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PRELIMINARY HYDROLOGY REPORT

FOR

T.T.M. 19447

9822 Russell Avenue

City of Garden Grove, CA

Date: October 28th, 2025

REGISTERED PROFESSIONAL ENGINEER
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NO. 45591
CIVIL
STATE OF CALIFORNIA

PLANS PREPARED UNDER THE SUPERVISION OF:

10/28/25

Fred Cornwell, P.E. - R.C.E 45591 Date

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1.0 INTRODUCTION

The purpose of this report is to present the hydrology analysis and drainage calculations for a proposed residential development located at 9822 Russell Avenue, in the City of Garden Grove, California. The site proposes to construct 26 townhomes and related improvements on approximately 1.80 acres. This report will determine the existing and proposed storm water runoff rates from the project site and determine the impact on the existing surrounding drainage facilities,

2.0 EXISTING DRAINAGE CONDITIONS

The project site is located in the City of Garden Grove, California, and is comprised of approximately 1.80 acres (78,537 square feet), and is located in a predominantly residential development area. The rectangular site is bounded by Russell Avenue to the north (beyond which are residential buildings), Sunnyside Elementary School to the east, Kerry Street to the west (beyond which are residential buildings), and residential buildings and a church to the south.

The northwest portion of the site is currently occupied by buildings housing a church and a preschool, and there is a small storage shed located near the southwest corner of the site. The remainder of the site is covered in asphalt drive aisles and parking areas, concrete hardscape, and landscaping.

The project site is rectangular in shape and has a relatively flat topography that generally slopes southwesterly with elevations ranging from about 74 to 72 feet above mean sea level (msl). Surface drainage sheet flows to either Russell Avenue or Kerry Street and is conveyed westerly and southerly until entering the storm drain system downstream via a catch basin on Donegal Drive near the Trask Avenue intersection. The project area currently has no water quality or drainage mitigation devices installed on-site.

3.0 PROPOSED DRAINAGE CONDITIONS

The drainage for the proposed project generally follows the existing flow characteristics. The site has been divided into four drainage areas, identified as Areas 1-4. Storm flows from each area will be collected via curb & gutters in the drive aisles and drain to one of four curb-opening catch basins. Drainage in the non-drive aisle areas will be captured via proposed area drains. All of the captured drainage will be directed to one of three underground infiltration BMP facilities that will be sized to treat the Design Capture Volume (DCV) as defined in the Technical Guidance Document for the WQMP.

During larger storm events, as with existing conditions, drainage for the proposed project will outlet onto either Russell Avenue or Kerry Street. In Area 1, the excess flows will bubble out of the Area 1 catch basin and be discharged to Russell Avenue via a parkway culvert. In Area 2, the excess flows will bubble out of the Area 2 catch basin and be discharged to Russell Avenue via the project driveway entrance. Overflow drainage for Areas 3 and 4 will bubble out of the Area 3 catch basin and be discharged to Kerry Street via a parkway culvert.

4.0 METHODOLOGY

The hydrology calculations for the study were completed using AES software based on the Orange County Hydrology Manual methodology. The Rational Method was used to determine the peak discharges for the pre-and post-developed conditions and can be found in Appendix “A” (existing) & Appendix “B” (proposed).

These peak flow rates for the 2, 10 and 100 year storm events will be compared in the results section of this report found below. The hydrologic sub areas and flow paths that produce these rates are shown on the Existing (Exhibit A) & Proposed (Exhibit B) hydrology maps.

5.0 HYDRAULICS

Note, the hydraulic calculations including the catch basin and pipe sizing will be analyzed in the Final Hydrology Report.

6.0 WATER QUALITY

The BMP facilities will be sized to capture and treat the Design Capture Volume (DCV) per the Technical Guidance Document as published by the County of Orange. The underground infiltration BMP facilities will be sized to store a total of 5,760 cubic feet of stormwater, which is in excess of the total DCV of 3,736 cubic feet.

Since there are no hydraulic conditions of concern (HCOC's), the flow will not have to be detained. When a larger storm event occurs that increases the runoff to a point where the underground infiltration BMP facilities are full, the excess flows be discharged to Russell Avenue or Kerry Street via parkway culverts or the driveway entrance.

7.0 FLOOD PLAIN DESIGNATION

The site falls within a Zone "X" designation under the FEMA Map 06059C0138J, dated December 3, 2009. Zone X (Shaded Orange Area) represents areas determined 0.2% annual chance flood hazard, area of 1% annual chance flood with average depth less than one foot or with drainage areas less than one square mile.

8.0 RESULTS

The results of the Existing and Proposed conditions for the existing site outlet location as shown on the hydrology maps are as follows:

	Existing Condition			Proposed Condition					Increase/ (Decrease)	%
	A1	∑A2/A3	TOTAL	A1	A2	A3	A4	TOTAL	-	-
Area	0.54 AC	1.26 AC	**1.80 AC**	0.48 AC	0.73 AC	0.42 AC	0.17 AC	**1.80 AC**	-	-
2 Year Storm	0.94 CFS	1.66 CFS	**2.60 CFS**	0.83 CFS	1.13 CFS	0.73 CFS	0.31 CFS	**3.00 CFS**	0.40 CFS	15.4%
10 Year Storm	1.69 CFS	3.01 CFS	**4.70 CFS**	1.51 CFS	2.05 CFS	1.33 CFS	0.56 CFS	**5.45 CFS**	0.75 CFS	16.0%
100 Year Storm	2.58 CFS	4.63 CFS	**7.21 CFS**	2.31 CFS	3.15 CFS	2.05 CFS	0.85 CFS	**8.36 CFS**	1.15 CFS	16.0%

Under proposed conditions, flows for the 2 year storm is increased by 15.4%, flows for the 10 year storm is increased 16.0%, and flows for the 100 year storm is increase by 16.0% when compared to existing conditions.

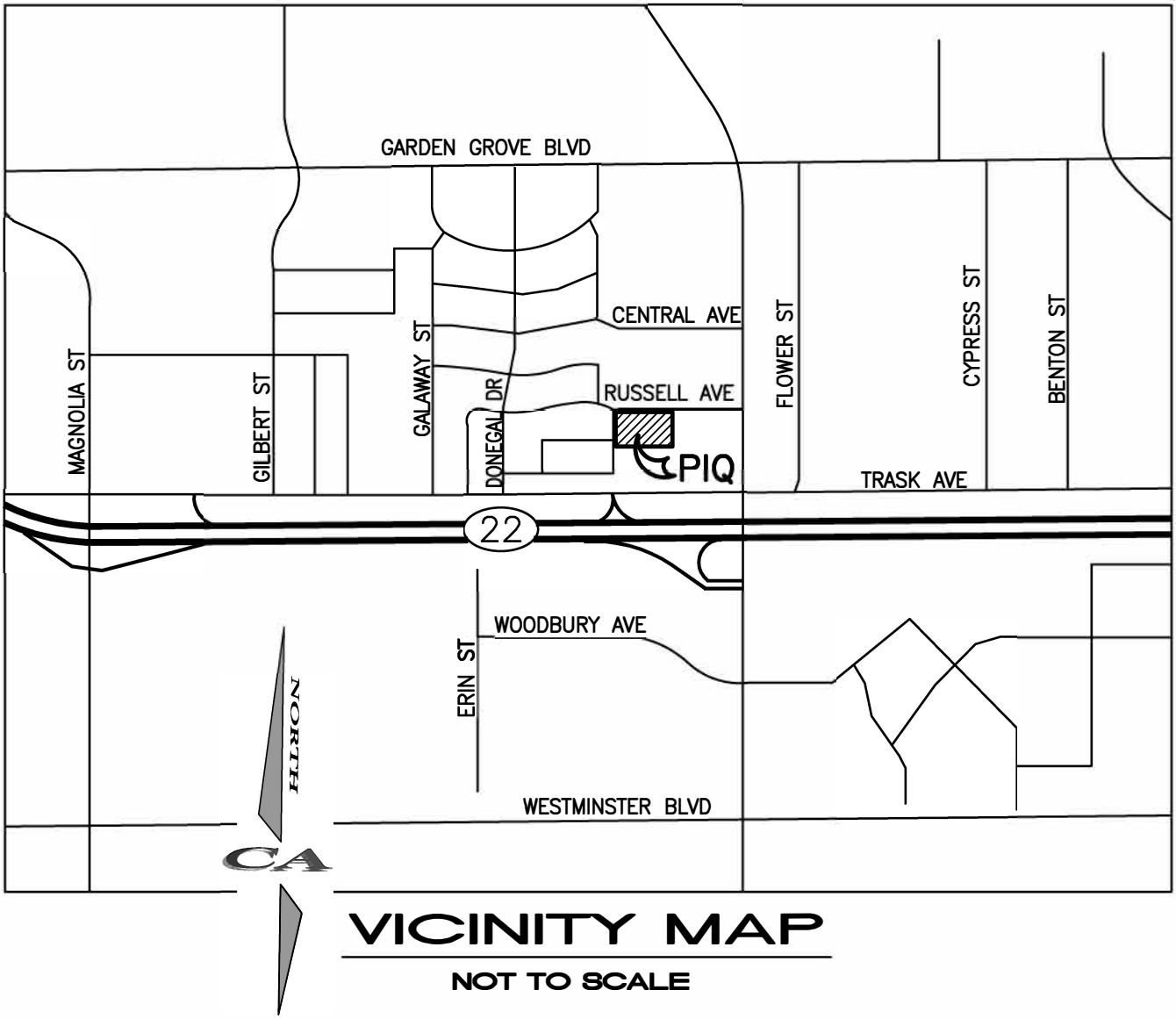
9.0 CONCLUSION

To meet water quality requirements, the DCV will be captured onsite with four curb inlet catch basins and treated in underground infiltration BMP facilities. During larger storm events, as with existing conditions, drainage for the proposed project will outlet onto Russell Avenue & Kerry Street.

During a 100 year storm event, existing flows (7.21 CFS) will be increase by 1.15 CFS under proposed conditions (8.36 CFS). For the 10 year storm event, existing flows (4.70 CFS) will be increased by 0.75 CFS under proposed conditions (5.45 CFS). For the 2 year storm event, existing flows (2.60 CFS) will be increased by 0.40 CFS under proposed conditions (3.00 CFS).

Since proposed flows are slightly increased from the existing flows, the proposed project site will have no significant impact on the existing surrounding drainage facilitates.

10.0 VICINITY MAP

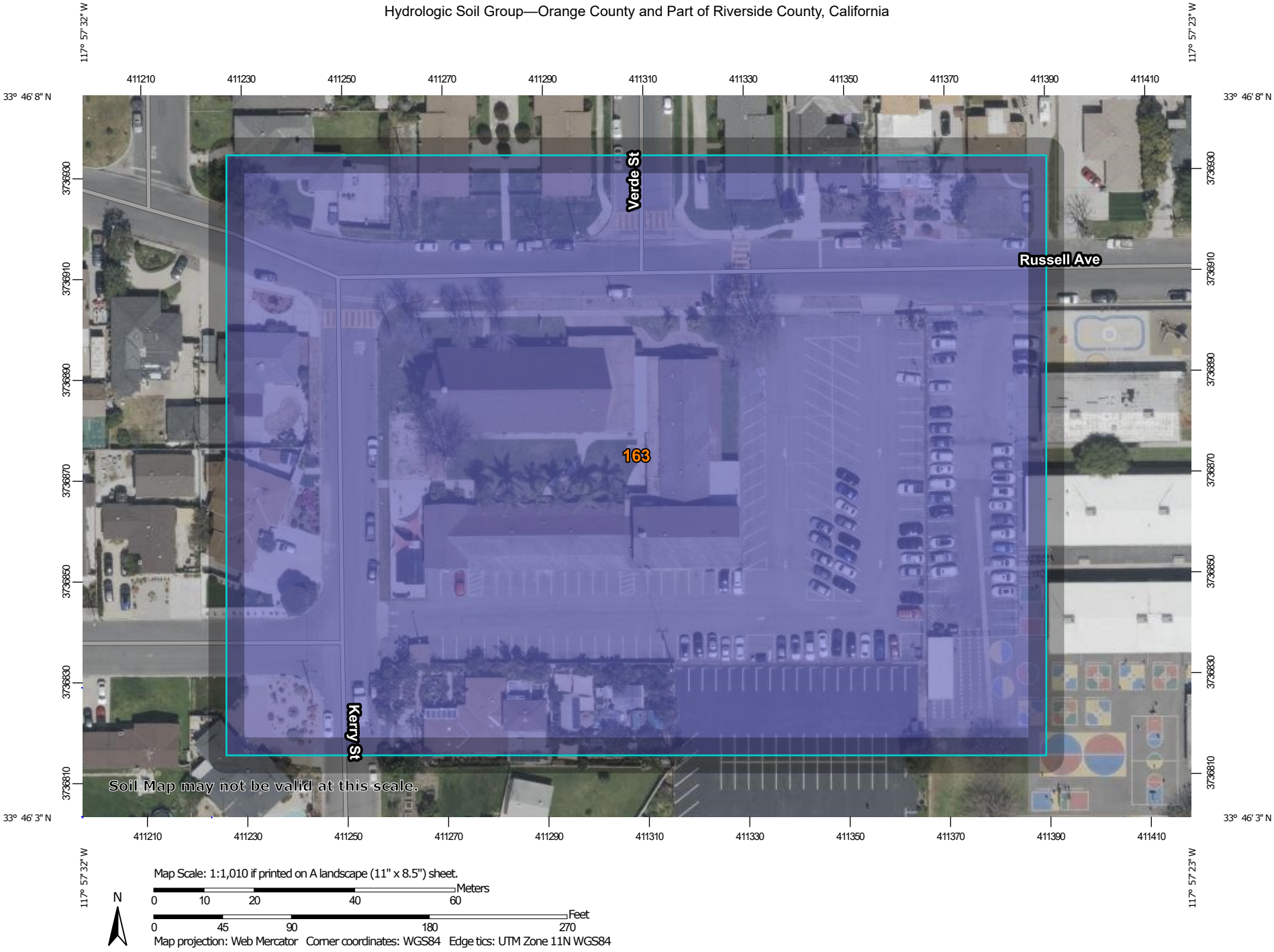


VICINITY MAP

NOT TO SCALE

11.0 SOIL MAP

Hydrologic Soil Group—Orange County and Part of Riverside County, California



Map Scale: 1:1,010 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 19, Sep 8, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
163	Metz loamy sand	B	4.8	100.0%
Totals for Area of Interest			**4.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDICES

APPENDIX A: EXISTING RATIONAL METHOD, 2, 10, & 100 YEAR STORM FREQUENCY OUTPUT FILES.

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****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* EXISTING CONDITION                                                       *
* 2 YR STORM                                                               *
*                                                                          *
 ****************************************************************************

  FILE NAME: 491-22EX.DAT
  TIME/DATE OF STUDY: 13:24 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   173.00
  ELEVATION DATA: UPSTREAM(FEET) =     73.40  DOWNSTREAM(FEET) =     72.20

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

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.455
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.955
  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                 B        0.54      0.30     0.100    36    6.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.94
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      0.94

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 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) =     74.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.981
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.617
  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                 B        0.91      0.30     0.100    36    8.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.30
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.30

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     72.80
  DOWNSTREAM NODE ELEVATION(FEET) =     71.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.050   MANNING'S N = .0140
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.491
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.82
  AVERAGE FLOW DEPTH(FEET) =   0.15   FLOOD WIDTH(FEET) =   14.53
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =   10.34
  SUBAREA AREA(ACRES) =    0.35       SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =    1.26     AREA-AVERAGED Fm(INCH/HR) =   0.03
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       1.66

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOOD WIDTH(FEET) =   15.47
  FLOW VELOCITY(FEET/SEC.) =   1.82   DEPTH*VELOCITY(FT*FT/SEC) =   0.28
```

```
  LONGEST FLOWPATH FROM NODE      3.00 TO NODE      5.00 =     449.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.3  TC(MIN.) =     10.34
  EFFECTIVE AREA(ACRES) =      1.26  AREA-AVERAGED Fm(INCH/HR)=  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       1.66
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                           Analysis prepared by:

 ************************** DESCRIPTION OF STUDY *************************
* EXISTING CONDITION                                                     *
* 10 YR STORM                                                            *
*                                                                        *
 ************************************************************************

  FILE NAME: 491-22EX.DAT
  TIME/DATE OF STUDY: 13:28 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   173.00
  ELEVATION DATA: UPSTREAM(FEET) =     73.40  DOWNSTREAM(FEET) =     72.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.455
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.507
  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                 B        0.54      0.30     0.100    56    6.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.69
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      1.69
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 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) =     74.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.981
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.902
  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                 B        0.91      0.30     0.100    56    8.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.35
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.35

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     72.80
  DOWNSTREAM NODE ELEVATION(FEET) =     71.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.050   MANNING'S N = .0140
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.685
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.90
  AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =   21.41
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =   10.29
  SUBAREA AREA(ACRES) =    0.35       SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =    1.26     AREA-AVERAGED Fm(INCH/HR) =   0.03
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       3.01

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOOD WIDTH(FEET) =   22.34
  FLOW VELOCITY(FEET/SEC.) =   1.93   DEPTH*VELOCITY(FT*FT/SEC) =   0.36
  LONGEST FLOWPATH FROM NODE      3.00 TO NODE      5.00 =     449.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.3  TC(MIN.) =     10.29
  EFFECTIVE AREA(ACRES) =      1.26  AREA-AVERAGED Fm(INCH/HR)=  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       3.01
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

 ************************** DESCRIPTION OF STUDY **************************
* EXISTING CONDITION                                                       *
* 100 YR STORM                                                             *
*                                                                          *
 ****************************************************************************

  FILE NAME: 491-22EX.DAT
  TIME/DATE OF STUDY: 13:28 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   173.00
  ELEVATION DATA: UPSTREAM(FEET) =     73.40  DOWNSTREAM(FEET) =     72.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.455
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.345
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.54      0.30     0.100    76    6.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.58
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      2.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 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) =     74.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.981
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.423
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.91      0.30     0.100    76    8.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.60
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.60

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     72.80
  DOWNSTREAM NODE ELEVATION(FEET) =     71.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.050   MANNING'S N = .0140
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.110
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.02
  AVERAGE FLOW DEPTH(FEET) =   0.21   FLOOD WIDTH(FEET) =   26.72
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =   10.21
  SUBAREA AREA(ACRES) =    0.35       SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =    1.26     AREA-AVERAGED Fm(INCH/HR) =   0.03
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       4.63

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOOD WIDTH(FEET) =   27.97
  FLOW VELOCITY(FEET/SEC.) =   2.04   DEPTH*VELOCITY(FT*FT/SEC) =   0.44
  LONGEST FLOWPATH FROM NODE      3.00 TO NODE      5.00 =     449.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.3  TC(MIN.) =     10.21
  EFFECTIVE AREA(ACRES) =      1.26  AREA-AVERAGED Fm(INCH/HR)=  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       4.63
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B: PROPOSED RATIONAL METHOD, 2, 10 & 100 YEAR STORM FREQUENCY OUTPUT FILES.

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




 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED CONDITION                                                       *
* 2 YR STORM                                                               *
*                                                                          *
 ****************************************************************************

  FILE NAME: 491-22PR.DAT
  TIME/DATE OF STUDY: 16:44 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   186.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.20

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

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.308
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.981
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.48      0.30     0.200    36    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.48   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   253.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.655
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.773
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.73      0.30     0.200    36    7.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      1.13

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.199
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.001
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.42      0.30     0.200    36    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.73
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.73

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     75.40  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.913
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.056
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.17      0.30     0.200    36    5.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.31
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.91
  EFFECTIVE AREA(ACRES) =      0.17  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       0.31
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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




 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED CONDITION                                                       *
* 10 YR STORM                                                              *
*                                                                          *
 ****************************************************************************

  FILE NAME: 491-22PR.DAT
  TIME/DATE OF STUDY: 16:50 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   186.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.308
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.553
  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
  "11+ DWELLINGS/ACRE"       B        0.48      0.30     0.200    56    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.51
  TOTAL AREA(ACRES) =      0.48   PEAK FLOW RATE(CFS) =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   253.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.655
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.180
  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
  "11+ DWELLINGS/ACRE"       B        0.73      0.30     0.200    56    7.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.05
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      2.05

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.199
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.589
  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
  "11+ DWELLINGS/ACRE"       B        0.42      0.30     0.200    56    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.33
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      1.33

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.40  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.913
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.688
```

```
  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
  "11+ DWELLINGS/ACRE"       B        0.17      0.30     0.200    56    5.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.56
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.91
  EFFECTIVE AREA(ACRES) =      0.17  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       0.56
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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




 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED CONDITION                                                       *
* 100 YR STORM                                                             *
*                                                                          *
 ***************************************************************************

  FILE NAME: 491-22PR.DAT
  TIME/DATE OF STUDY: 16:51 10/27/2025
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   186.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.308
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.416
  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
  "11+ DWELLINGS/ACRE"       B        0.48      0.30     0.200    76    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.31
  TOTAL AREA(ACRES) =      0.48   PEAK FLOW RATE(CFS) =      2.31

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   253.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.50  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.655
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.847
  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
  "11+ DWELLINGS/ACRE"       B        0.73      0.30     0.200    76    7.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.15
  TOTAL AREA(ACRES) =      0.73   PEAK FLOW RATE(CFS) =      3.15

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.00  DOWNSTREAM(FEET) =     72.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.199
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.470
  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
  "11+ DWELLINGS/ACRE"       B        0.42      0.30     0.200    76    6.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.05
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      2.05

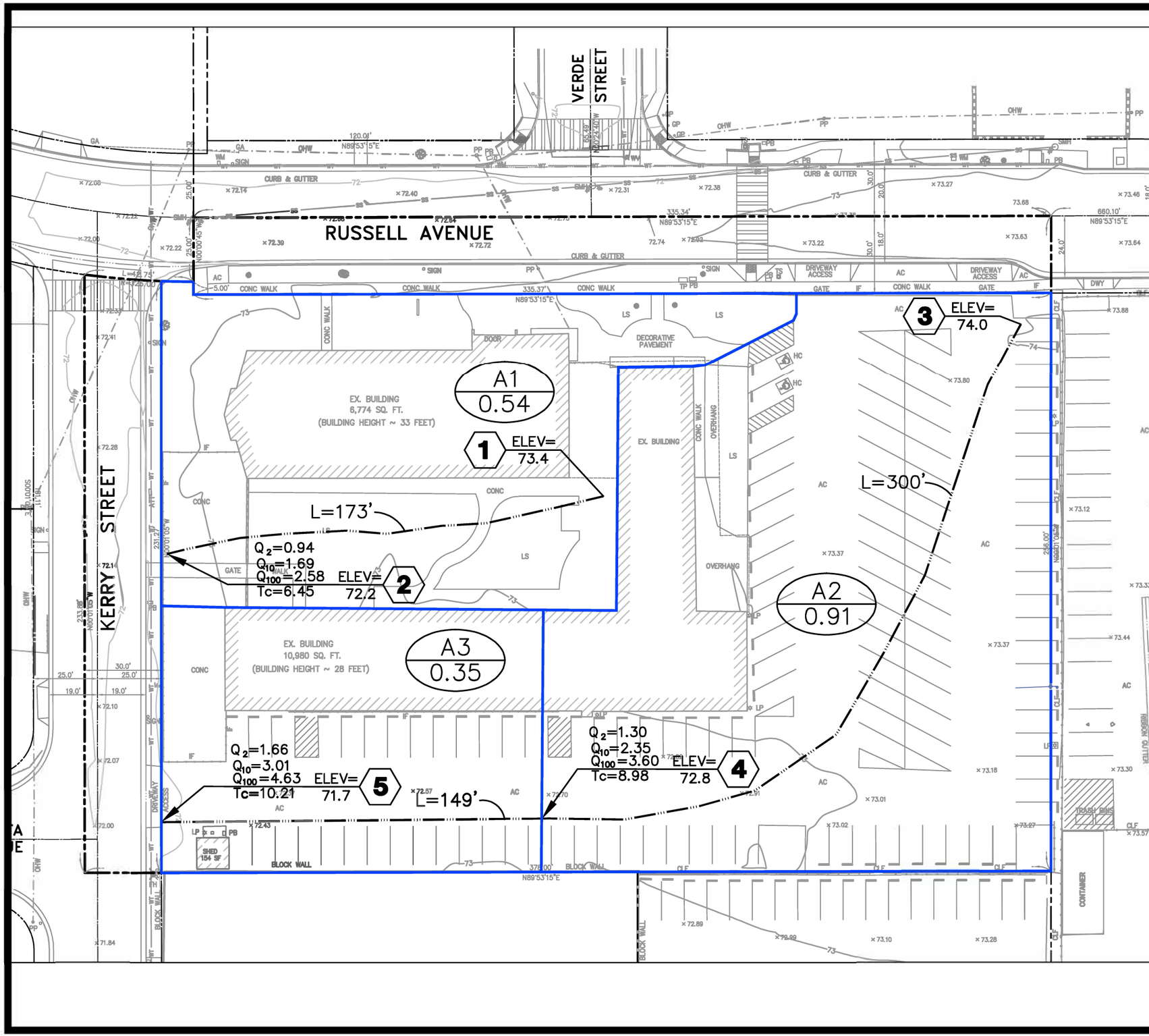
****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  ELEVATION DATA: UPSTREAM(FEET) =     75.40  DOWNSTREAM(FEET) =     73.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.913
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.620
```

```
  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
  "11+ DWELLINGS/ACRE"       B        0.17      0.30     0.200    76    5.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.85
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.91
  EFFECTIVE AREA(ACRES) =      0.17  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       0.85
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXHIBITS

EXHIBIT A: EXISTING CONDITION HYDROLOGY MAP



LEGEND:

DISCHARGE AT NODE (Q_{100} cfs) — NODE NUMBER

Q=13.41 EL= / Tc=11.37 527.8 (4)

TIME OF CONCENTRATION — F.S. ELEVATION AT NODE(ft)

SUBAREA BOUNDARY

L=205'

FLOWPATH

ENTIRE SITE = SOIL TYPE B

A2 / 1.83 — SUBAREA DESIGNATION — TRIBUTARY AREA (AC.)

NORTH

CA

GRAPHIC SCALE

0 20 50 80

(IN FEET)
1 inch = 40 ft.

CITY OF GARDEN GROVE

HYDROLOGY MAP
(EXISTING CONDITION)
9822 RUSSELL AVENUE
GARDEN GROVE, CA 92844

S:\491-22 Garden Grove russell\HYDRO\491-22 HYDRO EX.dwg Last Modified: 27 Oct 2025 - 11:04am
Plotted on: 28 Oct 2025 - 2:40pm by cward

EXHIBIT B: PROPOSED CONDITION HYDROLOGY MAP

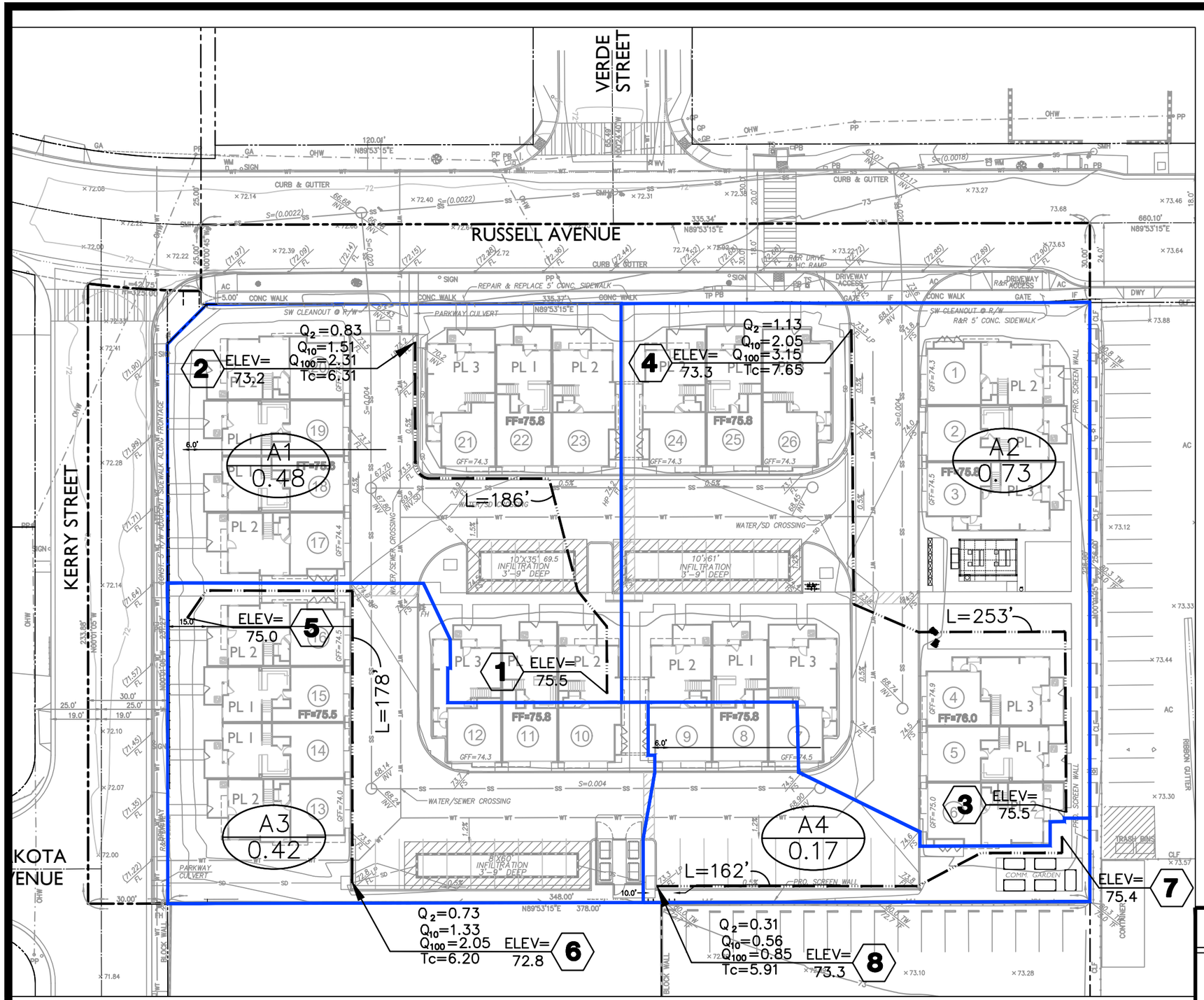
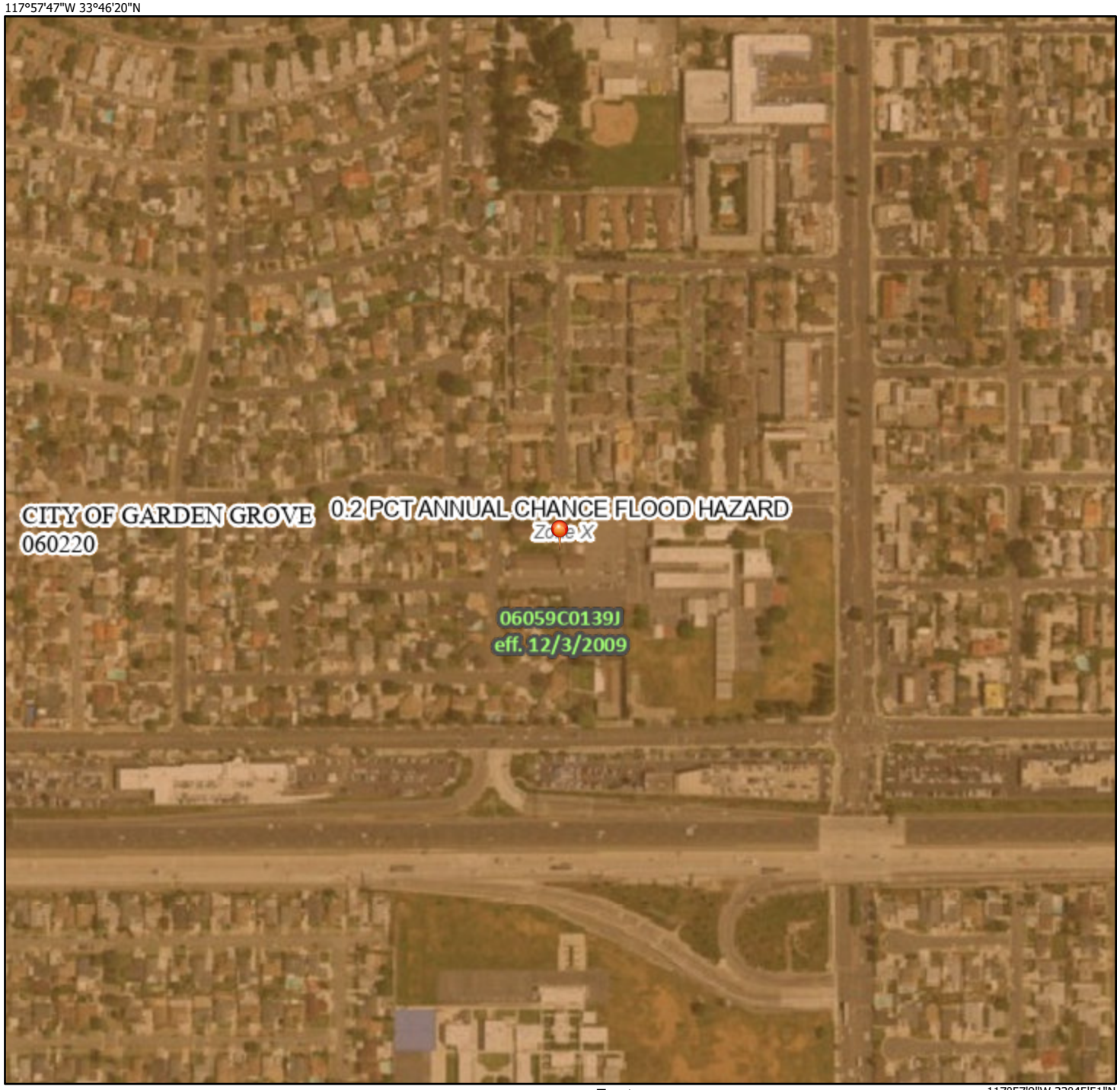

VERDE STREET
RUSSELL AVENUE
KERRY STREET
KOTA VENUE
A1
0.48
Q2=0.83
Q10=1.51
Q100=2.31
Tc=6.31
ELEV= 73.2
2
A2
0.73
Q2=1.13
Q10=2.05
Q100=3.15
Tc=7.65
ELEV= 73.3
4
A3
0.42
Q2=0.73
Q10=1.33
Q100=2.05
Tc=6.20
ELEV= 72.8
6
A4
0.17
Q2=0.31
Q10=0.56
Q100=0.85
Tc=5.91
ELEV= 73.3
8
ELEV= 75.0
5
ELEV= 75.5
1
ELEV= 75.5
3
ELEV= 75.4
7
L=186'
L=178'
L=253'
L=162'
FF=75.8
FF=75.5
FF=76.0
10'X35' 69.5 INFILTRATION 3'-9" DEEP
10'X61' INFILTRATION 3'-9" DEEP
8'X60' INFILTRATION 3'-9" DEEP
WATER/SD CROSSING
WATER/SEWER CROSSING
PARKWAY CULVERT
REPAIR & REPLACE 5' CONC. SIDEWALK
R&R 5' CONC. SIDEWALK
PRO. SCREEN WALL
COMM. GARDEN
TRASH BINS
CONTAINER
RIBBON GUTTER
CURB & GUTTER
CONC WALK
DRIVEWAY ACCESS
R&R DRIVE & HC RAMP
SW CLEANOUT @ R/W
S=0.004
S=(0.0022)
S=(0.0018)
N89°53'15"E
N00°01'05"W
N00°24'40"W
348.00'
378.00'
660.10'
335.34'
233.88'
120.01'
86.68
65.49
87.07
87.17
68.14
68.24
68.90
68.45
73.12
73.33
73.44
73.57
73.30
73.10
73.28
71.84
72.07
72.10
72.00
72.14
72.22
72.28
72.41
72.39
72.31
72.40
72.26
73.27
73.46
73.64
73.68
73.88
73.63
73.89
73.90
73.85
73.22
72.72
72.74
72.52
72.44
72.36
72.28
72.15
72.09
71.97
71.99
71.71
71.64
71.57
71.45
71.35
71.22
71.30
71.45
71.55
71.57
71.64
71.71
71.99

EXHIBIT C: FIRM MAP

National Flood Hazard Layer FIRMette

FEMA

117°57'47"W 33°46'20"N



Feet

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

1:6,000

117°57'9"W 33°45'51"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS

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

OTHER AREAS OF FLOOD HAZARD

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

OTHER AREAS

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

GENERAL STRUCTURES

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

OTHER FEATURES

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

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

N

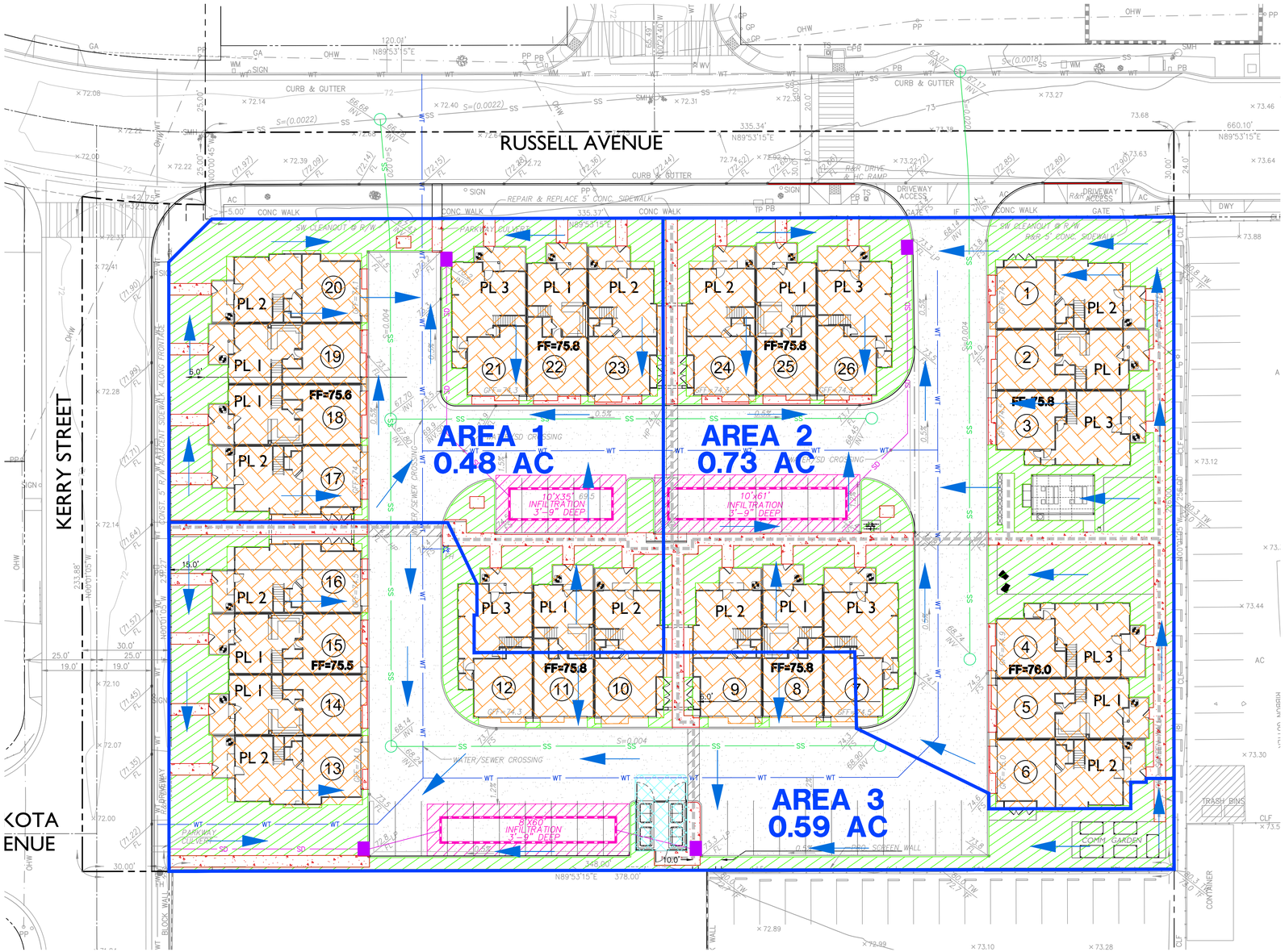
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/29/2025 at 1:33 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

EXHIBIT D: WQMP SITE PLAN



BMP LEGEND

- DRAINAGE AREAS — **AREA 1**
- FLOW DIRECTION
- UNDERGROUND STORM DRAIN INFILTRATION CHAMBER
- LANDSCAPE AREA EFFICIENT IRRIGATION / LANDSCAPE AREA RUNOFF–MINIMIZING DESIGN
- TRASH ENCLOSURE
- BUILDING
- CONCRETE HARDSCAPE
- ASPHALT CONCRETE DRIVE AISLES
- CATCH BASIN INSERT FILTERS
- SD — PROPOSED STORM DRAIN
- SS — PROPOSED SEWER
- SS — EXISTING SEWER
- WT — PROPOSED WATER
- WT — EXISTING WATER

PROJECT DATA:

TOTAL SITE AREA OF PROPOSED DEVELOPMENT: 1.80 AC (78,537 SF)

BUILDING FOOTPRINT: 30,930 SF
WALKWAYS / CONC. GUTTER / DOCK AREAS: 8,096 SF
DRIVEWAYS / DRIVE AISLES / PARKING AREAS: 23,233 SF

16,278 SF LANDSCAPING PROVIDED (20.7% PERVIOUS AREA)

CURRENT USE: COMMERCIAL
PROPOSED USE: RESIDENTIAL

WATERSHED:
ANAHEIM BAY – HUNTINGTON HARBOR

WATER QUALITY CALCULATIONS

FORMULAS
C = 0.75 * IMP % + 0.15
D = DESIGN CAPTURE STORM DEPTH (FIGURE III.1) = 0.77
Dremainder = D - Dhsc = 0.77 - 0 = 0.77
DCV = C * Dremainder * AREA (AC) * 43,560SF/AC * 1/12
A = DCV / Dp
INFILTRATION BASIN VOLUME (cf) = PROVIDED AREA * Dp

WQMP CALCULATIONS	AREA 1	AREA 2	AREA 3	TOTAL
AREA (sf)	20,945	31,680	25,912	**78,537**
% OF TOTAL AREA	26.7%	40.3%	33.0%	**100.0%**
AREA (ac)	0.48	0.73	0.59	**1.80**
LANDSCAPE (sf)	4,264	6,678	5,336	**16,278**
IMPERVIOUS %	79.6%	78.9%	79.4%	**79.3%**
C - RUNOFF COEFFICIENT	0.75	0.74	0.75	**0.74**
D - DESIGN STORM DEPTH	0.77	0.77	0.77	-
D-Remainder	0.77	0.77	0.77	-
DCV - DESIGN CAPTURE VOLUME (cf)	1,006	1,510	1,237	**3,753**
Dp - PONDING DEPTH (ft)	3.75	3.75	3.75	-
A - REQUIRED INFILTRATION BASIN AREA (sf)	268	403	330	-
PROVIDED INFILTRATION BASIN AREA (sf)	350	610	480	-
INFILTRATION BASIN VOLUME (cf)	1,313	2,288	1,800	-

NORTH

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

PREPARED BY:

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Planning • Engineering • Surveying
4101 BIRCH ST., STE 140
NEWPORT BEACH, CA 92660
949-724-9480 949-724-9484 FAX

OWNER:

MELIA HOMES INC.
9860 Irvine Center Drive
Irvine, CA 92618
Contact: Mr. Chad Brown
(949) 759-4367

Nov 03 2025

WATER QUALITY MANAGEMENT PLAN
BMP EXIBIT (SITE PLAN)
TR# 19447
9822 RUSSELL AVENUE
Garden Grove, CA 92844

SHEET 1 OF 1