Preliminary Drainage Report
for
Phelan Perris
PLN No. TBD
City of Perris

Prepared for:

Phelan Development Company
450 Newport Center Drive, Suite 405
Newport Beach, CA 92660

September 25, 2020

Prepared by:

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R.C.E. 45005

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TORY R. WALKER ENGINEERING
RELIABLE SOLUTIONS IN WATER RESOURCES

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CHAPTER 1 - BACKGROUND

1.1 – Introduction

The purpose of this report is to summarize the hydrologic and hydraulic analyses of the proposed Phelan Perris project (PLN No. TBD) and its associated improvements.

The Phelan Perris project proposes to construct one industrial building on APN 302-030-010 in the City of Perris. The site is bound by West Nance Street to the north, APN 302-030-012 to the east, APN 302-030-005 to the south, and North Webster Avenue to the west.

This report presents findings for the following:

1. The offsite storm drain system capacity
2. The proposed condition Rational Method peak flows
3. The overland drainage pathway to the offsite storm drain system

This study acknowledges that the offsite master planned storm drain system (Perris Valley MDP Line E-3 per PM 36726 Sheet Nos. 10 and 12) has been sized for build-out condition from the project site, from the project discharge location to the Ramona Expressway and Indian Avenue intersection. Therefore, since this project does not divert from the assumptions made for the existing offsite master planned system—as described later in this report—on-site peak flow attenuation is not required, and as a result, this report only assesses the proposed conditions.

1.2 – Summary of Existing Conditions

The existing site has historically supported agricultural and greenhouse operations. Existing land cover consists of approximately one-half tilled row crops and one-half greenhouse structures. The existing site drains from the southwest to the northeast via overland flow and shallow concentrated flow until reaching the northeastern property corner where runoff discharges to the West Nance Avenue curb and gutter. Runoff from the existing project site ultimately enters MDP Line E-3 at via Lateral E3-6 (existing inlet nearest the northeastern property line). The project site ultimately discharges to the Perris Valley Channel. The project is located within an Area of Undetermined Flood Hazard (Zone D), as illustrated on the Flood Insurance Rate Map Panel #06065C1430H, dated August 18, 2014. Therefore, no floodplain analysis is necessary. Supporting documentation is provided in Appendix 5.

1.3 – Summary of Proposed Conditions

The proposed development includes one light industrial warehouse, paved parking, landscaped areas, vegetated swales along the northern, eastern and western boundaries, and two subterranean biofiltration facilities sized for flow-based pollutant control per the project-specific water quality management plan (WQMP). The project site is characterized by two drainage areas

with a shared point. The drainage area consists of multiple sub-drainage areas characterized by warehouse rooftop, paved parking, sidewalk, and landscaped areas. The post-developed hydrology exhibit is provided in Appendix 1. Hydrologic parameters are provided in Appendix 2.

Each sub-drainage area presents the same general drainage characteristics: rooftop and downspouts, paved sheet flow, ribbon drains (sloped at roughly 1%), catch basins, and landscaped areas. Each drainage area drains to a single underground biofiltration facility via storm drain. The catch basins will intercept sheet flow and shallow ribbon gutter flow and will tie into the private on-site storm drain system. The private storm drain system will discharge flows into their respective biofiltration system. The biofiltration systems are designed to internally bypass flows in excess of the water quality design storm. The biofiltration system outflow pipes confluence onsite just before discharging from the project site via 18-inch diameter HDPE, where the onsite drainage system will tie into the relocated 7-foot-wide Lateral E3-6 catch basin within the southern half-street of West Nance Street.

CHAPTER 2 – HYDROLOGIC ANALYSIS

2.1 – Offsite Storm Drain Capacity

The site proposes to discharge to West Nance Street in roughly the same location and in a similar nature as in the existing condition. Based upon review of the Perris Valley Master Drainage Plan (MDP) Line E-3 storm drain improvement plans (PM 36726 Sheet Nos. 10 and 12), the offsite storm drain plans present a 30-inch diameter storm drain profile with capacity for 23.5 cfs from the build-out tributary drainage area. The hydraulic grade line (HGL) is approximately six feet below the street surface.

Based on the corresponding street improvement plans and topography of the project site, the tributary drainage area appears to consist of the project site and the West Nance Street southern half-street. The project proposes to maintain the same drainage footprint tributary to Line E-3. Therefore, since: (1) the proposed project and frontage improvements maintain the same tributary drainage area to MDP Line E-3 at the existing headworks and Lateral E3-6, (2) the existing HGL has roughly six feet of freeboard, and (3) since MDP Line E-3 can accommodate at least 23.5 cfs at its headworks without increasing the HGL, it is reasonable to conclude that the existing storm drain system is adequately sized to accommodate the built-out condition flow rates from the project site so long as flows do not exceed 23.5 cfs. Therefore, this analysis neglects the existing condition. Supporting documentation is provided in Appendix 6.

2.2 – Rational Method

Methodology used for the computation of storm runoff is consistent with criteria set forth in the Riverside County Hydrology Manual (RCHM). Advanced Engineering Software (AES) was used for computing hydrologic calculations and integrates the RCHM methodology and standards.

2.2.1 Design Storms

The 10-year and 100-year design storms were analyzed using the Rational Method from RCHM Section D.

2.2.2 Soil Type and Land Cover

The project site consists of Hydrologic Soil Group (HSG) Type B. The land cover consists of rooftop, paved parking, and landscaping. Therefore, the following conservative assumptions were made in the Rational Method analysis:

- HSG Type D assumed for the entire site
- 90% imperviousness assumed for all developed areas
- 5-minute time of concentration for all initial sub-areas

2.2.3 Peak Flow Determination

The Rational Method was used to analyze the 10-year and 100-year storm for the proposed condition. Post-developed peak flows were computed by AES Rational Method software for Riverside County and are presented in Table 1. The complete AES reports are provided in Appendix 3.

TABLE 1 – Proposed Condition Peak Flows

Drainage Area ID	Drainage Area (ac)	Node ID	10-Year Peak Flow (cfs)	100-Year Peak Flow (cfs)
1	5.0	108.00	8.9	14.3

The 10-year peak flow in Table 1 was used to determine inlet depth ponding. This analysis is provided in Chapter 3.

CHAPTER 3 – HYDRAULIC ANALYSIS

3.1 – On-Site Storm Drain Hydraulic Analysis

The 10-year storm peak flows were used for pipe hydraulic calculations. Pipes were assumed to be either PVC or HDPE, with a roughness coefficient of *n* = 0.013. Manning's equation was used to calculate pipe normal depths. The normal depth calculations demonstrate that the proposed storm drain system is expected to function under open channel flow conditions. The results are summarized in Table 2.

TABLE 2 – On-Site Storm Drain Summary

Reach	Upstream Node	Downstream Node	Diameter (in)	Q_{10} (cfs)	Normal Depth (in)
1	104.00	106.00	18	6.2	4
2	204.00	206.00	12	2.1	7
3	208.00	106.00	12	3.1	4
4	106.00	108.00	18	8.9	11

3.2 – On-Site Storm Drain Inlet Analysis

The 10-year storm peak flows were used to check inlet capacities at all inlet locations. Capacities were calculated using Hydraflow Express Extension for Autodesk AutoCAD Civil 3D software. Inlets were conservatively estimated at 50% capacity to account for potential clogging. All proposed inlets are in a sump configuration. Software output is provided in Appendix 3. Finished floor elevations were further compared to the lowest adjacent elevation within each sump area in the event emergency overland escape is needed due to system failure. The results are summarized in Table 3. Supporting calculations are provided in Appendix 4.

TABLE 3 – Inlet Capacity Analysis

Inlet(s)	Node	Size L (in) x W (in)	Q_{10} (cfs)	Depth (in)	Water Surface Elevation (ft)	Adjacent Finished Floor Elevation (ft)	Freeboard (ft)	Emergency Escape Elevation (ft)
1	104.00	48" x 48"	6.2	3.1	1468.88	1474.13	5.25	1470.50
2	204.00	24" x 24"	2.1	2.4	1473.50	1474.24	0.74	1474.00

Based on the results presented in Tables 2 and 3, the proposed storm drain system flows openly, the inlets can drain each sump without inundating the adjacent finished floor, and the grading plan is anticipated to provide sufficient freeboard at the proposed structure at each sump in the event of onsite storm drain system failure.

CHAPTER 4 – CONCLUSION

Our preliminary analysis demonstrates that the Jurupa Commerce Center project will:

1. Not adversely impact the offsite storm drain system
2. Provide an adequately sized storm drain to convey onsite flows to the proposed underground infiltration system
3. Provide an overland drainage pathway to the offsite storm drain system in the event the onsite storm drain system becomes inoperable

REFERENCES

1. Riverside County, *Hydrology Manual,* April 1978.

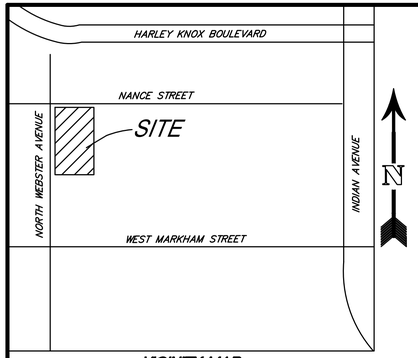
2. City of Perris, *Parcel Map 36726 IPT Perris DC-TPM 36726*, December 2016.

.

Appendix 1

Hydrology Exhibits

POST-DEVELOPED HYDROLOGY EXHIBIT
PHELAN PERRIS
PLN NO. TBD



VICINITY MAP
NOT TO SCALE

OWNER/APPLICANT

PHELAN DEVELOPMENT COMPANY
450 NEWPORT CENTER DRIVE, SUITE 405
NEWPORT BEACH, CA 92660

CIVIL ENGINEER

SDH & ASSOCIATES
14060 MERIDIAN PARKWAY
RIVERSIDE, CA 92518
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DRAINAGE REPORT PREPARER

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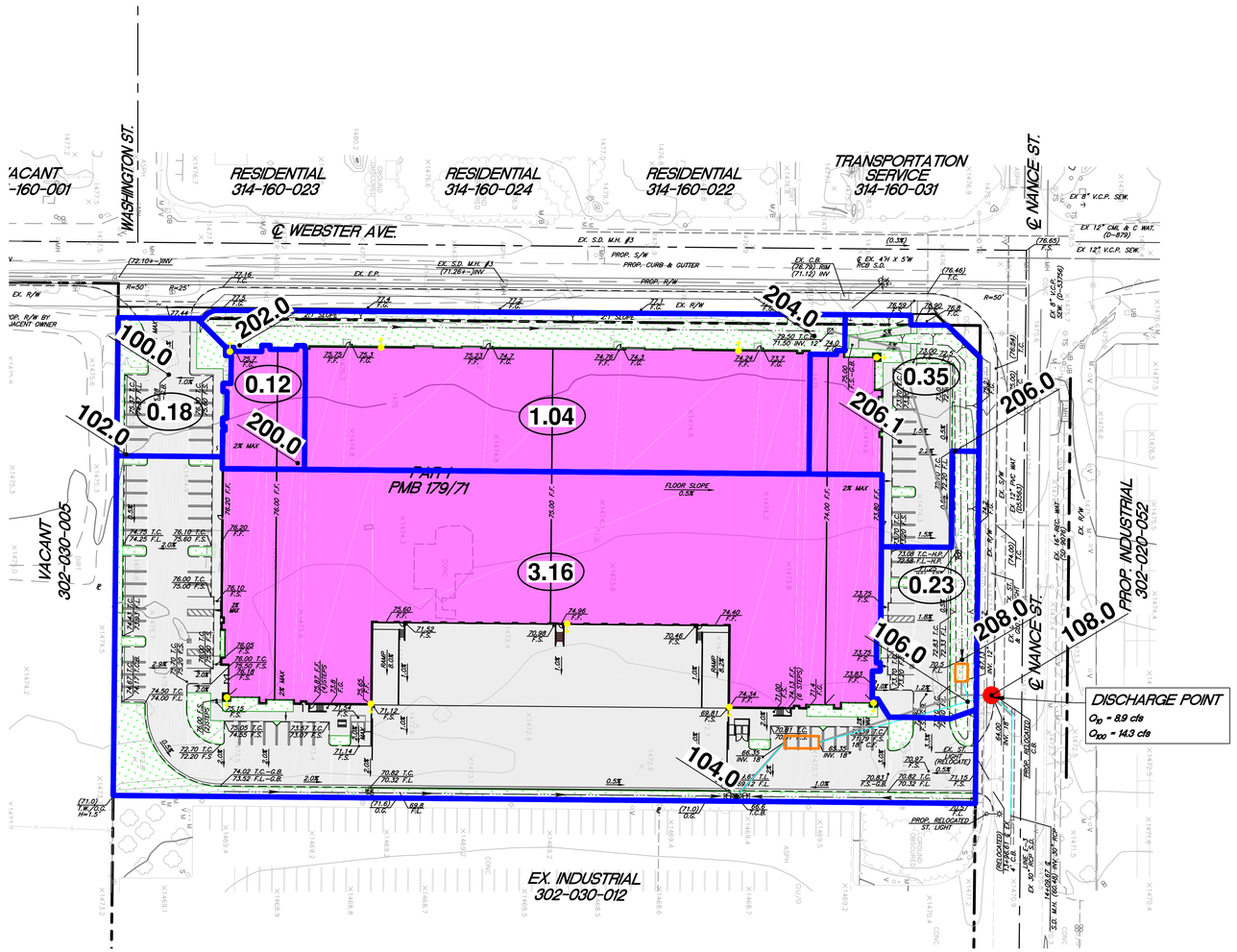
122 CIVIC CENTER DRIVE, STE. 206
VISTA, CA 92084
(760) 414-9212

LEGEND

- DRAINAGE MANAGEMENT AREA (DMA)
- BMP FOOTPRINT
- PROPOSED STORM DRAIN
- CURB AND GUTTER
- RIBBON DRAIN
- 1280 — EXISTING CONTOUR LINE
- SLOPE
- ROOF DOWNSPOUT
- DISCHARGE POINT
- LANDSCAPE/PERVIOUS AREA
- CONCRETE/IMPERVIOUS AREA
- ROOFS/IMPERVIOUS AREA
- 147.0 — NODE
- (0.36) — AREA (AC)



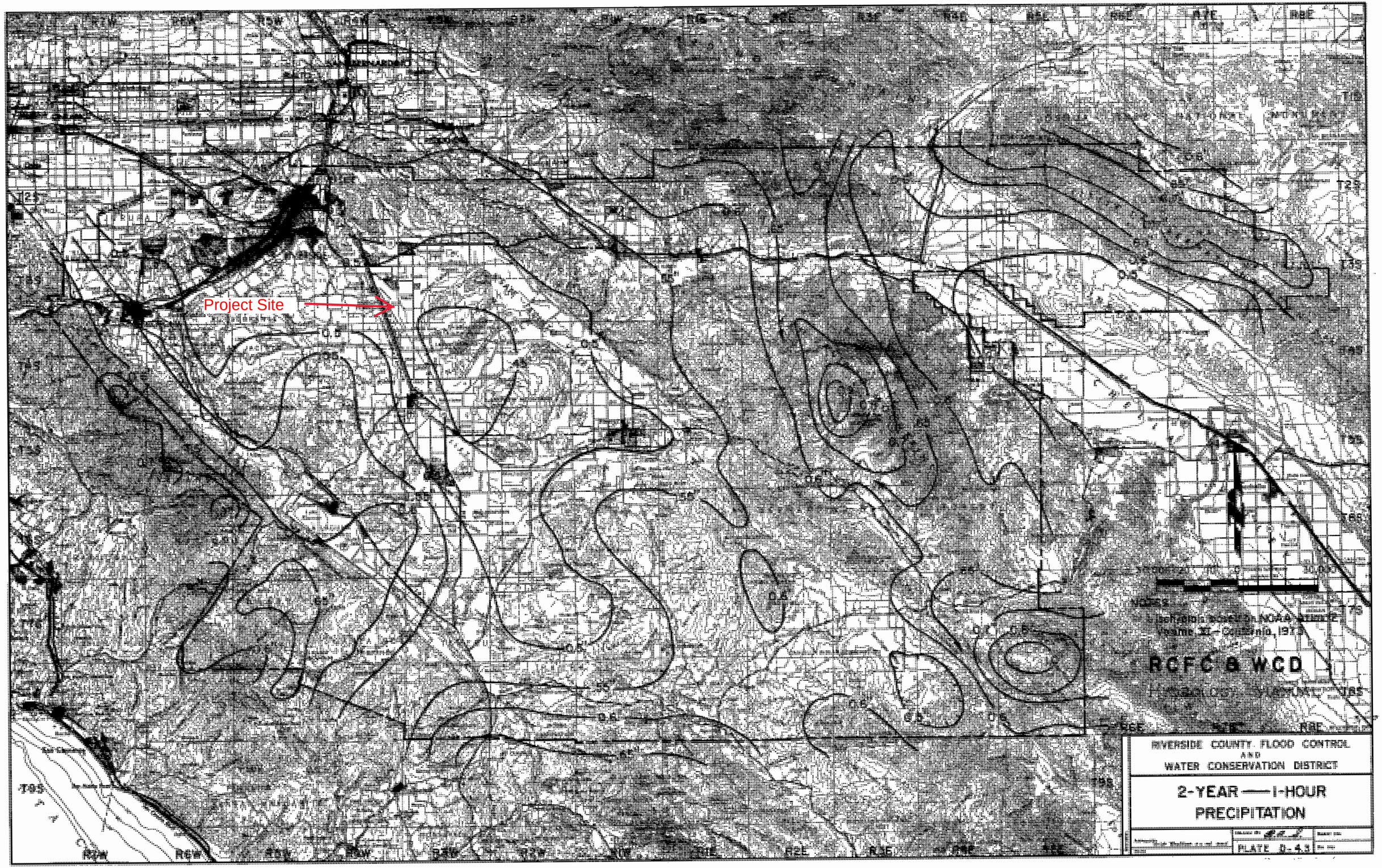
N

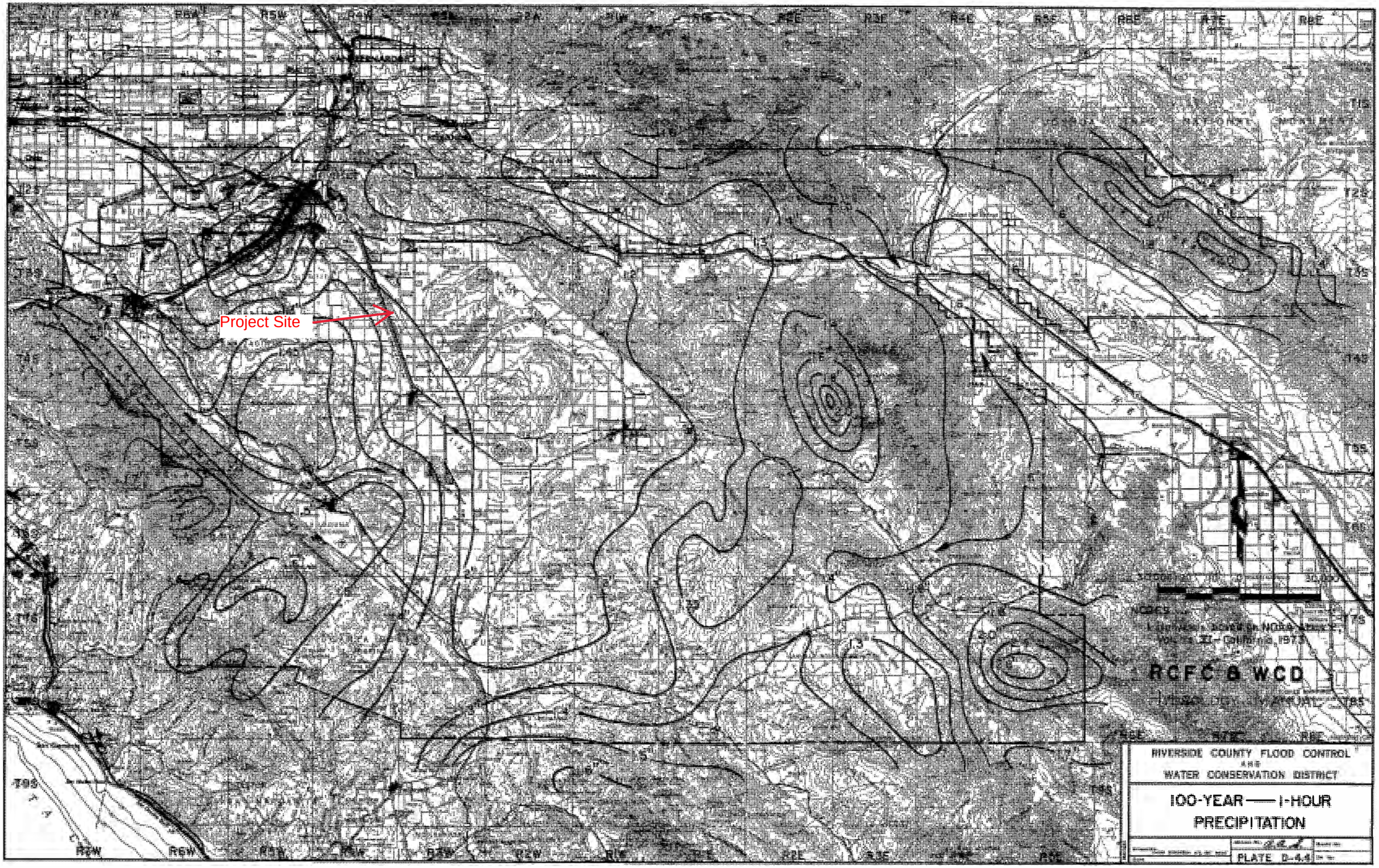
0 25 50 100 200 300
SCALE: 1"=50

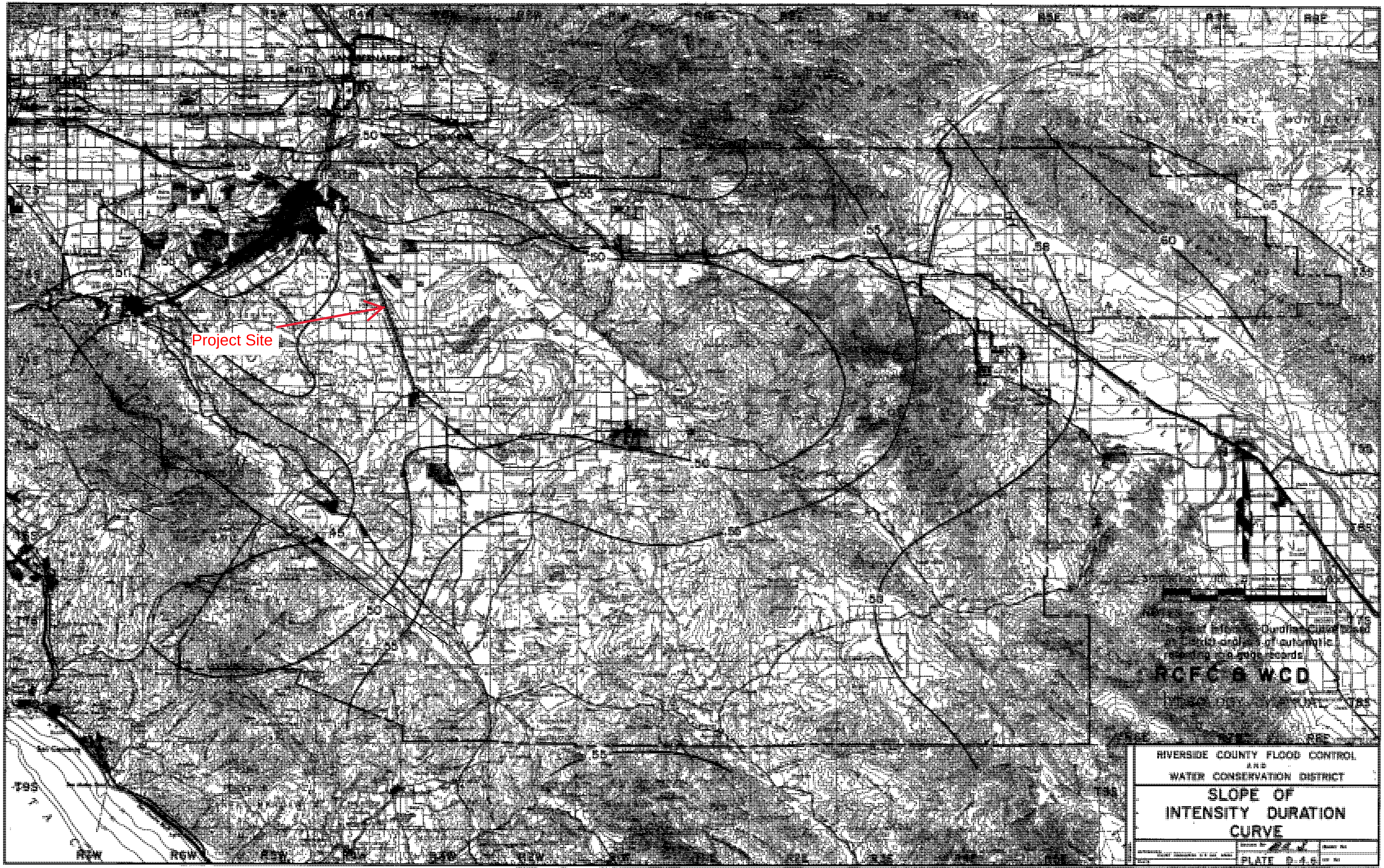
CITY OF PERRIS	
HYDROLOGY EXHIBIT PHELAN PERRIS PLN NO. TBD	1 OF 1 SHEETS

Appendix 2

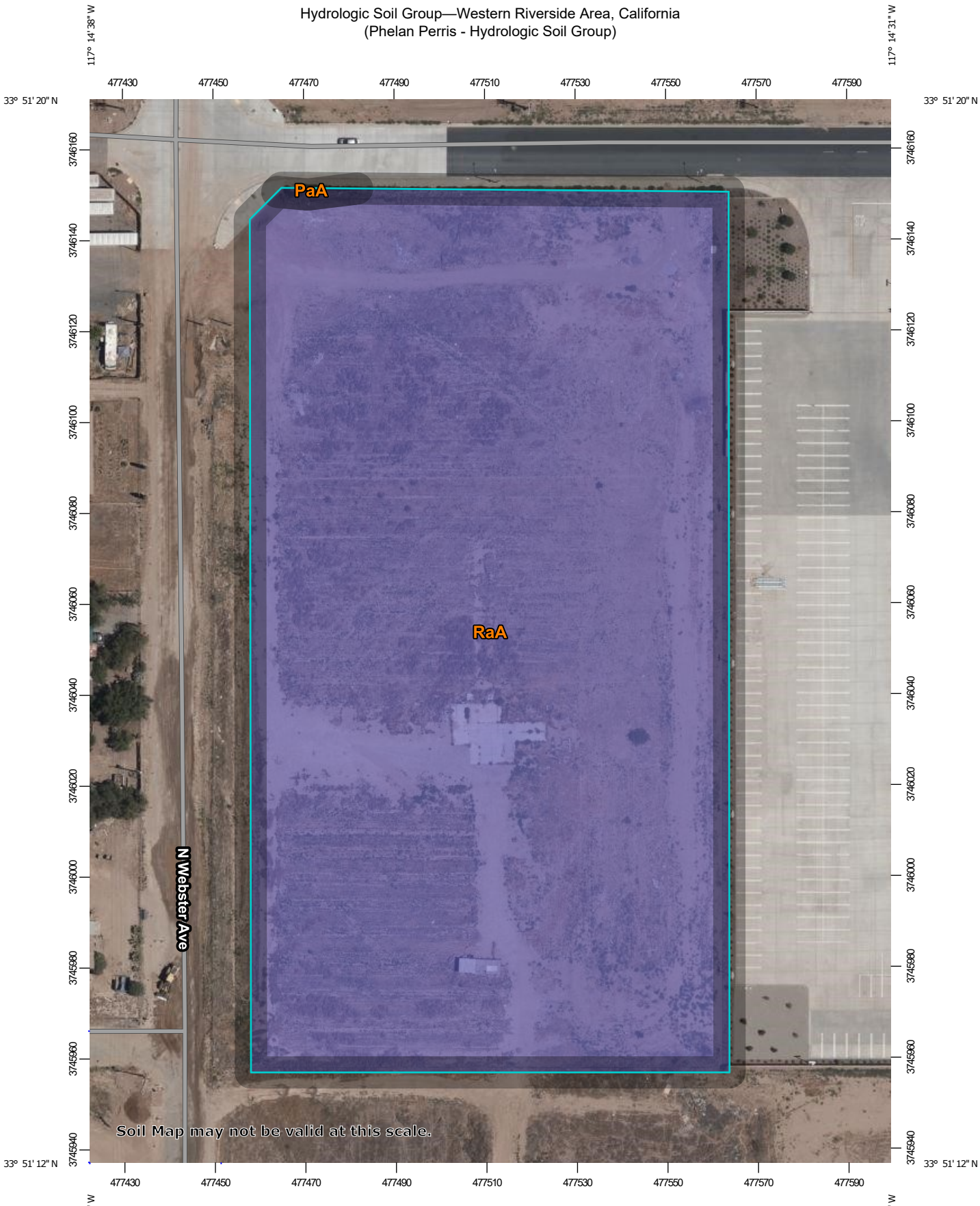
Hydrologic Parameters


Project Site
NOTES
Isohyetals based on NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.5


Project Site
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.4


Project Site
.50
.55
.60
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-4.6

Hydrologic Soil Group—Western Riverside Area, California
(Phelan Perris - Hydrologic Soil Group)



Map Scale: 1:1,140 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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 1:15,800.

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: Western Riverside Area, California
Survey Area Data: Version 13, May 27, 2020

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

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
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	0.0	0.1%
RaA	Ramona sandy loam, 0 to 2 percent slopes, MLRA 19	B	5.1	99.9%
Totals for Area of Interest			**5.1**	**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

Appendix 3

AES Rational Method Output

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******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1532

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* PHELAN PERRIS                                                        *
* RATIONAL METHOD HYDROLOGY                                            *
* 10-YEAR STORM                                                        *
 ************************************************************************

  FILE NAME: PP_10.DAT
  TIME/DATE OF STUDY: 15:02 09/25/2020
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.300
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.837
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.901
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   74.55  DOWNSTREAM ELEVATION(FEET) =   69.12
  STREET LENGTH(FEET) =   656.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.38
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   4.94   Tc(MIN.) =    9.94
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.057
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8840
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    5.75
  TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =       6.21

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.90
```

```
  FLOW VELOCITY(FEET/SEC.) =  2.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   19156.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    66.60  DOWNSTREAM(FEET) =    64.75
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.21
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   10.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   19269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   10.20
  RAINFALL INTENSITY(INCH/HR) =   2.03
  TOTAL STREAM AREA(ACRES) =     3.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.21

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.901
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     75.70  DOWNSTREAM(FEET) =     74.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   425.00   CHANNEL SLOPE =  0.0040
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.946
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8833
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.16
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   6.11
  Tc(MIN.) =   11.11
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    1.79
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       2.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   1.32
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    72.00  DOWNSTREAM(FEET) =    71.25
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.10
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.920
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8831
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.59
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       2.69
  TC(MIN.) =   11.41

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    208.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     70.82  DOWNSTREAM(FEET) =     70.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    32.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.891
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8829
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =   11.76
  SUBAREA AREA(ACRES) =     0.23       SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       3.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   1.55
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    67.13  DOWNSTREAM(FEET) =    64.75
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.18
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.07
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   11.78
  RAINFALL INTENSITY(INCH/HR) =   1.89
  TOTAL STREAM AREA(ACRES) =     1.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.21    10.20        2.031          3.34
     2        3.07    11.78        1.890          1.74

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        8.87    10.20       2.031
      2        8.85    11.78       1.890

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.87   Tc(MIN.) =   10.20
  TOTAL AREA(ACRES) =        5.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   19269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.75  DOWNSTREAM(FEET) =    64.50
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.87
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.24
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   19286.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.1  TC(MIN.) =     10.24
  PEAK FLOW RATE(CFS)   =       8.87
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1532

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* PHELAN PERRIS                                                        *
* RATIONAL METHOD HYDROLOGY                                            *
* 100-YEAR STORM                                                       *
 ************************************************************************

  FILE NAME: PP_100.DAT
  TIME/DATE OF STUDY: 15:11 09/25/2020
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.500
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.300
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.300
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.503
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8919
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   74.55  DOWNSTREAM ELEVATION(FEET) =   69.12
  STREET LENGTH(FEET) =   656.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  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 =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   14.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   4.44   Tc(MIN.) =    9.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.277
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8893
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    9.21
  TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =       9.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.26
```

```
  FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   1.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   19156.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    66.60  DOWNSTREAM(FEET) =    64.75
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.93
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    9.68
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   19269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =    9.68
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =     3.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.93

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.503
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8919
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =     75.70  DOWNSTREAM(FEET) =     74.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   425.00   CHANNEL SLOPE =  0.0040
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.116
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8888
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.30
  AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   5.44
  Tc(MIN.) =   10.44
  SUBAREA AREA(ACRES) =     1.04       SUBAREA RUNOFF(CFS) =    2.88
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.87   FLOW VELOCITY(FEET/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    72.00  DOWNSTREAM(FEET) =    71.25
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.36
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   10.72
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.076
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8886
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.96
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       4.32
  TC(MIN.) =   10.72

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    208.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     70.82  DOWNSTREAM(FEET) =     70.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    32.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.034
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8885
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.79
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.30
  Tc(MIN.) =   11.02
  SUBAREA AREA(ACRES) =     0.23       SUBAREA RUNOFF(CFS) =    0.62
  TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       4.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    67.13  DOWNSTREAM(FEET) =    64.75
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.15
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.94
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    106.00 =     665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   11.03
  RAINFALL INTENSITY(INCH/HR) =   3.03
  TOTAL STREAM AREA(ACRES) =     1.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.94

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.93     9.68        3.237          3.34
      2        4.94    11.03        3.032          1.74

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.26     9.68       3.237
      2       14.24    11.03       3.032

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.26   Tc(MIN.) =    9.68
  TOTAL AREA(ACRES) =        5.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   19269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.75  DOWNSTREAM(FEET) =    64.50
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.57
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.26
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.71
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   19286.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.1  TC(MIN.) =      9.71
  PEAK FLOW RATE(CFS)   =      14.26
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix 4

Hydraulic Calculations

Inlet Report

Inlet 1 (Node 104.00)

Drop Grate Inlet

Location	= Sag
Curb Length (ft)	= -0-
Throat Height (in)	= -0-
Grate Area (sqft)	= 8.00
Grate Width (ft)	= 4.00
Grate Length (ft)	= 4.00

Gutter

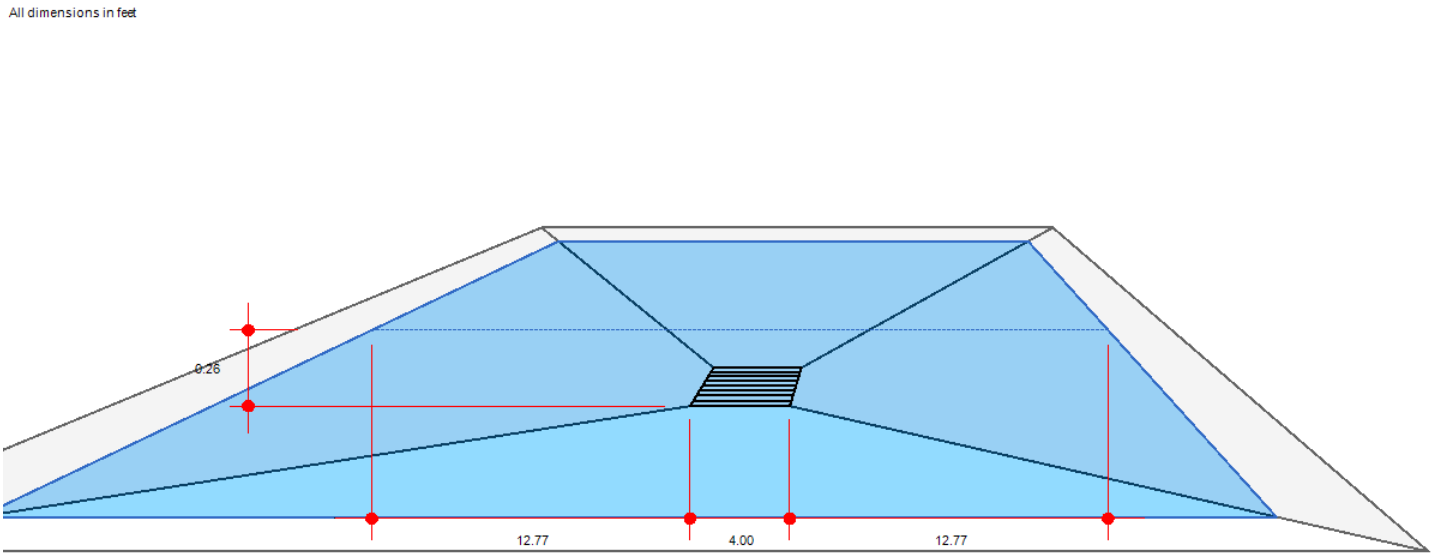
Slope, Sw (ft/ft)	= 0.020
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= -0-
Gutter Width (ft)	= 4.00
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 6.20

Highlighted

Q Total (cfs)	= 6.20
Q Capt (cfs)	= 6.20
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 3.06
Efficiency (%)	= 100
Gutter Spread (ft)	= 29.54
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

Inlet 2 (Node 204.00)

Drop Grate Inlet

Location	= Sag
Curb Length (ft)	= -0-
Throat Height (in)	= -0-
Grate Area (sqft)	= 2.00
Grate Width (ft)	= 2.00
Grate Length (ft)	= 2.00

Gutter

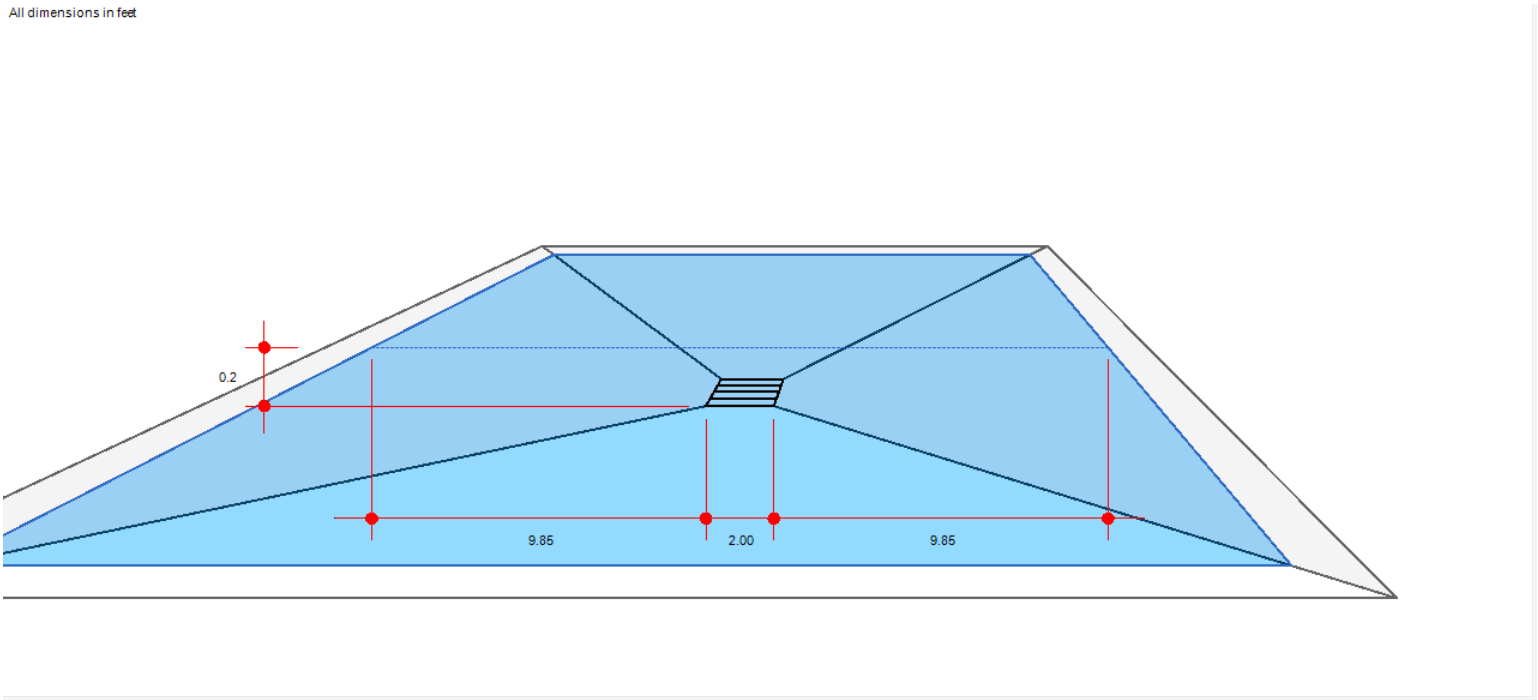
Slope, Sw (ft/ft)	= 0.020
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= -0-
Gutter Width (ft)	= 2.00
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

Calculations

Compute by:	Known Q
Q (cfs)	= 2.10

Highlighted

Q Total (cfs)	= 2.10
Q Capt (cfs)	= 2.10
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 2.36
Efficiency (%)	= 100
Gutter Spread (ft)	= 21.69
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Appendix 5

FEMA NFHL Firmette

National Flood Hazard Layer FIRMette

FEMA

117°14'54"W 33°51'31"N

117°14'16"W 33°51'1"N

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

1:6,000

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 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 9/25/2020 at 4:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix6

Referenced Documents

STREET IMPROVEMENT PLANS
CITY OF PERRIS
DPR # 14-02-0014
PM. 36726

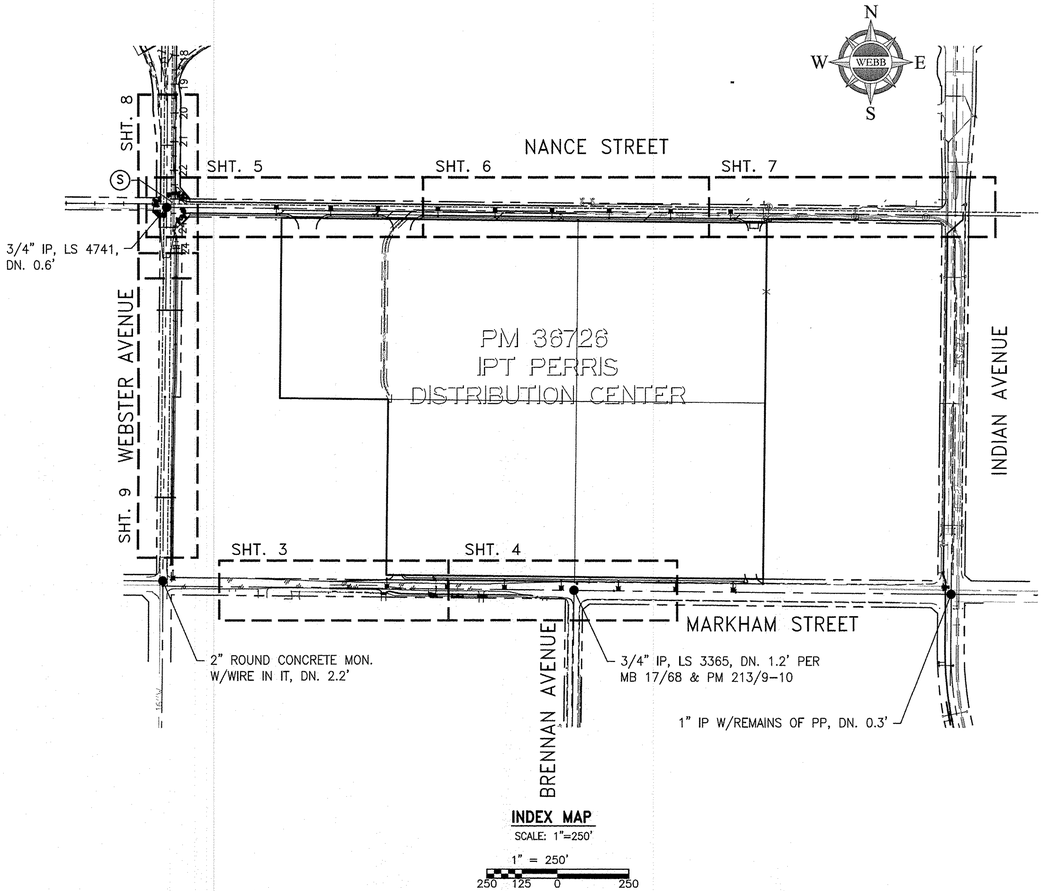
STREET NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER CONTRACTOR TO APPLY TO THE CITY OF PERRIS ENGINEERING DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE, AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT, ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR/DEVELOPER SHALL BE RESPONSIBLE FOR THE CLEARING OF THE WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. THIS INCLUDES UNDERGROUNDING OF EXISTING OVERHEAD LINES ALONG THE PROJECT FRONTAGE AS REQUIRED BY THE CONDITIONS OF APPROVAL. PERMITEE MUST INFORM CITY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
   PHONE: (951) 943-6504.
3. THE DEVELOPER WILL INSTALL STREET NAME SIGNS CONFORMING TO COUNTY STANDARD NO. 816 OR AS APPROVED BY THE CITY ENGINEER.
4. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT IMPROVEMENT STANDARDS AND SPECIFICATIONS, LATEST EDITION, COUNTY ORDINANCE NO. 461 AND SUBSEQUENT AMENDMENTS, CITY OF PERRIS STANDARDS AND AS APPROVED BY THE CITY ENGINEER AND COMPLY TO ADA REQUIREMENTS.
5. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO NOTIFY THE ENGINEER TO INSTALL STREET CENTERLINE MONUMENTS AS REQUIRED BY RIVERSIDE COUNTY ORDINANCE NO. 461 (TRACTS AND PARCEL MAPS ONLY). ALL EXISTING SURVEY MONUMENTS SHALL BE PROTECTED IN PLACE OR RELOCATED BY A LICENSED PROFESSIONAL SURVEYOR PRIOR TO CONSTRUCTION.
6. ALL UNDERGROUND FACILITIES, WITH LATERALS, SHALL BE IN PLACE PRIOR TO PAVING THE STREET, INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: SEWER, WATER, ELECTRIC, GAS, STORM DRAINS.
7. CURB DEPRESSIONS AND DRIVEWAY APPROACHES WILL BE INSTALLED AND CONSTRUCTED ACCORDING TO COUNTY STANDARD NO. 207A, AS DIRECTED IN THE FIELD AND AS APPROVED BY THE CITY ENGINEER.
8. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE CITY. A TRAFFIC CONTROL PLAN MUST BE SUBMITTED FOR REVIEW TO THE PERMITS SECTION OR INSPECTION SECTION PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
9. ALL STREET SECTIONS ARE MINIMUM REQUIREMENTS. ADDITIONAL SOIL TESTS SHALL BE TAKEN AFTER ROUGH GRADING TO DETERMINE THE RECOMMENDED STREET SECTION REQUIREMENTS. USE COUNTY STD. NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
10. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN FOURTEEN DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 AND 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39 AND 94 OF THE STATE STANDARD SPECIFICATIONS.
11. INSTALL STREET TREES IN ACCORDANCE WITH ORDINANCE NO. 461 AND THE COMPREHENSIVE LANDSCAPING GUIDELINES.
12. STREET LIGHTS SHALL BE INSTALLED PER RIVERSIDE COUNTY STANDARDS / SOUTHERN CALIFORNIA EDISON REQUIREMENTS AND AS APPROVED BY THE CITY ENGINEER IN ACCORDANCE WITH THE APPROVED STREET LIGHTING PLAN.
13. AS DETERMINED BY THE CITY ENGINEER, THE DEVELOPER IS RESPONSIBLE AT A MINIMUM FOR ROAD IMPROVEMENTS TO CENTERLINE, AND MAY BE REQUIRED TO RECONSTRUCT EXISTING PAVEMENT, INCLUDING BASE, AND MATCHING OVERLAY REQUIRED TO MEET THE STRUCTURAL STANDARDS FOR THE CURRENT ASSIGNED TRAFFIC INDEX PER ENGINEERING CONDITION OF APPROVAL.
14. ANY PRIVATE DRAINAGE FACILITIES SHOWN ON THESE PLANS ARE FOR INFORMATION ONLY. BY SIGNING THESE IMPROVEMENT PLANS, NO REVIEW OR APPROVAL OF THOSE PRIVATE FACILITIES IS IMPLIED OR INTENDED BY THE CITY OF PERRIS ENGINEERING DEPARTMENT.
15. CONSTRUCTION PROJECTS MUST OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT. OWNERS/DEVELOPERS ARE REQUIRED TO FILE A NOTICE OF INTENT (NOI) WITH THE STATE WATER RESOURCES CONTROL BOARD (SWRCB), PREPARE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND MONITORING PLAN FOR THE SITE.

    PRIOR TO ANY CONSTRUCTION, THE DEVELOPER SHALL PROVIDE THE CITY A COPY OF THE NOI WITH A VALID WDID NUMBER.
16. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ADDITIONAL SIGNS AND MARKINGS NOT INCLUDED IN THE SIGNING AND STRIPING PLAN WITHIN THE PROJECT AREAS, OR ON ROADWAYS ADJACENT TO THE PROJECT BOUNDARIES, UPON THE REQUEST OF THE CITY ENGINEER OR HIS DESIGNEE TO IMPROVE TRAFFIC SAFETY ON THE ROADS UNDER THE JURISDICTION OF THE DEVELOPER.
17. EXISTING STORM DRAIN PIPES / CULVERTS (WHETHER TO BE CONNECTED TO, EXTENDED, ADJUSTED, DRAINED TO, OR JUST IN THE PROJECT VICINITY) MUST BE REPAIRED, AND/OR CLEANED TO MAKE THEM FUNCTIONAL AND ACCEPTABLE APPROVED BY THE CITY ENGINEER.
18. FOR ALL DRIVEWAY RECONSTRUCTION BEYOND RIGHT-OF-WAY, PROOF OF DRIVEWAY OWNER NOTIFICATION IS REQUIRED PRIOR TO CONSTRUCTION.
19. IN THE EVENT OF ANY DAMAGE TO ADJACENT STREETS CAUSED BY THE CONSTRUCTION, CONTRACTOR SHALL REMOVE AND REPLACE DAMAGES AS DIRECTED BY CITY ENGINEER.
20. PAVEMENT REPAIR AND RESTORATION SUCH AS 0.15 GRIND AND OVERLAY SHALL BE DONE PER CITY STANDARDS OR AS APPROVED BY THE CITY ENGINEER.
21. TRAFFIC CONTROL SHALL BE SUBMITTED FOR REVIEW BY THE CITY ENGINEER. TRAFFIC CONTROL SHALL BE SIGNED BY CIVIL OR TRAFFIC ENGINEER AND SHALL BE INSPECTED ONSITE BY PROFESSIONAL ENGINEER TO MAKE SURE SIGNS ARE ADEQUATE AND PROMOTE PUBLIC SAFETY.
22. WORKING HOURS SHALL BE LIMITED FROM 7:00 AM TO 6:00 PM MONDAY THROUGH FRIDAY, ANY SCHEDULED WORK ON WEEKENDS AND HOLIDAYS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL. OVERTIME INSPECTION SHALL BE AT THE CONTRACTORS EXPENSE.

NOTICE TO CONTRACTORS

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

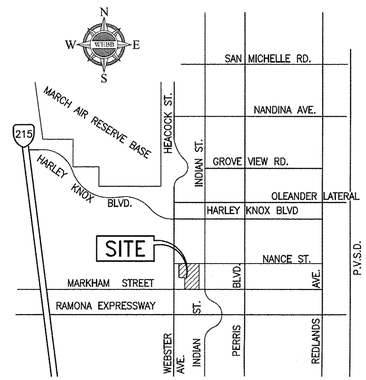


INDEX MAP

SCALE: 1"=250'

1" = 250'

250 125 0 250



VICINITY MAP

T4S R3W SEC 5
NOT TO SCALE

LEGEND:

- CONSTRUCT 0.54' A.C. OVER 1.00' CLASS 2 BASE
- GRIND AND A.C. OVERLAY
- CONSTRUCT 0.67' PCC CONCRETE OVER 1.33' CLASS 2 BASE
- CONSTRUCT SIDEWALK
- (XX.XX) EXISTING ELEVATION
- --1475-- EXISTING CONTOURS
- PROPOSED STREET LIGHT

A.C.	ASPHALT CONCRETE	MIN	MINIMUM
AP	ANGLE POINT	MH	MANHOLE
BC	BEGIN CURVE	MVC	MIDDLE OF VERTICAL CURVE
BCR	BEGIN CURB RETURN	PB	PULLBOX
BVC	BEGIN VERTICAL CURVE	PI	POINT OF INTERSECTION
CF	CURB FACE	PP	POWER POLE
C/L	CENTERLINE	PROP.	PROPOSED
C&G	CURB & GUTTER	PVI	POINT OF VERTICAL INTERSECTION
D/W	DRIVEWAY	PVM'T	PAVEMENT
EC	END OF CURVE	R/W	RIGHT OF WAY
ECR	END CURB RETURN	S.D.	STORM DRAIN
ELEC	ELECTRIC	STA	STATION
EVC	END VERTIVAL CURVE	S/W	SIDEWALK
E.P.	EDGE OF PAVEMENT	TC	TOP OF CURB
EX.	EXISTING	TD	TOP OF DIKE
FG	FINISHED GRADE	TEL	TELEPHONE
FH	FIRE HYDRANT	TG	TOP OF GRADE
FL	FLOW LINE	TRANS	TRANSITION
FS	FINISH SURFACE	TYP	TYPICAL
GB	GRADE BREAK	VC	VERTICAL CURVE
MAX	MAXIMUM	WM	WATER METER

UTILITIES:

WATER:	EASTERN MUNICIPAL WATER DISTRICT PHONE: (909) 820-3713
SEWER	EASTERN MUNICIPAL WATER DISTRICT PHONE: (909) 820-2525
ELECTRIC:	SOUTHERN CALIFORNIA EDISON COMPANY PHONE: (800) 655-4555
TELEPHONE:	VERIZON CALIFORNIA INC PHONE: (800) 837-4966
GAS:	SOUTHERN CALIFORNIA GAS COMPANY PHONE: (800) 427-2200

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS BASED ON THE CALIFORNIA COORDINATE SYSTEM (CCS83), ZONE V, NAD 83 (2010.00 EPOCH) AS DETERMINED LOCALLY BY A LINE BETWEEN "AJ1911" AND "AJ1887" BEING NORTH 53°20'18" WEST AS DERIVED FROM COORDINATES PUBLISHED BY NATIONAL GEODETIC SURVEY(NGS).

	NORTHING	EASTING	LATITUDE	LONGITUDE	CONVERGENCE
AJ1911	2248987.06	6278618.65	33°50'08.60372"N	117°10'55.47115"W	-0°30'43.9"
AJ1887	2279468.20	6237668.05	33°55'24080"N	117°19'04.60176"W	-0°35'12.7"

UNLESS OTHERWISE NOTED ALL BEARINGS AND DISTANCES ARE GROUND. TO OBTAIN GRID DISTANCES MULTIPLY GROUND DISTANCES BY 0.99999946.

UNDERGROUND STRUCTURES

ALL UNDERGROUND STRUCTURES OR UTILITIES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT.

THE OWNER, BY ACCEPTING THESE PLANS OR PROCEEDING WITH THE IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD THE UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, OR LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON THE RECORDS EXAMINED.

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 OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

SHEET INDEX

WDID: 8 33C375426

DIGALERT — DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG — TOLL FREE 811 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			CITY	

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER
12-5-16
DATE

SEAL — ENGINEER
REGISTERED PROFESSIONAL ENGINEER D.J. ARELLANO NO. 81988 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

UNDER SUPERVISION OF:
D.J. ARELLANO R.C.E. NO. 81988 DATE

BENCHMARK:
USC & GS BENCHMARKS:
NGS PID DX2725
ELEV. = 1535.16, (NAVD 88)

SCALE: H: 1"=250' V: N/A

CITY OF PERRIS
PARCEL MAP 36726
IPT PERRIS DC-TPM 36726
STREET IMPROVEMENT PLANS
TITLE SHEET

SHEET NO. 1 OF 16 SHEETS

FOR: IPT | W.O. 2015-0347 | CITY FILE NO. P8_1233

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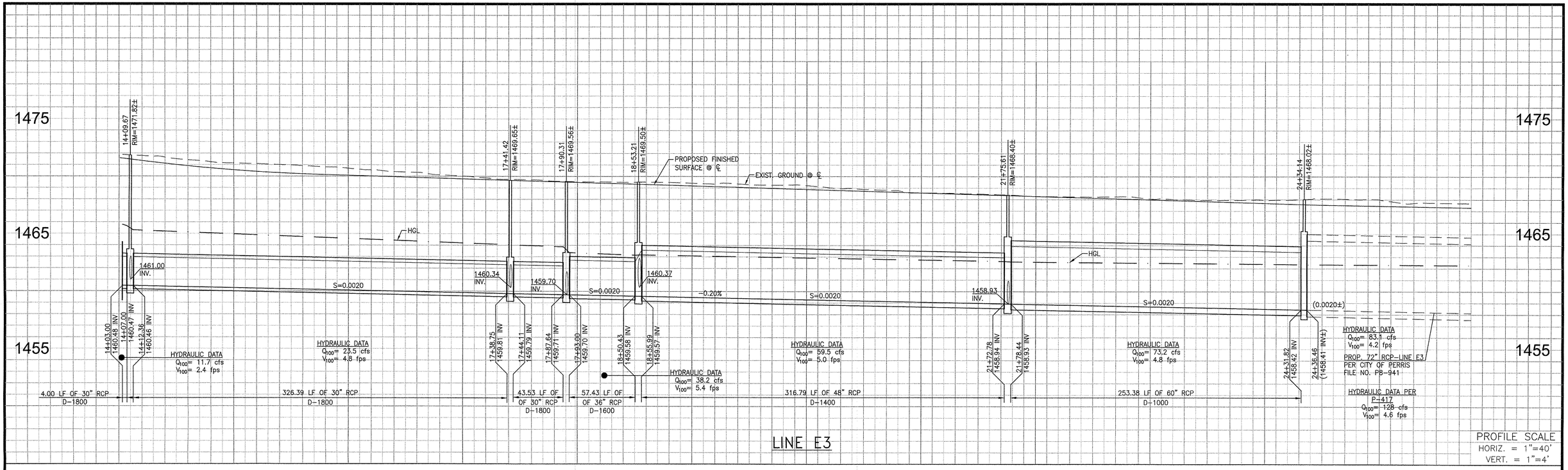
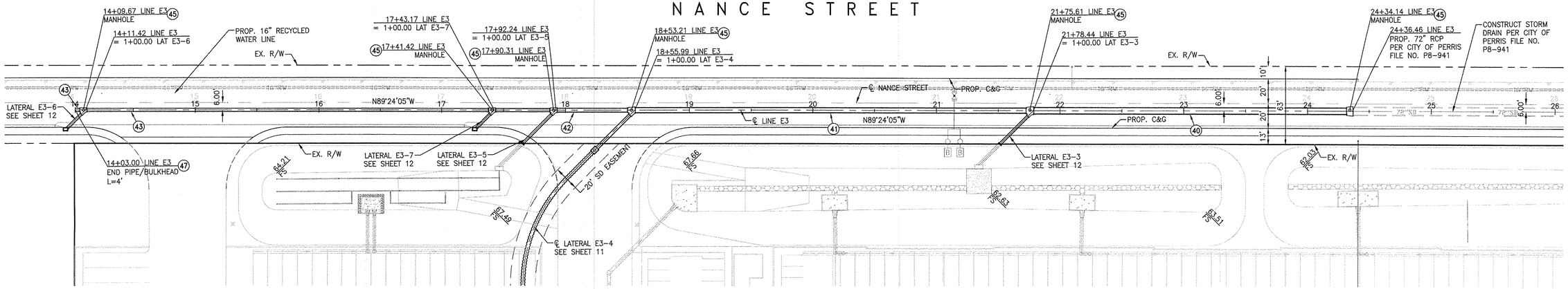


LINE E3

PROFILE SCALE
HORIZ. = 1"=40'
VERT. = 1"=4'

NOTE:
CONTRACTOR TO VERIFY THE LOCATION AND ELEVATION OF THE EXISTING FACILITES PRIOR TO THE BEGINNING OF CONSTRUCTION.

NOTE:
CONTRACTOR SHALL SUBMIT VIDEO OF STORM DRAIN TO THE CITY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING AND CONCRETING.



JUNCTION STRUCTURE DATA

MAINLINE	LATERAL	STRUCTURE TYPE	A	D1	D2	B	C	R	S
LINE E3	LAT. E3-3	MH NO. 4	45°00'00"	48"	60"	24"	6.60'	1458.98	1458.93
LINE E3	LAT. E3-4	MH NO. 4	45°00'00"	36"	48"	30"	5.80'	1460.40	1460.38
LINE E3	LAT. E3-5	MH NO. 4	45°00'00"	30"	36"	24"	5.10'	1459.74	1459.70
LINE E3	LAT. E3-6	MH NO. 4	45°00'00"	30"	30"	24"	4.90'	1461.61	1460.96
LINE E3	LAT. E3-6	MH NO. 4	45°00'00"	30"	30"	24"	4.90'	1460.94	1460.29

CONSTRUCTION NOTES

(40) INSTALL 60" RCP (D-LOAD PER PLAN)
(41) INSTALL 48" RCP (D-LOAD PER PLAN)
(42) INSTALL 36" RCP (D-LOAD PER PLAN)
(43) INSTALL 30" RCP (D-LOAD PER PLAN)
(44) INSTALL 24" RCP (D-LOAD PER PLAN)
(45) CONSTRUCT MANHOLE NO. 4 PER RCFC&WCD STD. MH254
(46) CONSTRUCT MANHOLE NO. 1 PER RCFC&WCD STD. MH251
(47) CONSTRUCT CONCRETE BULKHEAD PER RCFC&WCD STD. M816

N
W WEBB E
S

1" = 40'
40 20 0 40 80 120

DIGALERT
DIAL BEFORE YOU DIG TOLL FREE 811 — TWO WORKING DAYS BEFORE YOU DIG
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			CITY	

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER
12-5-16
DATE

SEAL – ENGINEER
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FAX (951) 788-1256

UNDER SUPERVISION OF:
D.J. ARELLANO R.C.E. NO. 81988 DATE 12/1/16

BENCHMARK:
SEE SHEET 1

SCALE:
H: 1"=40' V: 1"=4'

CITY OF PERRIS
PARCEL MAP 36726
IPT PERRIS DC-TPM 36726
STORM DRAIN IMPROVEMENT PLAN
LINE E-3 STORM DRAIN

SHEET NO. 10
OF 16 SHEETS

FOR: IPT
W.O. 2015-0347
CITY FILE NO. P8_1233

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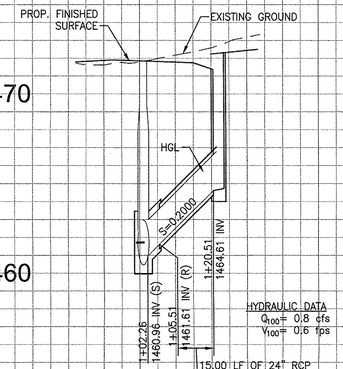
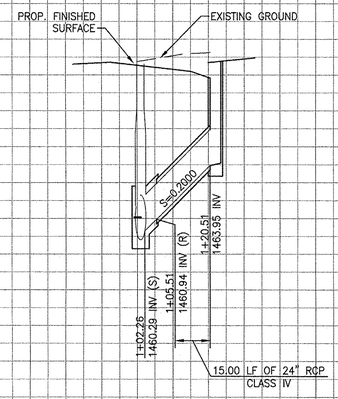


LATERAL E3-6



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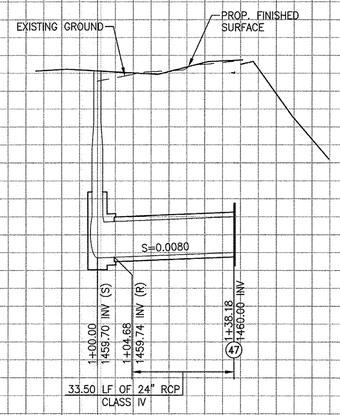
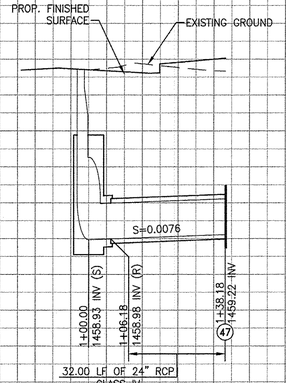
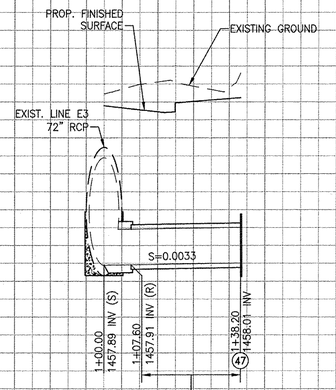


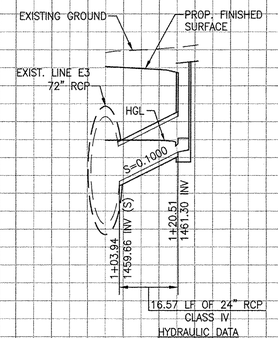
LATERAL E3-5



LATERAL E3-3



LATERAL E3-2



LATERAL E3-1

PROFILE SCALE
HORIZ. = 1"=20'
VERT. = 1"=4'

1 1+50 1 1+50 1 1+50 1 1+50 1 1+50 1 1+50

NOTE:
CONTRACTOR TO VERIFY THE LOCATION AND ELEVATION OF THE EXISTING FACILITES PRIOR TO THE BEGINNING OF CONSTRUCTION.

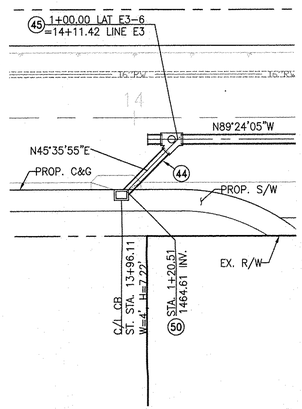
NOTE:
CONTRACTOR SHALL SUBMIT VIDEO OF STORM DRAIN TO THE CITY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING AND CONCRETING.

JUNCTION STRUCTURE DATA

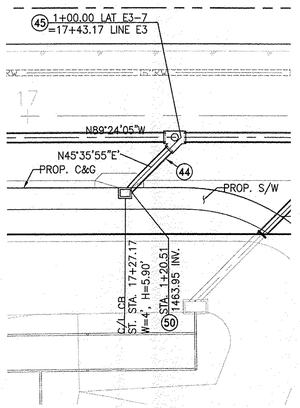
MAINLINE	LATERAL	STRUCTURE TYPE	A	D1	D2	B	C	R	S
LINE E3	LAT. E3-2	JS. NO. 2	45°07'02"	EX. 72"	EX. 72"	24"	8.00'	1457.91	1457.89
LINE E3	LAT. E3-3	MH NO. 4	45°00'00"	48"	60"	24"	6.60'	1458.98	1458.93
LINE E3	LAT. E3-4	TS NO. 3	45°00'00"	36"	48"	30"	5.80'	1460.40	1460.38
LINE E3	LAT. E3-5	MH NO. 4	45°00'00"	30"	36"	24"	5.10'	1459.74	1459.70
LINE E3	LAT. E3-6	MH NO. 4	45°00'00"	30"	30"	24"	4.90'	1461.61	1460.96
LINE E3	LAT. E3-7	MH NO. 4	45°00'00"	30"	30"	24"	4.90'	1460.94	1460.29

CONSTRUCTION NOTES

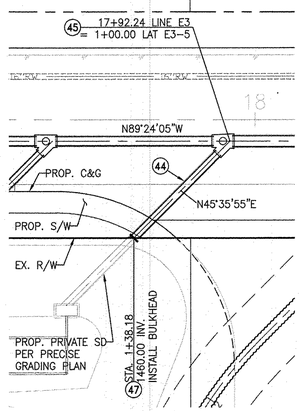
(40) INSTALL 60" RCP (D-LOAD PER PLAN)
(41) INSTALL 48" RCP (D-LOAD PER PLAN)
(42) INSTALL 36" RCP (D-LOAD PER PLAN)
(43) INSTALL 30" RCP (D-LOAD PER PLAN)
(44) INSTALL 24" RCP (D-LOAD PER PLAN)
(45) CONSTRUCT MANHOLE NO. 4 PER RCFC&WCD STD. MH254
(46) CONSTRUCT MANHOLE NO. 1 PER RCFC&WCD STD. MH251
(47) CONSTRUCT CONCRETE BULKHEAD PER RCFC&WCD STD. M816
(48) CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFC&WCD STD. JS227
(49) CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFC&WCD STD. JS229
(50) CONSTRUCT CATCH BASIN CONNECTION PER RCFC&WCD STD. CB109



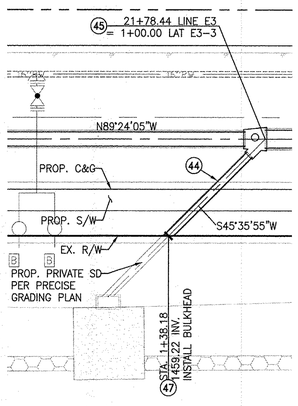
LATERAL E3-6
NANCE STREET
(SEE SHEET 10)



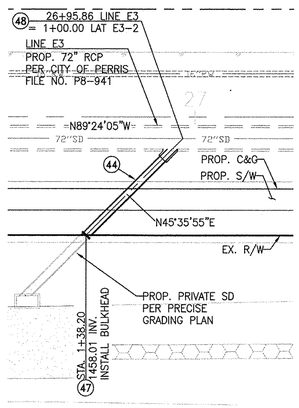
LATERAL E3-7
NANCE STREET
(SEE SHEET 10)



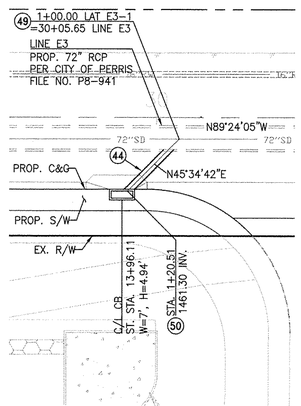
LATERAL E3-5
NANCE STREET
(SEE SHEET 10)



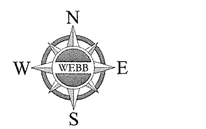
LATERAL E3-3
NANCE STREET
(SEE SHEET 10)



LATERAL E3-2
NANCE STREET



LATERAL E3-1
NANCE STREET



DIGALERT
DIAL BEFORE YOU DIG TOLL FREE 811 — TWO WORKING DAYS BEFORE YOU DIG
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			COUNTY	

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER
12-5-16
DATE

SEAL — ENGINEER
REGISTERED PROFESSIONAL ENGINEER D.J. ARELLANO NO. 81988 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

UNDER SUPERVISION OF:
D.J. ARELLANO R.C.E. NO. 81988 DATE 12/1/16

BENCHMARK:
SEE SHEET 1

SCALE: H: 1"=40' V: 1"=4'

CITY OF PERRIS
PARCEL MAP 36726
IPT PERRIS DC-TPM 36726
STORM DRAIN IMPROVEMENT PLAN
LATERALS

FOR: IPT | W.O. 2015-0347 | CITY FILE NO. P8_1233

SHEET NO. 12 OF 16 SHEETS

G:\2015\15-0347\DRAWINGS\DESIGN (30)\04-SHEETS-0347-C-SD.DWG 12/1/2016 3:47:30 PM