Appendix G2: Hydrology Report

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PRELIMINARY HYDROLOGY ANALYSIS

FOR

GREENBRIAR RESIDENTIAL DEVELOPMENT PROJECT

City of Brea

County of Orange, California

March 12, 2024

Prepared for:
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PRELIMINARY HYDROLOGY ANALYSIS

FOR

GREENBRIAR RESIDENTIAL DEVELOPMENT PROJECT

City of Brea

County of Orange

March 12, 2024

REGISTERED PROFESSIONAL ENGINEER
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PREPARED UNDER THE SUPERVISION OF:

03/12/2024

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SECTION I

INTRODUCTION

A. PROJECT LOCATION

The approximate 9.7-acre project site is located at 1698-1700 Greenbriar Lane in the City of Brea, County of Orange. More specifically, it is located off northwest intersection of Greenbriar Lane and South Associated Road (refer to Vicinity Map for general locations).

B. STUDY PURPOSE

The purpose of this hydrology study is to determine the flow rates produced by the site in its existing and proposed conditions for comparisons. It will also serve as the basis for analyzing and designing the proposed development's required storm drain system. As part of the report, the 2-, 25- and 100-year storm events for both existing and proposed conditions were analyzed. In addition, water quality BMPs are provided to ensure all flows will be treated prior to releasing into the existing downstream storm drain systems along Loftus Diversion Channel (Facility No. A-06).

C. DISCUSSION

Existing Condition:

The project site is currently fully developed with an existing 164,908 square foot office building and a three- level parking structure with parking lot.

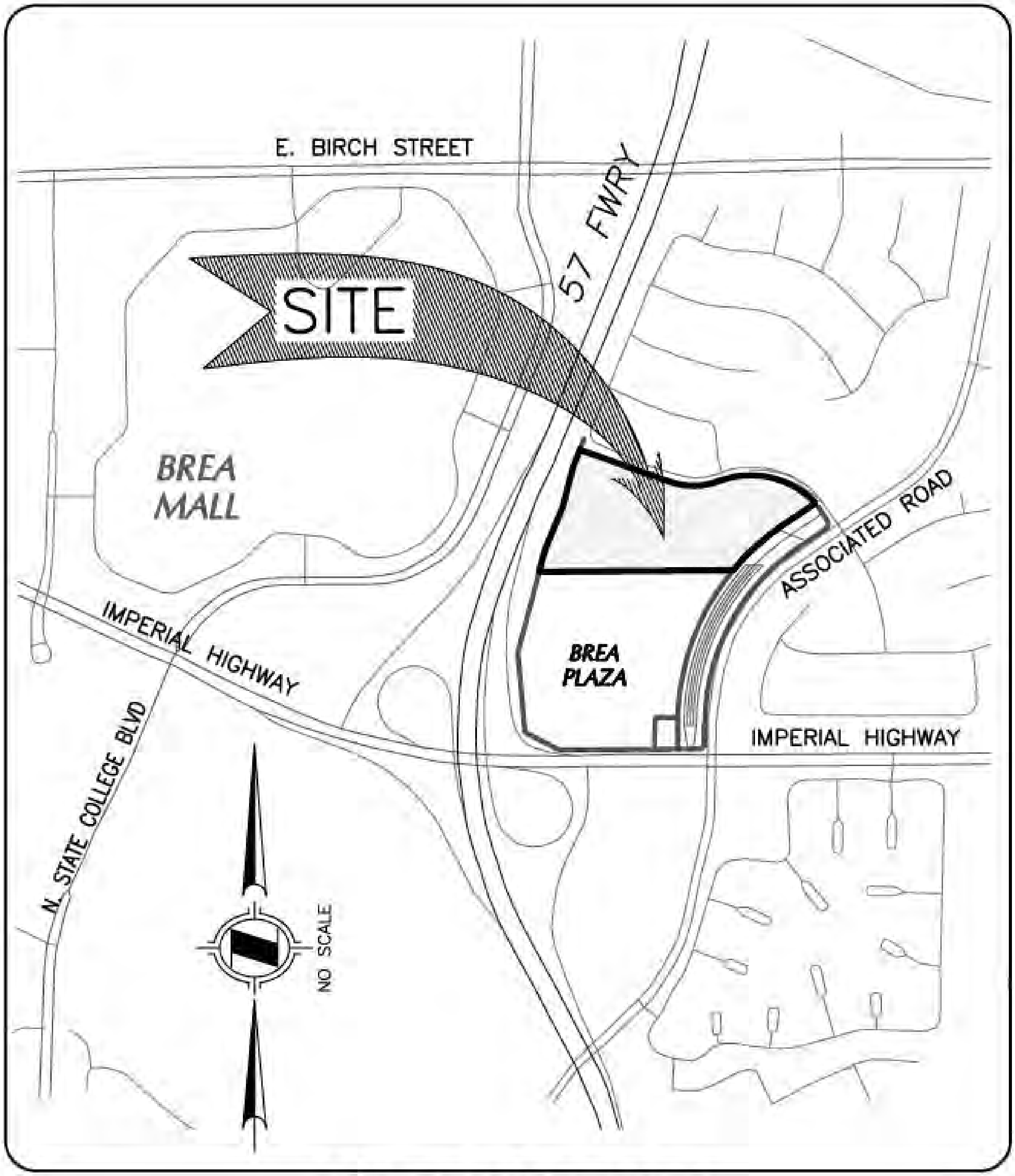
The project is located north of the Loftus Channel (Orange County Flood Control Facility No. A06). All the project site runoffs including off-site tributary areas drain into Loftus Channel. Loftus Channel is located 2/3 miles south of Lambert Road and runs east to west from Voyager to Associated Road and then runs southwest until crosses 57 Freeway and drains into U.S. Army Corps of Engineers Fullerton Creek Reservoir at Craig Regional Park. Loftus Channel is an engineered channel.

There is an existing triple 12'w x 8.5'h RCB culvert under Greenbriar Lane with an existing 10-ft catch basin on the north and a 21-ft catch basin on the south of Greenbriar Lane. Those catch basins are located right above the RCB culverts. There is an existing 4-cell RCB channel approximately 400' downstream of Greenbriar Lane; refer to the reference section for details.

There are four (4) drainage areas during the existing condition hydrology studies.

Drainage Area "A" contains the majority of the project site. The northern half of the project sheet flows to the northeast corner with an existing catch basin. There is also an existing 18" RCP collecting the off-site areas. Drainage Area "A" discharges into the existing 18" pipe to Loftus Channel.

Drainage Area "B" contains the off-site areas along Greenbriar Lane and drains to the existing 10-ft catch basin on top of the triple RCB culvert.



LOCATION MAP

N.T.S

Drainage Area “C” contains the areas to the existing 21-ft catch basins on top of the triple RCB culvert.

Drainage Area “D” contains the southern half the project site, sheet flows to the existing catch basin and to Loftus Channel via existing 18” pipe.

The existing drainage facilities and existing condition hydrology calculations can be found in Section 2.

Proposed Condition

The proposed project consists of demolishing the existing office building, parking structure and construction of 183 single-family attached dwelling units.

The runoffs from the proposed project including the off-site areas remain at the same discharge destination to Loftus Channel.

There are three (3) drainage areas during the proposed condition.

Drainage Area “A” contains exclusively the project site with proposed on-site storm drains, inlets and catch basins. Drainage Area “A” is proposed to join the existing 18” pipe at the northeast corner of the project site and ultimately to Loftus Channel.

Drainage “B” contains the off-site areas tributary to the existing 10-ft catch basin which is located north of Greenbriar Lane and on top of the existing triple RCB culvert. The off-site existing 15” RCP has been revised to discharge to Greenbriar Lane via Parkway culvert.

Drainage “C” contains the off-site areas tributary to the existing 21-ft catch basin which is located south of Greenbriar Lane and on top of the existing triple RCB culvert.

In addition to the proposed on-site drainage improvements, the water quality treatment BMPs are provided to ensure all flows will be treated prior to releasing into the downstream storm drain systems.

The proposed drainage facilities and proposed condition hydrology calculations can be found in Section 3.

D. HYDROLOGY METHODOLOGY

The rational method was used to calculate the design discharge for the local drainage areas since the watershed area to the proposed storm drain systems is less than one square mile.

Hydrologic calculations to determine the 25- and 100-year discharges at critical locations throughout the project site were performed using the Orange County Rational Method. A technical description of the rational method is provided in the Orange County Hydrology Manual dated October, 1986. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for small watersheds for storms of a specified recurrence interval. The rational method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity and a loss coefficient which describes the effects of land use and soil type. The design discharges were computed by generating a hydrologic "link-node" model which divides the area into subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed terrain or street layout.

The following assumptions/guidelines were applied for use of the Rational Method.

The rational Method Hydrology includes the effects of infiltration caused by soil surface characteristics. The soil map from Orange County Hydrology Manual indicates that the study area consists of soil type D. Hydrologic soils ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff.

The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surface. The runoff coefficients used for this study were based on the proposed land uses.

Standard intensity-duration curve data was taken from the Orange County Hydrology Manual, dated October, 1986.

The hydrologic calculations were prepared using the Advanced Engineering Software (A.E.S.) Rational Method computer program. The results of the hydrologic calculations were used to design the required storm drain facilities.

E. HYDROLOGY RESULTS

There are 4 drainage areas within the studied area for the existing condition. All the runoffs drain to the adjacent Loftus Channel. There are 3 drainage areas for the proposed condition with Drainage Area "D" (existing condition) discharges into the on-site proposed storm drain systems.

Table 1 summarizes the hydrology analysis results for the overall hydrology study for both the existing and proposed conditions.

As indicated in table 1, the overall drainage acreages for the studied area remain the same with approximately 22.4 acres.

Table 1 Overall Hydrology Analysis Summary
Greenbriar Project
City of Brea, Orange County

Existing Condition					Proposed Condition					Difference (Proposed-Existing)			
Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)
A	8.9	10.5	23.8	30.8	A	9.5	12.9	29.5	38.3	0.6	2.4	5.7	7.5
B	8.5	8.8	20.2	26.1	B	11.8	12.1	27.9	36.2	3.3	3.3	7.7	10.1
C	0.5	0.9	1.9	2.4	C	1.1	1.1	2.4	3.2	0.6	0.2	0.5	0.8
D	4.5	6.5	14.4	18.6	D	-	-	-	-	-4.5	-6.5	-14.4	-18.6
Overall	22.40	26.70	60.30	77.90	Overall	22.40	26.10	59.80	77.70	0.00	-0.60	-0.50	-0.20

Note:

Existing Drainage Area "D" was combined into the project site drainage areas

During the existing condition, the overall 2-year peak flow is approximately 26.7 cfs, 25-year peak flow is approximately 60.3 cfs and 100-year flow rate is approximately 77.9 cfs. The overall proposed peak flows are very close to the existing condition with minor decreases. The total 2-year peak flow is approximately 26.1 cfs, 25-year peak flow is approximately 59.8 cfs and 100-year flow rate is approximately 77.7 cfs with the same tributary area.

F. STREET AND EXISTING STORM DRAIN CAPACTIY

As shown from Table 1, the proposed runoffs are less than the existing condition ones.

Loftus Channel -Facility No. A06

The hydrology study and channel improvement plans were obtained and can be found in the Reference Section. As shown from the references, the Loftus Channel reach along the project site applied the same flow rates – 4,235 cfs. Even though Drainage Area “D” (existing condition) has been rerouted with on-site storm drain systems and discharge to Loftus Channel via existing 18” RCP at the northeastern corner of the project site, there should have no negative impacts to Loftus Channel since Loftus Channel design applied the same peak flow rates in this reach.

Greenbriar Lane Street Capacity

As part of the drainage modification, the existing off-site 15” RCP, which collects the flows along Chevy Chase Drive, was modified to release to Greenbriar Lane via parkway culverts. The flows continue along Greenbriar Lane via curb & gutter to the existing 10-ft and 21-ft catch basin on top of the Loftus Channel box culvert.

The street capacity calculations were performed to assure Greenbriar Lane would meet the flood protection requirements – 25-year storm within curb and 100-year storm contained within street Right-of-Way.

Street capacity calculation results indicated that Greenbriar Lane can convey the proposed flow and meet the flood protection requirements. Detailed calculations can be found in Section 4.

Existing Catch Basin Capacity

There are two existing catch basins with the size of 10-ft and 21-ft at Greenbriar Lane on top of the existing triple RCB Culvert.

The catch basin capacity calculations were performed with updated flow rates. Only the 25-year storm was performed, and calculation results indicated that the existing 10-ft and 21-ft catch basins have enough capacity to convey the flows.

Existing 18” RCP Capacity

The runoff from the project will be collected via area drains, inlets and catch basins and discharge to Loftus Channel via existing 18” catch basin. Preliminary capacity analysis was performed by applying FlowMaster program. The preliminary capacity calculations indicated that the existing 18” RCP can convey the proposed flows. Detailed hydraulic calculations will be performed during the final engineering phase.

G. WATER QUALITY REPORT

The WQMP report in compliance of the water quality and hydromodification requirements can be found in the separate report.

H. CONCLUSIONS

The proposed project consists of demolishing the existing office building, parking structure and construction of 183 single-family attached dwelling units.

The on-site and off-site drainage improvements are proposed for the project. The existing drainage system capacity calculations were performed to assure the existing drainage system have the capacity to convey the flows.

It is concluded that existing drainage systems have enough capacity and there should have no negative impacts to the downstream storm drain systems.

In addition, water quality BMPs are provided to ensure all flows will be treated prior to releasing into the existing downstream storm drain systems along Loftus Diversion Channel (Facility No. A-06).

SECTION II

EXISTING CONDITION HYDROLOGY CALCULATIONS &MAP

A. 2-YEAR STORM

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****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development in City of Brea               *
 * Existing Condition - Area "A"                                            *
 * 2-year Storm                                                             *
 **************************************************************************

  FILE NAME: GBEXA.DAT
  TIME/DATE OF STUDY: 14:05 02/28/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    348.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.076
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.719
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.63      0.20     0.500    57    8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     0.92
  TOTAL AREA(ACRES) =     0.63   PEAK FLOW RATE(CFS) =     0.92

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  348.00  DOWNSTREAM ELEVATION(FEET) =  340.00
  STREET LENGTH(FEET) =   435.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.93
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   10.59
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.472
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.22      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.22     SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      3.85    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       3.8       PEAK FLOW RATE(CFS) =      4.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.26
  FLOW VELOCITY(FEET/SEC.) =  3.23   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   328.50
  FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.75
  PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.57
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.399
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.93      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       4.8       PEAK FLOW RATE(CFS) =       5.65

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.50  DOWNSTREAM(FEET) =   322.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.65
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   12.15
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.360
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        4.15      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.15      SUBAREA RUNOFF(CFS) =    5.00
  EFFECTIVE AREA(ACRES) =      8.93   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       8.9       PEAK FLOW RATE(CFS) =      10.49
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       8.9  TC(MIN.) =     12.15
  EFFECTIVE AREA(ACRES) =      8.93  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.272
  PEAK FLOW RATE(CFS)   =      10.49
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* Hydrology Study for Greenbriar Development                               *
* Existing Condition - Area "B"                                            *
* 2-year Storm                                                             *
 **************************************************************************

  FILE NAME: GBEXB.DAT
  TIME/DATE OF STUDY: 07:54 02/27/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     0.46
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.96
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   1.77   Tc(MIN.) =   10.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.443
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83    SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      1.17    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =       1.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.17
  FLOW VELOCITY(FEET/SEC.) =  3.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   12.57
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    1.30
  EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       2.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.71
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
  STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.35
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.33
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   13.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.51
  EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =       6.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
  FLOW VELOCITY(FEET/SEC.) =  4.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
  STREET FLOW TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =   14.72
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.218
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.91      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.91      SUBAREA RUNOFF(CFS) =    3.14
  EFFECTIVE AREA(ACRES) =      8.50    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       8.5       PEAK FLOW RATE(CFS) =       8.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.70
  FLOW VELOCITY(FEET/SEC.) =  4.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        8.5  TC(MIN.) =     14.72
  EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.363
  PEAK FLOW RATE(CFS)   =      8.76
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
 * Hydrology Study for Greenbriar Development                             *
 * Existing Condition - Area "C"                                          *
 * 2-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBEXC.DAT
  TIME/DATE OF STUDY: 08:02 02/27/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    337.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.881
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.062
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D       0.20      0.20     0.100    57    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   1.77   Tc(MIN.) =    7.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.773
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.34      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =      0.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.40
  FLOW VELOCITY(FEET/SEC.) =  2.89   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     590.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      7.65
  EFFECTIVE AREA(ACRES) =      0.54  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       0.85
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Greenbriar Development                               *
* Existing Condition - Area "D"                                            *
* 2-year Storm                                                             *
 **************************************************************************

  FILE NAME: GBEXD.DAT
  TIME/DATE OF STUDY: 08:04 02/27/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    342.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.959
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.047
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D       0.65      0.20     0.100    57    5.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  342.00  DOWNSTREAM ELEVATION(FEET) =  329.50
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =    7.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.761
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       3.19      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =    5.00
  EFFECTIVE AREA(ACRES) =      3.84    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       3.8       PEAK FLOW RATE(CFS) =      6.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.16
  FLOW VELOCITY(FEET/SEC.) =  4.15   DEPTH*VELOCITY(FT*FT/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  329.50  DOWNSTREAM ELEVATION(FEET) =  323.50
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.41
  STREET FLOW TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =    8.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.636
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.62      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =      4.46    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       4.5       PEAK FLOW RATE(CFS) =       6.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.18
  FLOW VELOCITY(FEET/SEC.) =  3.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     930.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      8.81
  EFFECTIVE AREA(ACRES) =      4.46  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       6.48
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B. 25-YEAR STORM

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

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
 * Hydrology Study for Greenbriar Development in City of Brea              *
 * Existing Condition - Area "A"                                           *
 * 25-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBEXA.DAT
  TIME/DATE OF STUDY: 14:06 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    348.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.076
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.677
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.63      0.20     0.500    75    8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     2.03
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.03

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  348.00  DOWNSTREAM ELEVATION(FEET) =  340.00
  STREET LENGTH(FEET) =   435.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.226
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.22      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    9.06
  EFFECTIVE AREA(ACRES) =      3.85    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.14
 FLOW VELOCITY(FEET/SEC.) =  3.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.72
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     735.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   328.50
 FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.61
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   10.98
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1195.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.98
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.091
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.93      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) =    0.93      SUBAREA RUNOFF(CFS) =    2.57
 EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      12.93

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   328.50  DOWNSTREAM(FEET) =   322.00
 FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.65
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.93
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.46
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1475.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
 MAINLINE Tc(MIN.) =   11.46
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        4.15      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) =    4.15      SUBAREA RUNOFF(CFS) =   11.19
 EFFECTIVE AREA(ACRES) =      8.93   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =        8.9       PEAK FLOW RATE(CFS) =      23.80
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        8.9  TC(MIN.) =     11.46
 EFFECTIVE AREA(ACRES) =      8.93  AREA-AVERAGED Fm(INCH/HR)=  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.272
 PEAK FLOW RATE(CFS)   =      23.80
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                    Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                              *
 * Existing Condition - Area "B"                                           *
 * 25-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBEXB.DAT
  TIME/DATE OF STUDY: 07:55 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     1.02
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      1.02

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   10.70
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.136
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83    SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.17    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =      3.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.21
  FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =   12.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.930
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       5.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  3.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
  STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
  STREET FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   12.54
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.867
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    8.09
  EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      13.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  5.33   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.44
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.79
    SPLIT DEPTH(FEET) =    0.30   SPLIT FLOOD WIDTH(FEET) =    9.21
    SPLIT FLOW(CFS) =    2.90   SPLIT VELOCITY(FEET/SEC.) =    3.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.17
  STREET FLOW TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   13.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.91      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) =    2.91      SUBAREA RUNOFF(CFS) =    7.04
  EFFECTIVE AREA(ACRES) =      8.50    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =       8.5       PEAK FLOW RATE(CFS) =      20.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.79   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       8.5  TC(MIN.) =     13.88
  EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.363
  PEAK FLOW RATE(CFS)   =      20.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                                 Irvine,Inc
                      Planning * Engineering * Surveying
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 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                               *
 * Existing Condition - Area "C"                                            *
 * 25-year Storm                                                            *
 **************************************************************************

  FILE NAME: GBEXC.DAT
  TIME/DATE OF STUDY: 08:01 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    337.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.881
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.400
  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       0.20      0.20     0.100    75    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    5.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =    7.49
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.839
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.34      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) =    0.34      SUBAREA RUNOFF(CFS) =    1.17
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =      1.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.08
  FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     590.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      7.49
  EFFECTIVE AREA(ACRES) =      0.54  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       1.86
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                               *
 * Existing Condition - Area "D"                                            *
 * 25-year Storm                                                            *
 **************************************************************************

  FILE NAME: GBEXD.DAT
  TIME/DATE OF STUDY: 08:05 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020  0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020  0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020  0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    342.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.959
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.368
  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       0.65      0.20     0.100    75    5.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.54
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      2.54

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  342.00  DOWNSTREAM ELEVATION(FEET) =  329.50
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.67
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =    7.45
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.848
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       3.19      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) =    3.19      SUBAREA RUNOFF(CFS) =   10.99
  EFFECTIVE AREA(ACRES) =      3.84    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       3.8        PEAK FLOW RATE(CFS) =      13.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.73
  FLOW VELOCITY(FEET/SEC.) =  5.01   DEPTH*VELOCITY(FT*FT/SEC.) =   2.16
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  329.50  DOWNSTREAM ELEVATION(FEET) =  323.50
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.23
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.65
    SPLIT DEPTH(FEET) =    0.16   SPLIT FLOOD WIDTH(FEET) =    1.55
    SPLIT FLOW(CFS) =    0.12   SPLIT VELOCITY(FEET/SEC.) =    0.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    8.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.613
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D       0.62      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) =    0.62      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      4.46    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       4.5        PEAK FLOW RATE(CFS) =      14.42

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.65   DEPTH*VELOCITY(FT*FT/SEC.) =   2.11
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     930.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      8.33
  EFFECTIVE AREA(ACRES) =      4.46  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      14.42
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

C. 100-YEAR STORM

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* Hydrology Study for Greenbriar Development in City of Brea               *
* Existing Condition - Area "A"                                            *
* 100-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBEXA.DAT
  TIME/DATE OF STUDY: 14:06 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    348.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.076
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.701
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.63      0.20     0.500    91    8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.61
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.61

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  348.00  DOWNSTREAM ELEVATION(FEET) =  340.00
  STREET LENGTH(FEET) =   435.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
  STREET FLOW TRAVEL TIME(MIN.) =   1.98   Tc(MIN.) =   10.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.147
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.22      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.22     SUBAREA RUNOFF(CFS) =   11.73
  EFFECTIVE AREA(ACRES) =      3.85    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20   AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      14.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.00  DOWNSTREAM(FEET) =   328.50
  FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.02
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   10.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.977
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.93      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) =    0.93      SUBAREA RUNOFF(CFS) =    3.31
  EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      16.75

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.50  DOWNSTREAM(FEET) =   322.00
  FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.39
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.75
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   11.26
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
  MAINLINE Tc(MIN.) =   11.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.885
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        4.15      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) =    4.15      SUBAREA RUNOFF(CFS) =   14.44
  EFFECTIVE AREA(ACRES) =      8.93   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        8.9       PEAK FLOW RATE(CFS) =      30.79
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       8.9  TC(MIN.) =     11.26
  EFFECTIVE AREA(ACRES) =      8.93  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.272
  PEAK FLOW RATE(CFS)   =      30.79
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
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            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                               *
 * Existing Condition - Area "B"                                            *
 * 100-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBEXB.DAT
  TIME/DATE OF STUDY: 07:55 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     1.31
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      1.31

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =   10.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.022
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83   SUBAREA RUNOFF(CFS) =    2.93
  EFFECTIVE AREA(ACRES) =      1.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =      4.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.33
  FLOW VELOCITY(FEET/SEC.) =  3.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.20
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   12.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
  STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   11.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.769
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    3.86
  EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       7.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.89
  FLOW VELOCITY(FEET/SEC.) =  4.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.58
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
  STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.12
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.21
  STREET FLOW TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   12.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.691
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =   10.50
  EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      18.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  5.61   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.60
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.79
    SPLIT DEPTH(FEET) =    0.38   SPLIT FLOOD WIDTH(FEET) =   14.19
    SPLIT FLOW(CFS) =    8.06   SPLIT VELOCITY(FEET/SEC.) =    4.17
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.17
  STREET FLOW TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   13.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.479
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.91      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) =    2.91      SUBAREA RUNOFF(CFS) =    9.06
  EFFECTIVE AREA(ACRES) =      8.50    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =        8.5        PEAK FLOW RATE(CFS) =      26.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.79   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        8.5  TC(MIN.) =     13.66
  EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.363
  PEAK FLOW RATE(CFS)   =      26.06
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                              *
 * Existing Condition - Area "C"                                           *
 * 100-year Storm                                                          *
 **************************************************************************

  FILE NAME: GBEXC.DAT
  TIME/DATE OF STUDY: 08:00 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    337.00  DOWNSTREAM(FEET) =    328.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.881
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.638
  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       0.20      0.20     0.100    91    5.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      1.01

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.76
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =    7.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.931
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.34      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) =    0.34      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =      0.54    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =      2.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
  FLOW VELOCITY(FEET/SEC.) =  3.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     590.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =      7.43
  EFFECTIVE AREA(ACRES) =      0.54  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       2.39
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                       Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development                              *
 * Existing Condition - Area "D"                                           *
 * 100-year Storm                                                          *
 **************************************************************************

  FILE NAME: GBEXD.DAT
  TIME/DATE OF STUDY: 08:06 02/27/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    342.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.959
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.596
  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       0.65      0.20     0.100    91    5.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.26
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  342.00  DOWNSTREAM ELEVATION(FEET) =  329.50
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.90
  STREET FLOW TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =    7.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.952
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       3.19      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) =    3.19      SUBAREA RUNOFF(CFS) =   14.16
  EFFECTIVE AREA(ACRES) =      3.84    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       3.8       PEAK FLOW RATE(CFS) =      17.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  5.25   DEPTH*VELOCITY(FT*FT/SEC.) =   2.38
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  329.50  DOWNSTREAM ELEVATION(FEET) =  323.50
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.33
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.65
    SPLIT DEPTH(FEET) =    0.33   SPLIT FLOOD WIDTH(FEET) =   11.04
    SPLIT FLOW(CFS) =    4.22   SPLIT VELOCITY(FEET/SEC.) =    3.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
  STREET FLOW TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    8.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.642
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.62      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) =    0.62      SUBAREA RUNOFF(CFS) =    2.58
  EFFECTIVE AREA(ACRES) =      4.46    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       4.5        PEAK FLOW RATE(CFS) =      18.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.65   DEPTH*VELOCITY(FT*FT/SEC.) =   2.11
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     930.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      8.25
  EFFECTIVE AREA(ACRES) =      4.46  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      18.55
============================================================================
```

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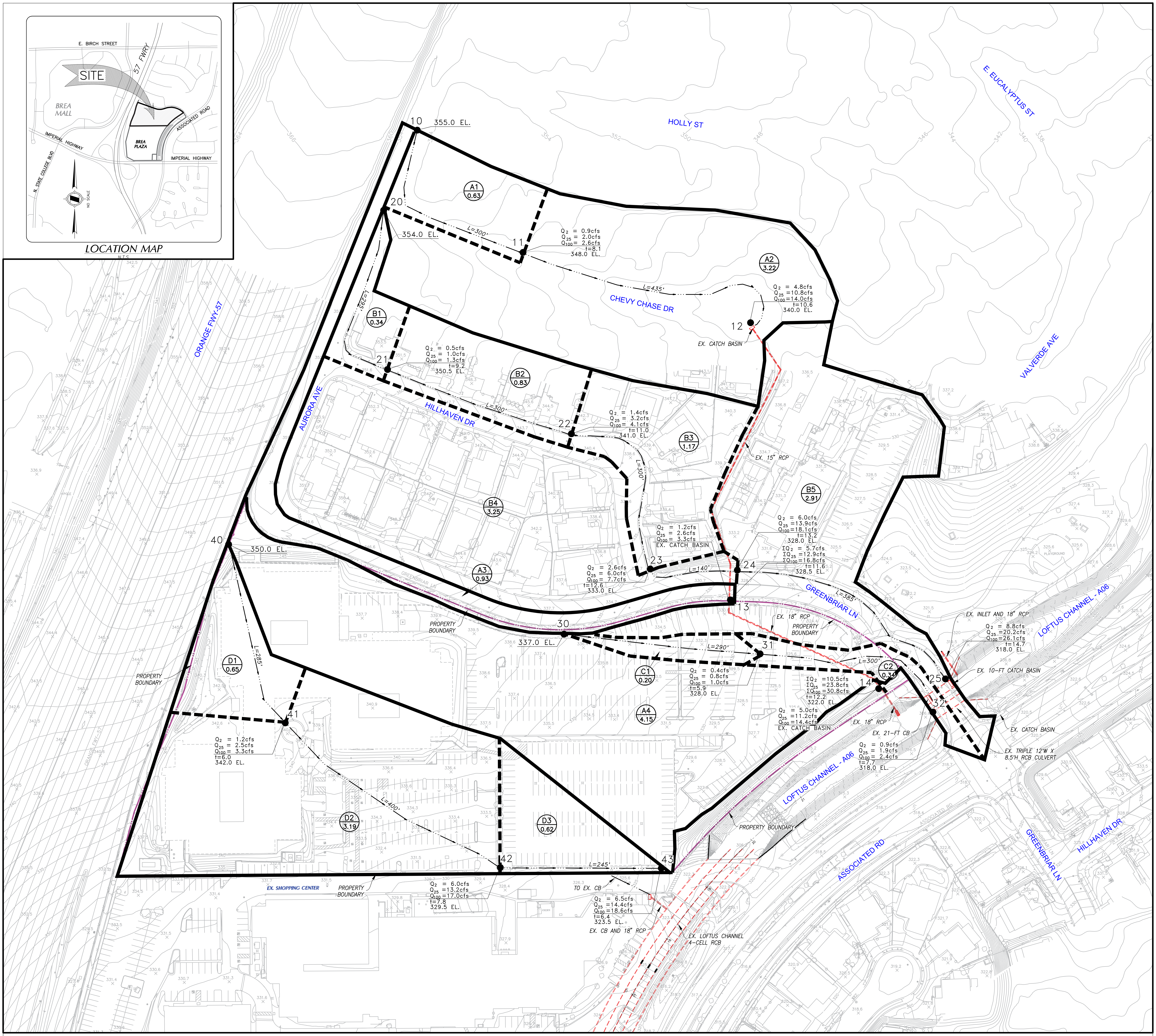
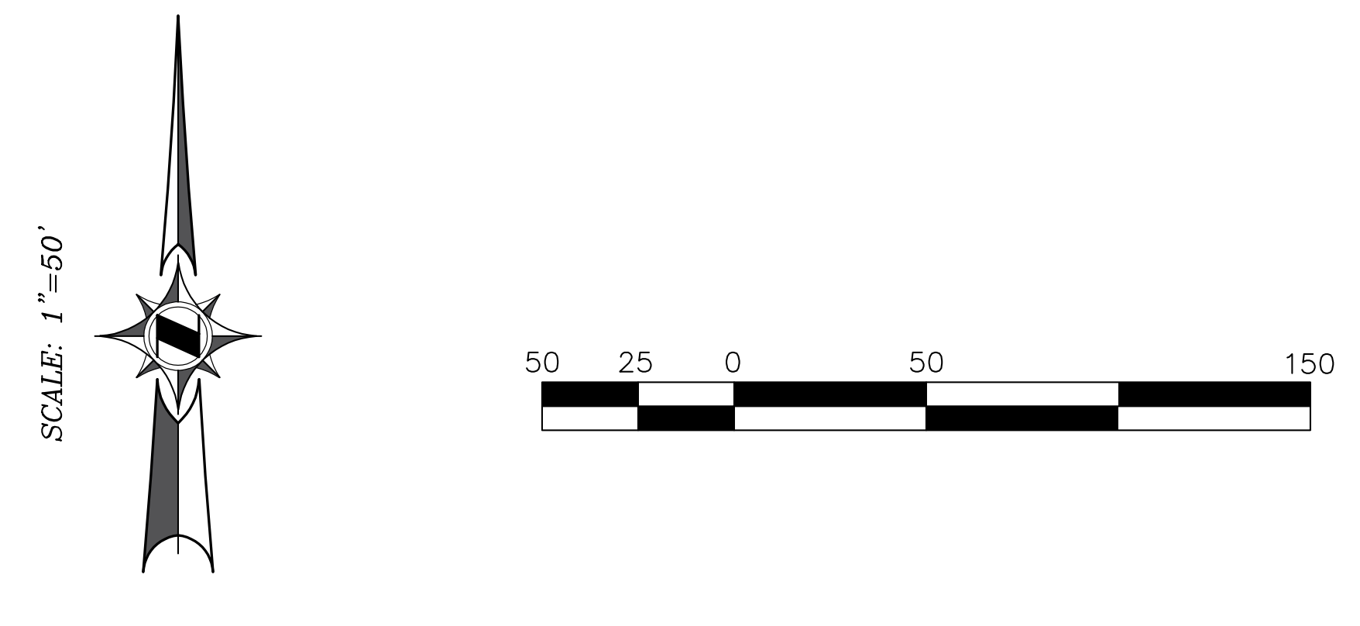
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```





LEGEND

MAJOR DRAINAGE BOUNDARY
MINOR DRAINAGE BOUNDARY
100 NODE NUMBER
A 1.0 AREA DESIGNATION
AREA ACREAGE (IN ACRES)
Q100=8.0cfs t=15.0 PEAK FLOW RATE
TIME OF CONCENTRATION
ΣQ100=10.0cfs t=15.0 PEAK CONFLUENCE FLOW RATE
TIME OF CONCENTRATION
EXISTING STORM DRAIN
D SOIL GROUP

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PREPARED FOR:

LENNAR
2000 FIVEPOINT, 3RD FLOOR
IRVINE, CA 92618
(949) 349-8000

HYDROLOGY MAP
GREENBRIAR - BREA
EXISTING CONDITION
CITY OF BREA

WO: 3916-89X
HYDROLOGY MAP FOR GREENBRIAR - BREA

DATE: Feb. 29, 2024 06:42:17 AM FILE: F:\1285\Engineering\SY_Hydrology\Greenbriar Existing Hydrology.dwg

SECTION III
PROPOSED CONDITION HYDROLOGY CALCULATIONS &MAP

A. 2-YEAR STORM

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             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development in City of Brea               *
 * Proposed Condition - Area "A"                                            *
 * 2-year Storm                                                             *
 **************************************************************************

  FILE NAME: GBPRA.DAT
  TIME/DATE OF STUDY: 15:47 02/28/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
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```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.50  DOWNSTREAM(FEET) =    343.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.286
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.193
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.22      0.20     0.100    57    5.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   343.80  DOWNSTREAM(FEET) =   342.70
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.43
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.54
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.29      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.29      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      0.51   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =       0.97

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.70  DOWNSTREAM(FEET) =   341.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.97
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    5.83
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.072
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      0.64   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       0.6      PEAK FLOW RATE(CFS) =      1.18

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.10  DOWNSTREAM(FEET) =   340.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.18
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
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  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.92   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       0.9      PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.30  DOWNSTREAM(FEET) =   339.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.66
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.13
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     445.00 FEET.

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  FLOW PROCESS FROM NODE    151.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.014
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.08      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.14
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       1.0      PEAK FLOW RATE(CFS) =      1.78

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.30  DOWNSTREAM(FEET) =   337.70
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.78
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    6.37
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =     525.00 FEET.

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  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.37
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.969
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.30      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =      2.27

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.70  DOWNSTREAM(FEET) =   337.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.27
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.55
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     17.00 =     570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.939
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.32      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       1.6       PEAK FLOW RATE(CFS) =      2.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

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============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.30  DOWNSTREAM(FEET) =   336.50
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.78
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    6.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.82
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.894
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =      1.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       1.7       PEAK FLOW RATE(CFS) =      2.90

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.50  DOWNSTREAM(FEET) =   336.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    6.97
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =     695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.871
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      2.03   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       2.0      PEAK FLOW RATE(CFS) =      3.36

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.871
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.68      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.71   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       2.7      PEAK FLOW RATE(CFS) =      4.48

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.00  DOWNSTREAM(FEET) =   335.30
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.48
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.22
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     20.00 =     775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.22
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.833
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.10      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.16
  EFFECTIVE AREA(ACRES) =      2.81   AREA-AVERAGED Fm(INCH/HR) =  0.03
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  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       2.8      PEAK FLOW RATE(CFS) =      4.55

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   335.30  DOWNSTREAM(FEET) =   334.80
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.55
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    7.36
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     21.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.814
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      3.11   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       3.1      PEAK FLOW RATE(CFS) =      4.98

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.80  DOWNSTREAM(FEET) =   334.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.98
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.50
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =     870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.793
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "WOODLAND,GRASS"           D       0.62      0.20     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      3.73   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =      5.81

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.30  DOWNSTREAM(FEET) =   334.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.81
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    7.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.57
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.784
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.17
  EFFECTIVE AREA(ACRES) =      3.84   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =      5.96

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.00  DOWNSTREAM(FEET) =   333.50
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.69
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     24.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.69
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.768
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.47
  EFFECTIVE AREA(ACRES) =      4.14   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =        4.1       PEAK FLOW RATE(CFS) =      6.37

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   333.50  DOWNSTREAM(FEET) =   332.90
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.37
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    7.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =     990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.82
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.751
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.38      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.38      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =      4.52   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       4.5       PEAK FLOW RATE(CFS) =      6.89

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.90  DOWNSTREAM(FEET) =   332.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.89
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.88
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.17
  EFFECTIVE AREA(ACRES) =      4.63   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       4.6       PEAK FLOW RATE(CFS) =      7.03

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.40  DOWNSTREAM(FEET) =   331.60
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.03
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.97
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    1060.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.732
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       4.9       PEAK FLOW RATE(CFS) =      7.44

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.60  DOWNSTREAM(FEET) =   330.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.07
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     28.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.07
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.719
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.34      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       5.3       PEAK FLOW RATE(CFS) =      7.90

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.50  DOWNSTREAM(FEET) =   329.70
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.90
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.13
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =    1140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.713
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.20
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       5.4       PEAK FLOW RATE(CFS) =       8.06

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   329.70  DOWNSTREAM(FEET) =   328.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.06
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.20
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    1185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.20
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.704
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  APARTMENTS                 D       0.31      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      5.71   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       5.7       PEAK FLOW RATE(CFS) =       8.48

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.30  DOWNSTREAM(FEET) =   327.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.48
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     31.00 =    1210.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.699
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.20
  EFFECTIVE AREA(ACRES) =      5.84   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       5.8       PEAK FLOW RATE(CFS) =       8.65

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.40  DOWNSTREAM(FEET) =   327.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.65
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.35
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     32.00 =    1250.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.687
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.42      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    0.62
  EFFECTIVE AREA(ACRES) =      6.26   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        6.3       PEAK FLOW RATE(CFS) =       9.21

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.00  DOWNSTREAM(FEET) =   326.80
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.21
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.40
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.681
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.19      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      6.45   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =       9.46

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.80  DOWNSTREAM(FEET) =   326.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.16
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.46
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     34.00 =    1370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.80
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.636
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =      6.58   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =       9.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.50  DOWNSTREAM(FEET) =   326.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.46
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    8.94
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    1410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.622
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.17      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.17      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.8       PEAK FLOW RATE(CFS) =      9.55

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.30  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.55
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    9.20
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     36.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.20
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.595
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.14      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.20
  EFFECTIVE AREA(ACRES) =      6.89   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.9       PEAK FLOW RATE(CFS) =      9.58

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.58
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.35
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.

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

```
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   1.58
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =      6.89
  TOTAL STREAM AREA(ACRES) =      6.89
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.58

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
  ELEVATION DATA: UPSTREAM(FEET) =    342.50  DOWNSTREAM(FEET) =    341.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.679
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 D       0.41      0.20     0.200    57    6.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     0.69
  TOTAL AREA(ACRES) =     0.41   PEAK FLOW RATE(CFS) =     0.69

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.40  DOWNSTREAM(FEET) =   339.10
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.69
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =    7.17
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
  MAINLINE Tc(MIN.) =    7.17
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.840
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.27      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      0.68   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       0.7       PEAK FLOW RATE(CFS) =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.10  DOWNSTREAM(FEET) =   336.40
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.10
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    7.62
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.62
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.777
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.0       PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.40  DOWNSTREAM(FEET) =   334.20
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.50
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    8.00
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     44.00 =     525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     44.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.729
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.30      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =      1.91

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.20  DOWNSTREAM(FEET) =   331.90
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.91
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     45.00 =     640.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.34
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.687
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.29      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.29      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      1.55   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       2.30

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.90  DOWNSTREAM(FEET) =   327.60
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.30
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    8.97
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     46.00 =     860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.618
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.62      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      2.17   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.08

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.60  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.08
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.11
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     47.00 =     920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.604
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.07      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.10
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.15

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.15
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    9.17
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     48.00 =     935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.17
  RAINFALL INTENSITY(INCH/HR) =    1.60
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.24
  TOTAL STREAM AREA(ACRES) =       2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.15

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.58    9.35    1.581  0.20( 0.05) 0.25       6.9      10.00
      2        3.15    9.17    1.598  0.20( 0.04) 0.20       2.2      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.66    9.17    1.598  0.20( 0.05) 0.23       9.0      40.00
      2       12.70    9.35    1.581  0.20( 0.05) 0.24       9.1      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.70    Tc(MIN.) =     9.35
  EFFECTIVE AREA(ACRES) =       9.13   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.90  DOWNSTREAM(FEET) =   325.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.73
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.70
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     49.00 =    1575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.568
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.32      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      9.45   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        9.5       PEAK FLOW RATE(CFS) =      12.94
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        9.5  TC(MIN.) =      9.48
  EFFECTIVE AREA(ACRES) =      9.45  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.234
  PEAK FLOW RATE(CFS)   =      12.94

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.90    9.31    1.585  0.20( 0.05) 0.23       9.3      40.00
      2       12.94    9.48    1.568  0.20( 0.05) 0.23       9.5      10.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
 * Hydrology Study for Greenbriar Development in City of Brea              *
 * Proposed Condition - Area "B"                                           *
 * 2-year Storm                                                            *
 **************************************************************************


  FILE NAME: GBPRB.DAT
  TIME/DATE OF STUDY: 08:51 02/28/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     0.46
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.96
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   1.77   Tc(MIN.) =   10.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.443
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83    SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      1.17    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =      1.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.17
 FLOW VELOCITY(FEET/SEC.) =  3.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
 STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.06
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.79
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
 STREET FLOW TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   12.57
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    1.30
 EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       2.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.71
 FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
 STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.35
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.33
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.03
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   13.15
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.51
 EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =       6.03

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
 FLOW VELOCITY(FEET/SEC.) =  4.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.15
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.85      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.85      SUBAREA RUNOFF(CFS) =    4.16
 EFFECTIVE AREA(ACRES) =      9.44   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =      10.19

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

```
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.48
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.91
  STREET FLOW TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   14.58
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.225
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.37      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.37      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =     11.81    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       11.8        PEAK FLOW RATE(CFS) =      12.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.73
  FLOW VELOCITY(FEET/SEC.) =  4.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.8  TC(MIN.) =     14.58
  EFFECTIVE AREA(ACRES) =     11.81  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.420
  PEAK FLOW RATE(CFS)   =      12.13
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development in City of Brea               *
 * Proposed Condition - Area "C"                                            *
 * 2-year Storm                                                             *
 **************************************************************************

  FILE NAME: GBPRC.DAT
  TIME/DATE OF STUDY: 09:14 02/28/2024
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    353.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.945
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.735
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D       0.15      0.20     0.100    57    7.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  339.50
  STREET LENGTH(FEET) =   655.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.20
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.41
  STREET FLOW TRAVEL TIME(MIN.) =   4.92   Tc(MIN.) =   12.87
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.316
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.41      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.41      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      0.56    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.6       PEAK FLOW RATE(CFS) =       0.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.29
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.47
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =     945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     63.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  339.50  DOWNSTREAM ELEVATION(FEET) =  325.50
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.50
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   3.86   Tc(MIN.) =   16.73
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.132
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.35      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    0.35
  EFFECTIVE AREA(ACRES) =      0.91    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.9       PEAK FLOW RATE(CFS) =       0.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   5.15
  FLOW VELOCITY(FEET/SEC.) =  2.53   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     63.00 =    1525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  325.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   18.17
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.079
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.22      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      1.13    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       1.1       PEAK FLOW RATE(CFS) =       1.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.36
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     64.00 =    1770.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       1.1  TC(MIN.) =     18.17
  EFFECTIVE AREA(ACRES) =      1.13  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      1.08
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

B. 25-YEAR STORM

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****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* Hydrology Study for Greenbriar Development in City of Brea               *
* Proposed Condition - Area "A"                                            *
* 25-year Storm                                                            *
 **************************************************************************

  FILE NAME: GBPRA.DAT
  TIME/DATE OF STUDY: 15:48 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.50  DOWNSTREAM(FEET) =    343.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.286
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.674
  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        0.22      0.20     0.100    75    5.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   343.80  DOWNSTREAM(FEET) =   342.70
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.92
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.49
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.49
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.576
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.29      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) =    0.29      SUBAREA RUNOFF(CFS) =    1.18
  EFFECTIVE AREA(ACRES) =      0.51   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =       2.09

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.70  DOWNSTREAM(FEET) =   341.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.09
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    5.72
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.72
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.469
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      0.64   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =        0.6      PEAK FLOW RATE(CFS) =       2.56

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.10  DOWNSTREAM(FEET) =   340.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.56
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    5.85
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.413
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.28      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) =    0.28      SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =      0.92   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        0.9      PEAK FLOW RATE(CFS) =       3.63

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.30  DOWNSTREAM(FEET) =   339.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.63
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.96
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.96
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.08      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) =    0.08      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        1.0      PEAK FLOW RATE(CFS) =       3.90

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.30  DOWNSTREAM(FEET) =   337.70
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.90
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.16
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =     525.00 FEET.

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

```
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.288
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       4.98

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.70  DOWNSTREAM(FEET) =   337.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.98
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.29
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     17.00 =     570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.234
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.32      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) =    0.32      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       1.6       PEAK FLOW RATE(CFS) =       6.13

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   337.30  DOWNSTREAM(FEET) =   336.50
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.13
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    6.52
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.151
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.41
  EFFECTIVE AREA(ACRES) =      1.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       1.7       PEAK FLOW RATE(CFS) =       6.42

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.50  DOWNSTREAM(FEET) =   336.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.42
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.64
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =     695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.64
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.108
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.10
 EFFECTIVE AREA(ACRES) =      2.03   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        2.0      PEAK FLOW RATE(CFS) =      7.45

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.64
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.108
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       0.68      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) =    0.68      SUBAREA RUNOFF(CFS) =    2.49
 EFFECTIVE AREA(ACRES) =      2.71   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        2.7      PEAK FLOW RATE(CFS) =      9.94

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   336.00  DOWNSTREAM(FEET) =   335.30
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.34
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.94
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    6.85
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     20.00 =     775.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.85
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.037
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D       0.10      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) =    0.10      SUBAREA RUNOFF(CFS) =    0.36
 EFFECTIVE AREA(ACRES) =      2.81   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        2.8      PEAK FLOW RATE(CFS) =     10.12
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   335.30  DOWNSTREAM(FEET) =   334.80
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.77
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.12
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.96
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     21.00 =     820.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.96
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.000
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.07
 EFFECTIVE AREA(ACRES) =      3.11   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        3.1      PEAK FLOW RATE(CFS) =     11.10

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   334.80  DOWNSTREAM(FEET) =   334.30
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.10
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.08
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =     870.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.08
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.961
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "WOODLAND,GRASS"           D        0.62      0.20     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      3.73   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       3.7       PEAK FLOW RATE(CFS) =      13.09

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.30  DOWNSTREAM(FEET) =   334.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.09
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.944
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      3.84   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =       3.8       PEAK FLOW RATE(CFS) =      13.42

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.00  DOWNSTREAM(FEET) =   333.50
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      13.42
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     24.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.05
  EFFECTIVE AREA(ACRES) =      4.14   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       4.1       PEAK FLOW RATE(CFS) =      14.36

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   333.50  DOWNSTREAM(FEET) =   332.90
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.36
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.35
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =     990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.880
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.38      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) =    0.38      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      4.52   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =       4.5       PEAK FLOW RATE(CFS) =      15.55

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

```
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.90  DOWNSTREAM(FEET) =   332.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.65
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.55
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.39
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.867
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =      4.63   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      15.88

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.40  DOWNSTREAM(FEET) =   331.60
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.24
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.88
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.47
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.47
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.843
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D        0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.03
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      16.81

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.60  DOWNSTREAM(FEET) =   330.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.81
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.55
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     28.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.55
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.819
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D        0.34      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) =    0.34      SUBAREA RUNOFF(CFS) =    1.16
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      17.86

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.50  DOWNSTREAM(FEET) =   329.70
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.13
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.86
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =    1140.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.60
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.807
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      18.24

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   329.70  DOWNSTREAM(FEET) =   328.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.88
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.24
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.66
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    1185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.66
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.789
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                D        0.31      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) =    0.31      SUBAREA RUNOFF(CFS) =    1.05
  EFFECTIVE AREA(ACRES) =      5.71   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =      19.20

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   328.30  DOWNSTREAM(FEET) =   327.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.20
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.69
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     31.00 =    1210.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      5.84   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.59

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.40  DOWNSTREAM(FEET) =   327.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.59
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.78
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     32.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.756
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                D        0.42      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) =    0.42      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      6.26   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       6.3       PEAK FLOW RATE(CFS) =      20.87

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.00  DOWNSTREAM(FEET) =   326.80
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.78
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.87
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.744
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.19      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) =    0.19      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =      6.45   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.5       PEAK FLOW RATE(CFS) =      21.44

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.80  DOWNSTREAM(FEET) =   326.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.44
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    8.15
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     34.00 =    1370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.659
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      6.58   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =      21.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.50  DOWNSTREAM(FEET) =   326.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.20
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.44
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.26
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    1410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.26
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.632
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.17      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) =    0.17      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.8       PEAK FLOW RATE(CFS) =      21.76

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.30  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.76
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    8.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     36.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.48
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.578
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.14      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) =    0.14      SUBAREA RUNOFF(CFS) =    0.45
  EFFECTIVE AREA(ACRES) =      6.89   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.9       PEAK FLOW RATE(CFS) =      21.88

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.03
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.88
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    8.59
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.59
  RAINFALL INTENSITY(INCH/HR) =   3.55
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       6.89
  TOTAL STREAM AREA(ACRES) =       6.89
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.88

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
  ELEVATION DATA: UPSTREAM(FEET) =    342.50  DOWNSTREAM(FEET) =    341.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.679
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.094
  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.)
  APARTMENTS                 D       0.41      0.20     0.200    75    6.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.40  DOWNSTREAM(FEET) =   339.10
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.50
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.07
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.965
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.27      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) =    0.27      SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =      0.68   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       0.7       PEAK FLOW RATE(CFS) =      2.40
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.10  DOWNSTREAM(FEET) =   336.40
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.40
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.855
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D       0.28      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) =    0.28      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.0       PEAK FLOW RATE(CFS) =      3.30

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.40  DOWNSTREAM(FEET) =   334.20
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.30
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    7.73
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     44.00 =     525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     44.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.770
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.01
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =      4.23

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.20  DOWNSTREAM(FEET) =   331.90
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.98
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.23
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    8.00
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     45.00 =     640.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  D       0.29      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) =    0.29      SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =      1.55   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.5       PEAK FLOW RATE(CFS) =      5.10

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.90  DOWNSTREAM(FEET) =   327.60
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.10
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    8.51
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     46.00 =     860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.570
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.62      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) =    0.62      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      2.17   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       2.2      PEAK FLOW RATE(CFS) =      6.89

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.60  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.89
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.62
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     47.00 =     920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.62
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.544
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.22
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.04
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       2.2      PEAK FLOW RATE(CFS) =      7.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.06
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.67
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     48.00 =     935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.67
  RAINFALL INTENSITY(INCH/HR) =   3.53
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =      2.24
  TOTAL STREAM AREA(ACRES) =      2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.06

  ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      21.88    8.59    3.550  0.20( 0.05) 0.25       6.9      10.00
      2       7.06    8.67    3.533  0.20( 0.04) 0.20       2.2      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      28.92    8.59    3.550  0.20( 0.05) 0.24       9.1      10.00
      2      28.83    8.67    3.533  0.20( 0.05) 0.24       9.1      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     28.92    Tc(MIN.) =     8.59
  EFFECTIVE AREA(ACRES) =      9.11   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =       9.1
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.90  DOWNSTREAM(FEET) =   325.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.92
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.70
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     49.00 =    1575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.70
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.525
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.32      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) =    0.32      SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      9.43   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =       9.5       PEAK FLOW RATE(CFS) =      29.52
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       9.5  TC(MIN.) =      8.70
  EFFECTIVE AREA(ACRES) =      9.43  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.234
  PEAK FLOW RATE(CFS)   =      29.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      29.52    8.70    3.525  0.20( 0.05) 0.23       9.4      10.00
      2      29.43    8.78    3.507  0.20( 0.05) 0.23       9.5      40.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Greenbriar Development in City of Brea               *
* Proposed Condition - Area "B"                                            *
* 25-year Storm                                                            *
 **************************************************************************

  FILE NAME: GBPRB.DAT
  TIME/DATE OF STUDY: 08:51 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.02
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      1.02

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   10.70
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.136
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83    SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.17    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =       3.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.21
  FLOW VELOCITY(FEET/SEC.) =  3.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =   12.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.930
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       5.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  3.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
  STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
  STREET FLOW TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   12.54
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.867
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    8.09
  EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      13.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  5.33   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =    1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.54
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.867
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        3.85      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.85      SUBAREA RUNOFF(CFS) =    9.59
  EFFECTIVE AREA(ACRES) =      9.44   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =      23.50

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

```
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.37
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.79
    SPLIT DEPTH(FEET) =    0.43   SPLIT FLOOD WIDTH(FEET) =   16.63
    SPLIT FLOW(CFS) =   11.83   SPLIT VELOCITY(FEET/SEC.) =    4.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.17
  STREET FLOW TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   13.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.37      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) =    2.37      SUBAREA RUNOFF(CFS) =    5.73
  EFFECTIVE AREA(ACRES) =     11.81    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       11.8        PEAK FLOW RATE(CFS) =      27.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  4.79   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.8  TC(MIN.) =     13.88
  EFFECTIVE AREA(ACRES) =     11.81  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.420
  PEAK FLOW RATE(CFS)   =      27.87
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Greenbriar Development in City of Brea               *
* Proposed Condition - Area "C"                                            *
* 25-year Storm                                                            *
 **************************************************************************

  FILE NAME: GBPRC.DAT
  TIME/DATE OF STUDY: 09:15 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    353.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.945
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.711
  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       0.15      0.20     0.100    75    7.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  339.50
  STREET LENGTH(FEET) =   655.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   4.56   Tc(MIN.) =   12.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.871
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.41      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) =    0.41      SUBAREA RUNOFF(CFS) =    1.05
  EFFECTIVE AREA(ACRES) =      0.56    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.6       PEAK FLOW RATE(CFS) =      1.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.98
  FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =     945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     63.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  339.50  DOWNSTREAM ELEVATION(FEET) =  325.50
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =   15.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.35      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) =    0.35      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      0.91    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.9       PEAK FLOW RATE(CFS) =       2.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
  FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     63.00 =    1525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  325.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
  STREET FLOW TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   17.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.405
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.22      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) =    0.22      SUBAREA RUNOFF(CFS) =    0.47
  EFFECTIVE AREA(ACRES) =      1.13    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       1.1       PEAK FLOW RATE(CFS) =       2.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.20
  FLOW VELOCITY(FEET/SEC.) =  3.34   DEPTH*VELOCITY(FT*FT/SEC.) =   0.93
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     64.00 =    1770.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       1.1  TC(MIN.) =     17.11
  EFFECTIVE AREA(ACRES) =      1.13  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      2.43
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
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C. 100-YEAR STORM

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             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development in City of Brea              *
 * Proposed Condition - Area "A"                                           *
 * 100-year Storm                                                          *
 **************************************************************************

  FILE NAME: GBPRA.DAT
  TIME/DATE OF STUDY: 15:49 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
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```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  ELEVATION DATA: UPSTREAM(FEET) =    350.50  DOWNSTREAM(FEET) =    343.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.286
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.993
  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        0.22      0.20     0.100    91    5.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.18
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      1.18

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   343.80  DOWNSTREAM(FEET) =   342.70
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.18
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    5.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.873
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.29      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) =    0.29      SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      0.51   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       0.5       PEAK FLOW RATE(CFS) =       2.68

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   342.70  DOWNSTREAM(FEET) =   341.10
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.68
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.69
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.744
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      0.64   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
  TOTAL AREA(ACRES) =       0.6      PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.10  DOWNSTREAM(FEET) =   340.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.29
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.676
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.28      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
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  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.42
  EFFECTIVE AREA(ACRES) =      0.92   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       0.9      PEAK FLOW RATE(CFS) =      4.67

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   340.30  DOWNSTREAM(FEET) =   339.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.620
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.08      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) =    0.08      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =       1.0      PEAK FLOW RATE(CFS) =      5.03

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.30  DOWNSTREAM(FEET) =   337.70
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.03
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.10
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =     525.00 FEET.

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 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.523
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.49
 EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =      6.43

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   337.70  DOWNSTREAM(FEET) =   337.30
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.43
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.23
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     17.00 =     570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.23
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.456
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       0.32      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) =    0.32      SUBAREA RUNOFF(CFS) =    1.56
 EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       1.6       PEAK FLOW RATE(CFS) =      7.91

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   337.30  DOWNSTREAM(FEET) =   336.50
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.25
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.91
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    6.44
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     18.00 =     650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.352
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D       0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.53
 EFFECTIVE AREA(ACRES) =      1.73   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       1.7       PEAK FLOW RATE(CFS) =      8.29

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   336.50  DOWNSTREAM(FEET) =   336.00
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.29
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.55
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =     695.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.298
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.42
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  EFFECTIVE AREA(ACRES) =      2.03   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       9.62

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.298
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.68      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) =    0.68      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      2.71   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =      12.84

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.00  DOWNSTREAM(FEET) =   335.30
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.63
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.84
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.76
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     20.00 =     775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.207
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.10      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) =    0.10      SUBAREA RUNOFF(CFS) =    0.47
  EFFECTIVE AREA(ACRES) =      2.81   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =      13.09

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  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   335.30  DOWNSTREAM(FEET) =   334.80
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.36
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.09
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     21.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.163
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      3.11   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      14.36

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.80  DOWNSTREAM(FEET) =   334.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.11
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.36
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.97
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =     870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.113
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "WOODLAND,GRASS"         D       0.62      0.20     1.000    95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    2.74
 EFFECTIVE AREA(ACRES) =      3.73   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =      16.96

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   334.30  DOWNSTREAM(FEET) =   334.00
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.15
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.96
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.03
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     23.00 =     895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.092
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL               D       0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.50
 EFFECTIVE AREA(ACRES) =      3.84   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =      17.39

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   334.00  DOWNSTREAM(FEET) =   333.50
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.39
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.12
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     24.00 =     940.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.12
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.053
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS               D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.35
 EFFECTIVE AREA(ACRES) =      4.14   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =        4.1       PEAK FLOW RATE(CFS) =      18.61

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   333.50  DOWNSTREAM(FEET) =   332.90
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.61
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.22
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.012
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS               D       0.38      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) =    0.38      SUBAREA RUNOFF(CFS) =    1.70
 EFFECTIVE AREA(ACRES) =      4.52   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =      20.16

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.90  DOWNSTREAM(FEET) =   332.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.06
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.16
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.26
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.996
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.11      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) =    0.11      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      4.63   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       4.6       PEAK FLOW RATE(CFS) =      20.58

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   332.40  DOWNSTREAM(FEET) =   331.60
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.91
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.58
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.34
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.33
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       4.9       PEAK FLOW RATE(CFS) =      21.79

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.60  DOWNSTREAM(FEET) =   330.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.79
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.42
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     28.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.936
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.34      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) =    0.34      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       5.3       PEAK FLOW RATE(CFS) =      23.15

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   330.50  DOWNSTREAM(FEET) =   329.70
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.61
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.15
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.46
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     29.00 =    1140.00 FEET.

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

```
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.920
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      23.65

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   329.70  DOWNSTREAM(FEET) =   328.30
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.46
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.65
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    7.52
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =    1185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.52
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.897
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.31      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) =    0.31      SUBAREA RUNOFF(CFS) =    1.36
  EFFECTIVE AREA(ACRES) =      5.71   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =      24.90

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   328.30  DOWNSTREAM(FEET) =   327.40
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.90
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.55
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     31.00 =    1210.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.886
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      5.84   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      25.40

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.40  DOWNSTREAM(FEET) =   327.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.40
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.63
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     32.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.856
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.42      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) =    0.42      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =      6.26   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =        6.3       PEAK FLOW RATE(CFS) =      27.07

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.00  DOWNSTREAM(FEET) =   326.80
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.39
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.07
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.67
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.842
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.19      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) =    0.19      SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =      6.45   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =      27.81

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.80  DOWNSTREAM(FEET) =   326.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.81
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    7.98
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     34.00 =    1370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
  MAINLINE Tc(MIN.) =    7.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.734
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      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) =    0.13      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      6.58   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      27.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.50  DOWNSTREAM(FEET) =   326.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.61
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.81
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.08
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    1410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.17      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) =    0.17      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        6.8       PEAK FLOW RATE(CFS) =      28.25

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.30  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.04
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.25
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    8.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     36.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.14      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) =    0.14      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      6.89   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =       6.9       PEAK FLOW RATE(CFS) =      28.42

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    35.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.42
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.39
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.39
  RAINFALL INTENSITY(INCH/HR) =   4.60
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.25
  EFFECTIVE STREAM AREA(ACRES) =       6.89
  TOTAL STREAM AREA(ACRES) =       6.89
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
  ELEVATION DATA: UPSTREAM(FEET) =    342.50  DOWNSTREAM(FEET) =    341.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.241
  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.)
  APARTMENTS                 D       0.41      0.20     0.200    91    6.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   341.40  DOWNSTREAM(FEET) =   339.10
  FLOW LENGTH(FEET) =   120.00    MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.50
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.92
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.084
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.27      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) =    0.27    SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      0.68   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       0.7       PEAK FLOW RATE(CFS) =       3.09

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

```
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   339.10  DOWNSTREAM(FEET) =   336.40
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.09
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    7.38
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.951
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.28      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) =    0.28      SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.0       PEAK FLOW RATE(CFS) =      4.24

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   336.40  DOWNSTREAM(FEET) =   334.20
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.24
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    7.66
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     44.00 =     525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     44.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.847
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.30      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) =    0.30      SUBAREA RUNOFF(CFS) =    1.30
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =      5.45

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   334.20  DOWNSTREAM(FEET) =   331.90
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.45
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.91
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     45.00 =     640.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.756
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.29      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) =    0.29      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      1.55   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       1.5       PEAK FLOW RATE(CFS) =      6.58

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   331.90  DOWNSTREAM(FEET) =   327.60
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.58
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    8.39
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     46.00 =     860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.601
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.62      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) =    0.62      SUBAREA RUNOFF(CFS) =    2.54
  EFFECTIVE AREA(ACRES) =      2.17   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.91

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   327.60  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.91
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    8.49
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     47.00 =     920.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.568
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.07      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) =    0.07      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       9.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   326.00  DOWNSTREAM(FEET) =   325.90
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.13
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.54
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     48.00 =     935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.54
  RAINFALL INTENSITY(INCH/HR) =   4.55
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.24
  TOTAL STREAM AREA(ACRES) =       2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.13

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      28.42    8.39    4.598  0.20( 0.05) 0.25      6.9      10.00
      2       9.13    8.54    4.554  0.20( 0.04) 0.20      2.2      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      37.48    8.39    4.598  0.20( 0.05) 0.24      9.1      10.00
      2      37.27    8.54    4.554  0.20( 0.05) 0.24      9.1      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      37.48    Tc(MIN.) =     8.39
  EFFECTIVE AREA(ACRES) =       9.09   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     48.00 =    1520.00 FEET.

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

```
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   325.90  DOWNSTREAM(FEET) =   325.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.91
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.50
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     49.00 =    1575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.566
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.32      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) =    0.32      SUBAREA RUNOFF(CFS) =    1.30
  EFFECTIVE AREA(ACRES) =      9.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =       9.5       PEAK FLOW RATE(CFS) =      38.29
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        9.5  TC(MIN.) =      8.50
  EFFECTIVE AREA(ACRES) =      9.41  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.234
  PEAK FLOW RATE(CFS)   =      38.29

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      38.29    8.50    4.566  0.20( 0.05) 0.23       9.4      10.00
      2      38.07    8.64    4.523  0.20( 0.05) 0.23       9.5      40.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* Hydrology Study for Greenbriar Development in City of Brea               *
* Proposed Condition - Area "B"                                            *
* 100-year Storm                                                           *
 **************************************************************************

  FILE NAME: GBPRB.DAT
  TIME/DATE OF STUDY: 08:49 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    354.00  DOWNSTREAM(FEET) =    350.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.34      0.20     0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.31
  TOTAL AREA(ACRES) =      0.34   PEAK FLOW RATE(CFS) =      1.31

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  350.50  DOWNSTREAM ELEVATION(FEET) =  341.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =   10.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.022
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.83      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.83    SUBAREA RUNOFF(CFS) =    2.93
  EFFECTIVE AREA(ACRES) =      1.17    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =       4.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.33
 FLOW VELOCITY(FEET/SEC.) =  3.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.20
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  341.00  DOWNSTREAM ELEVATION(FEET) =  333.00
 STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.06
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   12.57
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.93
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.40
 STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   11.88
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.769
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.17      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    3.86
 EFFECTIVE AREA(ACRES) =      2.34    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       7.73

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.89
 FLOW VELOCITY(FEET/SEC.) =  4.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.58
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  333.00  DOWNSTREAM ELEVATION(FEET) =  328.00
 STREET LENGTH(FEET) =   140.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.98
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   16.12
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.28
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.21
 STREET FLOW TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   12.32
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.691
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.25      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =   10.50
 EFFECTIVE AREA(ACRES) =      5.59    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      18.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  5.61   DEPTH*VELOCITY(FT*FT/SEC.) =   2.54
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     54.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.32
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.691
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        3.85      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.85      SUBAREA RUNOFF(CFS) =   12.44
 EFFECTIVE AREA(ACRES) =      9.44   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =      30.51

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

```
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  328.00  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   385.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.21
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.40
  STREET FLOW TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =   13.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.491
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.37      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) =    2.37      SUBAREA RUNOFF(CFS) =    7.40
  EFFECTIVE AREA(ACRES) =     11.81    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       11.8        PEAK FLOW RATE(CFS) =      36.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  5.23   DEPTH*VELOCITY(FT*FT/SEC.) =   2.49
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     55.00 =    1420.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.8  TC(MIN.) =     13.58
  EFFECTIVE AREA(ACRES) =     11.81  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.420
  PEAK FLOW RATE(CFS)   =      36.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                            Analysis prepared by:

                            HUNSAKER & ASSOCIATES
                                  Irvine,Inc
                        Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
 * Hydrology Study for Greenbriar Development in City of Brea              *
 * Proposed Condition - Area "C"                                           *
 * 100-year Storm                                                          *
 **************************************************************************

  FILE NAME: GBPRC.DAT
  TIME/DATE OF STUDY: 09:15 02/28/2024
============================================================================
  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 = 0.90
  *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   35.0     20.0    0.018/0.018/0.020  0.50    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.018/0.018/0.020  0.50    1.50 0.0312 0.125 0.0150
  3   55.0     45.0    0.011/0.011/0.020  0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    353.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.945
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.745
  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       0.15      0.20     0.100     91    7.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.15   PEAK FLOW RATE(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  339.50
  STREET LENGTH(FEET) =   655.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   4.31   Tc(MIN.) =   12.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.701
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.41      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) =    0.41      SUBAREA RUNOFF(CFS) =    1.36
  EFFECTIVE AREA(ACRES) =      0.56    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       0.6        PEAK FLOW RATE(CFS) =      1.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.89
  FLOW VELOCITY(FEET/SEC.) =  2.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =     945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     63.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  339.50  DOWNSTREAM ELEVATION(FEET) =  325.50
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   3.16   Tc(MIN.) =   15.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.246
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.35      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) =    0.35      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =      0.91    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     63.00 =    1525.00 FEET.

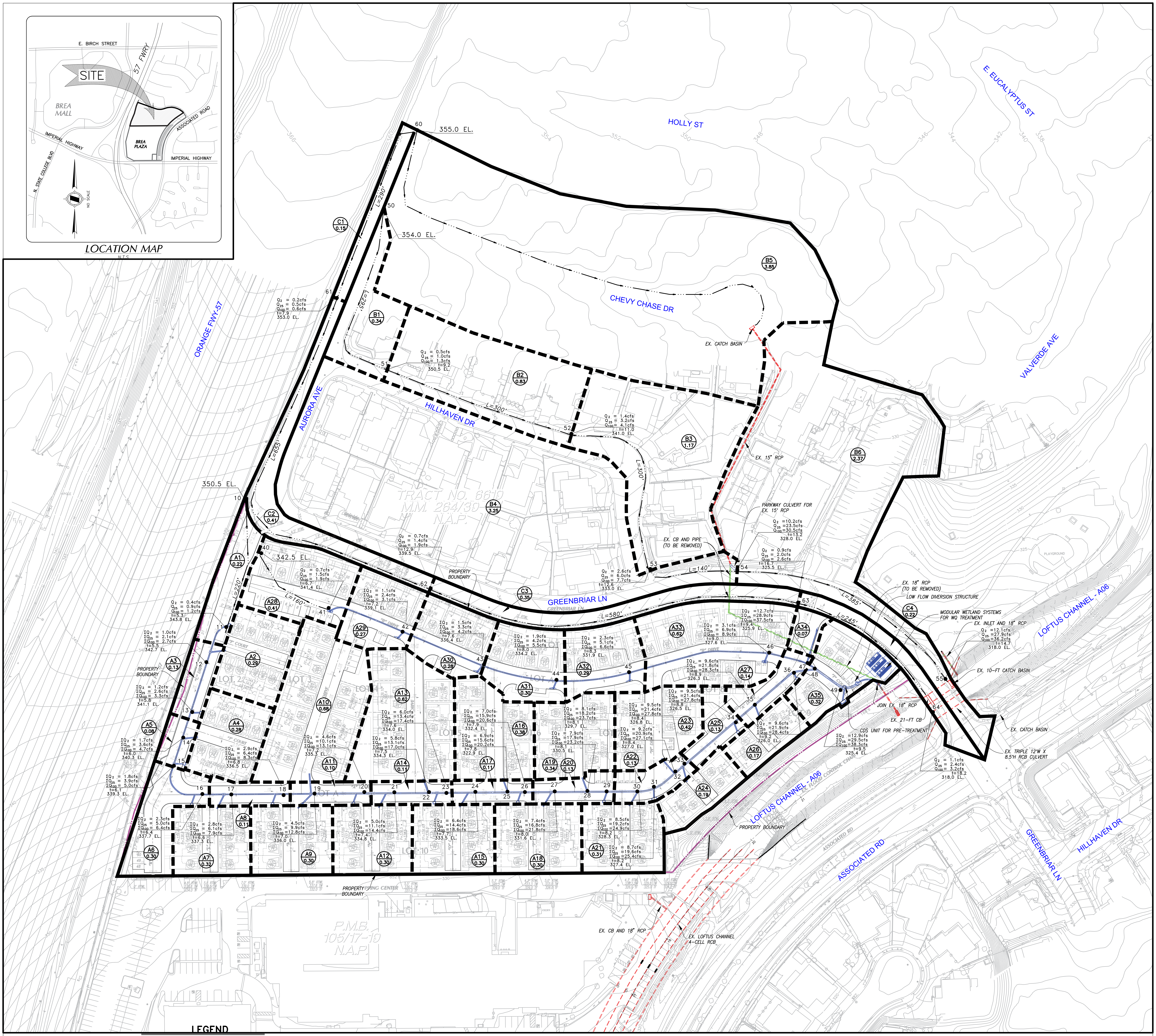
****************************************************************************
  FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  325.50  DOWNSTREAM ELEVATION(FEET) =  318.00
  STREET LENGTH(FEET) =   245.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.02
  STREET FLOW TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =   16.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D       0.22      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) =    0.22      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      1.13    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       3.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.21
  FLOW VELOCITY(FEET/SEC.) =  3.56   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     64.00 =    1770.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     16.57
  EFFECTIVE AREA(ACRES) =      1.13  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       3.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



LEGEND

MAJOR DRAINAGE BOUNDARY
MINOR DRAINAGE BOUNDARY
100 NODE NUMBER
A 1.0 AREA DESIGNATION
AREA ACREAGE (IN ACRES)
Q_{100}=8.0cfs t=15.0 PEAK FLOW RATE
TIME OF CONCENTRATION
ΣQ_{100}=10.0cfs t=15.0 PEAK CONFLUENCE FLOW RATE
TIME OF CONCENTRATION
EXISTING STORM DRAIN (TO BE REMOVED)
EXISTING STORM DRAIN
PROPOSED STORM DRAIN
D SOIL GROUP

SCALE: 1"=50'

50 25 0 50 150

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PREPARED FOR:

LENNAR
2000 FIVEPOINT, 3RD FLOOR
IRVINE, CA 92618
(949) 349-8000

HYDROLOGY MAP
GREENBRIAR - BREA
PROPOSED CONDITION
CITY OF BREA

WO: 3916-89X
HYDROLOGY MAP FOR GREENBRIAR - BREA

DATE: Mar. 12, 2024 08:40:34 AM FILE: F:\1285\Engineering\SY_Hydrology\Greenbriar Proposed Hydrology.dwg

SECTION IV

STREET AND EXISTING STORM DRAIN CAPACITY CALCULATIONS

Greenbriar Street Capacity Calculations for 25-year Storm

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.030 ft/ft
Discharge	27.90 cfs

Section Definitions

Station (ft)	Elevation (ft)
1+00	100.12
1+06	100.00
1+06	99.50
1+08	99.70
1+26	100.01

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(1+00, 100.12)	(1+26, 100.01)	0.015

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	6.7 in
Roughness Coefficient	0.015
Elevation	100.06 ft
Elevation Range	99.5 to 100.1 ft
Flow Area	4.7 ft²
Wetted Perimeter	23.7 ft
Hydraulic Radius	2.4 in
Top Width	23.10 ft
Normal Depth	6.7 in
Critical Depth	8.5 in
Critical Slope	0.005 ft/ft
Velocity	5.88 ft/s
Velocity Head	0.54 ft
Specific Energy	1.10 ft
Froude Number	2.286
Flow Type	Supercritical

Greenbriar Street Capacity Calculations for 25-year Storm

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.7 in
Critical Depth	8.5 in
Channel Slope	0.030 ft/ft
Critical Slope	0.005 ft/ft

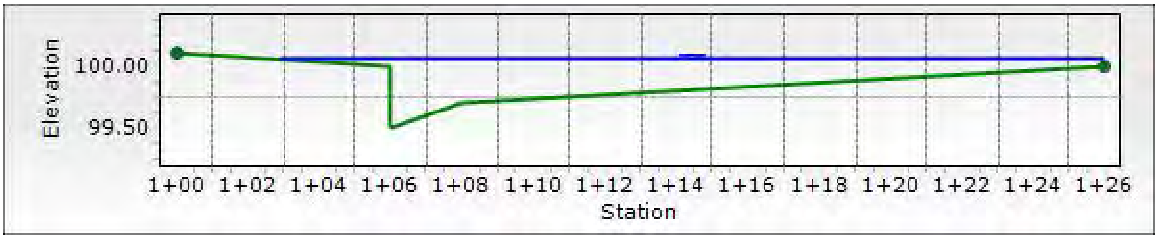
Cross Section for Greenbriar - 25-year Storm

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.030 ft/ft
Normal Depth	6.7 in
Discharge	27.90 cfs



Greenbriar Street Capacity for 100-yr Storm

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.030 ft/ft
Discharge	36.20 cfs

Section Definitions

Station (ft)	Elevation (ft)
1+00	100.12
1+06	100.00
1+06	99.50
1+08	99.70
1+26	100.01

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(1+00, 100.12)	(1+26, 100.01)	0.015

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	7.2 in
Roughness Coefficient	0.015
Elevation	100.10 ft
Elevation Range	99.5 to 100.1 ft
Flow Area	5.7 ft²
Wetted Perimeter	25.8 ft
Hydraulic Radius	2.7 in
Top Width	25.16 ft
Normal Depth	7.2 in
Critical Depth	9.3 in
Critical Slope	0.005 ft/ft
Velocity	6.31 ft/s
Velocity Head	0.62 ft
Specific Energy	1.22 ft
Froude Number	2.327
Flow Type	Supercritical

Greenbriar Street Capacity for 100-yr Storm

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.2 in
Critical Depth	9.3 in
Channel Slope	0.030 ft/ft
Critical Slope	0.005 ft/ft

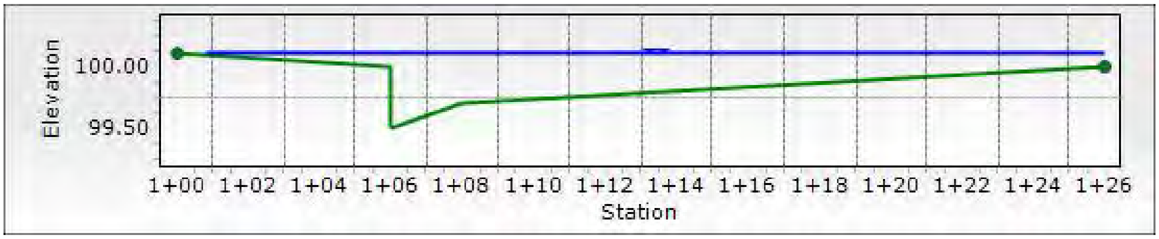
Cross Section for Greenbriar -100-yr Storm

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.030 ft/ft
Normal Depth	7.2 in
Discharge	36.20 cfs



Ex 18" RCP Capacity Calculations

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013
Channel Slope	0.100 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	33.22 cfs

25-YEAR FLOW RATE IS 29.5 CFS WHICH IS LESS THAN THE CAPACITY

Results

Discharge	33.22 cfs
Normal Depth	18.0 in
Flow Area	1.8 ft^2
Wetted Perimeter	4.7 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	17.9 in
Percent Full	100.0 %
Critical Slope	0.096 ft/ft
Velocity	18.80 ft/s
Velocity Head	5.49 ft
Specific Energy	6.99 ft
Froude Number	(N/A)
Maximum Discharge	35.73 cfs
Discharge Full	33.22 cfs
Slope Full	0.100 ft/ft
Flow Type	Undefined

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	100.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	17.9 in
Channel Slope	0.100 ft/ft
Critical Slope	0.096 ft/ft

Hunsaker & Associates Irvine, Inc.				DATE:	02/29/24
Greernbriar Ln at Loftus Channel				BY:	G. Guan

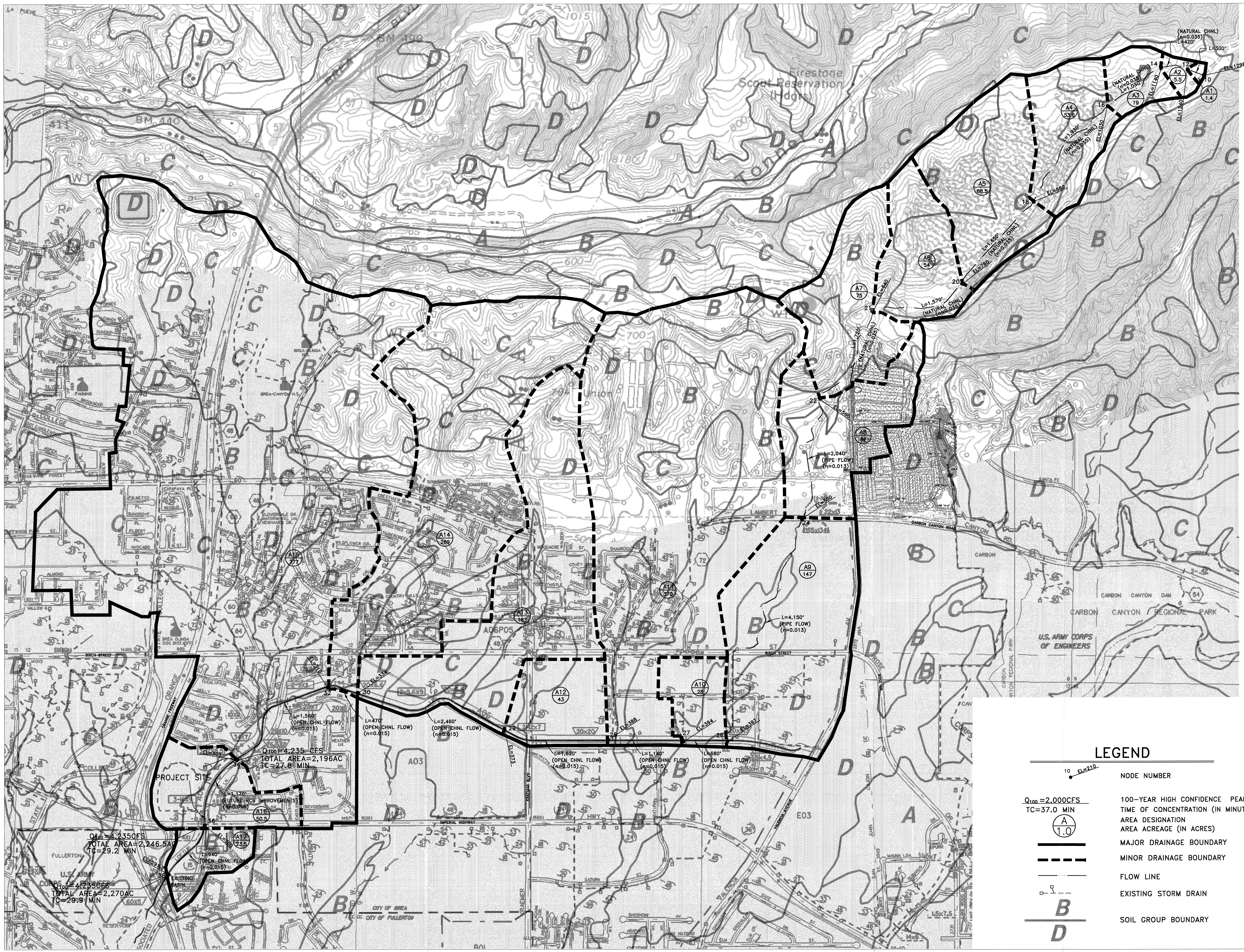
There are two existing catch basins (1-10' catch basin and 1-21' catch basin)
with total catch basin opening of 31'

Curb Opening (Sump)

Given:	(a) discharge Q25	=	30.3	c.f.s.	25-year flow rate: 27.9 cfs from Area "B" 2.4 cfs from Area "C"
				Total	30.3 cfs
	(b) 6" curb				
Solution:					
	H (depth at opening)	=	0.50	'	
	L = Q/3.087H^3/2	=	27.76	'	(Required)
Use:					
		L=	31.00	'	(31-ft catch basin opening with existing 10-ft and 21-ft catch basin)
Then:					
		H=	0.4645	'	(Ponding depth)

SECTION V
REFERENCES

A. LOFTUS CHANNEL HYDROLOGY MAP PREPARED BY HUNSAKER & ASSOCIATES IN 2007


Firestone Scout Reservation (Hdqrs)
BM 490
BM 440
(NATURAL CHNL) (n=0.035) L=420'
L=300'
EL=1298
A2 5.5
A1 1.4
A3 19
A4 53.8
A5 88.3
A6 54
A7 75
A8 84
A9 147
A10 28
A11 370
A12 43
A13 183
A14 289
A15 271
L=1,650' (NATURAL CHNL) (n=0.035)
L=1,570' (NATURAL CHNL) (n=0.035)
L=2,040' (PIPE FLOW) (n=0.013)
L=4,150' (PIPE FLOW) (n=0.013)
CARBON CANYON ROAD
CARBON CANYON DAM
CARBON CANYON REGIONAL PARK
U.S. ARMY CORPS OF ENGINEERS
BIRCH STREET
IMPERIAL HIGHWAY
L=2,460' (OPEN CHNL FLOW) (n=0.015)
L=1,620' (OPEN CHNL FLOW) (n=0.015)
L=1,140' (OPEN CHNL FLOW) (n=0.015)
L=680' (OPEN CHNL FLOW) (n=0.015)
L=1,560' (OPEN CHNL FLOW) (n=0.015)
L=470' (OPEN CHNL FLOW) (n=0.015)
EL=310
EL=334
EL=303
Q_{100}=4,235 CFS
TOTAL AREA=2,196AC
TC=27.8 MIN
PROJECT SITE
L=1,170' (FUTURE RCB IMPROVEMENTS) (n=0.015)
A16 50.5
A17 23.5
Q_{100}=4,235CFS
TOTAL AREA=2,246.5AC
TC=29.2 MIN
EL=300
L=940' (OPEN CHNL FLOW) (n=0.015)
EL=291.7
EXISTING BASIN
Q_{100}=4,235CFS
TOTAL AREA=2,270AC
TC=29.9 MIN
ORANGE FREEWAY
FULLERTON
CITY OF BREA
CITY OF FULLERTON
SCALE: 1" = 500'

LEGEND

10 EL=210 NODE NUMBER

Q_{100}=2,000CFS 100-YEAR HIGH CONFIDENCE PEAK DISCHARGE (IN CFS)

TC=37.0 MIN TIME OF CONCENTRATION (IN MINUTES)

A AREA DESIGNATION

1.0 AREA ACREAGE (IN ACRES)

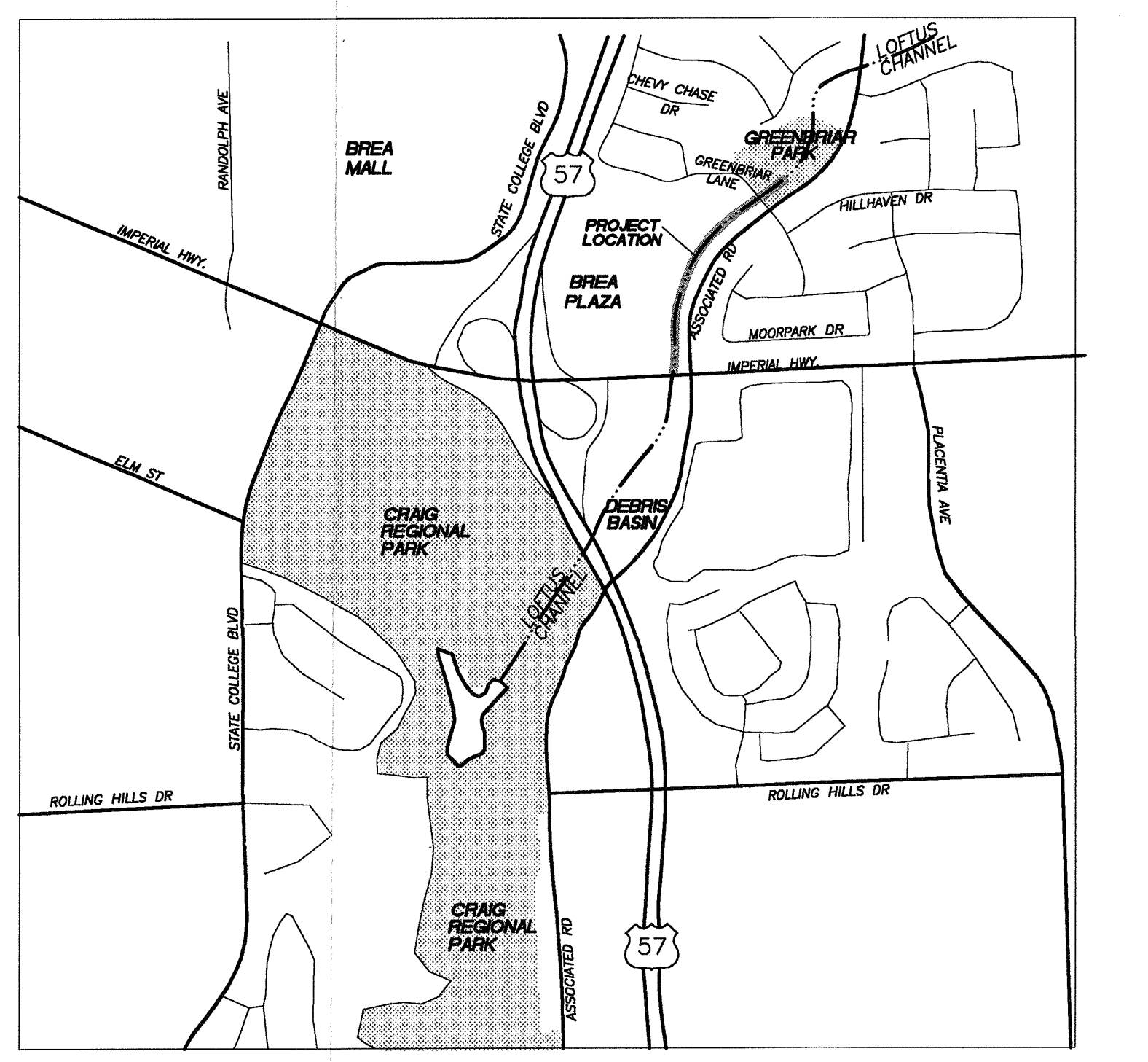
MAJOR DRAINAGE BOUNDARY

MINOR DRAINAGE BOUNDARY

FLOW LINE

EXISTING STORM DRAIN

B/D SOIL GROUP BOUNDARY



PROJECT LOCATION MAP

N.T.S.

PREPARED FOR:

BOSC EQUITIES
719 Griswold Street, Suite 530
Detroit, MI 48226
Telephone: (313) 965-8204

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

500 250 0 500 1500

GRAPHIC SCALE 1"=500'

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
04/30/07 BY: G.G
DATE OF THIS PLOT
05/01/07

EXHIBIT 1
HYDROLOGY MAP FOR LOFTUS CHANNEL (A06) AT BREA PLAZA CITY OF BREA

WO: 3210-2
HYDROLOGY MAP LOFTUS CHANNEL

MAY 0 1 2007

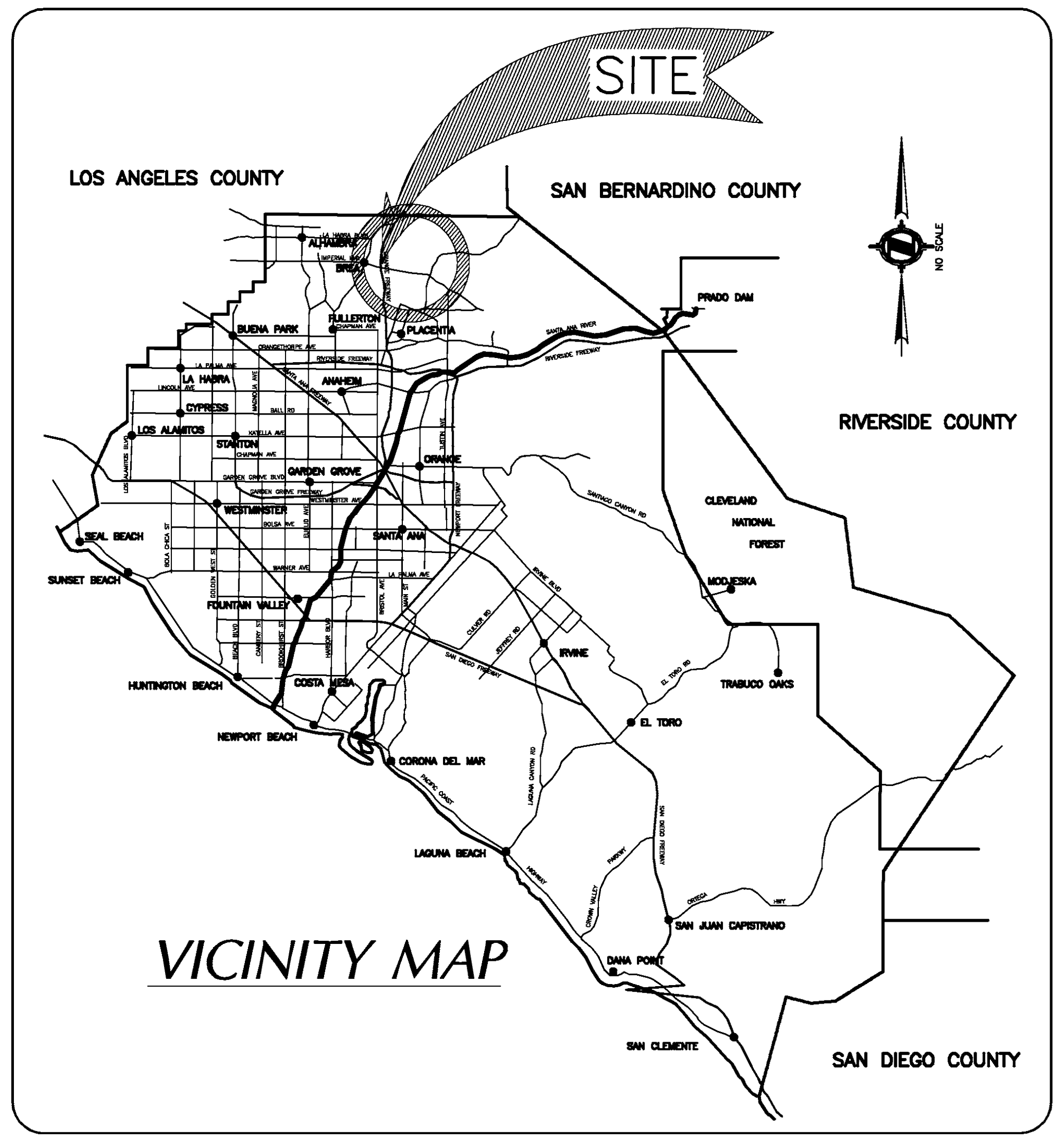
F:\0381\Engineering\SY_Hydrology\hydmap-loftus channel.dwg

B. LOFTUS CHANNEL RCB IMPROVEMENT AT BREA PLAZA PREPARED BY HUNSAKER & ASSOCIATES IN 2008

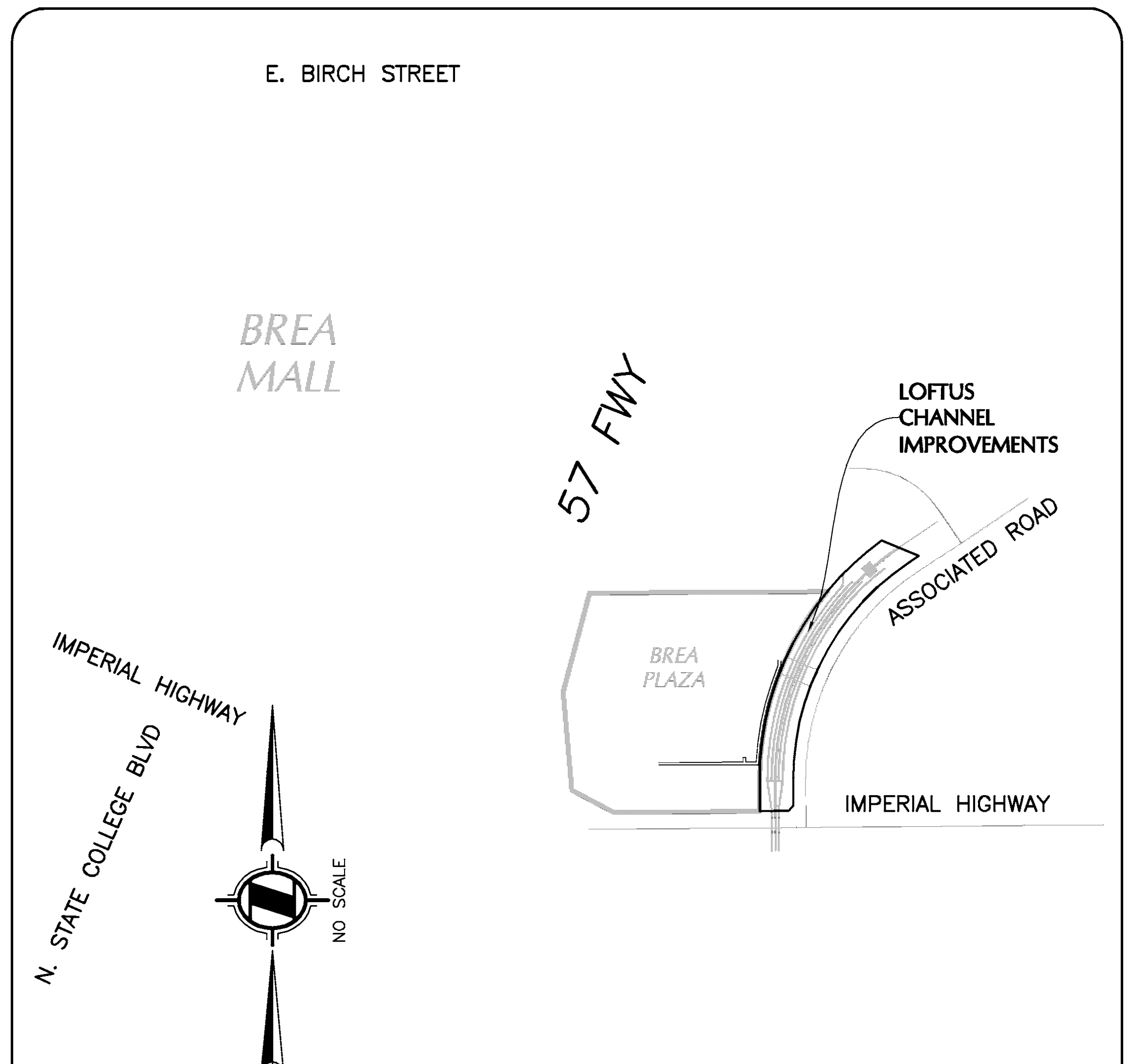
ORANGE COUNTY
PUBLIC WORKS DEPARTMENT
SANTA ANA, CALIFORNIA
BRYAN SPEEGLE, DIRECTOR

PLANS FOR CONSTRUCTION OF A PORTION OF

LOFTUS DIVERSION CHANNEL FACILITY A06
FROM: STA. 10+82.00 TO STA. 19+80.00±
IN THE CITY OF BREA, CALIFORNIA



VICINITY MAP



LOCATION MAP

R.C. BOX GENERAL NOTES

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 4000 LBS PER SQUARE INCH IN 28 DAYS; TYPE OF PORTLAND CEMENT CONCRETE PER RECOMMENDATION OF SOILS ENGINEER.
2. ALL CHANNEL AND PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE, THERE IS A MINIMUM OF 2 FEET OF FILL ABOVE THE TOP OF PIPE.
5. ALL WORK SHALL CONFORM WITH OCPW STANDARD PLANS AND STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITIONS, COPIES WHICH SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE OCPW INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING (714) 567-7804 OR BY WRITING THE ORANGE COUNTY PW, ATTN: CONSTRUCTION, 1152 E. FRUIT STREET, SANTA ANA, CA 92701.
7. ALL FILLS MUST BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216, 1978 "FIVE LAYER METHOD." ALL BACKFILL MUST BE FREE OF ORGANIC MATTER.
8. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER, AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE OCPW INSPECTOR.
9. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER OCPW STANDARD PLAN 1319.
10. CONTRACTOR WILL NOTIFY OCPW MATERIALS LAB (714) 567-7856 48-HOURS TO D-LOAD TESTING OF R.C.P. FOR VERIFICATION OF RESULTS.
11. PRIOR TO THE PLACEMENT OF CHANNEL IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEER SHALL CERTIFY IN WRITING TO THE RDMD INSPECTOR THAT THE STORM DRAINS SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
12. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
13. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
14. ALL STEEL TO BE CONTINUOUS SHALL BE LAPPED IN A MINIMUM OF 45 BAR DIAMETERS.
15. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FREQUENCY REQUESTED BY THE OCPW INSPECTOR.
16. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MINIMUM.
17. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE RDMD FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
18. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO-WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
19. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN PUBLIC RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER RDMD INSPECTION AND MUST MEET OR EXCEED RDMD MINIMUM STANDARDS AND PER RECOMMENDATION OF THE SOILS ENGINEER.
20. ALL PIPE TO BE BANDED AND GROUTED.
21. RCP SHALL COMPLY WITH ALL GREENBOOK APPLICABLE STANDARDS.
22. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 30 TO OCTOBER 1.
23. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM AND OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR DRAINAGE COURSES.
24. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR HARMFUL MATERIALS.
25. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR UNLESS OTHERWISE SHOWN.
26. A SOILS INVESTIGATION REPORT ENTITLED "PRELIMINARY GEOTECHNICAL INVESTIGATION", BY PACIFIC SOILS ENGINEERING, INC. DATED MARCH 26, 2008, SHALL BE MADE AVAILABLE FOR USE BY THE CONTRACTOR.
27. THE CONTRACTOR SHALL RESTORE OR REPLACE IN KIND (OR BETTER) ALL EXISTING IMPROVEMENTS INTENDED TO REMAIN UNDISTURBED DURING CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO STREETS, LANDSCAPING, FENCES AND SIGNS.
28. THE INFORMATION SHOWN ON THOSE DRAWINGS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITES IS NOT GUARANTEED TO BE ACCURATE OR ALL-INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION, AS MAY BE NECESSSARY, AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO. CONTRACTOR SHALL POTHOLE AND LOCATE THE EXISTING UNDERGROUND LINES TO DETERMINE ELEVATIONS PRIOR TO COMMENCEMENT OF THE WORK.
29. EXCAVATION DEPTH MAY CHANGE DURING THE CONSTRUCTION AS DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE ENGINEER.
30. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT PHONE NUMBER 1-800-422-4133 TWO WORKING DAYS IN ADVANCE BEFORE DIGGING. NO INSPECTION WILL BE PROVIDED BY THE ENGINEER.
31. ALL REINFORCED CONCRETE STRUCTURES SHALL BE CONSTRUCTED WITH SULFATE RESISTANT TYPE V CEMENT, UNLESS OTHERWISE APPROVED BY OCPW MATERIALS LABORATORY.
32. ALL CONCRETE SHALL CONTAIN FLY ASH AS SET FORTH IN GREENBOOK SECTION 201-1.1.3, "CONCRETE SPECIFIED BY SPECIAL EXPOSURE", IN A MANNER MEETING THE APPROVAL OF THE OCPW LABORATORY.

R.C. BOX GENERAL NOTES (CONT'D)

33. ALL STRUCTURAL BACKFILL SHALL BE PER GREENBOOK SECTION 300-3.5, AND RECOMMENDATION OF THE SOILS ENGINEER. SELECT BACKFILL SHOULD BE GRANULAR, STRUCTURAL QUALITY BACKFILL WITH A SAND EQUIVALENT OF 30 OR BETTER, AND AN ASCE EXPANSION INDEX OF 20 OR LESS.
34. GRADING CONTRACTOR SHALL NOTIFY GEOTECHNICAL ENGINEER NO LESS THAN 72 HOURS IN ADVANCE OF THE LOCATIONS FOR ANY SOILS PROPOSED FOR IMPORT. PROPOSED IMPORT SOURCE SHALL BE SAMPLED, TESTED AND APPROVED PRIOR TO DELIVERY OF SOILS FOR USE ON SITE.
35. ALL CONSTRUCTION JOINTS SHALL BE PER DETAILS ON SHEET 2 UNLESS OTHERWISE SHOWN.
36. NO LONGITUDINAL JOINTS SHALL BE PLACED IN FLOWLINE OR LOW FLOW.
37. SURPLUS LOOSE RIP-RAP TO BE CLEANED IN CONFORMANCE WITH CURRENT GREENBOOK, PART 2, CONSTRUCTION MATERIALS, 200-1.1 GENERAL SPECIFICATIONS, AND DELIVERED TO RDMD. ARRANGEMENTS FOR DELIVERY AND STOCKPILING OF THE SALVAGED RIP-RAP ARE TO BE COORDINATED WITH JIM HOSKINS, OCPW/O&M/PUBLIC FACILITIES SUPERVISOR AT 714-567-6279.
38. CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS AND SITE CONDITIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.
39. FOUNDATION EXCAVATIONS SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER DURING EXCAVATION AND PRIOR TO PLACEMENT OF REINFORCING STEEL OR CONCRETE.
40. SOILS BENEATH FOOTINGS SHALL BE PRE-MOISTENED (IF NECESSARY) AND COMPACTED TO MINIMUM REQUIREMENTS PRIOR TO PLACING CONCRETE.
41. REINFORCING STEEL SHALL BE DEFORMED BARS, CONFORMING TO ASTM A615 GRADE 60.
42. DIMENSIONS LOCATING REINFORCING BARS ARE CLEAR AND DENOTE CONCRETE COVERAGE TO MAIN STEEL UNLESS NOTED OTHERWISE. COVERAGE SHALL BE AS FOLLOWS:

CONCRETE PLACED AGAINST EARTH (NOT FORMED)	3"
FORMED CONCRETE AGAINST EARTH	2"
WALLS, ABOVE GRADE, EXPOSED TO WEATHER	2"

43. SUPPORT REINFORCING OFF FORMS WITH STEEL CHAIRS. SUPPORT REINFORCING OFF GRADE WITH DENSE CONCRETE BLOCKS. NO BRICK OR POROUS CONCRETE WILL BE PERMITTED TO SUPPORT REINFORCING.
44. NO REVISION SHALL BE MADE WITHOUT PRIOR WRITTEN APPROVAL OF THE ENGINEER.
45. CONTRACTOR SHALL SUBMIT ALL PCC MIX DESIGNS TO COUNTY INSPECTOR AND BE APPROVED BY COUNTY MATERIALS LAB PRIOR TO USE.
46. CONTRACTOR SHALL HAVE PRECONSTRUCTION MEETING WITH OCPW PRIOR TO BEGINNING OF CONSTRUCTION.
47. CONTRACTOR SHALL TAKE MEASURES TO PROTECT CHANNEL AND PROPOSED IMPROVEMENTS FROM DAMAGES RESULTING FROM WATER DISCHARGES FROM LOCAL WATER DISTRICT(S) FACILITIES.
48. IN-PLACE DENSITY SHALL BE DETERMINED BY CALIFORNIA TEST METHOD 216 OR 231.
49. CONTRACTOR SHALL MAINTAIN STREET IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE COUNTY'S INSPECTOR. THE ADJACENT STREET SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREET AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS.
50. ANY EXISTING ASPHALT THAT IS DAMAGED OR REMOVED BY CONTRACTOR DURING COURSE OF CONSTRUCTION SHALL BE REPLACED IN KIND.
51. THERE WILL BE NO STOCKPILING OF DIRT OR DEBRIS IN THE CHANNEL BOTTOM DURING OR AFTER CONSTRUCTION.
52. THE PRIVATE LAB PROVIDING SOILS TESTING MUST CALL OCPW INDEPENDENT ASSURANCE AT 714-567-7878 FOR TESTING VERIFICATION.
53. ANY TEMPORARY, IN-CHANNEL FLOW DIVERSION (PUMPED OR GRAVITY FLOW) OR DISCHARGE FROM DEWATERING SHALL BE CONTAINED IN A PIPE OR FLUME. IN THE EVENT OF DEWATERING, A DESILTING BASIN IS REQUIRED IN AT LEAST ONE LOCATION.
54. CLEAR WATER DIVERSIONS AND DEWATERING OPERATIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH POLICIES AND GUIDELINES OUTLINED IN THE CALTRANS STORM WATER QUALITY HANDBOOK, "THE CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL (CASQA) STORMWATER BEST MANAGEMENT PRACTICE HANDBOOK – CONSTRUCTION" (BMP FACT SHEETS, NS-2 AND NS-5).
55. ANY DIVERSION/DEWATERING SYSTEM CHOSEN SHALL RELIEVE SEEPAGE PRESSURE, DRAIN THE CHANNEL INVERT, AND KEEP THE SUBGRADE FREE FROM WATER.
56. THE CONTRACTOR/PERMITTEE SHALL SUBMIT A DIVERSION/DEWATERING PLAN TO THE COUNTY FOR REVIEW AND ACCEPTANCE PRIOR TO ANY CONSTRUCTION.

STORM DRAIN NOTES

1. RCP SHALL COMPLY WITH ALL GREENBOOK REQUIREMENTS, UNLESS OTHERWISE SHOWN.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER OCPW STANDARD PLAN 1319.
4. ALL PIPE TO BE BANDED AND GROUTED (LESS THAN 24" OUTSIDE ONLY, 24" AND GREATER INSIDE AND OUTSIDE).
5. CONTRACTOR WILL NOTIFY RDMD MATERIALS LAB (714-567-7805) 48 HOURS PRIOR TO D-LOAD TESTING OF RCP FOR VERIFICATION OF RESULTS.
6. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE OCPW INSPECTOR.

STORM DRAIN NOTES (CONT'D)

7. PRIOR TO PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEER SHALL CERTIFY IN WRITING TO THE OCPW INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS FIRM AND UNYIELDING AND ABLE TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
8. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT-OF-WAY IS TO BE PLACED AND COMPACTED UNDER RDMD INSPECTION AND MEET OR EXCEED RDMD MINIMUM STANDARD.
9. FOR TRENCH EXCAVATIONS, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
10. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS COMPLETED AT GRADE THERE IS A MINIMUM OF 2 FEET OF FILL ABOVE THE TOP OF PIPE.
11. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
12. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.
13. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE PLACED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEY WAY IS PERMITTED.
14. STATIONS SHOWN ON THIS 0+00 ARE STORM DRAIN STATIONS AND ARE INDEPENDENT OF ALL STREET CENTERLINE STATIONS.
15. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT-OF-WAY IS REQUIRED FROM THE CITY OF BREA AND A PERMIT FOR WORK WITHIN OCFCD RIGHT-OF-WAY IS REQUIRED FROM OCPW.

EROSION & SEDIMENT CONTROL NOTES

1. IN CASE OF EMERGENCY, CALL MARC HARRIS AT 714-990-5715 DURING AND/OR AFTER BUSINESS HOURS.
2. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
3. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF ORANGE COUNTY PUBLIC WORKS.
4. ALL REMOVABLE EROSION PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OT EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40%.
5. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS AND BASINS.
6. GRADED AREAS ON THE CONSTRUCTION AREA PERIMITER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE IS TO BE DIRECTED TOWARD DESILTING FACILITIES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
8. THE CONTRACTOR SHALL INSPECT THE EROSION CONTROL WORK AND INSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.
9. A 24-HOUR EMERGENCY PHONE # WILL BE PROVIDED TO THE CONTRACTOR AT THE PROJECT PRE-CONSTRUCTION MEETING.

ENVIRONMENTAL RESOURCES NOTES

1. ANY SPILLAGE OF FUEL, OIL OR HAZARDOUS MATERIALS FROM CONSTRUCTION EQUIPMENT OR VEHICLES OR SIGNIFICANT RELEASES OF SEDIMENT DUE TO CONSTRUCTION ACTIVITIES OR BMP FAILURES IMPACTING DOWNSTREAM STORM DRAIN AREAS MUST IMMEDIATELY AND PROPERLY CLEANED UP AND REMOVED FROM THE OCFCD'S RIGHT-OF-WAY. FOR SPILLS OF SIGNIFICANT VOLUME, NOTIFICATIONS MUST BE IMMEDIATELY MADE TO RDMD/ENVIRONMENTAL RESOURCES FOR ASSESSMENT OF BEST CORRECTIVE ACTION. CONTAMINATED WATER, SOIL, SANDD OR MATERIAL AND HAZARDOUS WASTES GENERATED FROM THE CLEANUP MUST BE DISPOSED BY APPROVED METHODS. PERMITTEE ASSUMES FULL RESPONSIBILITY FOR COSTS TO INVESTIGATE EXTENT OF CONTAMINATION, CLEANUP, WASTE REMOVAL AND IMPLEMENTATION OF AN APPROVED REMEDIAL ACTION PLAN FOR THE RELEASE OF ANY WASTES OR HAZARDOUS MATERIALS THAT RESULT IN SOIL AND GROUNDWATER CONTAMINATION. NOTIFICATIONS OD SPILLS AND SIGNIFICANT RELEASES OF SEDIMENT DUE TO CONSTRUCTION ACTIVITIES OR BMP FAILURES IMPACTING DOWNSTREAM AREAS OF STORM DRAINS MUST BE IMMEDIATELY MADE TO RDMD/ENVIRONMENTAL RESOURCES, ATTENTION DUC NGUYEN 714-973-6690. AFTER HOURS SPILL NOTIFICATION SHOULD BE MADE TO ORANGE COUNTY SHERIFFS COMMUNICATION CONTROL 1 BY DIALING 911.
2. SEDIMENT FROM AREAS DISTURBED BY CONSTRUCTION SHALL BE RETAINED ON SITE USING STRUCTURAL CONTROLS TO THE MAXIMUM EXTENT POSSIBLE.
3. STOCKPILES OF SOIL SHALL BE PROPERLY CONTAINED TO ELIMINATE OR REDUCE SEDIMENT TRANSPORT FROM THE SITE TO THE STREETS, DRAINAGE OF FACILITIES OR ADJACENT PROPERTIES VIA RUNOFF, VEHICLE TRACKING, OR WIND.
4. APPROPRIATE BMP'S FOR CONSTRUCTION-RELATED MATERIALS, WASTES, SPILLS OR RESIDUES SHALL BE IMPLEMENTED TO MINIMUZE TRANSPORT FROM THE SITE TO THE STREETS, DRAINAGE FACILITIES, OR ADJOINING PROPERTIES BY WIND OR RUNOFF.
5. ALL CONSTRUCTION CONTRACTOR AND SUBCONTRACTOR PERSONNEL ARE TO BE MADE AWARE OF THE REQUIRED BEST MANAGEMENT PRACTICES AND GOOD HOUSEKEEPING MEASURES FOR THE PROJECT SITE AND ANY ASSOCIATED CONSTRUCTION STAGING AREAS.
6. AT THE END OF THE DAY OF CONSTRUCTION ACTIVITY, ALL CONSTRUCTION DEBIRS AND WASTE MATERIALS SHALL BE COLLECTED AND PROPERLY DISPOSED IN TRASH OR RECYCLE BINS.
7. CONSTRUCTION SITES SHALL BE MAINTAINED IN SUCH A CONDITION THAT A STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. DISCHARGES OTHER THAN STORMWATER (NON-STORMWATER DISCHARGES) ARE AUTHORIZED UNDER CALIFORNIA'S GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY ONLY WHERE THEY DO NOT CAUSE OR CONTRIBUTE TO A VIOLATION OF ANY WATER QUALITY STANDARD AND ARE CONTROLLED THROUGH IMPLEMENTATION OF APPROPRIATE BMP'S FOR ELIMINATION OR REDUCTION OF POLLUTANTS. NON-STORMWATER DISCHARGES MIST BE ELIMINATED OR REDUCED TO THE EXTENT FEASIBLE.

   POTENTIAL POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO: SOLID OR LIQUID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, SEALANTS, SOLVENTS, DETERGENTS, GLUES, LIME, PESTICIDES, HERBICIDES, FERTILIZERS, WOOD PRESERVATIVES, AND ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; CONCRETE AND RELATED CUTTING OR CURING RESIDUES; FLOATABLE WASTES FROM ANY ENGINES/EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; WASTES FROM STREET CLEANING; AND SUPERCHLORINATED POTABLE WATER LINE FLUSHING AND TESTING. DURING CONSTRUCTION, DISPOSAL OF SUCH MATERIALS SHOULD OCCUR IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON-SITE PHUSICALLY SEPARATED FROM POTENTIAL STORMWATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.
8. DISCHARGING CONTAMINATED GROUNDWATER PRODUCED BY DEWATERING GROUNDWATER THAT HAS INFILTRATED INTO CONSTRUCTION SITE IS PROHIBITED. DISCHARGING OF CONTAMINATED SOILS VIA SURFACE EROSION IS ALSO PROHIBITED. DISCHARGING OF NON-CONTAMINATED GROUDWATER PRODUCED BY DEWATERING ACTIVITIES REQUIRES A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FROM THE SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD.

FACILITY TO BE MAINTAINED BY ORANGE COUNTY FLOOD CONTROL DISTRICT (O.C.F.C.D.)
KATCHALL FILTERS TO BE MAINTAINED BY DEVELOPER PER ENCROACHMENT PERMIT #2008-01230

NOTE:
PERMITTEE SHALL MAINTAIN ALL IMPROVEMENTS WITH THE EXCLUSION OF THE MAIN CHANNEL AND MANHOLES

ORANGE COUNTY PROPERTY PERMITS
ENCROACHMENT PERMIT NO. **2008-00284**

CHANNEL FACILITY TO BE MAINTAINED UNDER AGREEMENT NO. **D07-024**

BASIS OF BEARING:
THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. GPS"SACY" AND STATION GPS"CCCS", BEING N12°58'34"E PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

GEOTECHNICAL ENGINEER
PACIFIC SOILS ENGINEERING, INC.
710 E. PARKRIDGE AVENUE, SUITE 105
CORONA, CA 92879
(951) 582-0176

BENCH MARK: 2H-11-90
3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "2H-11-90", SET IN THE NORTHEASTERLY EDGE OF A ROUNDED CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEASTERLY CORNER OF KRAEMER BOULEVARD AND THE ENTRANCE TO 2601 KRAEMER (A PRIVATE DRIVEWAY), 0.1 MILES SOUTHERLY ALONG KRAEMER FROM THE CENTERLINE OF IMPERIAL HIGHWAY AND 42 FT. EASTERLY OF THE CENTERLINE OF KRAEMER. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

1995 O.C.S. ADJ. **ELEV. 362.353 (NAVD88)**

DEVELOPER
CALIFORNIA BREA PARTNERS, LP
719 GRISWOLD STREET, SUITE 530
DETROIT, MI 48226
(313) 965-8204

ORANGE COUNTY PUBLIC WORKS
THIS PLAN IS SIGNED BY THE ORANGE COUNTY PUBLIC WORKS FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. ORANGE COUNTY PUBLIC WORKS IS NOT RESPONSIBLE FOR THE DESIGN, ASSUMPTIONS OR ACCURACY.

APPROVED ______________________
R.C.E. DATE

PREPARED BY
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

UNDER THE SUPERVISION OF:

PATRICK L. PAGADUAN DATE
R.C.E. 56820
EXP. 6/30/09

PATRICK PAUL LAMADRID PAGADUAN
NO. 56820
Exp. 6/30/09
CIVIL

INDEX OF SHEETS

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UTILITY COMPANIES

	COMPANY	CONTACT	PHONE NO.
WATER	CITY OF BREA	JERRY MESA	714-990-7697
SEWER	CITY OF BREA	JERRY MESA	714-990-7697
STORM DRAIN	CITY OF BREA	JERRY MESA	714-990-7697
ELECTRIC	SOUTHERN CALIFORNIA EDISON	LORI ZUNIGA	714-973-5608
GAS	SOUTHERN CALIFORNIA GAS CO.	RYAN THOMAS	714-666-5718

NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES ETC. SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE PUBLIC RECORDS. THOSE SHOWN ON THE RECORDS EXAMINED, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF ANY UNDERGROUND UTILITIES TO BE USED AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER, THE COUNTY OF ORANGE AND THE CITY OF IRVINE HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM SOLE NEGLIGENCE OF OWNER, ENGINEER, THE COUNTY OF ORANGE OR THE CITY OF IRVINE.

THE CONTRACTOR AND ALL ITS SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR, AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS' "CONSTRUCTION SAFETY ORDERS".

THE CONTRACTOR SHALL MAINTAIN AT THE JOB SITE ALL APPLICABLE PERMITS, INCLUDING THOSE REQUIRED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME, REGIONAL WATER QUALITY CONTROL BOARD, U.S. ARMY CORPS OF ENGINEERS, AND STATE DIVISION OF INDUSTRIAL SAFETY.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE ENGINEER AND OWNERS OF ANY DISCOVERED UNMAPPED UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

NO.	DESCRIPTION	QUANTITY	UNIT
70	RETAINING WALL "A" TYPE 1 PER DETAIL ON SHT. 9	114	L.F.
71	RETAINING WALL "A" TYPE 2 PER DETAIL ON SHT. 9	52	L.F.
72	WALL V-DITCH PER DETAIL ON SHEET 10	93	L.F.
73	WALL DITCH TO PIPE INLET PER DETAIL ON SHT. 10	2	EACH
74	8" SDR 35 PVC RETAINING WALL DRAIN LINE	80	L.F.
75	OUTLET RETAINING WALL DRAIN LINE TO CHANNEL	1	EACH
76	SPLASH WALL PER DETAIL ON SHEET 10	17	L.F.
79	12" P.V.C. N-12 BY ADS OR EQUIVALENT	54	L.F.
80	18" R.C.P. (D-LOAD PER PROFILE)	202	L.F.
81	24" R.C.P. (D-LOAD PER PROFILE)	30	L.F.
100	4-CELL REINFORCED CONCRETE BOX	773	L.F.
101	TRANSITION STRUCTURE PER APWA 343-1 (MODIFIED)	1	EACH
102	BOX CULVERT WARPED WINGWALL PER CALTRANS D86A	2	EACH
103	R.C.B. WINDOW DETAIL PER APWA 382-1	6	EACH
104	JUNCTION STRUCTURE PER OCPW 1314	7	EACH
105	CULVERT PIER EXTENSION	3	EACH
106	RIP-RAP	480	C.Y.
107	6' HIGH CHAIN LINK FENCE PER APWA 600-1-OC	120	L.F.
108	REINFORCED CONCRETE BOX MANHOLE PER OCPW 1506	8	EACH
109	KATCHALL FILTER WEIRS **(PER PERMIT #2008-01230)**	1	L.S.
110	P.C.C. ACCESS RAMP	1300	S.F.
111	P.M.B. ACCESS ROAD	730	S.F.
112	P.C.C. LANDING APRON	1663	S.F.
113	CHAIN LINK GATE PER OCPW 600-1-OC	16	L.F.
114	JUNCTION STRUCTURE PER OCPW STD. PLAN 1313	2	EACH
115	PIPE INLET PER DETAIL ON SHT 10	1	EACH
116	LONGITUDINAL CONTROL JOINT PER DETAIL ON SHT. 10	166	L.F.
117	6' HIGH WROUGHT IRON FENCE PER DETAIL ON SHT. 8	190	L.F.

CONSTRUCTION QUANTITY ESTIMATES

THESE QUANTITY ESTIMATES ARE BASED ON PLANS DATED **09/30/08** FOR PERMIT PURPOSES ONLY. CONTRACTOR IS TO VERIFY ALL QUANTITIES FOR BID PURPOSES AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

DEVIATION REQUESTED

DESCRIPTION	APPROVED	DATE

NO.	DESCRIPTION	SHT.	APPROVED	DATE

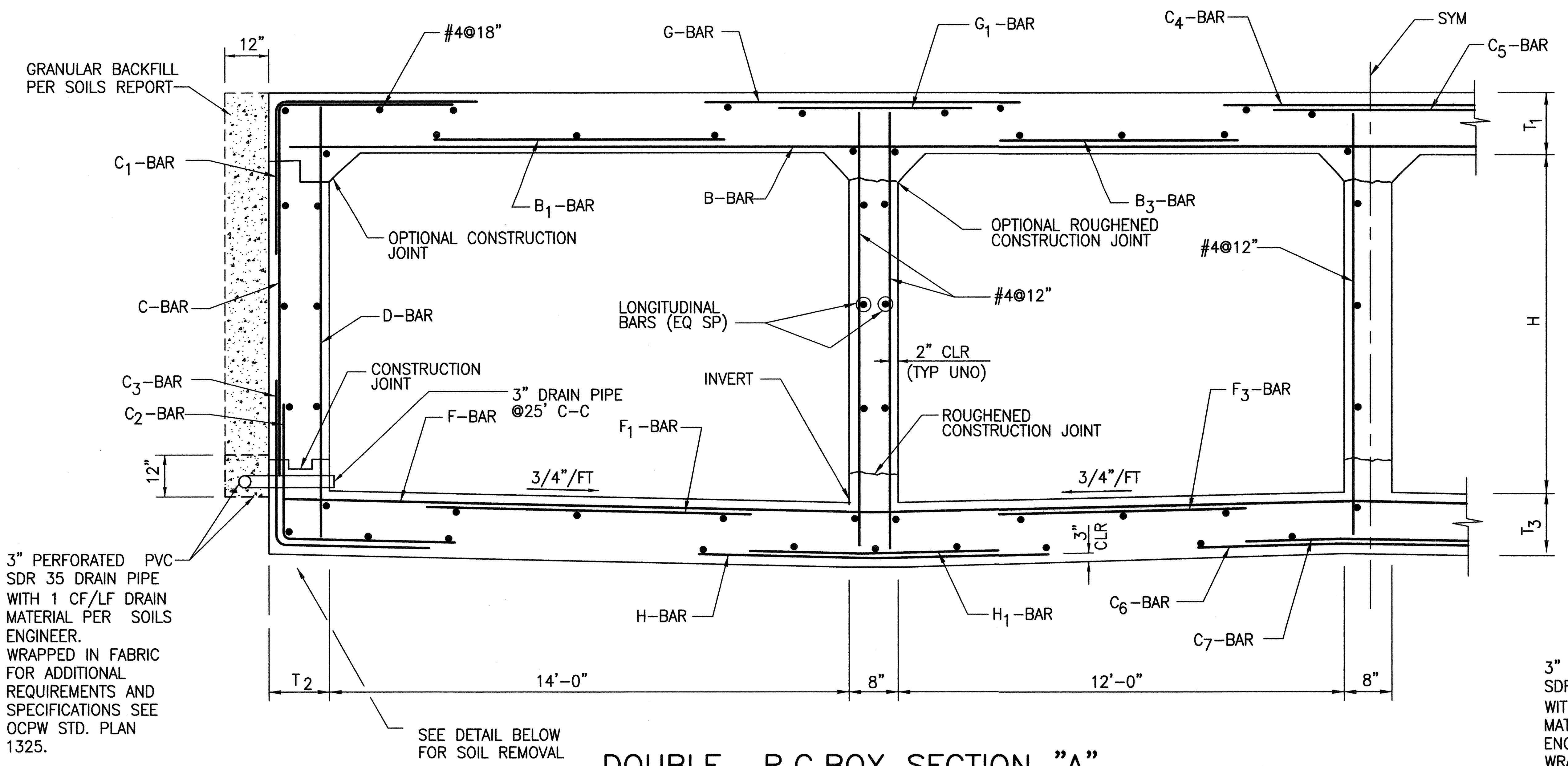
REVISIONS

W.O. NO. ______________
DWG. NO. A06-701-6

SHEET 1 OF 10

MAP DATE IDENTIFIER
09/30/08
DATE OF LATEST CHANGE TO THIS MAP
BY:P.P.
07/24/09
DATE OF THIS PLOT

WO: 3210-2 BIN: XXXX RM: XXX DOC: XXXXX
STORM DRAIN IMPROVEMENTS FOR LOFTUS DIVERSION CHANNEL – CITY OF BREA

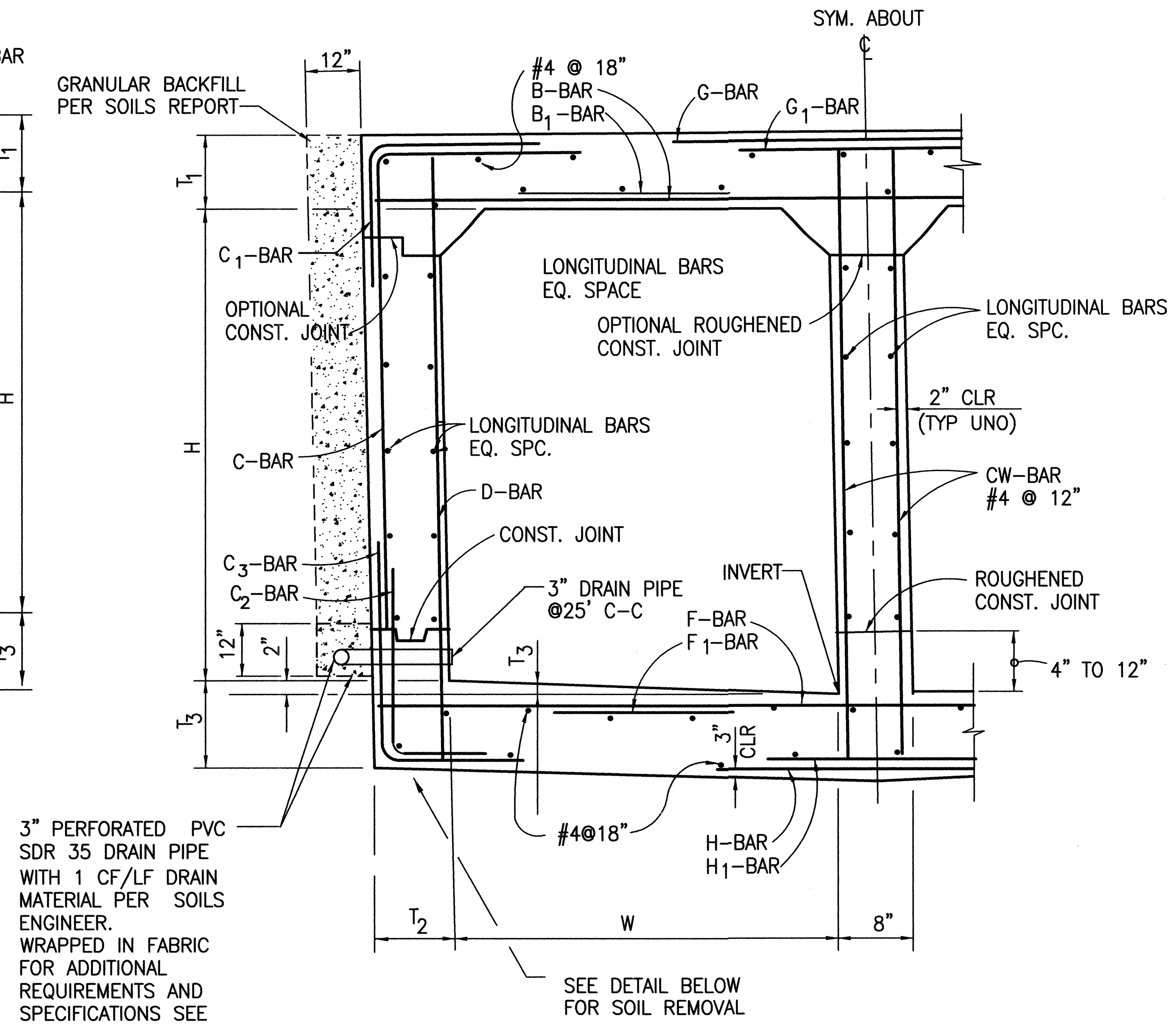


3" PERFORATED PVC SDR 35 DRAIN PIPE WITH 1 CF/LF DRAIN MATERIAL PER SOILS ENGINEER. WRAPPED IN FABRIC FOR ADDITIONAL REQUIREMENTS AND SPECIFICATIONS SEE OCPW STD. PLAN 1325.

SEE DETAIL BELOW FOR SOIL REMOVAL

DOUBLE R.C.BOX SECTION "A"

NOT TO SCALE



3" PERFORATED PVC SDR 35 DRAIN PIPE WITH 1 CF/LF DRAIN MATERIAL PER SOILS ENGINEER. WRAPPED IN FABRIC FOR ADDITIONAL REQUIREMENTS AND SPECIFICATIONS SEE OCPW STD. PLAN 1325.

SEE DETAIL BELOW FOR SOIL REMOVAL

SINGLE R.C.BOX SECTION "B" & "C"

NOT TO SCALE

STRUCTURAL NOTES

GENERAL

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. DELETED.
4. LONGITUDINAL STEEL SHALL BE LAPPED 45 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 45 BAR DIAMETERS AT SPLICES.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 4 FEET OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED, BEVELED, OR CHAMFERED
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED, AND STAGGERS SHALL NOT BE IN THE SAME PLANE.
10. SEE GRADING PLAN FOR OVEREXCAVATION REQUIREMENTS BELOW RCB.
11. ELEVATION OF WEEPHOLES ABOVE INVERT SHALL BE UNIFORM THROUGH ENTIRE REACH.
12. FILL AND BACKFILL SHALL COMPLY WITH GENERAL NOTES ON SHEET 1, AND GEOTECHNICAL INVESTIGATION REPORT REQUIRING CALIFORNIA TEST METHOD 216.
13. STRUCTURAL BACKFILL SHALL BE PER GREENBOOK SECTION 300-3, INCLUDING SECTION 300-3.5. STRUCTURAL BACKFILL SHALL ALSO CONFORM TO THE REQUIREMENTS OF THE SOILS REPORT, AND BACKFILLED TO AT LEAST 90% OF MAXIMUM DRY DENSITY AS DETERMINED BY CALIFORNIA TEST METHOD NO. 216 AND NO. 231.
14. SHORED CONSTRUCTION SHALL NOT BE USED UNLESS PROPOSED METHOD AND SPECIFICATIONS ARE REVIEWED AND APPROVED BY THE ENGINEER AND COUNTY OF ORANGE.

ADDITIONAL NOTES FOR BOX SECTIONS

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIAL TO CENTERLINE WITH SPACING NOT TO EXCEED THAT SHOWN ON SCHEDULE. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT. MAINTAIN 1.5" CLEARANCE FROM KEY OF CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN THE INTERIOR FACE OF WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICE SHALL BE 45 BAR DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 45 BAR DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BAR.
7. CONCRETE QUANTITIES ARE BASED ON A SIX-BY-SIX-INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. INVERT FINISH: CHANNEL INVERT SURFACE SHALL BE GIVEN A STEEL TROWEL FINISH.

DESIGN DATA

LIVE LOAD

HS20-44 UNLESS OTHERWISE NOTED.

DEAD LOAD

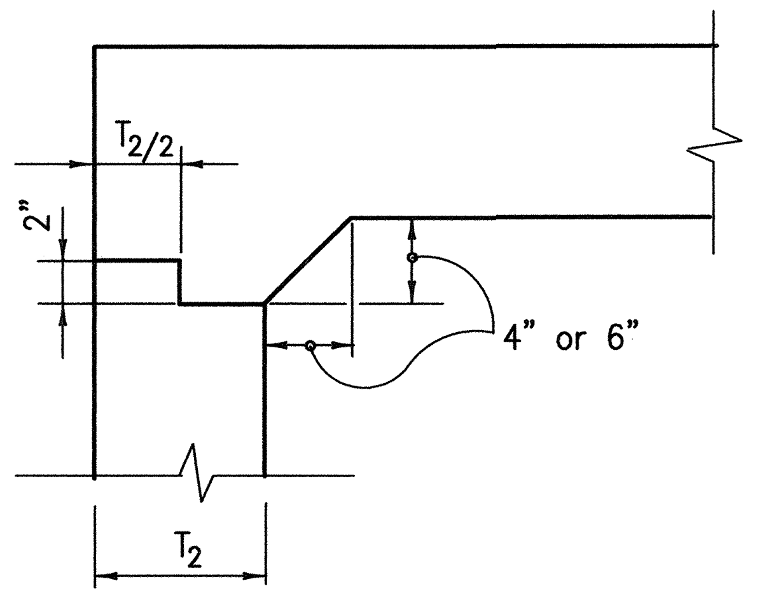
EARTH LOAD PER MARSTON'S FORMULA W=125 pcf
KU=KU'=0.150
BD=OUTSIDE WIDTH OF BOX PLUS 3 FEET
SIDE EARTH 82 EFP PER FOOT OF DEPTH
WEIGHT OF CONCRETE 150 pcf

ALLOWABLE STRESSES

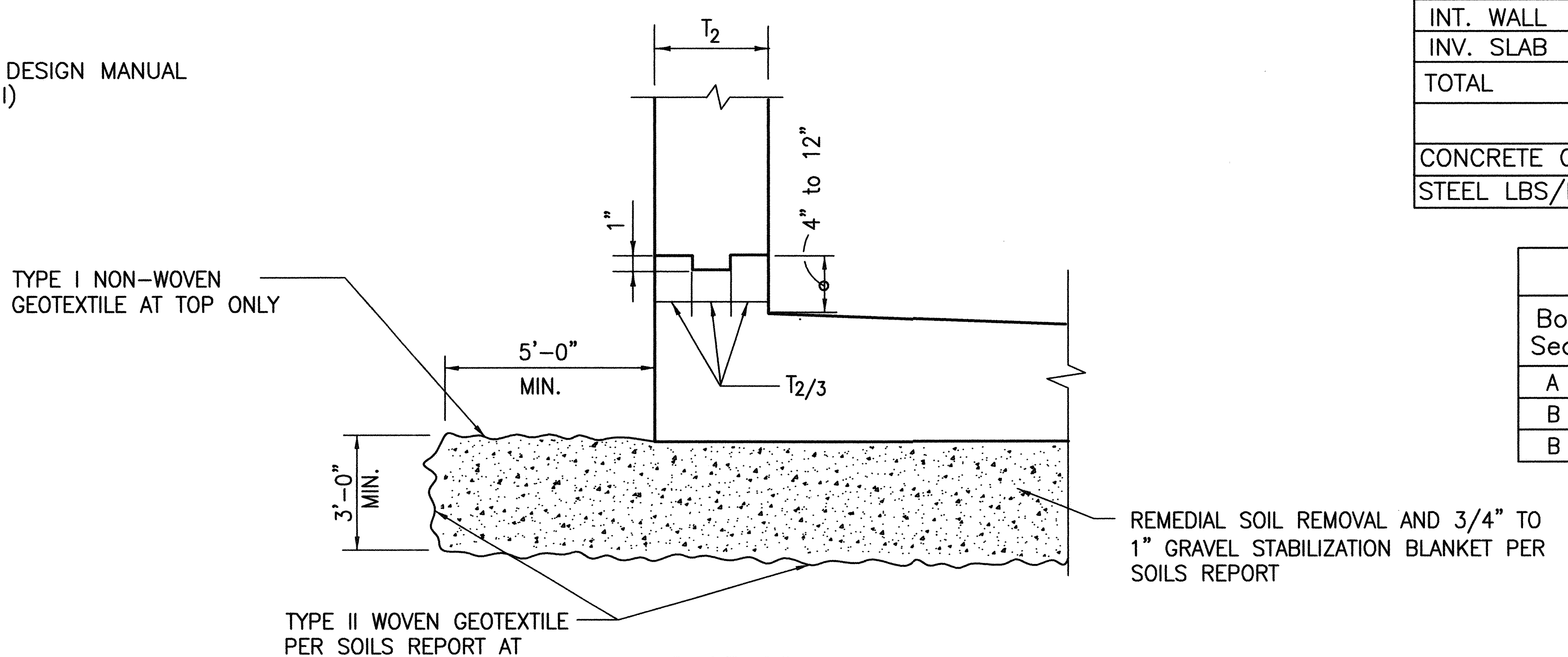
f_c' =4000 psi at 28 days
F_y = 60000 psi

DESIGN

STRENGTH DESIGN PER OCFCD DESIGN MANUAL
LOAD FACTORS: 1.5D + 1.8(L+I)
WHERE D = DEAD LOADS
L = LIVE LOADS
I = IMPACT



TOP OF WALL



TYPE I NON-WOVEN GEOTEXTILE AT TOP ONLY

REMEDIAL SOIL REMOVAL AND 3/4" TO 1" GRAVEL STABILIZATION BLANKET PER SOILS REPORT

TYPE II WOVEN GEOTEXTILE PER SOILS REPORT AT BOTTOM AND SIDES ONLY

BASE OF WALL

CONSTRUCTION JOINT DETAILS

NOT TO SCALE

BOX SECTION		A	B	C
Design Cover		7'	7'	4'
Width W		SEE SECTION	12'-0"	26'-8"
Height H		10'-0"	10'-0"	10'-0"
LIVE LOAD		HS 20-44	HS 20-44	HS 20-44
Top Slab Thickness T_1		14"	12"	24"
Side Wall Thickness T_2		10"	9"	15"
Bottom Slab Thickness T_3		15"	13"	24"
B Bars	Bar No & Spacing	#4@12"	#4@12"	#5@12"
	Length	CONT	CONT	CONT
B_1 Bars	Bar No & Spacing	#7@12"	#6@12"	#8@12"
	Length	CONT	CONT	CONT
B_3 Bars	Bar No & Spacing	#6@12"	–	–
	Length	CONT	–	–
C Bars	Bar No & Spacing	#4@12"	#5@12"	#5@12"
	Horiz. Length	5'-0"	5'-7"	5'-8"
	Vert. Length	11'-2"	10'-11"	10'-7"
C_1 Bars	Bar No & Spacing	#6@12"	#6@12"	#7@12"
	Horiz. Length	6'-4"	6'-3"	8'-2"
	Vert. Length	8'-1"	6'-9"	13'-1"
C_2 Bars	Bar No & Spacing	#5@12"	#5@12"	#5@12"
	Horiz. Length	5'-6"	5'-10"	6'-2"
	Vert. Length	7'-6"	4'-0"	8'-1"
C_3 Bars	Bar No & Spacing	#6@12"	#6@12"	#6@12"
	Horiz. Length	6'-2"	6'-2"	6'-10"
	Vert. Length	8'-2"	7'-2"	9'-0"
C_4 Bars	Bar No & Spacing	#6@12"	–	–
	Length	16'-2"	–	–
C_5 Bars	Bar No & Spacing	#7@12"	–	–
	Length	10'-2"	–	–
C_6 Bars	Bar No & Spacing	#6@12"	–	–
	Length	11'-6"	–	–
C_7 Bars	Bar No & Spacing	#7@12"	–	–
	Length	12'-8"	–	–
D Bars	Bar No & Spacing	#4@12"	#4@12"	#5@12"
	Length	CONT	CONT	CONT
F Bars	Bar No & Spacing	#4@12"	#4@12"	#5@12"
	Length	CONT	CONT	CONT
F_1 Bars	Bar No & Spacing	#7@12"	#6@12"	#8@12"
	Length	18'-0"	CONT	CONT
F_3 Bars	Bar No & Spacing	#6@12"	–	–
	Length	14'-8"	–	–
G Bars	Bar No & Spacing	#6@12"	#5@12"	#8@12"
	Length	13'-6"	12'-6"	CONT
G_1 Bars	Bar No & Spacing	#7@12"	#6@12"	#8@12"
	Length	18'-8"	13'-8"	29'-0"
H Bars	Bar No & Spacing	#6@12"	#5@12"	#9@12"
	Length	14'-10"	12'-0"	36'-0"
H_1 Bars	Bar No & Spacing	#7@12"	#7@12"	#9@12"
	Length	13'-4"	17'-0"	28'-6"
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS				
TOP SLAB (INCLUDES DISTRIB.)		80	38	80
EXT. WALL		24	24	24
INT. WALL		36	12	12
INV. SLAB		80	38	80
TOTAL		220	112	196
QUANTITIES				
CONCRETE CU. YDS./LIN. FT		6.4	2.8	8.9
STEEL LBS/LIN. FT		900	400	1350

R.C. BOX LOCATION SCHEDULE

Box Sect.	Station	
	From	To
A	11+87.20	19+60.00
B	10+82.00	10+84.00
B	11+85.20	11+87.20

40 20 0 40 80

GRAPHIC SCALE 1"=40'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

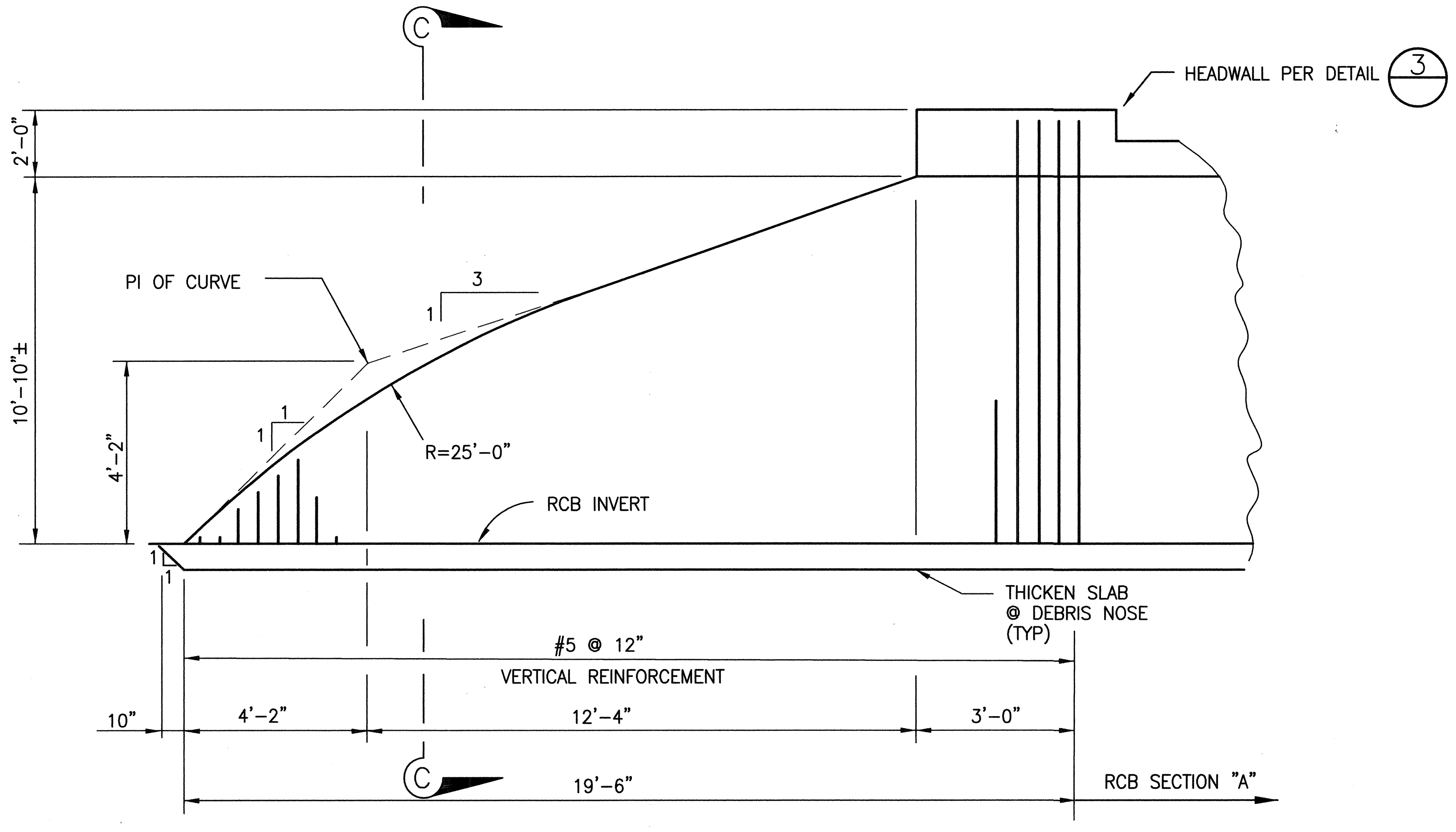
REVISIONS

WILBERT Y. CHO
NO. C36266
EXP. 6-30-10

11-6-08

SHEET 2 OF 10
RCB DETAILS

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

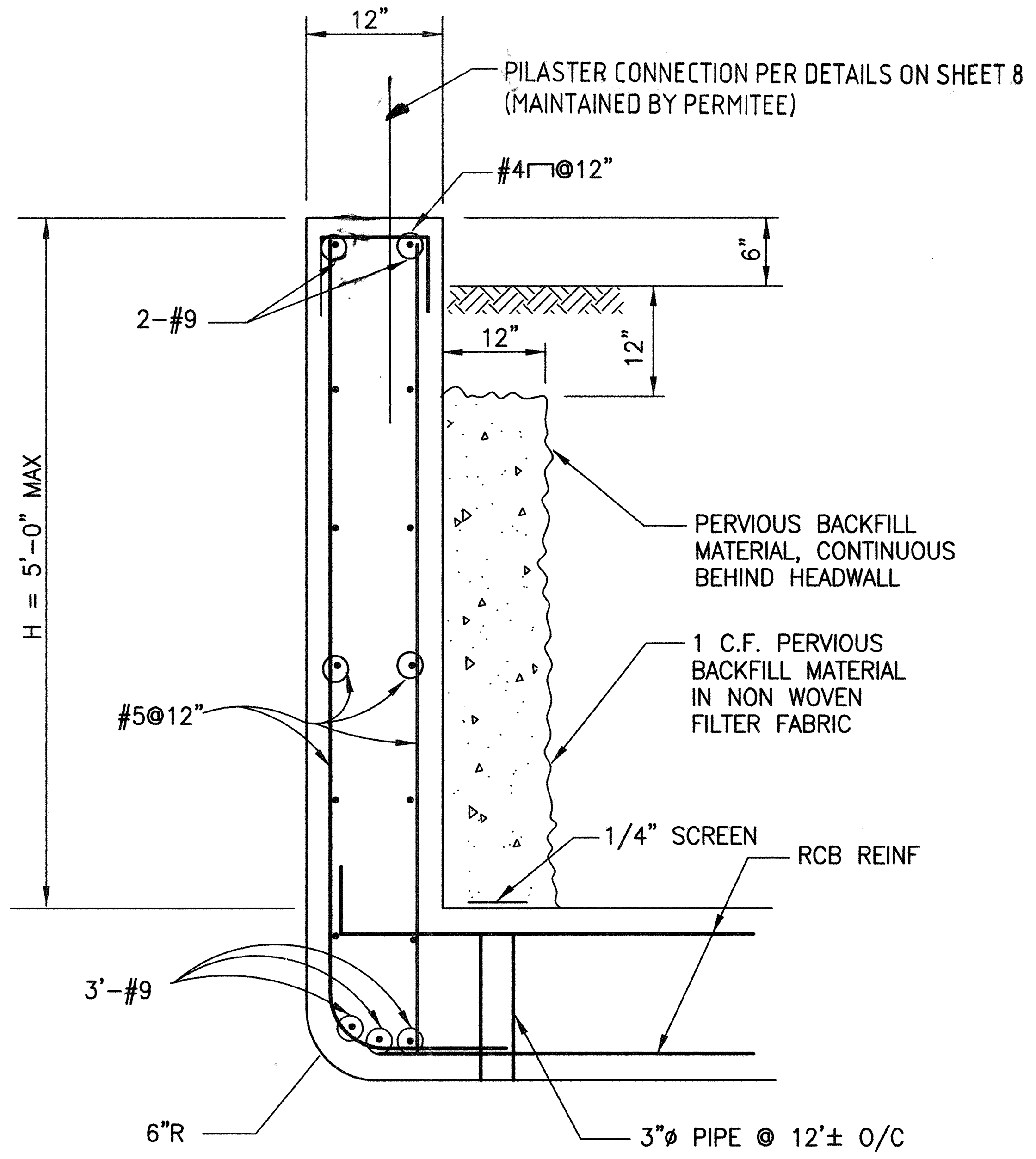


NOTE: FOR DETAILS AND NOTES
NOT SHOWN, SEE OCPW STD
PLAN 1324.

ELEVATION ①

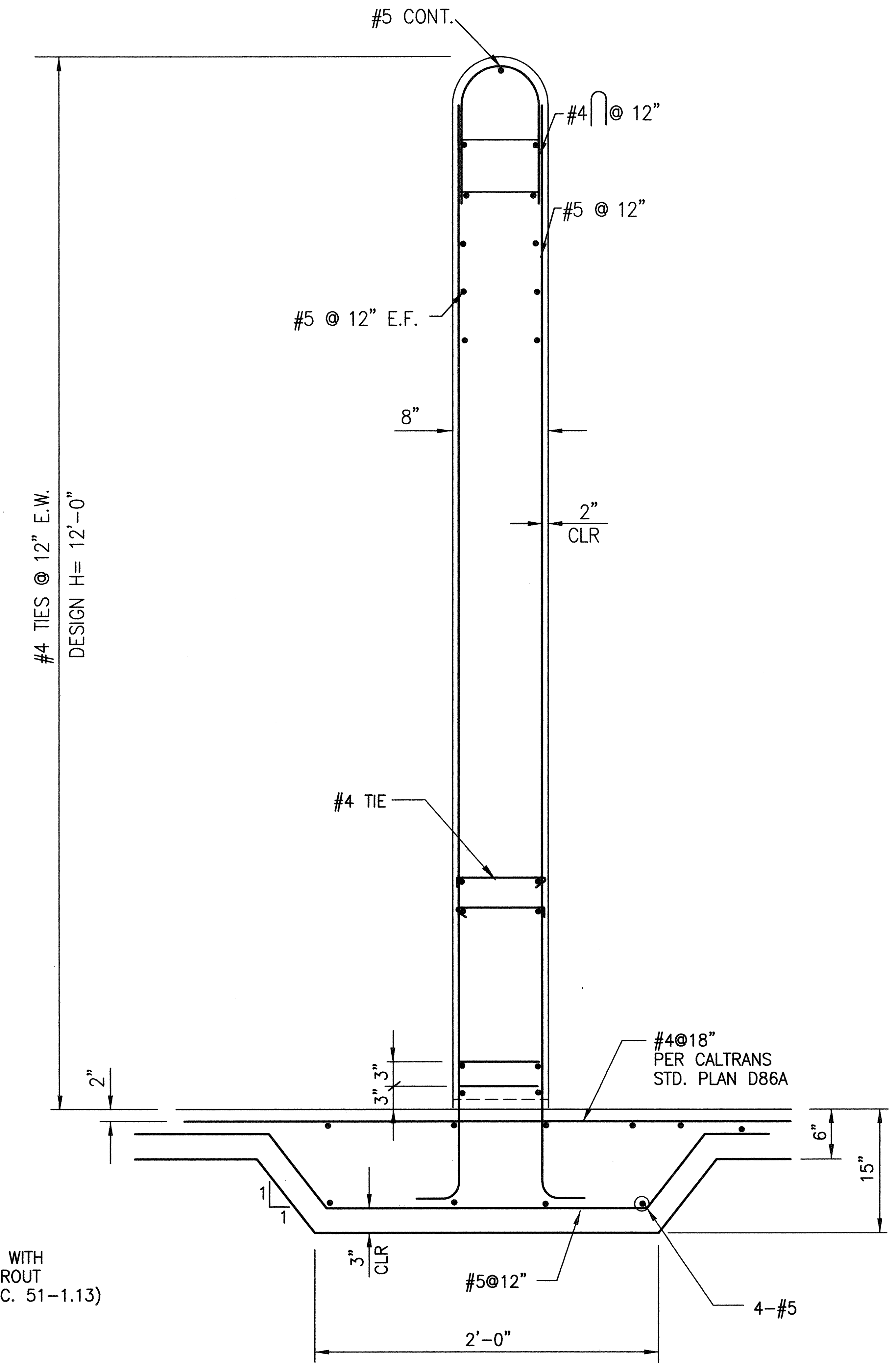
N.T.S.

NOTE: SEE SHEET 6 FOR DEBRIS NOSE PLAN VIEW



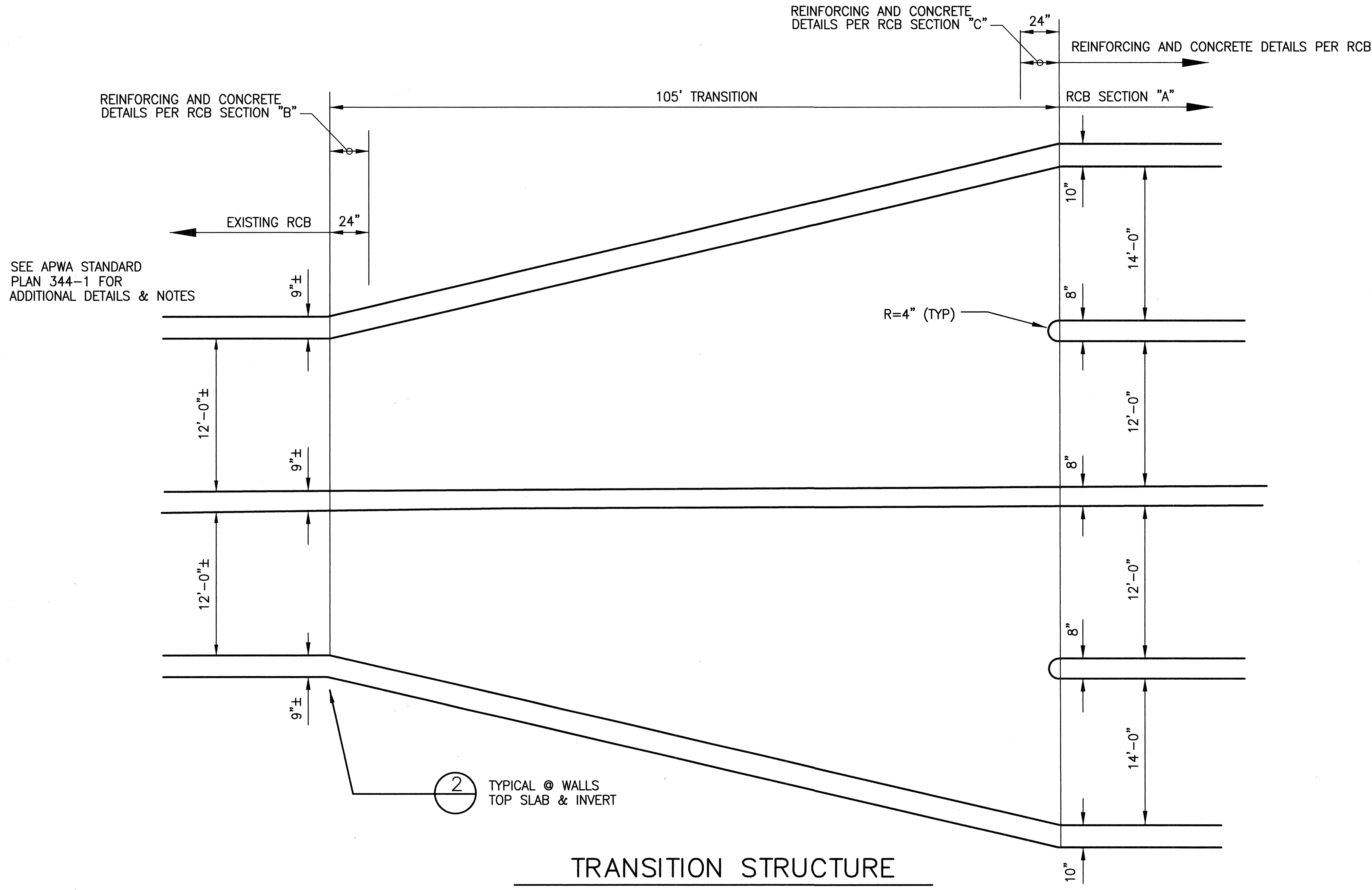
HEADWALL DETAIL ③

N.T.S.



SECTION C–C

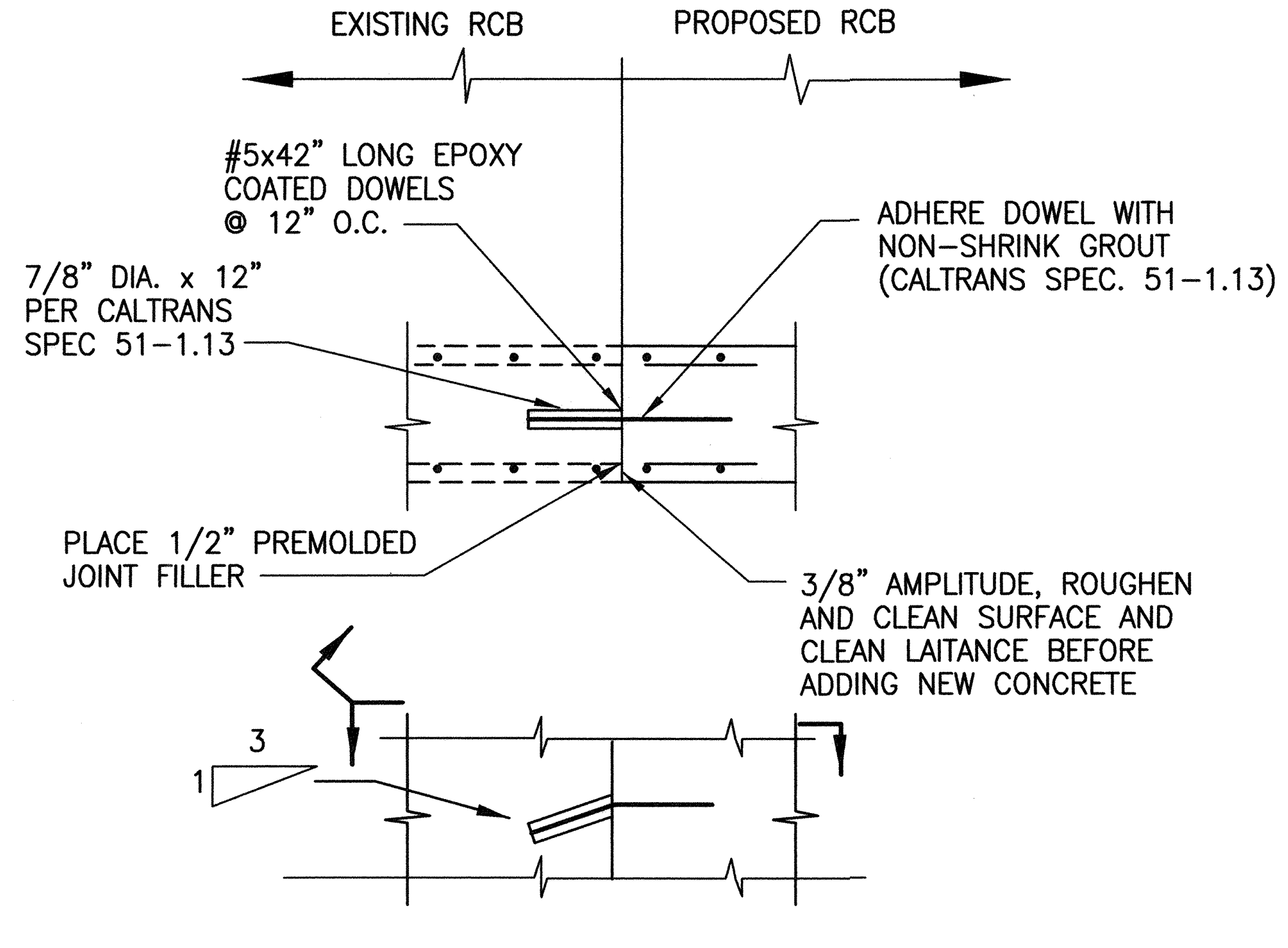
N.T.S.



TRANSITION STRUCTURE

4 CELL RCB TO EXISTING 2 CELL RCB

N.T.S.



EXISTING RCB/PROPOSED RCB

CONNECTION DETAIL ②

N.T.S.

40 20 0 40 80

GRAPHIC SCALE 1"=40'

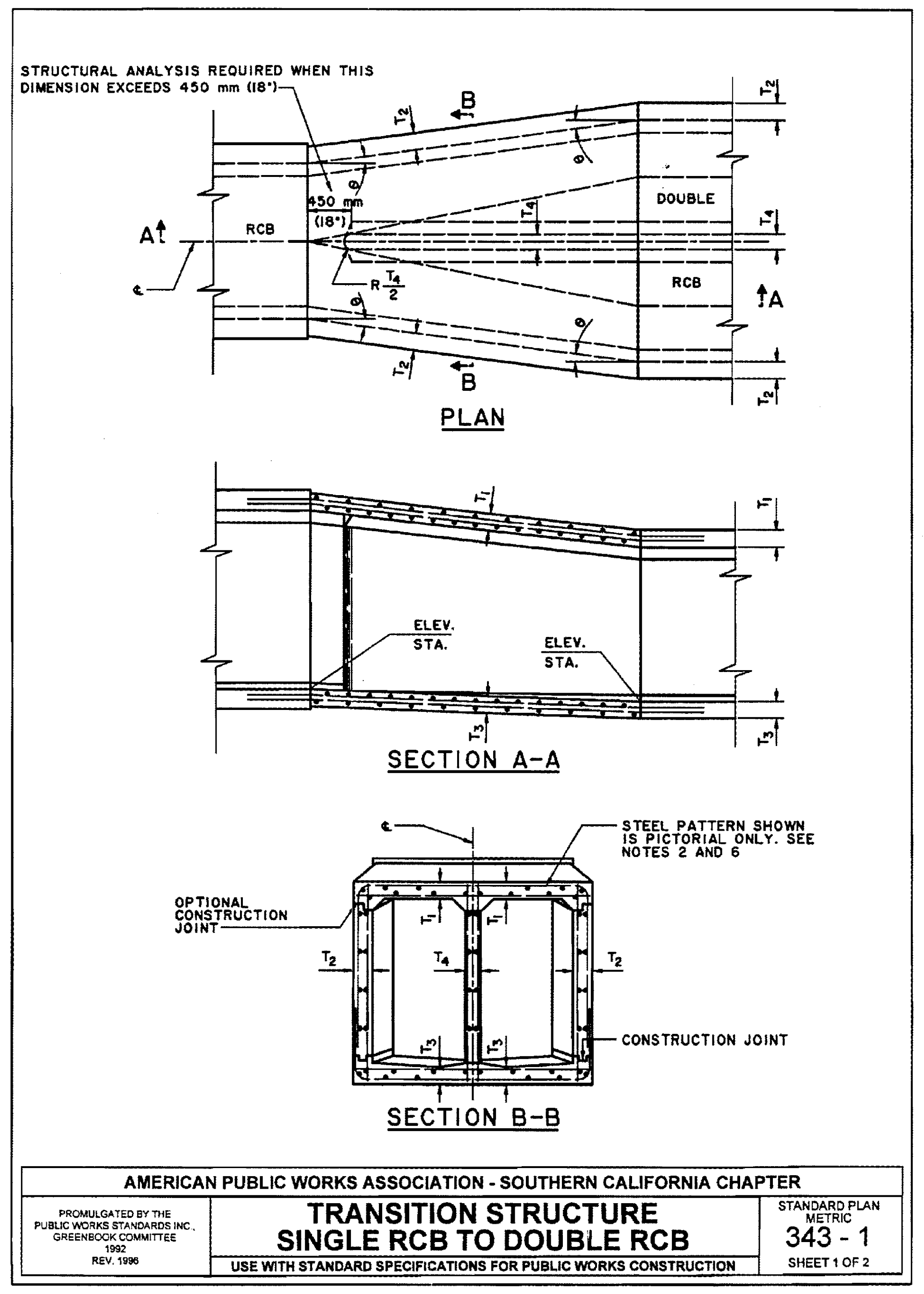
NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

WILBERT Y. CHO
NO. C36266
EXP. 6-30-10
11-6-08

SHEET 3 OF 10
PIER DETAILS

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA


STRUCTURAL ANALYSIS REQUIRED WHEN THIS DIMENSION EXCEEDS 450 mm (18")
450 mm (18")
B
B
A
A
RCB
DOUBLE
RCB
$R\frac{T_4}{2}$
T_1
T_2
T_3
T_4
θ
℄
PLAN
ELEV.
STA.
ELEV.
STA.
SECTION A-A
STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE NOTES 2 AND 6
OPTIONAL CONSTRUCTION JOINT
CONSTRUCTION JOINT
SECTION B-B

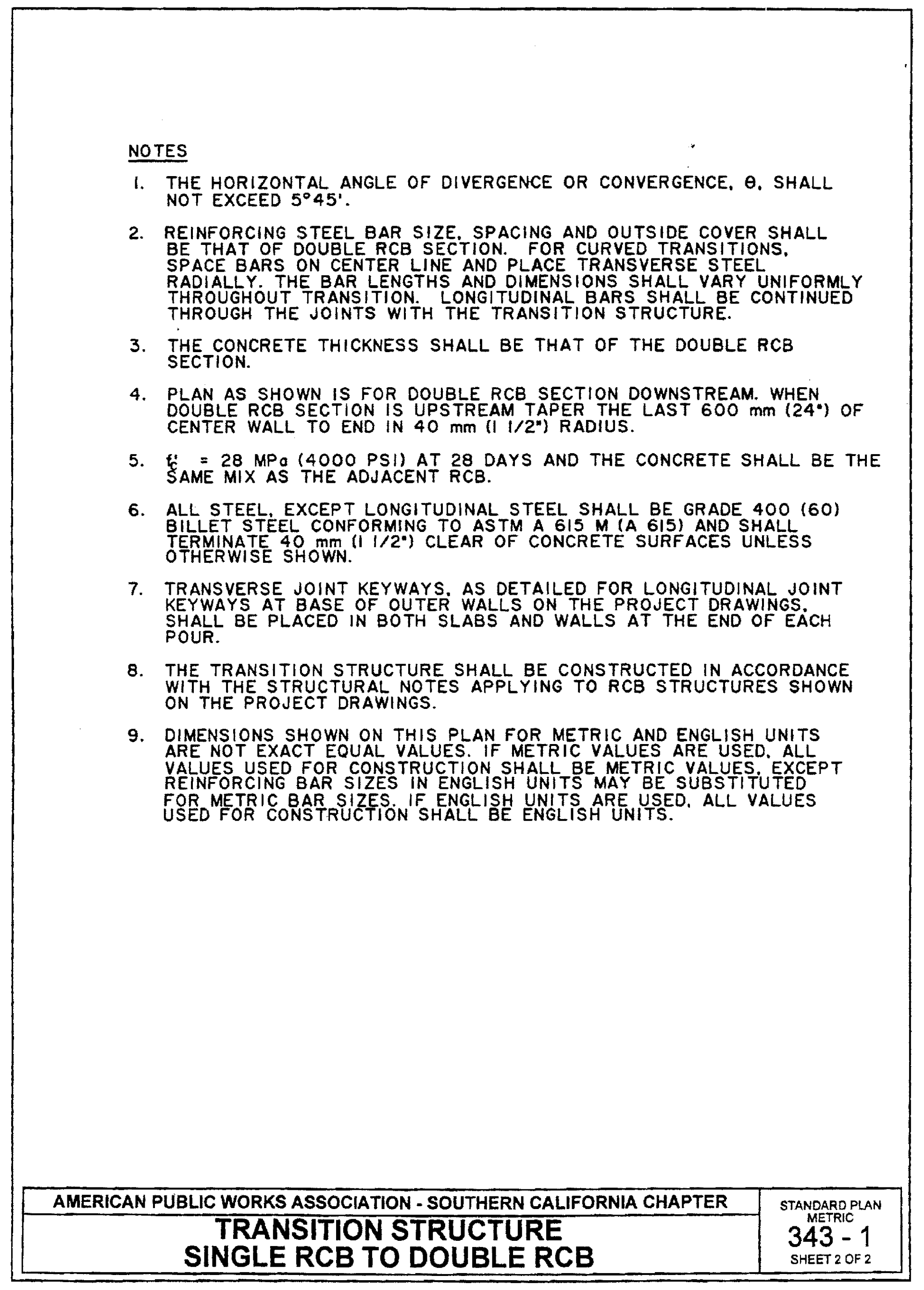
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.,
GREENBOOK COMMITTEE
1992
REV. 1996

TRANSITION STRUCTURE
SINGLE RCB TO DOUBLE RCB

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN
METRIC
343 - 1
SHEET 1 OF 2



NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, θ, SHALL NOT EXCEED 5°45'.
2. REINFORCING STEEL BAR SIZE, SPACING AND OUTSIDE COVER SHALL BE THAT OF DOUBLE RCB SECTION. FOR CURVED TRANSITIONS, SPACE BARS ON CENTER LINE AND PLACE TRANSVERSE STEEL RADIALLY. THE BAR LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.
3. THE CONCRETE THICKNESS SHALL BE THAT OF THE DOUBLE RCB SECTION.
4. PLAN AS SHOWN IS FOR DOUBLE RCB SECTION DOWNSTREAM. WHEN DOUBLE RCB SECTION IS UPSTREAM TAPER THE LAST 600 mm (24") OF CENTER WALL TO END IN 40 mm (1 1/2") RADIUS.
5. f'_c = 28 MPa (4000 PSI) AT 28 DAYS AND THE CONCRETE SHALL BE THE SAME MIX AS THE ADJACENT RCB.
6. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 400 (60) BILLET STEEL CONFORMING TO ASTM A 615 M (A 615) AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
7. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PROJECT DRAWINGS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.
8. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL NOTES APPLYING TO RCB STRUCTURES SHOWN ON THE PROJECT DRAWINGS.
9. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

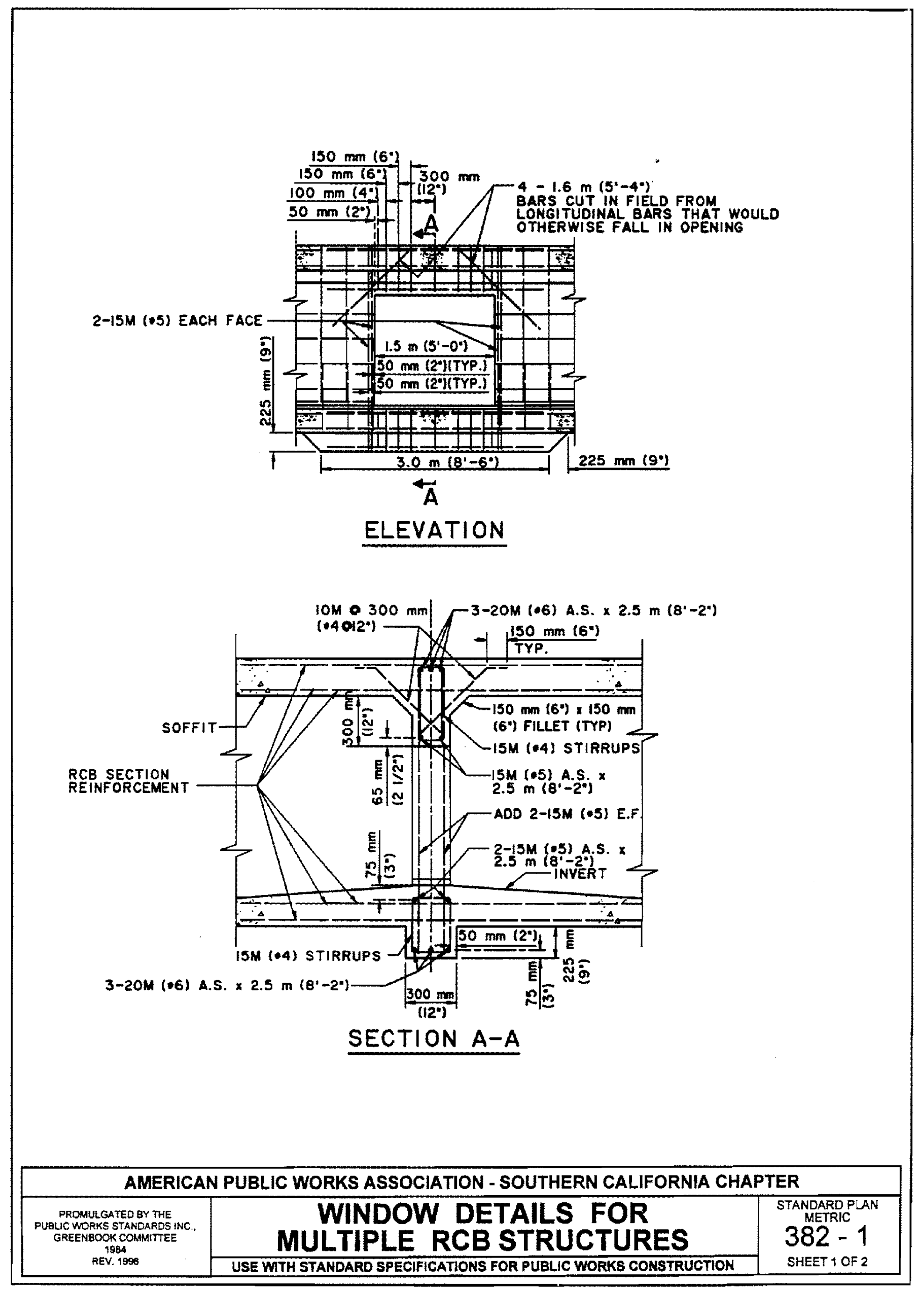
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

TRANSITION STRUCTURE
SINGLE RCB TO DOUBLE RCB

STANDARD PLAN
METRIC
343 - 1
SHEET 2 OF 2

(101) *R.C.B. TRANSITION STRUCTURE*

SEE SHEET 3 FOR ADDITIONAL DETAILS
USE U.S. STANDARDS
NOT TO SCALE



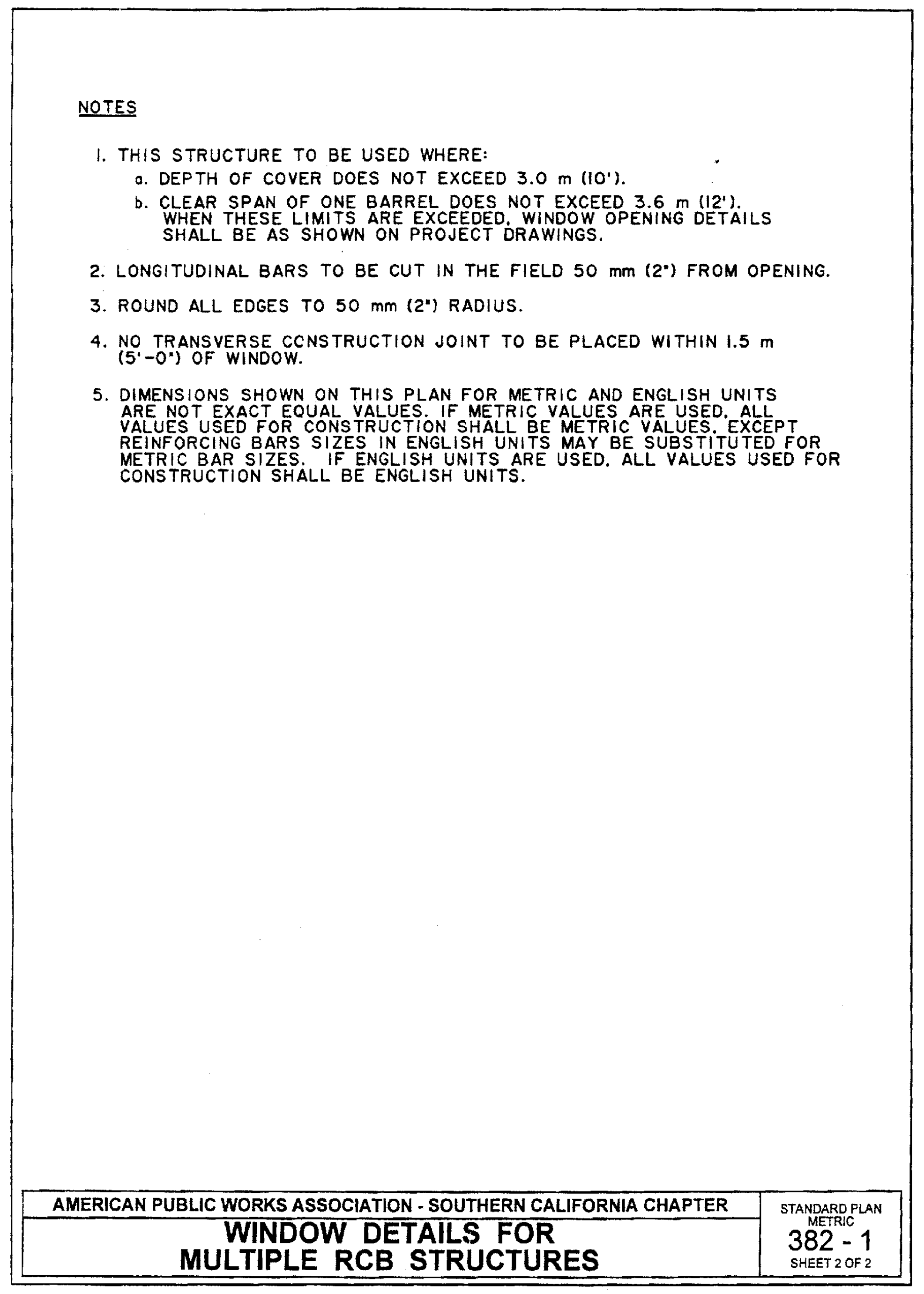
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.,
GREENBOOK COMMITTEE
1984
REV. 1996

WINDOW DETAILS FOR
MULTIPLE RCB STRUCTURES

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN
METRIC
382 - 1
SHEET 1 OF 2



NOTES

1. THIS STRUCTURE TO BE USED WHERE:
   a. DEPTH OF COVER DOES NOT EXCEED 3.0 m (10').
   b. CLEAR SPAN OF ONE BARREL DOES NOT EXCEED 3.6 m (12'). WHEN THESE LIMITS ARE EXCEEDED, WINDOW OPENING DETAILS SHALL BE AS SHOWN ON PROJECT DRAWINGS.
2. LONGITUDINAL BARS TO BE CUT IN THE FIELD 50 mm (2") FROM OPENING.
3. ROUND ALL EDGES TO 50 mm (2") RADIUS.
4. NO TRANSVERSE CONSTRUCTION JOINT TO BE PLACED WITHIN 1.5 m (5'-0") OF WINDOW.
5. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES, EXCEPT REINFORCING BARS SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

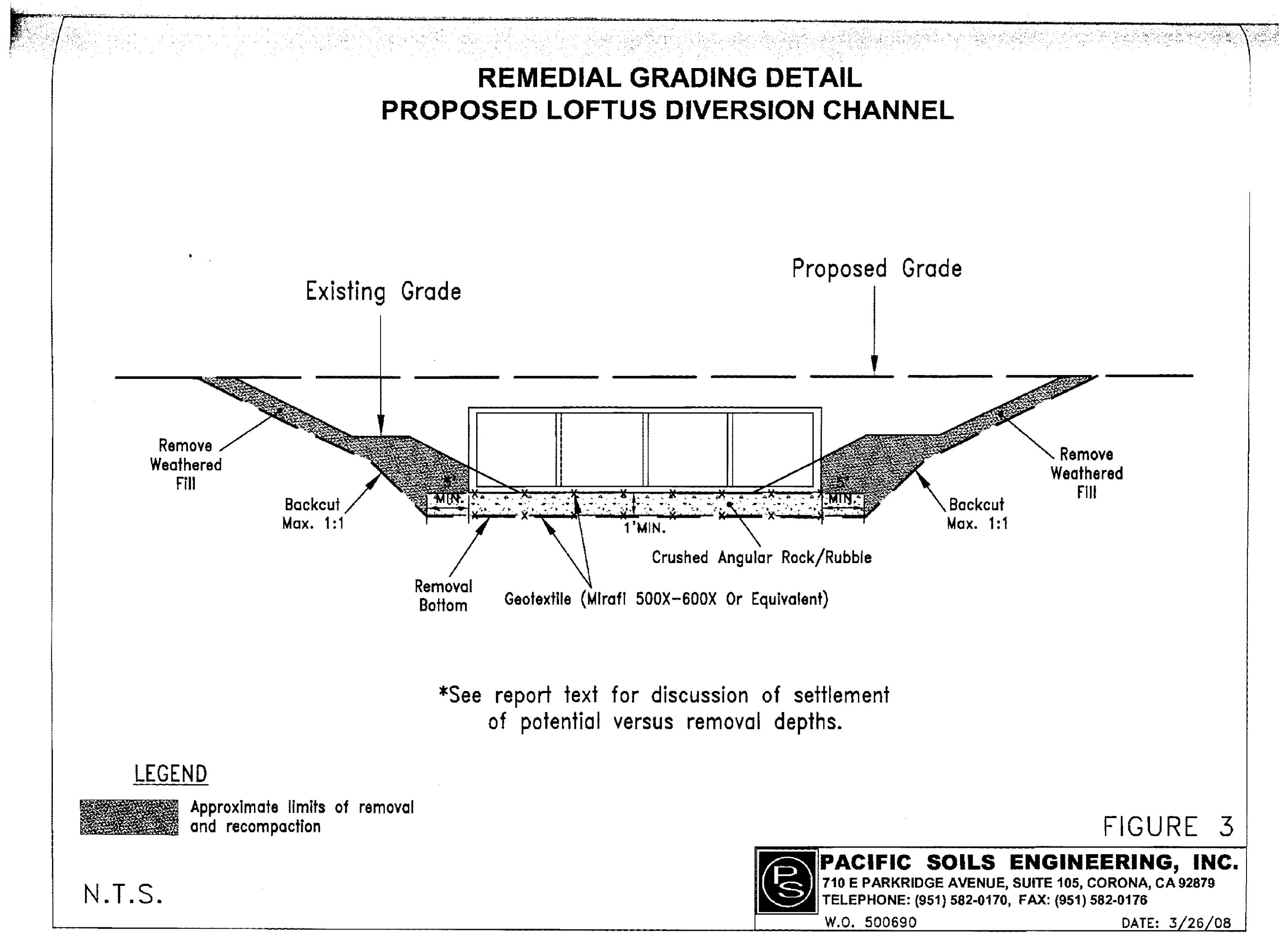
WINDOW DETAILS FOR
MULTIPLE RCB STRUCTURES

STANDARD PLAN
METRIC
382 - 1
SHEET 2 OF 2

(103) *R.C.B. WINDOW DETAILS*

USE U.S. STANDARDS
NOT TO SCALE

REMEDIAL GRADING DETAIL
PROPOSED LOFTUS DIVERSION CHANNEL



*See report text for discussion of settlement of potential versus removal depths.

LEGEND

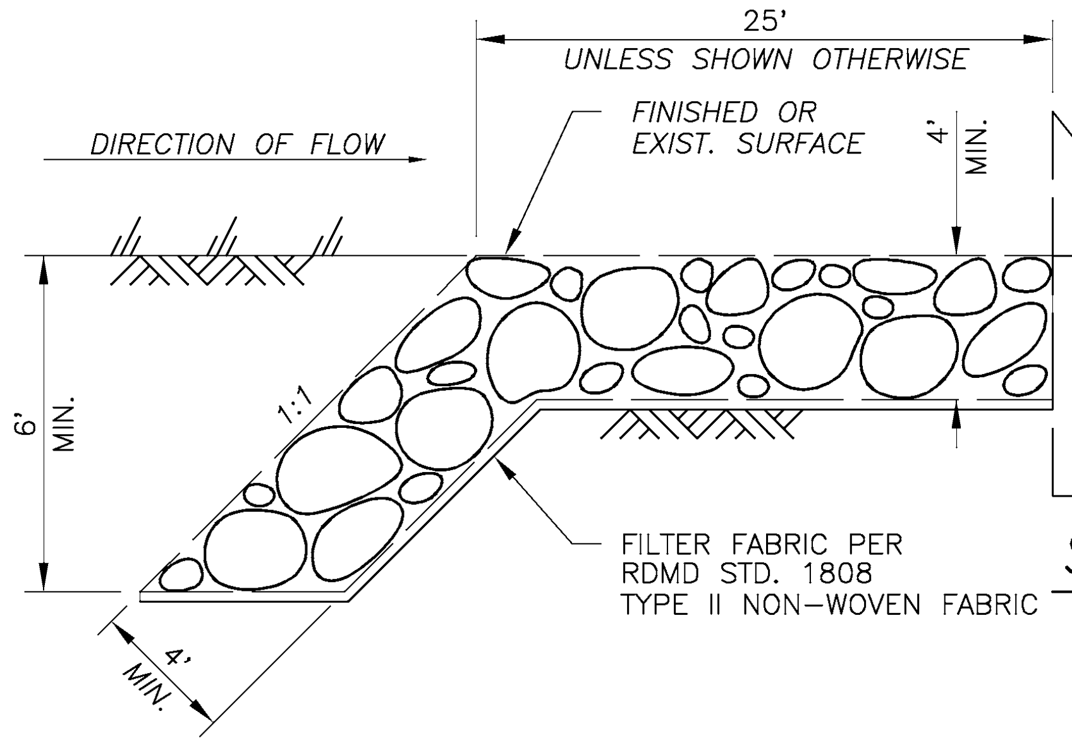
▨ Approximate limits of removal and recompaction

N.T.S.

FIGURE 3

PACIFIC SOILS ENGINEERING, INC.
710 E PARKRIDGE AVENUE, SUITE 105, CORONA, CA 92879
TELEPHONE: (951) 582-0170, FAX: (951) 582-0176
W.O. 500690 DATE: 3/26/08

NOTE:
SHORING SHALL NOT BE USED AS OUTSIDE FORMS FOR CONSTRUCTION OF THE R.C.B.

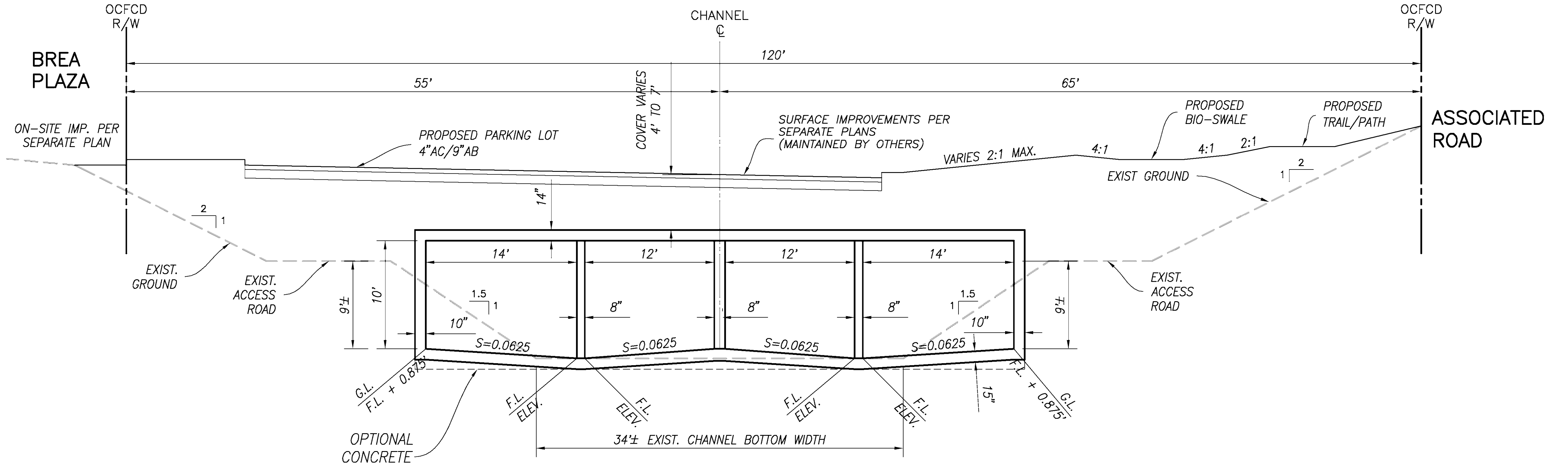

25'
UNLESS SHOWN OTHERWISE
DIRECTION OF FLOW
FINISHED OR EXIST. SURFACE
4' MIN.
6' MIN.
1:1
PROPOSED OR EXIST. DRAINAGE STRUCTURE
FILTER FABRIC PER RDMD STD. 1808 TYPE II NON-WOVEN FABRIC
4' MIN.

STONE GRADATION

SIZE	*% LARGER THAN*
500#	0 – 5
200#	50 – 100
75#	90 – 100
25#	95 – 100

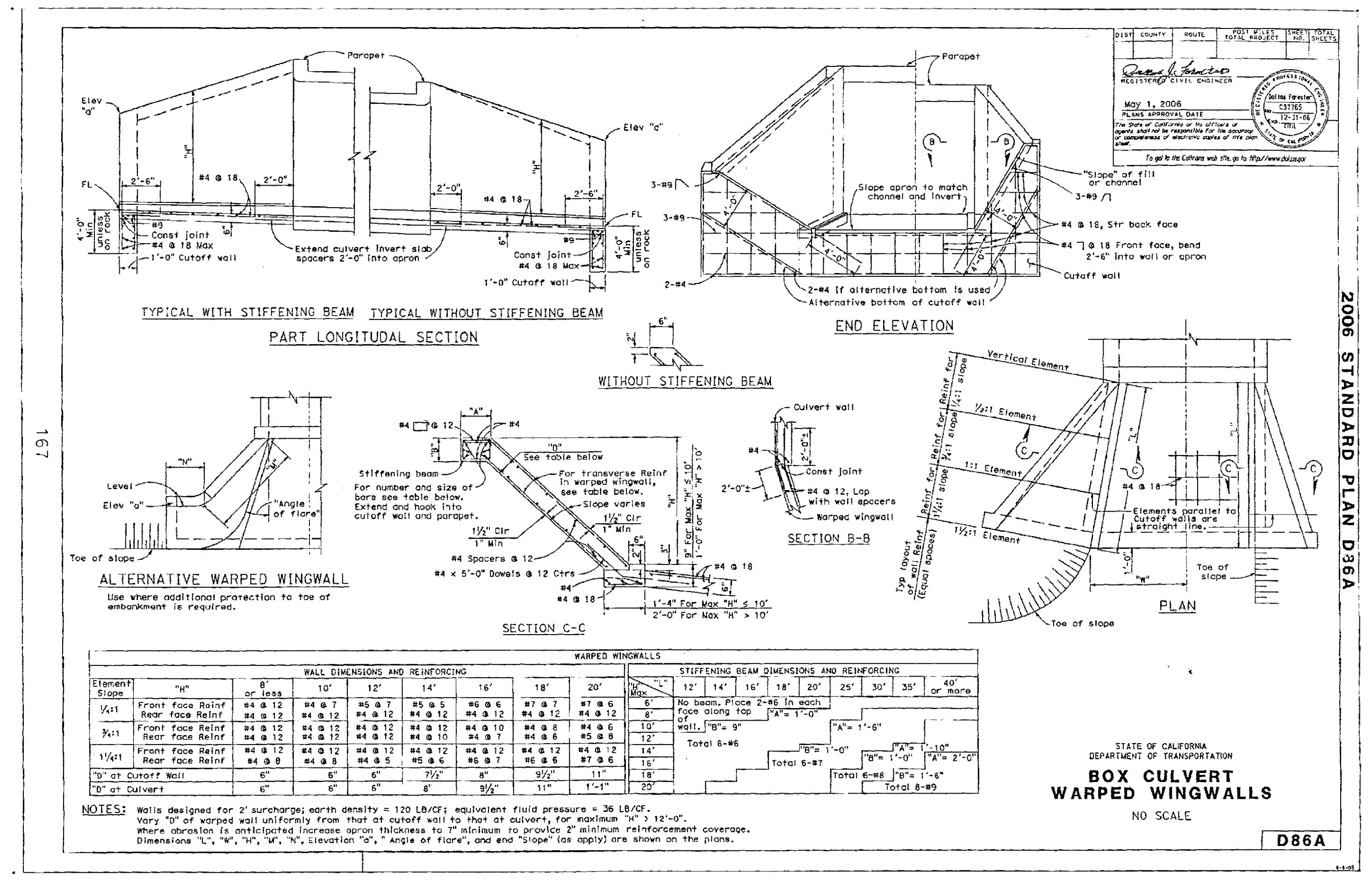
(106) *RIP-RAP DETAILS*

N.T.S.
GRADATION SHALL COMPLY WITH GREENBOOK TABLE 200-1.6(A) AND OCPW STD. PLAN 1809



TYPICAL 4-CELL R.C. BOX SECTION

NO SCALE


Parapet
Elev "a"
FL
2'-6"
#4 @ 18
2'-0"
4'-0" Min unless on rock
#9
Const joint
#4 @ 18 Max
1'-0" Cutoff wall
Extend culvert invert slab spacers 2'-0" into apron
6"
2'-0"
#4 @ 18
2'-6"
Elev "a"
FL
#9
Const joint
#4 @ 18 Max
1'-0" Cutoff wall
4'-0" Min unless on rock
"H"
TYPICAL WITH STIFFENING BEAM
TYPICAL WITHOUT STIFFENING BEAM
PART LONGITUDAL SECTION
Parapet
3-#9
3-#9
2-#4
4'-0"
Slope apron to match channel and invert
"Slope" of fill or channel
3-#9
#4 @ 18, Str back face
#4 @ 18 Front face, bend 2'-6" into wall or apron
Cutoff wall
2-#4 If alternative bottom is used
Alternative bottom of cutoff wall
END ELEVATION
6"
WITHOUT STIFFENING BEAM
Level
Elev "a"
"N"
"M"
"Angle of flare"
Toe of slope
ALTERNATIVE WARPED WINGWALL
Use where additional protection to toe of embankment is required.
#4 @ 12
"A"
#4
"B"
"D" See table below
Stiffening beam
For number and size of bars see table below. Extend and hook into cutoff wall and parapet.
For transverse Reinf in warped wingwall, see table below.
Slope varies
1½" Clr 1" Min
1½" Clr 1" Min
#4 Spacers @ 12
#4 x 5'-0" Dowels @ 12 Ctrs
#4
#4 @ 18
#4 @ 18
9" For Max "H" ≤ 10'
1'-0" For Max "H" > 10'
1'-4" For Max "H" ≤ 10'
2'-0" For Max "H" > 10'
SECTION C-C
Culvert wall
#4
2'-0"±
Const joint
#4 @ 12, Lap with wall spacers
Warped wingwall
2'-0"±
SECTION B-B
Vertical Element
½:1 Element
1:1 Element
1½:1 Element
Typ layout of wall Reinf (Equal spaces)
Reinf for ¼:1 slope
Reinf for ¾:1 slope
Reinf for 1¼:1 slope
#4 @ 18
Elements parallel to Cutoff walls are straight line.
"L"
"W"
1'-0"
Toe of slope
Toe of slope
PLAN
167
2006 STANDARD PLAN D86A
DIST COUNTY ROUTE POST MILES TOTAL PROJECT SHEET NO. TOTAL SHEETS
REGISTERED CIVIL ENGINEER
May 1, 2006
PLANS APPROVAL DATE
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.
To get to the Caltrans web site, go to: http://www.dot.ca.gov
Dallas Forester C31765 12-31-06
STIFFENING BEAM DIMENSIONS AND REINFORCING
"H" Max
"L"
12'
14'
16'
18'
20'
25'
30'
35'
40' or more
6'
8'
10'
12'
14'
16'
18'
20'
No beam. Place 2-#6 in each face along top of wall.
"A"= 1'-0"
"B"= 9"
Total 6-#6
"A"= 1'-6"
"B"= 1'-0"
Total 6-#7
"A"= 1'-10"
"B"= 1'-0"
"A"= 2'-0"
Total 6-#8
"B"= 1'-6"
Total 8-#9
D86A

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING

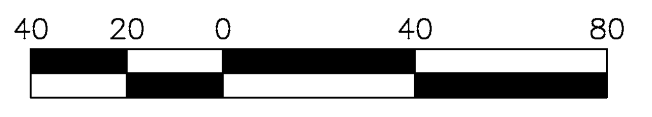
Element Slope	"H"	8' or less	10'	12'	14'	16'	18'	20'
¼:1	Front face Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#7 @ 7	#7 @ 6
	Rear face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
¾:1	Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6
	Rear face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 7	#4 @ 6	#5 @ 8
1¼:1	Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
	Rear face Reinf	#4 @ 8	#4 @ 8	#4 @ 5	#5 @ 6	#6 @ 7	#6 @ 6	#7 @ 6
"D" at Cutoff Wall		6"	6"	6"	7½"	8"	9½"	11"
"D" at Culvert		6"	6"	6"	8"	9½"	11"	1'-1"

NOTES: Walls designed for 2' surcharge; earth density = 120 LB/CF; equivalent fluid pressure = 36 LB/CF.
Vary "D" of warped wall uniformly from that at cutoff wall to that at culvert, for maximum "H" > 12'-0".
Where abrasion is anticipated increase apron thickness to 7" minimum to provide 2" minimum reinforcement coverage.
Dimensions "L", "W", "H", "M", "N", Elevation "a", "Angle of flare", and end "Slope" (as apply) are shown on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
BOX CULVERT
WARPED WINGWALLS
NO SCALE

(102) *R.C.B. WINGWALL*

NOT TO SCALE



GRAPHIC SCALE 1"=40'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

DWG. NO. A06-701-6

PATRICK PAUL LAMADRID PAGADUAN
NO. 56820
Exp. 6/30/09
CIVIL

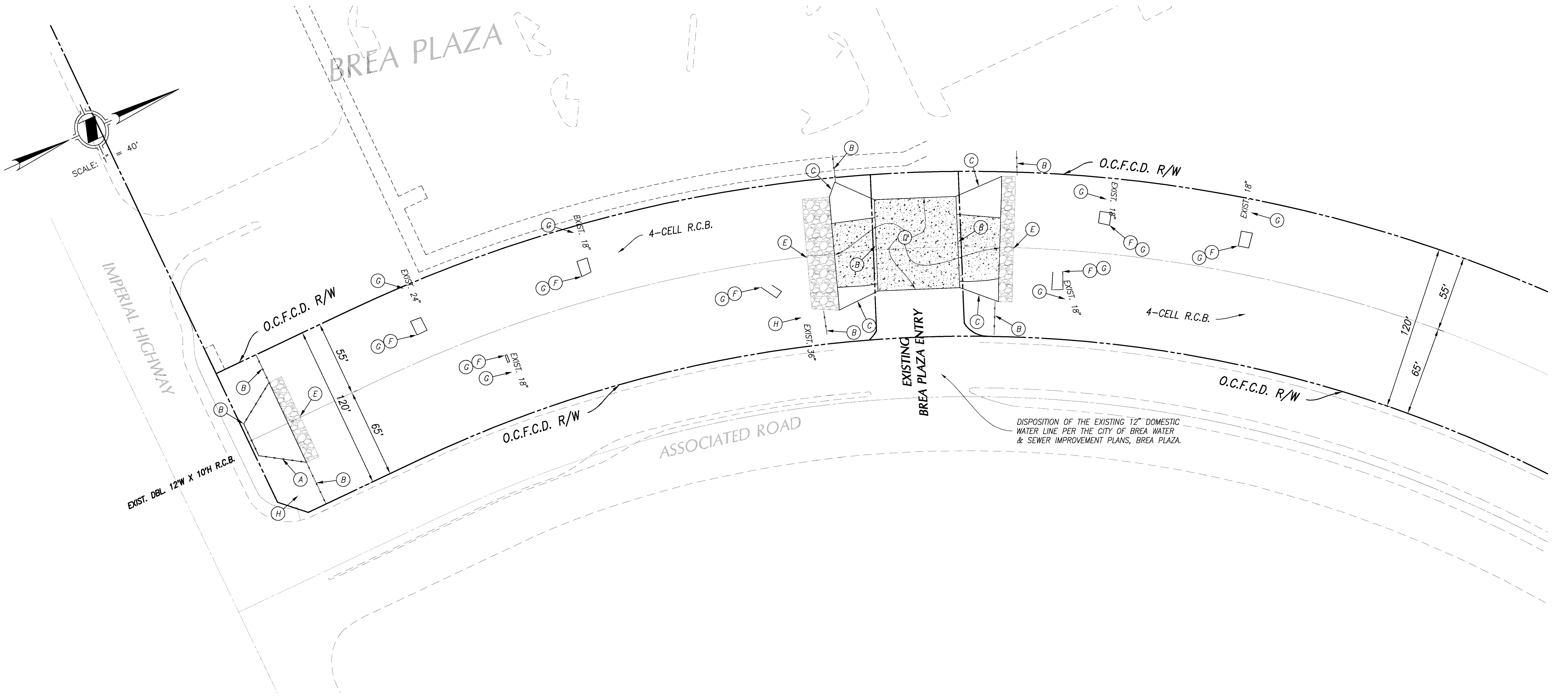
SHEET 4 OF 10
MISCELLANEOUS DETAILS

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

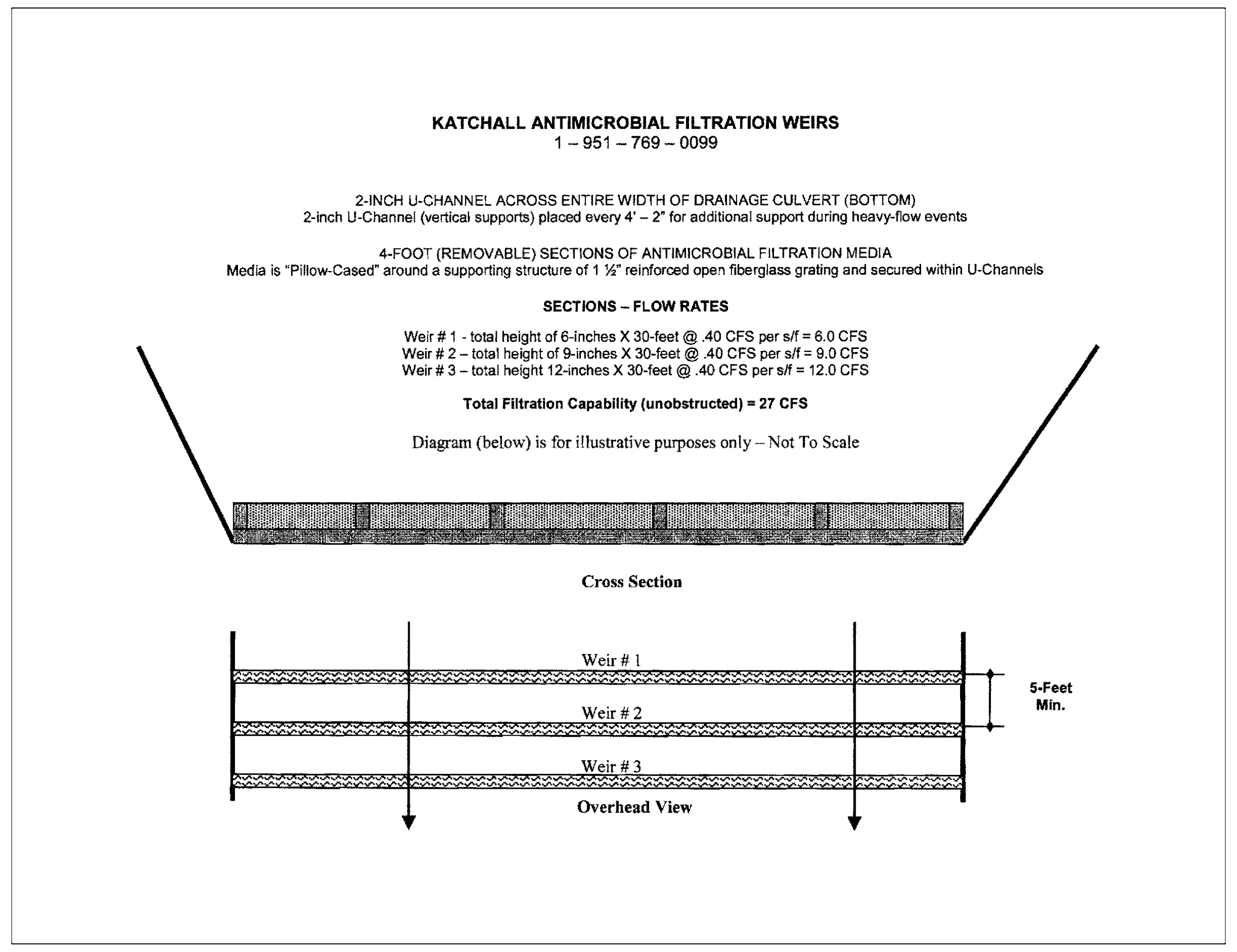
MAP DATE IDENTIFIER 09/30/08 BY:P.P. 01/23/09
DATE OF LATEST CHANGE TO THIS MAP
DATE OF THIS PLOT

WO: 3210-2 BIN: XXXX RM: XXX DOC: XXXXX
STORM DRAIN IMPROVEMENTS FOR LOFTUS DIVERSION CHANNEL – CITY OF BREA

F:\0381\Engineering\SY_Channel\SHT04.dwg



DISPOSITION OF THE EXISTING 12" DOMESTIC WATER LINE PER THE CITY OF BREA WATER & SEWER IMPROVEMENT PLANS, BREA PLAZA.



KATCHALL ANTIMICROBIAL FILTRATION WEIRS
1 – 951 – 769 – 0099

2-INCH U-CHANNEL ACROSS ENTIRE WIDTH OF DRAINAGE CULVERT (BOTTOM)
2-inch U-Channel (vertical supports) placed every 4' – 2" for additional support during heavy-flow events

4-FOOT (REMOVABLE) SECTIONS OF ANTIMICROBIAL FILTRATION MEDIA
Media is "Pillow-Cased" around a supporting structure of 1 ½" reinforced open fiberglass grating and secured within U-Channels

SECTIONS – FLOW RATES

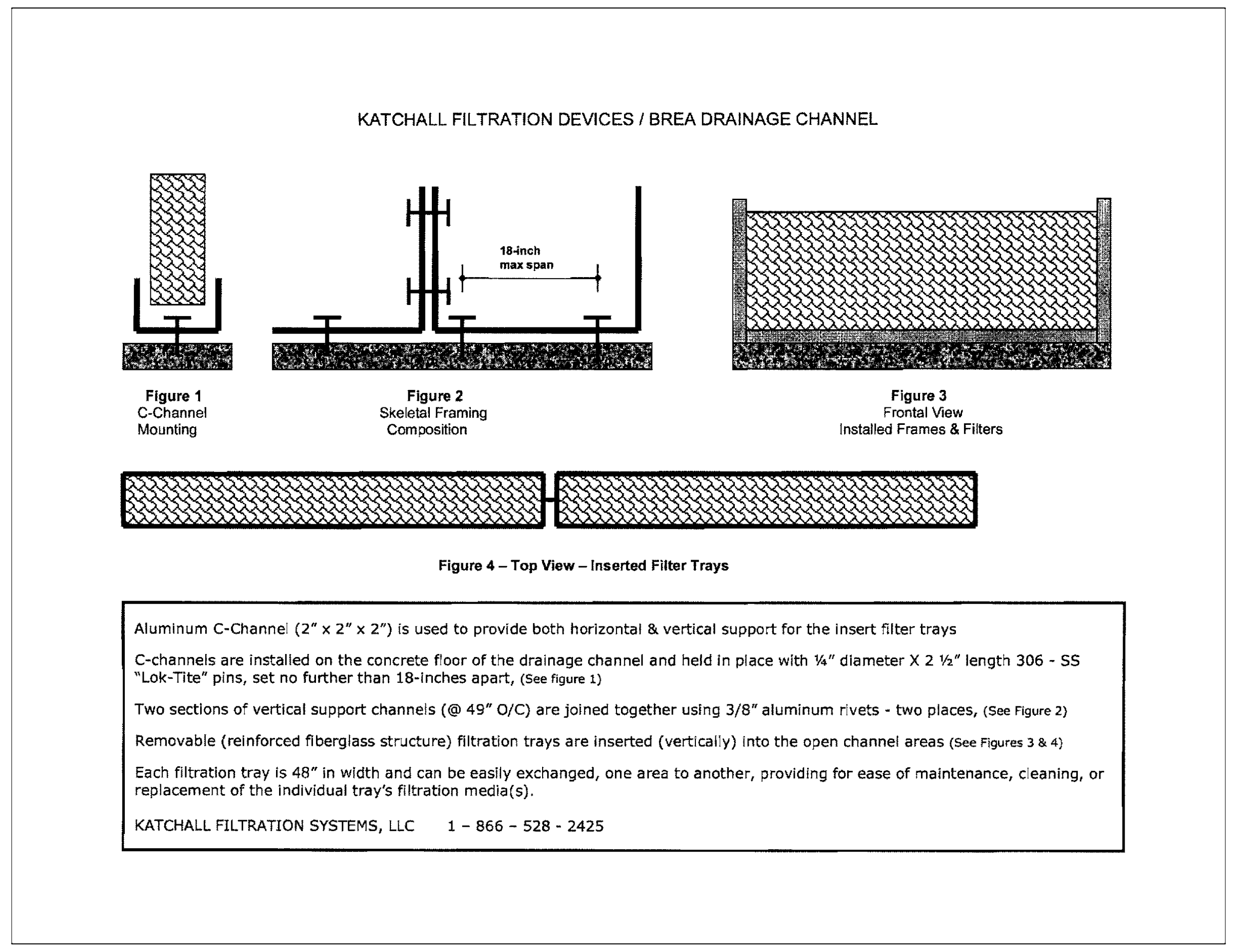
Weir # 1 - total height of 6-inches X 30-feet @ .40 CFS per s/f = 6.0 CFS
Weir # 2 – total height of 9-inches X 30-feet @ .40 CFS per s/f = 9.0 CFS
Weir # 3 – total height 12-inches X 30-feet @ .40 CFS per s/f = 12.0 CFS

Total Filtration Capability (unobstructed) = 27 CFS

Diagram (below) is for illustrative purposes only – Not To Scale

Cross Section

Overhead View



KATCHALL FILTRATION DEVICES / BREA DRAINAGE CHANNEL

18-inch max span

Figure 1
C-Channel
Mounting

Figure 2
Skeletal Framing
Composition

Figure 3
Frontal View
Installed Frames & Filters

Figure 4 – Top View – Inserted Filter Trays

Aluminum C-Channel (2" x 2" x 2") is used to provide both horizontal & vertical support for the insert filter trays

C-channels are installed on the concrete floor of the drainage channel and held in place with ¼" diameter X 2 ½" length 306 - SS "Lok-Tite" pins, set no further than 18-inches apart, (See figure 1)

Two sections of vertical support channels (@ 49" O/C) are joined together using 3/8" aluminum rivets - two places, (See Figure 2)

Removable (reinforced fiberglass structure) filtration trays are inserted (vertically) into the open channel areas (See Figures 3 & 4)

Each filtration tray is 48" in width and can be easily exchanged, one area to another, providing for ease of maintenance, cleaning, or replacement of the individual tray's filtration media(s).

KATCHALL FILTRATION SYSTEMS, LLC 1 – 866 – 528 - 2425

(109) KATCHALL FILTER WEIR DETAILS

CONTACT MANUFACTURER FOR ADDT'L. INFO
NOT TO SCALE
(TO BE INSTALLED & MAINTAINED BY DEVELOPER PER PERMIT #2008-01230)

DEMOLITION NOTES

Ⓐ	REMOVE EXIST. HEADWALL
Ⓑ	REMOVE EXIST. GATE/FENCE
Ⓒ	REMOVE EXIST. TRANSITION WALL
Ⓓ	REMOVE EXIST. BOX CULVERT/ROADWAY
Ⓔ	REMOVE EXIST. RIP-RAP, TO BE CLEANED AND SALVAGED PER INSPECTOR'S RECOMMENDATION, SEE GENERAL NOTE 37
Ⓕ	REMOVE EXIST. INLET STRUCTURE
Ⓖ	REMOVE INTERFERING PORTIONS OF EXIST. PIPE ABANDON/PLUG TO THE SATISFACTION OF THE INSPECTOR
Ⓗ	PROTECT EXIST. PIPE

NOTE:

EXCAVATION AND REMEDIAL GRADING SHALL BE PER THE RECOMMENDATION OF THE GEOTECHNICAL ENGINEER, AND AS SPECIFIED IN THE REPORT ENTITLED "PRELIMINARY GEOTECHNICAL INVESTIGATION" BY PACIFIC SOILS ENGINEERING, INC., DATED FEBRUARY 18, 2008. EXCAVATION DEPTH MAY CHANGE DURING CONSTRUCTION AS DETERMINED BY THE GEOTECHNICAL ENGINEER.

40 20 0 40 80
GRAPHIC SCALE 1"=40'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

DWG. NO. A06-701-6

PATRICK PAUL LAMADRID PAGADUAN
NO. 56820
Exp. 6/30/09

SHEET 5 OF 10
DEMOLITION PLAN
LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

WO: 3210-2 BIN: XXXX RM: XXX DOC: XXXXX
STORM DRAIN IMPROVEMENTS FOR LOFTUS DIVERSION CHANNEL - CITY OF BREA

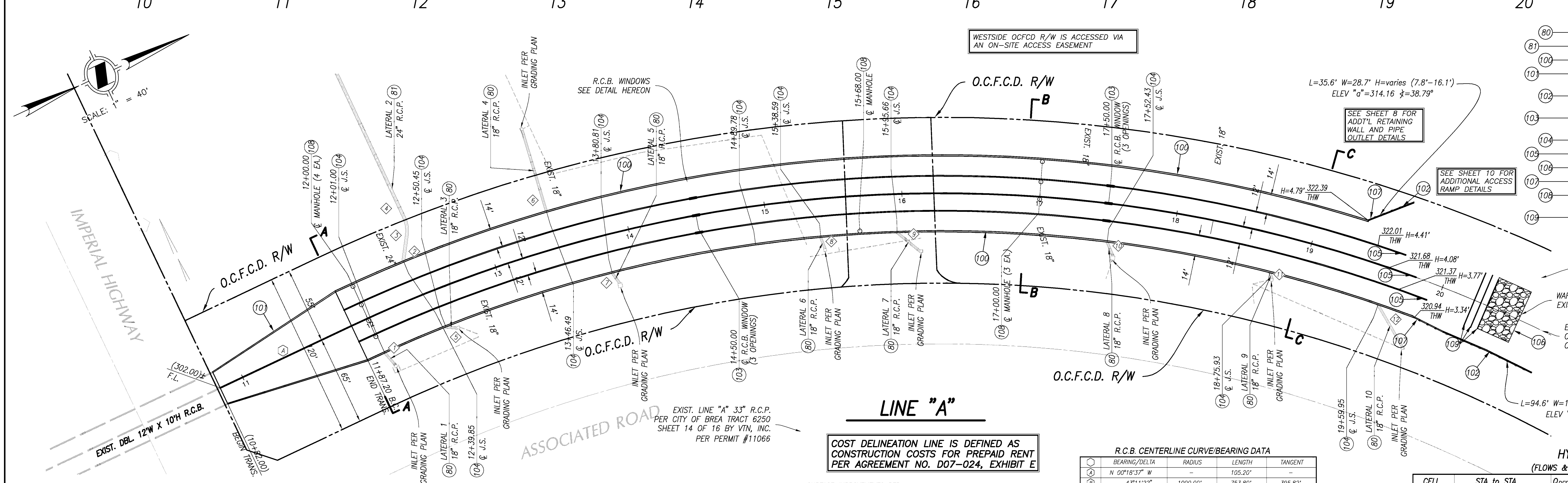
MAP DATE IDENTIFIER 09/30/08 BY:P.P. 01/22/09
DATE OF LATEST CHANGE TO THIS MAP DATE OF THIS PLOT

✳ CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION PRIOR TO START OF ANY CONSTRUCTION.

LINES 1–9 ARE OPERATED BY THE PERMITTEE PER SPECIAL PROVISIONS OF PERMIT #2008–00284

330
310
290
PROPOSED FINISHED SURFACE (CONSTRUCT PER SEPARATE PLAN)
IMPERIAL HIGHWAY
PROJECT H.G.L. Q=3,430 CFS
100-YR FEMA Q=1,900 CFS
JOIN EXIST.
EXIST. DBL. 12'W X 10'H R.C.B.
ULTIMATE H.G.L. Q=4,235 CFS
G.L. TRANSITION
JOIN EXIST. (302.00) F.L.
(297.19 INV.) 12" SEWER
PROTECT IN PLACE
303.82 F.L.
304.69 G.L.
11+87.20 ~ B.C. 303.82 F.L.
12+00.00 ℄ MANHOLE
12+01.00 ℄ J.S. TYPE V
12+39.85 ℄ J.S. TYPE V
12+50.45 ℄ J.S. TYPE V
LATERAL 1 RT. 18" R.C.P. 307.00 INV.
LATERAL 2 LT. 24" R.C.P. 307.00 INV.
LATERAL 3 RT. 18" R.C.P. 307.00 INV.
13+46.49 ℄ J.S. TYPE V
13+80.81 ℄ J.S. TYPE V
LATERAL 4 LT. 18" R.C.P. 308.00 INV.
LATERAL 5 RT. 18" R.C.P. 308.00 INV.
305.28 G.L.
304.40 F.L.
14+50.00 ℄ R.C.B. WINDOW
14+89.78 ℄ J.S. TYPE V
EXIST. LINE "A" 33" INLET (306.57)
15+38.59 ℄ J.S. TYPE V
LATERAL 6 RT. 18" R.C.P. 308.00 INV.
BREA PLAZA ENTRY
17+00.00 ℄ MANHOLE
15+95.66 ℄ J.S. TYPE V
S=0.0022
G.L.
F.L.
EXIST. CHANNEL F.S. @ CENTERLINE
EXIST. 12" WATER TO BE ABAN.
LATERAL 7 RT. 18" R.C.P. 308.00 INV.
COST DELINEATION LINE
LATERAL 8 RT. 18" R.C.P. 308.00 INV.
17+52.43 ℄ J.S. TYPE V
305.06 F.L.
305.93 G.L.
17+50.00 ℄ R.C.B. WINDOW
18+75.93 ℄ J.S. TYPE V
LATERAL 9 RT. 18" R.C.P. 308.00 INV.
6' H WROUGHT IRON FENCE PER DETAILS ON SHT. 8
322.4 T.W.
19+59.95 ℄ J.S. TYPE V
316.39 SOF.
LATERAL 10 RT. 18" R.C.P. 309.48 INV.
306.39 G.L.
(305.5) F.L.
PIER WALL TYP. (3)
ULTIMATE H.G.L. Q=4,235 CFS
PROJECT H.G.L. Q=3,430 CFS
100-YR FEMA Q=1,900 CFS
KATCHALL FILTER WEIRS (3)
(306.0)± F.S.
6' CUTOFF
5' DEEP CUTOFF WALL
Qult = 4,235 c.f.s. VMAX = 5.9 f.p.s.
Qproj = 3,430 c.f.s. VMAX = 9.1 f.p.s.
Qult = 4,235 c.f.s. VMAX = 18.9 f.p.s.
Qproj = 3,430 c.f.s. VMAX = 15.2 f.p.s.
Qult = 4,235 c.f.s. VMAX = 13.8 f.p.s.
Qproj = 3,430 c.f.s. VMAX = 6.6 f.p.s.
(10+82.00±) JOIN EXIST. BEGIN TRANS. STRUCTURE
END TRANS. STRUCTURE 11+87.20 BEGIN R.C.B.
19+60.00 END R.C.B.
20+25.00 ℄ 12"H KATCHALL FILTER WEIR
20+30.00 9"H KATCHALL FILTER WEIR
20+35.00 6"H KATCHALL FILTER WEIR
20+35.00 BEGIN RIP-RAP
20+60.00 END RIP-RAP
LINE "A"
105.20' TRANSITION STRUCTURE
CONST. 772.80 L.F. 4-CELL REINFORCED CONCRETE BOX STRUCTURE
10
11
12
13
14
15
16
17
18
19
20

PROFILE SCALES	
HORIZ.:	1"= 40'
VERT.:	1"= 8'

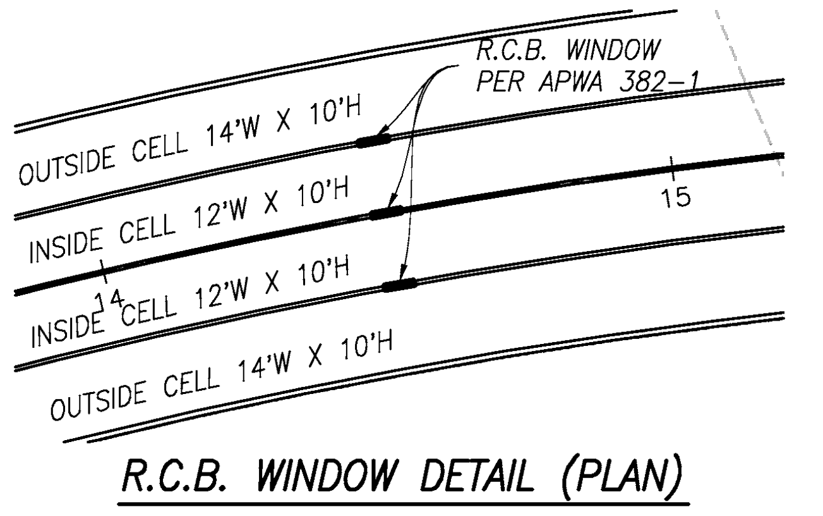


LINE "A"

COST DELINEATION LINE IS DEFINED AS CONSTRUCTION COSTS FOR PREPAID RENT PER AGREEMENT NO. D07–024, EXHIBIT E

CONSTRUCTION NOTES

- (80) INST. 18" R.C.P. (D–LOAD PER PROFILE)
- (81) INST. 24" R.C.P. (D–LOAD PER PROFILE)
- (100) INST. 4–CELL R.C. BOX PER DETAIL ON SHEET NO. 2
- (101) CONST. TRANSITION STRUCTURE PER A.P.W.A. STD. PLAN 343–1 ON SHEET 4 MODIFIED PER DETAIL SHEET NO. 3
- (102) CONST. BOX CULVERT WARPED WINGWALL PER CALTRANS STD. PLAN D86A SHEET 4 H VARIES PER PLAN, MODIFY CUTOFF WALL TO 5'
- (103) CONST. WINDOW DETAIL FOR MULTIPLE RCB STRUCTURES PER A.P.W.A. STD. PLAN 382–1 SHEET 4
- (104) CONST. JUNCTION STRUCTURE TYPE V PER OCPW STD. PLAN 1314
- (105) CONST. CULVERT DEBRIS NOSE PER DETAIL ON SHEET NO. 3
- (106) CONST. RIP–RAP PER DETAIL ON SHEET NO. 4
- (107) INSTALL 6' H CHAIN LINK FENCE PER APWA STD. PLAN 600–1–OC
- (108) CONST. REINFORCED CONCRETE BOX MANHOLE PER OCPW STD .PLAN 1506 BRING TO FINISH GRADE TO THE SATISFACTION OF COUNTY INSPECTOR
- (109) INSTALL KATCHALL CHANNEL FILTER WEIRS PER DETAILS ON SHEET NO. 5 **(PER PERMIT #2008–01230)**



R.C.B. WINDOW DETAIL (PLAN)

ADDITIONAL NOTES AND DETAILS ON SHEET 4
NOT TO SCALE

R.C.B. CENTERLINE CURVE/BEARING DATA

⬡	BEARING/DELTA	RADIUS	LENGTH	TANGENT
A	N 00°18'37" W	–	105.20'	–
B	43°11'22"	1000.00'	753.80'	395.82'

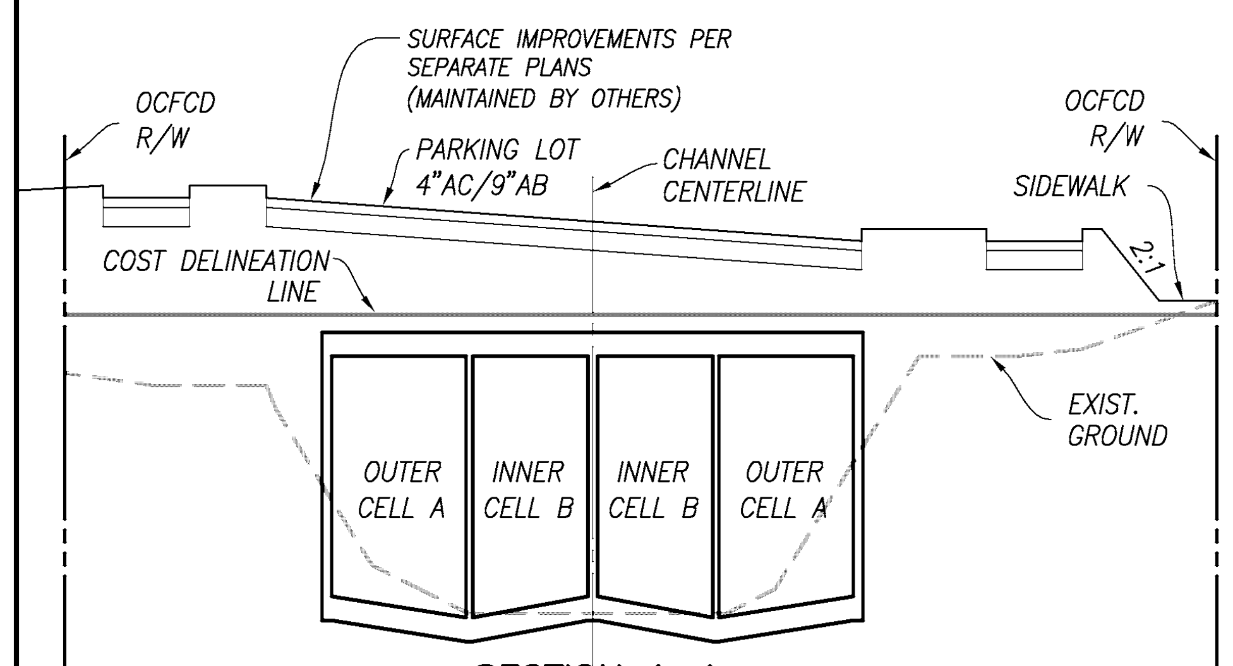
LATERAL CURVE DATA

◇	BEARING/DELTA	RADIUS	LENGTH	TANGENT
1	N 73°26'54" E	–	11.37'	–
2	S 57°17'38" E	–	13.55'	–
3	32°41'26"	22.50'	12.84'	6.60'
4	N 89°59'04" W	–	145.63'	–
5	N 30°22'11" E	–	8.09'	–
6	N 81°36'58" W	–	60.77'	–
7	N 78°31'30" E	–	9.19'	–
8	S 85°38'48" E	–	8.58'	–
9	S 64°12'44" W	–	21.29'	–
10	N 87°59'10" W	–	10.80'	–
11	S 84°20'55" E	–	4.42'	–
12	N 84°53'48" E	–	35.02'	–

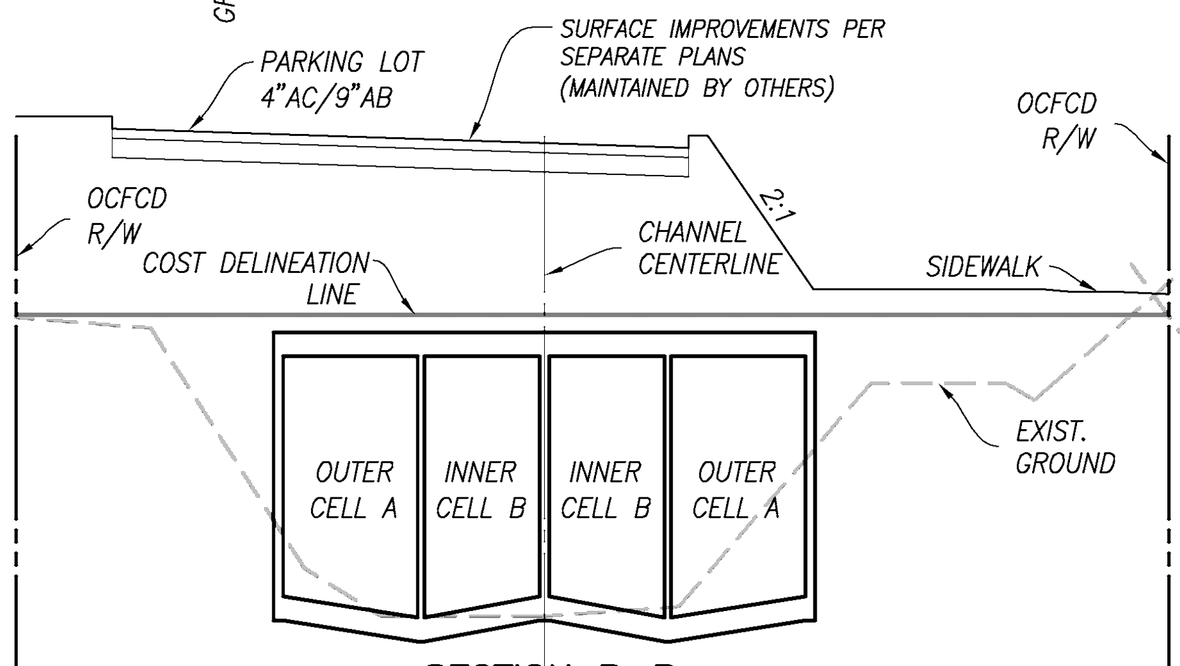
HYDRAULIC DATA TABLE

(FLOWS & NORMAL DEPTH ASSUMED SYMMETRIC)

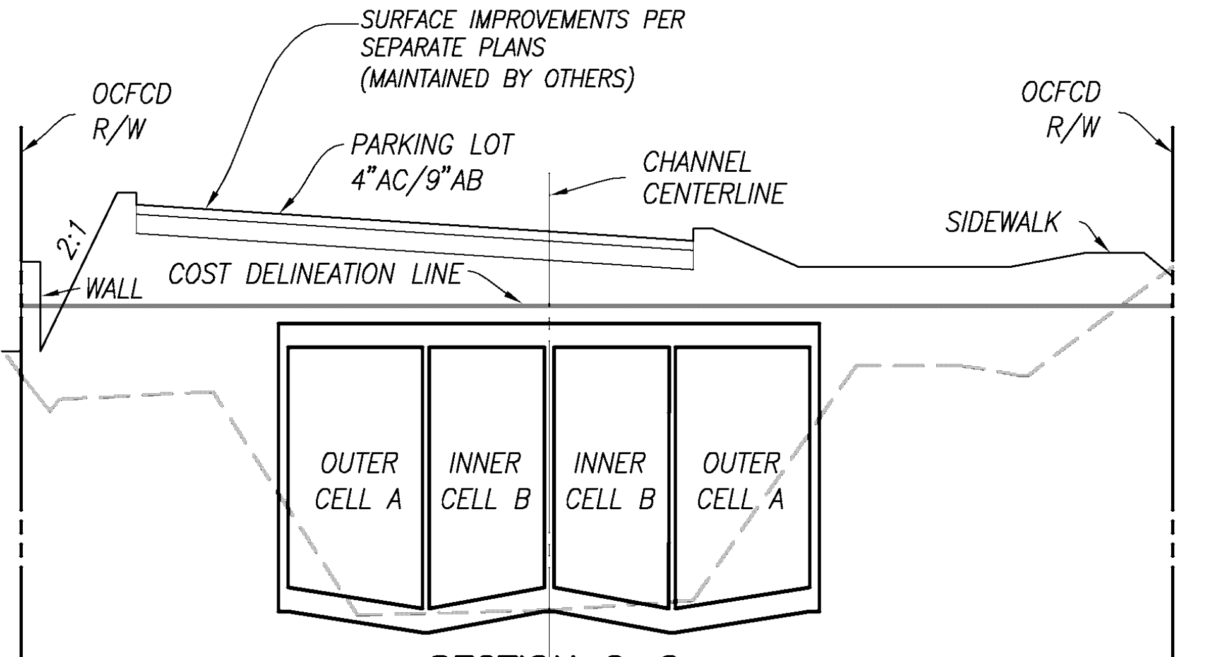
	CELL	STA to STA	Q_{DESIGN}	WIDTH	So	n	Dc	Fr	Sc	Dn	Vn
FEMA DISCHARGE	OUTER	10+82.00 19+60.00	520	14'	0.0022	0.014	3.50	0.82	0.0032	4.00	9.28
	INNER	10+82.00 19+60.00	430	12'	0.0022	0.014	3.42	0.79	0.0034	4.01	8.93
PROJECT DISCHARGE	OUTER	10+82.00 19+60.00	945	14'	0.0022	0.014	5.21	0.78	0.0034	6.15	10.98
	INNER	10+82.00 19+60.00	770	12'	0.0022	0.014	5.04	0.74	0.0037	6.15	10.44
ULTIMATE DISCHARGE	OUTER	10+82.00 19+60.00	1168.5	14'	0.0022	0.014	6.00	0.76	0.0036	7.20	11.59
	INNER	10+82.00 19+60.00	949	12'	0.0022	0.014	5.79	0.72	0.0039	7.21	10.98



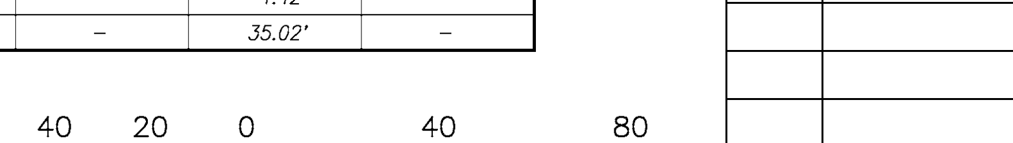
SECTION A–A (STA. 11+87.20)
LOOKING UPSTREAM
NOT TO SCALE



SECTION B–B (STA. 16+90.00)
LOOKING UPSTREAM
NOT TO SCALE



SECTION C–C (STA. 19+00.00)
LOOKING UPSTREAM
NOT TO SCALE



GRAPHIC SCALE 1"=40'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

DWG. NO. A06–701–6

NO. 56820
Exp. 6/30/09
PATRICK PAUL LAMADRID PAGADUAN
CIVIL

SHEET 6 OF 10
STA. 10+82 TO STA. 19+80

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

MAP DATE IDENTIFIER 10/17/08 DATE OF LATEST CHANGE TO THIS MAP
BY:P.P.
01/23/09 DATE OF THIS PLOT

WO: 3210–2 BIN: XXXX RM: XXX DOC: XXXXX
STORM DRAIN IMPROVEMENTS FOR LOFTUS DIVERSION CHANNEL – CITY OF BREA

PROFILE SCALES
HORIZ.: 1"= 40'
VERT.: 1"= 8'

* CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION PRIOR TO START OF ANY CONSTRUCTION.

40 20 0 40 80
GRAPHIC SCALE 1"=40'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

PATRICK PAUL LAMADRID PAGADUAN
NO. 56820
Exp. 6/30/09
CIVIL

DWG. NO. A06-701-6

SHEET 7 OF 10
CROSS SECTIONS & LATERALS

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

MAP DATE IDENTIFIER 09/30/08 DATE OF LATEST CHANGE TO THIS MAP BY:P.P. 01/22/09 DATE OF THIS PLOT

WO: 3210-2 BIN: XXXX RM: XXX DOC: XXXXX
STORM DRAIN IMPROVEMENTS FOR LOFTUS DIVERSION CHANNEL – CITY OF BREA

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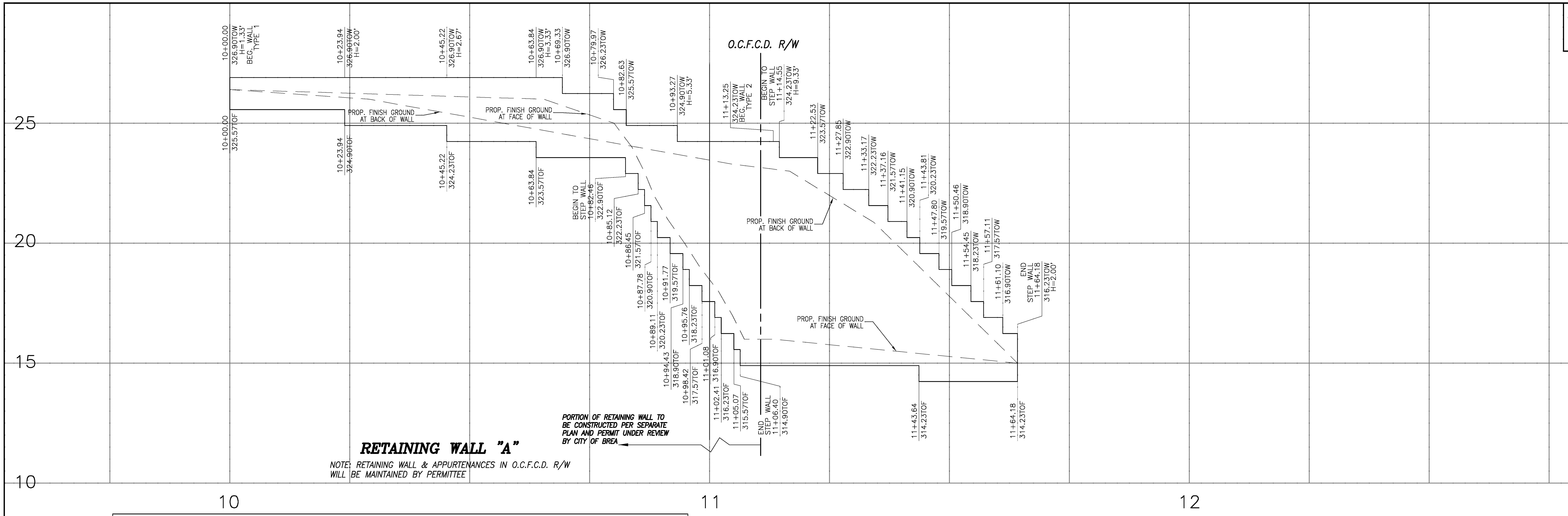
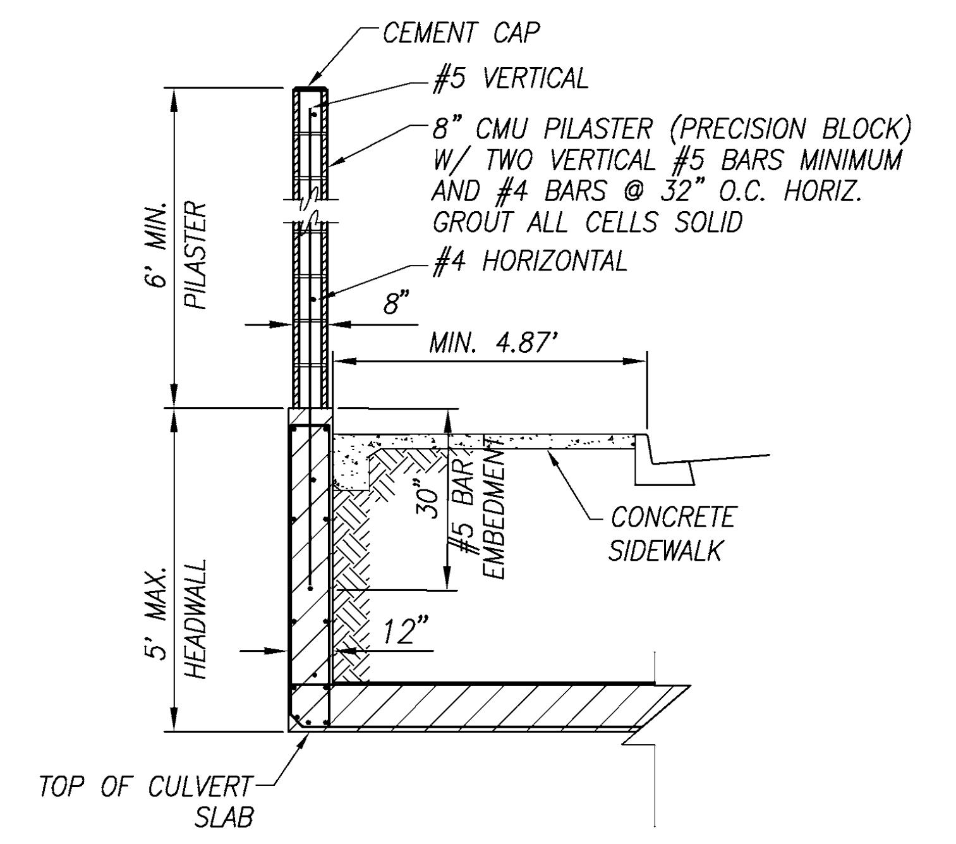
PROFILE SCALES
HORIZ.: 1"= 10'
VERT.: 1"= 2'

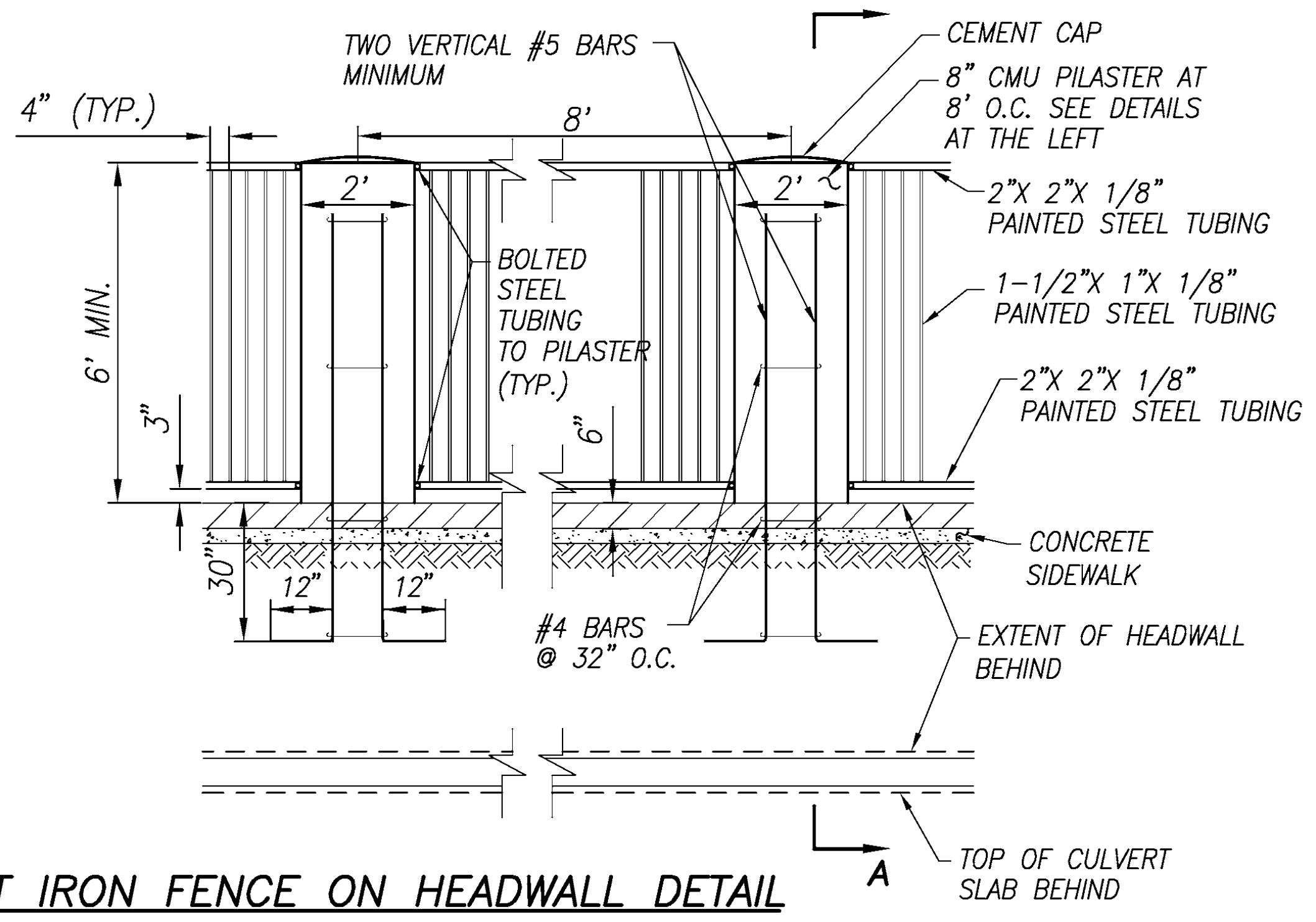


RETAINING WALL "A"

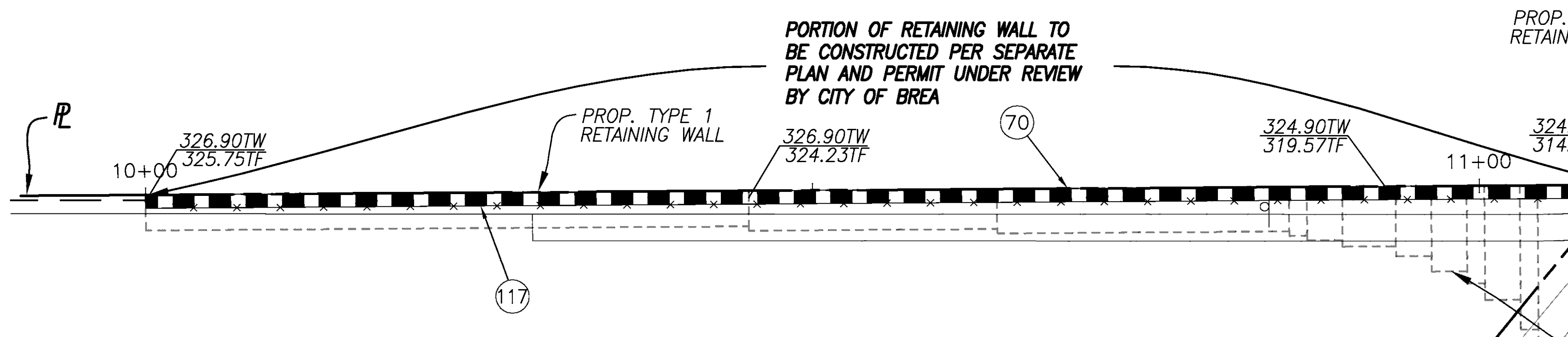
NOTE: RETAINING WALL & APPURTENANCES IN O.C.F.C.D. R/W WILL BE MAINTAINED BY PERMITTEE

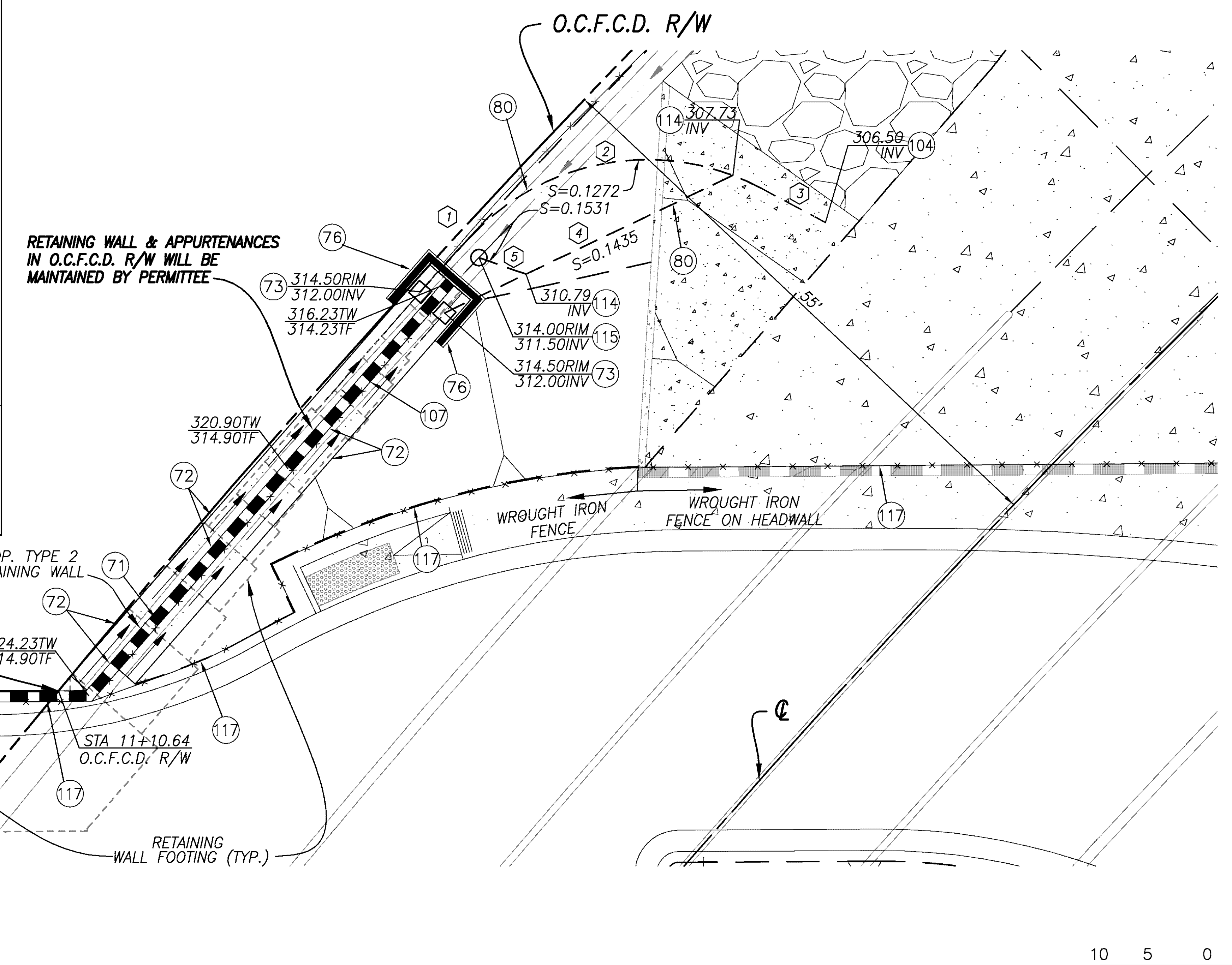


PILASTER ON HEADWALL
SECTION A–A


A
TWO VERTICAL #5 BARS MINIMUM
CEMENT CAP
8" CMU PILASTER AT 8' O.C. SEE DETAILS AT THE LEFT
4" (TYP.)
8'
2'
2'
2"X 2"X 1/8" PAINTED STEEL TUBING
BOLTED STEEL TUBING TO PILASTER (TYP.)
1-1/2"X 1"X 1/8" PAINTED STEEL TUBING
2"X 2"X 1/8" PAINTED STEEL TUBING
6' MIN.
3"
6"
30"
12"
12"
#4 BARS @ 32" O.C.
CONCRETE SIDEWALK
EXTENT OF HEADWALL BEHIND
TOP OF CULVERT SLAB BEHIND
A

(117) WROUGHT IRON FENCE ON HEADWALL DETAIL
N.T.S.


℞
10+00
326.90TW 325.75TF
PROP. TYPE 1 RETAINING WALL
326.90TW 324.23TF
(70)
324.90TW 319.57TF
11+00
324.23TW 314.90TF
(117)
PORTION OF RETAINING WALL TO BE CONSTRUCTED PER SEPARATE PLAN AND PERMIT UNDER REVIEW BY CITY OF BREA



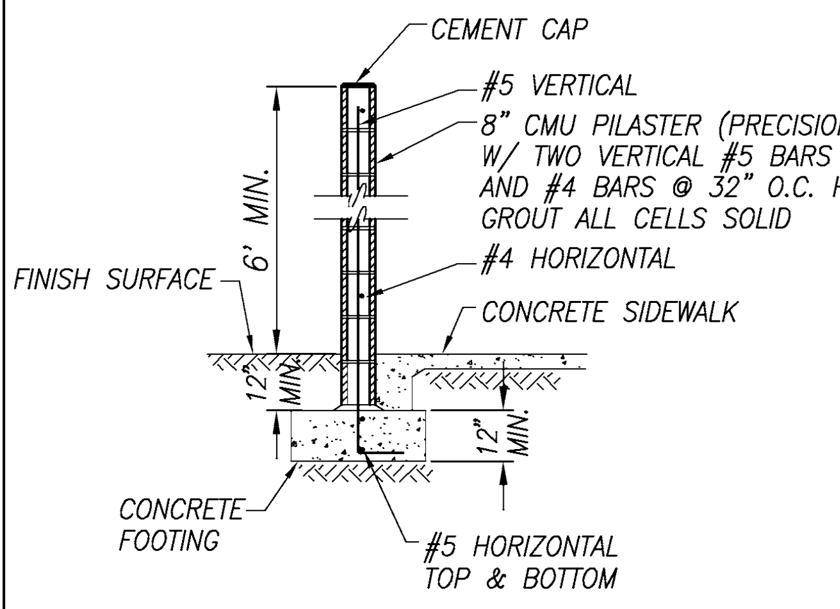
RETAINING WALL NOTES

(70) CONST. RETAINING WALL "A" TYPE 1 PER DETAIL ON SHEET 9
(71) CONST. RETAINING WALL "A" TYPE 2 PER DETAIL ON SHEET 9
(72) CONST. WALL V–DITCH PER DETAIL ON SHEET 10
(73) CONST. WALL DITCH TO PIPE INLET PER DETAIL ON SHEET 10
(76) CONST. SPLASH WALL PER DETAIL ON SHEET 10
(80) INST. 18" R.C.P. (2000 D)
(104) CONST. JUNCTION STRUCTURE TYPE V PER OCPW STD. PLAN 1314
(107) CONST. 6' HIGH CHAIN LINK FENCE PER APWA 600–1–OC
(114) CONST. JUNCTION STRUCTURE PER OCPW STD. PLAN 1313
(115) CONST. PIPE INLET PER DETAIL ON SHT 10
(117) CONST. 6' HIGH WROUGHT IRON FENCE PER DETAIL ON SHEET 8 (MAINTAINED BY PERMITTEE)

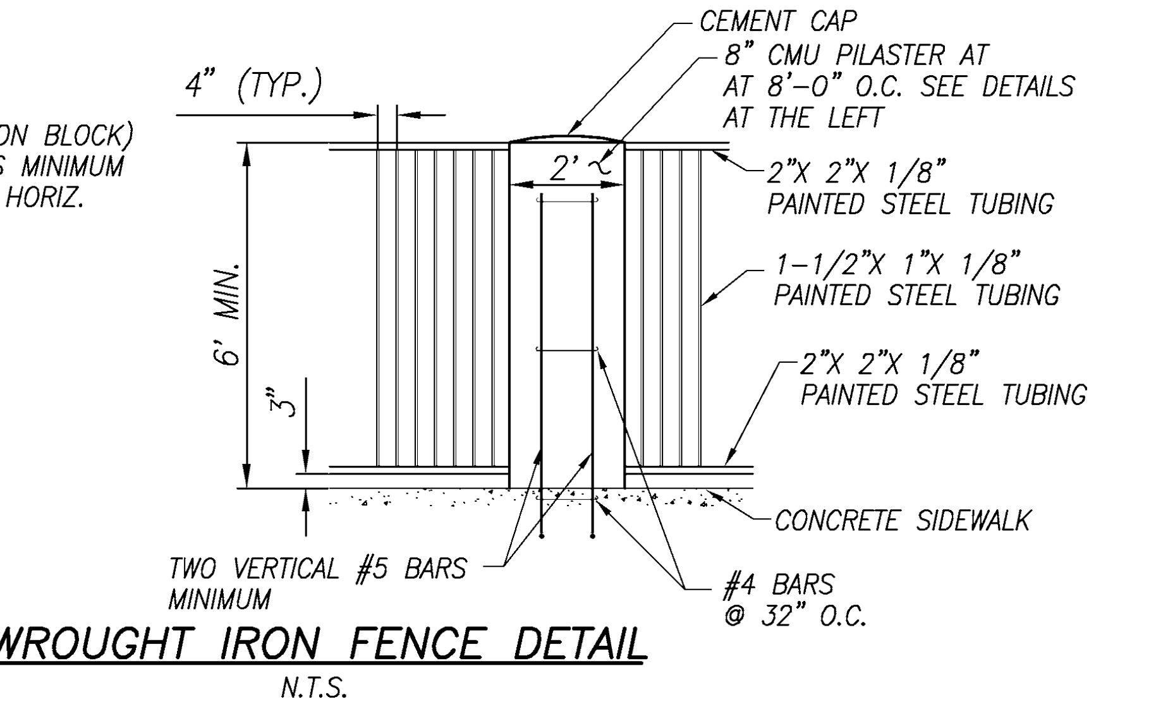
REINFORCED CONCRETE PIPE CURVE DATA

⬡	BEARING/DELTA	RADIUS	LENGTH	TANGENT
1	N 42°17'03" E	–	6.69'	–
2	75°45'25"	22.50'	29.75'	17.50'
3	N 61°57'32" W	–	6.81'	–
4	N 64°28'53" E	–	29.75'	–
5	N 70°31'07" W	–	4.64'	–

RETAINING WALL "A"


CEMENT CAP
#5 VERTICAL
8" CMU PILASTER (PRECISION BLOCK) W/ TWO VERTICAL #5 BARS MINIMUM AND #4 BARS @ 32" O.C. HORIZ. GROUT ALL CELLS SOLID
6' MIN.
#4 HORIZONTAL
FINISH SURFACE
CONCRETE SIDEWALK
12" MIN.
12" MIN.
CONCRETE FOOTING
#5 HORIZONTAL TOP & BOTTOM

PILASTER DETAILS


CEMENT CAP
8" CMU PILASTER AT AT 8'–0" O.C. SEE DETAILS AT THE LEFT
4" (TYP.)
2'
2"X 2"X 1/8" PAINTED STEEL TUBING
1-1/2"X 1"X 1/8" PAINTED STEEL TUBING
2"X 2"X 1/8" PAINTED STEEL TUBING
6' MIN.
3"
CONCRETE SIDEWALK
TWO VERTICAL #5 BARS MINIMUM
#4 BARS @ 32" O.C.

(117) WROUGHT IRON FENCE DETAIL
N.T.S.

10 5 0 10 30
SCALE 1"=10'

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

DWG. NO. A06–701–6

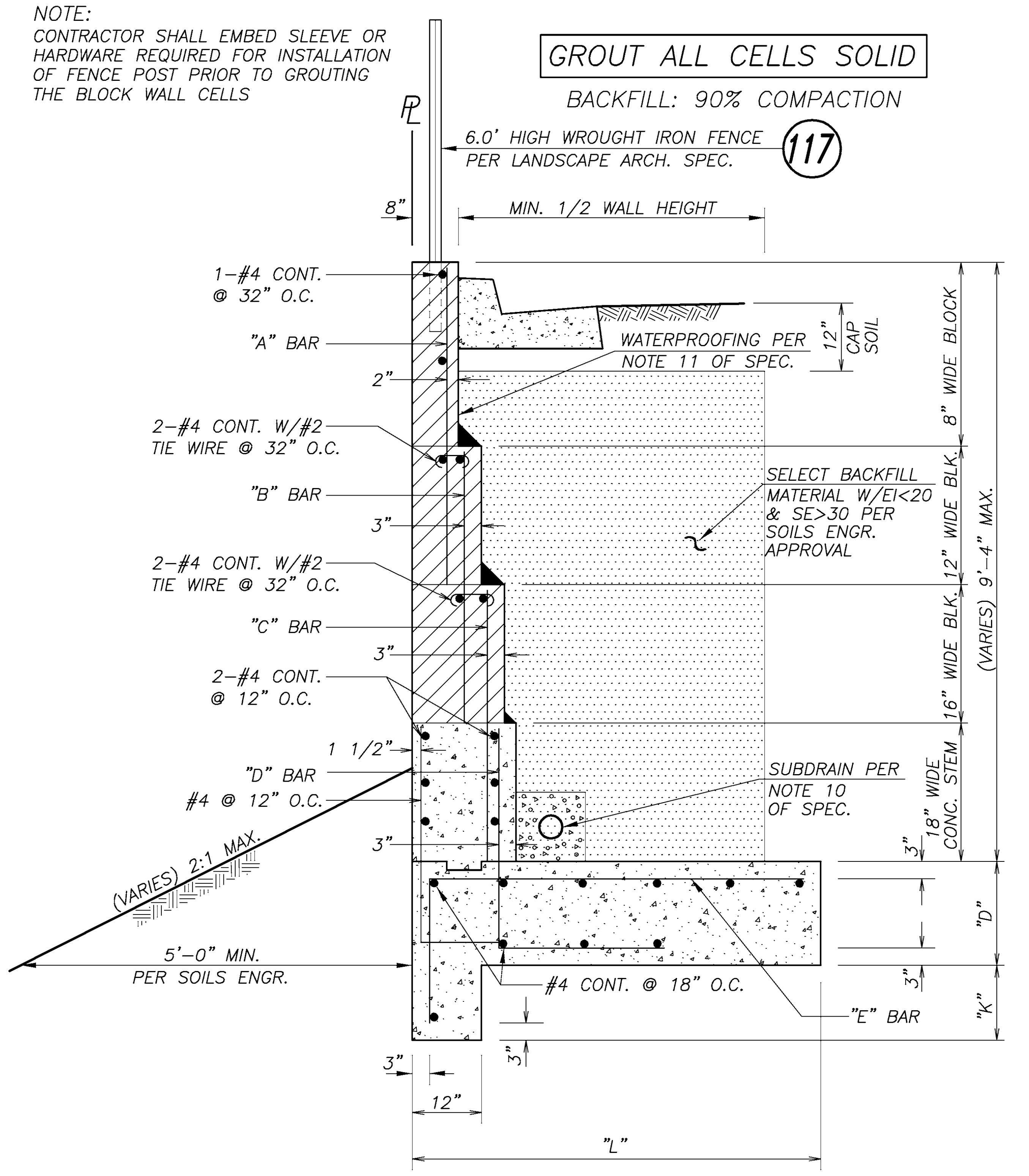
JONATHAN HOBART PETKE
No. 67585
Exp.06/30/09
CIVIL

SHEET 8 OF 10
RETAINING WALL PLAN & PROFILE
LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

MAP DATE IDENTIFIER 09/30/08 DATE OF LATEST CHANGE TO THIS MAP BY:P.P. 01/23/09 DATE OF THIS PLOT

W.O. 3210–4 BIN RM DOC. NO.
PRECISE GRADING/EROSION CONTROL PLAN FOR BREA PLAZA COMMERCIAL DEVELOPMENT

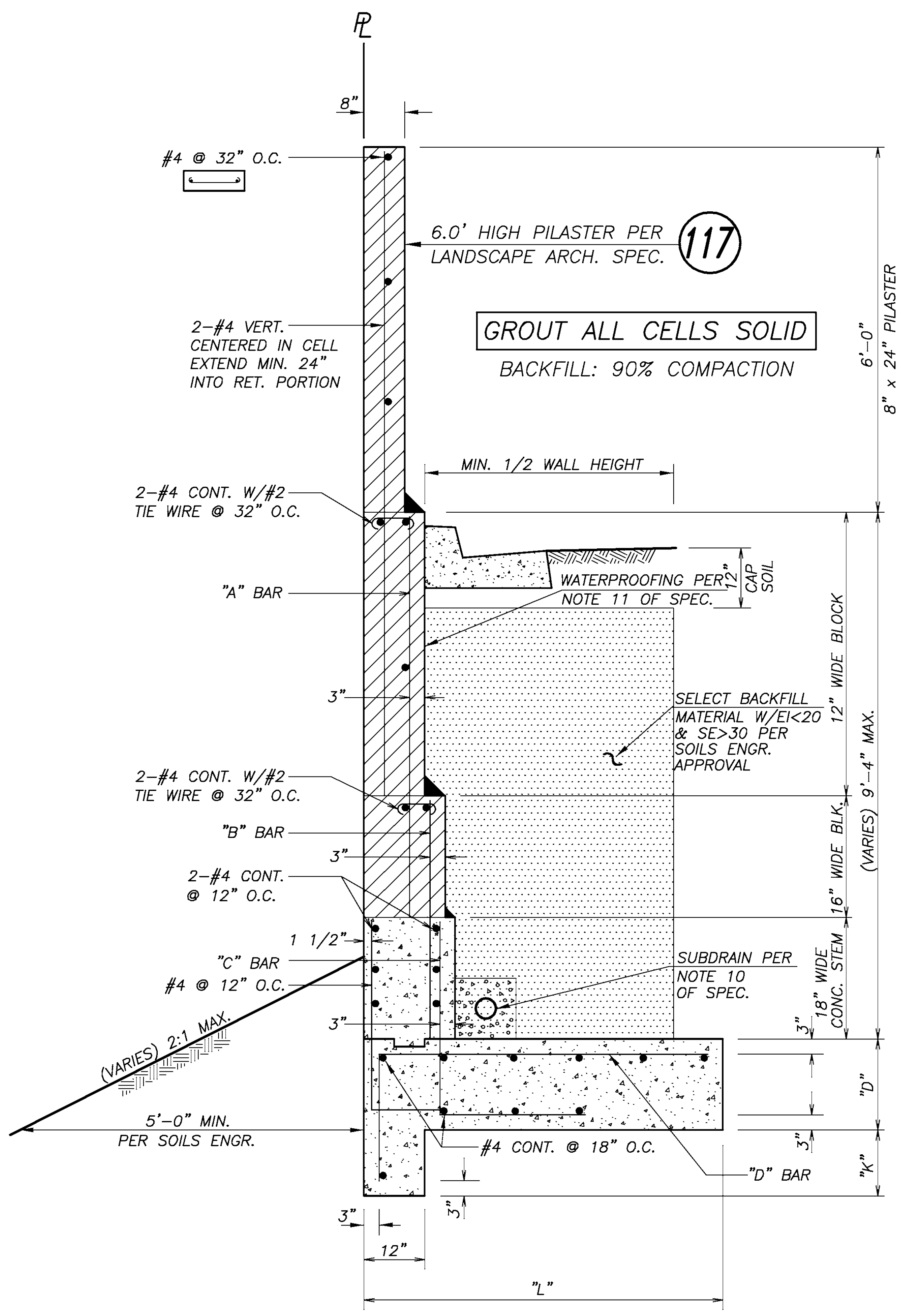
F:\0381\Engineering\SY_Channel\SHT08.dwg


NOTE:
CONTRACTOR SHALL EMBED SLEEVE OR HARDWARE REQUIRED FOR INSTALLATION OF FENCE POST PRIOR TO GROUTING THE BLOCK WALL CELLS
GROUT ALL CELLS SOLID
BACKFILL: 90% COMPACTION
℄
6.0' HIGH WROUGHT IRON FENCE PER LANDSCAPE ARCH. SPEC.
117
8"
MIN. 1/2 WALL HEIGHT
1-#4 CONT. @ 32" O.C.
"A" BAR
2"
WATERPROOFING PER NOTE 11 OF SPEC.
12" CAP SOIL
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"B" BAR
3"
SELECT BACKFILL MATERIAL W/EI<20 & SE>30 PER SOILS ENGR. APPROVAL
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"C" BAR
3"
2-#4 CONT. @ 12" O.C.
1 1/2"
"D" BAR
#4 @ 12" O.C.
SUBDRAIN PER NOTE 10 OF SPEC.
3"
(VARIES) 2:1 MAX.
5'-0" MIN. PER SOILS ENGR.
#4 CONT. @ 18" O.C.
"E" BAR
8" WIDE BLOCK
12" WIDE BLK.
16" WIDE BLK.
18" WIDE CONC. STEM
(VARIES) 9'-4" MAX.
3"
"D"
3"
"K"
3"
12"
"L"

⑳ RETAINING WALL "A" TYPE 1

W/LEVEL BACKFILL N.T.S.

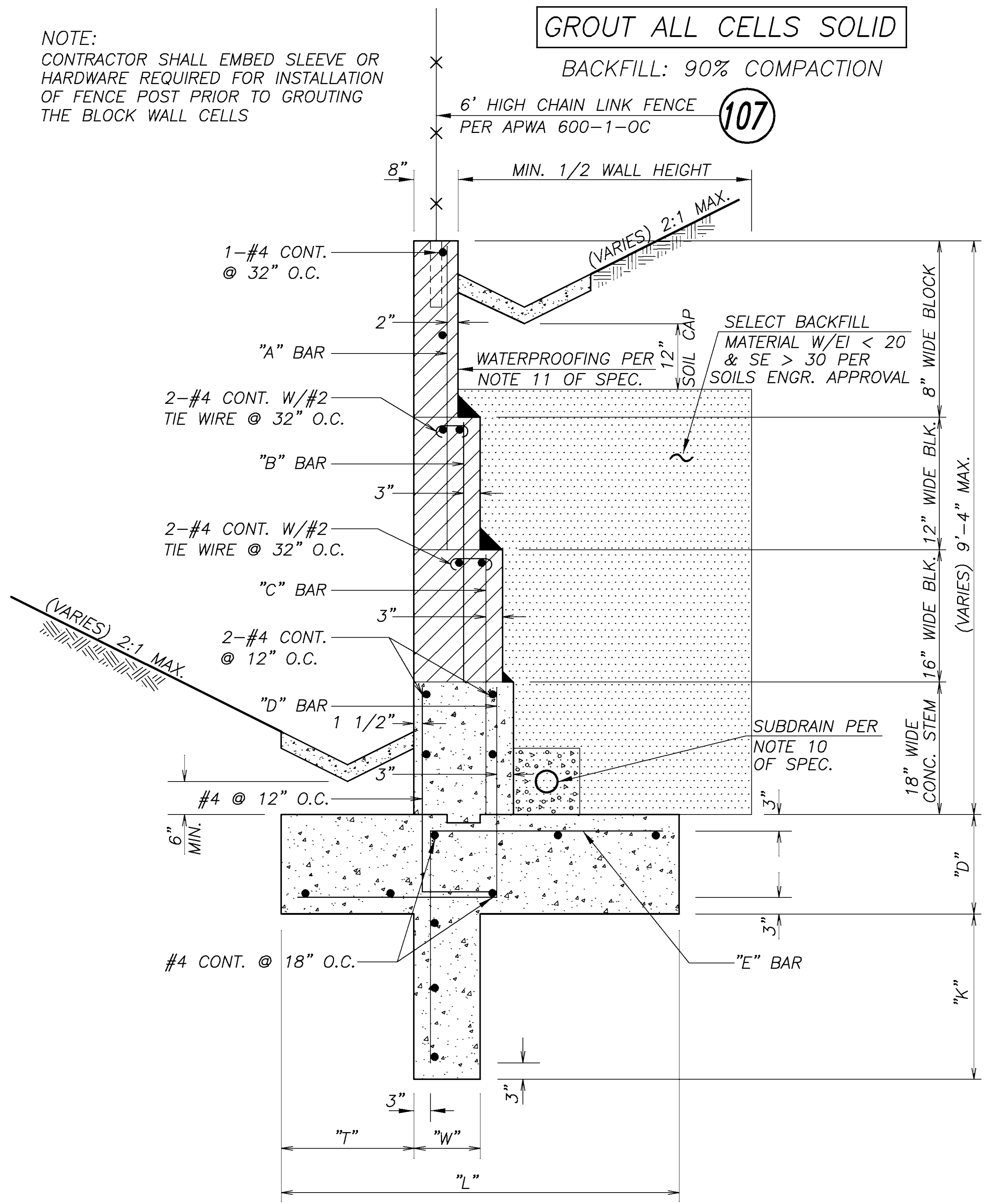
NOTE:
1- FOR WALL HT. 3'-4" & LOWER HOOK THE "A" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR
2- FOR WALL HT. 4'-0" TO 6'-0" HOOK THE "B" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR
3- FOR WALL HT. 6'-8" TO 8'-0" HOOK THE "C" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR


℄
8"
#4 @ 32" O.C.
6.0' HIGH PILASTER PER LANDSCAPE ARCH. SPEC.
117
GROUT ALL CELLS SOLID
BACKFILL: 90% COMPACTION
2-#4 VERT. CENTERED IN CELL EXTEND MIN. 24" INTO RET. PORTION
6'-0"
8" x 24" PILASTER
MIN. 1/2 WALL HEIGHT
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"A" BAR
WATERPROOFING PER NOTE 11 OF SPEC.
12" CAP SOIL
3"
SELECT BACKFILL MATERIAL W/EI<20 & SE>30 PER SOILS ENGR. APPROVAL
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"B" BAR
3"
2-#4 CONT. @ 12" O.C.
1 1/2"
"C" BAR
#4 @ 12" O.C.
SUBDRAIN PER NOTE 10 OF SPEC.
3"
(VARIES) 2:1 MAX.
5'-0" MIN. PER SOILS ENGR.
#4 CONT. @ 18" O.C.
"D" BAR
12" WIDE BLOCK
16" WIDE BLK.
18" WIDE CONC. STEM
(VARIES) 9'-4" MAX.
3"
"D"
3"
"K"
3"
12"
"L"

⑳ RETAINING WALL "A" TYPE 1

W/LEVEL BACKFILL @ PILASTER SPACING N.T.S.

NOTE:
1- FOR WALL HT. 5'-4" & LOWER HOOK THE "A" BAR INTO FTG. IN THE SAME CONFIGURATION AS "C" BAR
2- FOR WALL HT. 6'-0" TO 7'-4" HOOK THE "B" BAR INTO FTG. IN THE SAME CONFIGURATION AS "C" BAR


NOTE:
CONTRACTOR SHALL EMBED SLEEVE OR HARDWARE REQUIRED FOR INSTALLATION OF FENCE POST PRIOR TO GROUTING THE BLOCK WALL CELLS
GROUT ALL CELLS SOLID
BACKFILL: 90% COMPACTION
6' HIGH CHAIN LINK FENCE PER APWA 600-1-OC
107
8"
MIN. 1/2 WALL HEIGHT
(VARIES) 2:1 MAX.
1-#4 CONT. @ 32" O.C.
2"
"A" BAR
WATERPROOFING PER NOTE 11 OF SPEC.
12" SOIL CAP
SELECT BACKFILL MATERIAL W/EI < 20 & SE > 30 PER SOILS ENGR. APPROVAL
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"B" BAR
3"
2-#4 CONT. W/#2 TIE WIRE @ 32" O.C.
"C" BAR
3"
(VARIES) 2:1 MAX.
2-#4 CONT. @ 12" O.C.
"D" BAR
1 1/2"
3"
#4 @ 12" O.C.
6" MIN.
SUBDRAIN PER NOTE 10 OF SPEC.
3"
#4 CONT. @ 18" O.C.
"E" BAR
8" WIDE BLOCK
12" WIDE BLK.
16" WIDE BLK.
18" WIDE CONC. STEM
(VARIES) 9'-4" MAX.
"D"
3"
"K"
3"
3"
"T"
"W"
"L"

㉑ RETAINING WALL "A" TYPE 2

W/2:1 BACKFILL N.T.S.

NOTE:
1- FOR WALL HT. 4'-0" & LOWER HOOK THE "A" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR
2- FOR WALL HT. 4'-8" TO 6'-0" HOOK THE "B" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR
3- FOR WALL HT. 6'-8" TO 7'-4" HOOK THE "C" BAR INTO FTG. IN THE SAME CONFIGURATION AS "D" BAR

RETAINING WALL "A" TYPE 1 W/LEVEL BACKFILL SCHEDULE

WALL HT.	8" BLOCK	12" BLOCK	16" BLOCK	18" CONC.	"A" BAR	"B" BAR	"C" BAR	"D" BAR	"E" BAR	"L"	"D"	"K"
2'-0"	2'-0"	–	–	–	#4@32"	–	–	–	#4@16"	2'-8"	12"	3"
2'-8"	2'-8"	–	–	–	#4@16"	–	–	–	#4@16"	3'-0"	12"	5"
3'-4"	3'-4"	–	–	–	#4@8"	–	–	–	#4@16"	3'-4"	12"	7"
4'-0"	2'-0"	2'-0"	–	–	#4@32"	#4@16"	–	–	#4@16"	3'-8"	12"	10"
4'-8"	2'-0"	2'-8"	–	–	#4@32"	#5@16"	–	–	#4@16"	4'-0"	12"	12"
5'-4"	2'-8"	2'-8"	–	–	#4@16"	#5@8"	–	–	#5@16"	4'-6"	12"	1'-1"
6'-0"	2'-8"	3'-4"	–	–	#4@16"	#7@8"	–	–	#5@8"	4'-9"	12"	1'-4"
6'-8"	2'-0"	2'-0"	2'-8"	–	#4@32"	#4@16"	#5@8"	–	#5@8"	5'-3"	16"	1'-3"
7'-4"	2'-0"	2'-0"	3'-4"	–	#4@32"	#4@16"	#6@8"	–	#5@8"	6'-0"	16"	1'-2"
8'-0"	2'-0"	2'-0"	4'-0"	–	#4@32"	#4@16"	#8@8"	–	#5@8"	6'-9"	16"	1'-1"
8'-8"	2'-0"	2'-0"	2'-0"	2'-8"	#4@32"	#4@16"	#4@8"	#5@16"	#5@8"	7'-9"	18"	7"
9'-4"	2'-0"	2'-0"	2'-8"	2'-8"	#4@32"	#4@16"	#4@8"	#5@8"	#5@8"	8'-9"	18"	5"

RETAINING WALL "A" TYPE 1 W/LEVEL BACKFILL SCHEDULE @ PILASTER SPACING

WALL HT.	12" BLOCK	16" BLOCK	18" CONC.	"A" BAR	"B" BAR	"C" BAR	"D" BAR	"L"	"D"	"K"
2'-0"	2'-0"	–	–	#4@16"	–	–	#4@16"	3'-2"	12"	–
2'-8"	2'-8"	–	–	#4@16"	–	–	#4@16"	3'-9"	12"	–
3'-4"	3'-4"	–	–	#4@16"	–	–	#4@16"	4'-3"	12"	–
4'-0"	4'-0"	–	–	#5@16"	–	–	#5@16"	4'-7"	12"	3"
4'-8"	4'-8"	–	–	#5@8"	–	–	#5@16"	4'-10"	12"	5"
5'-4"	5'-4"	–	–	#6@8"	–	–	#5@8"	5'-3"	12"	8"
6'-0"	3'-4"	2'-8"	–	#4@16"	#5@8"	–	#5@8"	5'-7"	16"	8"
6'-8"	3'-4"	3'-4"	–	#4@16"	#6@8"	–	#5@8"	6'-2"	16"	8"
7'-4"	3'-4"	4'-0"	–	#4@16"	#7@8"	–	#5@8"	7'-0"	16"	6"
8'-0"	3'-4"	2'-8"	2'-0"	#4@16"	#4@8"	#5@8"	#5@8"	8'-0"	18"	–
8'-8"	3'-4"	2'-8"	2'-8"	#4@16"	#4@8"	#5@8"	#5@8"	9'-0"	18"	–
9'-4"	3'-4"	2'-8"	3'-4"	#4@16"	#4@8"	#5@8"	#5@8"	10'-3"	18"	–

RETAINING WALL "A" TYPE 2 W/2:1 BACKFILL SCHEDULE

WALL HT.	8" BLOCK	12" BLOCK	16" BLOCK	18" CONC.	"A" BAR	"B" BAR	"C" BAR	"D" BAR	"E" BAR	"T"	"L"	"D"	"W"	"K"
2'-0"	2'-0"	–	–	–	#4@32"	–	–	–	#4@16"	12"	2'-9"	12"	8"	6"
2'-8"	2'-8"	–	–	–	#4@32"	–	–	–	#4@16"	12"	3'-0"	12"	8"	10"
3'-4"	3'-4"	–	–	–	#4@16"	–	–	–	#4@16"	12"	3'-5"	12"	8"	1'-2"
4'-0"	4'-0"	–	–	–	#5@16"	–	–	–	#4@16"	12"	3'-9"	12"	8"	1'-7"
4'-8"	2'-8"	2'-0"	–	–	#4@32"	#4@16"	–	–	#4@16"	12"	4'-2"	12"	8"	1'-9"
5'-4"	2'-8"	2'-8"	–	–	#4@32"	#5@16"	–	–	#5@16"	1'-6"	4'-2"	12"	12"	2'-1"
6'-0"	3'-4"	2'-8"	–	–	#4@16"	#5@8"	–	–	#5@16"	1'-6"	4'-8"	12"	12"	2'-5"
6'-8"	2'-0"	2'-0"	2'-8"	–	#4@32"	#4@16"	#5@16"	–	#5@16"	1'-6"	5'-4"	16"	12"	2'-6"
7'-4"	1'-4"	2'-0"	4'-0"	–	#4@32"	#4@16"	#8@8"	–	#5@8"	2'-0"	6'-6"	16"	12"	2'-11"
8'-0"	2'-4"	2'-0"	2'-0"	2'-0"	#4@16"	#4@16"	#4@8"	#5@8"	#5@8"	2'-0"	7'-4"	18"	12"	3'-2"
8'-8"	2'-0"	2'-0"	2'-0"	2'-8"	#4@16"	#4@16"	#4@8"	#5@8"	#6@8"	2'-0"	8'-6"	18"	12"	3'-6"
9'-4"	2'-0"	2'-0"	2'-0"	3'-4"	#4@16"	#4@16"	#4@8"	#5@8"	#6@8"	2'-0"	10'-6"	18"	12"	3'-10"

NOTE:

ALL WORK MUST BE IN CONFORMANCE WITH THE CURRENT STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION ("GREEN BOOK") AND THE LATEST EDITION OF OCPW STANDARD PLANS. THE "GREEN BOOK" AND THE LATEST EDITION OF OCPW STANDARD PLANS MUST BE KEPT ON THE JOB SITE AT ALL TIMES.

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

No. 67585
Exp.06/30/09

SHEET 9 OF 10
RETAINING WALL DETAILS

LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

DWG. NO. A06-701-6

W.O. 3210-4 BIN RM DOC. NO.
PRECISE GRADING/EROSION CONTROL PLAN FOR BREA PLAZA COMMERCIAL DEVELOPMENT

MAP DATE IDENTIFIER | 09/30/08 BY:P.P. | 01/22/09
DATE OF LATEST CHANGE TO THIS MAP
DATE OF THIS PLOT

RETAINING WALL SPECIFICATIONS

CONCRETE:

PORTLAND CEMENT PER ASTM C 150
CONCRETE AGGREGATE PER ASTM C 33
f'c = 2500 PSI AT 28 DAYS.
CEMENT TYPE PER SOILS ENGINEER'S RECOMMENDATION

REINF. STEEL:

DEFORMED BILLET STEEL BARS PER ASTM A 615 AS FOLLOWS:
#4 OR SMALLER GRADE 40
#5 OR LARGER GRADE 60

CONCRETE BLOCK:

f'm = 1500 PSI AT 28 DAYS
GRADE "N" HOLLOW UNIT BLOCK PER ASTM C 90, BLOCK TYPE, COLOR AND /OR ARCHITECTURAL FINISH PER LANDSCAPE PLANS "NO SPECIAL INSPECTION"

MORTAR:

TYPE "S" PER ASTM C 270
1 PART CEMENT
1/2 PART LIME PUTTY
4 1/2 PARTS SAND

GROUT:

CONFORMING TO ASTM C 476
1 PART CEMENT
3 PARTS SAND
2 PARTS PEA GRAVEL

f'c = 2000 PSI
GROUT SHALL BE OF FLUID CONSISTENCY

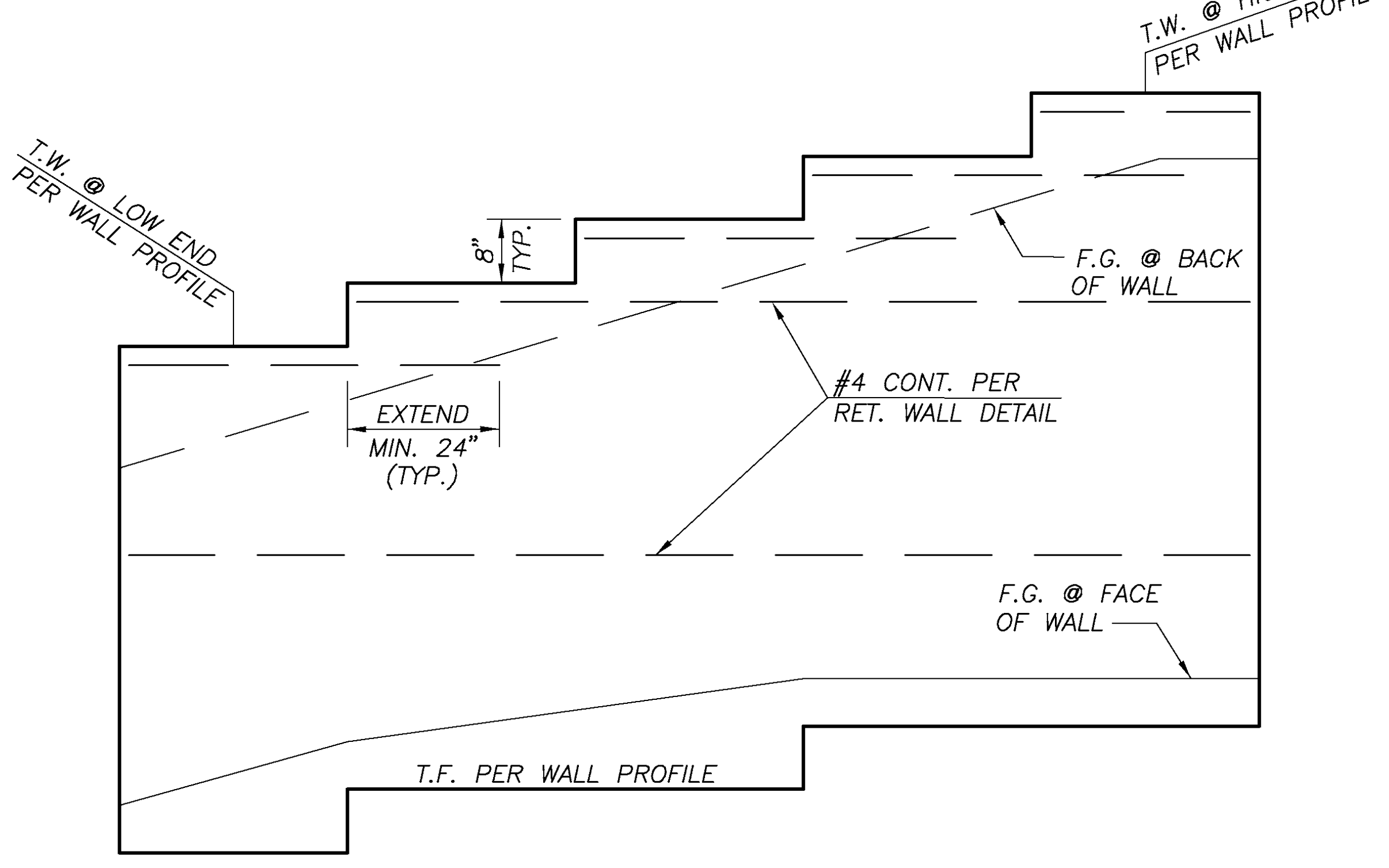
NOTES

1. GROUT ALL CELLS SOLID.
2. ALL FOOTINGS SHALL BE POURED ON UNDISTURBED GROUND OR UNDISTURBED ENGINEERED COMPACTED FILL.
3. WALL SHALL BE LAID TRUE AND PLUMB.
4. PROVISIONS SHALL BE MADE FOR ADJOINING CONSTRUCTION.
5. ALL SPLICES SHALL BE 48 BAR DIAMETERS.
6. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH APPLICABLE SECTIONS OF THE 2007 CALIFORNIA BUILDING CODE
7. ALL BARS SHALL BE BENT COLD.
8. CONTRACTOR SHALL VERIFY COMPATIBILITY OF DESIGN WITH EXISTING CONDITIONS PRIOR TO PLACEMENT OF FOOTING STEEL.
9. BACKFILL SHALL BE PER SOILS ENGINEER'S RECOMMENDATIONS.
10. SUBDRAIN SHALL BE 4" PERFORATED PVC SCHEDULE 40 PIPE PLACE 1.0 CF/LF OF 3/4" GRAVEL MATRIX AROUND PIPE WRAPPED IN FILTER FABRIC. OUTLET SUBDRAIN VIA 4" PVC SCH. 40 SOLID WALL PIPE TO THE ALLOWABLE & APPROPRIATE DRAINAGE DEVICE.
11. WATERPROOF BACK OF ALL THE RETAINING WALLS W/2 COATS OF ASPHALTIC EMULSION PER MANUFACTURER'S SPECIFICATIONS.
12. BACKFILLING SHALL NOT BE PERMITTED UNTIL AT LEAST 7 DAYS AFTER THE WALLS ARE BUILT.
13. CONTROL JOINTS SHALL BE PLACED AT ALL ANGLE POINTS, BC, EC AND AT A MAXIMUM 24' O.C. ON STRAIGHT PORTIONS.
14. OUTLET OF ANY SURFACE DRAINAGE PIPE INTO THE SUBDRAIN SYSTEM IS ABSOLUTELY PROHIBITED.

SOILS DATA:

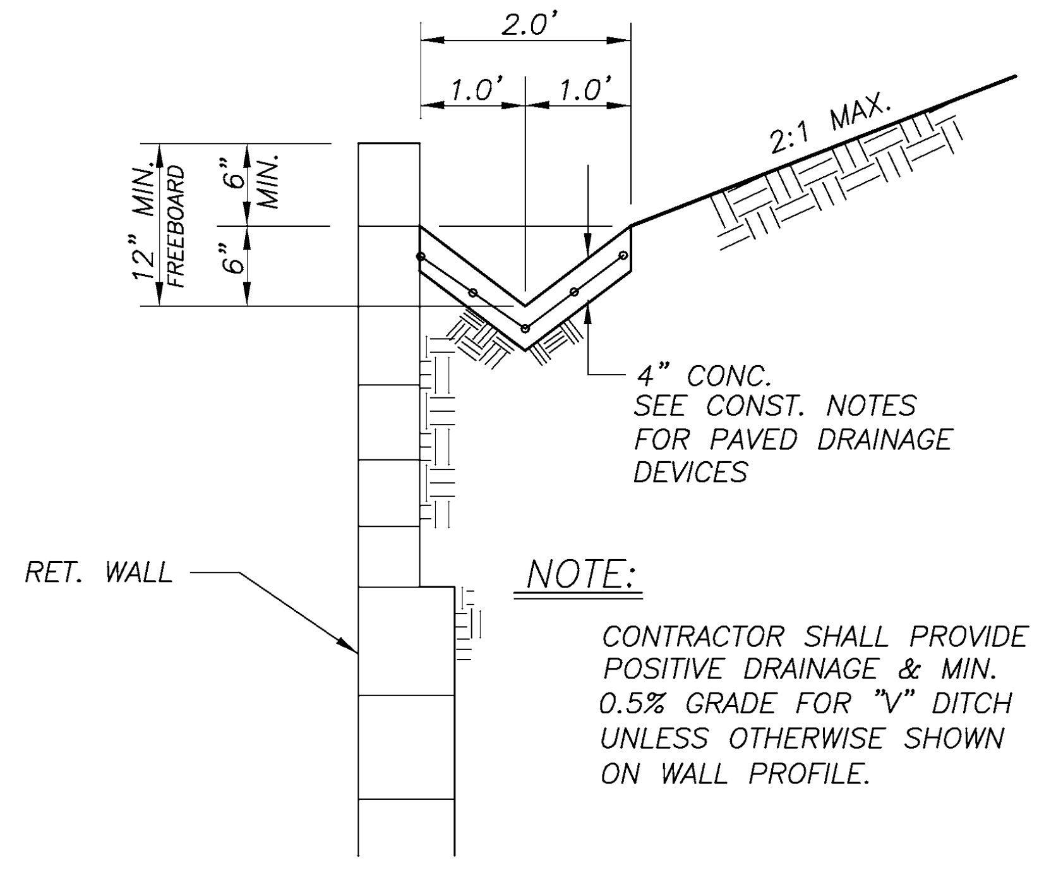
BY Pacific Soils Engineering, Inc.
DATED February 18 & June 4, 2008

BEARING = 2000 PSF
(LEVEL BACKFILL) EFP = 36 PCF (SELECT BACKFILL)
(2:1 BACKFILL) EFP = 52 PCF (SELECT BACKFILL)
PFP = 250 PCF
u = 0.30
DENSITY = 125 PCF
SOLUBLE SULFATE EXPOSURE = NEGLIGIBLE


T.W. @ HIGH END PER WALL PROFILE
T.W. @ LOW END PER WALL PROFILE
8" TYP.
F.G. @ BACK OF WALL
#4 CONT. PER RET. WALL DETAIL
EXTEND MIN. 24" (TYP.)
F.G. @ FACE OF WALL
T.F. PER WALL PROFILE

HORIZONTAL REINFORCEMENT LAYOUT (TYP.)

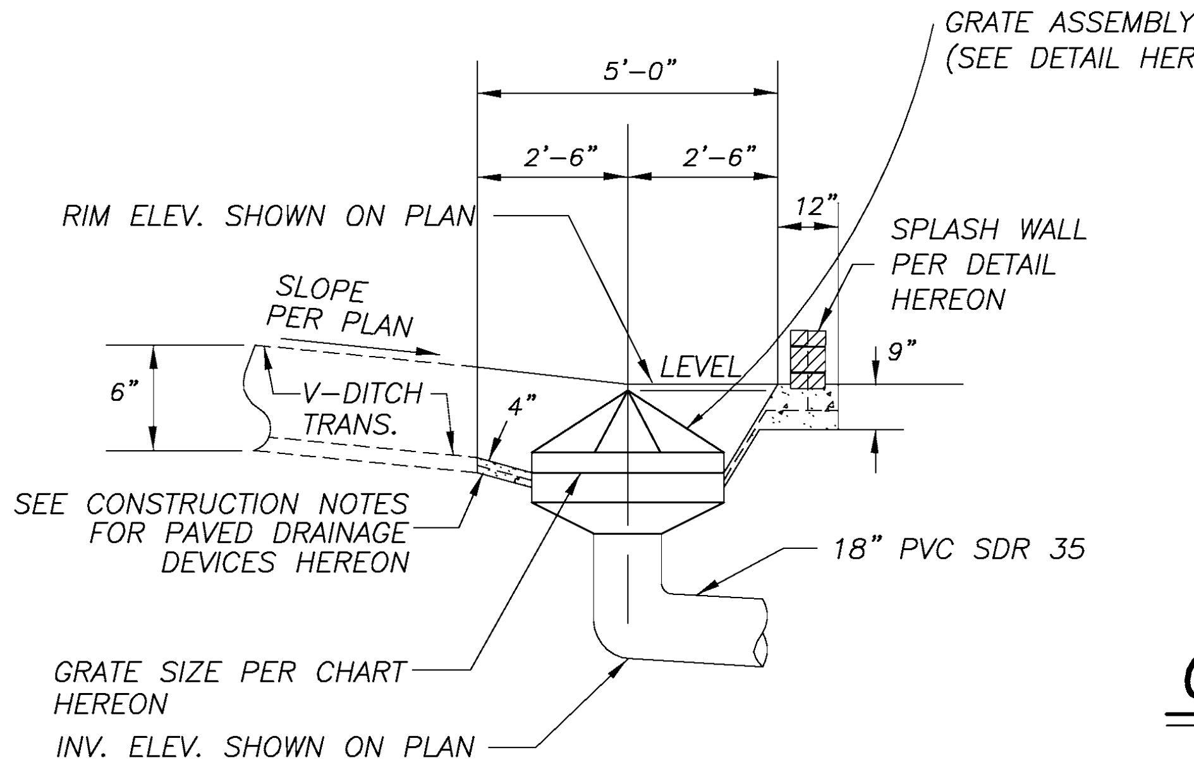
N.T.S.



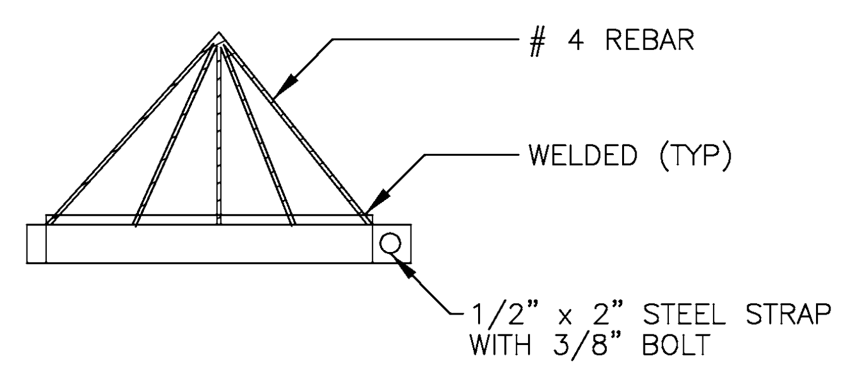
NOTE:
CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE & MIN. 0.5% GRADE FOR "V" DITCH UNLESS OTHERWISE SHOWN ON WALL PROFILE.

72 BACK OF WALL DITCH

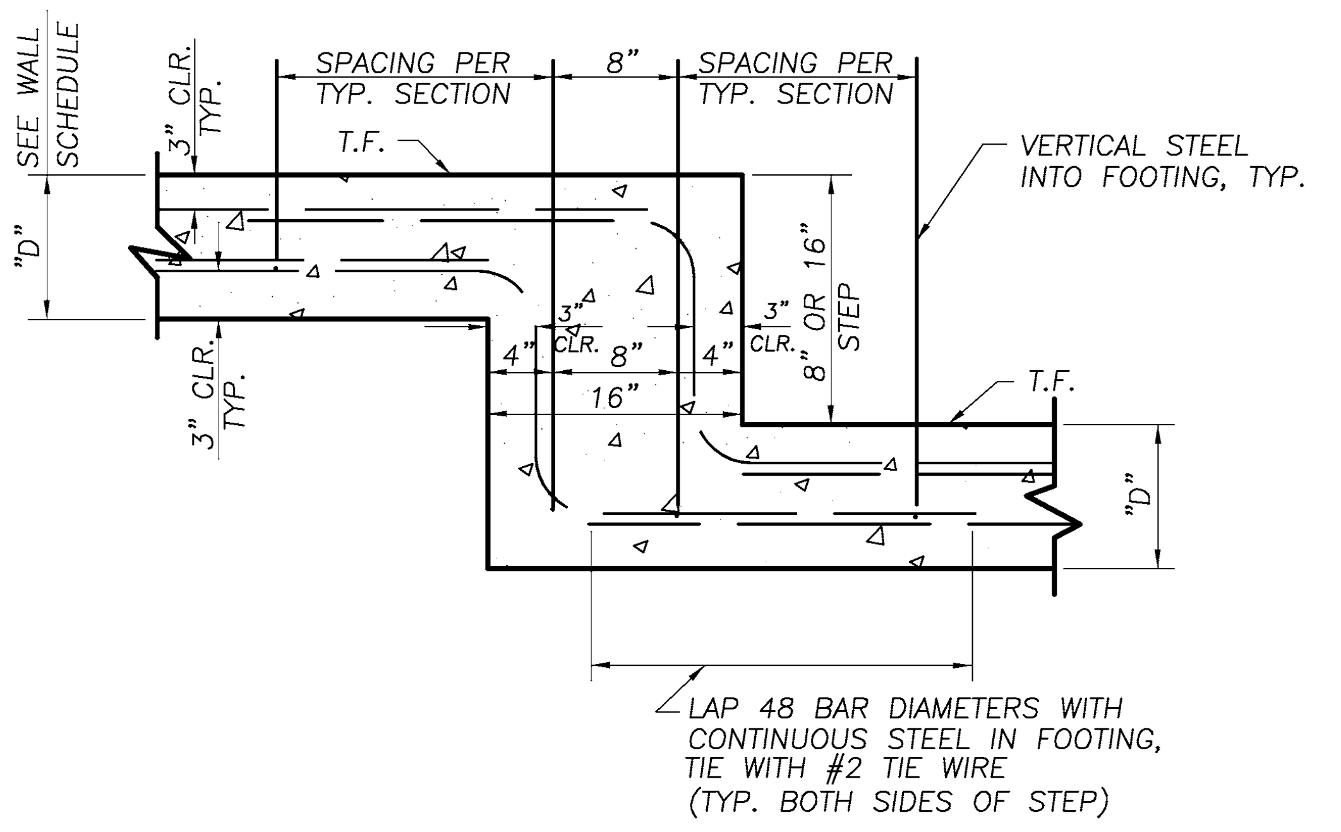
NOT TO SCALE


GRATE ASSEMBLY (SEE DETAIL HEREON)
5'-0"
2'-6"
2'-6"
12"
RIM ELEV. SHOWN ON PLAN
SPLASH WALL PER DETAIL HEREON
SLOPE PER PLAN
LEVEL
9"
6"
V-DITCH TRANS.
4"
SEE CONSTRUCTION NOTES FOR PAVED DRAINAGE DEVICES HEREON
18" PVC SDR 35
GRATE SIZE PER CHART HEREON
INV. ELEV. SHOWN ON PLAN

SECTION A-A



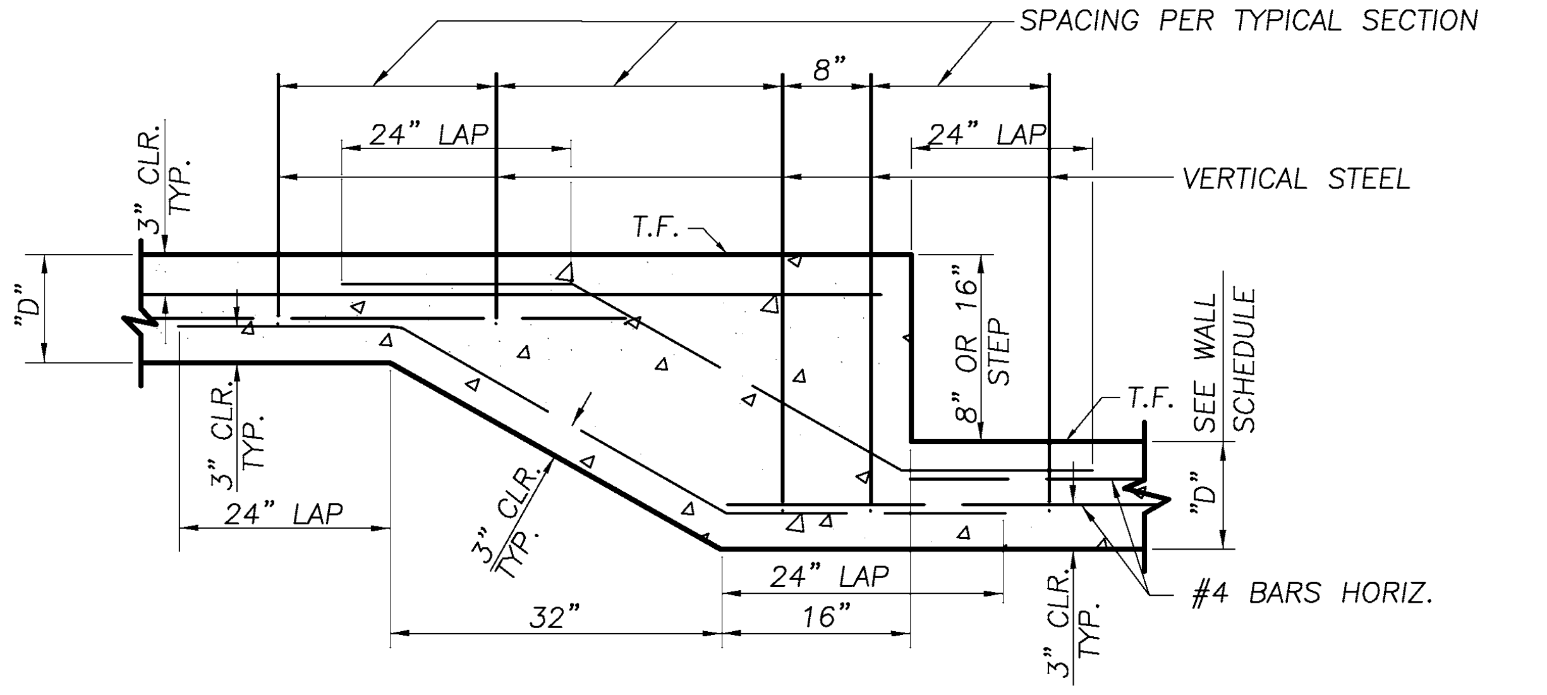
GRATE ASSEMBLY DETAIL


SEE WALL SCHEDULE
3" CLR. TYP.
SPACING PER TYP. SECTION
8"
SPACING PER TYP. SECTION
VERTICAL STEEL INTO FOOTING, TYP.
T.F.
"D"
3"
CLR.
8"
4"
16"
8" OR 16" STEP
3" CLR. TYP.
T.F.
"D"
LAP 48 BAR DIAMETERS WITH CONTINUOUS STEEL IN FOOTING, TIE WITH #2 TIE WIRE (TYP. BOTH SIDES OF STEP)

STEPPED FOOTING DETAIL

ALT. #1

N.T.S.

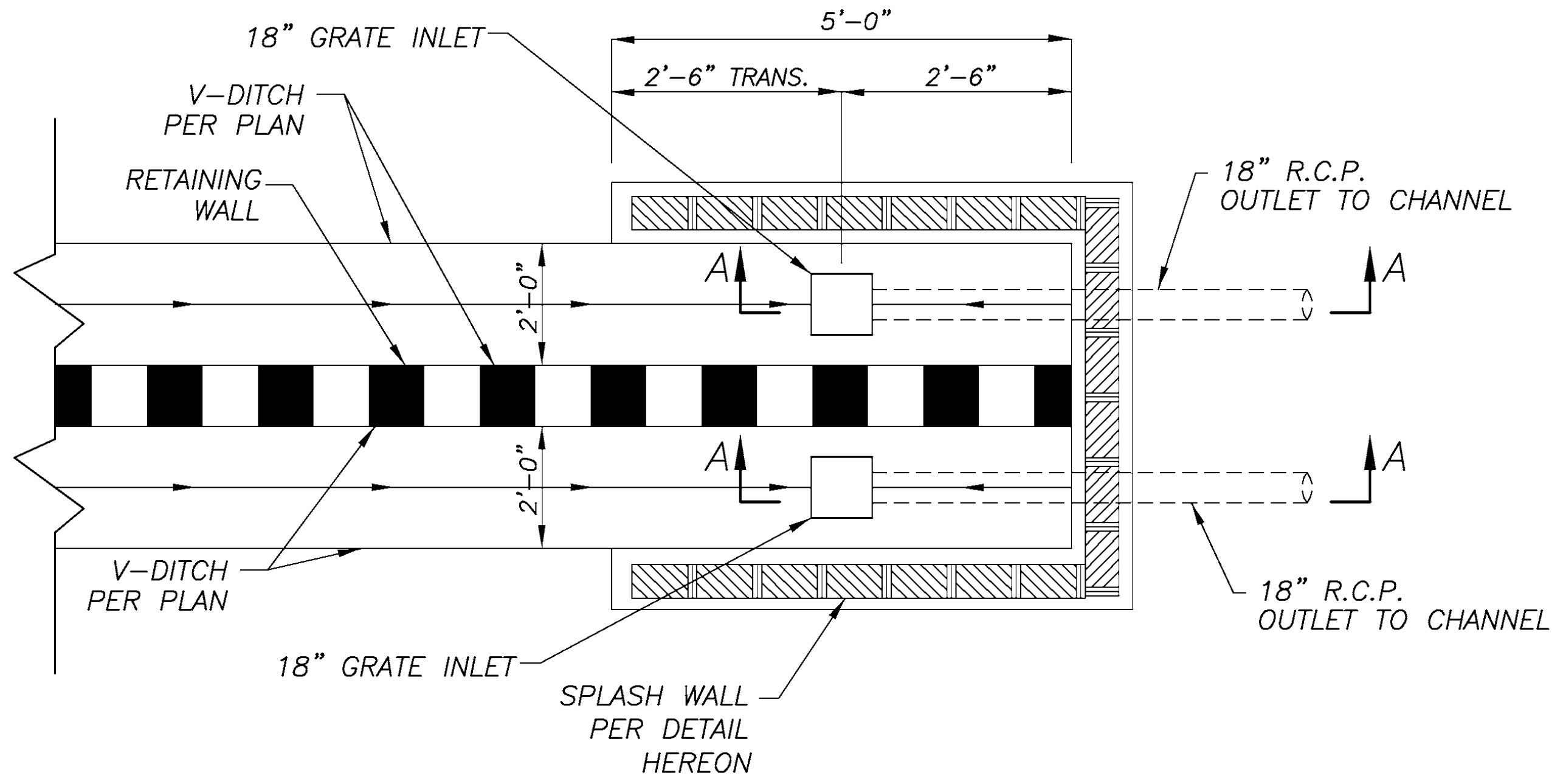


STEPPED FOOTING DETAIL

ALT. #2

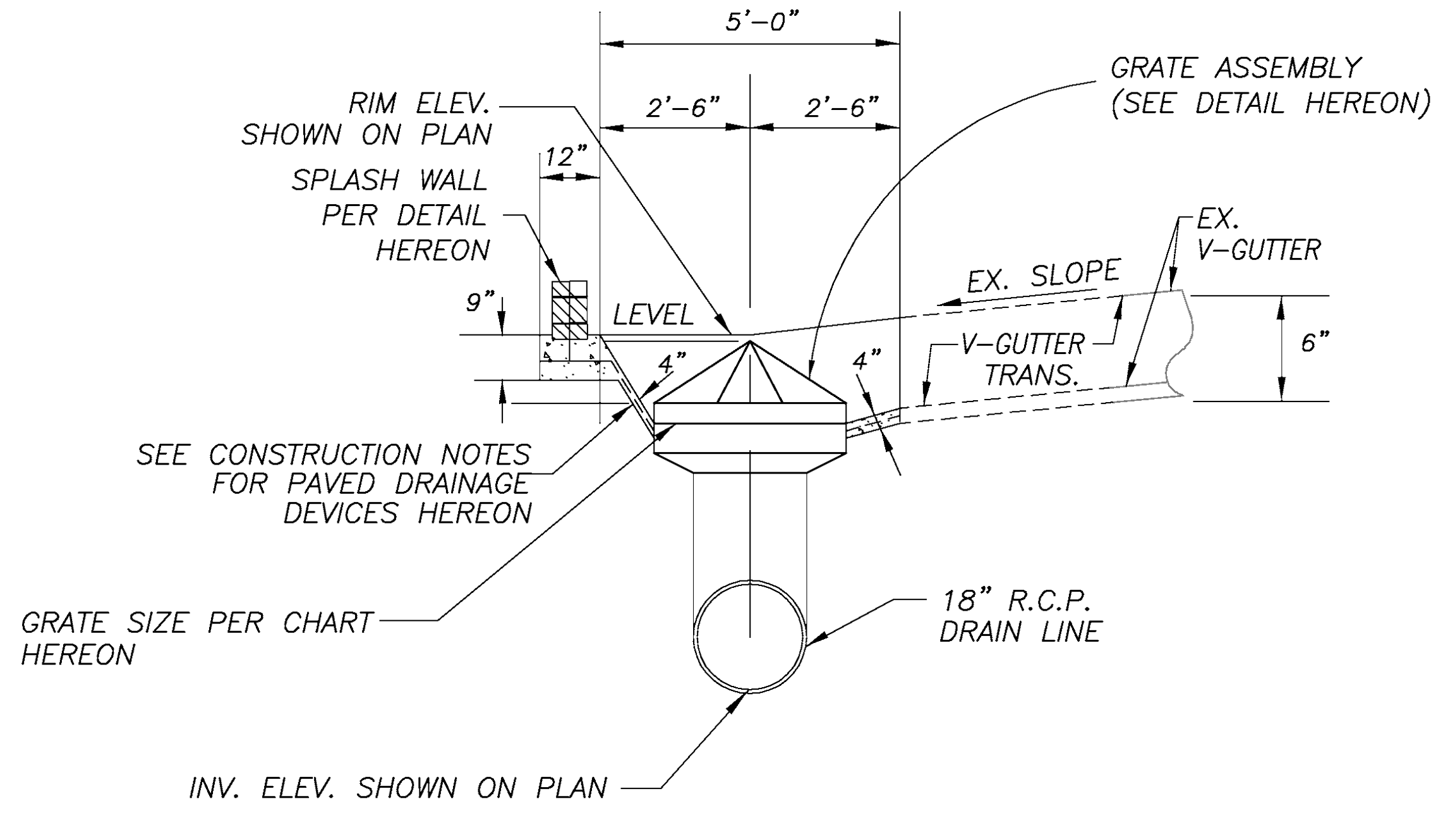
N.T.S.

NOTE: TIE WITH #2 TIE WIRE AT ALL LAPS



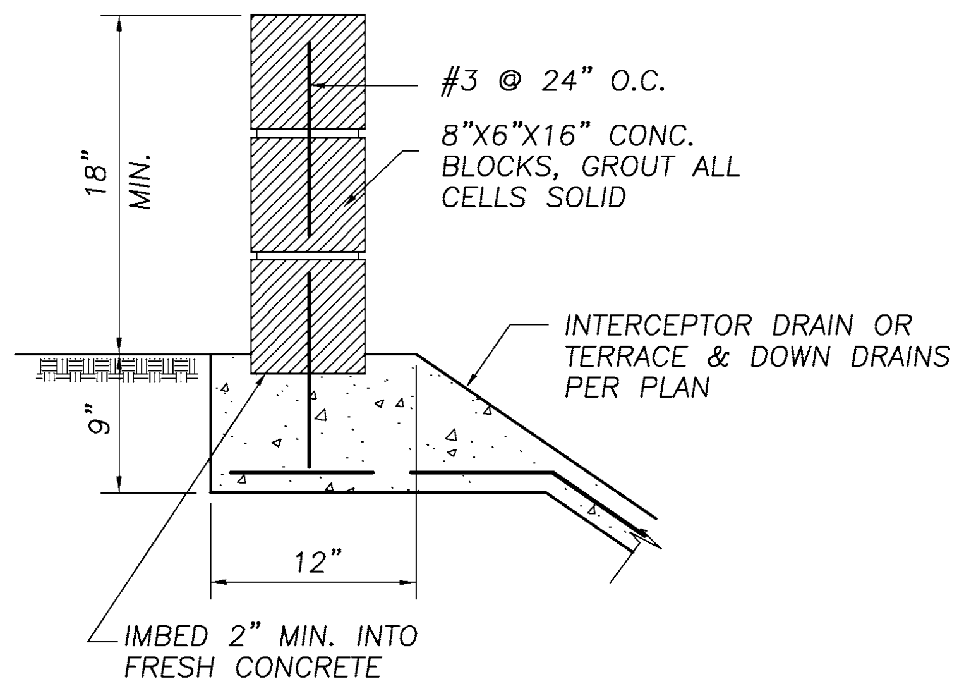
73 BACK OF WALL DITCH TO PIPE INLET

NOT TO SCALE


5'-0"
GRATE ASSEMBLY (SEE DETAIL HEREON)
RIM ELEV. SHOWN ON PLAN
2'-6"
2'-6"
12"
SPLASH WALL PER DETAIL HEREON
EX. V-GUTTER
EX. SLOPE
9"
LEVEL
4"
4"
V-GUTTER TRANS.
6"
SEE CONSTRUCTION NOTES FOR PAVED DRAINAGE DEVICES HEREON
18" R.C.P. DRAIN LINE
GRATE SIZE PER CHART HEREON
INV. ELEV. SHOWN ON PLAN

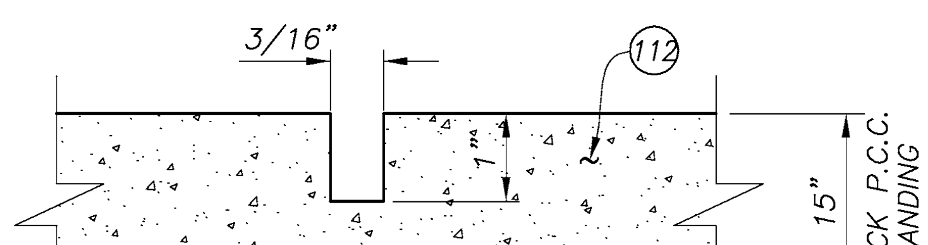
115 PIPE INLET DETAILS

NOT TO SCALE


18" MIN.
#3 @ 24" O.C.
8"X6"X16" CONC. BLOCKS, GROUT ALL CELLS SOLID
INTERCEPTOR DRAIN OR TERRACE & DOWN DRAINS PER PLAN
9"
12"
IMBED 2" MIN. INTO FRESH CONCRETE

76 SPLASH WALL

NOT TO SCALE



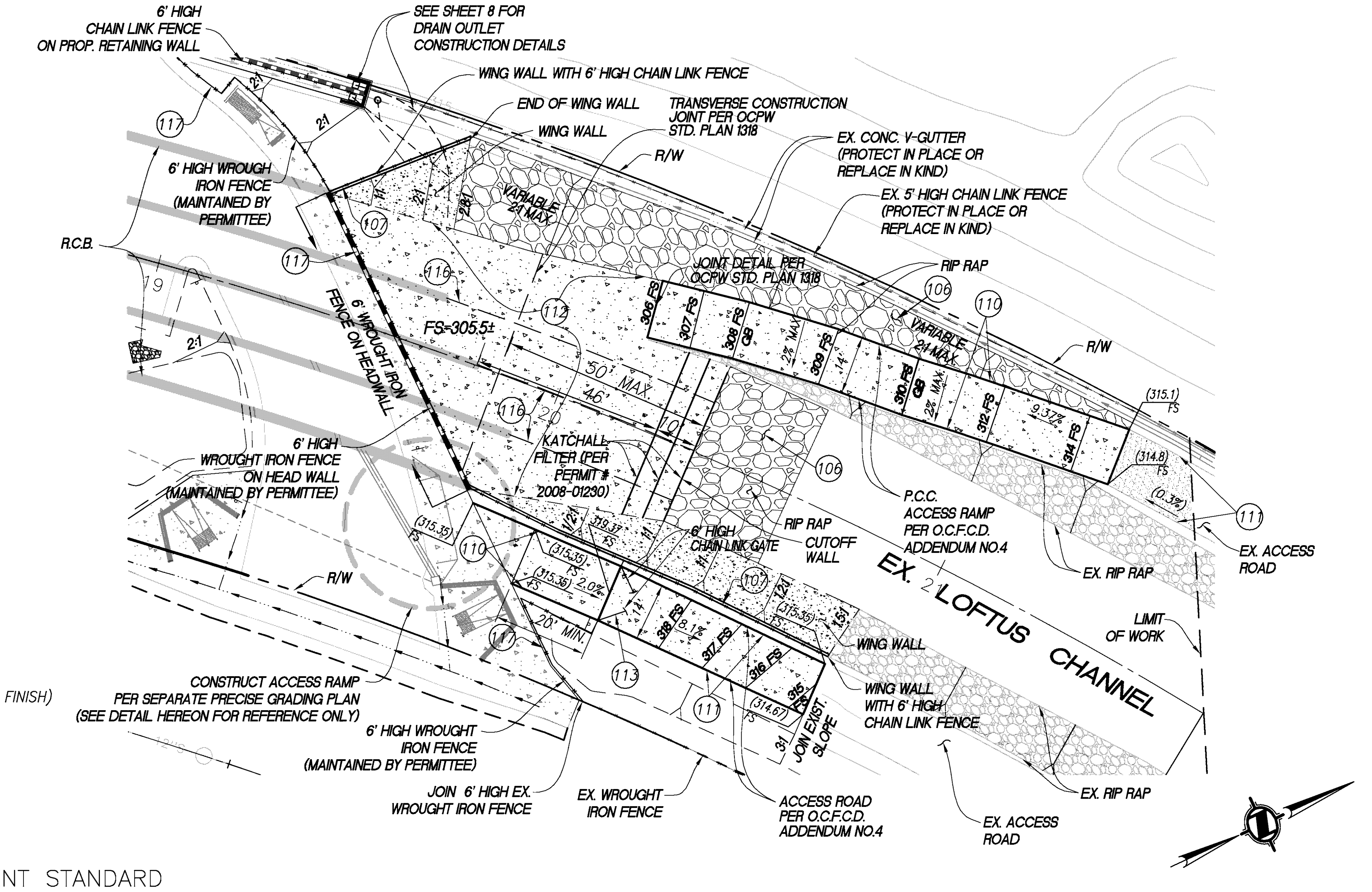
116 LONGITUDINAL CONTROL JOINT DETAIL

N.T.S.

CONSTRUCTION NOTES

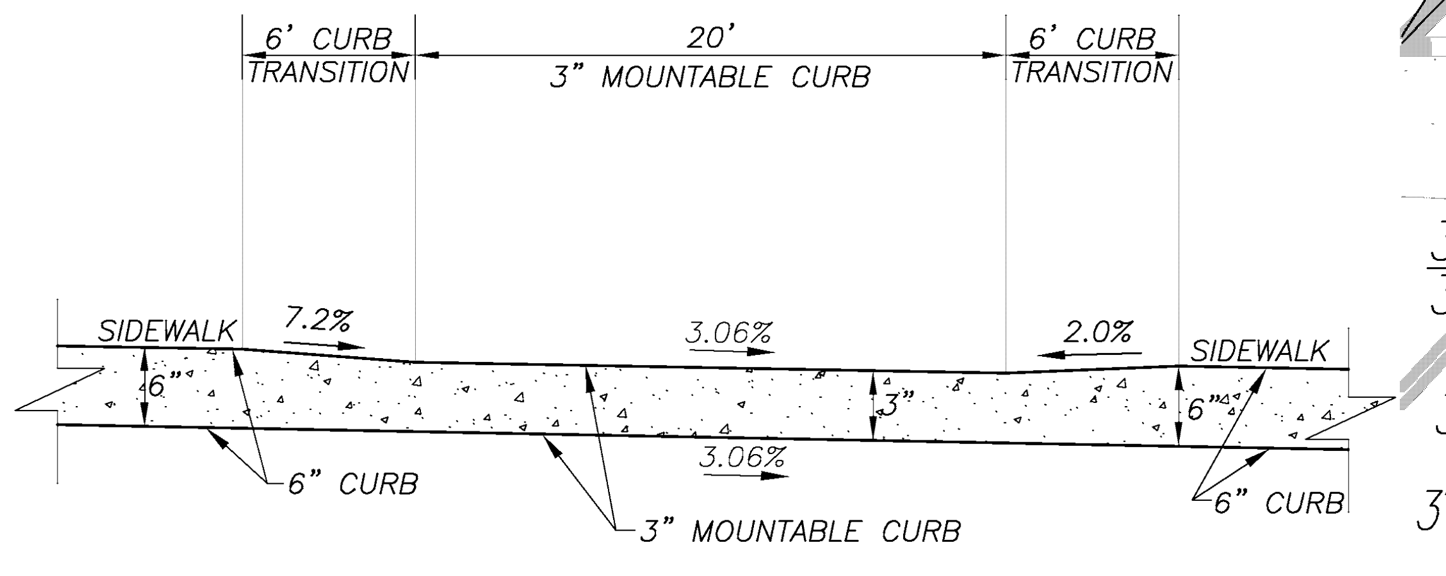
- (106) CONST. RIP-RAP PER DETAIL ON SHEET NO. 4
- (107) CONST. 6' HIGH CHAIN LINK FENCE PER APWA 600-1-OC
- (110) CONST. 6" P.C.C./6" A.B. ACCESS RAMP PER O.C.F.C.D. ADDENDUM NO. 4 (TRANSVERSE RAKED FINISH)
- (111) CONST. 6" THICK P.M.B. ACCESS ROAD PER O.C.F.C.D. ADDENDUM NO. 4
- (112) CONST. P.C.C. LANDING APRON PER O.C.F.C.D. ADDENDUM NO. 4 (STRUCTURAL INVERT SAME AS R.C.B. SECTION A PER SHEET NO. 2, STEEL TROWEL FINISH)
- (113) CONST. CHAIN LINK GATE PER OCPW STANDARD PLAN 600-1-OC
- (116) CONST. LONGITUDINAL CONTROL JOINT PER DETAIL HEREON
- (117) CONST. 6' HIGH WROUGHT IRON FENCE PER DETAIL ON SHEET 8 (MAINTAINED BY PERMITTEE)

NOTE:
ALL WORK MUST BE IN CONFORMANCE WITH THE CURRENT STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION ("GREEN BOOK") AND THE LATEST EDITION OF OCPW STANDARD PLANS. THE "GREEN BOOK" AND THE LATEST EDITION OF OCPW STANDARD PLANS MUST BE KEPT ON THE JOB SITE AT ALL TIMES.

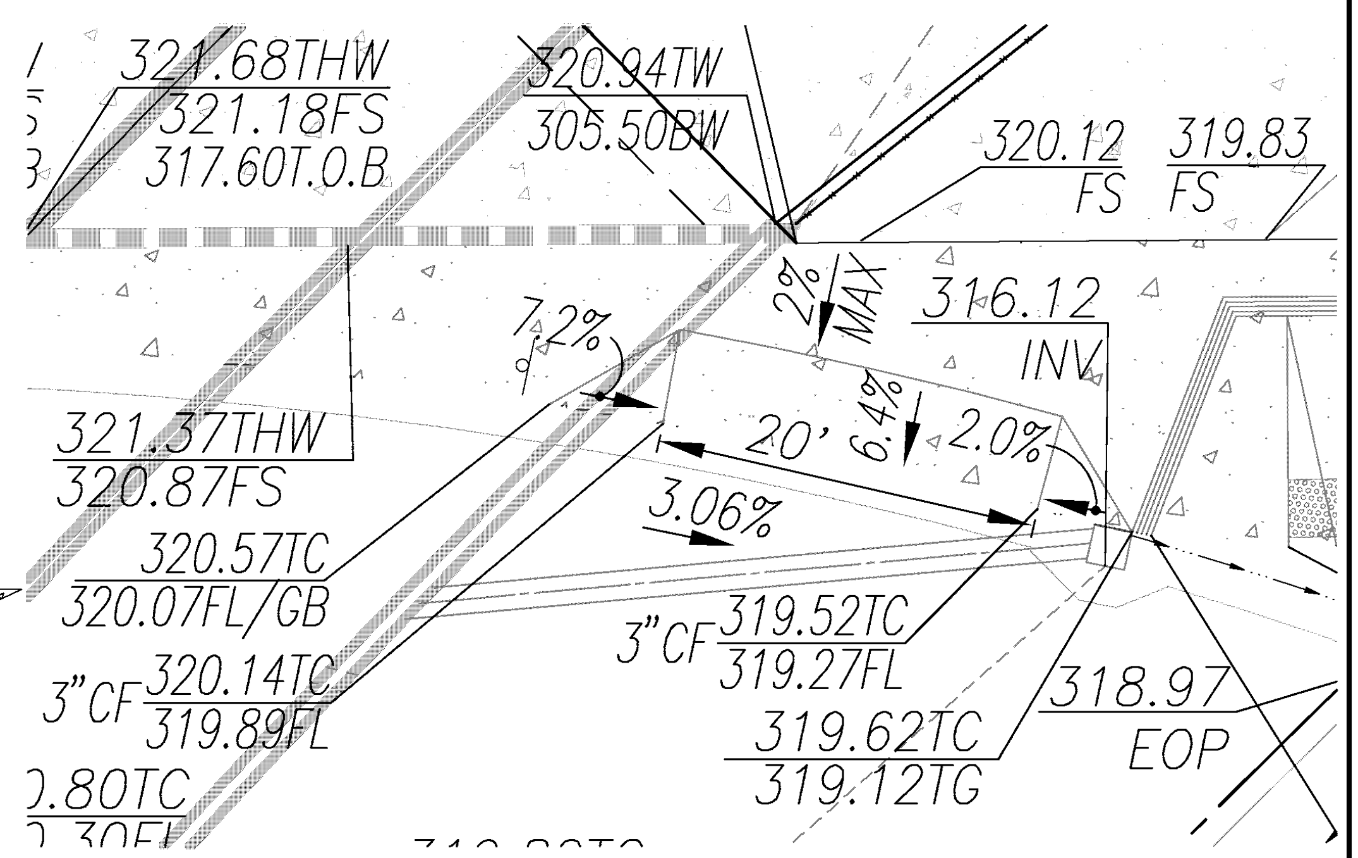

6' HIGH CHAIN LINK FENCE ON PROP. RETAINING WALL
SEE SHEET 8 FOR DRAIN OUTLET CONSTRUCTION DETAILS
WING WALL WITH 6' HIGH CHAIN LINK FENCE
END OF WING WALL
TRANSVERSE CONSTRUCTION JOINT PER OCPW STD. PLAN 1318
WING WALL
R/W
EX. CONC. V-GUTTER (PROTECT IN PLACE OR REPLACE IN KIND)
EX. 5' HIGH CHAIN LINK FENCE (PROTECT IN PLACE OR REPLACE IN KIND)
6' HIGH WROUGHT IRON FENCE (MAINTAINED BY PERMITTEE)
RIP RAP
JOINT DETAIL PER OCPW STD. PLAN 1318
R.C.B.
6' WROUGHT IRON FENCE ON HEADWALL
FS=305.5±
VARIABLE 2:1 MAX
KATCHALL FILTER (PER PERMIT # 2008-01230)
R/W
6' HIGH WROUGHT IRON FENCE ON HEAD WALL (MAINTAINED BY PERMITTEE)
RIP RAP CUTOFF WALL
6' HIGH CHAIN LINK GATE
P.C.C. ACCESS RAMP PER O.C.F.C.D. ADDENDUM NO.4
EX. LOFTUS CHANNEL
EX. RIP RAP
EX. ACCESS ROAD
R/W
20' MIN
WING WALL
LIMIT OF WORK
CONSTRUCT ACCESS RAMP PER SEPARATE PRECISE GRADING PLAN (SEE DETAIL HEREON FOR REFERENCE ONLY)
6' HIGH WROUGHT IRON FENCE (MAINTAINED BY PERMITTEE)
WING WALL WITH 6' HIGH CHAIN LINK FENCE
JOIN 6' HIGH EX. WROUGHT IRON FENCE
EX. WROUGHT IRON FENCE
ACCESS ROAD PER O.C.F.C.D. ADDENDUM NO.4
EX. ACCESS ROAD
EX. RIP RAP

DETAIL OF ACCESS RAMP PER O.C.F.C.D. ADDENDUM NO.4

SCALE: 1"=25'



CROSS SECTION VIEW



PLAN VIEW
SCALE: 1"=10'

ACCESS RAMP DETAILS

N.T.S.

NO.	DESCRIPTION	SHT.	APPROVED	DATE

REVISIONS

DWG. NO. A06-701-6

No. 67585
Exp.06/30/09

SHEET 10 OF 10
RETAINING WALL DETAILS & NOTES
ACCESS RAMP DETAILS

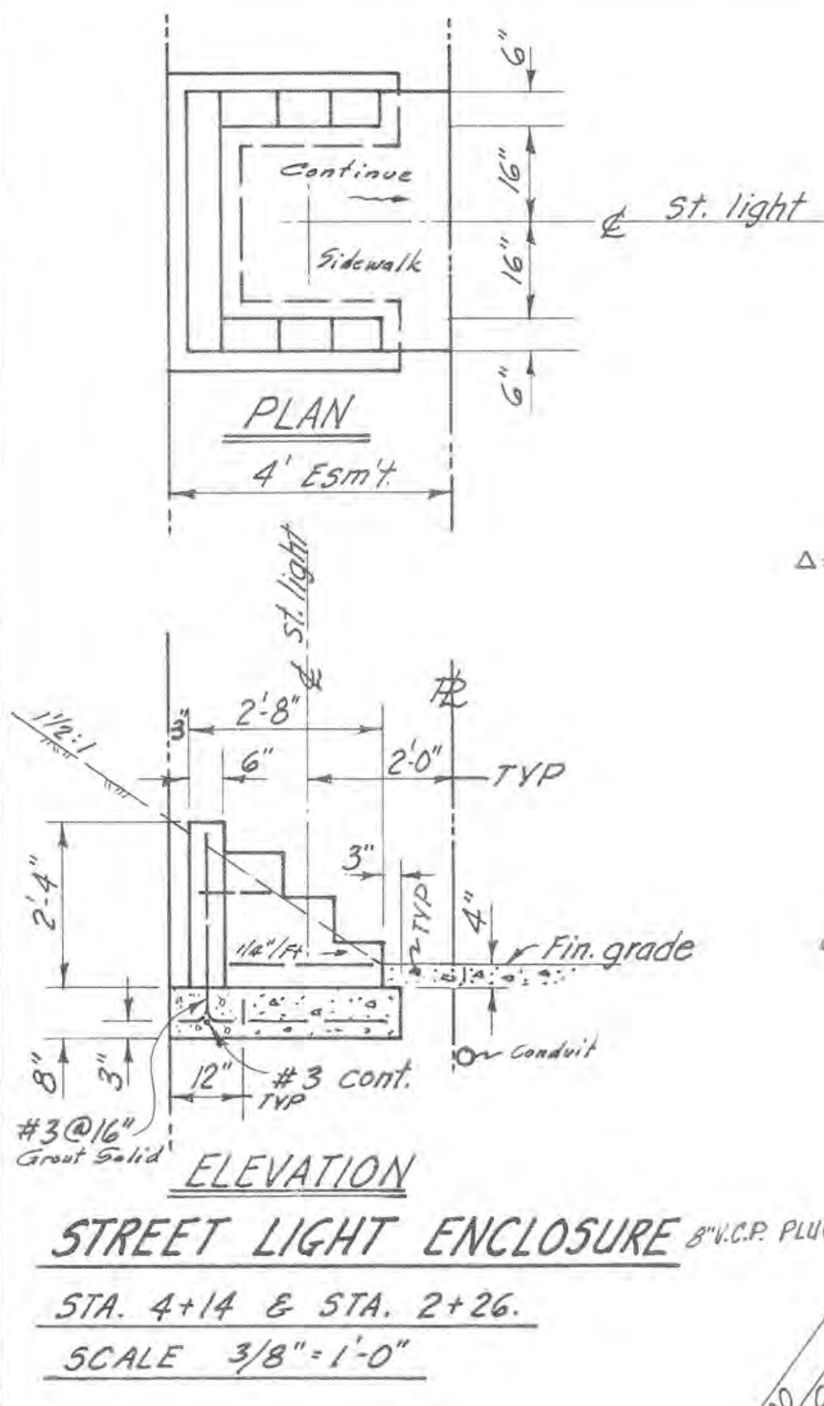
LOFTUS DIVERSION CHANNEL
FACILITY A06
CITY OF BREA

W.O. 3210-4 BIN RM DOC. NO.
PRECISE GRADING/EROSION CONTROL PLAN FOR BREA PLAZA COMMERCIAL DEVELOPMENT

MAP DATE IDENTIFIER | 09/30/08 BY:P.P. | 01/22/09
DATE OF LATEST CHANGE TO THIS MAP | DATE OF THIS PLOT

F:\0381\Engineering\SY_Channel\SHT10.dwg

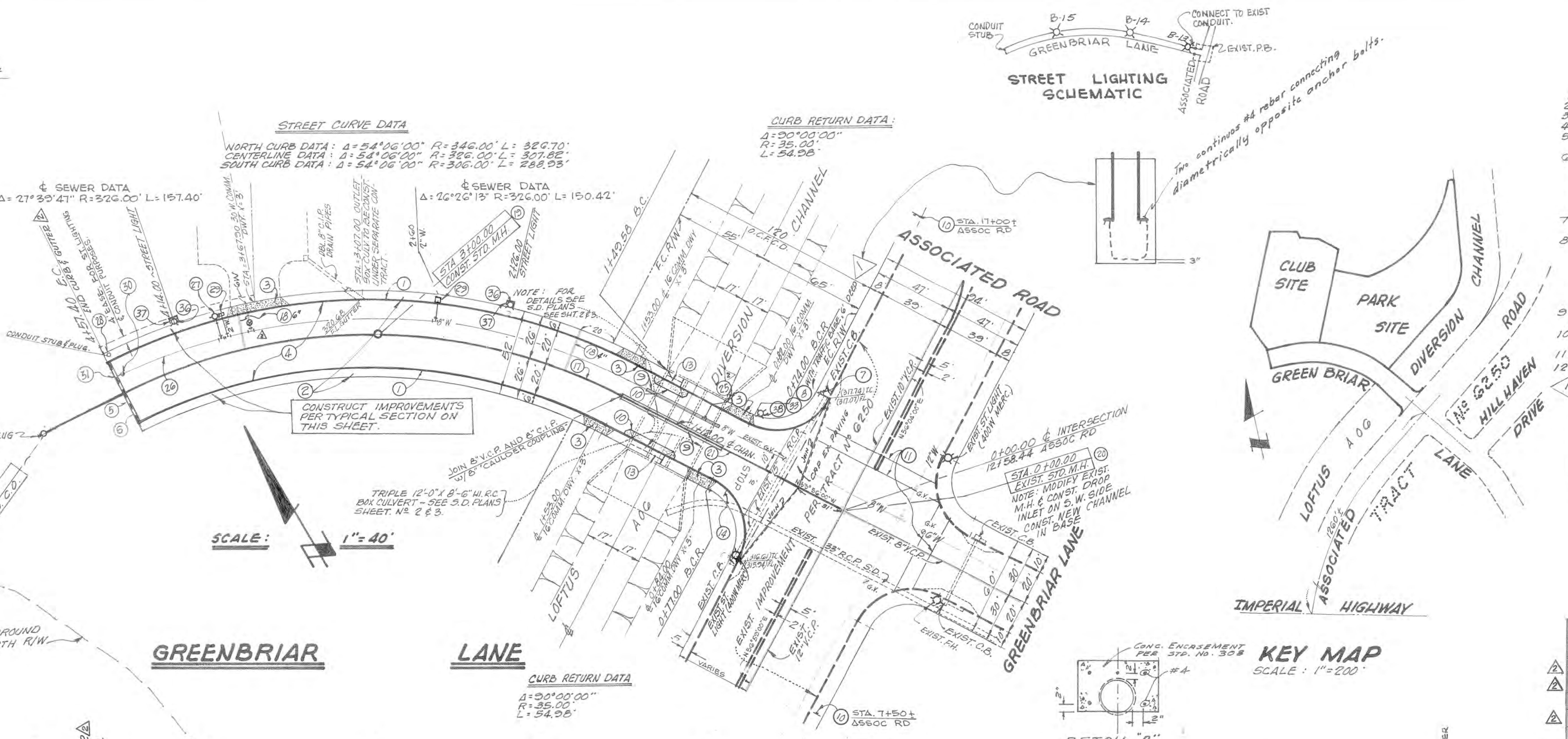
C. LOFTUS CHANNEL RCB CULVERT AT GREENBRIAR LANE



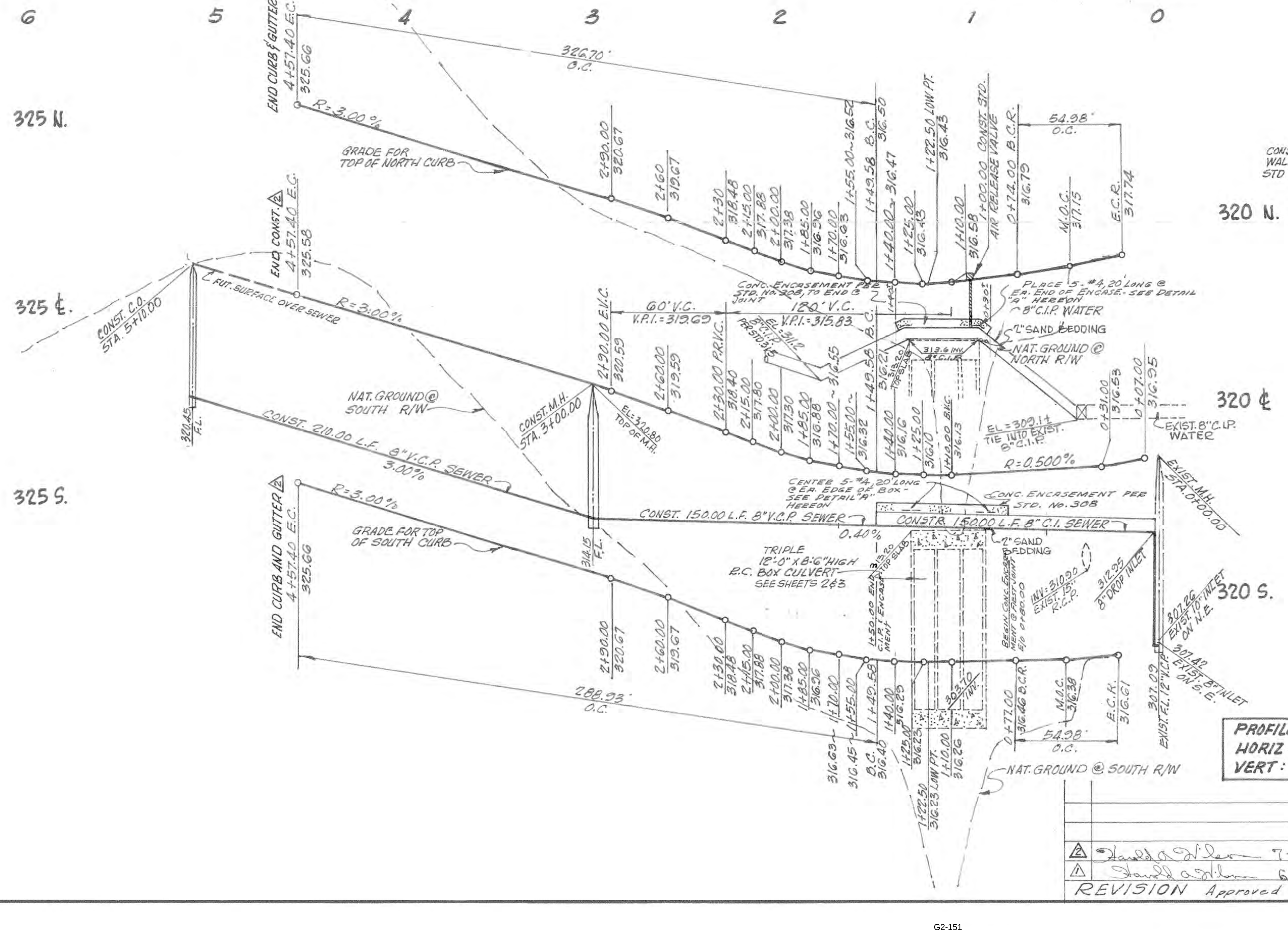
STREET LIGHT ENCLOSURE

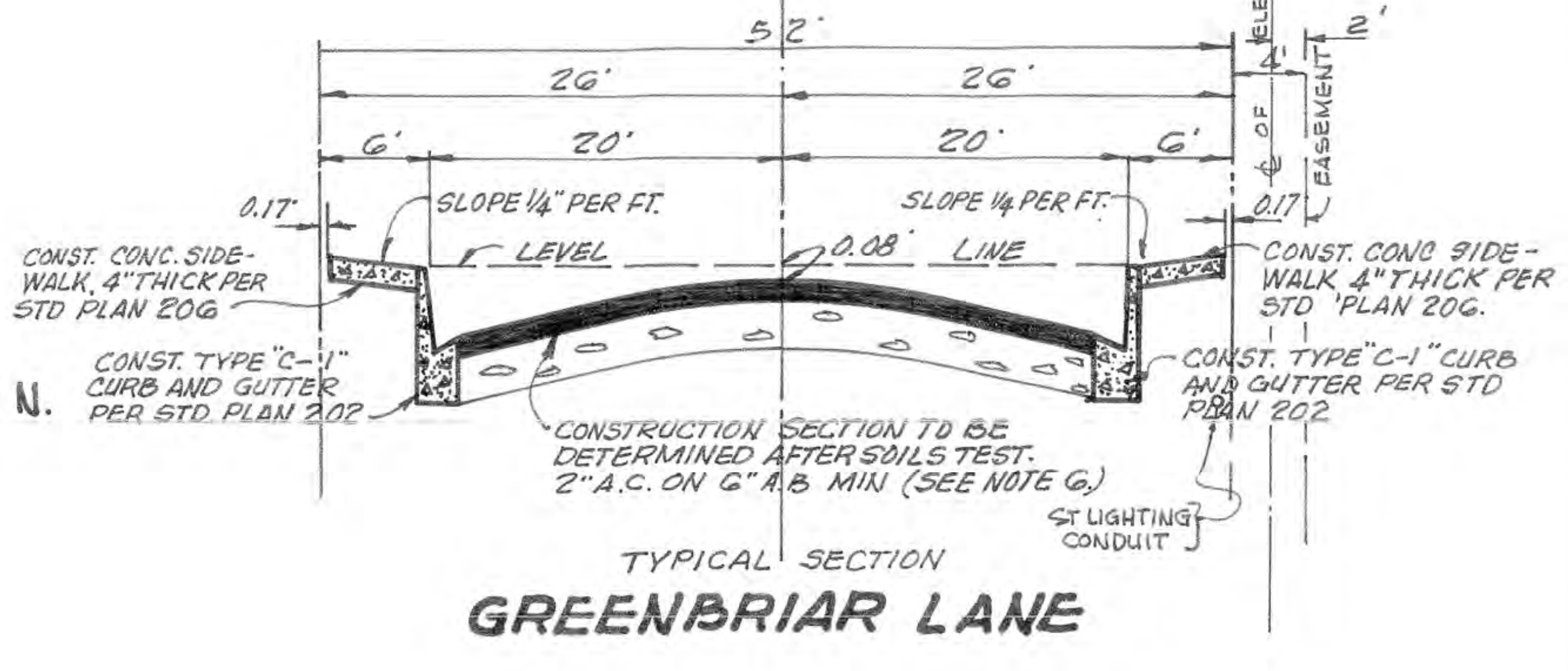
STA. 4+14 & STA. 2+26.

SCALE 3/8" = 1'-0"


STREET CURVE DATA
NORTH CURB DATA: Δ=54°06'00" R=346.00' L: 326.70'
CENTERLINE DATA: Δ=54°06'00" R=326.00' L=307.82'
SOUTH CURB DATA: Δ=54°06'00" R=306.00' L=288.93'
℄ SEWER DATA
Δ=27°39'47" R=326.00' L=157.40'
℄ SEWER DATA
Δ=26°26'13" R=326.00' L=150.42'
4+57.40 E.C. END CURB & GUTTER
4' EASE. FOR ST. LIGHTING & CONDUIT PURPOSES.
4+14.00 ~STREET LIGHT
STA=3+67.90 30 W. COMM. DWY. X=3'
DBL. 8" C.I.P. DRAIN PIPES
STA=3+07.00 OUTLET BOX CULV. TO BE CONST. UNDER SEPARATE CONTRACT.
2+60 2"W.
STA 3+00.00 CONST. STD. M.H.
2+26.00 STREET LIGHT
NOTE: FOR DETAILS SEE S.D. PLANS SEE SHT. 2 & 3.
CONDUIT STUB & PLUG.
320.68 F.L. GUTTER
CONSTRUCT IMPROVEMENTS PER TYPICAL SECTION ON THIS SHEET.
8" V.C.P. PLUG
STA. 5+10.00 CONST. STD. C.O.
JOIN 8" V.C.P. AND 8" C.I.P. W/ 8" "CAULDER COUPLING"
TRIPLE 12'-0" X 8'-6" HI. R.C. BOX CULVERT - SEE S.D. PLANS SHEET. Nº 2 & 3.
SCALE: 1" = 40'
NAT. GROUND @ NORTH R/W
GREENBRIAR LANE
1+49.58 B.C.
1+53.00 ℄ 16' COMM. DWY X=3'
F.C. R/W
55'
O.C.F.C.D.
120 CHANNEL
65'
DIVERSION
AOG
LOFTUS
0+82.00 16' COMM. DWY X=3'
0+74.00 B.C.R. WITH TRAFFIC BASE, 6' DEEP
EXIST. C.B.
F.C. R/W
(317.74) T.C.
(317.07) F.L.
8"W EXIST. G.V.
1+12.00 ℄ CHAN.
STOP
CAP EX. PAVING
PER TRACT Nº 6250
EXIST. 10" V.C.P.
N56°04'00"E
N33°56'00"W
EXIST. 8" V.C.P.
EXIST. 33" R.C.P. S.D.
EXIST. ST. LIGHT (400W MERC.)
0+00.00 ℄ INTERSECTION 12+58.44 ASSOC RD
STA. 0+00.00 EXIST. STD. M.H.
NOTE: MODIFY EXIST. M.H. & CONST. DROP INLET ON S.W. SIDE. CONST. NEW CHANNEL IN BASE
EXIST. C.B.
EXIST. F.H.
EXIST. C.B.
GREENBRIAR LANE
ASSOCIATED ROAD
STA. 17+00± ASSOC RD
STA. 7+50± ASSOC RD
1+53.00 ℄ 16' COMM. DWY. X=3'
0+84.00 ℄ 16' COMM. DWY X=3'
0+77.00 B.C.R.
EXIST. C.B.
EXIST. ST. LIGHT (400W MERC.)
(316.61) T.C.
(315.94) F.L.
EXIST. IMPROVEMENT
N56°53'00"E
EXIST. 12" V.C.P.
VARIES
CURB RETURN DATA:
Δ=90°00'00"
R=35.00'
L=54.98'
CURB RETURN DATA
Δ=90°00'00"
R=35.00'
L=54.98'
CONDUIT STUB
B-15
B-14
B-13
GREENBRIAR LANE
CONNECT TO EXIST CONDUIT.
EXIST. P.B.
ASSOCIATED ROAD
STREET LIGHTING SCHEMATIC
Two continuos #4 rebar connecting diametrically opposite anchor bolts.
3"
CLUB SITE
PARK SITE
GREEN BRIAR
DIVERSION CHANNEL
ROAD
Nº 6250
HILL HAVEN DRIVE
LANE
TRACT
LOFTUS
AOG
ASSOCIATED
1260'±
IMPERIAL HIGHWAY
KEY MAP
SCALE: 1" = 200'
CONC. ENCASEMENT PER STD. No. 308
#4
2"
2"

DETAIL "A"
NO SCALE


6
5
4
3
2
1
0
325 N.
325 ℄.
325 S.
320 N.
320 ℄
320 S.
END CURB & GUTTER 4+57.40 E.C. 325.66
326.70' O.C.
R=3.00%
GRADE FOR TOP OF NORTH CURB
END CONST. 4+57.40 E.C. 325.58
℄ FUT. SURFACE OVER SEWER
R=3.00%
CONST. C.O. STA. 5+10.00
320.45 F.L.
CONST. 210.00 L.F. 8" V.C.P. SEWER 3.00%
NAT. GROUND @ SOUTH R/W
CONST. M.H. STA. 3+00.00
EL: 320.80 TOP OF M.H.
314.15 F.L.
END CURB AND GUTTER 4+57.40 E.C. 325.66
R=3.00%
GRADE FOR TOP OF SOUTH CURB
288.93' O.C.
60' V.C.
V.P.I.=319.69
120' V.C.
V.P.I.=315.83
2+90.00 E.V.C. 320.59
2+30.00 P.R.V.C. 318.40
CONC. ENCASEMENT PER STD. No. 308, TO END @ JOINT
PLACE 5-#4, 20' LONG @ EA. END OF ENCASE. - SEE DETAIL "A" HEREON
8" C.I.P. WATER
2" SAND BEDDING
313.6 INV. 8" C.I.P.
NAT. GROUND @ NORTH R/W
EL=309.1± TIE INTO EXIST. 8" C.I.P.
R=0.500%
EXIST. 8" C.I.P. WATER
1+22.50 LOW PT. 316.43
1+00.00 CONST. STD. AIR RELEASE VALVE
0+74.00 B.C.R. 316.79
M.O.C. 317.15
E.C.R. 317.74
54.98' O.C.
CENTER 5-#4, 20' LONG @ EA. EDGE OF BOX - SEE DETAIL "A" HEREON
CONST. 150.00 L.F. 8" V.C.P. SEWER
0.40%
CONSTR. 150.00 L.F. 8" C.I. SEWER
CONC. ENCASEMENT PER STD. No. 308
2" SAND BEDDING
TRIPLE 12'-0" X 8'-6" HIGH R.C. BOX CULVERT SEE SHEETS 2 & 3
INV: 310.90 EXIST. 15" R.C.P.
312.95 8" DROP INLET
EXIST. M.H. STA. 0+00.00
307.26 EXIST. 10" INLET ON N.E.
307.42 EXIST. 8" INLET ON S.E.
307.09 EXIST. F.L. 12" V.C.P.
0+77.00 316.46 B.C.R.
M.O.C. 316.38
E.C.R. 316.61
54.98' O.C.
1+22.50 316.23 LOW PT.
NAT. GROUND @ SOUTH R/W


52'
26'
26'
6'
20'
20'
6'
0.17'
0.17'
SLOPE 1/4" PER FT.
SLOPE 1/4 PER FT.
LEVEL
0.08'
LINE
ELECTROLIER
4'
℄ OF EASEMENT
2'
CONST. CONC. SIDEWALK, 4" THICK PER STD PLAN 206
CONST. TYPE "C-1" CURB AND GUTTER PER STD. PLAN 202
CONSTRUCTION SECTION TO BE DETERMINED AFTER SOILS TEST. 2" A.C. ON 6" A.B. MIN (SEE NOTE 6.)
CONST. CONC SIDEWALK 4" THICK PER STD PLAN 206.
CONST. TYPE "C-1" CURB AND GUTTER PER STD PLAN 202
ST LIGHTING CONDUIT

TYPICAL SECTION

GREENBRIAR LANE

GENERAL NOTES

1. SEE STANDARD 104 FOR TYPICAL SECTION OF LOCAL
2. SEE STANDARD 902.
3. ONE PARKWAY TREE SHALL BE PLANTED AT APPR
4. STREET LIGHTING SPECIFICATIONS ~ SEE STANDARD
5. NO JOINT PIPE MAY BE SUBSTITUTED FOR R.C.P. WH STANDARD PLAN 515.
6. UPON COMPLETION OF THE ROUGH GRADING, THE CI HAVE THE ORANGE COUNTY ROAD DEPARTMENT MA TESTS AND DETERMINE THE CONSTRUCTION SECT AND BASE THICKNESS SHOWN ON THESE PLANS THE ENGINEER AND DO NOT INDICATE FINAL SECTIO TO BE INCLUDED IN CONTRACT.
7. THE CITY OF BREA WILL DO ALL NECESSARY ST DEVELOPER FOR COSTS THEREOF.
8. THE EXISTENCE AND LOCATION OF ANY UNDERGRO STRUCTURES SHOWN ON THESE PLANS ARE OBTAI OF THE AVAILABLE RECORDS. TO THE BEST OF OUR ARE NO EXISTING UTILITIES OTHER THAN SHOWN THE CONTRACTOR IS REQUIRED TO TAKE ALL PRE URES TO PROTECT THE UTILITY LINES AND ANY O RECORD OR NOT SHOWN ON THESE PLANS.
9. TYPE I BEDDING PER STD. 308 SHALL BE USED ATIONS UNLESS OTHERWISE NOTED ON THESE PLA
10. DRIVEWAYS TO BE CONSTRUCTED PER CITY OF BRE UNLESS OTHERWISE NOTED ON THESE PLANS.
11. ALL LOCAL STREETS TO HAVE SOLID WHITE CENTER
12. ELECTROLIER (38) SHALL BE FURNISHED WITHO BUT, WITH: PLATE OVER ARM SOCKET, HAND OPPOSITE TRAFFIC, PLUGGED HOLES FO PEDESTRIAN BUTTON - SIGNAL HEADS AN WALK SIGNALS. △1

STREET NAME SIGN ⑦

NO. COR.	ASSOCIATED RD.	400 S.	GREENB

ESTIMATE OF QUANTIT

	ITEM	DESCRIPTION	PER B
		STREETS	
△2	①	CURB & GUTTER TYPE "C-1"	.
△2	②	P.C.C. SIDEWALK 4" THICK	206
	③	P.C.C. COMMERCIAL DRIVEWAY	2.
△2	④	2" A.C. W/SC.250 P.C. ON 6" A.B. (SEE NOTE 6)	214
	⑤	BARRICADE	6
	⑥	2"x6" REDWOOD HEADER	6
	⑦	STREET NAME SIGN	6
	⑧	TRAFFIC SIGN W53R (TEMP.)	6
	⑨	CONCRETE ENCASEMENT	3
	⑩	"GREENBRIAR LANE" ADVANCE SIGN G7R W/BACK FRAME 8" U.C. 6" L.C.	6
	⑪	CROSSWALK	6
	○		
	⑬	INLET - VARIABLE LENGTH PER SHT. 3	5
	⑭	TRAFFIC SIGN R1R	
	○		
	○	SEWERS	
	⑰	8" V.C.P. MAINLINE SEWER	4
	⑱	4"&6" V.C.P HOUSE LATERAL	4
	⑲	STD. MANHOLE	4
	⑳	CONST. DROP INTO EXIST STD. MANHOLE	4
	㉑	8" C.I.P. MAINLINE SEWER	301,
	㉒	STD. CLEAN-OUT	4
	○		
	○	WATER	
	㉕	AIR RELEASE VALVE ASSEMBLY	3
△2	㉖	6&8" C.I.P. WATER	5
	㉗	FIRE HYDRANT ASSEMBLIES, A 24015	3.
	㉘	BLOW-OFF ASSEMBLY	3
	㉙	WATER SERVICE - 2"	3.
	㉚	8" G.V. & 6" GV	302,
	㉛	8" C.I.P. PLUG	30
	○	STREET LIGHTS	
	㉝	EXTERNAL SHIELDS 35-100947-02	8
	㉞	SHIELDS (STREET) 35-103413-01	8
	㉟	SHIELDS (HOUSE) 35-104562-02	8
▷1	㊱	D7425120 175W II Pfaff & Kendall ELECTROLIER	
	㊲	STREET LIGHT ENCLOSURE	
▷1	㊳	WR-15-J-309-5-0, 400W II Weldrite ELECTROLIER	822
	○		
	○		

NOTES APPLYING TO CONSTRUCTION IN O.C.F.C.D. R/W. △2

1. THE CONTRACTOR SHALL NOTIFY O.C.F.C.D. AT 534-0336 AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY WORK WITHIN THE DISTRICT RIGHT-OF-WAY.
2. ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH ATTACHED PLANS. ALL EXCAVATIONS SHALL BE BACKFILLED AND COMPACTED TO A RELATIVE DENSITY OF AT LEAST 90% OF THE MAXIMUM DENSITY BY THE "FIVE LAYER METHOD" AS SPECIFIED IN CALIFORNIA TEST METHOD Nº 216C, 1956. See SHT 2.
3. ALL WORK WITHIN THE FLOOD CONTROL RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH THE PROVISIONS OF THE CONSTRUCTION PERMIT GRANTED BY ORANGE COUNTY FLOOD CONTROL CONTROL DISTRICT AND THE PLANS STAMPED WITH THE APPROVAL OF ORANGE COUNTY FLOOD CONTROL DISTRICT. THE CONTRACTOR SHALL HAVE A COPY OF SAID PERMIT AND STAMPED PLANS ON THE JOB SITE.

PROFILE SCALES:
HORIZ: 1" = 40'
VERT: 1" = 4'

REVISION	Approved	Date
△2	Harold A. Wilson	7-18-68
△1	Harold A. Wilson	6-12-68

O.C.F.C.D.

DATE 03168

PERMIT Nº

PREPARED UNDER THE DIRECTION OF:
James E. Whitelaw 3-13-68
JAMES E. WHITELAW R.C.E 14385 DATE
APPROVED BY:
Harold A. Wilson 4-5-68
CITY ENGINEER R.C.E. 8646 DATE
REVISED 4-12-68

BENCH MARK: Nº 2B-17-58

O.C.S.BM DISK STAMPED "R.C.E. 7872" 1.2 MI. S.E. AND E. ALONG IMPERIAL HWY. FROM POMONA AVE. 100' W. OF ASSOCIATED RD. 18' S. & IMPERIAL HWY. IN TOP OF CONC. HDWL. (STAMPED 1954) OF A TRIPLE CONC. & C.M.P. CULV. TO THE FLOOD CONTROL CHANNEL 1' E. OF W. END OF HDWL. BRIDE Nº 55-222. 1964 READJ. EL. 308.483.

CITY OF BRE

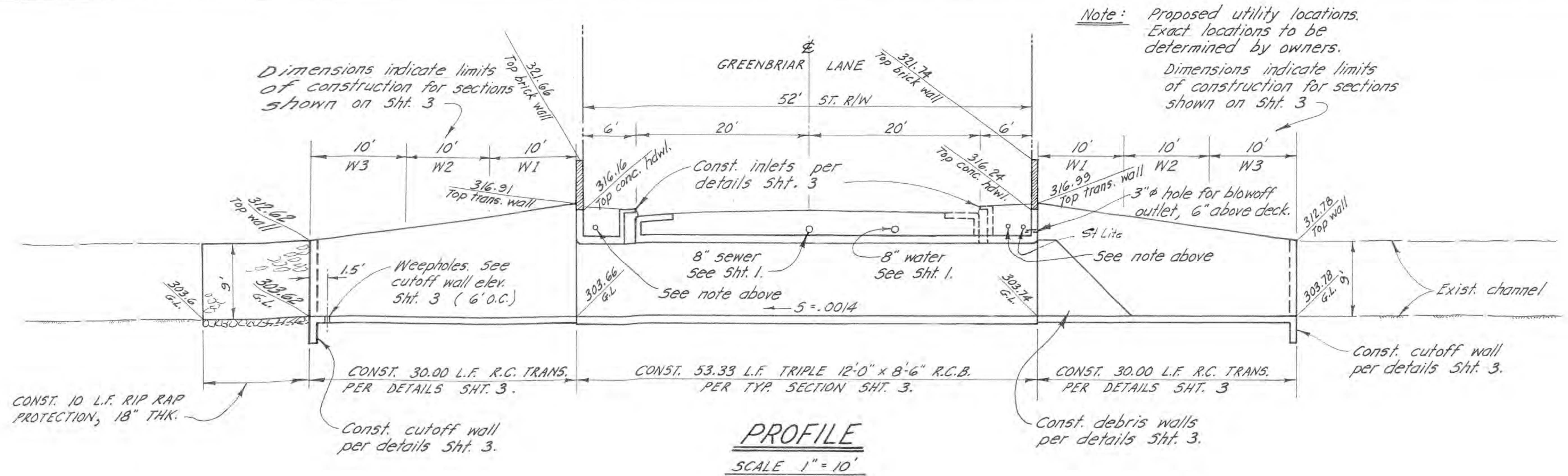
IMPROVEMENT
FOR
GREENBRIAR

PREPARED IN THE OFFICE OF
Voorheis-Trindle & Nelson, Inc.
13794 Beach Blvd
Westminster, Calif

Date: 3-5-68 J.N. G-3015

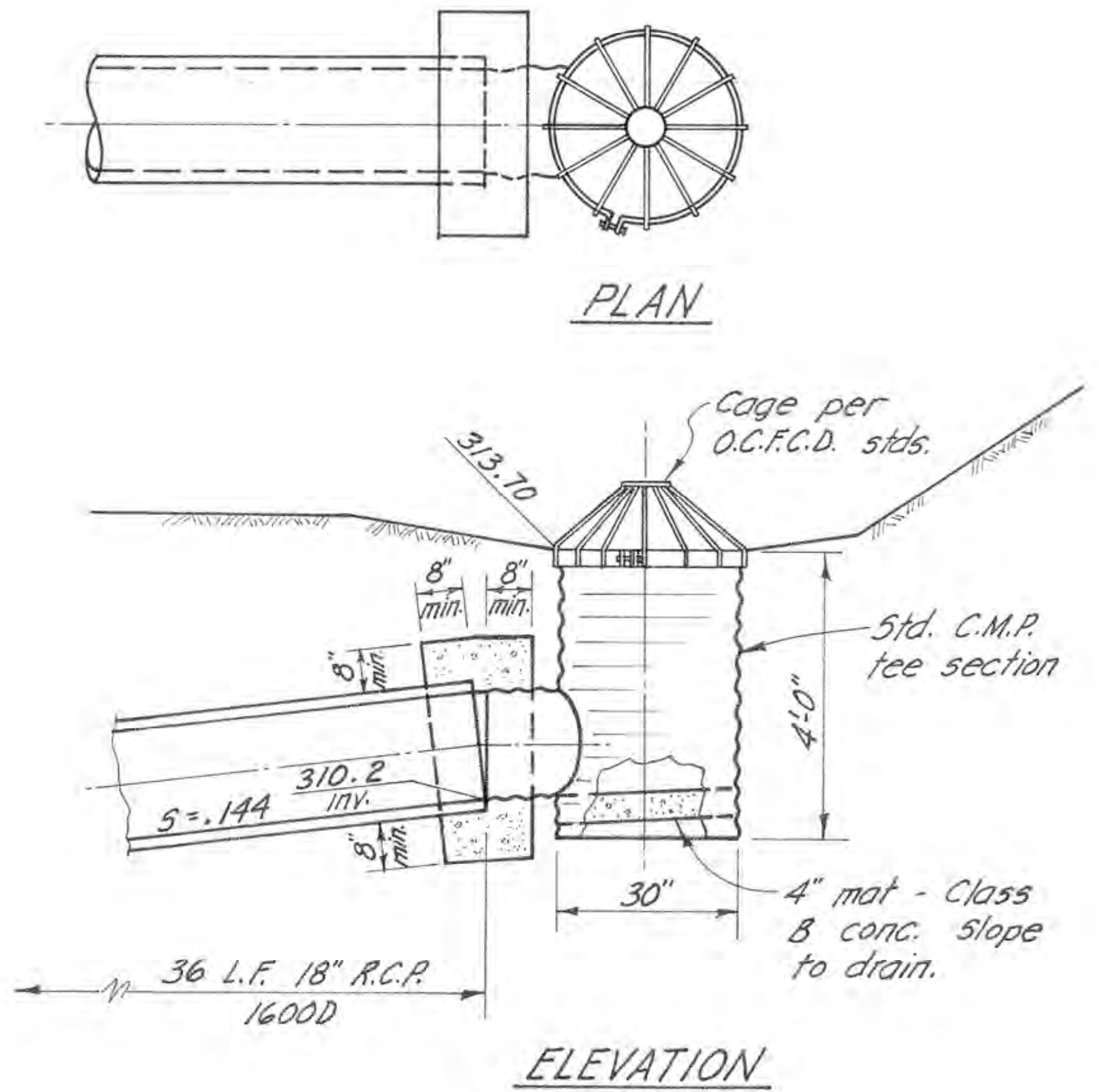
DE
DD
CH

Note: Proposed utility locations. Exact locations to be determined by owners.


Dimensions indicate limits of construction for sections shown on Sht. 3
GREENBRIAR LANE
52' ST. R/W
6'
20'
20'
6'
10' W3
10' W2
10' W1
10' W1
10' W2
10' W3
316.66 Top brick wall
321.74 Top brick wall
316.16 Top conc. hdwl.
316.24 Top conc. hdwl.
316.91 Top trans. wall
316.99 Top trans. wall
312.62 Top wall
312.78 Top wall
Const. inlets per details Sht. 3
3"ø hole for blowoff outlet, 6" above deck.
St. Lite
See note above
8" sewer See Sht. 1.
8" water See Sht. 1.
Weepholes. See cutoff wall elev. Sht. 3 (6' O.C.)
1.5'
9'
303.6 G.L.
302.66 G.L.
303.66 G.L.
303.74 G.L.
303.78 G.L.
S = .0014
Exist. channel
CONST. 10 L.F. RIP RAP PROTECTION, 18" THK.
CONST. 30.00 L.F. R.C. TRANS. PER DETAILS SHT. 3.
CONST. 53.33 L.F. TRIPLE 12'-0" × 8'-6" R.C.B. PER TYP. SECTION SHT. 3.
CONST. 30.00 L.F. R.C. TRANS. PER DETAILS SHT. 3
Const. cutoff wall per details Sht. 3.
Const. debris walls per details Sht. 3.

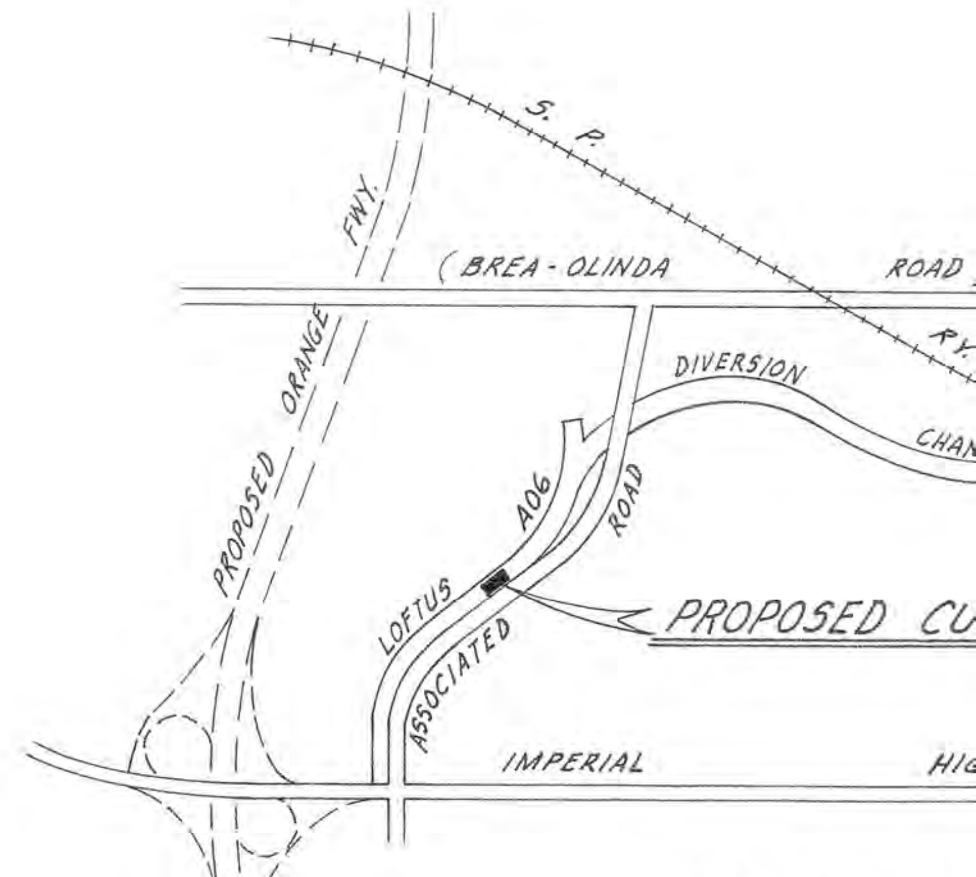
PROFILE

SCALE 1" = 10'



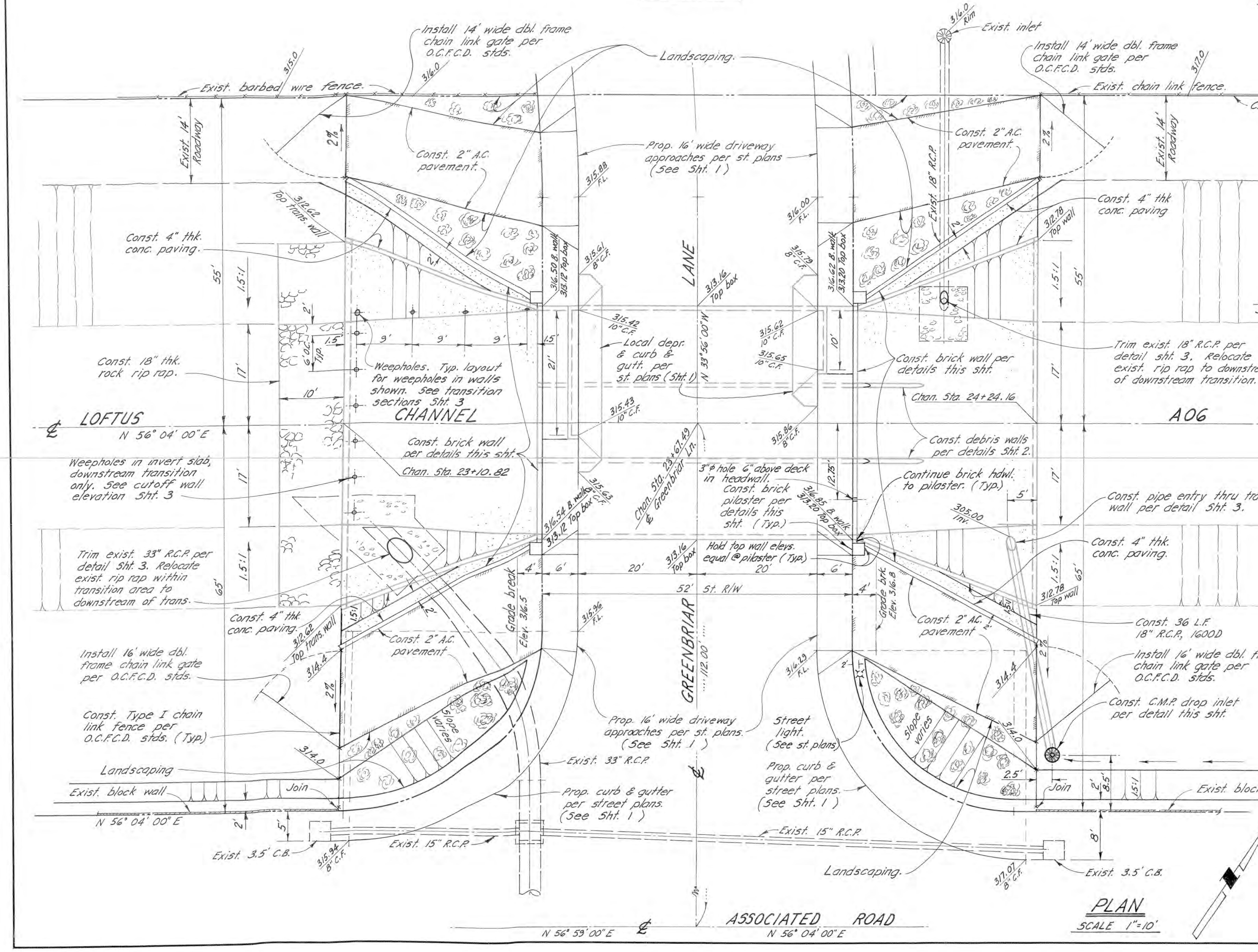
C.M.P. DROP INLET DETAILS

SCALE 3/8" = 1'-0"



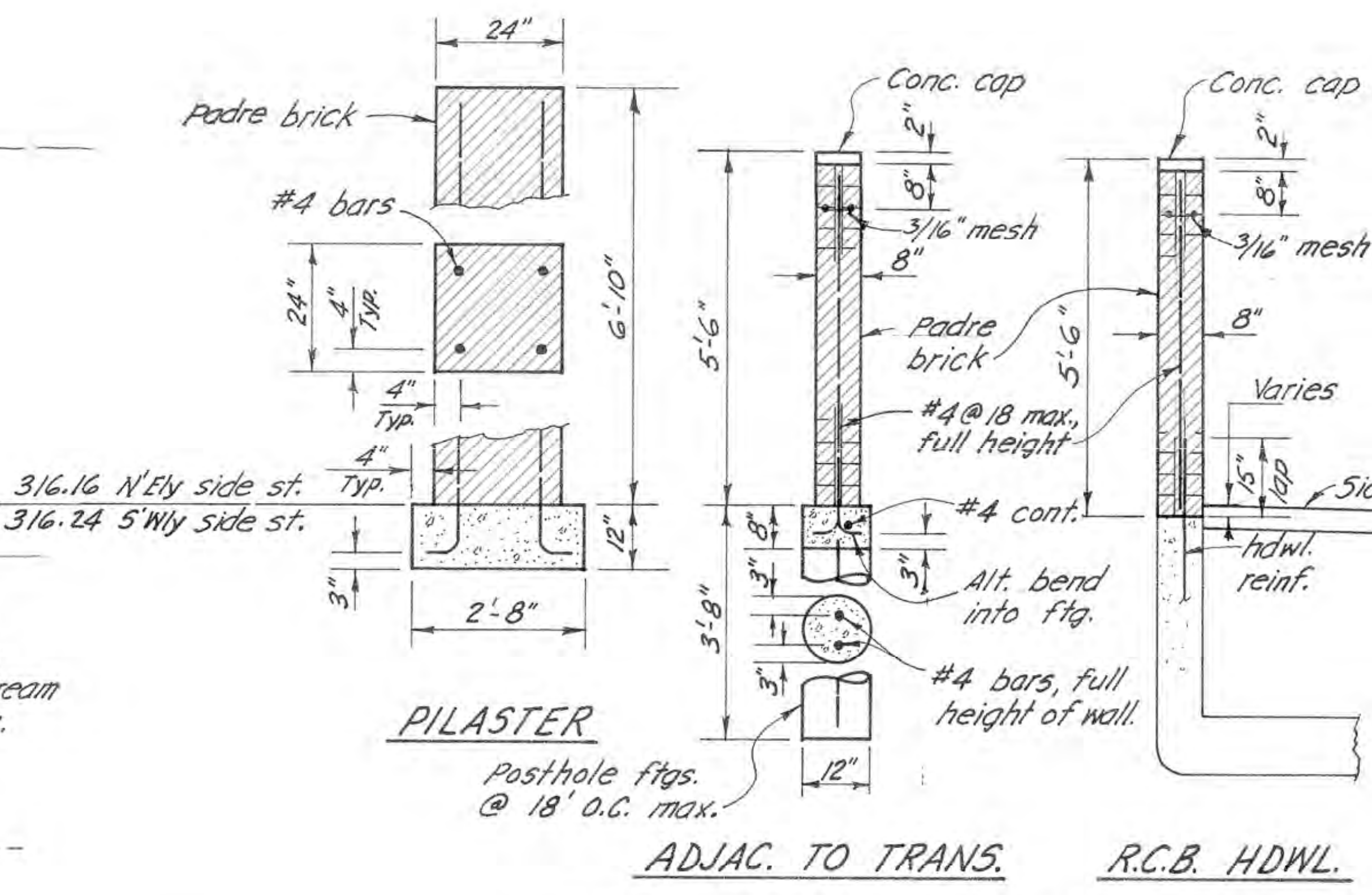
LOCATION M

SCALE 1" = 1000


316.0 Rim
Exist. inlet
Install 14' wide dbl. frame chain link gate per O.C.F.C.D. stds.
Landscaping.
Exist. barbed wire fence.
Exist. chain link fence.
Channel R/W line
315.0
316.0
317.0
Exist. 14' Roadway
Exist. 14' Roadway
Const. 2" A.C. pavement.
Prop. 16' wide driveway approaches per st. plans (See Sht. 1)
Const. 4" thk. conc. paving
312.62 Top trans. wall
312.78 Top wall
315.88 F.L.
316.00 F.L.
316.59 B. walk 313.12 Top box
316.62 B. walk 313.20 Top box
315.61 8" C.F.
315.79 8" C.F.
LANE
313.16 Top box
N 33° 56' 00" W
55'
1.5:1
Exist. 18" R.C.P.
Const. 18" thk. rock rip rap.
Weepholes. Typ. layout for weepholes in walls shown. See transition sections Sht. 3
9'
9'
9'
1.5'
6' O.C. Typ.
315.42 10" C.F.
315.62 10" C.F.
315.65 10" C.F.
315.43 10" C.F.
Local depr. & curb & gutt. per st. plans (Sht. 1)
Const. brick wall per details this sht.
Trim exist. 18" R.C.P. per detail sht. 3. Relocate exist. rip rap to downstream of downstream transition.
Chan. Sta. 24+24.16
LOFTUS
N 56° 04' 00" E
CHANNEL
A06
17'
17'
10'
15'
21'
10'
Const. brick wall per details this sht.
Chan. Sta. 23+10.82
Weepholes in invert slab, downstream transition only. See cutoff wall elevation Sht. 3
Const. debris walls per details Sht. 2.
Continue brick hdwl. to pilaster. (Typ.)
3"ø hole 6" above deck in headwall.
Const. brick pilaster per details this sht. (Typ.)
Hold top wall elevs. equal @ pilaster (Typ.)
Chan. Sta. 23+67.49 ℄ Greenbriar Ln.
316.54 B. walk 313.12 Top box
316.85 B. walk 313.20 Top box
315.63 8" C.F.
12.75'
305.00 Inv.
5'
Const. pipe entry thru trans. wall per detail Sht. 3.
Const. 4" thk. conc. paving.
Trim exist. 33" R.C.P. per detail Sht. 3. Relocate exist. rip rap within transition area to downstream of trans.
65'
65'
1.5:1
1.5:1
Const. 4" thk. conc. paving.
312.62 Top trans. wall
312.78 Top wall
Grade break Elev. 316.5
Grade brk. Elev. 316.8
313.16 Top box
6'
20'
20'
6'
4'
4'
52' St. R/W
Const. 2" A.C. pavement
Const. 2" A.C. pavement
315.96 F.L.
316.23 F.L.
GREENBRIAR
112.00
Const. 36 L.F. 18" R.C.P. 1600D
Install 16' wide dbl. frame chain link gate per O.C.F.C.D. stds.
Install 16' wide dbl. frame chain link gate per O.C.F.C.D. stds.
Const. C.M.P. drop inlet per detail this sht.
Const. Type I chain link fence per O.C.F.C.D. stds. (Typ.)
314.4
314.4
314.0
314.0
Slope varies
Slope varies
Prop. 16' wide driveway approaches per st. plans. (See Sht. 1)
Street light. (See st. plans)
Prop. curb & gutter per street plans. (See Sht. 1)
Prop. curb & gutter per street plans (See Sht. 1)
Landscaping
Exist. 33" R.C.P.
Exist. block wall
Exist. block wall
Join
Join
2.5'
2'
8.5'
15:1
N 56° 04' 00" E
2'
5'
8'
Exist. 15" R.C.P.
Exist. 15" R.C.P.
Exist. 3.5' C.B.
Exist. 3.5' C.B.
315.94 8" C.F.
317.01 8" C.F.
Landscaping.
N 56° 59' 00" E
℄
ASSOCIATED ROAD
N 56° 04' 00" E

PLAN

SCALE 1" = 10'



BRICK WALL DETAILS

SCALE 3/8" = 1'-0"

FLOOD CONTROL NOTE

All materials used and work district right of way shall co standard specifications and construction permit granted shall maintain a copy of sa and stamped plans on the property and conformance w subject to inspection and duly assigned inspector wh decisions shall be final.

ORANGE COUNTY FLOOD CO

PERMIT Nº 03168

GENERAL NOTES

1. Locations of public utilities shown have been determined from available information. However it shall be the responsibility of the contractor to determine the true location of any existing utilities and to exercise proper precautions to avoid injury or damage thereto.
2. ▽ ✱ All excavations shall be backfilled & compacted to a relative density of at least 90% of the maximum density by the "Five Layer Method," as specified in California Test Method Nº 216; except as noted in Typical Section.
3. All materials and construction, including forms and minimum strength requirements for reinforced concrete before form removal, shall be in accordance with Orange County Flood Control District Specifications.
4. Lap all splices 30 bar diameters unless otherwise shown on plans.
5. All concrete in reinforced concrete structures shall be 3000 pounds per square inch Portland cement concrete.

▽ REV 4-22-68 HAW by CLE

REVISED 4-12-68

PREPARED UNDER THE DIRECTION O

Jack Mahoney
RCE 14325

APPROVED FOR STREET IMPROVEM

City Engineer

BENCH MARK:

O.C.S. B.M. DISK STAMPED "RCE 7872
IMPERIAL HWY. FROM POMONA AVE.
18' S. ℄ IMPERIAL HWY. IN THE TOP
1954) OF A TRIPLE CONC. & C.M.P. CULV
1' E. OF THE W. END OF THE HDW'L.
1964 READJ.

O.C.F.C.D. BENCH MARK: Chis. "+" c
Hwy. struct, Sta. 10+40 Loftus Cha
(Add 0.87' to elevs. shown hereon

CITY OF

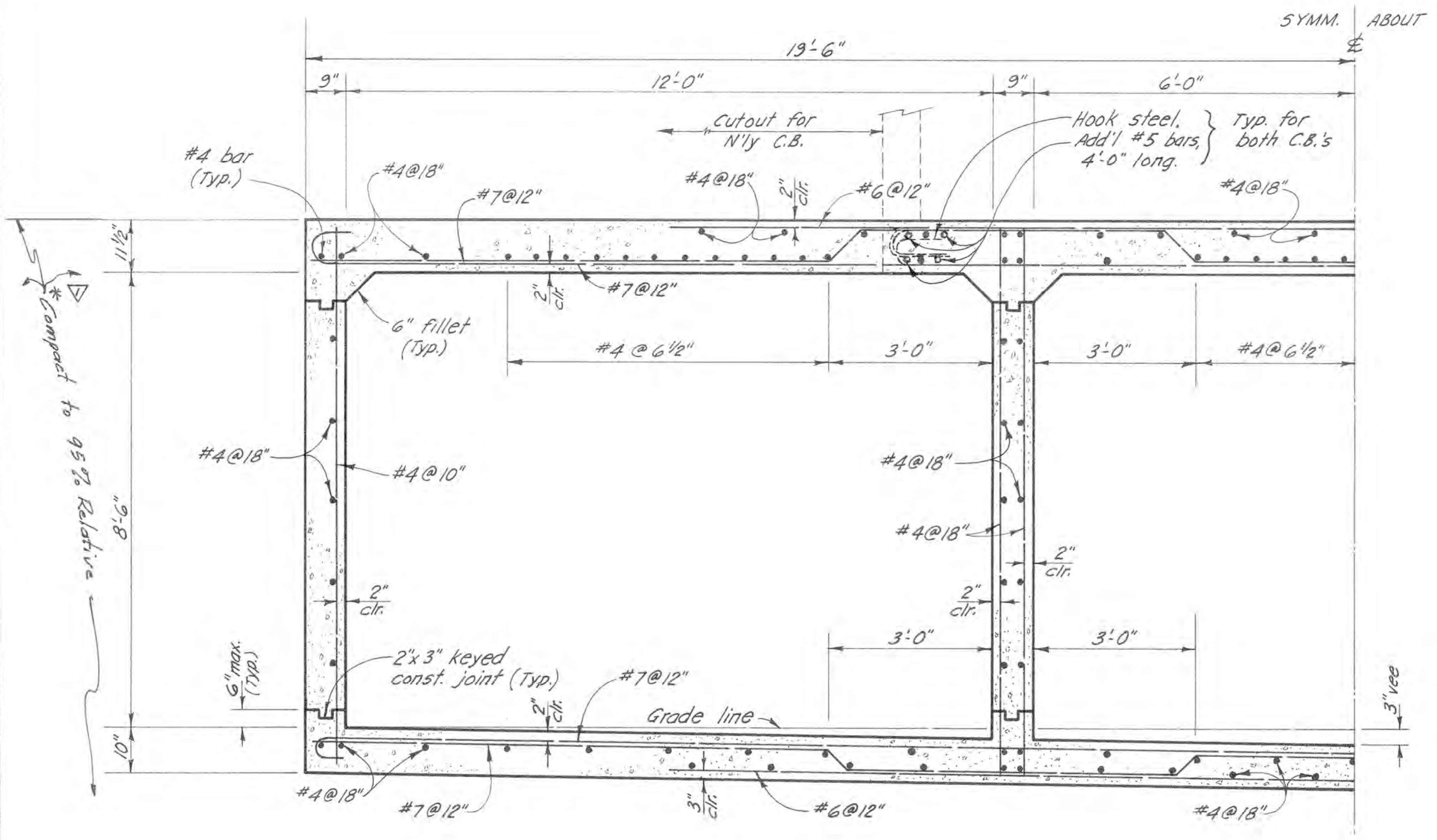
PLAN & PR

TRIPLE BOX CU
ON
LOFTUS CHANNEL AT

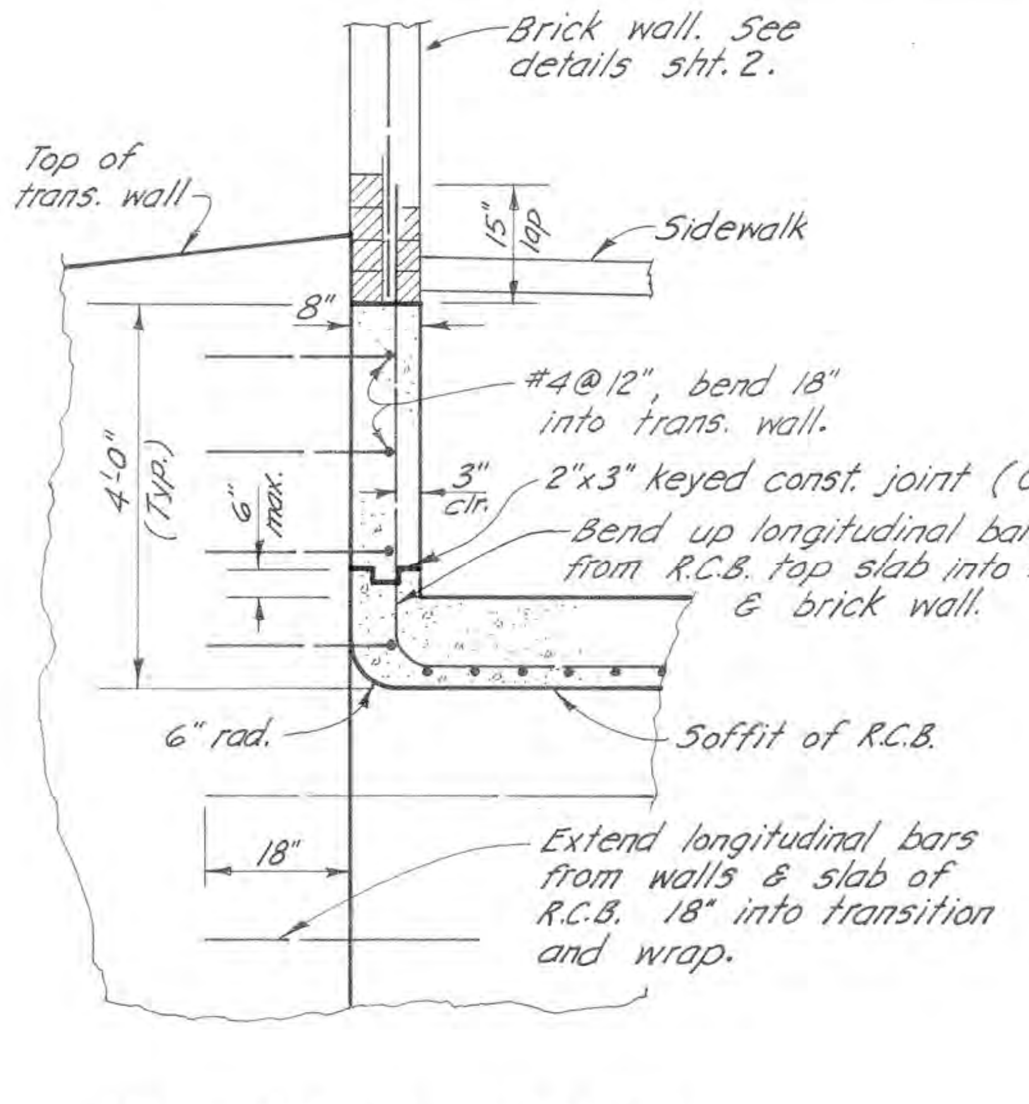
Prepared in the office of:
VOORHEIS TRINDLE NELSON, INC.
13794 BEACH BLVD.
WESTMINSTER, CALIF.

DATE: MARCH, 1968

1253-

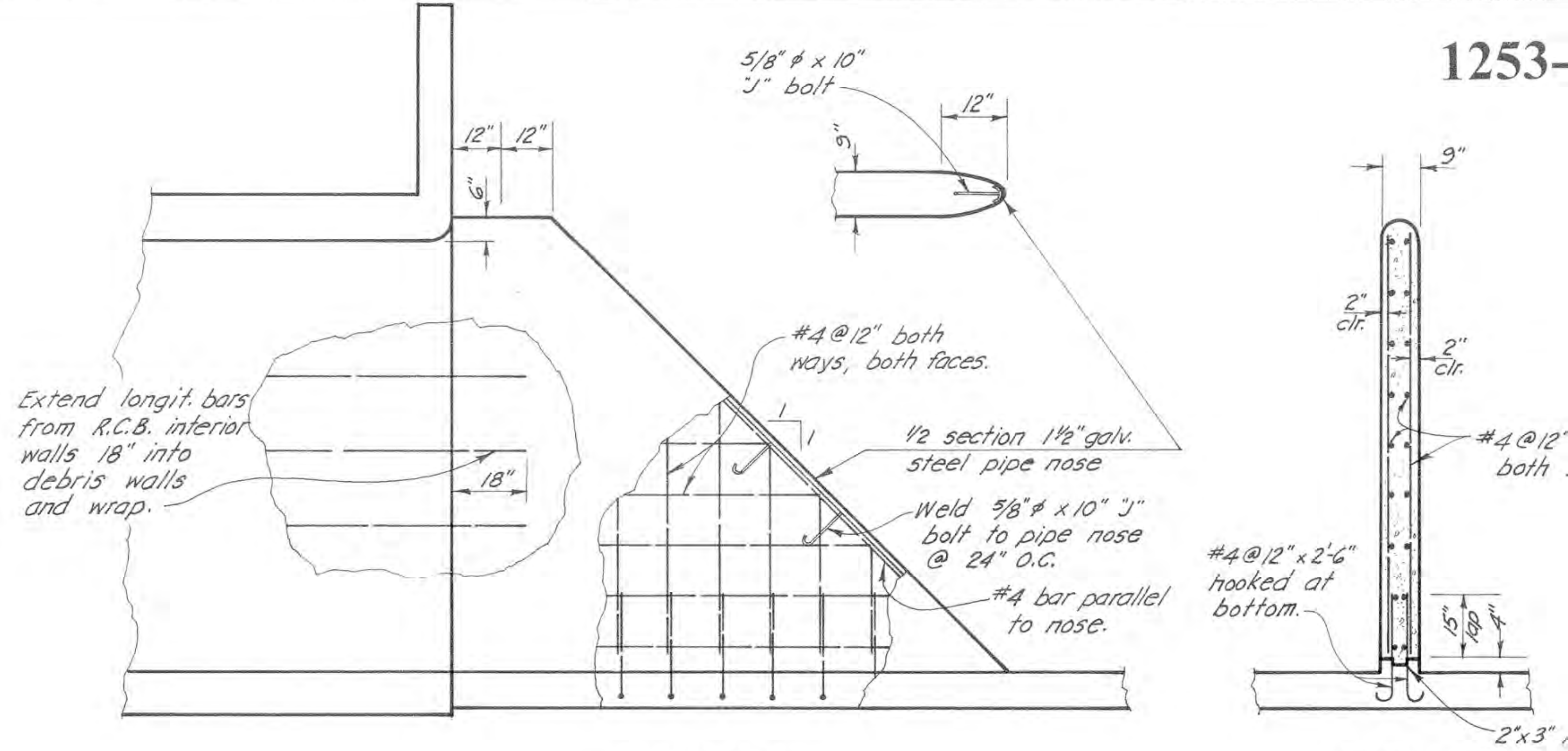


TYPICAL SECTION
TRIPLE 12'-0" x 8'-6" R.C.B.
SCALE 1/2"=1'-0"



Brick wall. See details sht. 2.
Top of trans. wall
Sidewalk
15" lap
8"
#4@12", bend 18" into trans. wall.
4'-0" (Typ.)
6" max.
3" clr.
2"x3" keyed const. joint (Opt.)
Bend up longitudinal bars from R.C.B. top slab into hdwl. & brick wall.
6" rad.
Soffit of R.C.B.
18"
Extend longitudinal bars from walls & slab of R.C.B. 18" into transition and wrap.

HEADWALL DETAIL
SCALE 1/2"=1'-0"

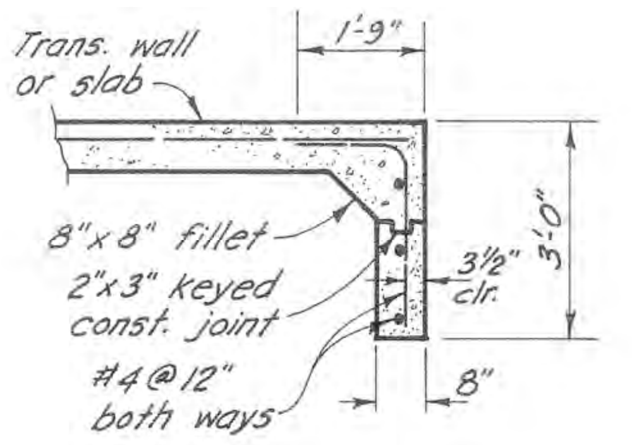


12"
12"
6"
5/8" ϕ x 10" "J" bolt
12"
9"
9"
Extend longit. bars from R.C.B. interior walls 18" into debris walls and wrap.
18"
#4@12" both ways, both faces.
1
1
½ section 1½" galv. steel pipe nose
Weld 5/8" ϕ x 10" "J" bolt to pipe nose @ 24" O.C.
#4 bar parallel to nose.
2" clr.
2" clr.
#4@12" both
#4@12" x 2'-6" hooked at bottom.
15" lap
4"
2"x3"

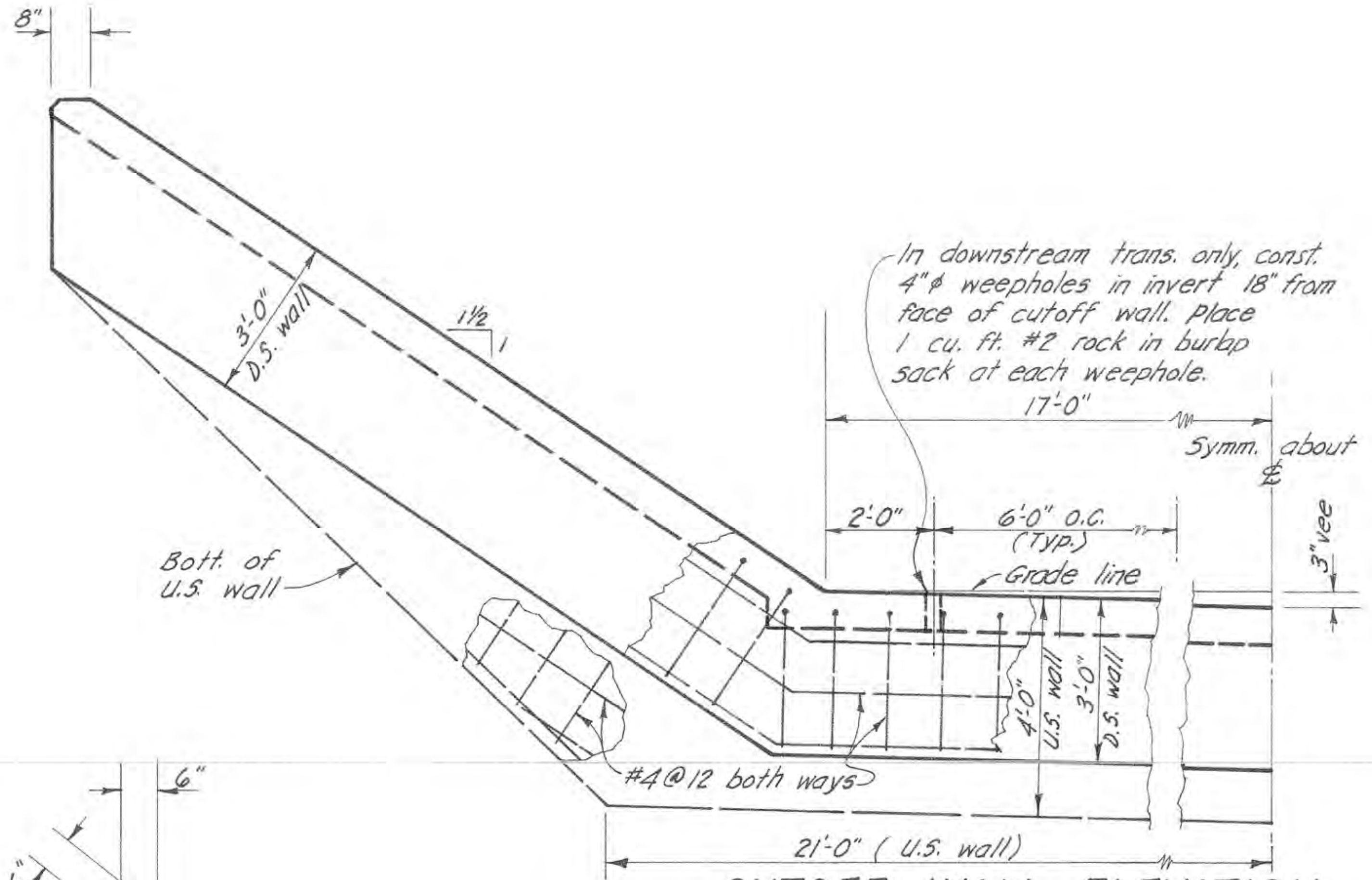
ELEVATION

SECTION

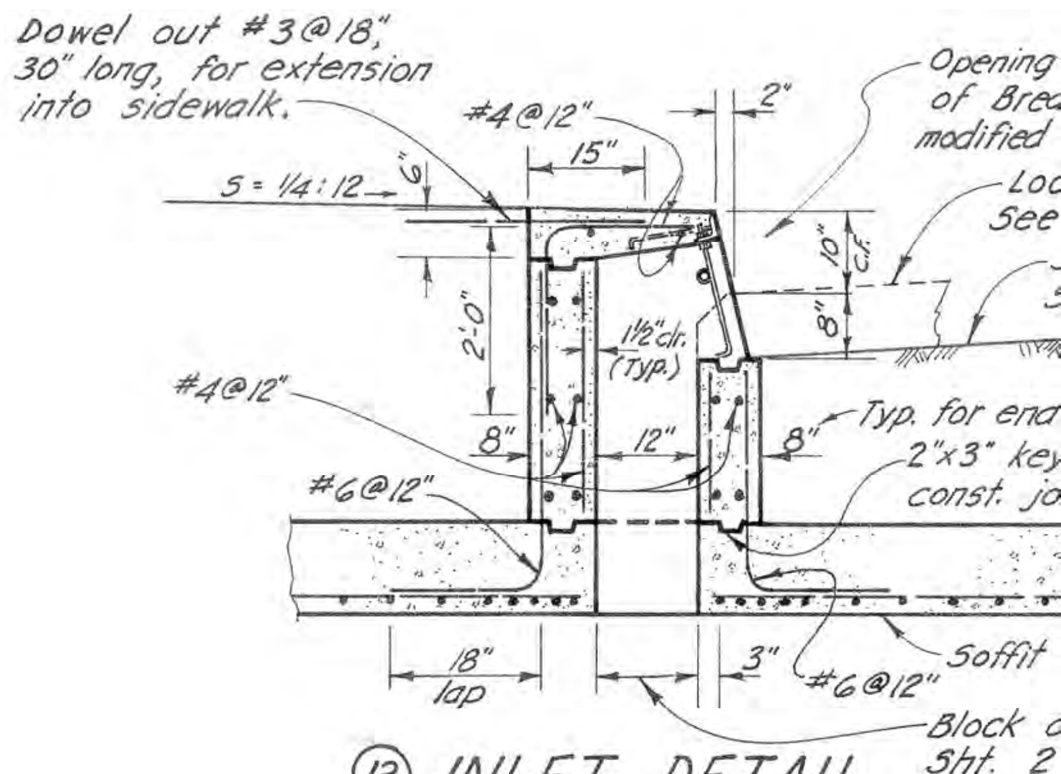
DEBRIS WALL DETAILS
SCALE 3/8"=1'-0"



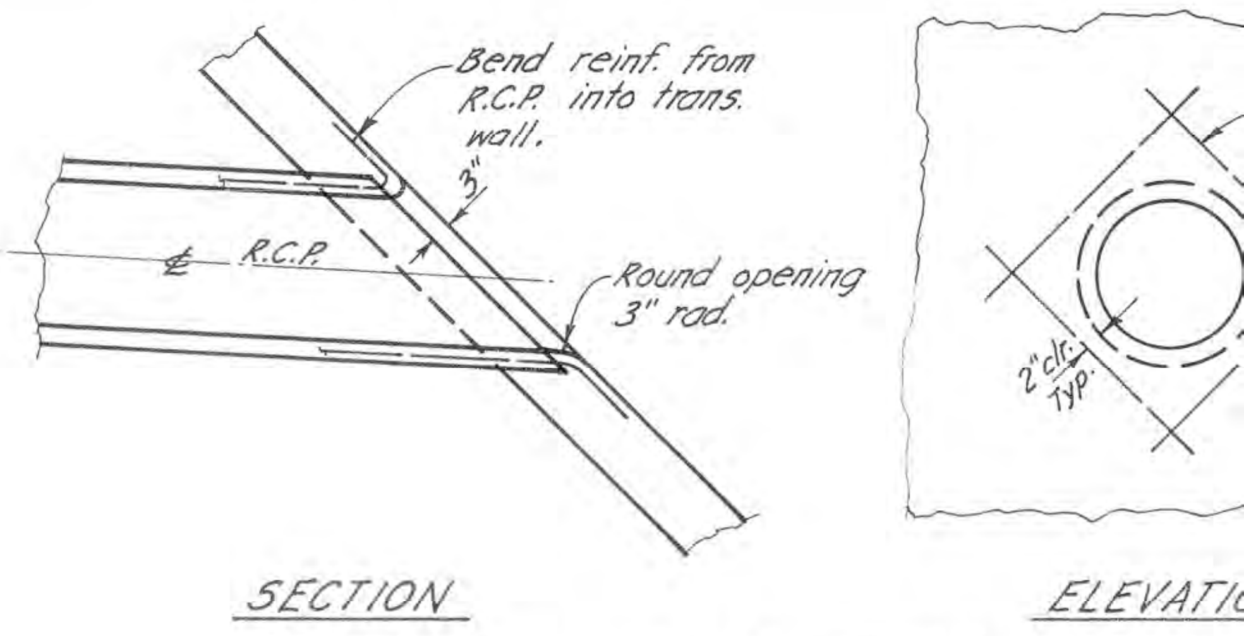
TYPICAL SECTION
CUTOFF WALL
SCALE 3/8"=1'-0"



CUTOFF WALL ELEVATION
SCALE 3/8"=1'-0"



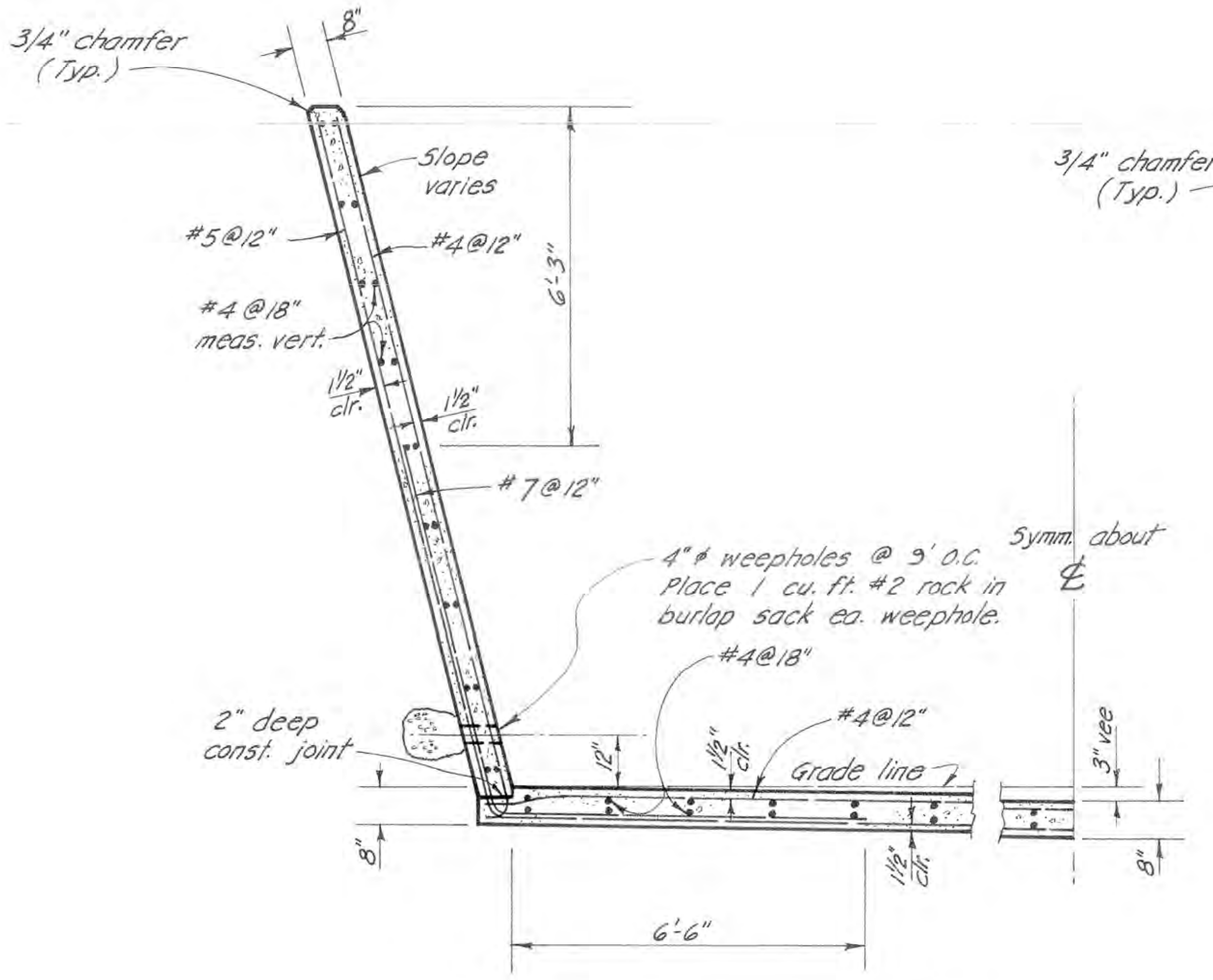
⑬ INLET DETAIL
SCALE 1/2"=1'-0"



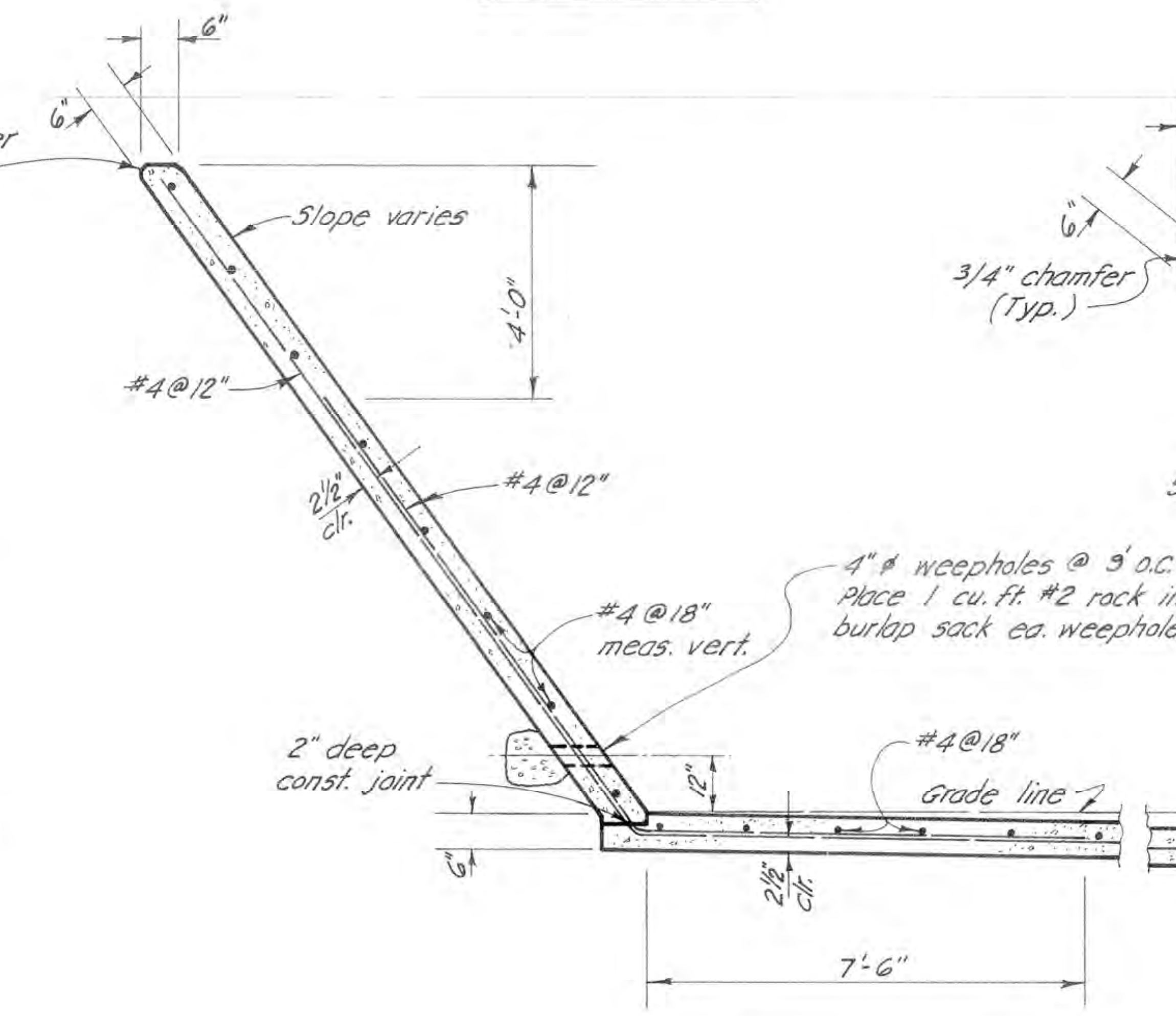
SECTION

ELEVATIO

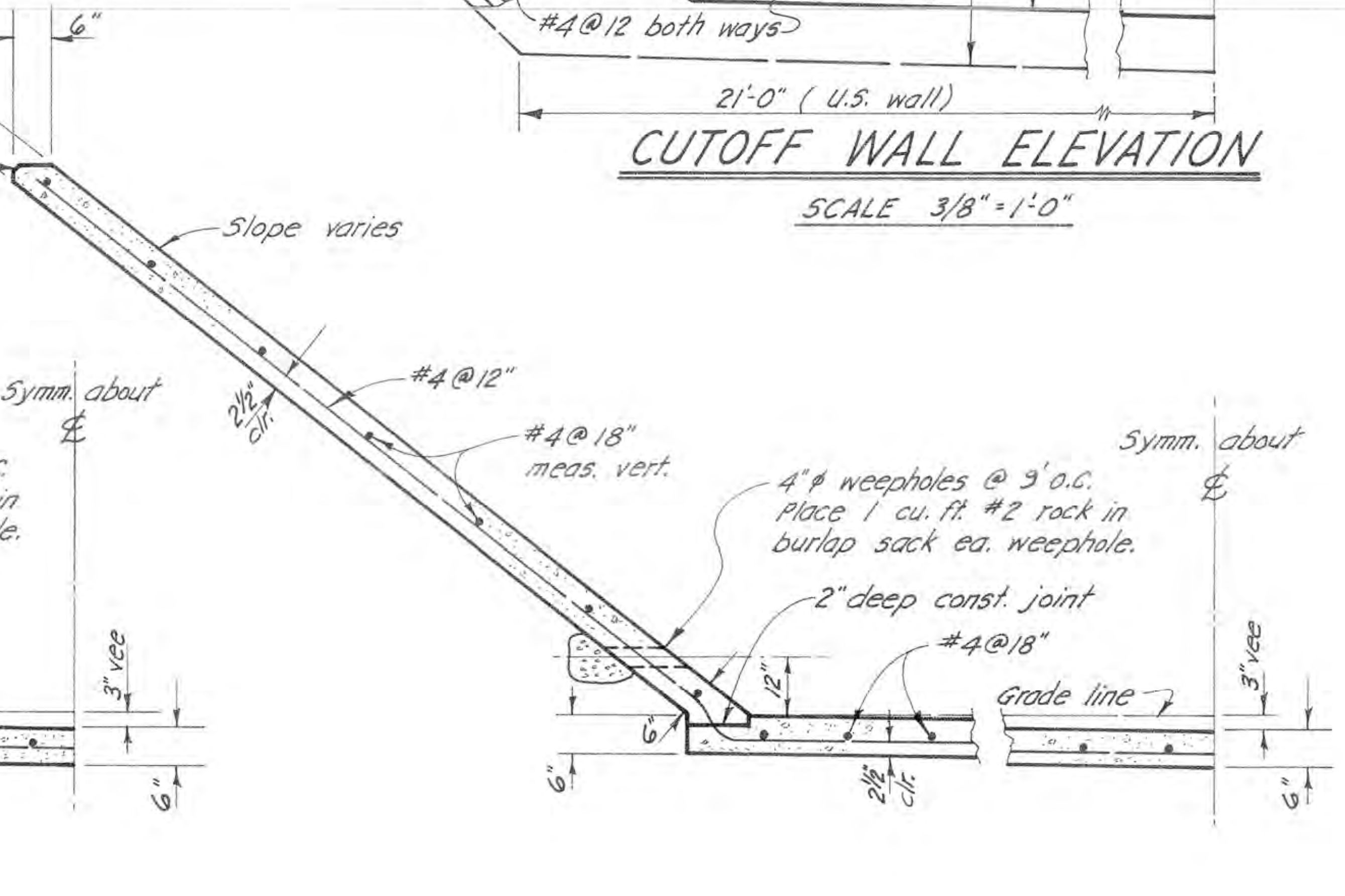
TYP. PIPE ENTRY THRU TRANS.
NO SCALE



TRANS. SECTION W1
(SEE PROFILE SHT. 2.)
SCALE 3/8"=1'-0"



TRANS. SECTION W2
(SEE PROFILE SHT. 2)
SCALE 3/8"=1'-0"



TRANS. SECTION W3
(SEE PROFILE SHT. 2)
SCALE 3/8"=1'-0"

CITY OF BRE

STRUCTURAL DETA

TRIPLE BOX CULVE
ON
LOFTUS CHANNEL AT GREE

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