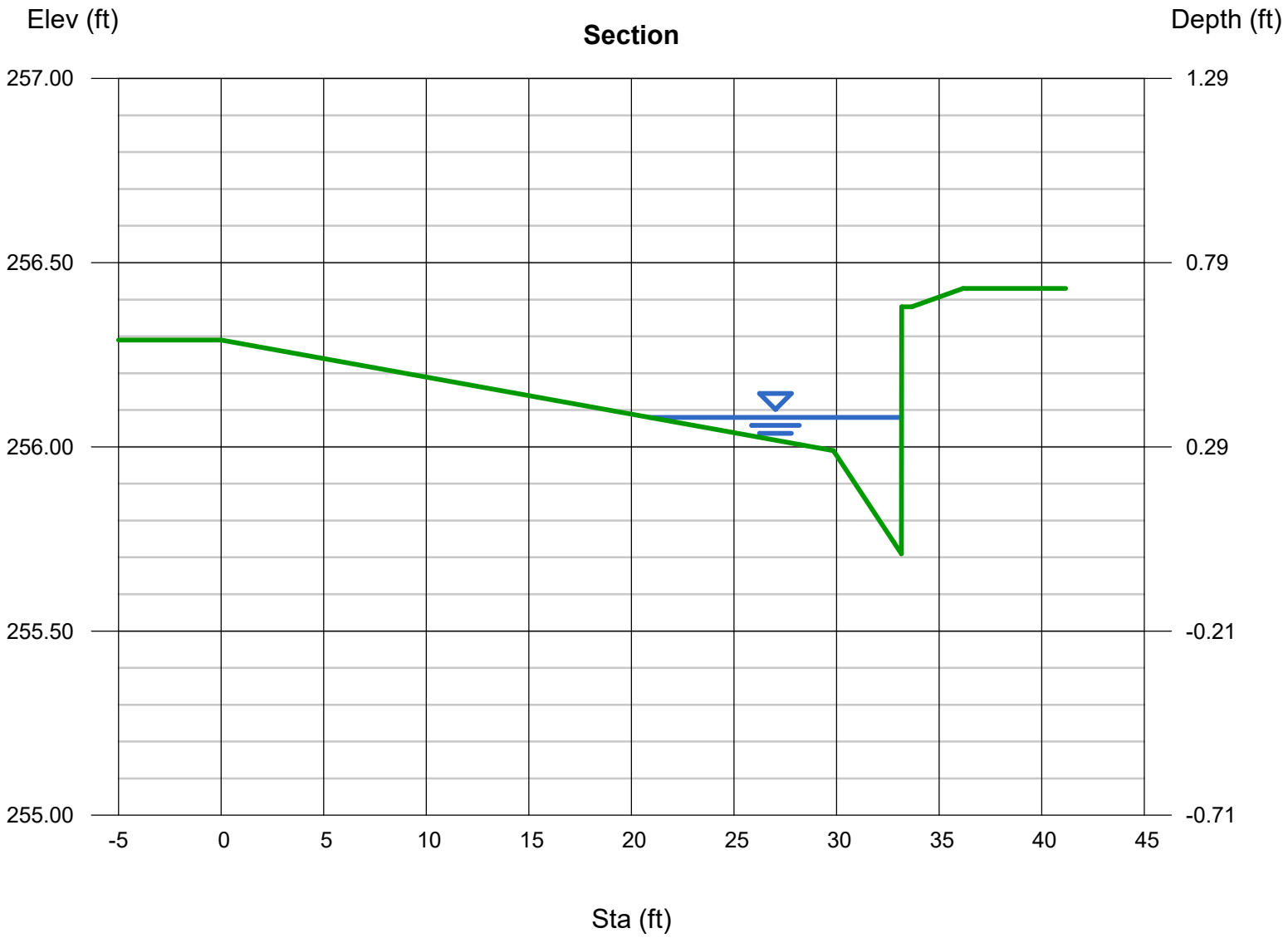

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Mar 9 2021

Q100_CB #7 Depth of Flow

User-defined

Invert Elev (ft)	= 259.67
Slope (%)	= 0.80
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.02

Highlighted

Depth (ft)	= 0.25
Q (cfs)	= 3.020
Area (sqft)	= 1.92
Velocity (ft/s)	= 1.58
Wetted Perim (ft)	= 26.97
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 26.75
EGL (ft)	= 0.29

(Sta, El, n)-(Sta, El, n)...

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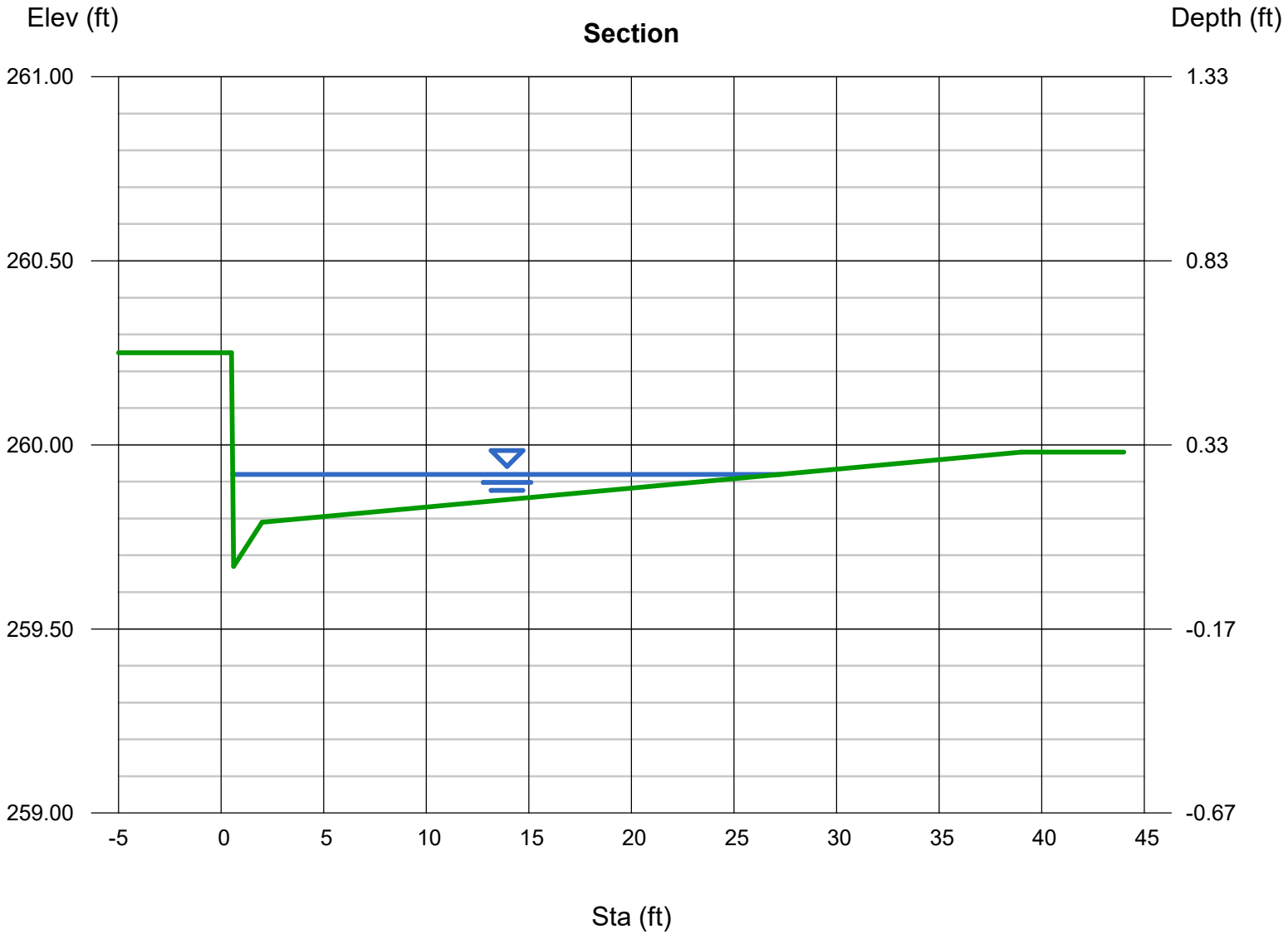
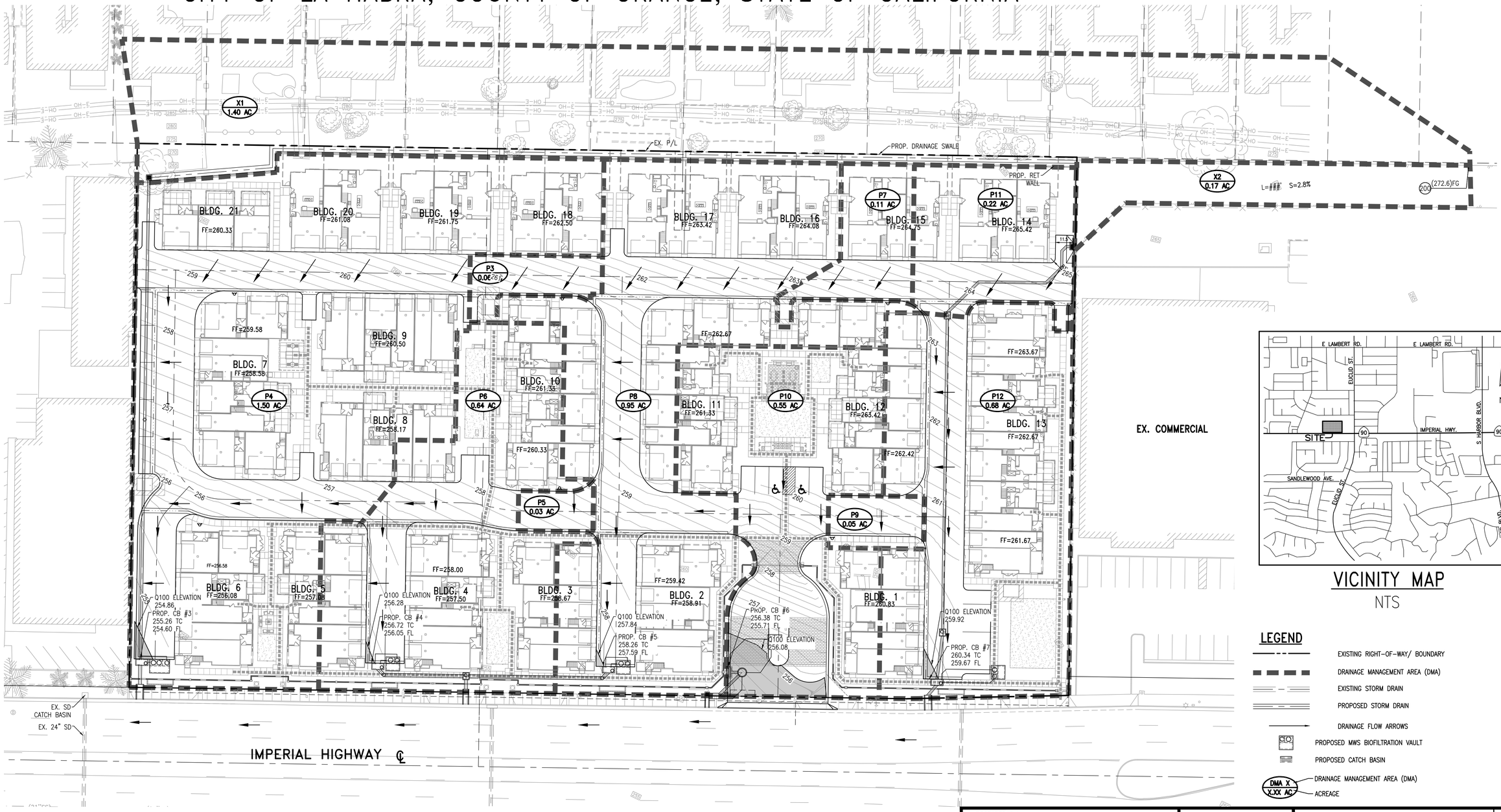


PONDING EXHIBIT

TR 19143

251–271 AND 341–351 IMPERIAL HIGHWAY

CITY OF LA HABRA, COUNTY OF ORANGE, STATE OF CALIFORNIA



VICINITY MAP

NTS

LEGEND

- EXISTING RIGHT–OF–WAY/ BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- DRAINAGE FLOW ARROWS
- PROPOSED MWS BIOFILTRATION VAULT
- PROPOSED CATCH BASIN
- DMA X / X.XX AC — DRAINAGE MANAGEMENT AREA (DMA) / ACREAGE

1" = 30'

0 15 30 60

PREPARED BY :

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET

REGISTERED PROFESSIONAL ENGINEER
RYAN J. BITTNER
No. 68167
CIVIL
STATE OF CALIFORNIA

TENTATIVE TRACT NO. 19143
PONDING EXHIBIT

DATE: 5/17/2021

SHEET 1 OF 1

SCALE: AS SHOWN | DRAWN BY: SP | CHECKED BY: JH

CITY OF LA HABRA

APPENDIX D
REFERENCE MATERIALS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	90	0.8/4.1, 8.1/13.0	25	134

12/15/99
REGISTERED CIVIL ENGINEER

TAN NGUYEN No. C 047660 Exp. 12/31/99 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

6-19-00
PLANS APCPROVALDATE

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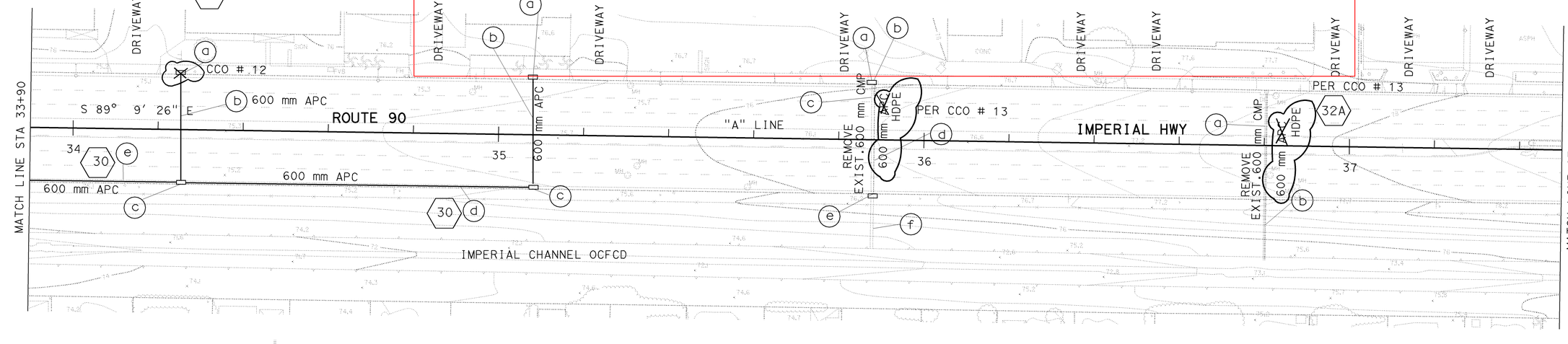
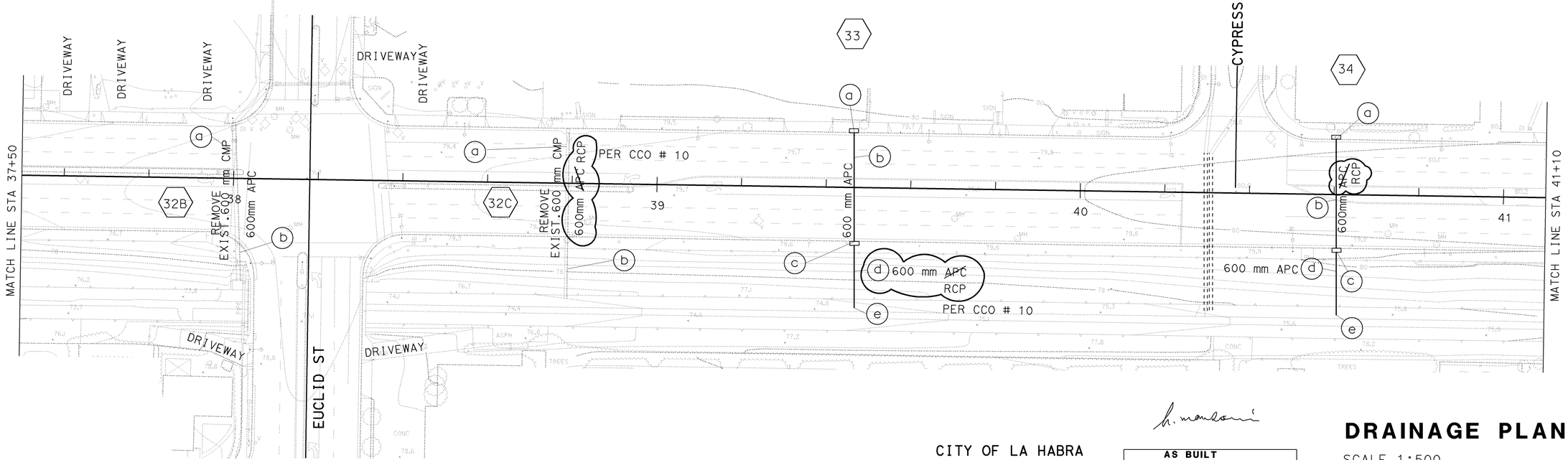
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

CITY OF LA HABRA

SITE





CITY OF LA HABRA

AS BUILT
CONTRACT NUMBER 12-0296A4
CORRECTIONS BY MIKE GROTKE
COMPLETION DATE FEB. 14, 2003

DRAINAGE PLAN

SCALE 1:500

D-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
HYDRAULICS
PROJECT ENGINEER
TAN T NGUYEN
CALCULATED/ DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED
SJO 8/98

LAST REVISION 11-15-99
DATE PLOTTED => 09-DEC-2005
TIME PLOTTED => 11:48

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => ajalali
c0296Ai04.dgn

CU 12209

0296A1

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	Ora	90	0.8/4.1 8.1/13.0	42	134

12/15/99
REGISTERED CIVIL ENGINEER

T NGUYEN
No. C47660
Exp. 12/31/99
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

6-19-00
PLANS APCPROVALDATE

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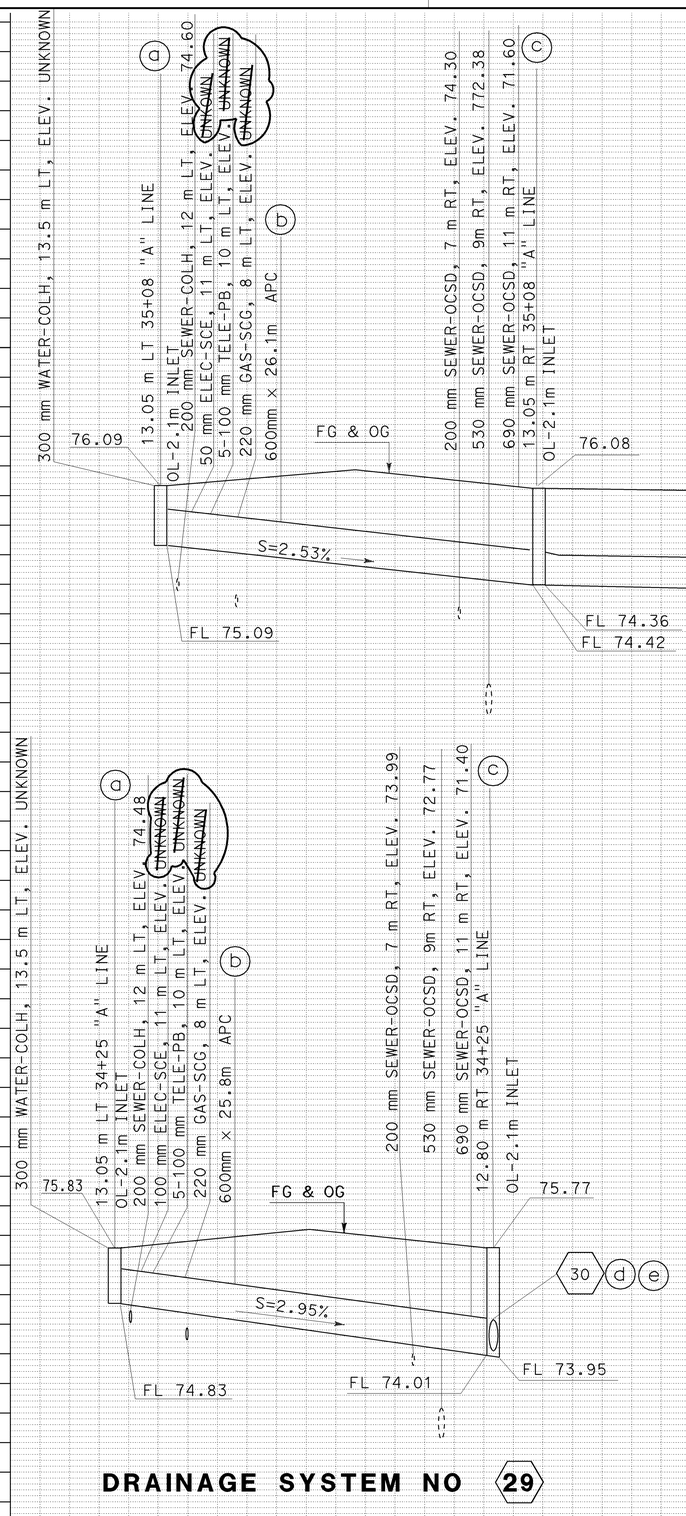
Caltrans Metric

DRAINAGE SYSTEM NO 29



DRAINAGE SYSTEM NO 30

DRAINAGE SYSTEM NO 30

AS BUILT
CONTRACT NUMBER 12-0296A4
CORRECTIONS BY MIKE GROTKE
COMPLETION DATE FEB. 14, 2003

DRAINAGE PROFILE

SCALE: Horiz 1:200
Vert 1:50

D-21

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
HYDRAULICS

PROJECT ENGINEER
TAN T NGUYEN

CALCULATED/ DESIGNED BY
CHECKED BY

DATE REVISED BY

Station
m³ Exc
Emb

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => ajalali
DGN FILE => c0296ai22.dgn

CU 12209

EA 0296A1

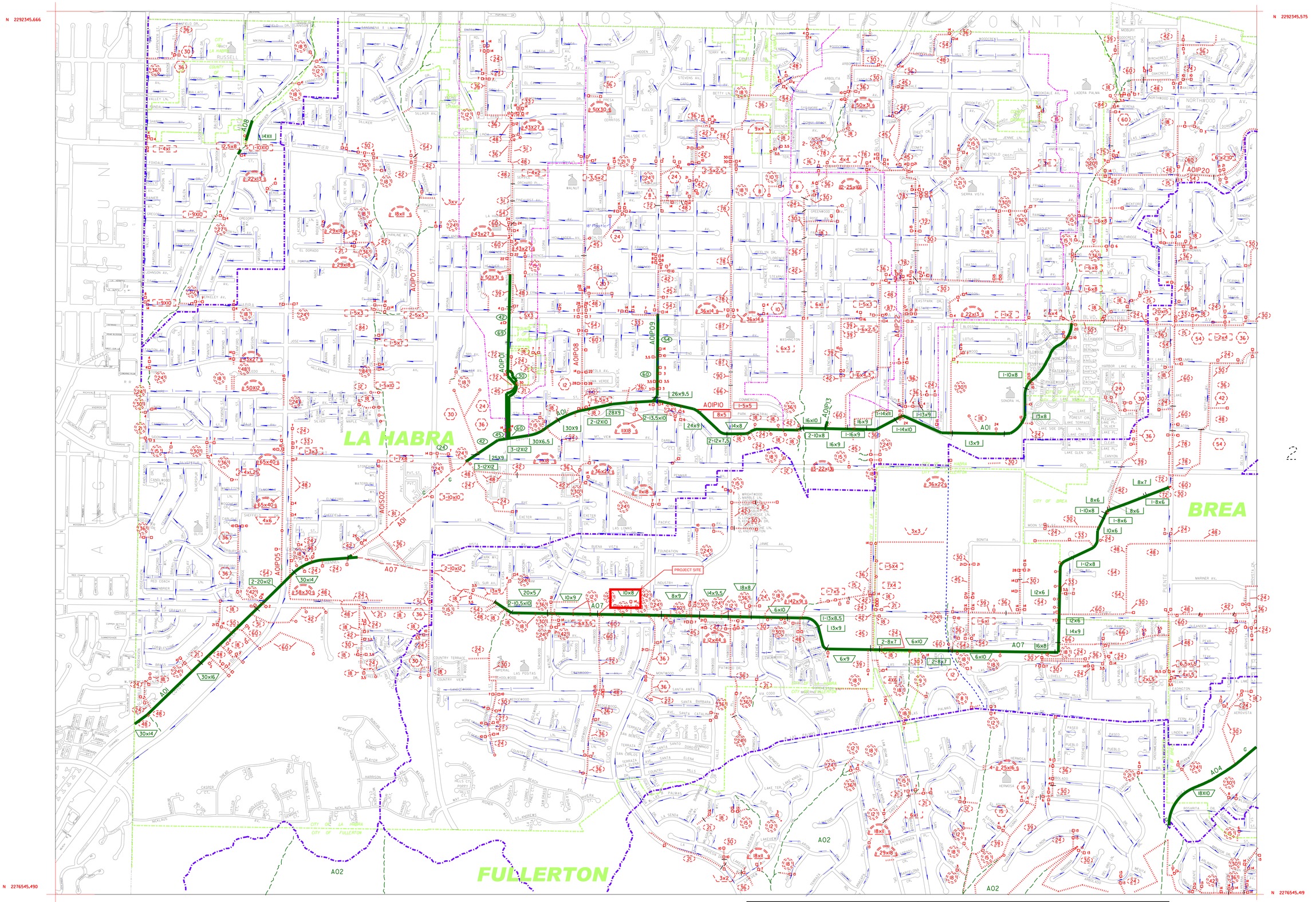
REVISION DATE PLOTTED => 09-DEC-2005
TIME PLOTTED => 12:31
11-09-99

E 6036406.487

N 2292345.666

E 6057906.734

N 2292345.575



N 2276545.490

E 6036406.645

N 2276545.419

E 6057906.870

N

0 200 400 600 800

FEET

NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for inaccuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JAN 3,201	1	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet.Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

N 2276545.824

N 2276545.490

E 6049406.39

E 6036406.645

E 6049406.528

E 6036406.802

N 2260745.634

N 2260745.32

O.C.F.C.D. maintains Coyote Creek (AO1) from North Fork to the beginning of O.C.F.C.D. R/W 5200' south of the center line of Imperial Hwy per Agreement No. BO2 (566-U) with L.A.C.F.C.D.

Coyote Creek from the ocean to North Fork is owned and maintained by L.A.C.F.C.D.

NOTICE

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ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	MAR.12,2010	5	MAPS-113-5

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G Greenbelt
- P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet./Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

N

0 200 400 600 800 FEET

5

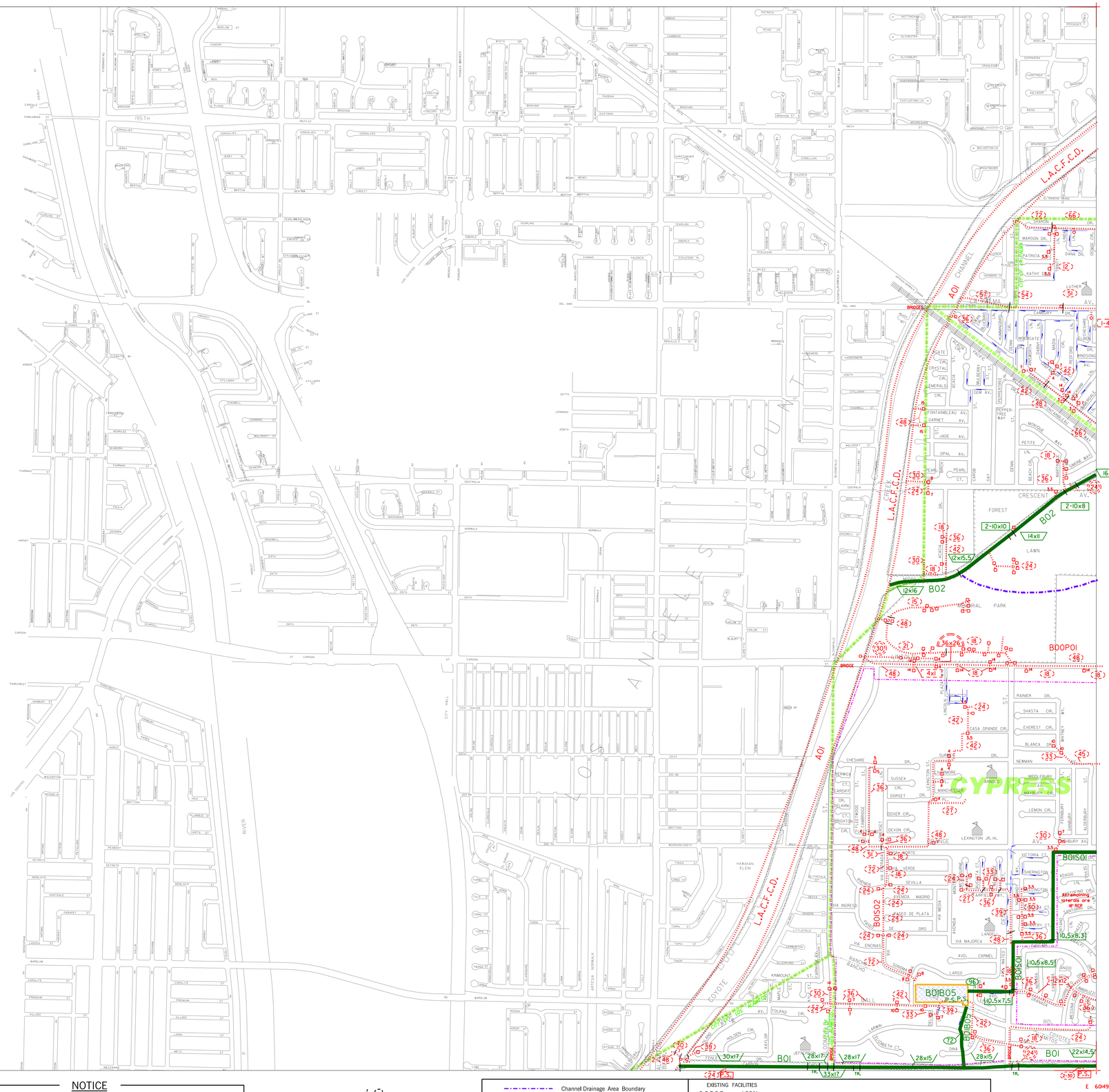
5

E 5993406.222

N 2260746.069

E 6014906.528

N 2260745.634



N 2244945.876

E 5993406.320

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E 6014906.665

12

13

NOTICE

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To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	OCT. 1, 2007	II	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

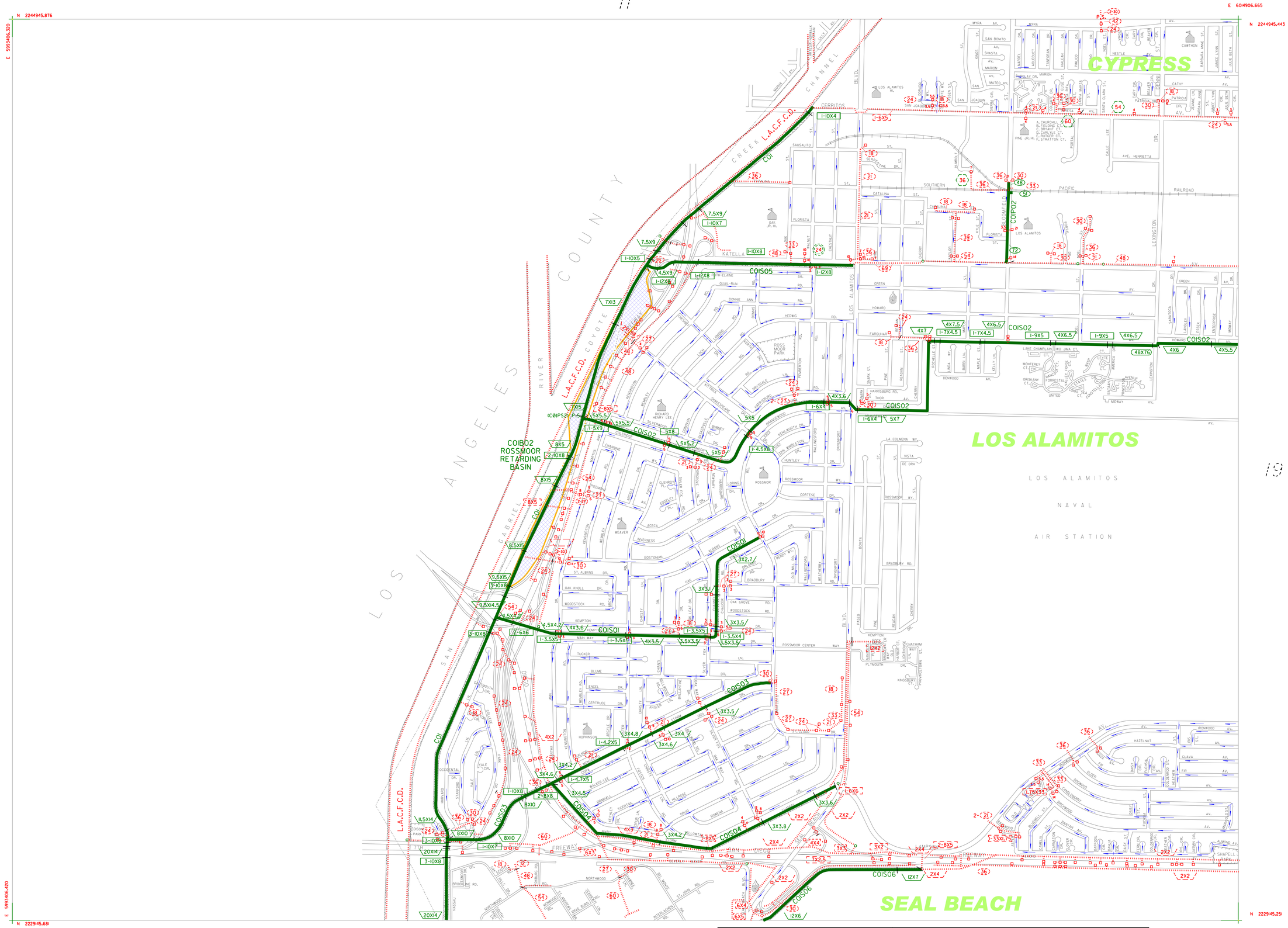
EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet.Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

N

0 200 400 600 800

FEET



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ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JUN 9, 2008	18	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

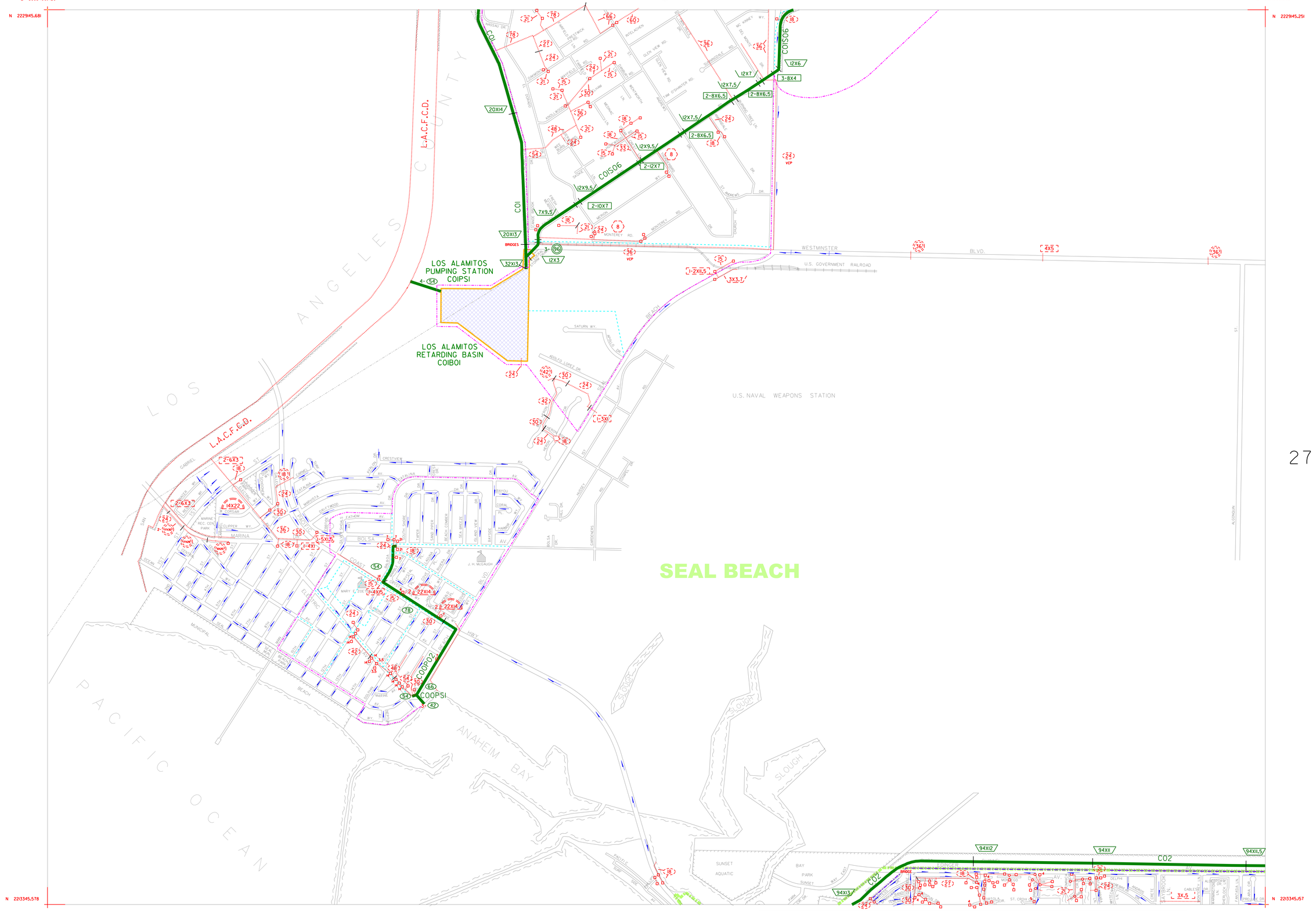
Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet/Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

0 200 400 600 800 FEET

E 5993406.420
N 2229145.681

E 6014906.805
N 2229145.251



N

0 200 400 600 800
FEET

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To notify the Resources & Development Management Department (RDMD) of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@rdmd.ocgov.com

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	MAR. 7, 2007	26	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet /Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

26