ALTERNATE PRELIMINARY HYDROLOGY STUDY
4665 Lampson Avenue
LOS ALAMITOS, CA
TTM No. 19263

Project Address:

4665 Lampson Avenue
Los Alamitos, California 90720

Prepared For:

MJW Investments, LLC
27702 Crown Valley Parkway
Suite D-4-197
Ladera Ranch, Ca 92694

Prepared By:

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

Prepared: March 2023
Revised: September 2023

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Preliminary Hydrology Study
For
4665 Lampson Avenue
TR 19263, Los Alamitos

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

_____ _____

Philip Malcomson, R.C.E. 67819 Date
Principal, C&V Consulting, Inc.

1.0 SITE DESCRIPTION:

The proposed development encompasses one parcel consisting of approximately 12.37 acres as shown on the Assessor's Parcel Map, Book 14, Page 31, County of Orange, dated February 1891. The project is bounded to the south by Lampson Avenue, a golf course to the east, the Seal Beach Joint Forces Training Base to the west, and a park to the north. There are 2 driveways that provide access to the site from Lampson Avenue. The site is currently occupied by the California Department of Fish and Wildlife with an associated parking lot and open space. Approximately 1/3 of the site consists of a paved parking lot. Along the west and northern property lines there is a drive aisle and parking that serves the park to the north. The rest of the site consists of a two-story office building, associated concrete sidewalks, and a large grassy/ brush filled open space. Per the City of Los Alamitos General Plan dated March 2015, Existing Land Use exhibit the site is located within the General Office designation. According to the city of Los Alamitos Zoning Map the site is located within the C-F Community Facilities designation.

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 Los Alamitos drainage requirements.

3.0 EXISTING CONDITIONS:

According to existing topography, the site elevations range from approximately 21 feet to 26 feet. The existing site generally flows in a north to south direction into an existing westerly flowing concrete channel along the site's southerly property line. The westerly flowing channel is collected via an offsite 18-inch CMP that flows under the offsite driveway to Arbor Park and discharges into an offsite earthen channel on the west side of the driveway. Runoff flows within this earthen channel are then collected by an existing 24-inch CMP that flows westerly, discharge into a westerly flowing earthen channel within the Joint Forces Training Base, and then drains to the Old Ranch Country Club to the south. Runoff is ultimately conveyed downstream into the San Gabriel River.

Per field observation, the existing concrete channel along the site's southerly property line currently ponds back to the existing driveway and may overflow onto Lampson Avenue. Per Orange County Flood Protection Goals attached in Appendix A, flooding is allowed over the curb for the 100-year storm event as long as the 1-foot freeboard from the building finished floor to the water surface elevation is provided; additionally, street flow calculations located within Appendix C.2, contributing Q25 street flows are contained below the top of curb with a 12-ft wide travel lane provided for emergency vehicles in accordance with Orange County Flood Protection requirements. Based on conversations with City of Seal Beach staff, historical stormwater flows in Lampson Avenue exceed the top of curb elevation during larger storm events. C&V Consulting conducted field observations and found that the existing concrete channel along the site's southerly property line currently ponds back to the existing driveway and may overflow onto Lampson Avenue.

Refer to the Existing Conditions Hydrology Map located within Appendix A.1 of this report for additional information.

4.0 PROPOSED CONDITIONS:

The proposed development will consist of 76 single family residential buildings (consisting of detached condos and attached townhomes) and 3 apartment buildings for a total of 246 dwelling units. Associated drive aisles, parking and flatwork will increase the impervious area compared to the existing condition of the site.

The proposed site's stormwater runoff will be conveyed by roof downspouts or street surface flow to proposed gutters and collected by thru-curb inlet bio-filtration devices or catch basin inlets for water quality treatment. The bio-filtration devices include internal overflow bypass that direct flows via on-site underground storm drain system to an underground detention system located under parking areas at the southwest portion of the site. From the detention system, a stormwater sump pump located in the southwest corner of the site will outlet flows onto Lampson Avenue via a parkway culvert. Due to existing flooding concerns on Lampson Avenue, the onsite pump system will allow for low flows to enter Lampson Avenue up until the time that the flows begin to exceed the allowed Q25 in Lampson Avenue. At that point, peak flows will be detained onsite. Once the flows are no longer above the allowed Q25 in Lampson Avenue, onsite flows will continue pumping to Lampson Avenue normally.

Proposed finished floor elevations for the onsite buildings shall be set 1-ft minimum above the Q100 water surface elevation in accordance with Orange County Flood Protection requirements.

A 10-ft dedication along the northern the property line to the adjacent park is proposed. This 10-ft dedication area is outside the proposed residential development and will not be tributary to the site's proposed storm drain system.

Refer to the Proposed Conditions Hydrology Map located within Appendix A.2 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.

Recommended perviousness values are based on existing and proposed land use.

Proposed conditions are analyzed with AES rational method to determine the detention volume.

AES Ration Method Analysis identify the onsite and offsite 25-year storm event flow allowed to prevent flooding of one travel lane of the half-street per Orange County Public Works Flood Local Drainage Manual.

6.0 RESULTS:

Existing Conditions

Drainage Area	Area (ac)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)	T_c (min)
X1	0.20	0.48	0.58	0.75	9.09
X2	3.05	6.98	8.43	10.92	9.92
X3	8.87	18.47	22.72	29.86	11.92
Total	**12.12**	**24.71**	**30.52**	**40.28**	

Proposed Conditions

Drainage Area	Area (ac)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)	T_c (min)
P1	0.73	2.13	2.54	3.27	7.15
P2	6.07	14.75	17.86	23.17	9.39
P3	3.16	7.39	8.95	11.63	10
P4	0.64	1.86	2.22	2.85	7.19
P5	1.52	3.85	4.64	5.99	8.88
Total	**12.12**	28.14	34.08	44.31	10.7

Catch Basin Sizing

Catch basin Sizing will be analyzed for the 100-year storm event peak flow and provided during final engineering.

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.

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 will be prepared based on the 100-year water surface elevation tributary to each subarea during final engineering.

Onsite Detention Calculations

Due to increased peak runoff flows and existing flooding on Lampson Avenue, stormwater will need to be detained and mitigated onsite such that Lampson Avenue meets OC Hydrology flooding standards. Onsite and Offsite small unit hydrographs were analyzed using AES Rational Method Analysis to identify the time that the flows exceed the allowed offsite Q_{25} to prevent flooding of one travel lane of the half-street per the OC Local Drainage Manual. Hydrographs of the onsite and offsite flows were plotted to determine the volume required to be detained onsite during the time that the offsite Q_{25} is exceeded. It was determined that approximately 32,300 cf (cubic feet) of volume will have to be detained onsite.

By matching the maximum flows and providing an additional 20% factor of safety for preliminary sizing, approximately 38,800 cf is required to be detained onsite.

7.0 CONCLUSION:

The results from this hydrology study demonstrate that the proposed condition of the project site will generate a 10% (44.31/40.28cfs) higher Q100 peak runoff flowrate than the existing condition of the site due to an increase in impervious area and change in land use. The proposed detention facilities will be designed to detain at the flows and times indicated by the produced hydrographs in Appendix C.1. Detained volumes will be discharged from the site via a pump system at flow rates that do not exceed the existing condition flow rates. Downstream facilities will not be hydrologically impacted by the proposed project site improvements.

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. The offsite drainage was analyzed for a 25, 100-Year storm event.

2. The drainage area is classified as Soil Group D (See Appendix E of this report). According to the Geotechnical Investigation report prepared by LGC Geotechnical, Inc. (dated December 21, 2021), the site is underlain by alluvial fan deposits to the maximum depth of 46.5 feet below existing grade. It consists of clay, clayey sand, silty clay, and silty sand. The soil is to be very moist to wet with depth and soft to stiff and medium dense to dense.

3. Assumed commercial and natural turf for existing land use.

4. Assumed apartments and condo for proposed land use.

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

6. There is no offsite run-on tributary to the site.

9.0 REFERENCES:

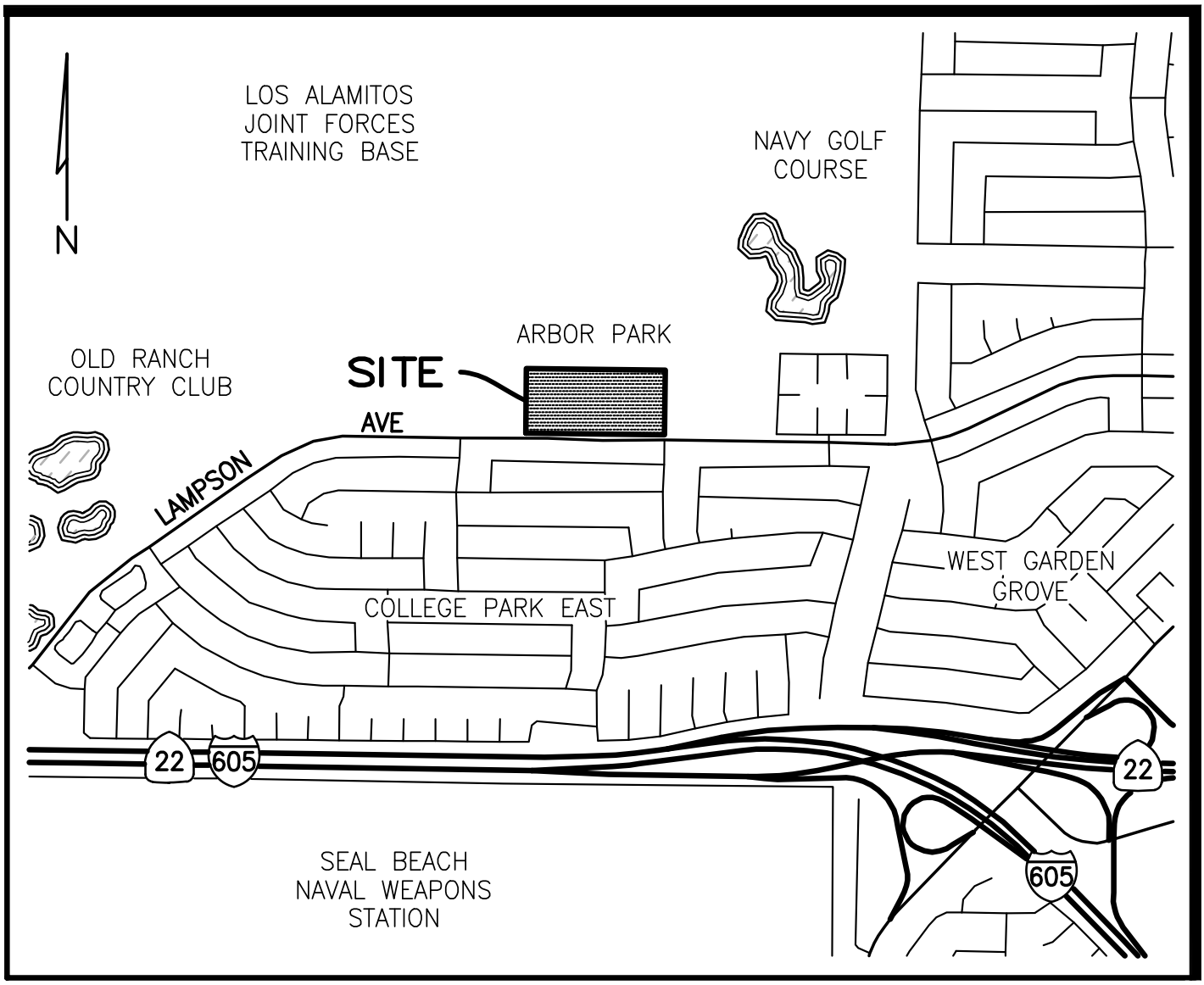
1. Orange County Hydrology Manual dated October 1986

2. Hydraflow Express Extension for Autodesk AutoCAD Civil 3D

3. Existing Storm Drain As-Built Plans

4. Orange County Technical Guidance Document

APPENDIX A
HYDROLOGY MAPS



VICINITY MAP

N.T.S.

National Flood Hazard Layer FIRMette

FEMA

118°3'12"W 33°47'7"N

118°2'34"W 33°46'38"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/18/2022 at 12:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

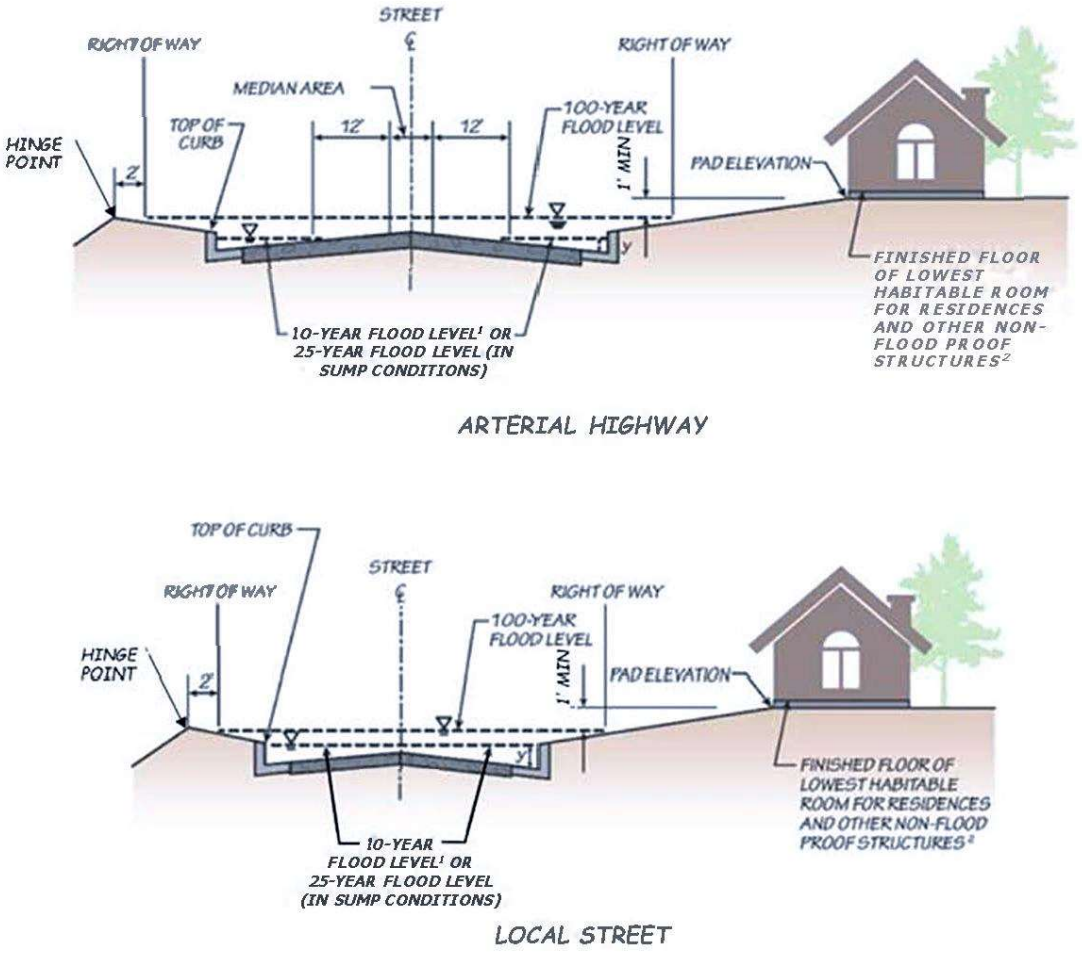
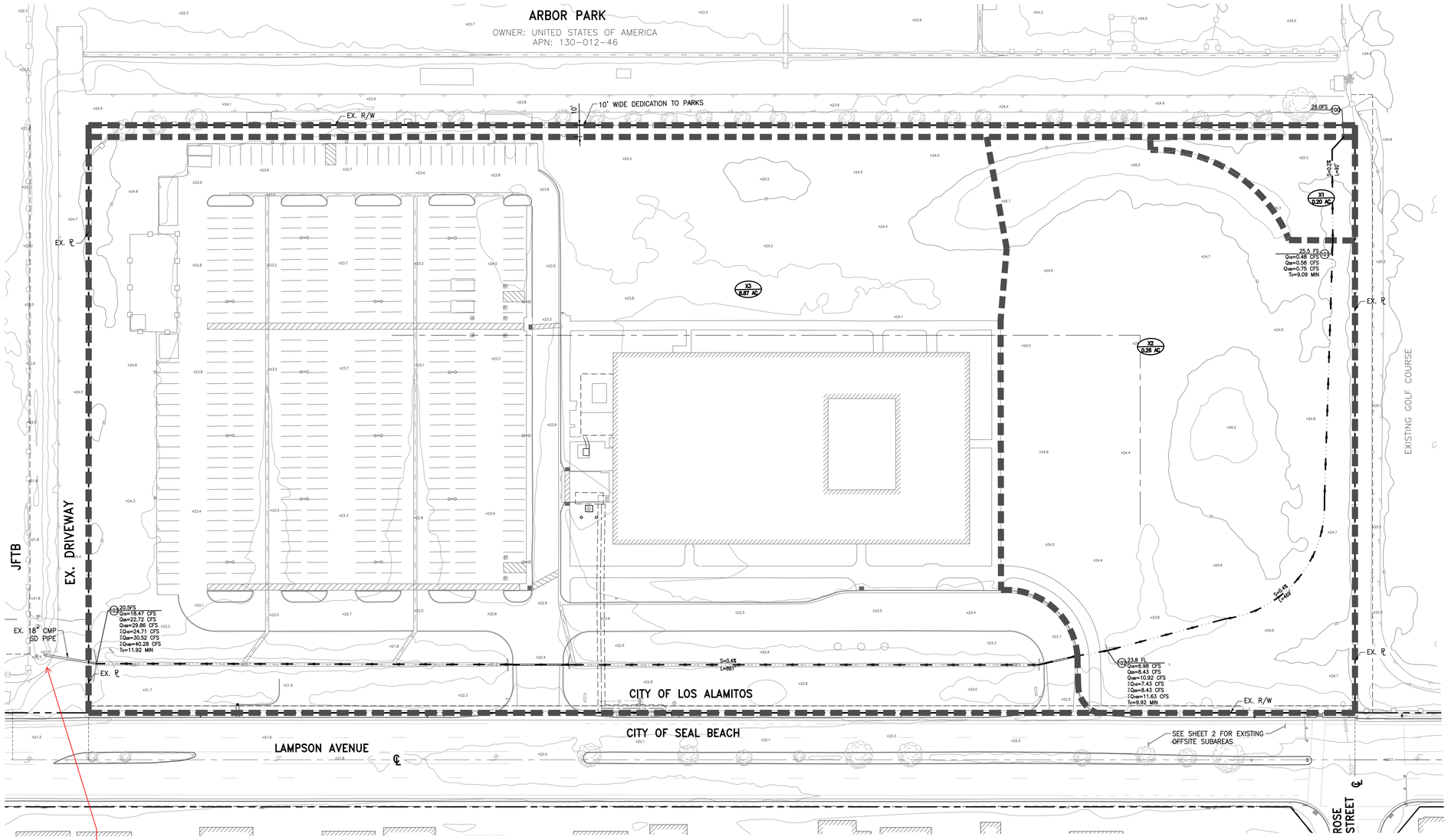


Figure 3-1: Flood Protection Goals

A.1 - Existing Conditions Hydrology Map

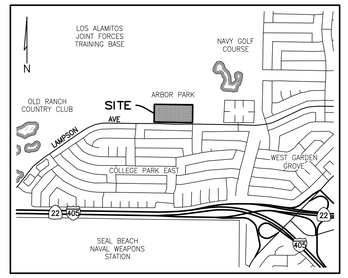
ONSITE EXISTING CONDITIONS HYDROLOGY MAP
TENTATIVE TRACT MAP NO. 19263
4665 LAMPSON AVENUE
CITY OF LOS ALAMITOS, COUNTY OF ORANGE, STATE OF CALIFORNIA



LOCAL HIGH POINT ELEVATION IN DRIVEWAY ADJACENT TO OPEN DITCH = 23.2-FT

DRAINAGE AREA SUMMARY (ONSITE)

DA	AREA (SF)	AREA (AC)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS	Q10	Q25	Q100	100-yr Tc
X1	8627.39	0.20	0.20	0	0	0.48	0.58	0.75	9.09
X2	133050.72	3.05	3.05	0	0	6.98	8.43	10.92	9.92
X3	386267.51	8.87	0.89	7.98	0.9	18.47	22.72	29.86	11.92
TOTAL	527945.61	12.12	4.14	7.98	0.66	24.71	30.52	40.28	



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" = 40'
0 20 40 80

REVISIONS					
NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

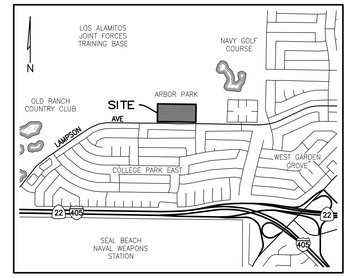
PLANS PREPARED BY:
C&V CONSULTING, INC. CIVIL ENGINEERING LAND PLANNING & SURVEYING
9630 IRVINE CENTER DRIVE IRVINE, CALIFORNIA 92618
(949) 910-3600 INFO@CVCINC.NET WWW.CVCINC.NET

VESTING TENTATIVE TRACT MAP NO. 19263
EXISTING CONDITIONS HYDROLOGY MAP
4665 LAMPSON AVENUE

PUBLIC WORKS AGENCY
CITY OF LOS ALAMITOS

SHEET 1 OF 2

OFFSITE EXISTING CONDITIONS HYDROLOGY MAP
TENTATIVE TRACT MAP NO. 19263
4665 LAMPSON AVENUE
CITY OF LOS ALAMITOS, 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

DRAINAGE AREA SUMMARY (OFFSITE)

DA	AREA (SF)	AREA (AC)	Q25	25-yr Tc	Q100	100-yr Tc
X4	19,129.9	0.44	1.49	7.69	1.91	7.69
X5	109,209.9	2.51	3.40	38.23	4.43	36.56
TOTAL	128,339.8	2.95	4.00	38.23	5.20	36.56

1" = 40'
0 20 40 80

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

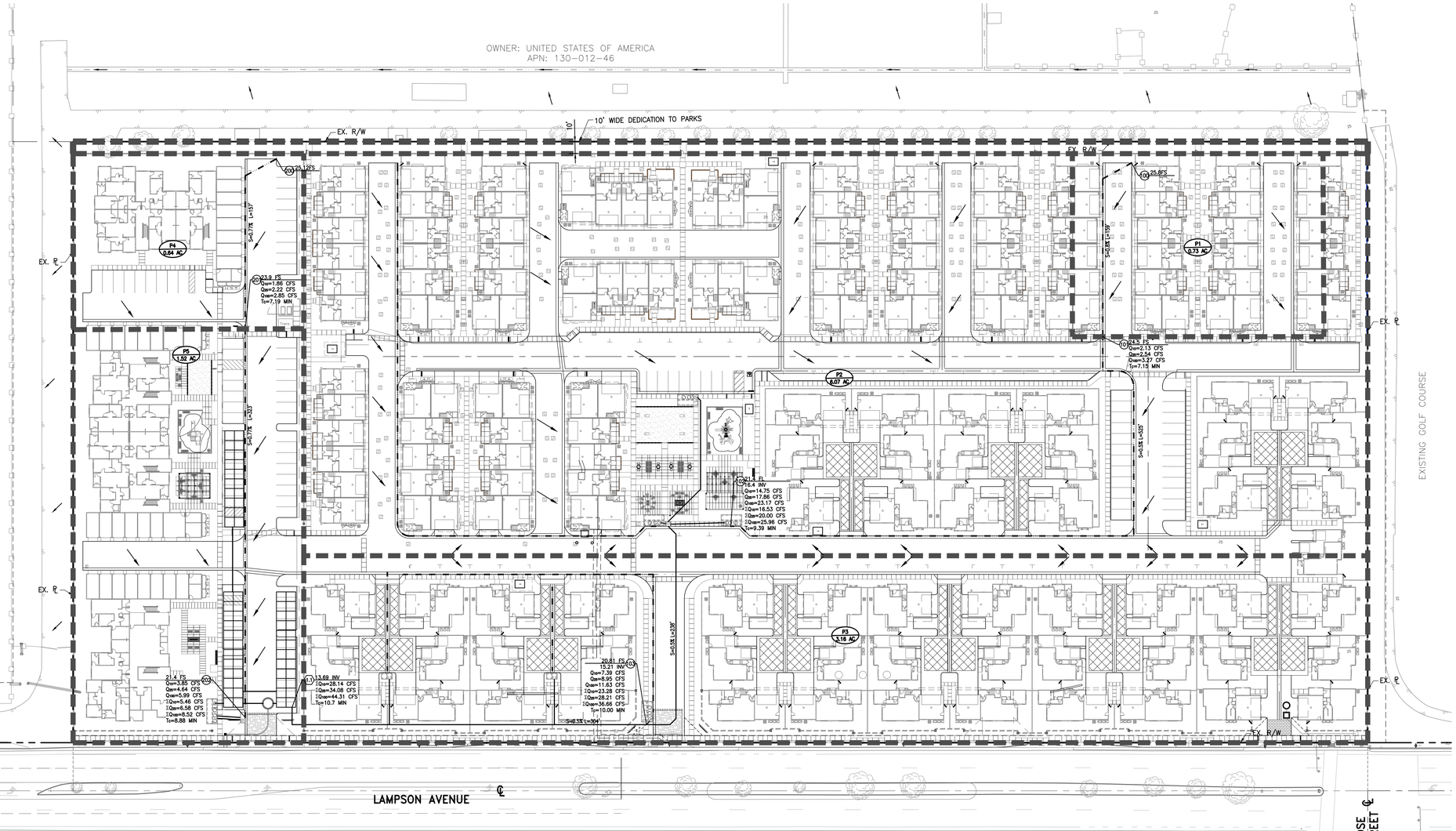
PLANS PREPARED BY:
C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
9630 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
TEL: (949) 581-8300
INFO@CVCINC.NET
WWW.CVCINC.NET

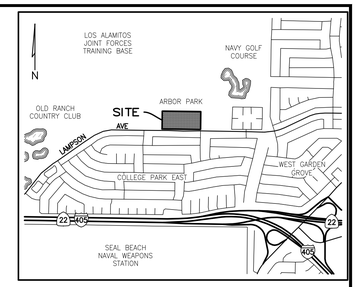
VESTING TENTATIVE TRACT MAP NO. 19263
EXISTING CONDITIONS HYDROLOGY MAP
4665 LAMPSON AVENUE

PUBLIC WORKS AGENCY
CITY OF LOS ALAMITOS

A.2 - Proposed Conditions Hydrology Map

ONSITE PROPOSED CONDITIONS HYDROLOGY MAP
TENTATIVE TRACT MAP NO. 19263
4665 LAMPSON AVENUE
CITY OF LOS ALAMITOS, 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

DRAINAGE AREA SUMMARY

DA	AREA (SF)	AREA (AC)	Q10	Q25	Q100	100-yr Tc
1	31825.47	0.73	2.13	2.54	3.27	7.15
2	264358.13	6.07	14.75	17.86	23.17	9.39
3	137683.35	3.16	7.39	8.95	11.63	10
4	28039.35	0.64	1.86	2.22	2.85	7.19
5	66043.15	1.52	3.85	4.64	5.99	8.88
TOTAL	527949.45	12.12	28.14	34.08	44.31	10.7

1" = 40'
0 20 40 80

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APPROVED	INSTALLED

PLANS PREPARED BY:
C&V CONSULTING, INC.
CIVIL ENGINEERING
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6630 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3600
INFO@CVC-INC.NET
WWW.CVC-INC.NET

VESTING TENTATIVE TRACT MAP NO. 19263
PROPOSED CONDITIONS HYDROLOGY MAP
4665 LAMPSON AVENUE

PUBLIC WORKS AGENCY
CITY OF LOS ALAMITOS

SHEET 1 OF 1

APPENDIX B
HYDROLOGY CALCULATIONS

B.1 - Existing Conditions Hydrology Calculations (10, 25, 100-year Storm Event)

```
**************************************************************************
             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 *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* EXISTING Q10                                                          *
 ************************************************************************

  FILE NAME: KB07X10.DAT
  TIME/DATE OF STUDY: 10:04 10/10/2022
==========================================================================
  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) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   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) =    92.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     25.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.092
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.882
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                      D        0.20      0.20     1.000    87    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     25.50
  DOWNSTREAM NODE ELEVATION(FEET) =     23.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   469.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0050
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200
  MAXIMUM DEPTH(FEET) =   1.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.741
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN POOR COVER
  "TURF"                      D        3.05      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.40
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =    9.92
  SUBAREA AREA(ACRES) =    3.05       SUBAREA RUNOFF(CFS) =    6.98
  EFFECTIVE AREA(ACRES) =    3.25     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       7.43

         NOTE:TRAVEL TIME ESTIMATES BASED ON NORMAL DEPTH
```

```
        IN A FLOWING-FULL GUTTER(NORMAL DEPTH = GUTTER HIKE)


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =    5.00
  FLOW VELOCITY(FEET/SEC.) =   9.40   DEPTH*VELOCITY(FT*FT/SEC) =   7.52
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     561.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     23.80
  DOWNSTREAM NODE ELEVATION(FEET) =     20.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   861.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.334
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        8.87      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.47
  AVERAGE FLOW DEPTH(FEET) =   1.00   FLOOD WIDTH(FEET) =   22.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.21   Tc(MIN.) =   13.14
  SUBAREA AREA(ACRES) =    8.87       SUBAREA RUNOFF(CFS) =   18.47
  EFFECTIVE AREA(ACRES) =   12.12     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.34
  TOTAL AREA(ACRES) =       12.1         PEAK FLOW RATE(CFS) =      24.71

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.00   FLOOD WIDTH(FEET) =   22.00
  FLOW VELOCITY(FEET/SEC.) =   6.86   DEPTH*VELOCITY(FT*FT/SEC) =   6.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1422.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     13.14
  EFFECTIVE AREA(ACRES) =     12.12  AREA-AVERAGED Fm(INCH/HR)=  0.07
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.341
  PEAK FLOW RATE(CFS)   =      24.71
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* EXISTING Q25                                                          *
 ************************************************************************

  FILE NAME: KB07X25.DAT
  TIME/DATE OF STUDY: 10:03 10/10/2022
==========================================================================
  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) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   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) =    92.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     25.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.092
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.439
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                      D        0.20      0.20     1.000    87    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.58

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     25.50
  DOWNSTREAM NODE ELEVATION(FEET) =     23.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   469.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0050
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.273
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN POOR COVER
  "TURF"                      D        3.05      0.20     1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.40
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =    9.92
  SUBAREA AREA(ACRES) =    3.05       SUBAREA RUNOFF(CFS) =    8.43
  EFFECTIVE AREA(ACRES) =    3.25     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =       8.99

         NOTE:TRAVEL TIME ESTIMATES BASED ON NORMAL DEPTH
```

```
        IN A FLOWING-FULL GUTTER(NORMAL DEPTH = GUTTER HIKE)


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =    5.00
  FLOW VELOCITY(FEET/SEC.) =   9.40   DEPTH*VELOCITY(FT*FT/SEC) =   7.52
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     561.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     23.80
  DOWNSTREAM NODE ELEVATION(FEET) =     20.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   861.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.866
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        8.87      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.47
  AVERAGE FLOW DEPTH(FEET) =   1.00   FLOOD WIDTH(FEET) =   22.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.62   Tc(MIN.) =   12.55
  SUBAREA AREA(ACRES) =    8.87       SUBAREA RUNOFF(CFS) =   22.72
  EFFECTIVE AREA(ACRES) =   12.12     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.34
  TOTAL AREA(ACRES) =       12.1         PEAK FLOW RATE(CFS) =      30.52

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.00   FLOOD WIDTH(FEET) =   22.00
  FLOW VELOCITY(FEET/SEC.) =   8.47   DEPTH*VELOCITY(FT*FT/SEC) =   8.47
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1422.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     12.55
  EFFECTIVE AREA(ACRES) =     12.12  AREA-AVERAGED Fm(INCH/HR)=  0.07
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.341
  PEAK FLOW RATE(CFS)   =      30.52
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* EXISTING Q100                                                         *
 ************************************************************************

  FILE NAME: KB07X100.DAT
  TIME/DATE OF STUDY: 10:02 10/10/2022
==========================================================================
  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) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (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) =    92.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     25.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.092
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.392
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                      D        0.20      0.20     1.000    97    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     25.50
  DOWNSTREAM NODE ELEVATION(FEET) =     23.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   469.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0050
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.178
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  URBAN POOR COVER
  "TURF"                      D        3.05      0.20     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.40
  AVERAGE FLOW DEPTH(FEET) =   0.80   FLOOD WIDTH(FEET) =    5.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =    9.92
  SUBAREA AREA(ACRES) =    3.05       SUBAREA RUNOFF(CFS) =   10.92
  EFFECTIVE AREA(ACRES) =    3.25     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.2         PEAK FLOW RATE(CFS) =      11.63

         NOTE:TRAVEL TIME ESTIMATES BASED ON NORMAL DEPTH
```

```
        IN A FLOWING-FULL GUTTER(NORMAL DEPTH = GUTTER HIKE)


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOOD WIDTH(FEET) =    5.00
  FLOW VELOCITY(FEET/SEC.) =   9.40   DEPTH*VELOCITY(FT*FT/SEC) =   7.52
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     561.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     23.80
  DOWNSTREAM NODE ELEVATION(FEET) =     20.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   861.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.800
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.761
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        8.87      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     25.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.18
  AVERAGE FLOW DEPTH(FEET) =   1.00   FLOOD WIDTH(FEET) =   22.00
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =   11.92
  SUBAREA AREA(ACRES) =    8.87       SUBAREA RUNOFF(CFS) =   29.86
  EFFECTIVE AREA(ACRES) =   12.12     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.34
  TOTAL AREA(ACRES) =       12.1         PEAK FLOW RATE(CFS) =      40.28

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.00   FLOOD WIDTH(FEET) =   22.00
  FLOW VELOCITY(FEET/SEC.) =  11.17   DEPTH*VELOCITY(FT*FT/SEC) =  11.17
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1422.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     11.92
  EFFECTIVE AREA(ACRES) =     12.12  AREA-AVERAGED Fm(INCH/HR)=  0.07
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.341
  PEAK FLOW RATE(CFS)   =      40.28
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B.2 - Offsite Existing Conditions Hydrology Calculations For Lampson Avenue (25, 100-year Storm Event)

```
_____
*****************************************************************************
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                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* EXISTING Q25 OFFSITE                                                  *
 *************************************************************************

  FILE NAME: KB07X25.DAT
  TIME/DATE OF STUDY: 11:22 03/13/2023
=============================================================================
  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) II ASSUMED FOR RATIONAL METHOD*

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

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

*****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   292.00
  ELEVATION DATA: UPSTREAM(FEET) =     28.70  DOWNSTREAM(FEET) =     26.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.692
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.44      0.20     0.100    75    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.49

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   26.30  DOWNSTREAM ELEVATION(FEET) =   21.50
  STREET LENGTH(FEET) =  2400.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   15.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =  30.54   Tc(MIN.) =   38.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.51      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    2.51      SUBAREA RUNOFF(CFS) =    3.40
  EFFECTIVE AREA(ACRES) =      2.95    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.0        PEAK FLOW RATE(CFS) =       4.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  16.51
  FLOW VELOCITY(FEET/SEC.) =  1.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    2692.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.0  TC(MIN.) =     38.23
  EFFECTIVE AREA(ACRES) =      2.95  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       4.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:
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```
 ************************* DESCRIPTION OF STUDY *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* EXISTING Q100 OFFSITE                                                 *
 ************************************************************************

  FILE NAME: KB07X100.DAT
  TIME/DATE OF STUDY: 18:15 08/28/2023
==========================================================================
  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) III ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   292.00
  ELEVATION DATA: UPSTREAM(FEET) =     28.70  DOWNSTREAM(FEET) =     26.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.692
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.834
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.44      0.20     0.100    91    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.91

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   26.30  DOWNSTREAM ELEVATION(FEET) =   21.50
  STREET LENGTH(FEET) =  2400.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.50
    HALFSTREET FLOOD WIDTH(FEET) =   16.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
  STREET FLOW TRAVEL TIME(MIN.) =  28.86   Tc(MIN.) =   36.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.979
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.51      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    2.51      SUBAREA RUNOFF(CFS) =    4.43
  EFFECTIVE AREA(ACRES) =      2.95    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.0        PEAK FLOW RATE(CFS) =       5.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  18.37
  FLOW VELOCITY(FEET/SEC.) =  1.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    2692.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.0  TC(MIN.) =     36.56
  EFFECTIVE AREA(ACRES) =      2.95  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       5.20
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B.3 - Proposed Conditions Hydrology Calculations (10, 25, 100-year Storm Event)

```
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                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* PROPOSED Q10                                                          *
 ************************************************************************

  FILE NAME: KB07P10.DAT
  TIME/DATE OF STUDY: 08:51 02/16/2023
==========================================================================
  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) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   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) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.80  DOWNSTREAM(FEET) =     24.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.151
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.307
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.73      0.20     0.350    75    7.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      2.13
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      2.13

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   24.50  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   525.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =    8.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.75
  STREET FLOW TRAVEL TIME(MIN.) =   2.59   Tc(MIN.) =    9.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.771
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS             D        6.07      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    6.07      SUBAREA RUNOFF(CFS) =   14.75
  EFFECTIVE AREA(ACRES) =      6.80    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        6.8        PEAK FLOW RATE(CFS) =      16.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  10.08
  FLOW VELOCITY(FEET/SEC.) =  4.03   DEPTH*VELOCITY(FT*FT/SEC.) =   2.62
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  525.0 FT WITH ELEVATION-DROP =   3.1 FT, IS   12.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    102.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.40  DOWNSTREAM(FEET) =    15.21
  FLOW LENGTH(FEET) =   238.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.53
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     922.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.41
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.667
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.16      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    7.39
  EFFECTIVE AREA(ACRES) =      9.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      23.28
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    103.00 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) =    15.21  DOWNSTREAM(FEET) =    13.69
  FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.43
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.28
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 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    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) =   157.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.12  DOWNSTREAM(FEET) =     23.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.187
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.64      0.20     0.350    75    7.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      1.86
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.86

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   23.90  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    7.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =    9.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        1.51      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.51      SUBAREA RUNOFF(CFS) =    3.85
  EFFECTIVE AREA(ACRES) =      2.15    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       5.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =   7.93
  FLOW VELOCITY(FEET/SEC.) =  3.09   DEPTH*VELOCITY(FT*FT/SEC.) =   1.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 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        5.46    9.16    2.869  0.20( 0.05) 0.24       2.2     200.00
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE      1.10 =     480.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.28   11.20    2.558  0.20( 0.07) 0.35      10.0     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.89    9.16    2.869  0.20( 0.07) 0.33      10.3     200.00
      2       28.14   11.20    2.558  0.20( 0.07) 0.33      12.1     100.00
    TOTAL AREA(ACRES) =        12.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       28.14  Tc(MIN.) =   11.195
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =       12.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     11.20
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.331
  PEAK FLOW RATE(CFS)   =      28.14

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.89    9.16    2.869  0.20( 0.07) 0.33      10.3     200.00
      2       28.14   11.20    2.558  0.20( 0.07) 0.33      12.1     100.00
============================================================================
============================================================================
  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:
```



```
  FILE NAME: KB07P25.DAT
  TIME/DATE OF STUDY: 08:56 02/16/2023
==========================================================================
  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) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   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) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.80  DOWNSTREAM(FEET) =     24.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.151
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.939
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.73      0.20     0.350    75    7.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      2.54
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   24.50  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   525.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =    9.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.01
  STREET FLOW TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =    9.58
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.338
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS             D        6.07      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    6.07      SUBAREA RUNOFF(CFS) =   17.86
  EFFECTIVE AREA(ACRES) =      6.80    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        6.8        PEAK FLOW RATE(CFS) =      20.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   HALFSTREET FLOOD WIDTH(FEET) =  10.55
  FLOW VELOCITY(FEET/SEC.) =  4.27   DEPTH*VELOCITY(FT*FT/SEC.) =   3.02
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  525.0 FT WITH ELEVATION-DROP =   3.1 FT, IS   15.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    102.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.40  DOWNSTREAM(FEET) =    15.21
  FLOW LENGTH(FEET) =   238.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.00
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   10.23
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     922.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.217
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.16      0.20     0.350    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    8.95
  EFFECTIVE AREA(ACRES) =      9.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      28.21
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    103.00 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) =    15.21  DOWNSTREAM(FEET) =    13.69
  FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.21
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   11.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 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    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) =   157.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.12  DOWNSTREAM(FEET) =     23.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.187
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.928
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.64      0.20     0.350    75    7.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      2.22
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.22

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   23.90  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =    7.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =    9.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.451
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        1.51      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.51      SUBAREA RUNOFF(CFS) =    4.64
  EFFECTIVE AREA(ACRES) =      2.15    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       6.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =   8.17
  FLOW VELOCITY(FEET/SEC.) =  3.28   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 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        6.58    9.03    3.451  0.20( 0.05) 0.24       2.2     200.00
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE      1.10 =     480.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       28.21   11.00    3.087  0.20( 0.07) 0.35      10.0     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       32.54    9.03    3.451  0.20( 0.07) 0.33      10.3     200.00
      2       34.08   11.00    3.087  0.20( 0.07) 0.33      12.1     100.00
    TOTAL AREA(ACRES) =        12.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       34.08  Tc(MIN.) =   11.002
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =       12.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     11.00
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.331
  PEAK FLOW RATE(CFS)   =      34.08

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       32.54    9.03    3.451  0.20( 0.07) 0.33      10.3     200.00
      2       34.08   11.00    3.087  0.20( 0.07) 0.33      12.1     100.00
============================================================================
============================================================================
  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 *************************
* LOS ALAMITOS                                                          *
* TTM 19263                                                             *
* PROPOSED Q100                                                         *
 *************************************************************************

  FILE NAME: KB07P100.DAT
  TIME/DATE OF STUDY: 08:58 02/16/2023
=============================================================================
  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) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (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) =   159.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.80  DOWNSTREAM(FEET) =     24.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.151
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.040
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.73      0.20     0.350    91    7.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      3.27
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      3.27

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   24.50  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   525.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.62
    HALFSTREET FLOOD WIDTH(FEET) =    9.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.43
  STREET FLOW TRAVEL TIME(MIN.) =   2.24   Tc(MIN.) =    9.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.312
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS             D        6.07      0.20     0.350    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    6.07      SUBAREA RUNOFF(CFS) =   23.17
  EFFECTIVE AREA(ACRES) =      6.80    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        6.8        PEAK FLOW RATE(CFS) =      25.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.79   HALFSTREET FLOOD WIDTH(FEET) =  11.27
  FLOW VELOCITY(FEET/SEC.) =  4.62   DEPTH*VELOCITY(FT*FT/SEC.) =   3.67
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  525.0 FT WITH ELEVATION-DROP =   3.1 FT, IS   19.8 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    102.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.40  DOWNSTREAM(FEET) =    15.21
  FLOW LENGTH(FEET) =   238.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.96
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   10.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     922.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.159
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               D        3.16      0.20     0.350    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =   11.63
  EFFECTIVE AREA(ACRES) =      9.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      36.66
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    103.00 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) =    15.21  DOWNSTREAM(FEET) =    13.69
  FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.22
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.66
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   10.70
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 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    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) =   157.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.12  DOWNSTREAM(FEET) =     23.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.187
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.026
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               D        0.64      0.20      0.350    91    7.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =      2.85
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.85

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   23.90  DOWNSTREAM ELEVATION(FEET) =   21.40
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.120
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =    8.01
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   1.70   Tc(MIN.) =    8.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.451
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        1.51      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.51      SUBAREA RUNOFF(CFS) =    5.99
  EFFECTIVE AREA(ACRES) =      2.15    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       8.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =   8.55
  FLOW VELOCITY(FEET/SEC.) =  3.58   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 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        8.52    8.88    4.451  0.20( 0.05) 0.24       2.2     200.00
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE      1.10 =     480.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       36.66   10.70    4.001  0.20( 0.07) 0.35      10.0     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       42.44    8.88    4.451  0.20( 0.07) 0.33      10.4     200.00
      2       44.31   10.70    4.001  0.20( 0.07) 0.33      12.1     100.00
    TOTAL AREA(ACRES) =        12.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       44.31  Tc(MIN.) =   10.700
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =       12.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE      1.10 =    1226.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.1  TC(MIN.) =     10.70
  EFFECTIVE AREA(ACRES) =     12.11  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.331
  PEAK FLOW RATE(CFS)   =      44.31

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       42.44    8.88    4.451  0.20( 0.07) 0.33      10.4     200.00
      2       44.31   10.70    4.001  0.20( 0.07) 0.33      12.1     100.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C
HYDRAULIC CALCULATIONS

C.1 - Detention Calculations

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   292.00
  ELEVATION DATA: UPSTREAM(FEET) =     28.70  DOWNSTREAM(FEET) =     26.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.692
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.44      0.20     0.100    75    7.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.49

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   26.30  DOWNSTREAM ELEVATION(FEET) =   21.50
  STREET LENGTH(FEET) =  2400.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 36.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   5.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   15.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
  STREET FLOW TRAVEL TIME(MIN.) =  30.54   Tc(MIN.) =   38.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.51      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    2.51      SUBAREA RUNOFF(CFS) =    3.40
  EFFECTIVE AREA(ACRES) =      2.95    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.0        PEAK FLOW RATE(CFS) =       4.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  16.51
  FLOW VELOCITY(FEET/SEC.) =  1.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    2692.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.0  TC(MIN.) =     38.23
  EFFECTIVE AREA(ACRES) =      2.95  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       4.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                   AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
```



```
            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                        Analysis prepared by:

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  LOS ALAMITOS
  TTM 19263
  PROPOSED Q25
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.29 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1         12.12       35.00            75.       0.200       0.768

    TOTAL AREA (Acres) =     12.12

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.070

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.232
==========================================================================

 Problem Descriptions:
  LOS ALAMITOS
  TTM 19263
  PROPOSED Q25
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.94
    TOTAL CATCHMENT AREA(ACRES) =   12.12
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.070
    LOW LOSS FRACTION = 0.232
```

```
    TIME OF CONCENTRATION(MIN.) = 11.00
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.46
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.07

********************************************************************************
  TIME     VOLUME       Q    0.       10.0      20.0      30.0      40.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.05      0.0000      0.00  Q         .         .         .         .
  0.23      0.0045      0.60  Q         .         .         .         .
  0.42      0.0136      0.60  Q         .         .         .         .
  0.60      0.0227      0.60  Q         .         .         .         .
  0.78      0.0319      0.61  Q         .         .         .         .
  0.97      0.0412      0.61  Q         .         .         .         .
  1.15      0.0505      0.62  Q         .         .         .         .
  1.33      0.0600      0.62  Q         .         .         .         .
  1.52      0.0694      0.63  Q         .         .         .         .
  1.70      0.0790      0.63  Q         .         .         .         .
  1.88      0.0887      0.64  Q         .         .         .         .
  2.07      0.0984      0.64  Q         .         .         .         .
  2.25      0.1082      0.65  Q         .         .         .         .
  2.43      0.1181      0.65  Q         .         .         .         .
  2.62      0.1280      0.66  Q         .         .         .         .
  2.80      0.1381      0.67  Q         .         .         .         .
  2.98      0.1482      0.67  Q         .         .         .         .
  3.17      0.1585      0.68  Q         .         .         .         .
  3.35      0.1688      0.69  Q         .         .         .         .
  3.53      0.1792      0.69  Q         .         .         .         .
  3.72      0.1898      0.70  Q         .         .         .         .
  3.90      0.2004      0.70  Q         .         .         .         .
  4.08      0.2111      0.71  Q         .         .         .         .
  4.27      0.2219      0.72  Q         .         .         .         .
  4.45      0.2329      0.73  Q         .         .         .         .
  4.63      0.2439      0.73  Q         .         .         .         .
  4.82      0.2550      0.74  Q         .         .         .         .
  5.00      0.2663      0.75  Q         .         .         .         .
  5.18      0.2777      0.76  Q         .         .         .         .
  5.37      0.2892      0.76  Q         .         .         .         .
```

5.55	0.3008	0.77	Q	.	.	.	.
5.73	0.3126	0.78	Q	.	.	.	.
5.92	0.3245	0.79	Q	.	.	.	.
6.10	0.3365	0.80	Q	.	.	.	.
6.28	0.3487	0.81	Q	.	.	.	.
6.47	0.3610	0.82	Q	.	.	.	.
6.65	0.3735	0.83	Q	.	.	.	.
6.83	0.3861	0.84	Q	.	.	.	.
7.02	0.3989	0.85	Q	.	.	.	.
7.20	0.4118	0.86	Q	.	.	.	.
7.38	0.4249	0.87	Q	.	.	.	.
7.57	0.4382	0.88	Q	.	.	.	.
7.75	0.4517	0.90	Q	.	.	.	.
7.93	0.4653	0.91	Q	.	.	.	.
8.12	0.4792	0.92	Q	.	.	.	.
8.30	0.4932	0.93	Q	.	.	.	.
8.48	0.5075	0.95	Q	.	.	.	.
8.67	0.5220	0.96	Q	.	.	.	.
8.85	0.5367	0.98	Q	.	.	.	.
9.03	0.5516	0.99	Q	.	.	.	.
9.22	0.5668	1.01	.Q	.	.	.	.
9.40	0.5823	1.03	.Q	.	.	.	.
9.58	0.5980	1.05	.Q	.	.	.	.
9.77	0.6140	1.06	.Q	.	.	.	.
9.95	0.6303	1.09	.Q	.	.	.	.
10.13	0.6469	1.10	.Q	.	.	.	.
10.32	0.6639	1.13	.Q	.	.	.	.
10.50	0.6811	1.15	.Q	.	.	.	.
10.68	0.6988	1.18	.Q	.	.	.	.
10.87	0.7168	1.20	.Q	.	.	.	.
11.05	0.7352	1.23	.Q	.	.	.	.
11.23	0.7540	1.25	.Q	.	.	.	.
11.42	0.7733	1.29	.Q	.	.	.	.
11.60	0.7931	1.32	.Q	.	.	.	.
11.78	0.8134	1.36	.Q	.	.	.	.
11.97	0.8342	1.39	.Q	.	.	.	.
12.15	0.8582	1.78	.Q	.	.	.	.
12.33	0.8864	1.94	.Q	.	.	.	.
12.52	0.9162	2.00	. Q	.	.	.	.
12.70	0.9469	2.04	. Q	.	.	.	.
12.88	0.9784	2.12	. Q	.	.	.	.
13.07	1.0108	2.16	. Q	.	.	.	.
13.25	1.0443	2.26	. Q	.	.	.	.
13.43	1.0789	2.31	. Q	.	.	.	.
13.62	1.1147	2.42	. Q	.	.	.	.
13.80	1.1518	2.48	. Q	.	.	.	.
13.98	1.1905	2.63	. Q	.	.	.	.
14.17	1.2310	2.72	. Q	.	.	.	.
14.35	1.2738	2.93	. Q	.	.	.	.
14.53	1.3192	3.07	. Q	.	.	.	.

14.72	1.3684	3.41	. Q	.	.	.	.
14.90	1.4216	3.62	. Q	.	.	.	.
15.08	1.4803	4.13	. Q	.	.	.	.
15.27	1.5455	4.47	. Q	.	.	.	.
15.45	1.6170	4.96	. Q	.	.	.	.
15.63	1.6933	5.11	. Q	.	.	.	.
15.82	1.7934	8.10	. Q	.	.	.	.
16.00	1.9413	11.44	. .Q	.	.	.	.
16.18	2.2862	34.08	. .	.	.	Q	.
16.37	2.5905	6.08	. Q	.	.	.	.
16.55	2.6735	4.88	. Q	.	.	.	.
16.73	2.7397	3.85	. Q	.	.	.	.
16.92	2.7933	3.23	. Q	.	.	.	.
17.10	2.8391	2.80	. Q	.	.	.	.
17.28	2.8796	2.55	. Q	.	.	.	.
17.47	2.9168	2.36	. Q	.	.	.	.
17.65	2.9515	2.21	. Q	.	.	.	.
17.83	2.9839	2.08	. Q	.	.	.	.
18.02	3.0146	1.97	.Q	.	.	.	.
18.20	3.0402	1.41	.Q	.	.	.	.
18.38	3.0611	1.34	.Q	.	.	.	.
18.57	3.0809	1.27	.Q	.	.	.	.
18.75	3.0997	1.22	.Q	.	.	.	.
18.93	3.1177	1.16	.Q	.	.	.	.
19.12	3.1350	1.12	.Q	.	.	.	.
19.30	3.1516	1.08	.Q	.	.	.	.
19.48	3.1676	1.04	.Q	.	.	.	.
19.67	3.1831	1.00	.Q	.	.	.	.
19.85	3.1980	0.97	Q	.	.	.	.
20.03	3.2125	0.94	Q	.	.	.	.
20.22	3.2266	0.91	Q	.	.	.	.
20.40	3.2403	0.89	Q	.	.	.	.
20.58	3.2535	0.87	Q	.	.	.	.
20.77	3.2665	0.84	Q	.	.	.	.
20.95	3.2791	0.82	Q	.	.	.	.
21.13	3.2914	0.80	Q	.	.	.	.
21.32	3.3035	0.79	Q	.	.	.	.
21.50	3.3152	0.77	Q	.	.	.	.
21.68	3.3267	0.75	Q	.	.	.	.
21.87	3.3380	0.74	Q	.	.	.	.
22.05	3.3490	0.72	Q	.	.	.	.
22.23	3.3599	0.71	Q	.	.	.	.
22.42	3.3705	0.69	Q	.	.	.	.
22.60	3.3809	0.68	Q	.	.	.	.
22.78	3.3911	0.67	Q	.	.	.	.
22.97	3.4012	0.66	Q	.	.	.	.
23.15	3.4111	0.65	Q	.	.	.	.
23.33	3.4208	0.64	Q	.	.	.	.
23.52	3.4304	0.63	Q	.	.	.	.
23.70	3.4398	0.62	Q	.	.	.	.

23.88	3.4491	0.61	Q	.	.	.	.
24.07	3.4582	0.60	Q	.	.	.	.
24.25	3.4627	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1441.0
10%	132.0
20%	33.0
30%	22.0
40%	11.0
50%	11.0
60%	11.0
70%	11.0
80%	11.0
90%	11.0

```
**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
```



```
            Ver. 21.0  Release Date: 06/01/2014  License ID 1580

                         Analysis prepared by:

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  LOS ALAMITOS
  TTM 19263
  EXISTING Q25 OFFSITE
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.29 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          2.95        0.00            98.       0.200       0.945

    TOTAL AREA (Acres) =      2.95

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.000

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.055
==========================================================================

 Problem Descriptions:
  LOS ALAMITOS
  TTM 19263
  EXISTING Q25 OFFSITE
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.95
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.000
    LOW LOSS FRACTION = 0.055
```

```
    TIME OF CONCENTRATION(MIN.) = 38.23
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------------

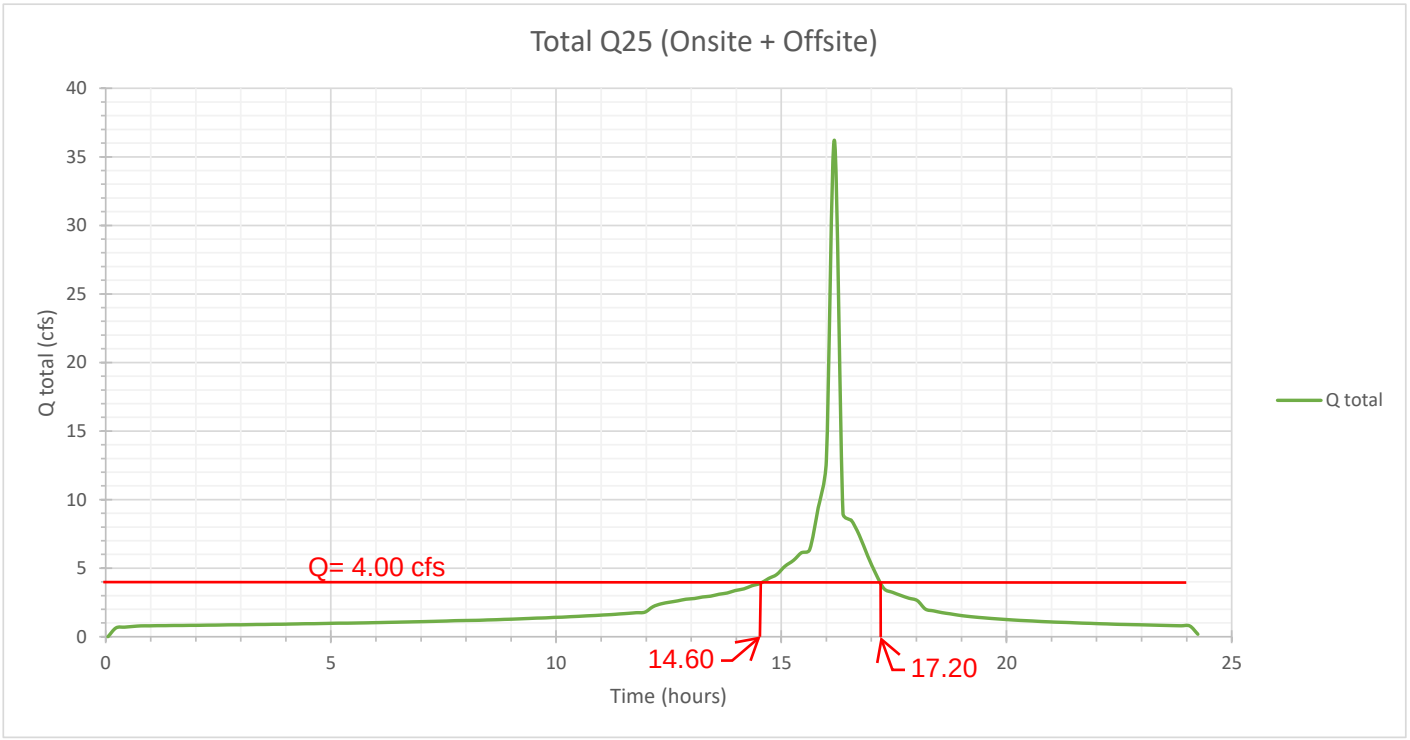
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.99
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.12

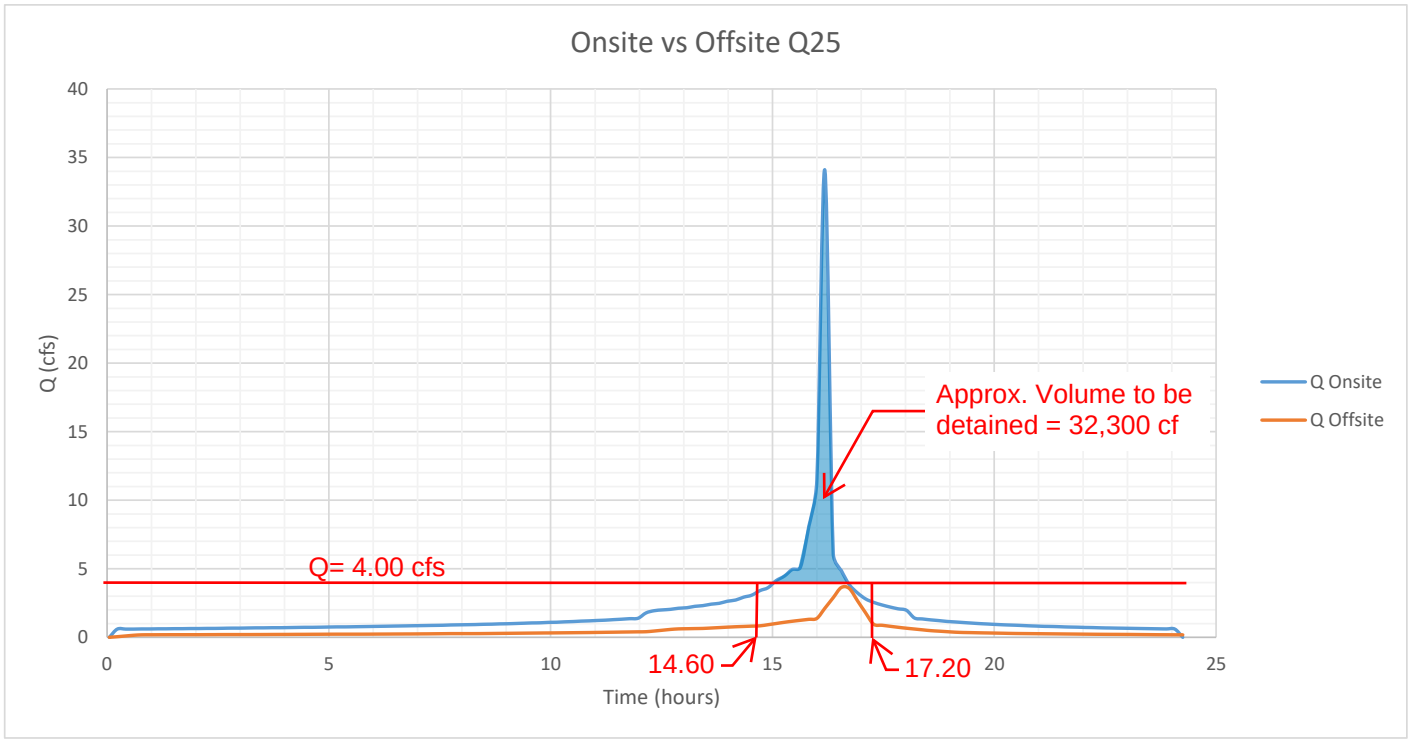
********************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.07      0.0000      0.00  Q         .         .         .         .
  0.71      0.0048      0.18  Q         .         .         .         .
  1.35      0.0145      0.19  Q         .         .         .         .
  1.98      0.0245      0.19  Q         .         .         .         .
  2.62      0.0348      0.20  Q         .         .         .         .
  3.26      0.0453      0.20  Q         .         .         .         .
  3.89      0.0562      0.21  Q         .         .         .         .
  4.53      0.0675      0.22  Q         .         .         .         .
  5.17      0.0791      0.23  Q         .         .         .         .
  5.81      0.0912      0.23  Q         .         .         .         .
  6.44      0.1037      0.24  Q         .         .         .         .
  7.08      0.1168      0.25  .Q        .         .         .         .
  7.72      0.1304      0.27  .Q        .         .         .         .
  8.35      0.1447      0.27  .Q        .         .         .         .
  8.99      0.1596      0.29  .Q        .         .         .         .
  9.63      0.1755      0.31  .Q        .         .         .         .
 10.27      0.1922      0.33  .Q        .         .         .         .
 10.90      0.2101      0.35  .Q        .         .         .         .
 11.54      0.2294      0.38  .Q        .         .         .         .
 12.18      0.2503      0.41  .Q        .         .         .         .
 12.81      0.2771      0.61  . Q       .         .         .         .
 13.45      0.3103      0.65  . Q       .         .         .         .
 14.09      0.3476      0.76  .  Q      .         .         .         .
 14.73      0.3898      0.84  .  Q      .         .         .         .
 15.36      0.4421      1.14  .   Q     .         .         .         .
 16.00      0.5086      1.38  .    Q    .         .         .         .
 16.64      0.6502      4.00  .         .    Q    .         .         .
 17.27      0.7807      0.96  .  Q      .         .         .         .
 17.91      0.8243      0.70  . Q       .         .         .         .
 18.55      0.8558      0.49  .Q        .         .         .         .
```

19.19	0.8784	0.36	.Q	.	.	.	.
19.82	0.8964	0.32	.Q	.	.	.	.
20.46	0.9123	0.28	.Q	.	.	.	.
21.10	0.9266	0.26	.Q	.	.	.	.
21.73	0.9396	0.24	Q	.	.	.	.
22.37	0.9517	0.22	Q	.	.	.	.
23.01	0.9630	0.21	Q	.	.	.	.
23.65	0.9735	0.19	Q	.	.	.	.
24.28	0.9835	0.18	Q	.	.	.	.
24.92	0.9884	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1452.7
10%	420.5
20%	191.1
30%	76.5
40%	38.2
50%	38.2
60%	38.2
70%	38.2
80%	38.2
90%	38.2


Total Q25 (Onsite + Offsite)
Q total (cfs)
Time (hours)
Q= 4.00 cfs
14.60
17.20
Q total


Onsite vs Offsite Q25
Q (cfs)
Time (hours)
Approx. Volume to be detained = 32,300 cf
Q= 4.00 cfs
14.60
17.20
Q Onsite
Q Offsite

C.2 - Street Flows

Q25 Street Flow Depth on North Side of Lampson Ave (per X4+X5)
Section A-A

Q vs Depth_Half-Street to median 29 ft

User-defined

Invert Elev (ft)	= 20.61
Slope (%)	= 0.20
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.00

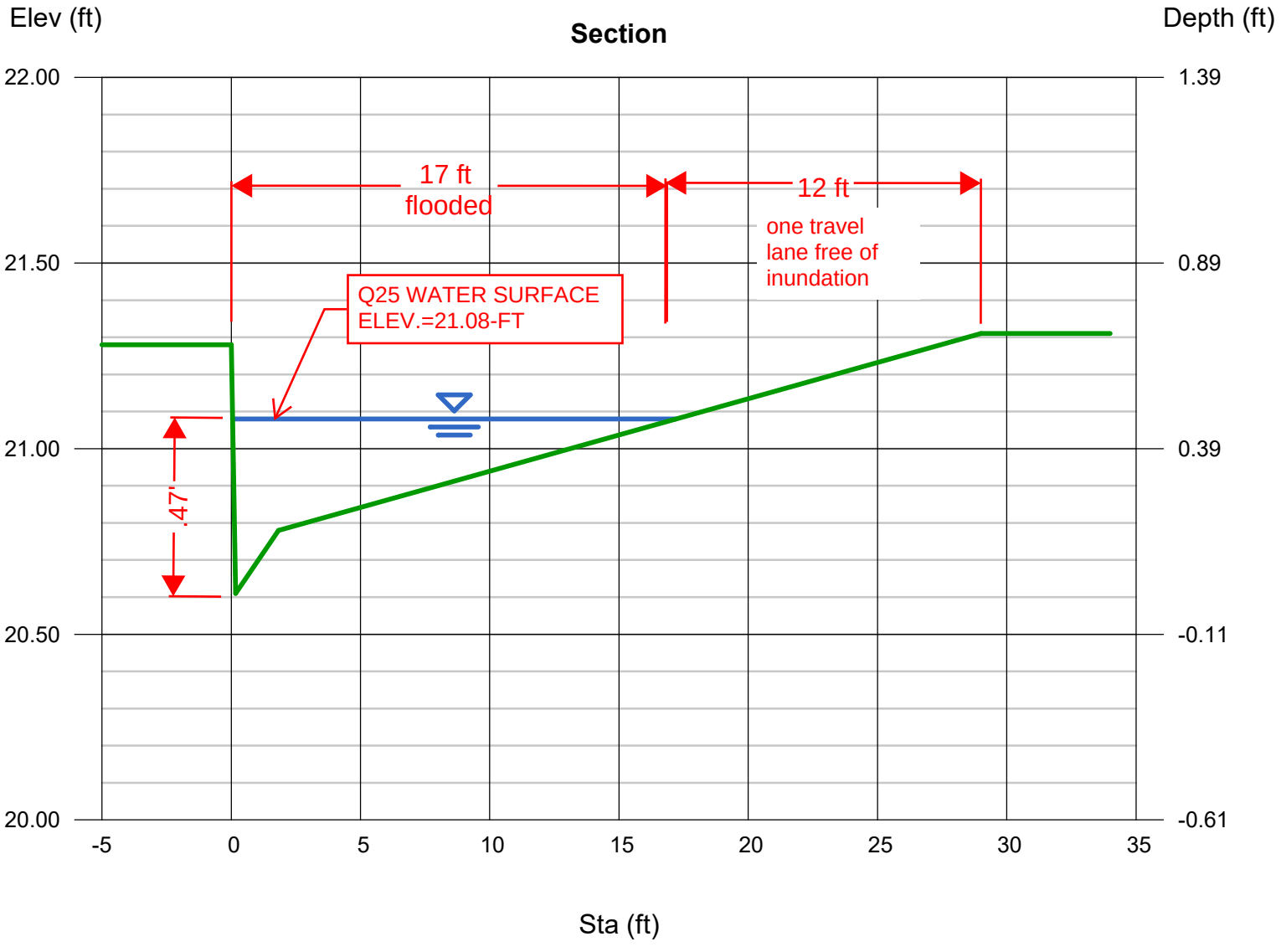
Highlighted

Depth (ft)	= 0.47
Q (cfs)	= 4.000
Area (sqft)	= 2.97
Velocity (ft/s)	= 1.34
Wetted Perim (ft)	= 17.54
Crit Depth, Yc (ft)	= 0.40
Top Width (ft)	= 17.16
EGL (ft)	= 0.50

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

(0.00, 21.28)-(0.17, 20.61, 0.015)-(1.83, 20.78, 0.015)-(29.00, 21.31, 0.015)

Per Basin X4 + X5 contributing flows, street flooded ~17 ft, leaving 12 ft travel lane free of flooding.



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Sep 6 2023

Q vs Depth_Half-Street to median 29 ft - Q100

User-defined

Invert Elev (ft)	= 20.61
Slope (%)	= 0.20
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 49.51

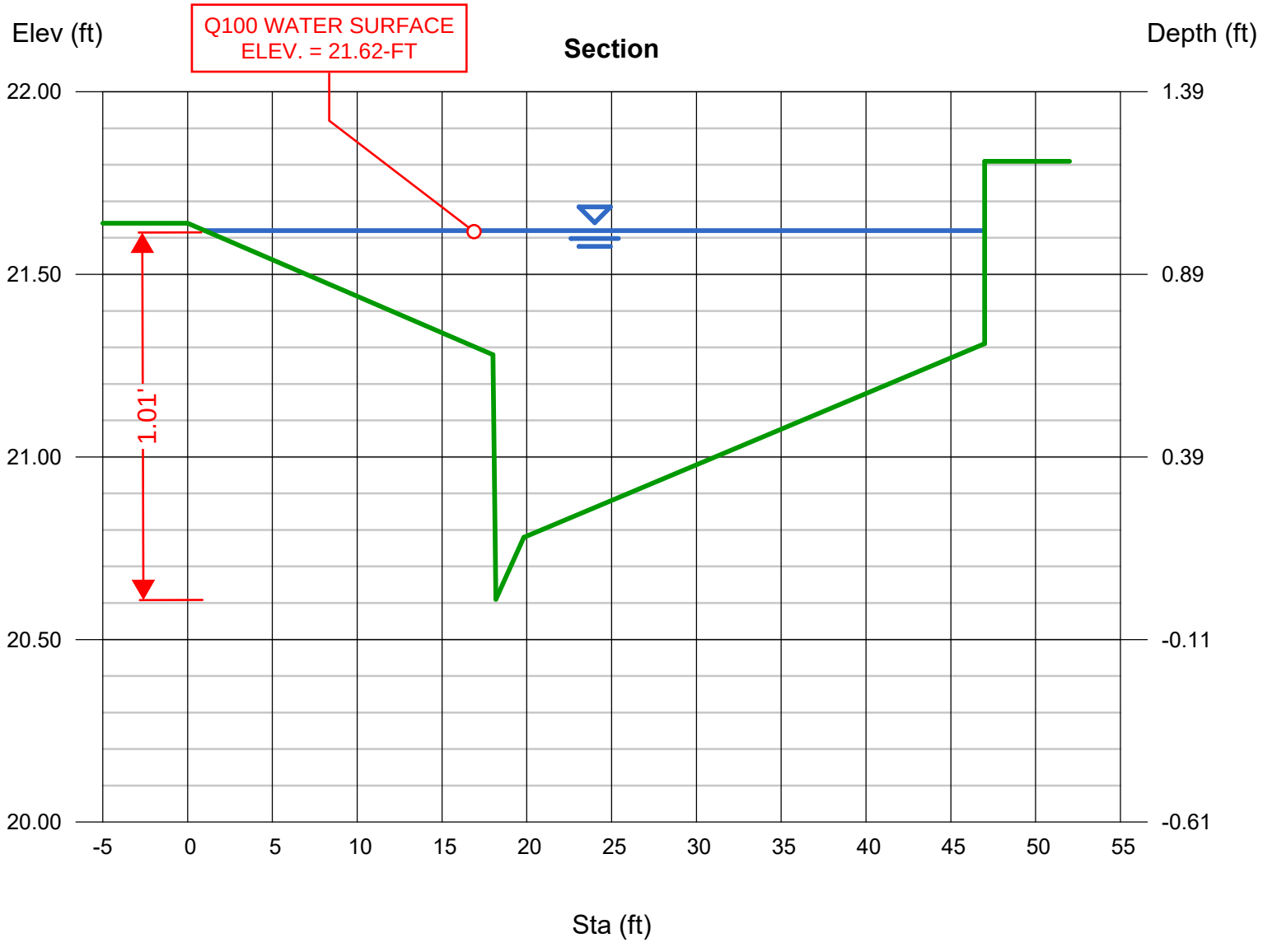
Highlighted

Depth (ft)	= 1.01
Q (cfs)	= 49.51
Area (sqft)	= 20.16
Velocity (ft/s)	= 2.46
Wetted Perim (ft)	= 46.85
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 46.00
EGL (ft)	= 1.10

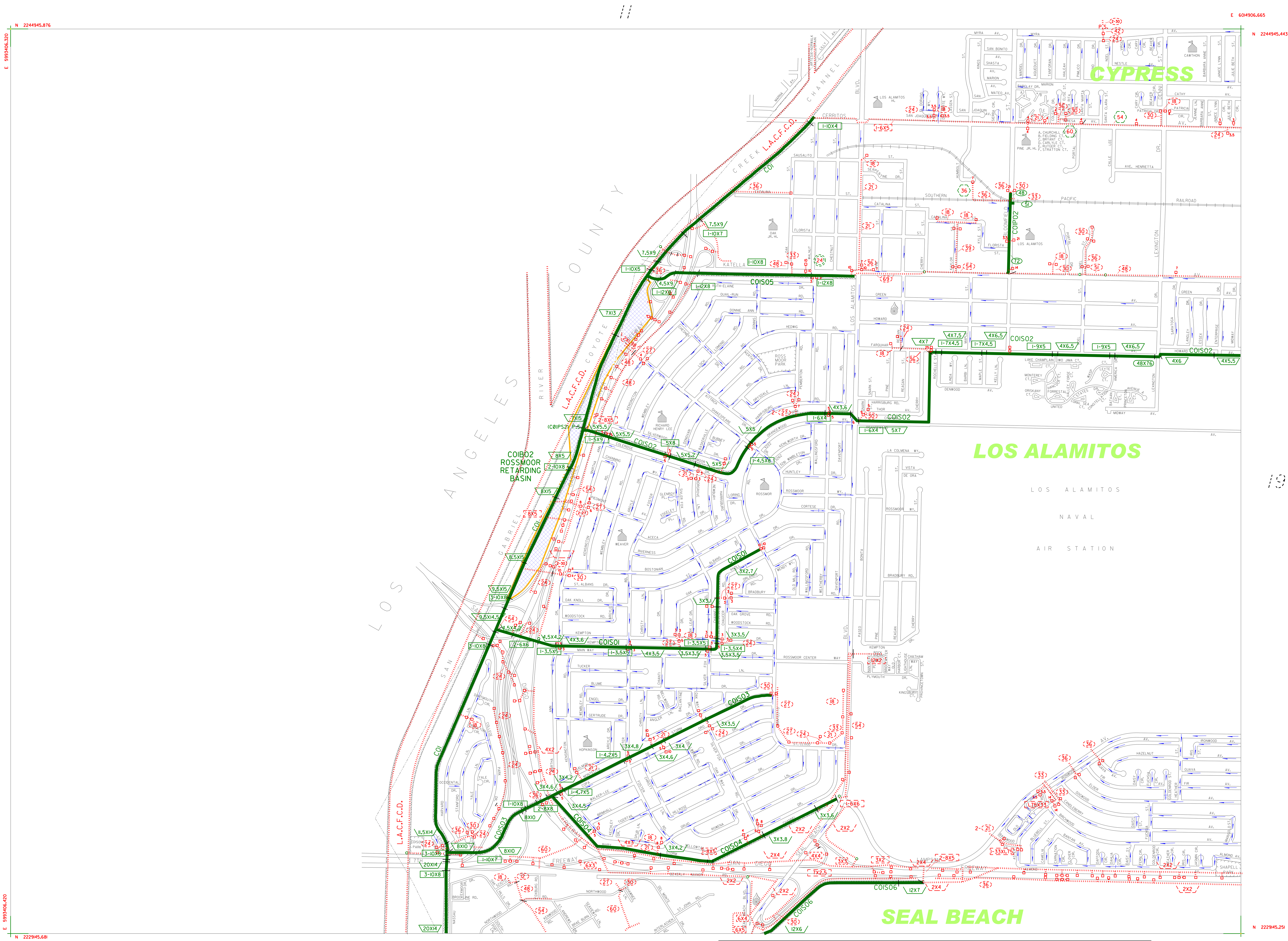
(Sta, El, n)-(Sta, El, n)...

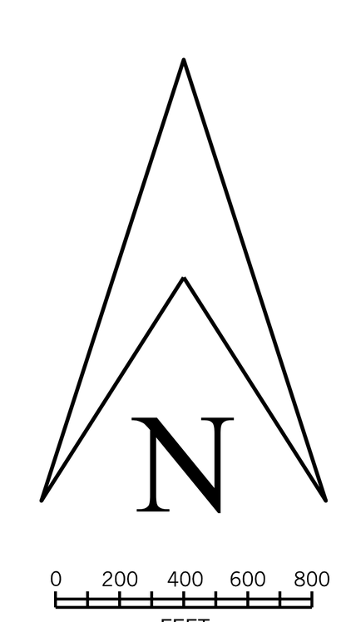
(0.00, 21.64)-(18.00, 21.28, 0.015)-(18.17, 20.61, 0.015)-(19.83, 20.78, 0.015)-(47.00, 21.31, 0.015)-(47.00, 21.81, 0.015)

Per Basin X4 + X5 contributing flows with onsite Q100 peak flow rate:
5.20 + 44.31 = 49.51 cfs
Lowest Building FF - Q100 Surface Elevation:
25.10' - 21.62' = 3.48' > 1' ; therefore satisfy OC flood protection goals.



APPENDIX D
REFERENCE MATERIALS





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	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

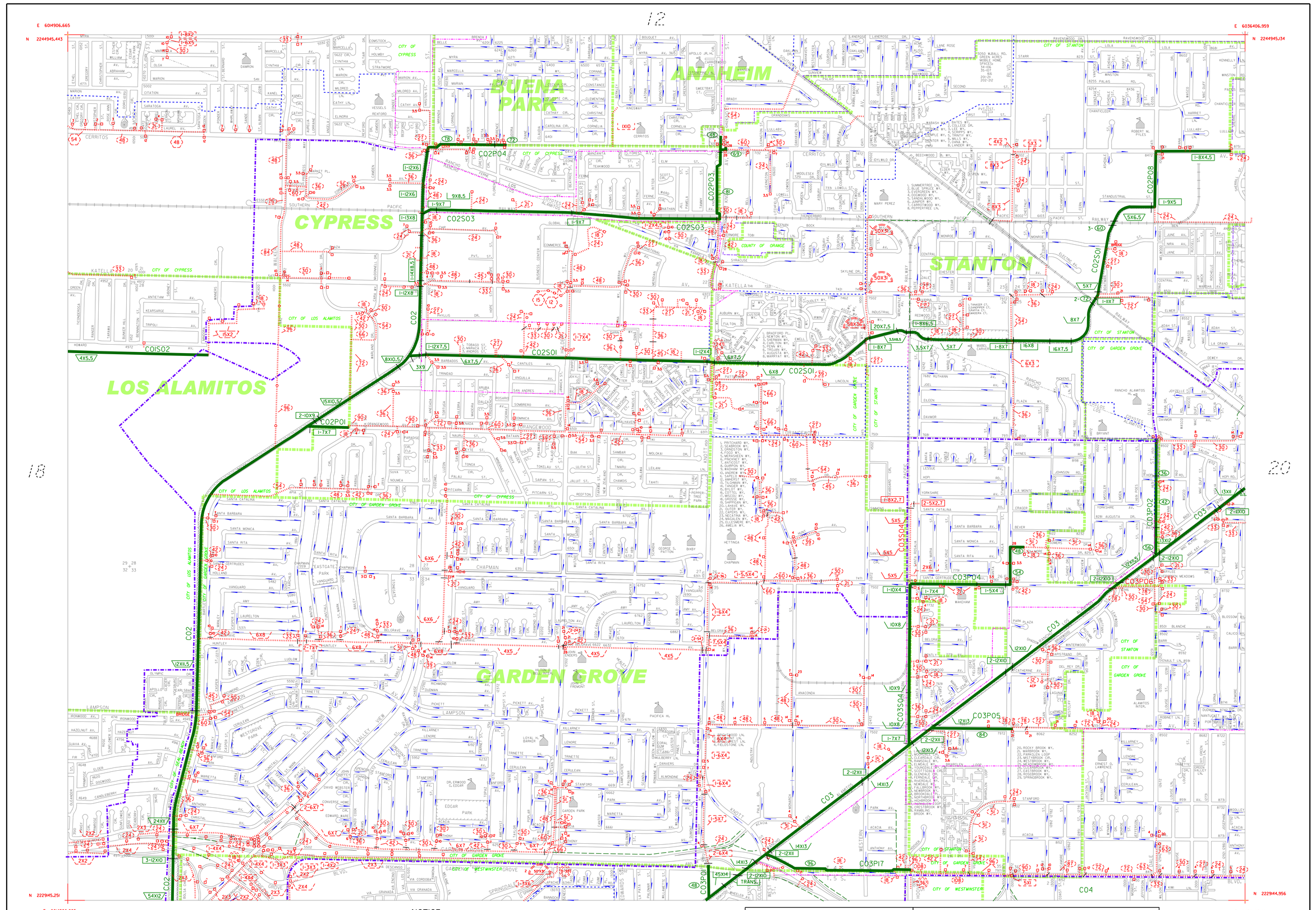
EXISTING FACILITIES

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)

18

18


E 6014906.665
N 2244945.443
E 6036406.959
N 2244945.434
12
18
20
19
19
CYPRESS
LOS ALAMITOS
ANAHEIM
BUENA PARK
STANTON
GARDEN GROVE
CITY OF CYPRESS
CITY OF LOS ALAMITOS
CITY OF GARDEN GROVE
CITY OF STANTON
COUNTY OF ORANGE
C02P04
C02P03
C02P08
C02S03
C02S01
C02P01
C02S02
C02
C03
C03P02
C03P04
C03P06
C03S04
C03P05
C03P01
C03P17
C04
E 6014906.805
N 2229145.251
E 6036407.116
N 2229144.956
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N
0 200 400 600 800
FEET
27
ORANGE COUNTY FLOOD CONTROL DISTRICT
BASE MAP
OF DRAINAGE FACILITIES
IN ORANGE COUNTY
REVISION
S. GUTIERREZ
DATE
JAN 23,2012
SHEET NO.
19
DWG. NO.
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
Greenbelt
Pump Station
Catch Basin (length in feet)
Drop Inlet or Other Entry
OCFCD Basins or Reservoirs
Ownership (If other than City or County): Private = P State = S Federal = F
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)
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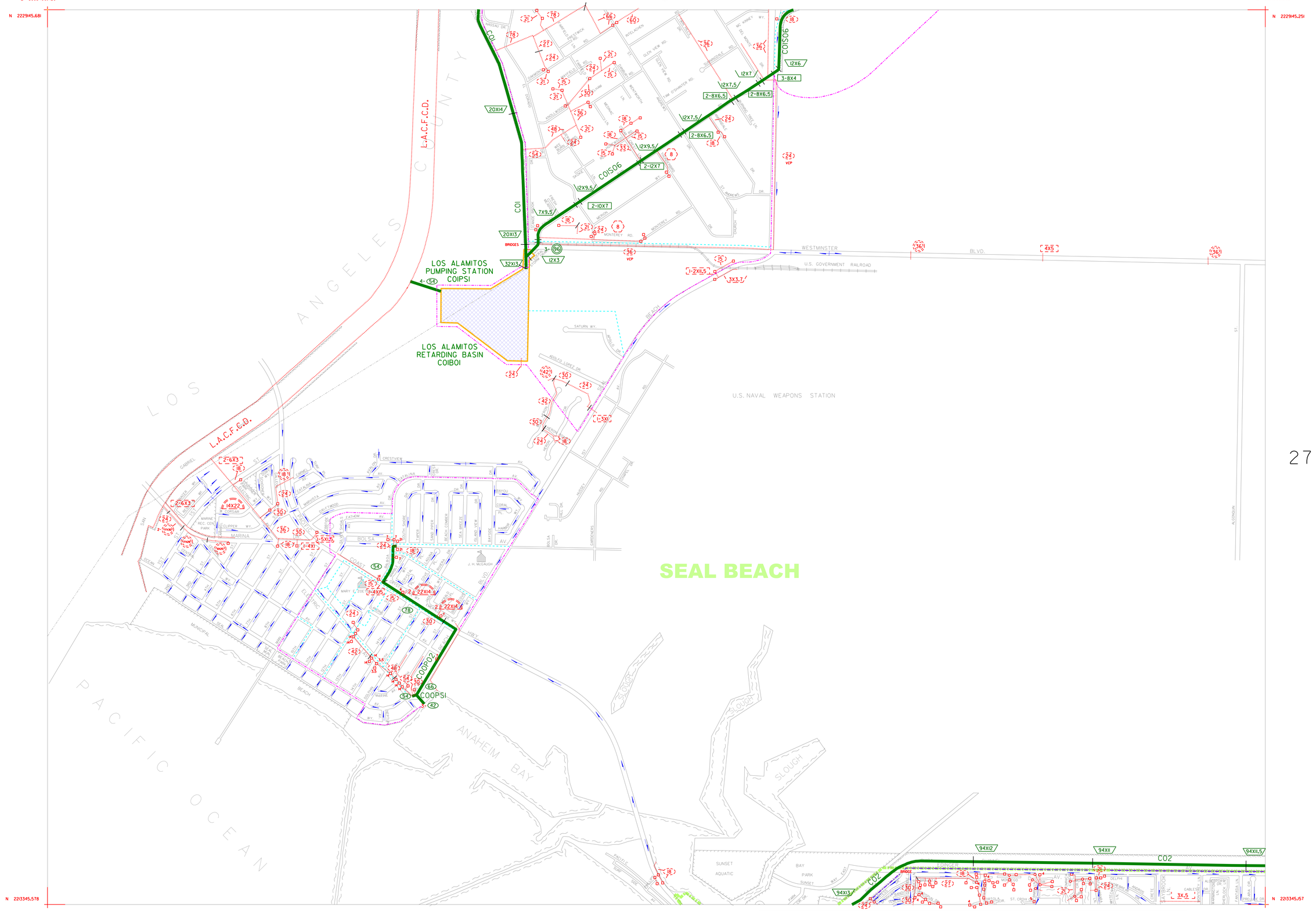
Corrugated Metal Pipe (CMP) (diameter in inches)
Concrete Pipe (diameter in inches)
Concrete Oval Pipe (width by height in inches)
Steel Pipe (diameter in inches)
Reinforced Concrete Arch (base span by height in inches)
Corrugated Metal Arch (base span by height in inches)

E 5993406.420
N 2229145.681

E 6014906.805
N 2229145.251



N

0 200 400 600 800
FEET

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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 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
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- Natural Watercourse
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- 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)
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		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)

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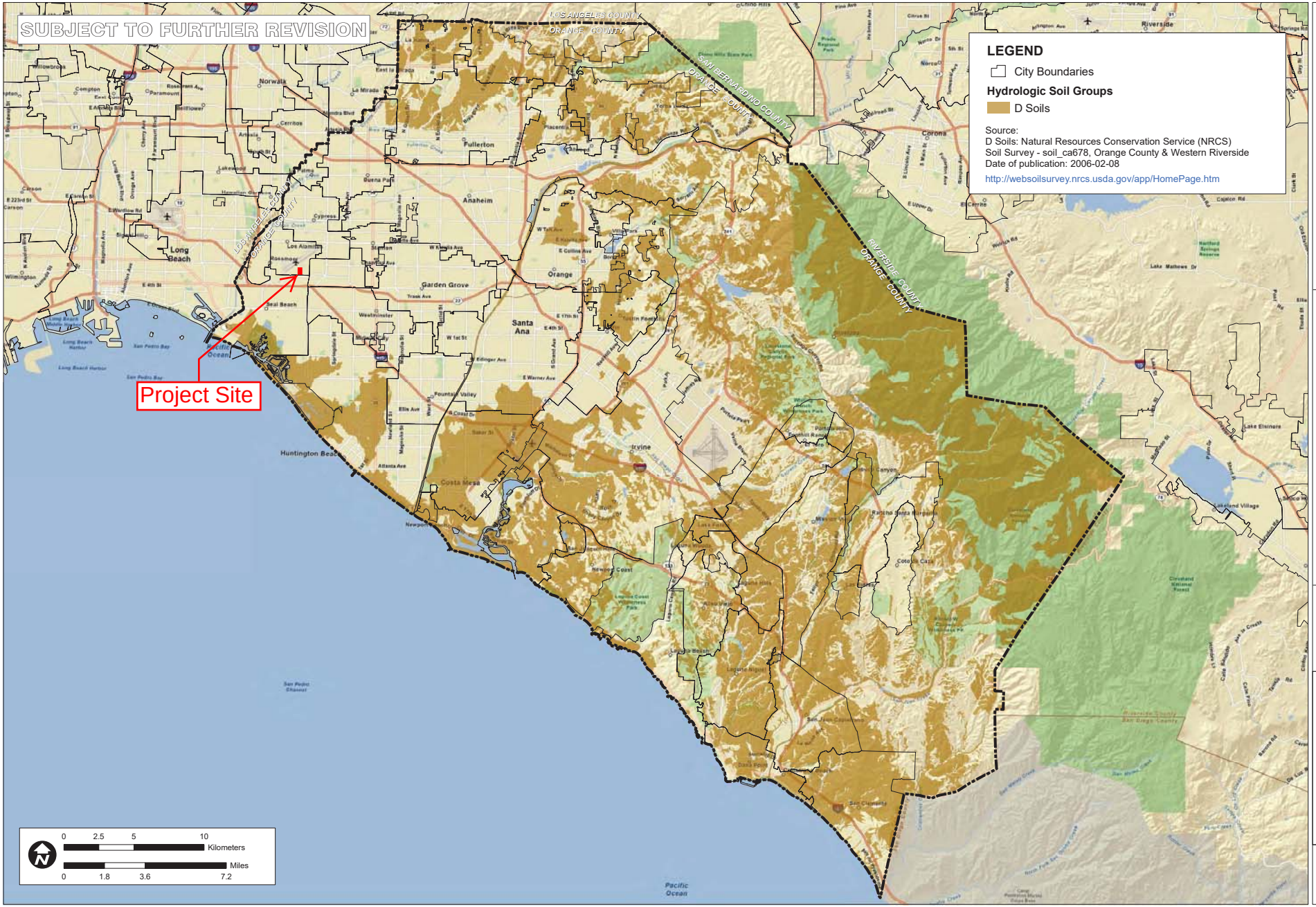
APPENDIX E
SOILS MAP



TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

JOB
ORANGE COUNTY
INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.6 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2b

P:\9526E\16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2b_D-Soils_20110215.mxd