

**PRELIMINARY DRAINAGE STUDY  
(HYDROLOGY AND HYDRAULICS)**

**FOR**

**OLIVE GROVE TTM 20728**

**CITY CASE #: TBD**

(Job Number 24-003)

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**Date: December 21, 2024**

**Olive Grove TTM 20728**  
**Preliminary Drainage Study**

**Preparer's Certification**

This report has been prepared by or under the oversight of the following registered civil engineer who attests to the technical information contained herein and has judged the qualifications of referenced data upon which recommendations, conclusions, and decisions are based.



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**Chris Morlok, P.E.**  
R.C.E. #76545

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**Date**

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**Seal**

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Appendix B: Modified Rational Method Results

Appendix C: Inlet Sizing (To be provided during final engineering)

Appendix D: Storm Drain Sizing (To be provided during final engineering)

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## **1.0 INTRODUCTION**

### **1.1 Project Location**

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Olive Grove TTM 20728 Development (herein referred to as “the project”). The project is located west of River Ranch Parkway and north of N. Sycamore Avenue. The project is an infill site between two single family developments, Tract 20092 of River Ranch to the north and Tracts 3746, 8612 and 9147 to the south, in the City of Rialto, California. Refer to Figure 1.0 for a Vicinity Map of the project. Applicable APN is 0264-032-21.

### **1.2 Project Description**

The overall project parcel area is approximately 4.15 acres of developable area. The proposed improvements will consist of approximately 29 residential lots, with a minimum lot size of 2,200 SF, including streets, sidewalks, and landscaping areas. For the purpose of off-site mitigation design (storm water management design), the proposed impervious and pervious footprints are approximately 57,210 square feet (~32%) and 123,564 square feet (~68%), respectively. As mentioned above, the remaining drainage areas consist of pervious perimeter areas (self-treating areas) that bypass or drain away from the project. In order to comply with the San Bernardino County storm water quality management requirements, the project proposes to utilize the existing above ground tandem stormwater detention basins located in River Ranch Tract 20092, as those facilities were sized and designed to capture stormwater flows generated from the subject property.

### **1.3 Pre-Development Condition**

In the existing condition, the site consists of vacant undeveloped land with sparse vegetation. The existing topography slopes from west to east with no drainage facilities located within the project site. During storms, runoff flows offsite to River Ranch Parkway until being collected in the existing catch basins located at the intersection of Powel Drive and River Ranch Parkway constructed as part of the TR 20092 residential development. Based on the hydrology calculations for TR 20092, the storm drain system has been designed to convey the 100-year flows and maintain sufficient freeboard below the adjacent flowline grade within the local depression. Storm drain flows are collected and conveyed to Basin 2. Basin 2 house potential storage 2-1/2 times greater than Basins 1 of the existing tandem detention basins within Tract 20092, before discharging into the Lytle Creek Wash. Lytle Creek Wash continues to surface flow southeasterly, which eventually drains to Lytle-Cajon Channel and ultimately the Santa Ana River.

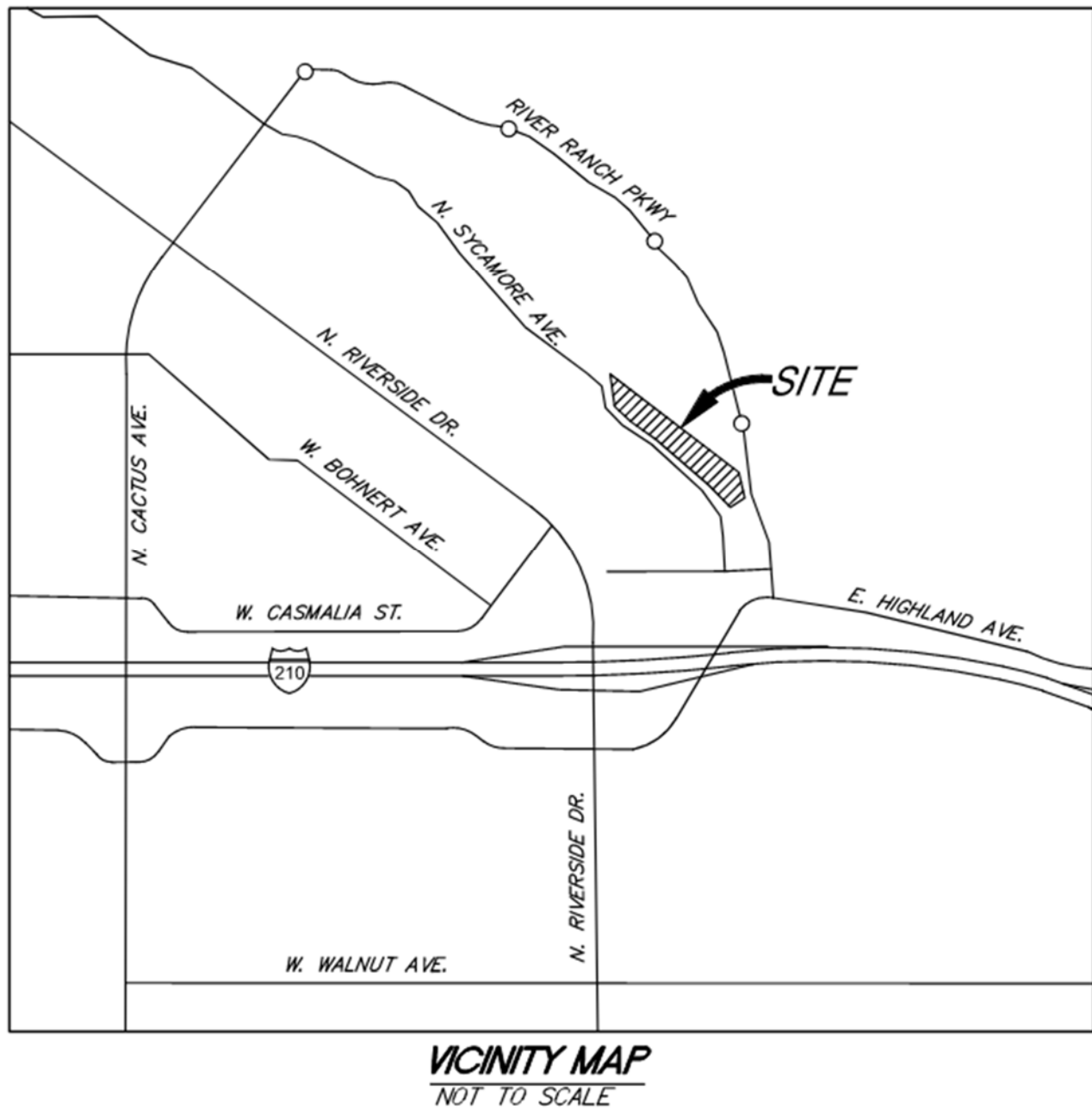
## **1.4 Post-Development Condition**

In the post-project condition, the drainage characteristics will remain similar as compared to the pre-project condition. Runoff from the site will surface flow to River Ranch Parkway, where the flows will be conveyed by curb and gutter to the existing catch basins located at the intersection of Powel Drive and River Ranch Parkway within TR 20092. These flows will be collected via underground storm drain system (including catch basins and storm drain pipes) and be conveyed to Basin 2. The existing BMP is an above ground tandem detention basin which provides adequate capacity to retain the low-flow water quality volume and address storm water quality requirements. It is assumed that the existing detention basins were designed with additional capacity beyond the required water quality volume in an effort to provide some flow attenuation for larger storm events including potential hydrologic condition of concern (HCOC) volume which account for this site. Overflow from the existing tandem basins are designed to outlet via a concrete spillway structure which outlets to the Lytle Creek Wash.

## **1.5 FEMA Flood Hazard Zone Information**

The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as 'Zone X'. Based on the FEMA Flood Insurance Rate Map Zone definitions, Zone X is the area between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone X. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 06071C7940J, with an effective date of September 2, 2016. There is also a letter of map revision referenced on the firmette, noted as LOMR 20-09-1006P, effective 12/12/2022. Therefore, processing through FEMA is not anticipated to be required for this project. For reference purposes, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

**Figure 1: Vicinity Map**



## 2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the guidance document title, "San Bernardino County Hydrology Manual," dated August 1986, for preliminary on-site storm drain sizing purpose. As allowed by the District, the CIVILCADD/CIVILDESIGN engineering software (2018 Version 9.0) was used to perform the hydrologic analysis in this study to determine the peak flow rates for the 10-year, 1-hour and 100-year, 1-hour storm events.

The program has the capability to perform calculations for 12 hydrologic processes. These process descriptions appear in the results. The process descriptions are provided below:

### Subarea Hydrologic Processes

- 1: Initial subarea input, top of stream
- 2: Street flow thru subarea, includes subarea runoff
- 3: Addition of runoff from subarea to stream
- 4: Street inlet + parallel street & pipe flow + area
- 5: Natural mountain/valley channel + area
- 6: Pipeflow travel time (program estimated pipesize)
- 7: Pipeflow travel time (user specified pipesize)
- 8: Improved channel travel – area add option
- 9: Irregular channel travel time – area add option
- 10: User specified entry of data at a point
- 11: Confluence at downstream point in current stream
- 12: Confluence of main stream

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled Hydrologic backup is included as Appendix B to this report.

### Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties as well as to determine peak flows at confluence points, existing and proposed storm drain facilities, and to facilitate hydraulic analyses. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the hydrologic workmap for the site, included in Appendix B.

### Time of Concentration / Intensity

The time of concentration was calculated using the CIVILCADD/CIVILDESIGN to determine the intensity for the 10-year and 100-year storm events. The rainfall intensity was calculated in CIVILCADD/CIVILDESIGN software, based on the user entered relevant precipitation depths for the project area using NOAA Atlas 14 Point Precipitation Frequency Estimates. A supporting annotated chart has been included in Appendix A.

### Runoff Coefficient

The runoff coefficients used for each drainage area were calculated by the CIVILCADD/CIVILDESIGN software based on the user-entered information of the hydrologic soil group and the land use for each basin. The percentage of impervious area (i.e. land use) in each subdrainage area was used to determine the land use entered within CIVILCADD/CIVILDESIGN based Figure C-4 of the Hydrology Manual. Supporting information for parameters assigned to CIVILCADD/CIVILDESIGN calculations is included with Appendix A of this report.

### Hydrologic Soils Group

Hydrologic soil group data is available for the site through the Natural Resource Conservation Service (NRCS) Web Soil Survey, showing the site consisting primarily of type “A” soil. For the purpose of hydrologic calculations, soil type “A” has been applied.

### Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Dawson Surveying.

## **2.1 Hydrologic Results**

Since the existing drainage basins facilities are designed with additional capacity beyond the required water quality volume and to provide some flow attenuation for larger storm events, including potential hydrologic condition of concern (HCOC) volume, the site was analyzed based on the pre and post development conditions for the 10-year, 1-hour and 100-year, 1-hour storm events. The results of the pre and post rational method calculations are summarized in Table 2.1, which provides the estimated 10-year and 100-year peak flow rates. As the design matures, more detailed hydrologic calculations will be conducted for the purpose of on-site catch basin and storm drain sizing. Supporting hydrologic calculation results are to be located in Appendix B of this report.

**Table 2.1 – On-site Hydrologic Data Summary at Key Locations (10-year & 100-year)**

| Key Drainage<br>Basin ID <sup>3</sup> | 1 Hour Storm Peak Flow Rate <sup>1</sup> |                                       |                                       |                                        |                                        |
|---------------------------------------|------------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------|
|                                       | Total Area (Acres)                       | Pre                                   | Post                                  | Pre                                    | Post                                   |
|                                       |                                          | Q <sub>10</sub><br>(cfs) <sup>2</sup> | Q <sub>10</sub><br>(cfs) <sup>2</sup> | Q <sub>100</sub><br>(cfs) <sup>2</sup> | Q <sub>100</sub><br>(cfs) <sup>2</sup> |
| A-1                                   | 0.8                                      | 1.5                                   | 2.0                                   | 3.0                                    | 3.8                                    |
| A-2                                   | 3.3                                      | 4.6                                   | 6.8                                   | 8.2                                    | 12.4                                   |
| TOTALS                                | 4.1                                      | 6.1                                   | 8.8                                   | 13.2                                   | 16.2                                   |

Note:

1: Refer to Appendix B for supporting information.

2: “cfs”= cubic feet per second.

3: Refer to the Drainage Study Map in Appendix B for drainage basin locations.

## **3.0 HYDRAULICS**

### **3.1 Hydraulic Methodology and Criteria**

The 10-year and 100-year, 1-hour proposed peak flow rates determined using the Modified Rational Method (CIVILCADD/CIVILDESIGN Rational Method) outputs from Section 2 will be used to determine preliminary sizes for the on-site storm drain system should any be required.

### **3.2 Inlet Sizing**

Inlet design calculation specific to the proposed any on-site private catch basins will be conducted during final engineering and calculation output will be incorporated in Appendix C as needed. In the post-project condition, any proposed on-site storm drain catch basins (inlets) will be designed to intercept the 100-year, 1-hour peak flow rates.

### **3.3 Storm Drain Sizing**

At this point, estimated preliminary storm drain sizes in the modified rational method calculations were referenced to provide the storm drain layouts on the preliminary grading plan. Preliminary design calculations are to be provided at a later stage. The calculations will be prepared to ensure the proposed on-site private storm drain pipes could convey the anticipated 100-year flow rates (output from the Modified Rational Method analysis). The supporting calculation summary is to be provided in Appendix A. Typically, this calculation approach is adequate for on-site privately-maintained storm drain pipe sizing.

## 4.0 CONCLUSION

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Olive Grove TTM 20728 Development project in the City of Rialto, California. Hydrologic calculations were computed in accordance with the San Bernardino County Hydrology Manual, dated August 1986 (guidance document). The peak discharge rates for the 10-year and 100-year, 1-hour storm events have been determined for the project using the CIVILCADD/CIVILDESIGN engineering software (2018 Version 9.0). The relevant 100-year peak flow rates were used to determine the preliminary onsite private storm drain sizes (based on both normal depth calculations). The project proposes utilizing the existing above ground basins located in the River Ranch Tract 20092 to meet the storm water quality management requirements. It is our understanding that the above ground detention facilities were sized and designed to capture flows from the project site. The detention basins have been sized to also address potential HCOC requirement (as part of WQMP) and flow attenuation for larger storm event (i.e. – 100-year storm). In summary, with the proposed improvements, no adverse impacts are anticipated to the existing downstream drainage facilities because of the project.

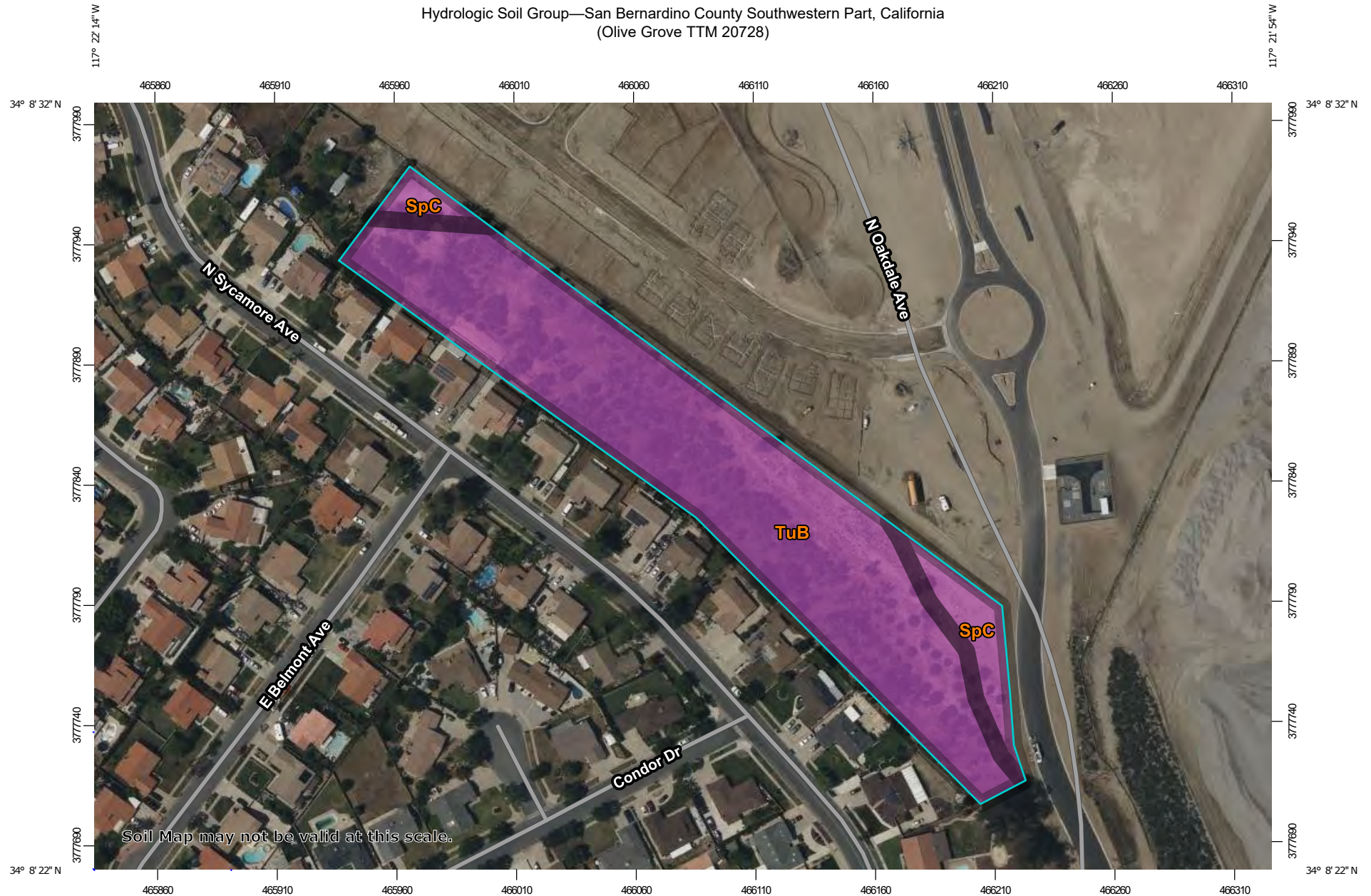
## **Appendix A**

### **Hydrologic Backup Information**

Includes:

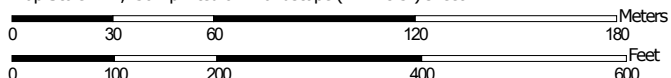
1. Web Soil Survey Hydrologic Soil Group
2. FEMA FIRM Map
3. NOAA Atlas 14 Annotated Rainfall Precipitation Data

# Hydrologic Soil Group—San Bernardino County Southwestern Part, California (Olive Grove TTM 20728)



Soil Map may not be valid at this scale.

Map Scale: 1:2,250 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

8/20/2024  
Page 1 of 4

## 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: San Bernardino County Southwestern Part, California  
Survey Area Data: Version 15, Aug 30, 2023

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

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 |
|------------------------------------|------------------------------------------------|--------|--------------|----------------|
| SpC                                | Soboba stony loamy sand, 2 to 9 percent slopes | A      | 0.5          | 11.8%          |
| TuB                                | Tujunga loamy sand, 0 to 5 percent slopes      | A      | 3.9          | 88.2%          |
| <b>Totals for Area of Interest</b> |                                                |        | <b>4.4</b>   | <b>100.0%</b>  |

## 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

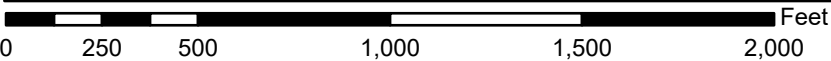
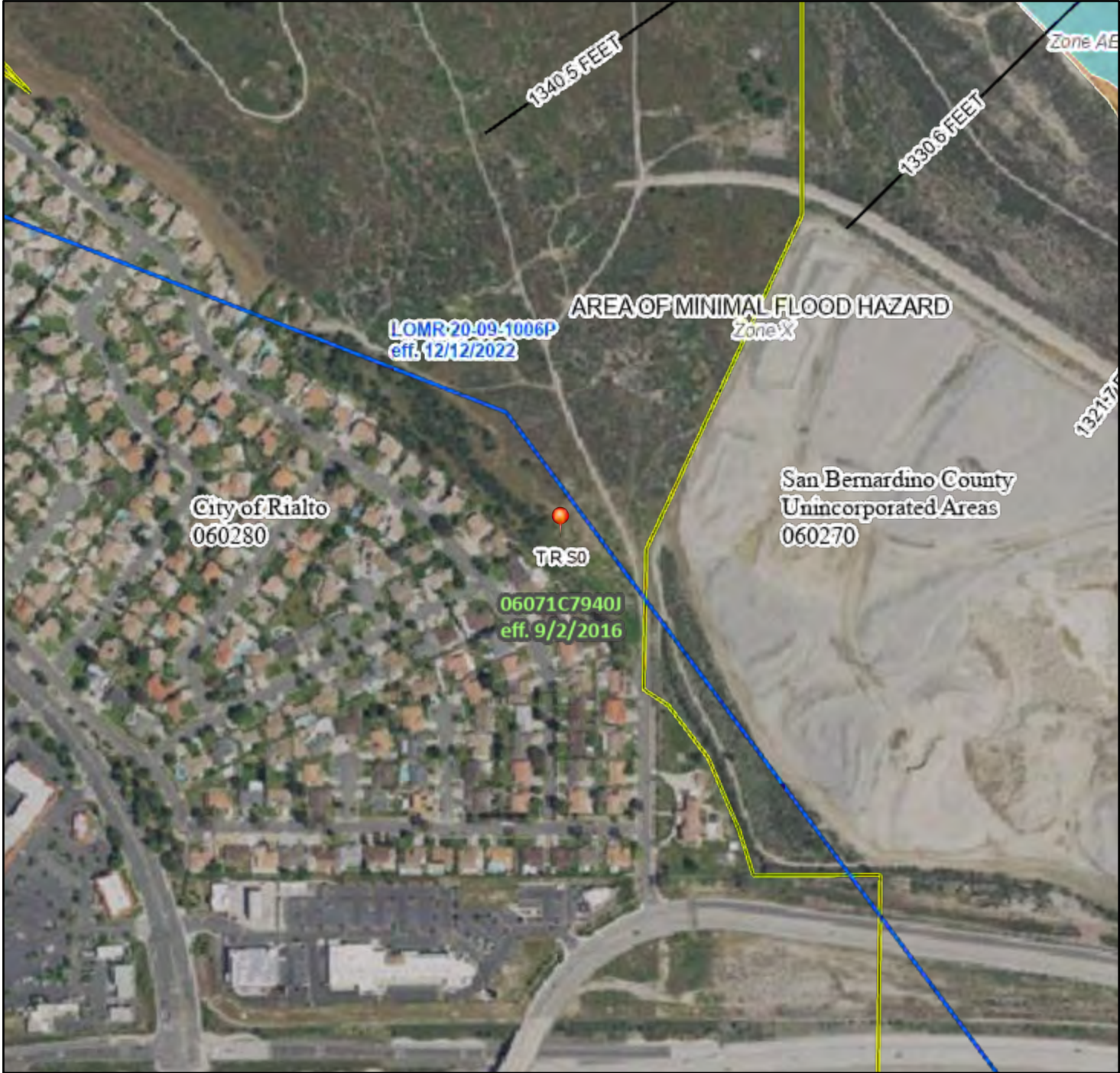
*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

# National Flood Hazard Layer FIRMette



117°22'20"W 34°8'40"N



1:6,000

117°21'42"W 34°8'10"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)<br>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                                                                                                                                                   |
| GENERAL STRUCTURES          |  | Area of Undetermined Flood Hazard Zone D                                                                                                                          |
|                             |  | Channel, Culvert, or Storm Sewer                                                                                                                                  |
|                             |  | Levee, Dike, or Floodwall                                                                                                                                         |
| OTHER FEATURES              |  | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation                                                                                                 |
|                             |  | 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation                                                                                                 |
|                             |  | Coastal Transect                                                                                                                                                  |
|                             |  | Base Flood Elevation Line (BFE)                                                                                                                                   |
|                             |  | Limit of Study                                                                                                                                                    |
|                             |  | Jurisdiction Boundary                                                                                                                                             |
| MAP PANELS                  |  | Coastal Transect Baseline                                                                                                                                         |
|                             |  | Profile Baseline                                                                                                                                                  |
|                             |  | Hydrographic Feature                                                                                                                                              |
|                             |  | Digital Data Available                                                                                                                                            |
|                             |  | No Digital Data Available                                                                                                                                         |
|                             |  | Unmapped                                                                                                                                                          |



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 **12/30/2024 at 9:33 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.



**NOAA Atlas 14, Volume 6, Version 2**  
**Location name: Rialto, California, USA\***  
**Latitude: 34.141°, Longitude: -117.3675°**  
**Elevation: 1391 ft\*\***

\* source: ESRI Maps  
 \*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

**PF tabular**

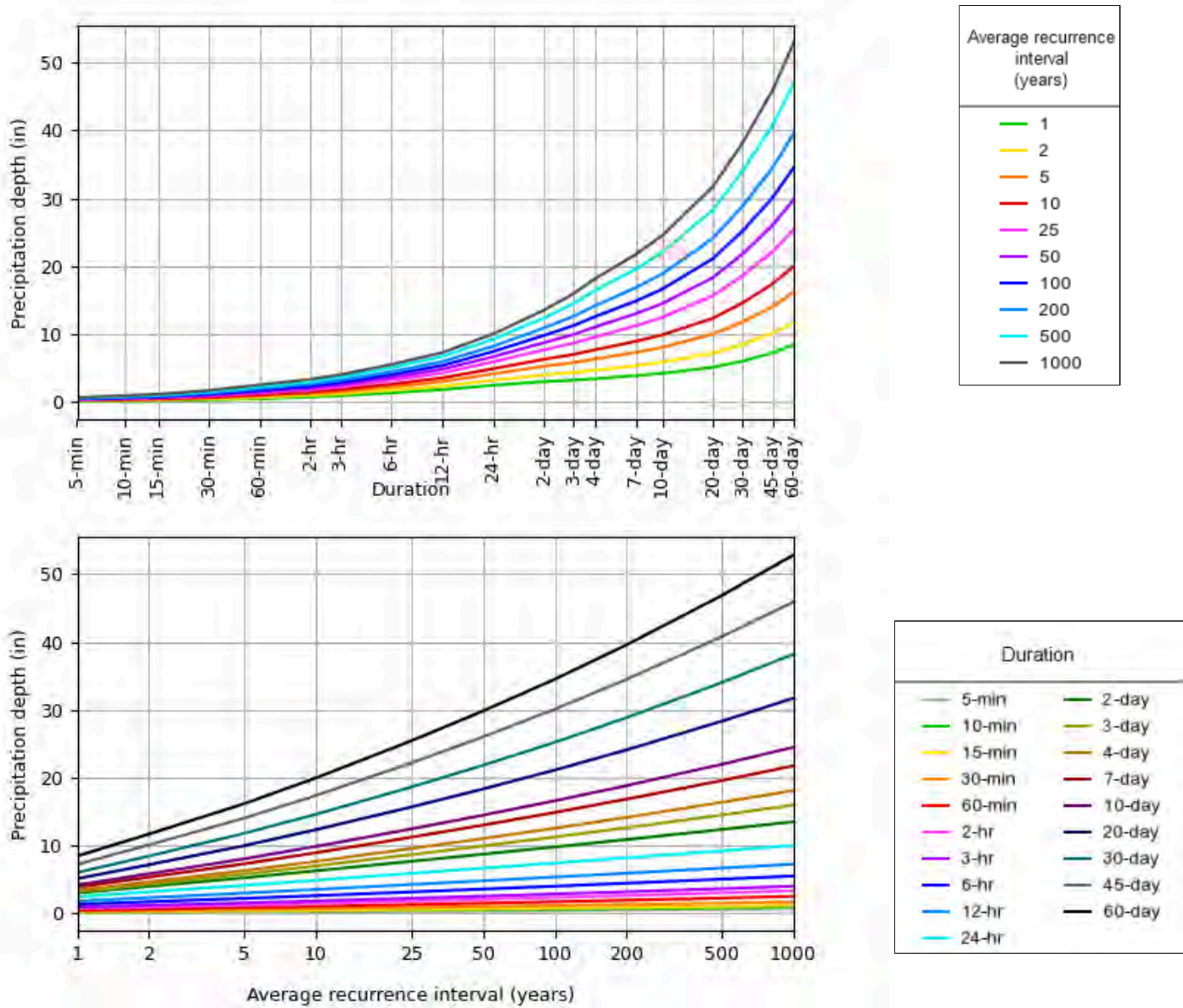
| <b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b> |                                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Duration</b>                                                                                                | <b>Average recurrence interval (years)</b> |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|                                                                                                                | <b>1</b>                                   | <b>2</b>                      | <b>5</b>                      | <b>10</b>                     | <b>25</b>                     | <b>50</b>                     | <b>100</b>                    | <b>200</b>                    | <b>500</b>                    | <b>1000</b>                   |
| <b>5-min</b>                                                                                                   | <b>0.131</b><br>(0.109-0.159)              | <b>0.174</b><br>(0.144-0.211) | <b>0.231</b><br>(0.191-0.281) | <b>0.278</b><br>(0.229-0.342) | <b>0.345</b><br>(0.274-0.439) | <b>0.397</b><br>(0.309-0.517) | <b>0.453</b><br>(0.343-0.603) | <b>0.511</b><br>(0.376-0.701) | <b>0.594</b><br>(0.419-0.850) | <b>0.661</b><br>(0.450-0.980) |
| <b>10-min</b>                                                                                                  | <b>0.188</b><br>(0.157-0.228)              | <b>0.249</b><br>(0.207-0.303) | <b>0.331</b><br>(0.274-0.403) | <b>0.399</b><br>(0.328-0.490) | <b>0.494</b><br>(0.392-0.629) | <b>0.570</b><br>(0.443-0.741) | <b>0.649</b><br>(0.492-0.865) | <b>0.733</b><br>(0.540-1.00)  | <b>0.851</b><br>(0.601-1.22)  | <b>0.947</b><br>(0.645-1.40)  |
| <b>15-min</b>                                                                                                  | <b>0.228</b><br>(0.189-0.276)              | <b>0.301</b><br>(0.250-0.366) | <b>0.400</b><br>(0.331-0.488) | <b>0.482</b><br>(0.396-0.593) | <b>0.598</b><br>(0.474-0.760) | <b>0.689</b><br>(0.535-0.896) | <b>0.785</b><br>(0.595-1.05)  | <b>0.886</b><br>(0.653-1.22)  | <b>1.03</b><br>(0.727-1.47)   | <b>1.15</b><br>(0.780-1.70)   |
| <b>30-min</b>                                                                                                  | <b>0.338</b><br>(0.281-0.411)              | <b>0.448</b><br>(0.372-0.544) | <b>0.595</b><br>(0.493-0.725) | <b>0.717</b><br>(0.589-0.882) | <b>0.888</b><br>(0.705-1.13)  | <b>1.02</b><br>(0.796-1.33)   | <b>1.17</b><br>(0.884-1.56)   | <b>1.32</b><br>(0.970-1.81)   | <b>1.53</b><br>(1.08-2.19)    | <b>1.70</b><br>(1.16-2.53)    |
| <b>60-min</b>                                                                                                  | <b>0.503</b><br>(0.419-0.611)              | <b>0.667</b><br>(0.554-0.810) | <b>0.885</b><br>(0.733-1.08)  | <b>1.07</b><br>(0.877-1.31)   | <b>1.32</b><br>(1.05-1.68)    | <b>1.52</b><br>(1.18-1.98)    | <b>1.74</b><br>(1.32-2.31)    | <b>1.96</b><br>(1.44-2.69)    | <b>2.28</b><br>(1.61-3.26)    | <b>2.54</b><br>(1.73-3.76)    |
| <b>2-hr</b>                                                                                                    | <b>0.747</b><br>(0.621-0.907)              | <b>0.968</b><br>(0.804-1.18)  | <b>1.26</b><br>(1.04-1.54)    | <b>1.50</b><br>(1.23-1.85)    | <b>1.84</b><br>(1.46-2.34)    | <b>2.10</b><br>(1.63-2.73)    | <b>2.37</b><br>(1.79-3.16)    | <b>2.65</b><br>(1.95-3.64)    | <b>3.04</b><br>(2.15-4.36)    | <b>3.36</b><br>(2.29-4.98)    |
| <b>3-hr</b>                                                                                                    | <b>0.937</b><br>(0.780-1.14)               | <b>1.20</b><br>(1.00-1.46)    | <b>1.56</b><br>(1.29-1.90)    | <b>1.85</b><br>(1.52-2.27)    | <b>2.24</b><br>(1.78-2.86)    | <b>2.55</b><br>(1.98-3.32)    | <b>2.87</b><br>(2.18-3.83)    | <b>3.20</b><br>(2.36-4.39)    | <b>3.66</b><br>(2.58-5.24)    | <b>4.02</b><br>(2.74-5.96)    |
| <b>6-hr</b>                                                                                                    | <b>1.36</b><br>(1.13-1.65)                 | <b>1.74</b><br>(1.44-2.11)    | <b>2.23</b><br>(1.85-2.72)    | <b>2.63</b><br>(2.16-3.23)    | <b>3.18</b><br>(2.52-4.04)    | <b>3.59</b><br>(2.79-4.67)    | <b>4.02</b><br>(3.05-5.36)    | <b>4.46</b><br>(3.28-6.12)    | <b>5.06</b><br>(3.57-7.24)    | <b>5.53</b><br>(3.76-8.20)    |
| <b>12-hr</b>                                                                                                   | <b>1.82</b><br>(1.52-2.21)                 | <b>2.34</b><br>(1.94-2.84)    | <b>3.01</b><br>(2.49-3.67)    | <b>3.55</b><br>(2.92-4.36)    | <b>4.27</b><br>(3.39-5.43)    | <b>4.82</b><br>(3.74-6.27)    | <b>5.37</b><br>(4.07-7.16)    | <b>5.94</b><br>(4.37-8.14)    | <b>6.69</b><br>(4.72-9.58)    | <b>7.27</b><br>(4.95-10.8)    |
| <b>24-hr</b>                                                                                                   | <b>2.46</b><br>(2.18-2.83)                 | <b>3.20</b><br>(2.83-3.69)    | <b>4.14</b><br>(3.66-4.79)    | <b>4.90</b><br>(4.29-5.72)    | <b>5.91</b><br>(5.01-7.12)    | <b>6.67</b><br>(5.54-8.20)    | <b>7.43</b><br>(6.02-9.36)    | <b>8.20</b><br>(6.46-10.6)    | <b>9.23</b><br>(6.98-12.4)    | <b>10.0</b><br>(7.32-14.0)    |
| <b>2-day</b>                                                                                                   | <b>3.01</b><br>(2.67-3.47)                 | <b>3.99</b><br>(3.53-4.60)    | <b>5.26</b><br>(4.64-6.09)    | <b>6.29</b><br>(5.51-7.34)    | <b>7.68</b><br>(6.50-9.25)    | <b>8.74</b><br>(7.25-10.7)    | <b>9.80</b><br>(7.94-12.3)    | <b>10.9</b><br>(8.59-14.1)    | <b>12.4</b><br>(9.36-16.7)    | <b>13.5</b><br>(9.88-18.9)    |
| <b>3-day</b>                                                                                                   | <b>3.21</b><br>(2.84-3.70)                 | <b>4.33</b><br>(3.83-5.00)    | <b>5.80</b><br>(5.12-6.71)    | <b>7.01</b><br>(6.13-8.17)    | <b>8.66</b><br>(7.34-10.4)    | <b>9.95</b><br>(8.26-12.2)    | <b>11.3</b><br>(9.12-14.2)    | <b>12.6</b><br>(9.95-16.4)    | <b>14.5</b><br>(11.0-19.6)    | <b>16.0</b><br>(11.7-22.3)    |
| <b>4-day</b>                                                                                                   | <b>3.42</b><br>(3.03-3.95)                 | <b>4.66</b><br>(4.13-5.38)    | <b>6.31</b><br>(5.57-7.30)    | <b>7.68</b><br>(6.72-8.95)    | <b>9.56</b><br>(8.10-11.5)    | <b>11.0</b><br>(9.16-13.6)    | <b>12.6</b><br>(10.2-15.8)    | <b>14.2</b><br>(11.2-18.3)    | <b>16.4</b><br>(12.4-22.1)    | <b>18.1</b><br>(13.3-25.3)    |
| <b>7-day</b>                                                                                                   | <b>3.88</b><br>(3.44-4.47)                 | <b>5.35</b><br>(4.73-6.17)    | <b>7.31</b><br>(6.45-8.46)    | <b>8.95</b><br>(7.83-10.4)    | <b>11.2</b><br>(9.50-13.5)    | <b>13.0</b><br>(10.8-16.0)    | <b>14.9</b><br>(12.1-18.7)    | <b>16.8</b><br>(13.3-21.8)    | <b>19.6</b><br>(14.8-26.4)    | <b>21.8</b><br>(15.9-30.4)    |
| <b>10-day</b>                                                                                                  | <b>4.21</b><br>(3.73-4.85)                 | <b>5.85</b><br>(5.17-6.75)    | <b>8.04</b><br>(7.10-9.30)    | <b>9.88</b><br>(8.64-11.5)    | <b>12.4</b><br>(10.5-15.0)    | <b>14.5</b><br>(12.0-17.8)    | <b>16.6</b><br>(13.4-20.9)    | <b>18.8</b><br>(14.8-24.4)    | <b>22.0</b><br>(16.6-29.6)    | <b>24.5</b><br>(17.9-34.2)    |
| <b>20-day</b>                                                                                                  | <b>5.12</b><br>(4.54-5.90)                 | <b>7.19</b><br>(6.36-8.29)    | <b>9.99</b><br>(8.81-11.6)    | <b>12.3</b><br>(10.8-14.4)    | <b>15.7</b><br>(13.3-18.9)    | <b>18.3</b><br>(15.2-22.5)    | <b>21.1</b><br>(17.1-26.6)    | <b>24.1</b><br>(19.0-31.2)    | <b>28.3</b><br>(21.4-38.2)    | <b>31.7</b><br>(23.2-44.3)    |
| <b>30-day</b>                                                                                                  | <b>6.03</b><br>(5.34-6.94)                 | <b>8.47</b><br>(7.49-9.77)    | <b>11.8</b><br>(10.4-13.6)    | <b>14.6</b><br>(12.8-17.0)    | <b>18.6</b><br>(15.8-22.4)    | <b>21.8</b><br>(18.1-26.8)    | <b>25.2</b><br>(20.4-31.8)    | <b>28.8</b><br>(22.7-37.3)    | <b>34.0</b><br>(25.7-45.9)    | <b>38.2</b><br>(27.9-53.3)    |
| <b>45-day</b>                                                                                                  | <b>7.23</b><br>(6.40-8.33)                 | <b>10.1</b><br>(8.94-11.7)    | <b>14.0</b><br>(12.4-16.2)    | <b>17.4</b><br>(15.2-20.3)    | <b>22.1</b><br>(18.8-26.7)    | <b>26.0</b><br>(21.6-32.0)    | <b>30.1</b><br>(24.4-37.9)    | <b>34.5</b><br>(27.2-44.6)    | <b>40.8</b><br>(30.8-55.0)    | <b>45.9</b><br>(33.6-64.1)    |
| <b>60-day</b>                                                                                                  | <b>8.45</b><br>(7.48-9.74)                 | <b>11.7</b><br>(10.3-13.5)    | <b>16.2</b><br>(14.3-18.7)    | <b>20.0</b><br>(17.5-23.3)    | <b>25.4</b><br>(21.5-30.6)    | <b>29.8</b><br>(24.7-36.7)    | <b>34.5</b><br>(27.9-43.5)    | <b>39.6</b><br>(31.2-51.2)    | <b>46.8</b><br>(35.4-63.2)    | <b>52.8</b><br>(38.6-73.7)    |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).  
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.  
 Please refer to NOAA Atlas 14 document for more information.

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**PF graphical**

PDS-based depth-duration-frequency (DDF) curves  
Latitude: 34.1410°, Longitude: -117.3675°



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**NOAA Atlas 14, Volume 6, Version 2**  
**Location name: Rialto, California, USA\***  
**Latitude: 34.141°, Longitude: -117.3675°**  
**Elevation: 1391 ft\*\***

\* source: ESRI Maps  
 \*\* source: USGS



### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

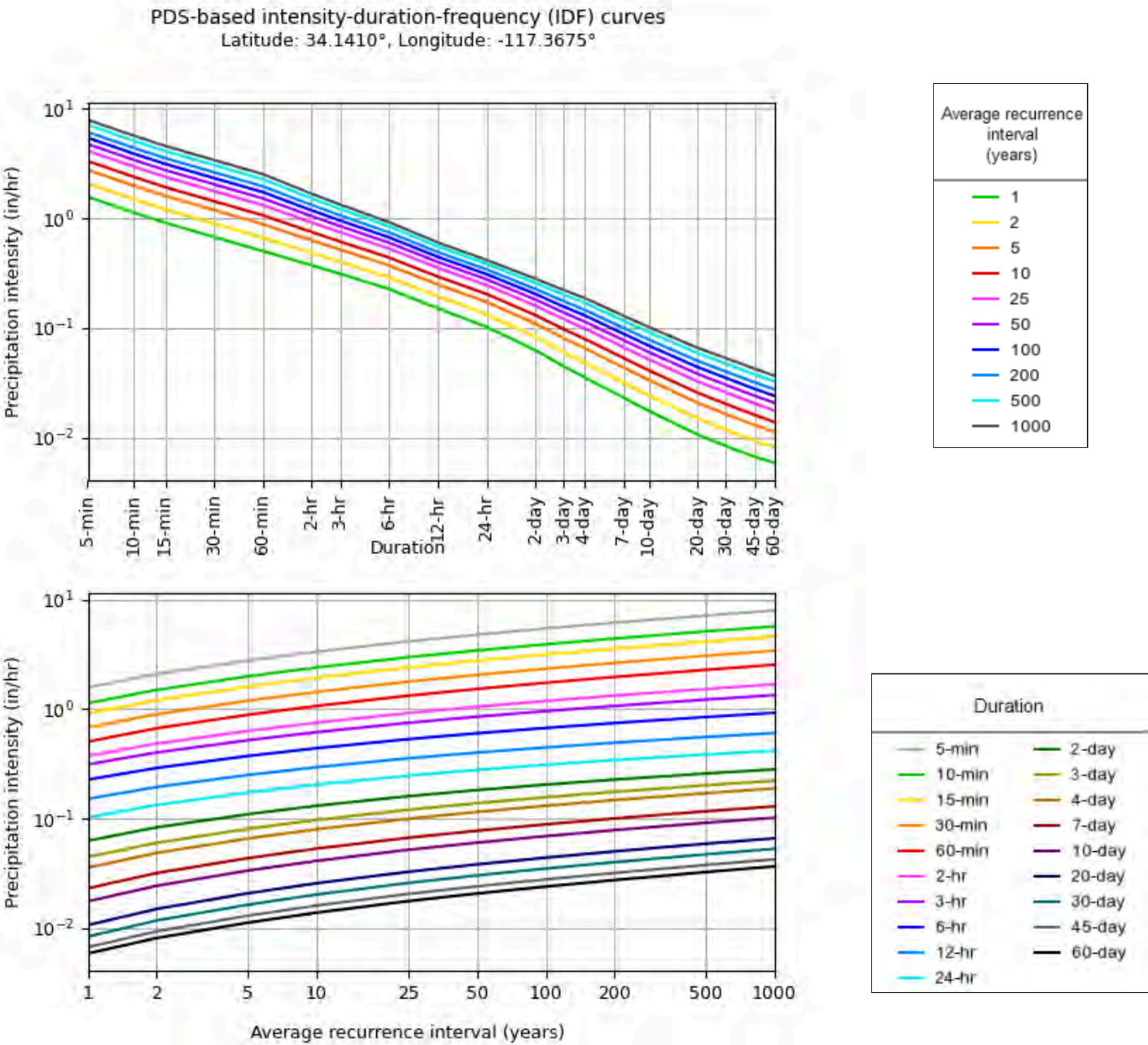
### PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) <sup>1</sup> |                                     |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|---------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Duration                                                                                                      | Average recurrence interval (years) |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|                                                                                                               | 1                                   | 2                      | 5                      | 10                     | 25                     | 50                     | 100                    | 200                    | 500                    | 1000                   |
| 5-min                                                                                                         | 1.57<br>(1.31-1.91)                 | 2.09<br>(1.73-2.53)    | 2.77<br>(2.29-3.37)    | 3.34<br>(2.75-4.10)    | 4.14<br>(3.29-5.27)    | 4.76<br>(3.71-6.20)    | 5.44<br>(4.12-7.24)    | 6.13<br>(4.51-8.41)    | 7.13<br>(5.03-10.2)    | 7.93<br>(5.40-11.8)    |
| 10-min                                                                                                        | 1.13<br>(0.942-1.37)                | 1.49<br>(1.24-1.82)    | 1.99<br>(1.64-2.42)    | 2.39<br>(1.97-2.94)    | 2.96<br>(2.35-3.77)    | 3.42<br>(2.66-4.45)    | 3.89<br>(2.95-5.19)    | 4.40<br>(3.24-6.03)    | 5.11<br>(3.61-7.31)    | 5.68<br>(3.87-8.43)    |
| 15-min                                                                                                        | 0.912<br>(0.756-1.10)               | 1.20<br>(1.00-1.46)    | 1.60<br>(1.32-1.95)    | 1.93<br>(1.58-2.37)    | 2.39<br>(1.90-3.04)    | 2.76<br>(2.14-3.58)    | 3.14<br>(2.38-4.18)    | 3.54<br>(2.61-4.86)    | 4.12<br>(2.91-5.90)    | 4.58<br>(3.12-6.80)    |
| 30-min                                                                                                        | 0.676<br>(0.562-0.822)              | 0.896<br>(0.744-1.09)  | 1.19<br>(0.986-1.45)   | 1.43<br>(1.18-1.76)    | 1.78<br>(1.41-2.26)    | 2.05<br>(1.59-2.66)    | 2.33<br>(1.77-3.11)    | 2.64<br>(1.94-3.62)    | 3.06<br>(2.16-4.38)    | 3.41<br>(2.32-5.05)    |
| 60-min                                                                                                        | 0.503<br>(0.419-0.611)              | 0.667<br>(0.554-0.810) | 0.885<br>(0.733-1.08)  | 1.07<br>(0.877-1.31)   | 1.32<br>(1.05-1.68)    | 1.52<br>(1.18-1.98)    | 1.74<br>(1.32-2.31)    | 1.96<br>(1.44-2.69)    | 2.28<br>(1.61-3.26)    | 2.54<br>(1.73-3.76)    |
| 2-hr                                                                                                          | 0.373<br>(0.310-0.453)              | 0.484<br>(0.402-0.588) | 0.630<br>(0.522-0.768) | 0.751<br>(0.617-0.923) | 0.918<br>(0.728-1.17)  | 1.05<br>(0.815-1.36)   | 1.18<br>(0.897-1.58)   | 1.32<br>(0.976-1.82)   | 1.52<br>(1.07-2.18)    | 1.68<br>(1.14-2.49)    |
| 3-hr                                                                                                          | 0.312<br>(0.259-0.378)              | 0.400<br>(0.333-0.487) | 0.518<br>(0.429-0.632) | 0.615<br>(0.505-0.756) | 0.747<br>(0.593-0.951) | 0.850<br>(0.660-1.10)  | 0.956<br>(0.724-1.27)  | 1.07<br>(0.785-1.46)   | 1.22<br>(0.859-1.74)   | 1.34<br>(0.912-1.98)   |
| 6-hr                                                                                                          | 0.226<br>(0.188-0.275)              | 0.289<br>(0.240-0.352) | 0.372<br>(0.308-0.453) | 0.439<br>(0.360-0.539) | 0.530<br>(0.421-0.674) | 0.600<br>(0.466-0.780) | 0.671<br>(0.508-0.894) | 0.744<br>(0.548-1.02)  | 0.844<br>(0.596-1.21)  | 0.922<br>(0.628-1.37)  |
| 12-hr                                                                                                         | 0.151<br>(0.125-0.183)              | 0.194<br>(0.161-0.236) | 0.249<br>(0.207-0.304) | 0.294<br>(0.242-0.362) | 0.354<br>(0.281-0.451) | 0.400<br>(0.310-0.520) | 0.445<br>(0.337-0.594) | 0.492<br>(0.362-0.675) | 0.555<br>(0.391-0.795) | 0.603<br>(0.411-0.895) |
| 24-hr                                                                                                         | 0.102<br>(0.090-0.117)              | 0.133<br>(0.117-0.153) | 0.172<br>(0.152-0.199) | 0.204<br>(0.178-0.238) | 0.246<br>(0.208-0.296) | 0.277<br>(0.230-0.341) | 0.309<br>(0.250-0.390) | 0.341<br>(0.269-0.442) | 0.384<br>(0.290-0.518) | 0.417<br>(0.305-0.582) |
| 2-day                                                                                                         | 0.062<br>(0.055-0.072)              | 0.083<br>(0.073-0.095) | 0.109<br>(0.096-0.126) | 0.131<br>(0.114-0.152) | 0.159<br>(0.135-0.192) | 0.181<br>(0.150-0.223) | 0.204<br>(0.165-0.257) | 0.226<br>(0.178-0.293) | 0.257<br>(0.194-0.347) | 0.281<br>(0.205-0.392) |
| 3-day                                                                                                         | 0.044<br>(0.039-0.051)              | 0.060<br>(0.053-0.069) | 0.080<br>(0.071-0.093) | 0.097<br>(0.085-0.113) | 0.120<br>(0.101-0.144) | 0.138<br>(0.114-0.169) | 0.156<br>(0.126-0.197) | 0.175<br>(0.138-0.227) | 0.201<br>(0.152-0.271) | 0.221<br>(0.162-0.309) |
| 4-day                                                                                                         | 0.035<br>(0.031-0.041)              | 0.048<br>(0.042-0.056) | 0.065<br>(0.058-0.076) | 0.079<br>(0.069-0.093) | 0.099<br>(0.084-0.119) | 0.114<br>(0.095-0.141) | 0.130<br>(0.106-0.164) | 0.147<br>(0.116-0.190) | 0.170<br>(0.128-0.229) | 0.188<br>(0.138-0.263) |
| 7-day                                                                                                         | 0.023<br>(0.020-0.026)              | 0.031<br>(0.028-0.036) | 0.043<br>(0.038-0.050) | 0.053<br>(0.046-0.062) | 0.066<br>(0.056-0.080) | 0.077<br>(0.064-0.095) | 0.088<br>(0.071-0.111) | 0.100<br>(0.078-0.129) | 0.116<br>(0.088-0.157) | 0.129<br>(0.094-0.180) |
| 10-day                                                                                                        | 0.017<br>(0.015-0.020)              | 0.024<br>(0.021-0.028) | 0.033<br>(0.029-0.038) | 0.041<br>(0.036-0.047) | 0.051<br>(0.043-0.062) | 0.060<br>(0.050-0.074) | 0.069<br>(0.056-0.087) | 0.078<br>(0.061-0.101) | 0.091<br>(0.069-0.123) | 0.102<br>(0.074-0.142) |
| 20-day                                                                                                        | 0.010<br>(0.009-0.012)              | 0.014<br>(0.013-0.017) | 0.020<br>(0.018-0.024) | 0.025<br>(0.022-0.029) | 0.032<br>(0.027-0.039) | 0.038<br>(0.031-0.046) | 0.044<br>(0.035-0.055) | 0.050<br>(0.039-0.065) | 0.058<br>(0.044-0.079) | 0.066<br>(0.048-0.092) |
| 30-day                                                                                                        | 0.008<br>(0.007-0.009)              | 0.011<br>(0.010-0.013) | 0.016<br>(0.014-0.018) | 0.020<br>(0.017-0.023) | 0.025<br>(0.021-0.031) | 0.030<br>(0.025-0.037) | 0.034<br>(0.028-0.044) | 0.040<br>(0.031-0.051) | 0.047<br>(0.035-0.063) | 0.053<br>(0.038-0.073) |
| 45-day                                                                                                        | 0.006<br>(0.005-0.007)              | 0.009<br>(0.008-0.010) | 0.012<br>(0.011-0.015) | 0.016<br>(0.014-0.018) | 0.020<br>(0.017-0.024) | 0.024<br>(0.019-0.029) | 0.027<br>(0.022-0.035) | 0.031<br>(0.025-0.041) | 0.037<br>(0.028-0.050) | 0.042<br>(0.031-0.059) |
| 60-day                                                                                                        | 0.005<br>(0.005-0.006)              | 0.008<br>(0.007-0.009) | 0.011<br>(0.009-0.012) | 0.013<br>(0.012-0.016) | 0.017<br>(0.014-0.021) | 0.020<br>(0.017-0.025) | 0.023<br>(0.019-0.030) | 0.027<br>(0.021-0.035) | 0.032<br>(0.024-0.043) | 0.036<br>(0.026-0.051) |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).  
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.  
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### PF graphical



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**Maps & aerials**

**Small scale terrain**



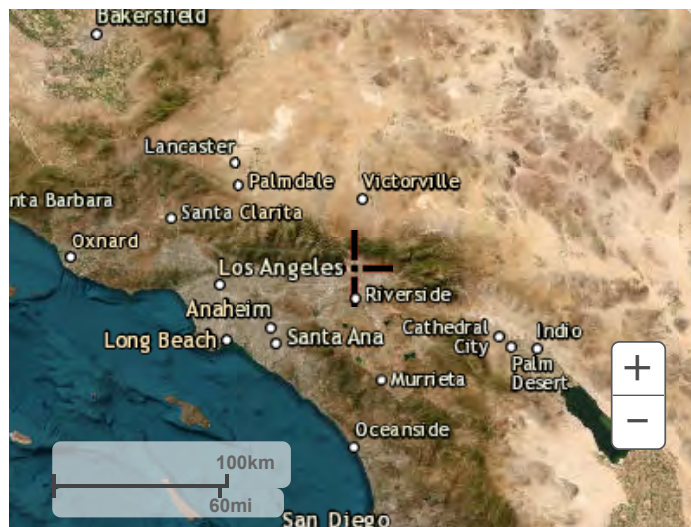
Large scale terrain



Large scale map



Large scale aerial



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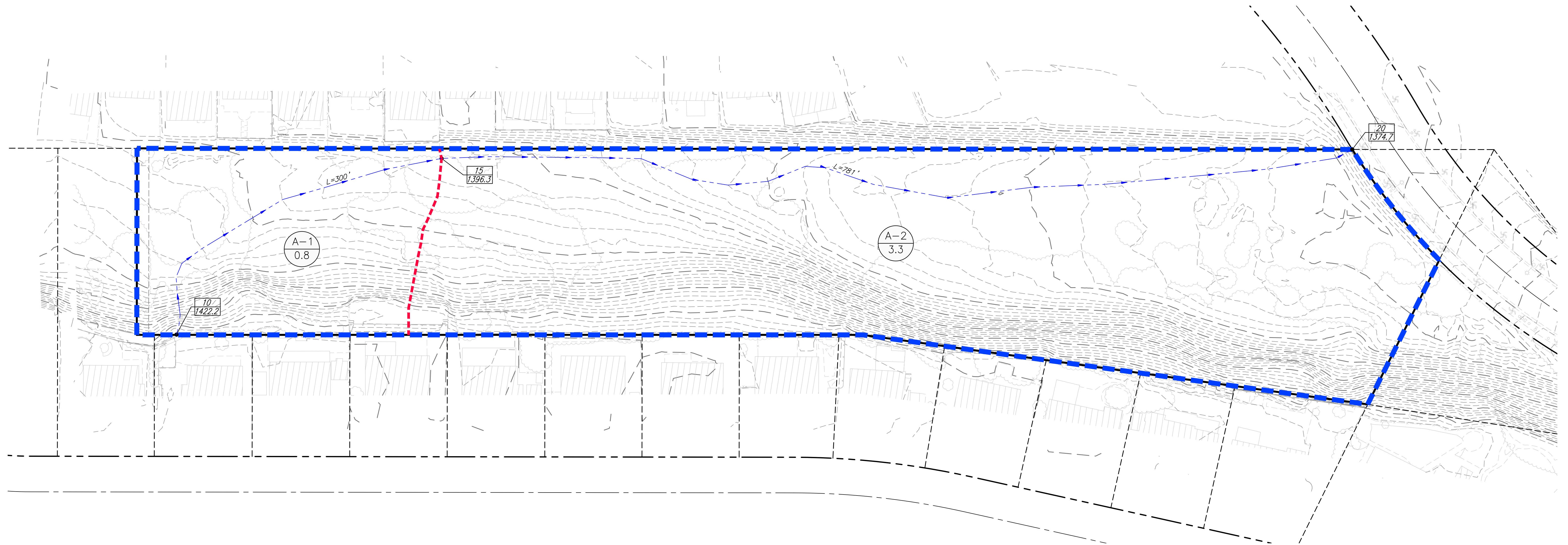
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## **Appendix B**

### **Modified Rational Method Results**

Includes:

1. Drainage Study Map (pre-project & post-project)
2. Supporting Hydrologic Calculations



# LEGEND

|  |                                                     |
|--|-----------------------------------------------------|
|  | MAJOR DRAINAGE BOUNDARY                             |
|  | TRACT BOUNDARY                                      |
|  | SUB BASIN BOUNDARY                                  |
|  | GENERAL SURFACE FLOW PATH                           |
|  | DRAINAGE ID                                         |
|  | DRAINAGE AREA                                       |
|  | DRAINAGE NODE<br>NODE ELEVATION<br>INVERT ELEVATION |
|  | DISCHARGE LOCATION                                  |

## NOTES:

1. THIS DRAINAGE STUDY MAP IS PREPARED IN SUPPORT OF THE ON-SITE HYDROLOGIC CALCULATIONS TO ADDRESS THE REQUIREMENTS OF THE RCFC&WCD'S INCREASED RUNOFF CRITERIA.
2. THE SITE IS SITUATED ON HYDROLOGIC SOIL GROUPS A. FOR THE PURPOSE OF HYDROLOGIC CALCULATION SOIL GROUP A WAS USED IN THE CALCULATIONS.
3. RUNOFF FROM THE EXISTING SITE GENERALLY DRAINS NORTH EASTERLY TOWARDS RIVER RANCH PARKWAY, WHERE SURFACE FLOWS ARE CAPTURED BY EXISTING STORM DRAIN LINE 'B', WHICH OUTLETS TO EXISTING BASIN '2'.
4. RUNOFF FROM THE PROPOSED DEVELOPMENT WILL BE DIRECTED IN A NORTH EASTERLY DIRECTION TOWARDS PROPOSED CATCH BASINS. THE FLOWS WILL THEN BE CONVEYED NORTHERLY ALONG RIVER RANCH PARKWAY TO CONNECT TO THE EXISTING LINE B STORM DRAIN, PRIOR TO DISCHARGING TO BASIN 2 FOR WATER QUALITY TREATMENT AND DETENTION/MITIGATION.
5. THE OVERALL SITE AREA IS APPROXIMATELY 4.15 ACRES. THE NORTHWESTERLY CORNER OF THE SITE (APPROXIMATELY 0.3 ACRE AS SHOWN) IS EXPECTED TO REMAIN PERVIOUS AND CONSIDERED AS SELF-TREATING AREA FOR THE PURPOSED WATER QUALITY LOW-FLOW STORM EVENT. DURING THE LARGER STORM EVENT (GREATER THAN THE LOW-FLOW STORM EVENT), THIS PERVIOUS AREA IS EXPECTED TO RUN-ON TO THE ON-SITE SURFACE PARKING ADJACENT TO IT AND DRAIN TOWARDS THE PROJECT OUTLET LOCATION NEAR THE SOUTHEASTERLY CORNER OF THE PROJECT.

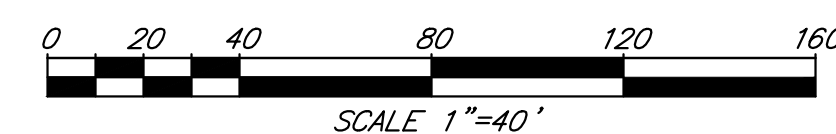
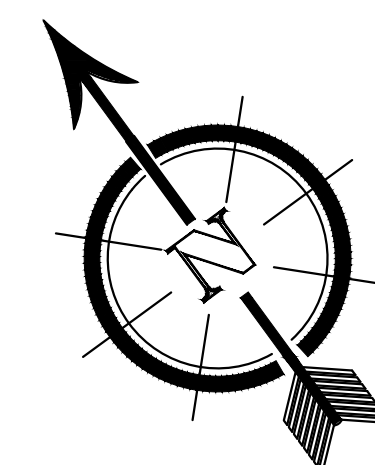


**FIGURE 1**  
**OLIVE GROVE TTM 20728**  
**EXISTING CONDITION**  
**HYDROLOGY MAP**

PREPARED: DECEMBER 2024

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SHEET  
**1**  
1 OF SHEETS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1  
Rational Hydrology Study Date: 12/30/24

-----  
OLIVE GROVE TTM 20728  
EXISTING CONDITION  
10-YEAR, 1-HOUR  
DECEMBER 2024  
-----

Program License Serial Number 6612

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

-----  
Rational hydrology study storm event year is 10.0  
Computed rainfall intensity:  
Storm year = 10.00 1 hour rainfall = 1.070 (In.)  
Slope used for rainfall intensity curve b = 0.6000  
Soil antecedent moisture condition (AMC) = 2

+++++  
Process from Point/Station 10.000 to Point/Station 15.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 50.00  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)  
Initial subarea data:  
Initial area flow distance = 300.000(Ft.)  
Top (of initial area) elevation = 1422.200(Ft.)  
Bottom (of initial area) elevation = 1396.300(Ft.)  
Difference in elevation = 25.900(Ft.)  
Slope = 0.08633 s(%)= 8.63  
 $TC = k(0.706)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 11.283 min.  
Rainfall intensity = 2.916(In/Hr) for a 10.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.650  
Subarea runoff = 1.517(CFS)

Total initial stream area = 0.800(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.810(In/Hr)

+++++  
Process from Point/Station 15.000 to Point/Station 20.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 0.000(CFS)  
Depth of flow = 0.434(Ft.), Average velocity = 3.563(Ft/s)  
!!Warning: Water is above left or right bank elevations

\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 0.00  
2 80.00 7.00  
Manning's 'N' friction factor = 0.025

-----  
Sub-Channel flow = 3.843(CFS)  
' ' flow top width = 4.965(Ft.)  
' ' velocity = 3.563(Ft/s)  
' ' area = 1.078(Sq.Ft)  
' ' Froude number = 1.347

Upstream point elevation = 1396.300(Ft.)  
Downstream point elevation = 1374.700(Ft.)  
Flow length = 781.000(Ft.)  
Travel time = 3.65 min.  
Time of concentration = 14.94 min.  
Depth of flow = 0.434(Ft.)  
Average velocity = 3.563(Ft/s)  
Total irregular channel flow = 3.842(CFS)  
Irregular channel normal depth above invert elev. = 0.434(Ft.)  
Average velocity of channel(s) = 3.563(Ft/s)  
!!Warning: Water is above left or right bank elevations

Adding area flow to channel  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 50.00  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.810(In/Hr)  
Rainfall intensity = 2.465(In/Hr) for a 10.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.604  
Subarea runoff = 4.590(CFS) for 3.300(Ac.)  
Total runoff = 6.107(CFS)

Effective area this stream = 4.10(Ac.)  
 Total Study Area (Main Stream No. 1) = 4.10(Ac.)  
 Area averaged Fm value = 0.810(In/Hr)  
 Depth of flow = 0.517(Ft.), Average velocity = 4.000(Ft/s)  
 !!Warning: Water is above left or right bank elevations

+++++  
 Process from Point/Station 15.000 to Point/Station 20.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 1  
 Stream flow area = 4.100(Ac.)  
 Runoff from this stream = 6.107(CFS)  
 Time of concentration = 14.94 min.  
 Rainfall intensity = 2.465(In/Hr)  
 Area averaged loss rate (Fm) = 0.8095(In/Hr)  
 Area averaged Pervious ratio (Ap) = 1.0000  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | Area (Ac.) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|-----------------|------------|----------|------------|----------------------------|
| 1          | 6.11            | 4.100      | 14.94    | 0.810      | 2.465                      |

Qmax(1) =  
 1.000 \* 1.000 \* 6.107) + = 6.107

Total of 1 main streams to confluence:

Flow rates before confluence point:

7.107

Maximum flow rates at confluence using above data:

6.107

Area of streams before confluence:

4.100

Effective area values after confluence:

4.100

Results of confluence:

Total flow rate = 6.107(CFS)

Time of concentration = 14.936 min.

Effective stream area after confluence = 4.100(Ac.)

Study area average Pervious fraction(Ap) = 1.000

Study area average soil loss rate(Fm) = 0.810(In/Hr)

Study area total = 4.10(Ac.)

End of computations, Total Study Area = 4.10 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 1.000

Area averaged SCS curve number = 50.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2019 Version 9.1  
Rational Hydrology Study Date: 12/30/24

-----  
OLIVE GROVE TTM 20728  
EXISTING CONDITION  
100-YEAR, 1-HOUR  
DECEMBER 2024  
-----

Program License Serial Number 6612

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

-----  
Rational hydrology study storm event year is 100.0  
10 Year storm 1 hour rainfall = 1.070(In.)  
100 Year storm 1 hour rainfall = 1.740(In.)  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.740 (In.)  
Slope used for rainfall intensity curve b = 0.6000  
Soil antecedent moisture condition (AMC) = 3

++++  
Process from Point/Station 10.000 to Point/Station 15.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 50.00  
Adjusted SCS curve number for AMC 3 = 70.00  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.532(In/Hr)  
Initial subarea data:  
Initial area flow distance = 300.000(Ft.)  
Top (of initial area) elevation = 1422.200(Ft.)  
Bottom (of initial area) elevation = 1396.300(Ft.)  
Difference in elevation = 25.900(Ft.)  
Slope = 0.08633 s(%)= 8.63  
TC = k(0.706)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 11.283 min.

Rainfall intensity = 4.742(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.799  
Subarea runoff = 3.031(CFS)  
Total initial stream area = 0.800(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.532(In/Hr)

+++++  
Process from Point/Station 15.000 to Point/Station 20.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 0.000(CFS)  
Depth of flow = 0.576(Ft.), Average velocity = 4.301(Ft/s)  
!!Warning: Water is above left or right bank elevations  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 0.00  
2 80.00 7.00  
Manning's 'N' friction factor = 0.025  
-----

Sub-Channel flow = 8.161(CFS)  
' ' flow top width = 6.585(Ft.)  
' ' velocity= 4.301(Ft/s)  
' ' area = 1.897(Sq.Ft)  
' ' Froude number = 1.412

Upstream point elevation = 1396.300(Ft.)  
Downstream point elevation = 1374.700(Ft.)  
Flow length = 781.000(Ft.)  
Travel time = 3.03 min.  
Time of concentration = 14.31 min.  
Depth of flow = 0.576(Ft.)  
Average velocity = 4.301(Ft/s)  
Total irregular channel flow = 8.161(CFS)  
Irregular channel normal depth above invert elev. = 0.576(Ft.)  
Average velocity of channel(s) = 4.301(Ft/s)  
!!Warning: Water is above left or right bank elevations  
Adding area flow to channel  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 50.00  
Adjusted SCS curve number for AMC 3 = 70.00  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.532(In/Hr)  
Rainfall intensity = 4.112(In/Hr) for a 100.0 year storm

Effective runoff coefficient used for area,(total area with modified rational method)(Q=KCIA) is  $C = 0.783$   
 Subarea runoff = 10.178(CFS) for 3.300(Ac.)  
 Total runoff = 13.209(CFS)  
 Effective area this stream = 4.10(Ac.)  
 Total Study Area (Main Stream No. 1) = 4.10(Ac.)  
 Area averaged Fm value = 0.532(In/Hr)  
 Depth of flow = 0.690(Ft.), Average velocity = 4.851(Ft/s)  
 !!Warning: Water is above left or right bank elevations

+++++  
 Process from Point/Station 15.000 to Point/Station 20.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 1  
 Stream flow area = 4.100(Ac.)  
 Runoff from this stream = 13.209(CFS)  
 Time of concentration = 14.31 min.  
 Rainfall intensity = 4.112(In/Hr)  
 Area averaged loss rate (Fm) = 0.5325(In/Hr)  
 Area averaged Pervious ratio (Ap) = 1.0000  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | Area (Ac.) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|-----------------|------------|----------|------------|----------------------------|
|------------|-----------------|------------|----------|------------|----------------------------|

|   |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|
| 1 | 13.21 | 4.100 | 14.31 | 0.532 | 4.112 |
|---|-------|-------|-------|-------|-------|

Qmax(1) =  
 $1.000 * 1.000 * 13.209 + = 13.209$

Total of 1 main streams to confluence:

Flow rates before confluence point:  
 14.209

Maximum flow rates at confluence using above data:  
 13.209

Area of streams before confluence:  
 4.100

Effective area values after confluence:  
 4.100

Results of confluence:

Total flow rate = 13.209(CFS)  
 Time of concentration = 14.309 min.  
 Effective stream area after confluence = 4.100(Ac.)  
 Study area average Pervious fraction(Ap) = 1.000  
 Study area average soil loss rate(Fm) = 0.532(In/Hr)

Study area total = 4.10(Ac.)

End of computations, Total Study Area = 4.10 (Ac.)

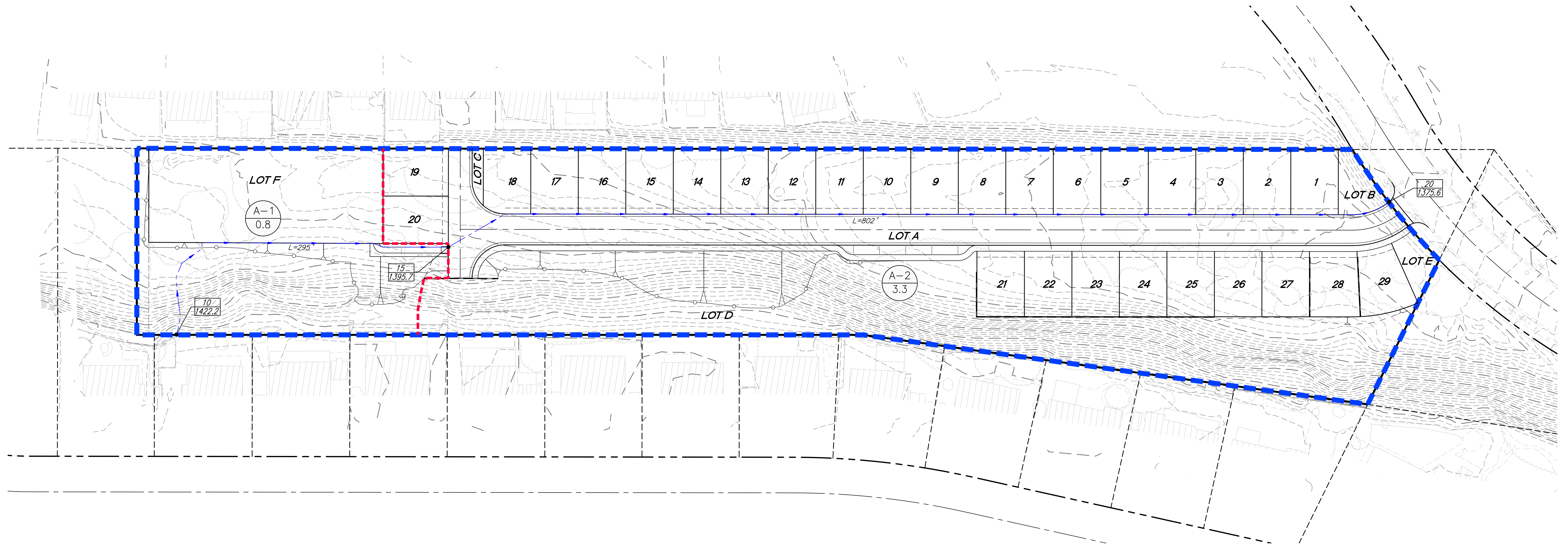
The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 1.000

Area averaged SCS curve number = 50.0



# LEGEND

|  |                                                     |
|--|-----------------------------------------------------|
|  | MAJOR DRAINAGE BOUNDARY                             |
|  | TRACT BOUNDARY                                      |
|  | SUB BASIN BOUNDARY                                  |
|  | GENERAL SURFACE FLOW PATH                           |
|  | DRAINAGE ID                                         |
|  | DRAINAGE AREA                                       |
|  | DRAINAGE NODE<br>NODE ELEVATION<br>INVERT ELEVATION |
|  | DISCHARGE LOCATION                                  |

# NOTES:

- THIS DRAINAGE STUDY MAP IS PREPARED IN SUPPORT OF THE ON-SITE HYDROLOGIC CALCULATIONS TO ADDRESS THE REQUIREMENTS OF THE RCFC&WCD'S INCREASED RUNOFF CRITERIA.
- THE SITE IS SITUATED ON HYDROLOGIC SOIL GROUPS A. FOR THE PURPOSE OF HYDROLOGIC CALCULATION SOIL GROUP A WAS USED IN THE CALCULATIONS.
- RUNOFF FROM THE PROPOSED DEVELOPMENT WILL BE DIRECTED IN A NORTH EASTERLY DIRECTION TOWARDS PROPOSED CATCH BASINS. THE FLOWS WILL THEN BE CONVEYED NORTHERLY ALONG RIVER RANCH PARKWAY TO CONNECT TO THE EXISTING LINE B STORM DRAIN, PRIOR TO DISCHARGING TO BASIN 2 FOR WATER QUALITY TREATMENT AND DETENTION/MITIGATION.
- THE OVERALL SITE AREA IS APPROXIMATELY 4.15 ACRES. THE NORTHWESTERLY CORNER OF THE SITE (APPROXIMATELY 0.3 ACRE AS SHOWN) IS EXPECTED TO REMAIN PERVIOUS AND CONSIDERED AS SELF-TREATING AREA FOR THE PURPOSED WATER QUALITY LOW-FLOW STORM EVENT. DURING THE LARGER STORM EVENT (GREATER THAN THE LOW-FLOW STORM EVENT), THIS PERVIOUS AREA IS EXPECTED TO RUN-ON TO THE ON-SITE SURFACE PARKING ADJACENT TO IT AND DRAIN TOWARDS THE PROJECT OUTLET LOCATION NEAR THE NORTHEASTERLY CORNER OF THE PROJECT.

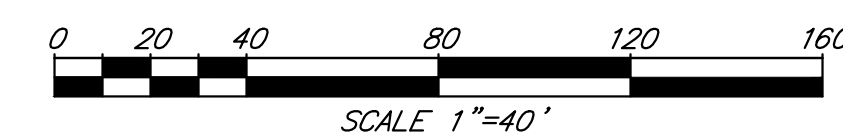
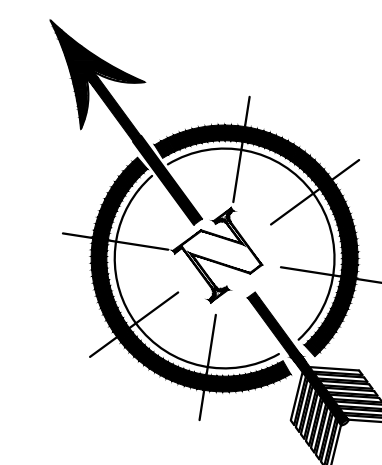


FIGURE 2  
OLIVE GROVE TTM 20728  
DEVELOPED CONDITION  
HYDROLOGY MAP

PREPARED: DECEMBER 2024

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SHEET  
1  
1 OF SHEETS

San Bernardino County Rational Hydrology Program

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Rational Hydrology Study Date: 12/30/24

-----  
OLIVE GROVE TTM 20728  
PROPOSED CONDITION  
10-YEAR, 1-HOUR  
DECEMBER 2024  
-----

Program License Serial Number 6612

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

-----  
Rational hydrology study storm event year is 10.0  
Computed rainfall intensity:  
Storm year = 10.00 1 hour rainfall = 1.070 (In.)  
Slope used for rainfall intensity curve b = 0.6000  
Soil antecedent moisture condition (AMC) = 2

+++++  
Process from Point/Station 10.000 to Point/Station 15.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
PARK subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 32.00  
Pervious ratio(Ap) = 0.8500 Max loss rate(Fm)= 0.831(In/Hr)  
Initial subarea data:  
Initial area flow distance = 295.000(Ft.)  
Top (of initial area) elevation = 1422.200(Ft.)  
Bottom (of initial area) elevation = 1395.700(Ft.)  
Difference in elevation = 26.500(Ft.)  
Slope = 0.08983 s(%)= 8.98  
 $TC = k(0.483)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 7.607 min.  
Rainfall intensity = 3.695(In/Hr) for a 10.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.698  
Subarea runoff = 2.062(CFS)

Total initial stream area = 0.800(Ac.)  
Pervious area fraction = 0.850  
Initial area Fm value = 0.831(In/Hr)

+++++  
Process from Point/Station 15.000 to Point/Station 20.000  
\*\*\*\* STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of street segment elevation = 1395.700(Ft.)  
End of street segment elevation = 1375.600(Ft.)  
Length of street segment = 802.000(Ft.)  
Height of curb above gutter flowline = 4.0(In.)  
Width of half street (curb to crown) = 13.000(Ft.)  
Distance from crown to crossfall grade break = 10.000(Ft.)  
Slope from gutter to grade break (v/hz) = 0.020  
Slope from grade break to crown (v/hz) = 0.020  
Street flow is on [2] side(s) of the street  
Distance from curb to property line = 5.000(Ft.)  
Slope from curb to property line (v/hz) = 0.020  
Gutter width = 3.000(Ft.)  
Gutter hike from flowline = 2.000(In.)  
Manning's N in gutter = 0.0150  
Manning's N from gutter to grade break = 0.0150  
Manning's N from grade break to crown = 0.0150  
Estimated mean flow rate at midpoint of street = 5.499(CFS)  
Depth of flow = 0.270(Ft.), Average velocity = 3.331(Ft/s)  
Streetflow hydraulics at midpoint of street travel:  
Halfstreet flow width = 8.157(Ft.)  
Flow velocity = 3.33(Ft/s)  
Travel time = 4.01 min. TC = 11.62 min.  
Adding area flow to street  
RESIDENTIAL(8 - 10 dwl/acre)  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 32.00  
Pervious ratio(Ap) = 0.4000 Max loss rate(Fm)= 0.391(In/Hr)  
Rainfall intensity = 2.865(In/Hr) for a 10.0 year storm  
Effective runoff coefficient used for area,(total area with modified  
rational method)(Q=KCIA) is C = 0.750  
Subarea runoff = 6.751(CFS) for 3.300(Ac.)  
Total runoff = 8.813(CFS)  
Effective area this stream = 4.10(Ac.)  
Total Study Area (Main Stream No. 1) = 4.10(Ac.)  
Area averaged Fm value = 0.477(In/Hr)  
Street flow at end of street = 8.813(CFS)  
Half street flow at end of street = 4.406(CFS)  
Depth of flow = 0.310(Ft.), Average velocity = 3.686(Ft/s)

Flow width (from curb towards crown)= 10.176(Ft.)

+++++  
Process from Point/Station 15.000 to Point/Station 20.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 4.100(Ac.)

Runoff from this stream = 8.813(CFS)

Time of concentration = 11.62 min.

Rainfall intensity = 2.865(In/Hr)

Area averaged loss rate (Fm) = 0.4770(In/Hr)

Area averaged Pervious ratio (Ap) = 0.4878

Summary of stream data:

| Stream No. | Flow rate (CFS) | Area (Ac.) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|-----------------|------------|----------|------------|----------------------------|
|------------|-----------------|------------|----------|------------|----------------------------|

|   |      |       |       |       |       |
|---|------|-------|-------|-------|-------|
| 1 | 8.81 | 4.100 | 11.62 | 0.477 | 2.865 |
|---|------|-------|-------|-------|-------|

Qmax(1) =

1.000 \* 1.000 \* 8.813) + = 8.813

Total of 1 streams to confluence:

Flow rates before confluence point:

8.813

Maximum flow rates at confluence using above data:

8.813

Area of streams before confluence:

4.100

Effective area values after confluence:

4.100

Results of confluence:

Total flow rate = 8.813(CFS)

Time of concentration = 11.619 min.

Effective stream area after confluence = 4.100(Ac.)

Study area average Pervious fraction(Ap) = 0.488

Study area average soil loss rate(Fm) = 0.477(In/Hr)

Study area total (this main stream) = 4.10(Ac.)

End of computations, Total Study Area = 4.10 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.488

Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

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Rational Hydrology Study Date: 12/30/24

-----  
OLIVE GROVE TTM 20728  
PROPOSED CONDITION  
100-YEAR, 1-HOUR  
DECEMBER 2024  
-----

Program License Serial Number 6612

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

-----  
Rational hydrology study storm event year is 100.0  
10 Year storm 1 hour rainfall = 1.070(In.)  
100 Year storm 1 hour rainfall = 1.740(In.)  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.740 (In.)  
Slope used for rainfall intensity curve b = 0.6000  
Soil antecedent moisture condition (AMC) = 3

++++  
Process from Point/Station 10.000 to Point/Station 15.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
PARK subarea  
Decimal fraction soil group A = 1.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 32.00  
Adjusted SCS curve number for AMC 3 = 52.00  
Pervious ratio(Ap) = 0.8500 Max loss rate(Fm)= 0.667(In/Hr)  
Initial subarea data:  
Initial area flow distance = 295.000(Ft.)  
Top (of initial area) elevation = 1422.200(Ft.)  
Bottom (of initial area) elevation = 1395.700(Ft.)  
Difference in elevation = 26.500(Ft.)  
Slope = 0.08983 s(%)= 8.98  
TC = k(0.483)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 7.607 min.

Rainfall intensity = 6.008(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.800  
 Subarea runoff = 3.845(CFS)  
 Total initial stream area = 0.800(Ac.)  
 Pervious area fraction = 0.850  
 Initial area Fm value = 0.667(In/Hr)

++++++  
 Process from Point/Station 15.000 to Point/Station 20.000  
 \*\*\*\* STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of street segment elevation = 1395.700(Ft.)  
 End of street segment elevation = 1375.600(Ft.)  
 Length of street segment = 802.000(Ft.)  
 Height of curb above gutter flowline = 4.0(In.)  
 Width of half street (curb to crown) = 13.000(Ft.)  
 Distance from crown to crossfall grade break = 10.000(Ft.)  
 Slope from gutter to grade break (v/hz) = 0.020  
 Slope from grade break to crown (v/hz) = 0.020  
 Street flow is on [2] side(s) of the street  
 Distance from curb to property line = 5.000(Ft.)  
 Slope from curb to property line (v/hz) = 0.020  
 Gutter width = 3.000(Ft.)  
 Gutter hike from flowline = 2.000(In.)  
 Manning's N in gutter = 0.0150  
 Manning's N from gutter to grade break = 0.0150  
 Manning's N from grade break to crown = 0.0150  
 Estimated mean flow rate at midpoint of street = 10.102(CFS)  
 Depth of flow = 0.323(Ft.), Average velocity = 3.800(Ft/s)  
 Streetflow hydraulics at midpoint of street travel:  
 Halfstreet flow width = 10.812(Ft.)  
 Flow velocity = 3.80(Ft/s)  
 Travel time = 3.52 min. TC = 11.12 min.  
 Adding area flow to street  
 RESIDENTIAL(8 - 10 dwl/acre)  
 Decimal fraction soil group A = 1.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 SCS curve number for soil(AMC 2) = 32.00  
 Adjusted SCS curve number for AMC 3 = 52.00  
 Pervious ratio(Ap) = 0.4000 Max loss rate(Fm)= 0.314(In/Hr)  
 Rainfall intensity = 4.783(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area,(total area with modified  
 rational method)(Q=KCIA) is C = 0.828  
 Subarea runoff = 12.390(CFS) for 3.300(Ac.)  
 Total runoff = 16.236(CFS)  
 Effective area this stream = 4.10(Ac.)  
 Total Study Area (Main Stream No. 1) = 4.10(Ac.)

Area averaged Fm value = 0.383(In/Hr)  
 Street flow at end of street = 16.236(CFS)  
 Half street flow at end of street = 8.118(CFS)  
 Depth of flow = 0.376(Ft.), Average velocity = 4.030(Ft/s)  
 Warning: depth of flow exceeds top of curb  
 Note: depth of flow exceeds top of street crown.  
 Distance that curb overflow reaches into property = 2.13(Ft.)  
 Flow width (from curb towards crown)= 13.000(Ft.)

++++++  
 Process from Point/Station 15.000 to Point/Station 20.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 4.100(Ac.)  
 Runoff from this stream = 16.236(CFS)  
 Time of concentration = 11.12 min.  
 Rainfall intensity = 4.783(In/Hr)  
 Area averaged loss rate (Fm) = 0.3830(In/Hr)  
 Area averaged Pervious ratio (Ap) = 0.4878  
 Summary of stream data:

| Stream No. | Flow rate (CFS) | Area (Ac.) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|-----------------|------------|----------|------------|----------------------------|
| 1          | 16.24           | 4.100      | 11.12    | 0.383      | 4.783                      |

Qmax(1) = 1.000 \* 1.000 \* 16.236) + = 16.236

Total of 1 streams to confluence:  
 Flow rates before confluence point:  
 16.236  
 Maximum flow rates at confluence using above data:  
 16.236  
 Area of streams before confluence:  
 4.100  
 Effective area values after confluence:  
 4.100

Results of confluence:  
 Total flow rate = 16.236(CFS)  
 Time of concentration = 11.124 min.  
 Effective stream area after confluence = 4.100(Ac.)  
 Study area average Pervious fraction(Ap) = 0.488  
 Study area average soil loss rate(Fm) = 0.383(In/Hr)  
 Study area total (this main stream) = 4.10(Ac.)  
 End of computations, Total Study Area = 4.10 (Ac.)  
 The following figures may  
 be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 0.488

Area averaged SCS curve number = 32.0

## **Appendix C**

### **Inlet Sizing**

Note: Detailed on-site inlet calculations will be conducted at the time of the final drainage study and will be incorporated in this Appendix.

## **Appendix D**

### **Storm Drain Sizing**

Note: Preliminary on-site storm drain pipe layouts are provided on the drainage exhibit and preliminary grading plan. Storm drain pipe sizing calculations will be conducted at the time of the final drainage study and will be incorporated in this Appendix.

**Appendix E**  
**Reference Drawings (Excerpts)**

CITY OF RIALTO  
HYDROLOGY NODE MAP  
~ TRACT No. 20092 ~  
El Rancho Verde

SCALE: 1" = 150'

DRAINAGE SUMMARY

| Node                  | $Q_2$ | $Q_3$  | $Q_{10}$ | $Q_{20}$ | $Q_{50}$ | $Q_{100}$ |
|-----------------------|-------|--------|----------|----------|----------|-----------|
| 1.00 out of Basin 0   | 6.82  | 9.17   | 12.05    | 14.47    | 16.31    | 19.86     |
| 1.14 from SD Line "A" | 61.87 | 108.31 | 166.15   | 221.14   | 265.76   | 327.61    |
| 1.14 into Basin 1     | 85.90 | 153.53 | 238.54   | 318.93   | 384.20   | 474.55    |
| 2.09 from SD Line "B" | 23.99 | 39.31  | 57.50    | 75.47    | 89.79    | 109.09    |
| 2.09 into Basin 2     | 29.31 | 48.20  | 71.00    | 93.16    | 110.83   | 135.15    |

HYDRAULIC ELEMENT TABLES

STORM DRAIN LINE "A"

| $Q_{100}$ | $Q_{street}$ | Depth | V   | $Q_{flow}$ |
|-----------|--------------|-------|-----|------------|
| (A)       | 10.6         | 0.41' | 4.5 | -          |
| (B)       | 16.4         | 0.48' | 4.7 | 1.8        |
| (C)       | 8.6          | 0.40' | 3.9 | 0.3        |
| (D)       | 6.8          | 0.37' | 3.6 | -          |
| (E)       | 3.1          | 0.31' | 2.6 | 0.1        |
| (F)       | 6.7          | 0.40' | 3.1 | -          |
| (G)       | 6.7          | 0.36' | 3.9 | -          |
| (H)       | 9.8          | 0.41' | 4.1 | -          |

STORM DRAIN LINE "B"

| $Q_{100}$ | $Q_{street}$ | Depth | V | $Q_{flow}$ |
|-----------|--------------|-------|---|------------|
| (J)       | 50.6         | SUMP  | - | -          |
| (K)       | 8.7          | SUMP  | - | -          |

$Q_{100}$  FLOW RATES AT NODES

| Node | $Q_{100}$ to Node | $Q_{100}$ Confluence |
|------|-------------------|----------------------|
| 1.00 | 19.86             | -                    |
| 1.01 | 19.86             | 23.69                |
| 1.02 | 23.69             | 54.04                |
| 1.03 | 54.04             | 80.95                |
| 1.04 | 80.95             | 195.97               |
| 1.05 | 195.97            | 199.69               |
| 1.07 | 199.69            | 203.09               |
| 1.08 | 203.09            | 209.33               |
| 1.10 | 209.33            | 214.20               |
| 1.11 | 214.20            | 296.62               |
| 1.12 | 296.62            | 312.97               |
| 1.13 | 312.97            | 327.61               |
| 1.14 | 327.61            | 474.55               |

| Node | $Q_{100}$ to Node | $Q_{100}$ Confluence |
|------|-------------------|----------------------|
| 2.00 | 0.00              | -                    |
| 2.01 | 1.87              | -                    |
| 2.02 | 4.64              | -                    |
| 2.03 | 7.86              | -                    |
| 2.04 | 13.07             | -                    |
| 2.05 | 14.69             | 24.59                |
| 2.06 | 24.59             | 37.74                |
| 2.07 | 37.74             | 96.28                |
| 2.08 | 96.28             | 109.09               |
| 2.09 | 109.09            | 135.15               |

LEGEND

- (B) CATCH BASIN ID AS SHOWN IN DRAINAGE REPORT
- (7.46 Ac\*) DENOTES SUB-BOUNDARY AREA  
(\* INDICATES COMPOSITE AREA COMPRISED OF MULTIPLE LAND USE TYPES)
- (2.05) DENOTES HYDROLOGIC NODE NO.  
BLACK - INDICATES FINISHED SURFACE ELEVATION  
RED - INDICATES REPRESENTATIVE GRADE ABOVE PIPE INVERT

The map shows a street grid with the following labels:

- Vertical Streets (from left to right):** CACTUS AVENUE, N RIVERSIDE AVENUE.
- Horizontal Streets (from top to bottom):** W EASTON STREET, W BASE LINE ROAD, E BASELINE ROAD.
- Other Features:**
  - FOOTHILL FWY** runs horizontally across the middle of the map.
  - Highland Avenue** is shown as a curved street on the right side.
  - Country Club Dr** is shown as a curved street at the top left.
  - Riverside Avenue** is shown as a curved street at the top left, near Country Club Dr.
  - Oakdale Avenue** is shown as a curved street on the right side, near Highland Avenue.
- Orientation:** A north arrow points towards the top left. A large arrow labeled **PROJECT LOCATION** points towards the top right.

|   | STORM DRAIN CONSTRUCTION ITEMS                                                                                                           | QUANTITIES |
|---|------------------------------------------------------------------------------------------------------------------------------------------|------------|
| ① | INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 991 LF     |
| ② | INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 1,357 LF   |
| ③ | INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 202 LF     |
| ④ | INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 520 LF     |
| ⑤ | INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 498 LF     |
| ⑥ | INSTALL 30" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 66 LF      |
| ⑦ | INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED                                                                                    | 2,573 LF   |
| ⑧ | CONSTRUCT MANHOLE PER STANDARD PLAN 320-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION                                            | 12 EA      |
| ⑨ | CONSTRUCT MANHOLE PER STANDARD PLAN 321-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION                                            | 9 EA       |
| ⑩ | CONSTRUCT MANHOLE PER STANDARD PLAN 322-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION                                            | 4 EA       |
| ⑪ | CONSTRUCT TRANSITION STRUCTURE PER STANDARD PLAN 340-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION                               | 4 EA       |
| ⑫ | CONSTRUCT CURB OPENING CATCH BASIN PER STANDARD PLAN 300-3 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION (size as indicated)       | 10 EA      |
| ⑬ | CONSTRUCT HEADWALL, WING-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209, DETAIL PROVIDED ON SHEET 13                     | 3 EA       |
| ⑭ | CONSTRUCT HEADWALL, 'U'-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13                     | 2 EA       |
| ⑮ | INSTALL TRASH RACK, CASE A, PER STANDARD PLAN 361-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION                                  | 5 EA       |
| ⑯ | CONSTRUCT 2"-THICK RIP-RAP PAD AS DIMENSIONED ON PLAN. (FACING CLASS, METHOD B PLACEMENT)                                                | 1,476 CF   |
| ⑰ | CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL  | 9 EA       |
| ⑱ | PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE                                                                               | 57,788 SF  |
| ⑲ | CONSTRUCT CONCRETE SPILLWAY PER DETAIL                | 1 EA       |

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

|                  |                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------|
| WATER            | WEST VALLEY WATER DISTRICT<br>855 W. BASELINE ROAD<br>RIALTO, CALIFORNIA 92377<br>(909) 875-1804  |
| SEWER &<br>WATER | CITY OF RIALTO<br>335 W. RIALTO AVENUE<br>RIALTO, CALIFORNIA 92376<br>(909) 421-7229              |
| ELECTRIC         | SOUTHERN CALIFORNIA EDISON<br>300 N. PEPPER AVENUE<br>RIALTO, CALIFORNIA 92376<br>(909) 820-5617  |
| GAS              | THE GAS COMPANY<br>251 EAST FIRST STREET, SC8080<br>BEAUMONT, CALIFORNIA 92223<br>(909) 845-0709  |
| TELEPHONE        | AT&T<br>100 S. ANAHEIM BOULEVARD, SUITE 320<br>ANAHEIM, CALIFORNIA 92805<br>(714) 284-3498        |
| CABLE TV         | ADELPHIA CABLE<br>1971 W. REDLANDS BOULEVARD, "B"<br>REDLANDS, CALIFORNIA 92373<br>(888) 683-1000 |

AERIAL TOPOGRAPHY SHOWN PREPARED BY  
ANALYTICAL PHOTOGRAMMETRIC SURVEYS  
DATED JUNE 2006.

SURVEY MONUMENTS THAT EXIST AS SHOWN ON RECORD MAPS, HIGHWAY MAPS, OR POINTS THAT PROVIDE SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED OUT BY A LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER (AUTHORIZED TO PRACTICE LAND SURVEYING), AND CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE START OF CONSTRUCTION. THESE MONUMENTS SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION WITH THE DISTANCES TO REFERENCE POINTS FOR RESETTING OF THE SURVEY MONUMENT. WHEN CONSTRUCTION IS COMPLETED, MONUMENTS SHALL BE SET AND CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR SHOWING THE NEW MONUMENTS.

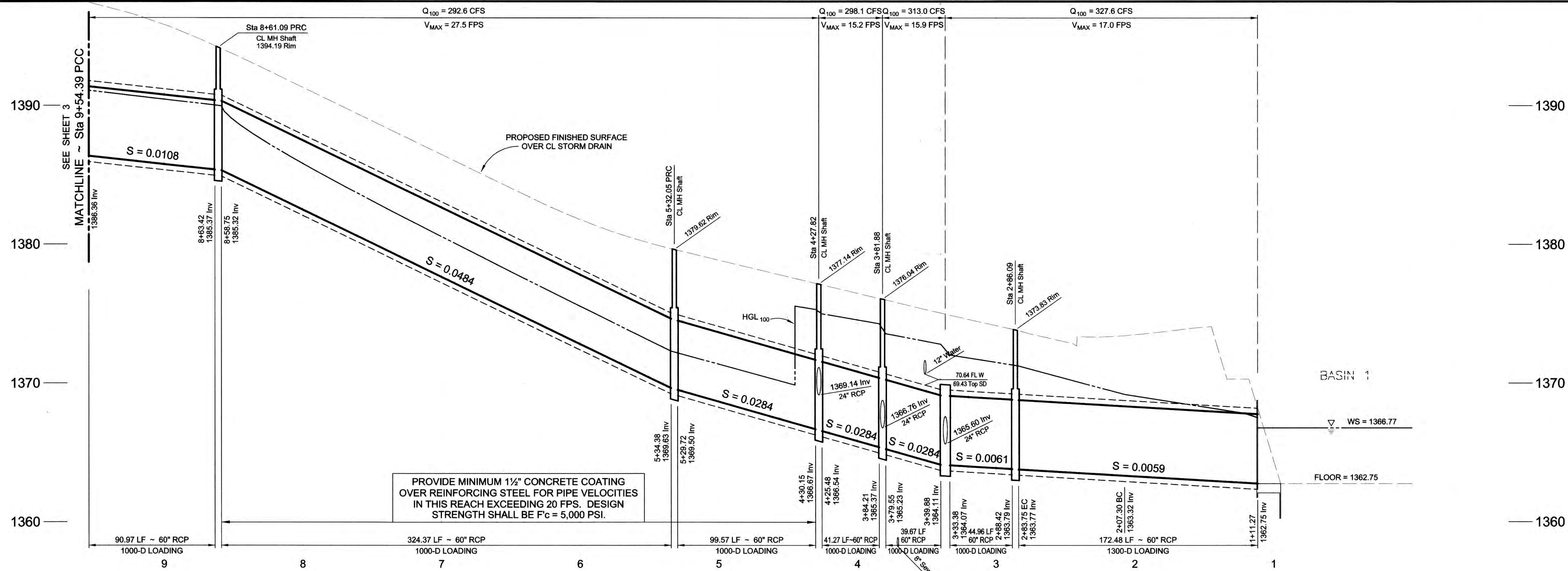
**LYTLE DEVELOPMENT COMPANY**  
285 W. RIALTO AVENUE, SUITE B  
RIALTO, CALIFORNIA 92376  
CONTACT: Mr. KEVIN LYNCH  
(909) 937-4058

GEOSOLS, Inc.  
26590 MADISON AVENUE  
MURRIETA, CALIFORNIA 92562  
CONTACT: Mr. TODD A. GREER, CEG 2377  
(951) 677-6951  
W.O. 7408-A-SC APRIL 20, 2018

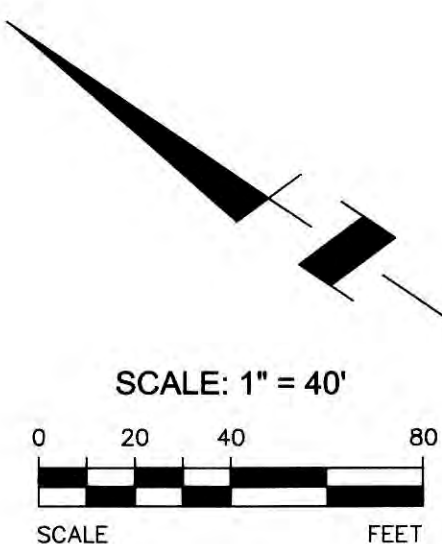
1. THE CONSTRUCTION OF ALL IMPROVEMENTS SHALL CONFORM TO THESE PLANS, THE REQUIREMENTS OF THE CITY OF RIALTO STANDARD SPECIFICATIONS AND TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION "GREEN BOOK", LATEST EDITION.
2. CONSTRUCTION PERMITS SHALL BE OBTAINED FROM THE CITY OF RIALTO PUBLIC WORKS DEPARTMENT PRIOR TO START OF ANY WORK WITHIN THE CITY LIMITS.
3. STATIONING REFERS TO THE CENTERLINES OF STORM DRAINS EXCEPT WHERE NOTED OTHERWISE.
4. CONSTRUCTION INSPECTION WILL BE PERFORMED BY THE CITY OF RIALTO. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND SHALL NOTIFY THE CITY INSPECTORS (909) 820-2533 - 24 HOURS PRIOR TO STARTING EACH PHASE OF CONSTRUCTION AND PRIOR TO REQUIREING INSPECTION. CITY OF RIALTO CONSTRUCTION INSPECTION HOURS - 7:00 am TO 5:00 pm MONDAY THROUGH THURSDAY.
5. ALL EXPOSED CONCRETE SURFACES SHALL CONFORM IN GRADE, COLOR, AND FINISH TO ALL ADJOINING CURBS AND SIDEWALK.
6. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE - CENTERLINE INTERSECTION STATION.
7. STATE LAW (SB 3019) REQUIRES THE CONTRACTOR TO CONTACT UNDERGROUND SERVICE ALERT AND OBTAIN A IDENTIFICATION NUMBER PRIOR TO THE ISSUANCE OF THE CITY'S ENCROACHMENT PERMIT. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT TWO FULL WORKING DAYS (48 HOURS MINIMUM) IN ADVANCE OF ANY CONSTRUCTION ACTIVITIES, INCLUDING PAVEMENT REMOVAL, EXCAVATION AND AC OVERLAY, WHICH COULD AFFECT ANY UNDERGROUND UTILITY.
8. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON CITY OF RIALTO BENCHMARK AND DATUM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. IF ANY EXISTING UTILITIES OR ANY OTHER FACILITIES CONFLICT WITH THE PROPOSED IMPROVEMENTS, WORK SHALL STOP AND THE ENGINEER OF RECORD NOTIFIED IMMEDIATELY.
11. CONTRACTOR SHALL POTHOLE AT TIE-IN STATIONS AND AT ANY OTHER POINTS OF POTENTIAL CONFLICTS WITH UNDERGROUND FACILITIES BEFORE STARTING CONSTRUCTION.
12. BACKFILL MATERIAL TO HAVE A SAND EQUIVALENT (S.E.) OF 30 (Min) AND MINIMUM COMPACTION OF 90%. ALL TRENCH BACKFILL SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE CITY OF RIALTO AND STANDARD NO. 5C-231.
13. BACKFILL TO BE IN 8" LIFTS IF TRENCH BOTTOM AND SIDES HAVE A S.E. LESS THAN 20.
14. NO TRENCH MAY BE LEFT OPEN OVERNIGHT UNLESS AUTHORIZED IN WRITING BY THE CITY ENGINEER.
15. TRENCHES SHALL HAVE SHAPED BEDDING WITH THE TOP 12" OVER PIPE BEING COLORED SAND, UNLESS OTHERWISE NOTED ON PLANS. COLOR TO BE APPROVED BY THE FIELD INSPECTOR.
16. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAS BEEN PLACED, INSPECTED, AND APPROVED.
17. EXISTING UNDERGROUND UTILITIES ARE AS PER THE AVAILABLE RECORDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION AND ELEVATION IN THE FIELD.
18. THE WALL AND FACES OF ALL EXCAVATIONS GREATER THAN FIVE (5) FEET IN DEPTH SHALL BE EFFECTIVELY GUARDED BY A SHORING SYSTEM, SLOPING OF THE GROUND, OR OTHER EQUIVALENT MEANS. TRENCHES LESS THAN FIVE (5) FEET IN DEPTH SHALL ALSO BE GUARDED WHEN EXAMINATION INDICATES HAZARDOUS GROUND MOVEMENT MAY BE EXPECTED.
19. THE CONTRACTOR(S) SHALL ALSO OBTAIN A PERMIT TO PERFORM EXCAVATION OF TRENCH WORK AS DESCRIBED IN NOTE 18 ABOVE FROM CAL/OSHA.
20. "V" IS THE DEPTH ON INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OUTLET OF CONNECTOR PIPE.
21. THE CONTRACTOR SHALL DETERMINE THE TRUE LOCATION OF ANY UNDERGROUND UTILITY PRIOR TO LAYING ANY LINES WHICH ARE TO CONNECT TO THE EXISTING SEWER OR STORM DRAINS.
22. IF CAST IN PLACE PIPE (CIPP) WERE USED IN LIEU OF RCP, A SOILS REPORT MUST BE SUBMITTED TO THE CITY OF RIALTO.
23. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSIONS SHALL BEGIN AT EXISTING CURB RETURN OR JOINT UNLESS OTHERWISE SPECIFIED.
24. ALL MANHOLES SHALL BE CONSTRUCTED 6" BELOW PAVEMENT GRADE AND BROUGHT TO FINISH GRADE BY THE PAVING CONTRACTOR AFTER PAVEMENT IS IN PLACE. ELEVATIONS SHOWN ON PROFILE AS TOP OF MANHOLE (RIM) ARE APPROXIMATE ONLY AND NOT TO BE USED FOR SETTING OF MANHOLE RING.
25. IMMEDIATELY FOLLOWING REMOVAL OF EXISTING PAVEMENT OR DIKE OR CURB AND/OR GUTTER, THE CONTRACTOR SHALL DILIGENTLY PURSUE THAT PORTION OF WORK TO COMPLETION.
26. IF DURING CONSTRUCTION GROUND WATER IN ENCOUNTERED, A SYSTEM APPROVED BY THE CITY ENGINEER SHALL BE INSTALLED TO Dewater SAIL AREA AT THE DIRECTION OF THE SOILS ENGINEER.
27. NO TRENCH BACKFILL SHALL TAKE PLACE WITHOUT PRIOR APPROVAL OF THE CITY'S INSPECTOR.
28. AS-BUILT PLANS SHALL BE PROVIDED TO THE CITY BY THE CONTRACTOR.
29. ALL CATCH BASINS WITHIN THE TRACT BOUNDARY WHERE STORM WATER IS AN INFLOW TO THE BASIN SHALL HAVE A WATER QUALITY INSERT INSTALLED AS PART OF THE CATCH BASIN. THE INSERT SHALL BE A FloGard+PLUS® CATCH BASIN FILTER INSERT BY KRISTAR ENTERPRISES, Inc. OR APPROVED EQUAL.
30. NOTICE TO CONTRACTOR: THE EXISTENCE AND LOCATION ON ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THESE PLANS BY THE CITY OF RIALTO DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

SHEET 1 ..... TITLE SHEET  
SHEET 2 ..... Line "A" - Sta 1+16.33 to Sta 9+54.39  
SHEET 3 ..... Line "A" - Sta 9+54.39 to Sta 18+64.50  
SHEET 4 ..... Line "A" - Sta 18+64.50 to Sta 27+50  
SHEET 5 ..... Line "A" - Sta 27+50 to Sta 37+00  
SHEET 6 ..... Line "A" - Sta 37+00 to Sta 46+22.21  
SHEET 7 ..... Line "B" & Line "B-1"  
SHEET 8 ..... PROFILES - Laterals "A-1" through "A-8"  
SHEET 9 ..... PROFILES - Laterals "A-9" through "A-15", "B-2" & "B-3"  
SHEET 10 ..... BASIN 1 DETAILS  
SHEET 11 ..... BASIN 2 DETAILS  
SHEET 12 ..... Line "C"  
SHEET 13 ..... COUNTY OF SAN BERNARDINO DETAILS

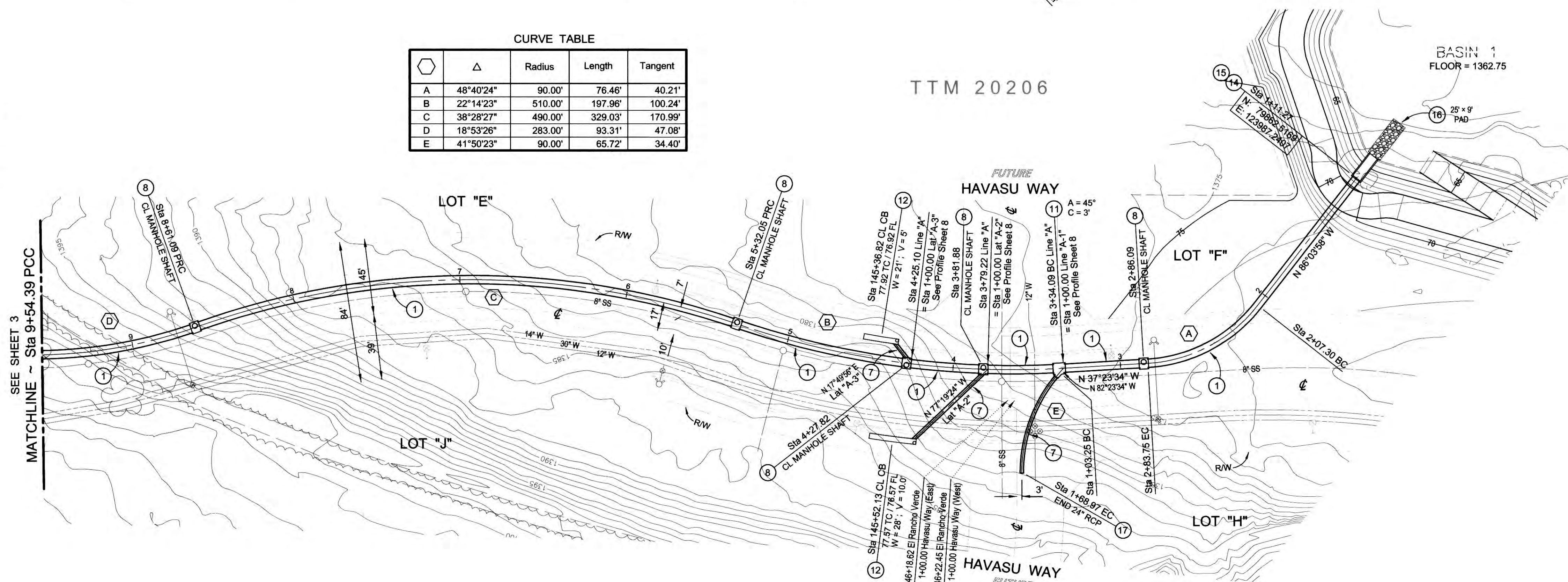
This plan is copyrighted by OBG, Inc. - 2020



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



| CURVE TABLE |         |         |         |  |
|-------------|---------|---------|---------|--|
| Δ           | Radius  | Length  | Tangent |  |
| A 48°40'24" | 90.00'  | 76.46'  | 40.21'  |  |
| B 22°14'23" | 510.00' | 197.96' | 100.24' |  |
| C 38°28'27" | 490.00' | 329.03' | 170.99' |  |
| D 18°53'26" | 283.00' | 93.31'  | 47.08'  |  |
| E 41°50'23" | 90.00'  | 65.72'  | 34.40'  |  |



## EL RANCHO VERDE PARKWAY

### STORM DRAIN LINE "A"

#### STORM DRAIN CONSTRUCTION ITEMS

- INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 30" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- CONSTRUCT MANHOLE PER STANDARD PLAN 320-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT MANHOLE PER STANDARD PLAN 321-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT MANHOLE PER STANDARD PLAN 322-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT TRANSITION STRUCTURE PER STANDARD PLAN 340-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT CURB OPENING CATCH BASIN PER STANDARD PLAN 300-3 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION (size as indicated)
- CONSTRUCT HEADWALL, WING-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209, DETAIL PROVIDED ON SHEET 13
- CONSTRUCT HEADWALL, 'U'-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13
- INSTALL TRASH RACK, CASE A, PER STANDARD PLAN 361-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT 2" THICK RIP-RAP PAD AS DIMENSIONED ON PLAN (FACING CLASS, METHOD B PLACEMENT)
- CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL (A) 13
- PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
- CONSTRUCT CONCRETE SPILLWAY PER DETAIL (B) 10

Underground Service Alert

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227-2600

TWO WORKING DAYS BEFORE YOU DIG

| REVISIONS                                                              |
|------------------------------------------------------------------------|
| MARK                                                                   |
| DESIGN BY: J.F. BERKELEY DRAWN BY: J.F. BERKELEY CHECKED BY: R.R. OTTE |

SEAL-DESIGN ENGINEER  
JOHN FORD BERKELEY  
No. 63652  
Exp. 09-30-20

DEPT. INIT. DATE

PREPARED UNDER THE SUPERVISION OF:  
JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20)  
RECOMMENDED FOR APPROVAL BY:  
APPROVED BY:  
SAVAT KHAMPHOU, CITY ENGINEER, RCE No. 62019



OTTE-BERKELEY GROUPE, INC.  
575 E. CARREON DRIVE  
COLTON, CALIFORNIA 92324-3000  
TEL: (909) 370-0911 FAX: (909) 370-1211

BENCHMARK: CITY OF RIALTO No. 036-88  
DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF CACTUS AVENUE.  
Elev: 1490.698  
04/01/1989

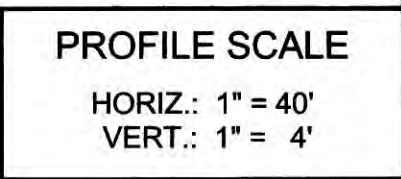
FOR:  
LYTLE DEVELOPMENT

CITY OF RIALTO  
TRACT MAP No. 20092  
STORM DRAIN LINE "A"  
Sta 1+16.33 to Sta 9+54.39

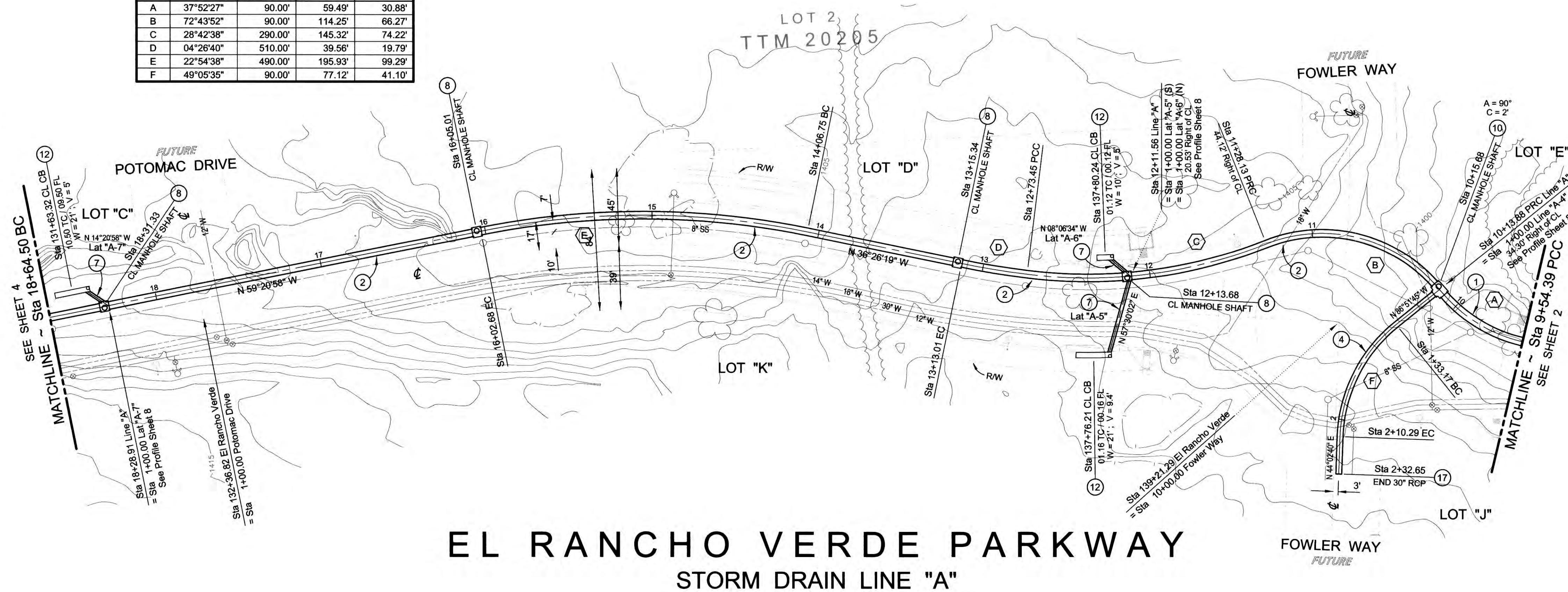
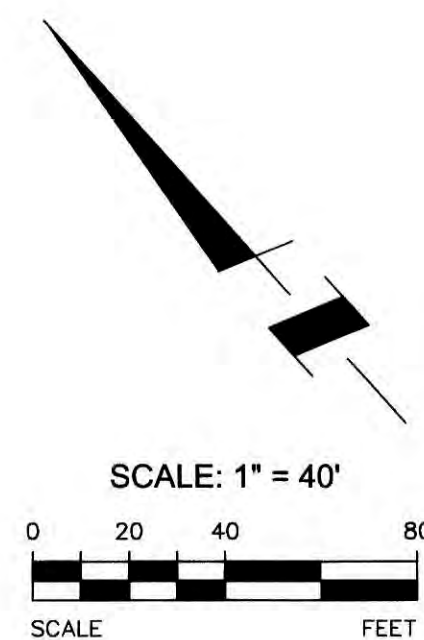
TR 20092

PLAN No. FCD-100

SHEET  
2  
OF 13 SHEETS

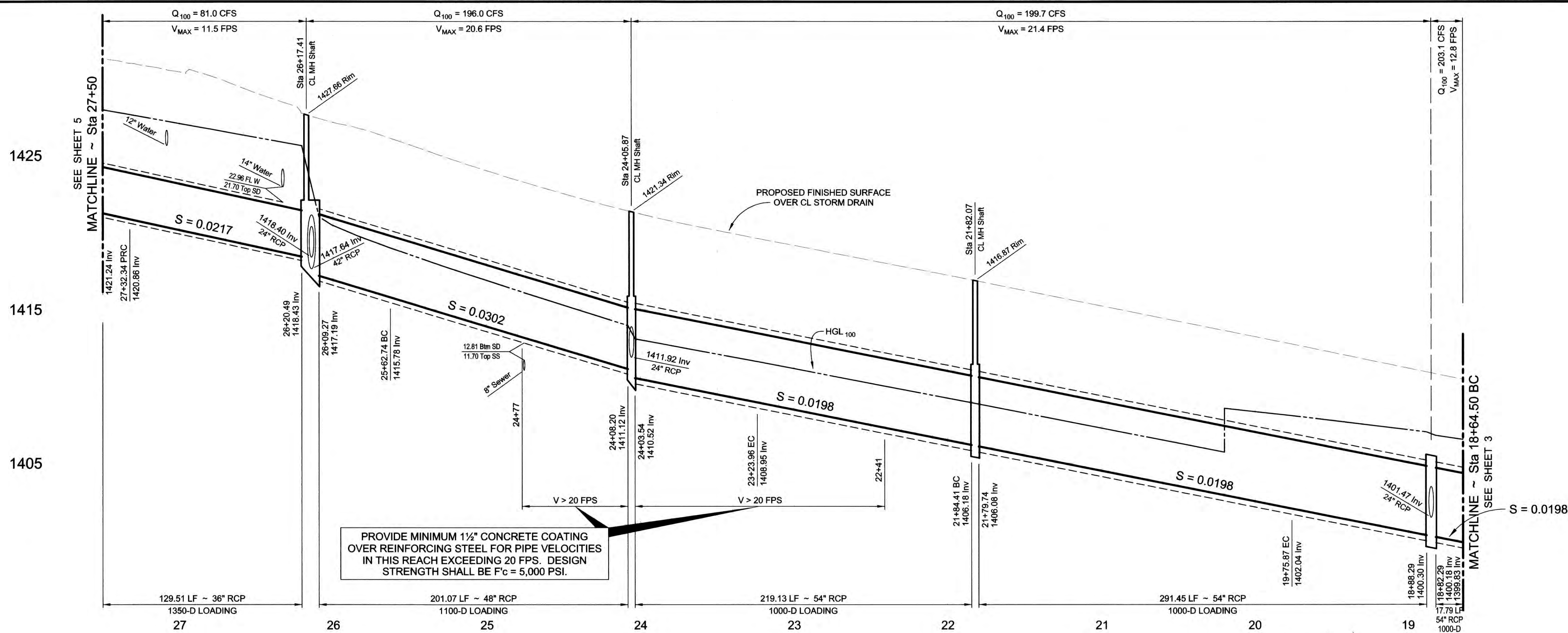


|  | $\Delta$  | Radius  | Length  | Tangent |
|-----------------------------------------------------------------------------------|-----------|---------|---------|---------|
| A                                                                                 | 37°52'27" | 90.00'  | 59.49'  | 30.88'  |
| B                                                                                 | 72°43'52" | 90.00'  | 114.25' | 66.27'  |
| C                                                                                 | 28°42'38" | 290.00' | 145.32' | 74.22'  |
| D                                                                                 | 40°26'40" | 510.00' | 39.56'  | 19.79'  |
| E                                                                                 | 22°54'38" | 490.00' | 195.93' | 99.29'  |
| F                                                                                 | 49°05'35" | 90.00'  | 77.12'  | 41.10'  |

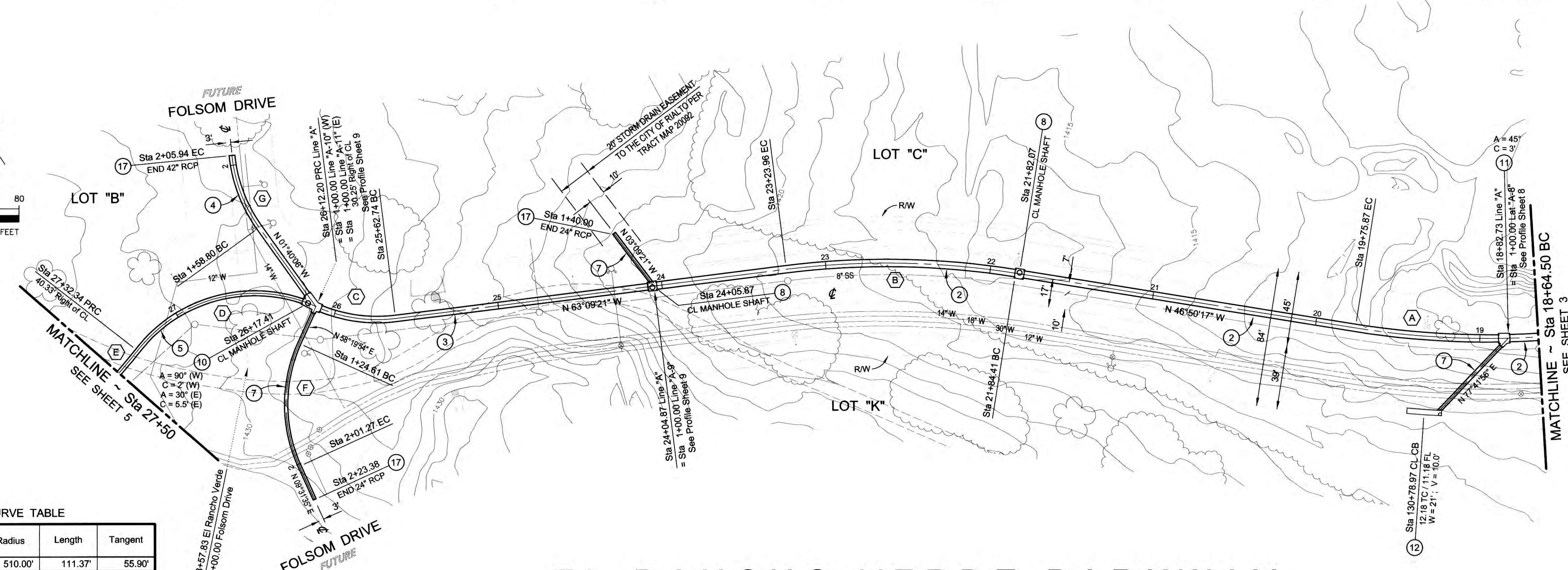
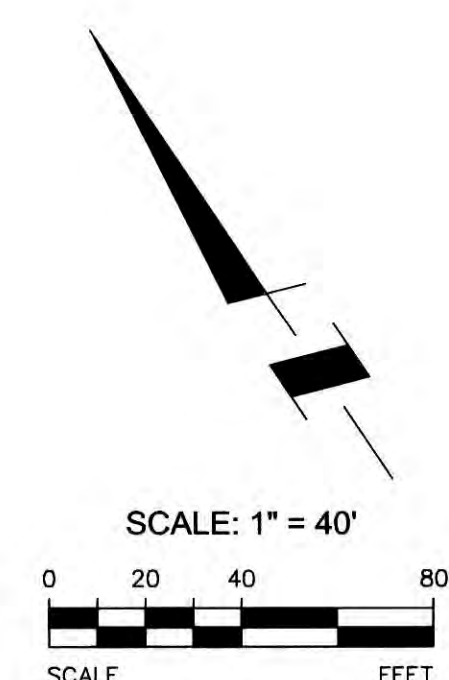


- 1 INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 2 INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 3 INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 4 INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 5 INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 6 INSTALL 30" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 7 INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- 8 CONSTRUCT MANHOLE PER STANDARD PLAN 320-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- 9 CONSTRUCT MANHOLE PER STANDARD PLAN 321-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- 10 CONSTRUCT MANHOLE PER STANDARD PLAN 322-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- 11 CONSTRUCT TRANSITION STRUCTURE PER STANDARD PLAN 340-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- 12 CONSTRUCT CURB OPENING CATCH BASIN PER STANDARD PLAN 300-3 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION (size as indicated)
- 13 CONSTRUCT HEADWALL, WING-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209, DETAIL PROVIDED ON SHEET 13
- 14 CONSTRUCT HEADWALL, 'U'-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13
- 15 INSTALL TRASH RACK, CASE A, PER STANDARD PLAN 361-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- 16 CONSTRUCT 2"-THICK RIP-RAP PAD AS DIMENSIONED ON PLAN (FACING CLASS, METHOD B PLACEMENT)
- 17 CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL 
- 18 PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
- 19 CONSTRUCT CONCRETE SPILLWAY PER DETAIL 

[illegible]



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



CURVE TABLE

| Station | Δ         | Radius  | Length  | Tangent |
|---------|-----------|---------|---------|---------|
| A       | 12°30'41" | 510.00' | 111.37' | 55.90'  |
| B       | 16°19'04" | 490.00' | 139.55' | 70.25'  |
| C       | 31°29'15" | 90.00'  | 49.46'  | 25.37'  |
| D       | 76°28'57" | 90.00'  | 120.14' | 70.93'  |
| E       | 25°33'03" | 290.00' | 129.32' | 65.76'  |
| F       | 48°48'19" | 90.00'  | 76.66'  | 40.83'  |
| G       | 30°00'52" | 90.00'  | 47.15'  | 24.13'  |

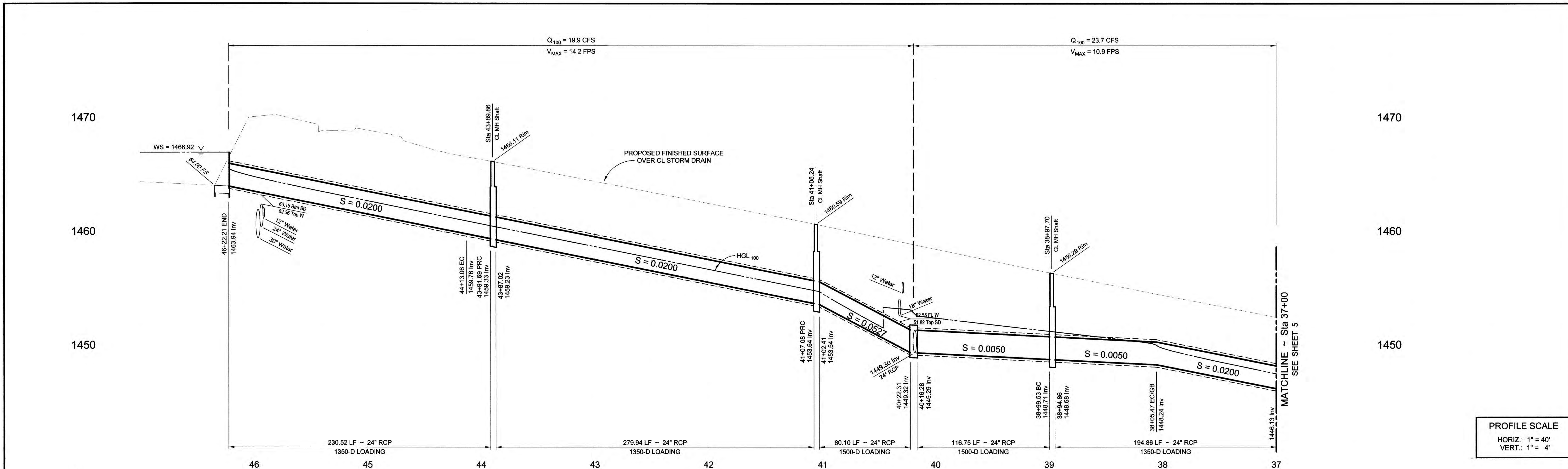
STORM DRAIN CONSTRUCTION ITEMS

- INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
- INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
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- CONSTRUCT CURB OPENING CATCH BASIN PER STANDARD PLAN 300-3 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT HEADWALL, WING-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209, DETAIL PROVIDED ON SHEET 13
- CONSTRUCT HEADWALL, 'U'-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13
- INSTALL TRASH RACK, CASE A, PER STANDARD PLAN 361-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
- CONSTRUCT 2'-THICK RIP-RAP PAD AS DIMENSIONED ON PLAN (FACING CLASS, METHOD B PLACEMENT)
- CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL (A)
- PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
- CONSTRUCT CONCRETE SPILLWAY PER DETAIL (B)

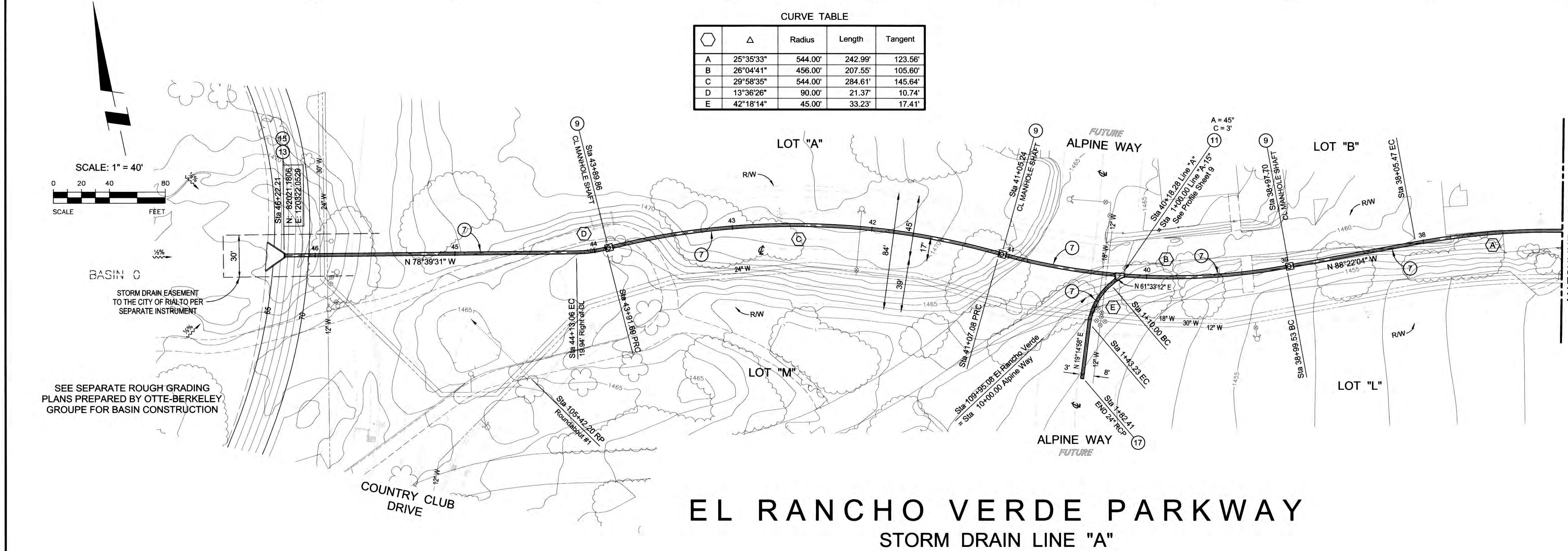
# EL RANCHO VERDE PARKWAY STORM DRAIN LINE "A"

|                                                                                                                     |                                                                              |                                                                              |                                                     |                                                                                             |                                                                                                                                                                                                                                                          |                                                                                                                                           |                                                                                                          |                                   |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>Underground Service Alert</b><br><br>Call: TOLL FREE<br><b>1-800-227-2600</b><br>TWO WORKING DAYS BEFORE YOU DIG | DESIGN BY: J.F. BERKELEY<br>DRAWN BY: J.F. BERKELEY<br>CHECKED BY: R.R. OTTE | SEAL-DESIGN ENGINEER<br><br>JOHN FORD BERKELEY<br>No. 63652<br>Exp. 09-30-20 | DEPT. _____<br>INIT. _____<br>DATE _____            | PREPARED UNDER THE SUPERVISION OF:<br><br>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20) | 10 Aug 2020<br>DATE                                                                                                                                                                                                                                      | <br><b>OTTE-BERKELEY GROUPE, INC.</b><br>575 E. CARREON DRIVE<br>COLTON, CALIFORNIA 92324-3000<br>TEL: (909) 370-0911 FAX: (909) 370-1211 | <b>CITY OF RIALTO</b><br>TRACT MAP No. 20092<br><b>STORM DRAIN LINE "A"</b><br>Sta 18+64.50 to Sta 27+50 | SHEET<br><b>4</b><br>OF 13 SHEETS |
|                                                                                                                     |                                                                              |                                                                              | RECOMMENDED FOR APPROVAL BY:<br>_____<br>DATE _____ | APPROVED BY:<br><br>SAVAT KHAMPOU, CITY ENGINEER, RCE No. 62019<br>9/15/20<br>DATE          | BENCHMARK: CITY OF RIALTO No. 036-88<br>DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF CACTUS AVENUE.<br>Elev: 1490.698<br>04/01/1989 |                                                                                                                                           |                                                                                                          |                                   |



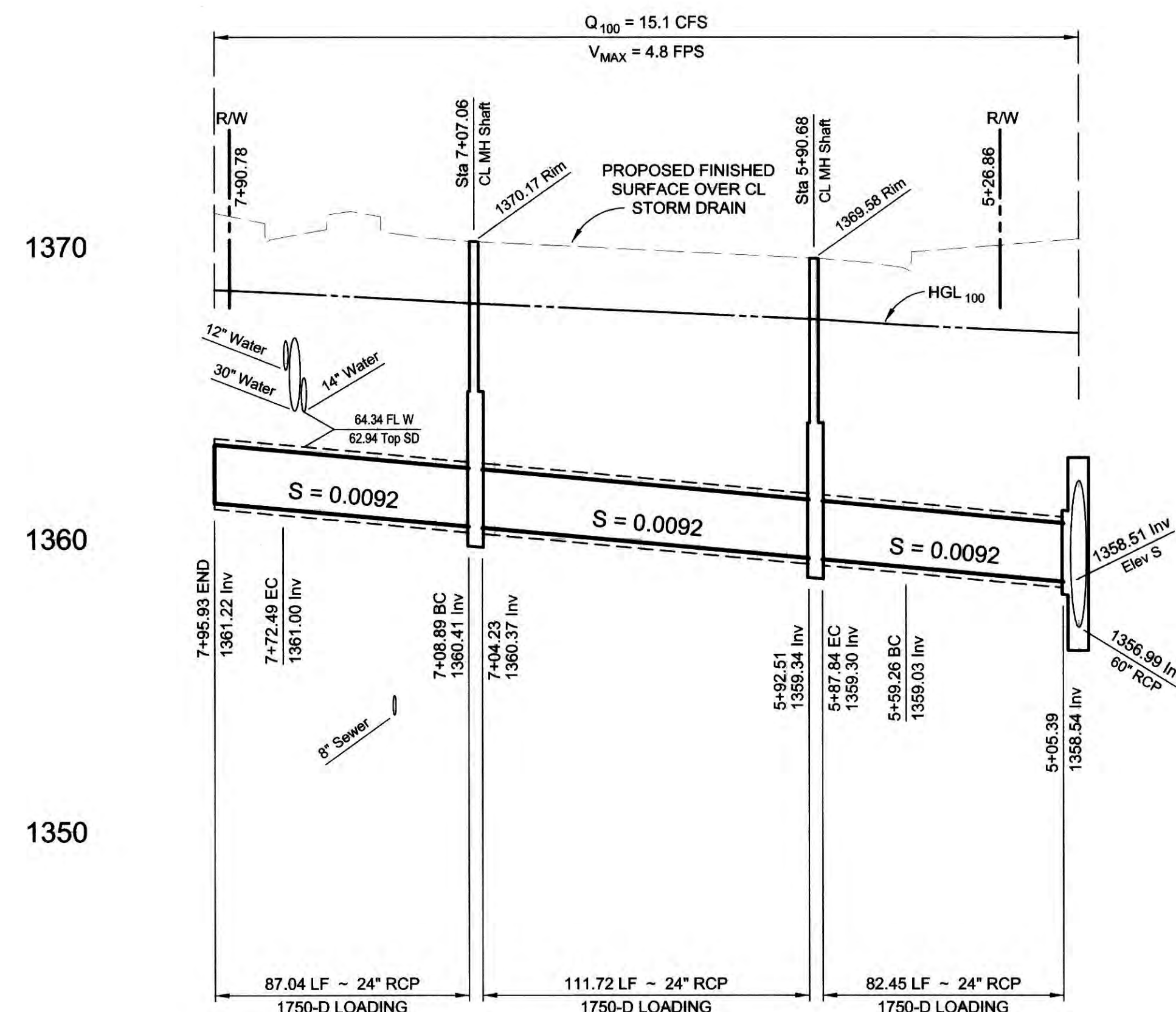


| CURVE TABLE |           |         |         |         |
|-------------|-----------|---------|---------|---------|
|             | Δ         | Radius  | Length  | Tangent |
| A           | 25°35'33" | 544.00' | 242.99' | 123.56' |
| B           | 26°04'41" | 456.00' | 207.55' | 105.60' |
| C           | 29°58'35" | 544.00' | 284.61' | 145.64' |
| D           | 13°36'26" | 90.00'  | 21.37'  | 10.74'  |
| E           | 42°18'14" | 45.00'  | 33.23'  | 17.41'  |



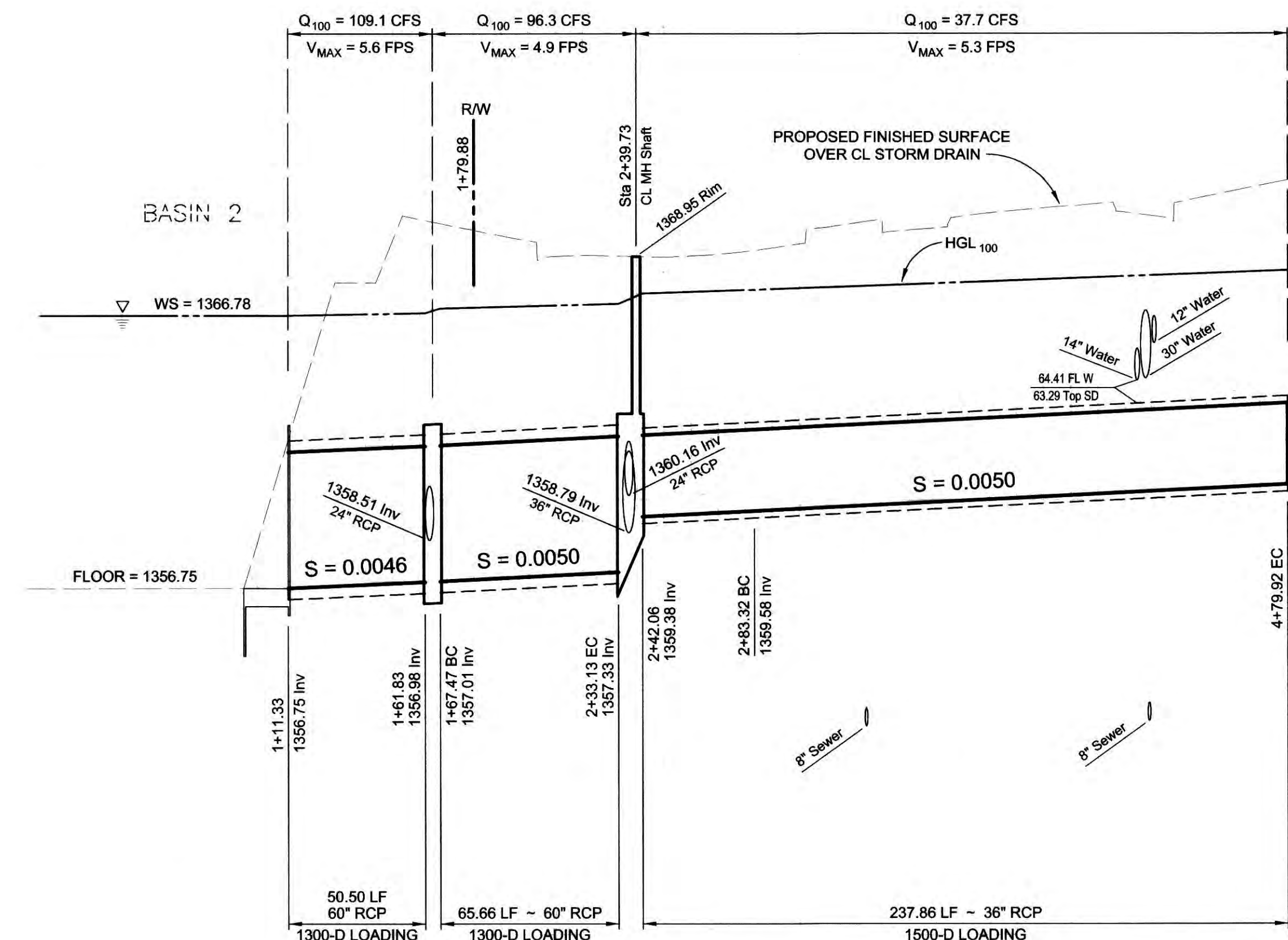
- STORM DRAIN CONSTRUCTION ITEMS**
1. INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  2. INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  3. INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  4. INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  5. INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
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  7. INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
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  14. CONSTRUCT HEADWALL, 'U'-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13
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  16. CONSTRUCT 2" THICK RIP-RAP PAD AS DIMENSIONED ON PLAN (FACING CLASS, METHOD B PLACEMENT)
  17. CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL (A) 13
  18. PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
  19. CONSTRUCT CONCRETE SPILLWAY PER DETAIL (B) 10

|                                                                                                             |  |                                                                                                                 |  |                                                                                                                                                                                                                                                          |                                                                                                                |                                                                                                                                       |                                                                                                          |          |                                   |
|-------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------|-----------------------------------|
| <b>Underground Service Alert</b><br>Call: TOLL FREE<br>1-800<br>227-2600<br>TWO WORKING DAYS BEFORE YOU DIG |  | <b>SEAL-DESIGN ENGINEER</b><br>JOHN FORD BERKELEY<br>No. 63652<br>Exp. 09-30-20<br>CIVIL<br>STATE OF CALIFORNIA |  | DEPT. _____<br>INIT. _____<br>DATE _____                                                                                                                                                                                                                 | PREPARED UNDER THE SUPERVISION OF:<br>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20)<br>10 Aug 2020<br>DATE | <b>OTTE-BERKELEY GROUPE, INC.</b><br>575 E. CARREON DRIVE<br>COLTON, CALIFORNIA 92324-3000<br>TEL: (909) 370-0911 FAX: (909) 370-1211 | <b>CITY OF RIALTO</b><br>TRACT MAP No. 20092<br><b>STORM DRAIN LINE "A"</b><br>Sta 37+00 to Sta 46+22.21 |          | SHEET<br><b>6</b><br>OF 13 SHEETS |
| DESIGN BY: J.F. BERKELEY DRAWN BY: J.F. BERKELEY CHECKED BY: R.R. OTTE                                      |  | APPROVED BY:<br>SAVAT KHAMPHOU, CITY ENGINEER, RCE No. 62019<br>9/15/20<br>DATE                                 |  | BENCHMARK: CITY OF RIALTO No. 036-88<br>DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF CACTUS AVENUE.<br>Elev: 1490.698<br>04/01/1989 |                                                                                                                |                                                                                                                                       | FOR:<br>LYTLE DEVELOPMENT                                                                                | TR 20092 | PLAN No. FCD-100                  |



STORM DRAIN LINE "B-1"

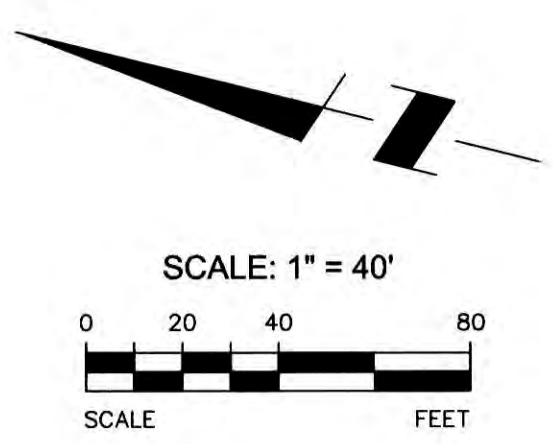
7 6 5



STORM DRAIN LINE "B"

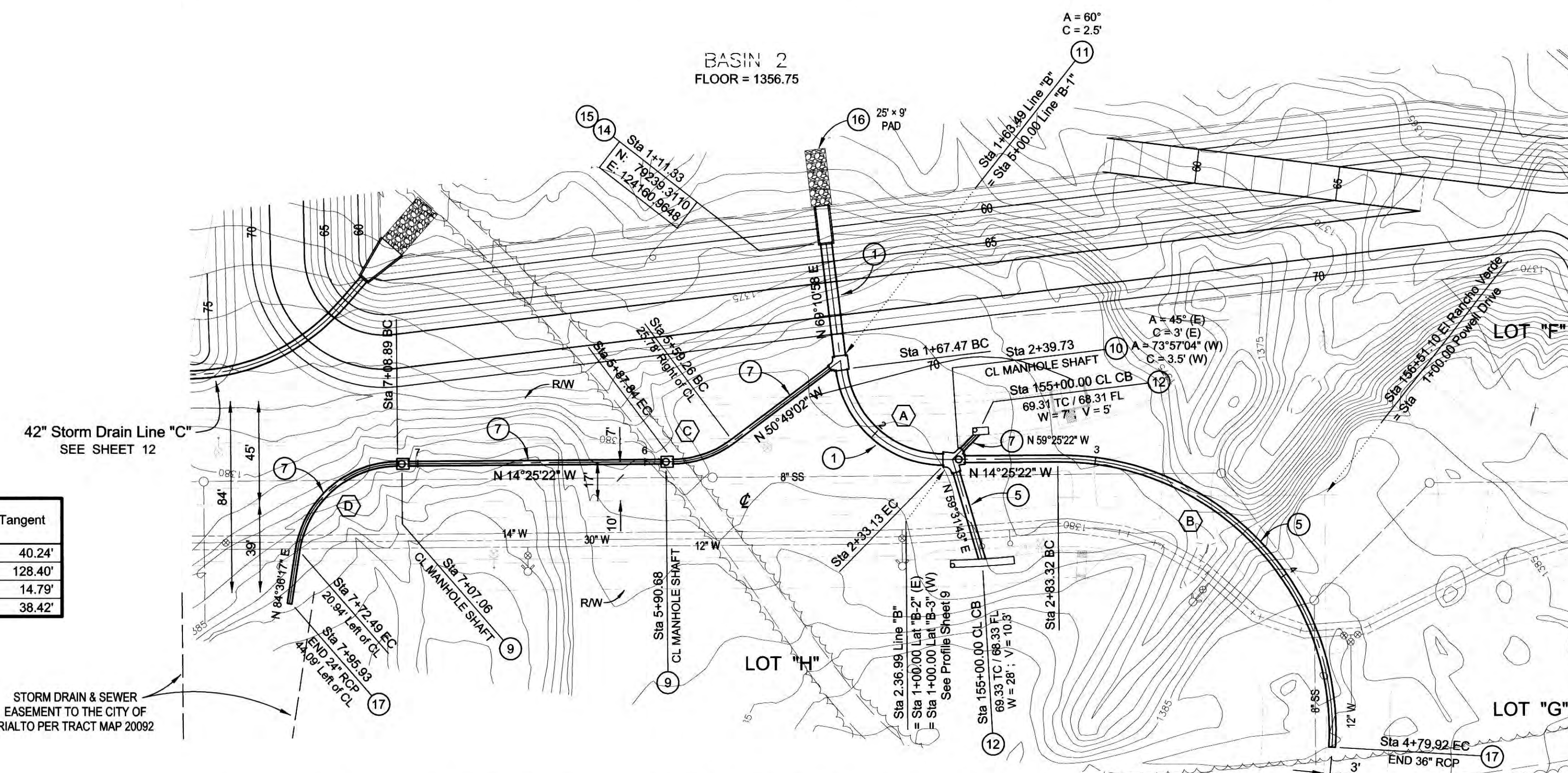
1 2 3 4

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



CURVE TABLE

|   | $\Delta$  | Radius  | Length  | Tangent |
|---|-----------|---------|---------|---------|
| A | 83°36'19" | 45.00'  | 65.66'  | 40.24'  |
| B | 93°52'20" | 120.00' | 196.61' | 128.40' |
| C | 36°23'41" | 45.00'  | 28.58'  | 14.79'  |
| D | 80°58'22" | 45.00'  | 63.60'  | 38.42'  |

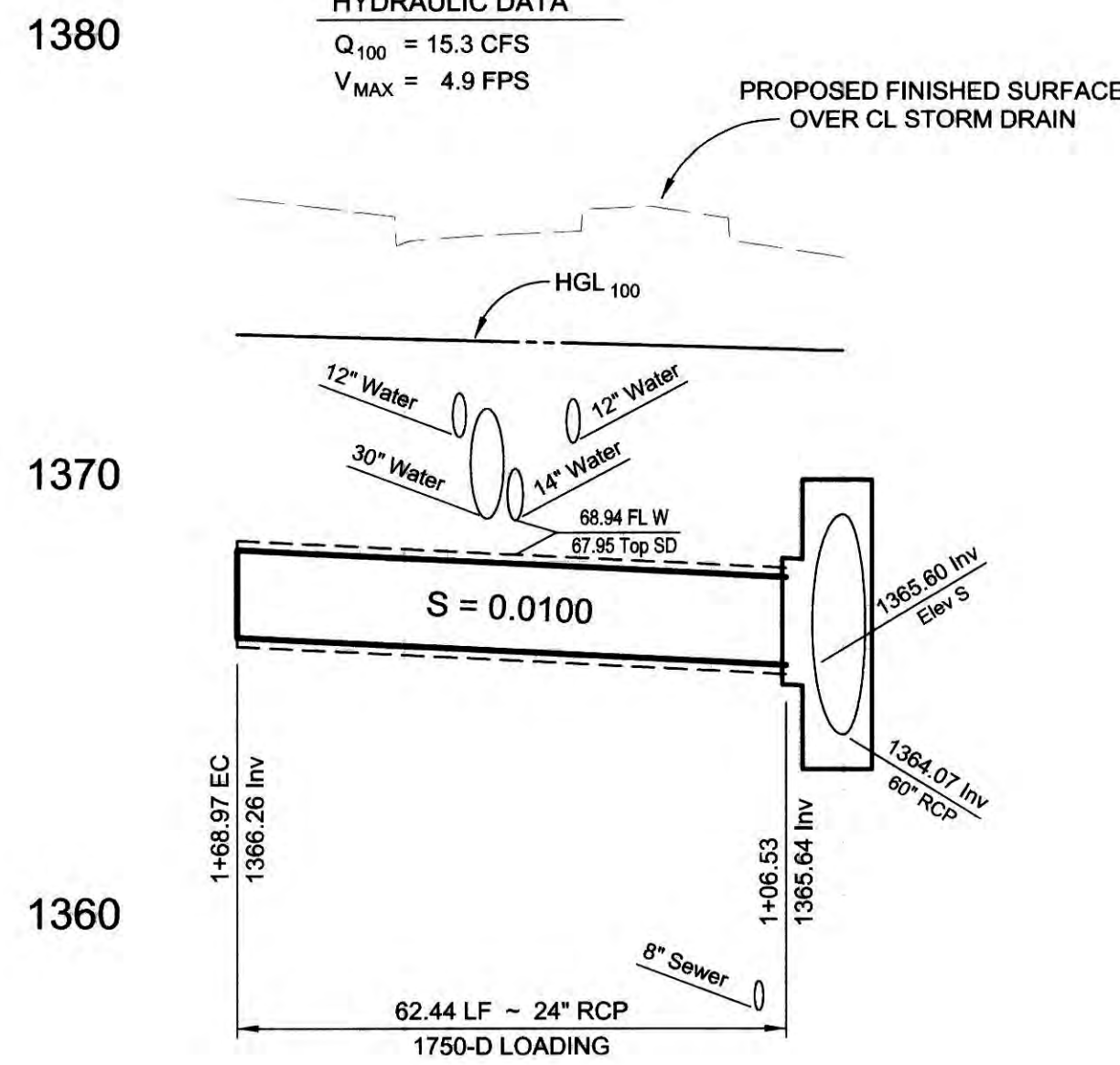


# EL RANCHO VERDE PARKWAY STORM DRAIN LINES "B" & "B-1"

## STORM DRAIN CONSTRUCTION ITEMS

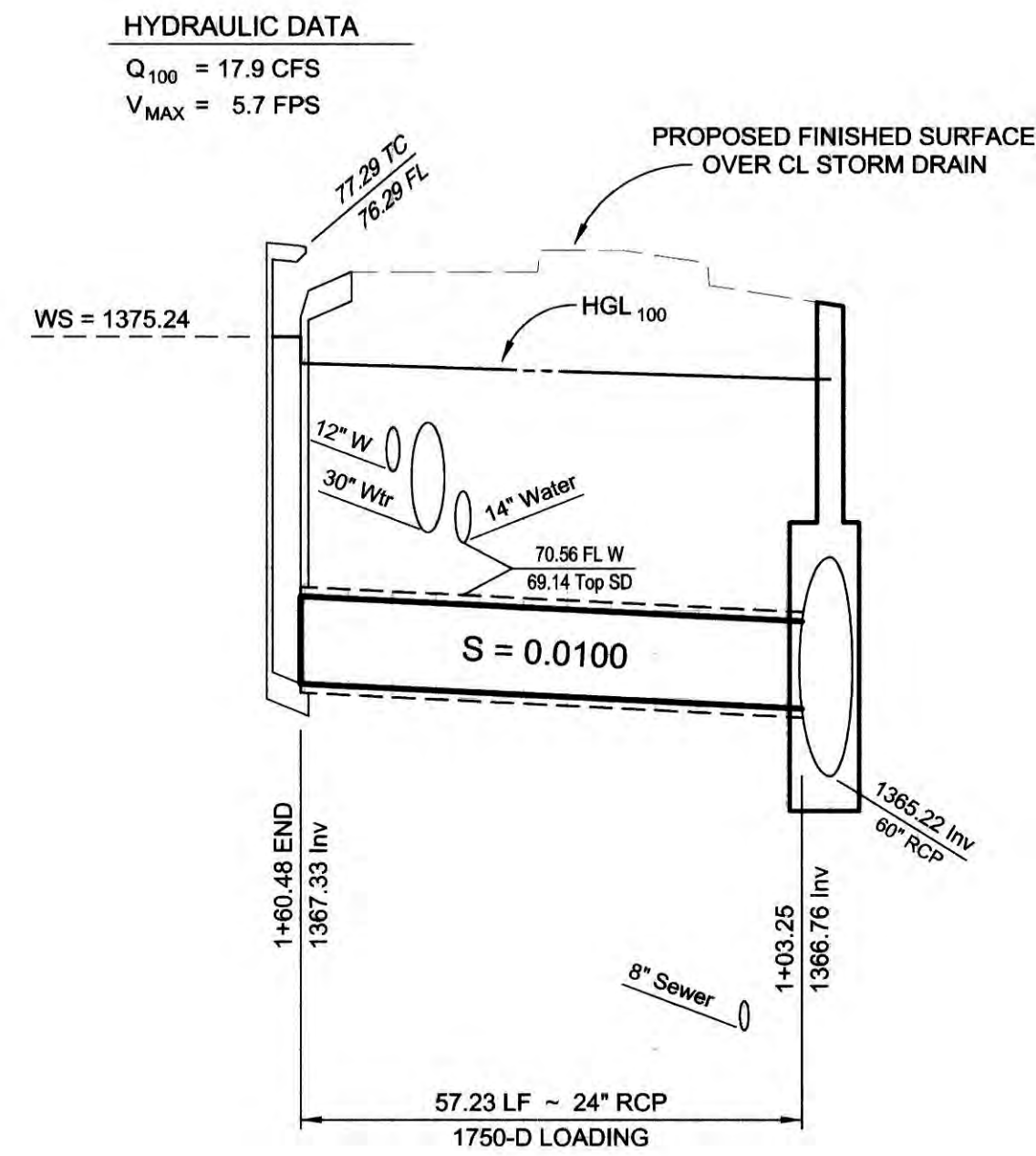
- INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
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- CONSTRUCT CONCRETE SPILLWAY PER DETAIL (B)

|                                                                                                               |                                                                               |                                                                                             |                         |                                                                                                                       |                                                                                                                                                   |                                                                                                                                                                                                                                                                             |                                                                                                                     |                                    |
|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <p>Underground Service Alert</p> <p>Call: TOLL FREE 1-800 227-2600</p> <p>TWO WORKING DAYS BEFORE YOU DIG</p> | <p>DESIGN BY: J.F. BERKELEY DRAWN BY: J.F. BERKELEY CHECKED BY: R.R. OTTE</p> | <p>SEAL-DESIGN ENGINEER</p> <p>JOHN FORD BERKELEY</p> <p>NO. 63652</p> <p>EXP. 09-30-20</p> | <p>DEPT. INIT. DATE</p> | <p>PREPARED UNDER THE SUPERVISION OF:</p> <p>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20)</p> <p>10 Aug 2020</p> | <p>OTTE-BERKELEY GROUPE, INC.</p> <p>575 E. CARREON DRIVE</p> <p>COLTON, CALIFORNIA 92324-3000</p> <p>TEL: (909) 370-0911 FAX: (909) 370-1211</p> | <p>BENCHMARK: CITY OF RIALTO No. 036-88</p> <p>DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF CACTUS AVENUE.</p> <p>Elev: 1490.698</p> <p>04/01/1989</p> | <p>CITY OF RIALTO</p> <p>TRACT MAP No. 20092</p> <p>STORM DRAIN LINES "B" &amp; "B-1"</p> <p>Plan &amp; Profile</p> | <p>SHEET 7</p> <p>OF 13 SHEETS</p> |
|                                                                                                               |                                                                               |                                                                                             |                         | <p>RECOMMENDED FOR APPROVAL BY:</p> <p>SAVAT KHAMPHOU, CITY ENGINEER, RCE No. 62019</p> <p>9/15/20</p>                |                                                                                                                                                   |                                                                                                                                                                                                                                                                             |                                                                                                                     |                                    |



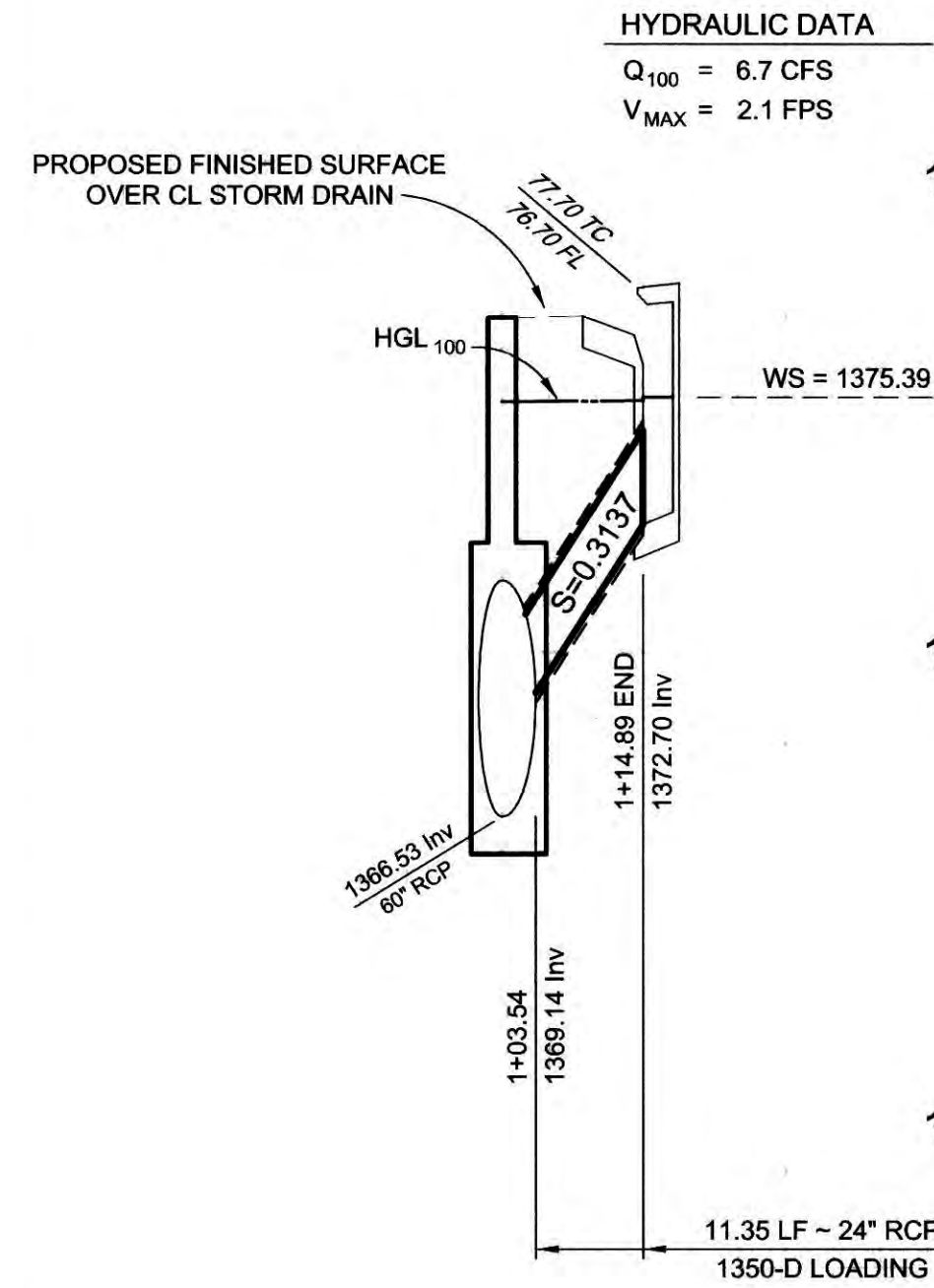
STORM DRAIN LINE "A-1"  
for PLAN VIEW, SEE SHEET 2

1+50 1+00



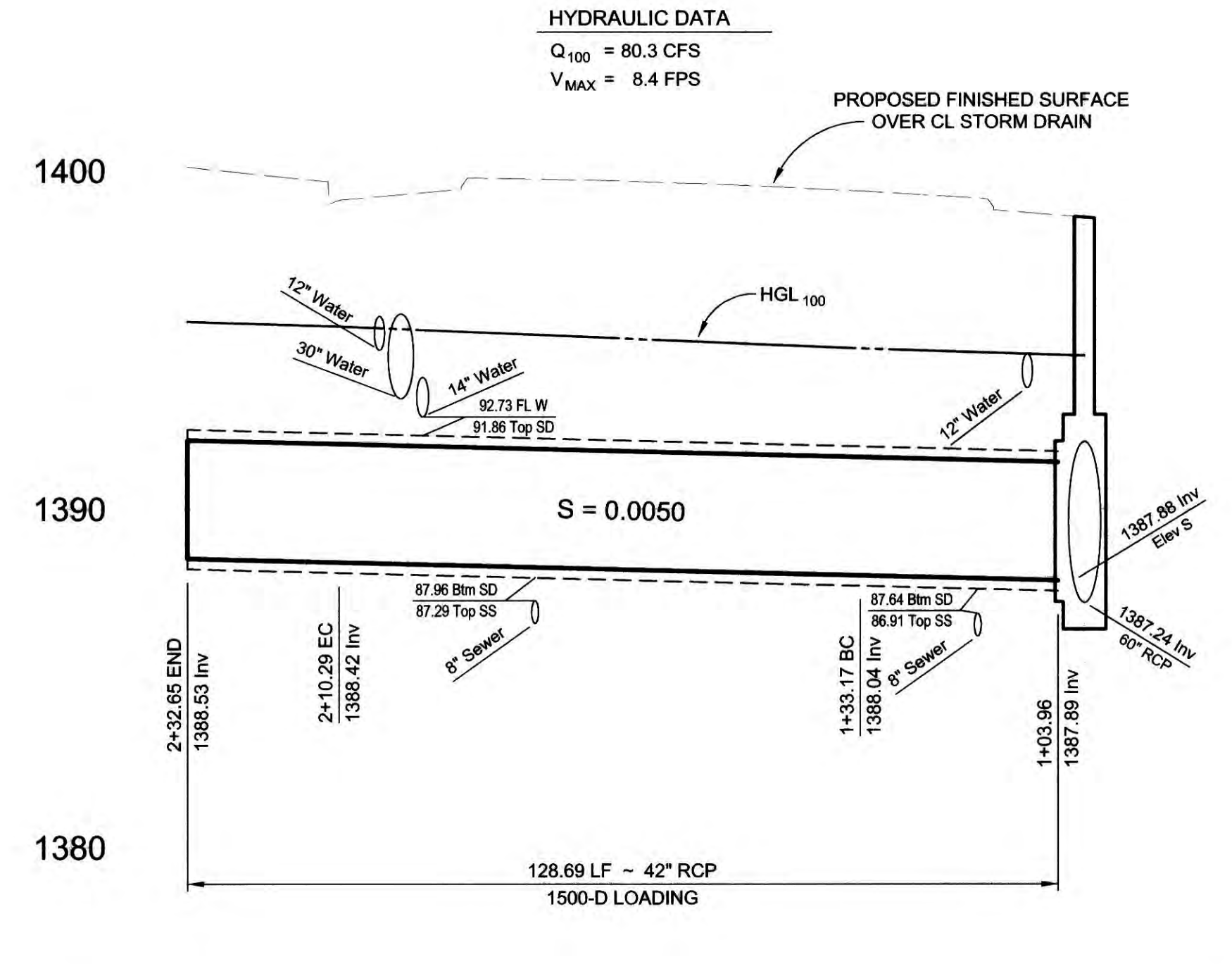
LATERAL "A-2"  
for PLAN VIEW, SEE SHEET 2

1+50 1+00



LATERAL "A-3"  
for PLAN VIEW, SEE SHEET 2

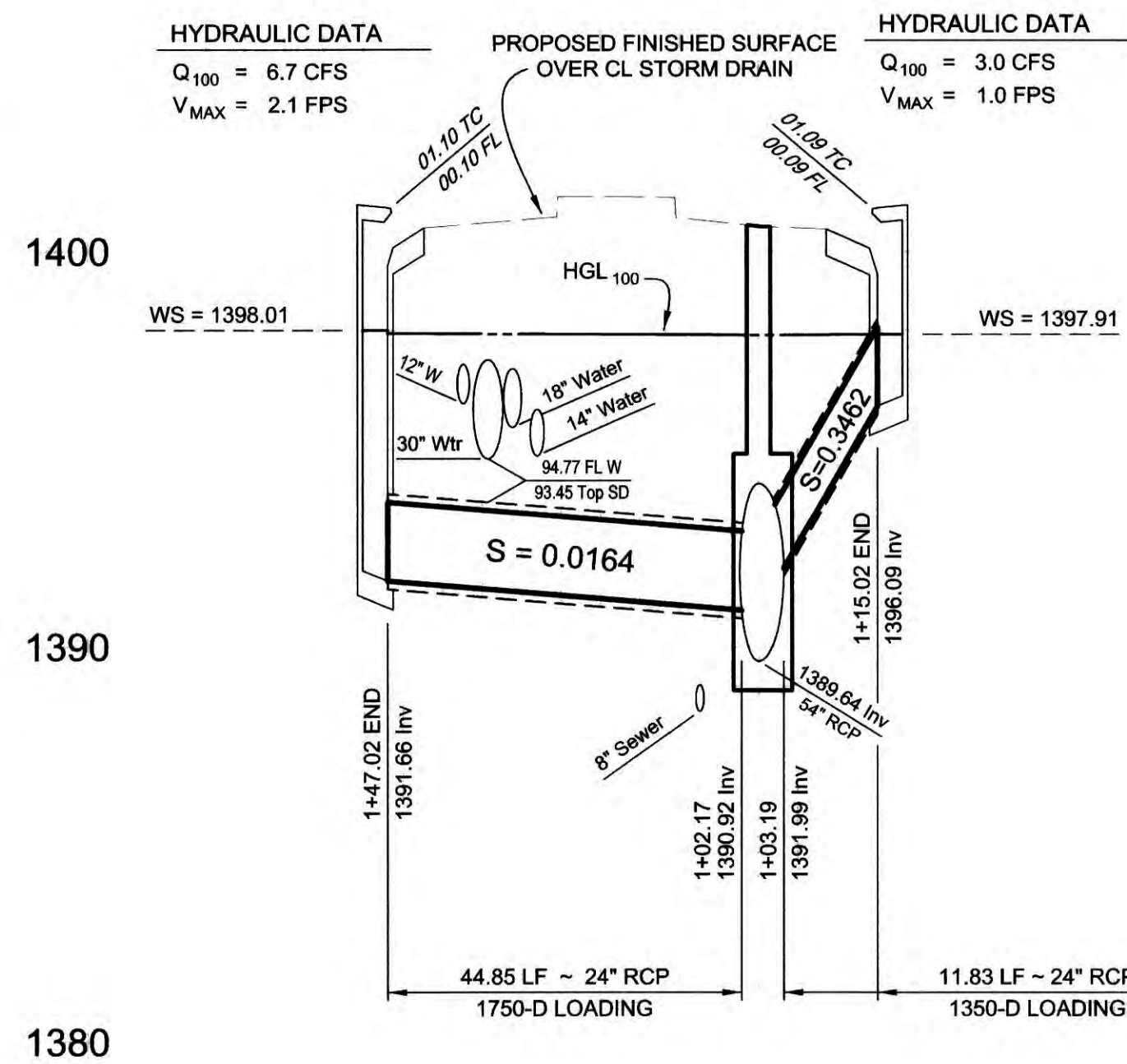
1+00



STORM DRAIN LINE "A-4"  
for PLAN VIEW, SEE SHEET 3

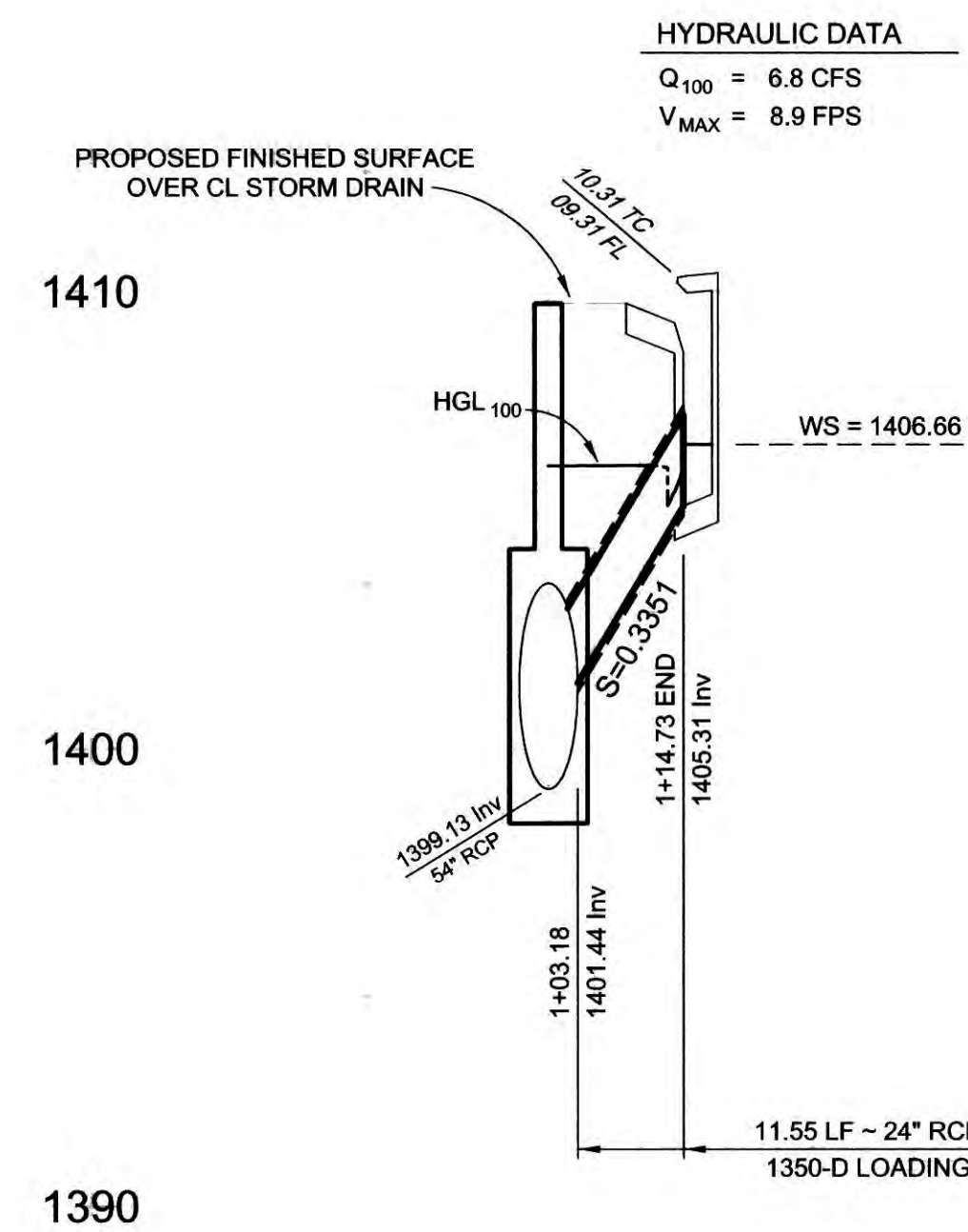
2+00 1+50 1+00

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



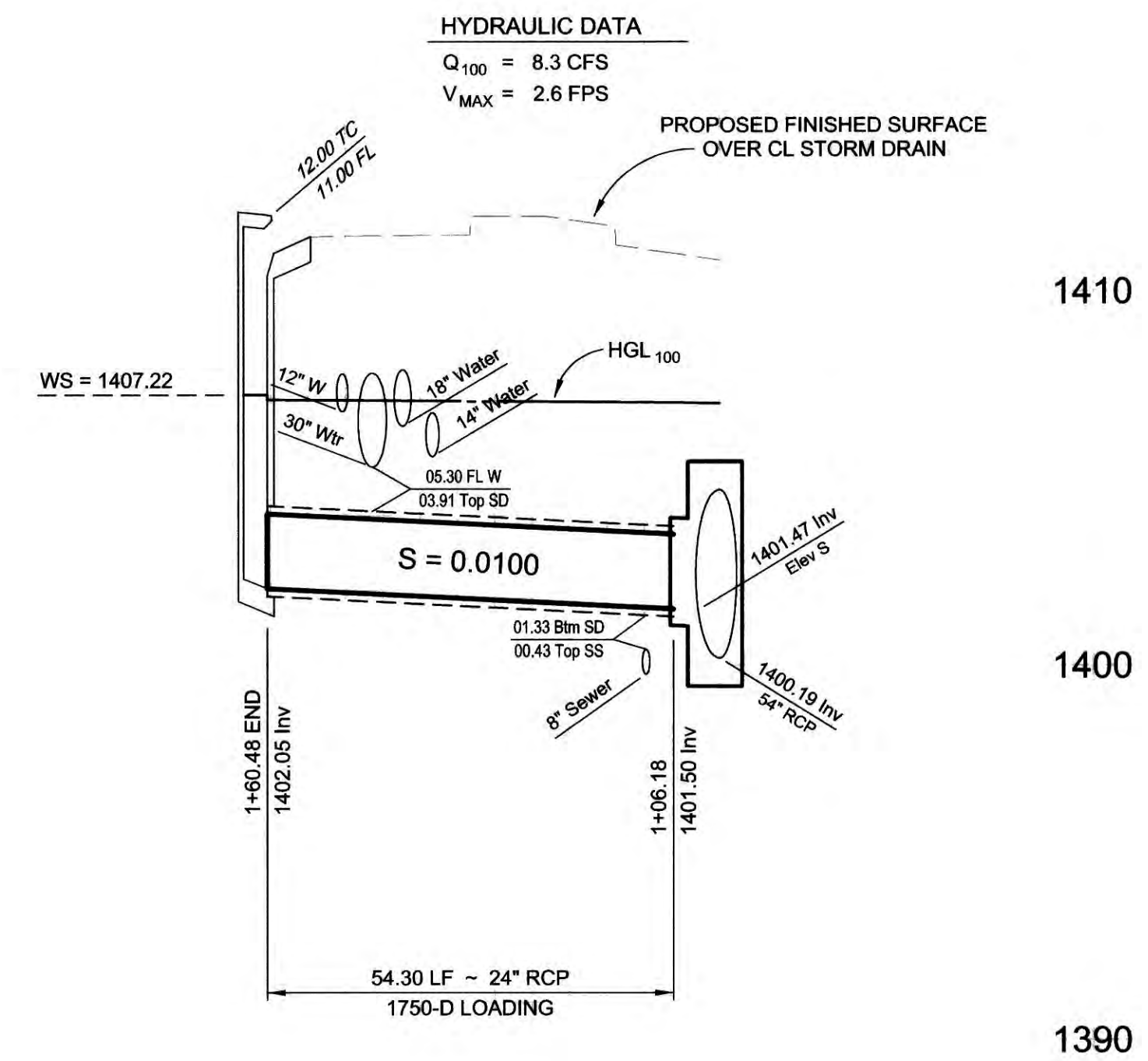
LATERAL "A-5" LATERAL "A-6"  
for PLAN VIEW, SEE SHEET 3

1+50 1+00



LATERAL "A-7"  
for PLAN VIEW, SEE SHEET 3

1+00



LATERAL "A-8"  
for PLAN VIEW, SEE SHEET 4

1+50 1+00

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

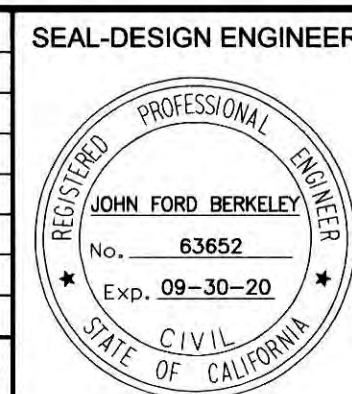
Underground Service Alert



Call: TOLL FREE  
1-800  
227-2600

TWO WORKING DAYS BEFORE YOU DIG

|                          |                         |                       |
|--------------------------|-------------------------|-----------------------|
| DESIGN BY: J.F. BERKELEY | DRAWN BY: J.F. BERKELEY | CHECKED BY: R.R. OTTE |
| REVISIONS                |                         |                       |
| MARK                     |                         |                       |



| DEPT. | INIT. | DATE |
|-------|-------|------|
|       |       |      |

|                                                   |             |
|---------------------------------------------------|-------------|
| PREPARED UNDER THE SUPERVISION OF:                | 10 Aug 2020 |
| JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20) | DATE        |
| RECOMMENDED FOR APPROVAL BY:                      |             |
|                                                   | DATE        |
| APPROVED BY:                                      | 9/15/20     |
| SAVAT KHAMPHOU, CITY ENGINEER, RCE No. 62019      | DATE        |



OTTE-BERKELEY GROUPE, INC.  
575 E. CARREON DRIVE  
COLTON, CALIFORNIA 92324-3000  
TEL: (909) 370-0911 FAX: (909) 370-1211

BENCHMARK: CITY OF RIALTO No. 036-88  
Elev: 1490.698  
DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE  
FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE  
OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF  
CACTUS AVENUE.

CITY OF RIALTO  
TRACT MAP No. 20092  
STORM DRAINS "A-1" thru "A-8"  
Lateral Profiles

FOR:  
LYTLE DEVELOPMENT

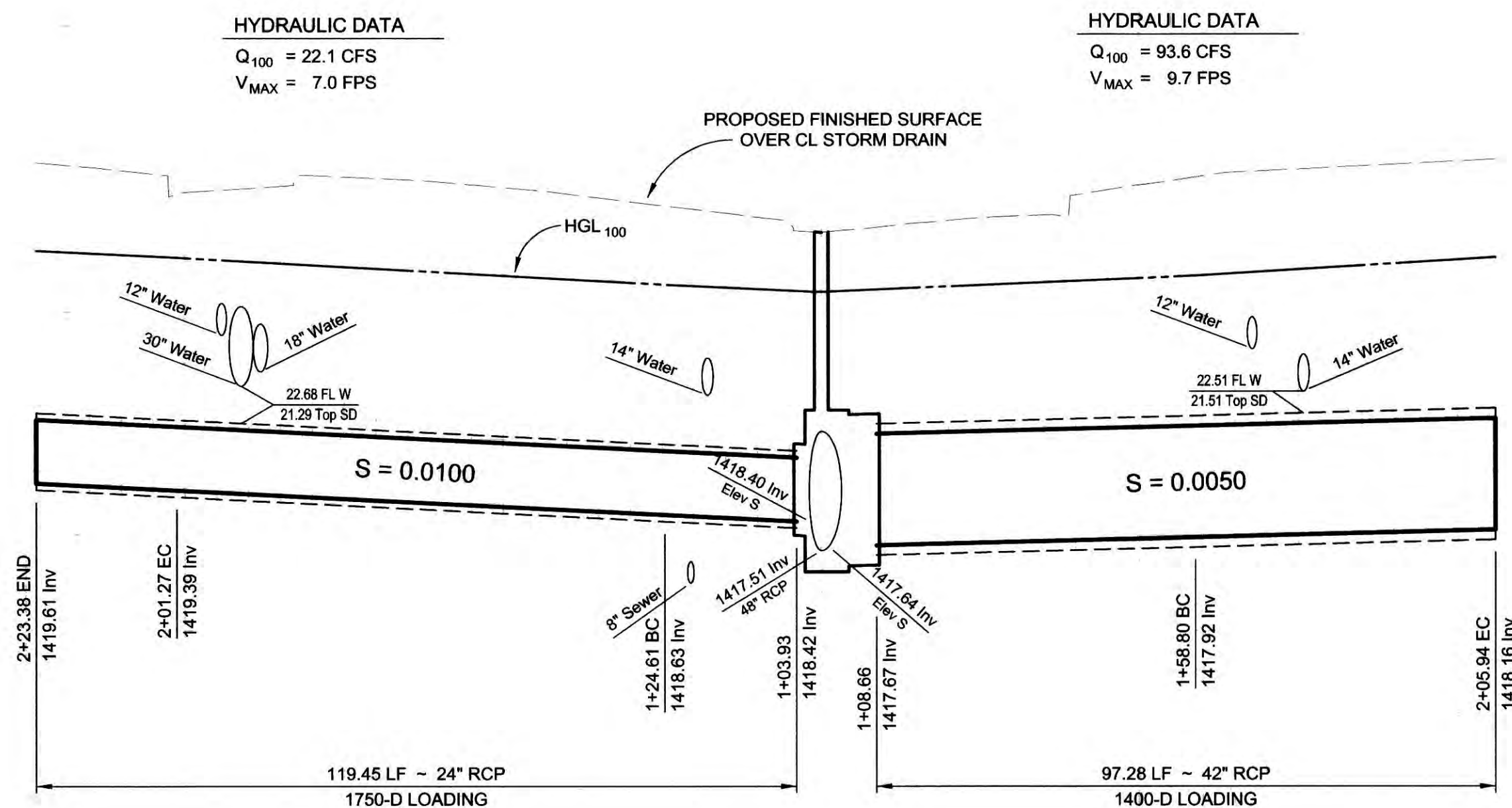
TR 20092

PLAN No. FCD-100

SHEET

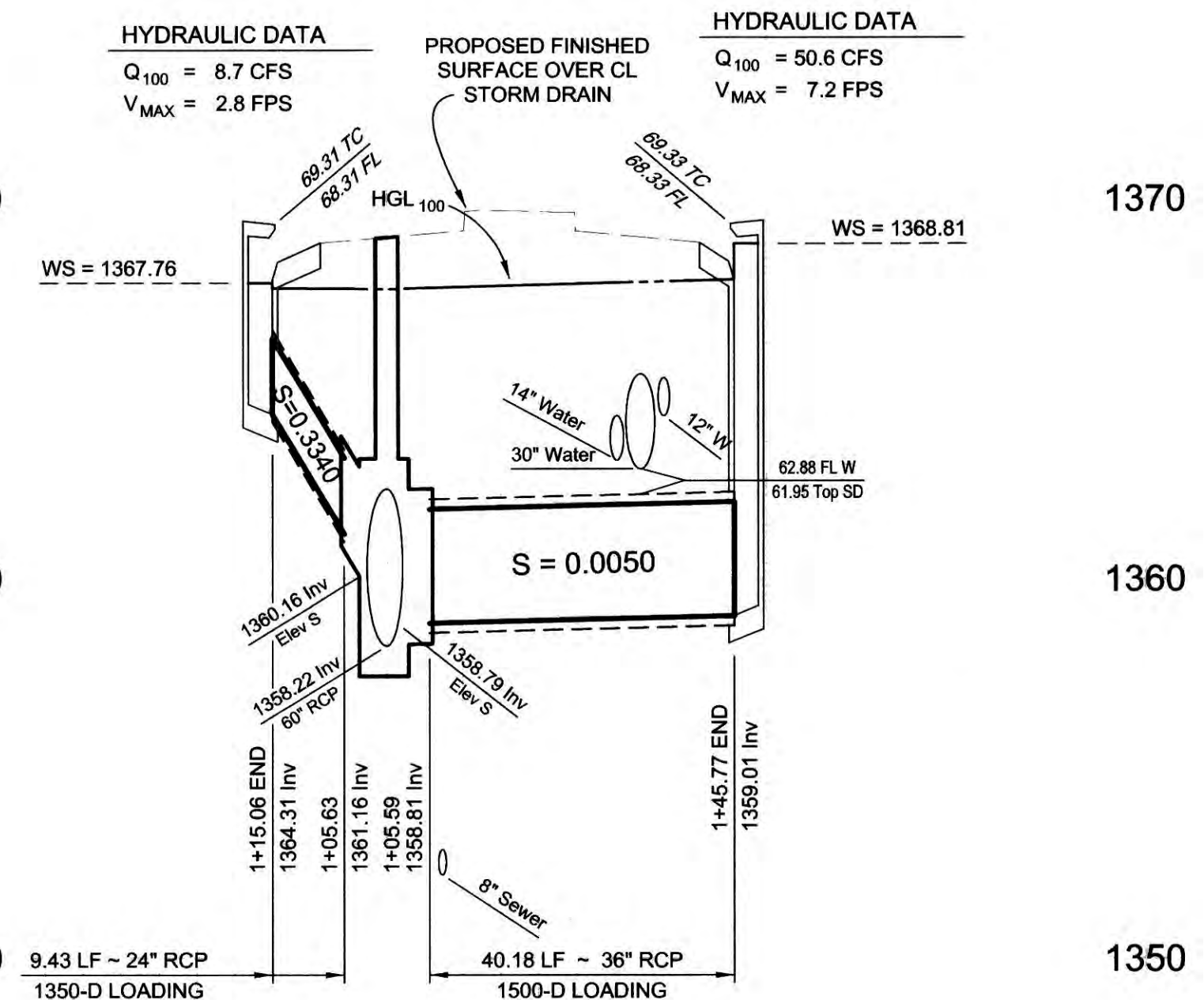
8

OF 13 SHEETS



STORM DRAIN LINE "A-11"

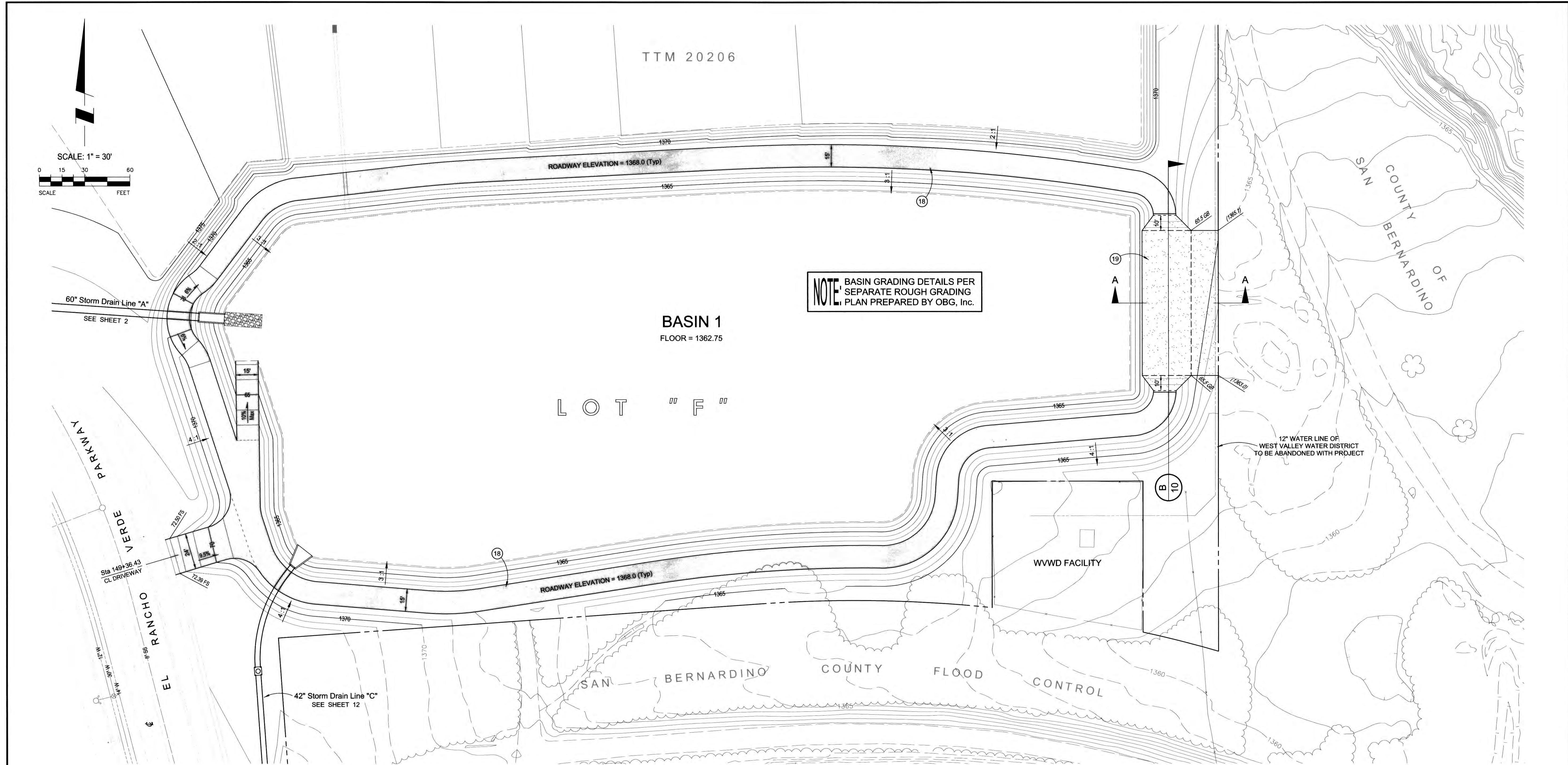
HORIZ.: 1" = 20'  
VERT.: 1" = 4'



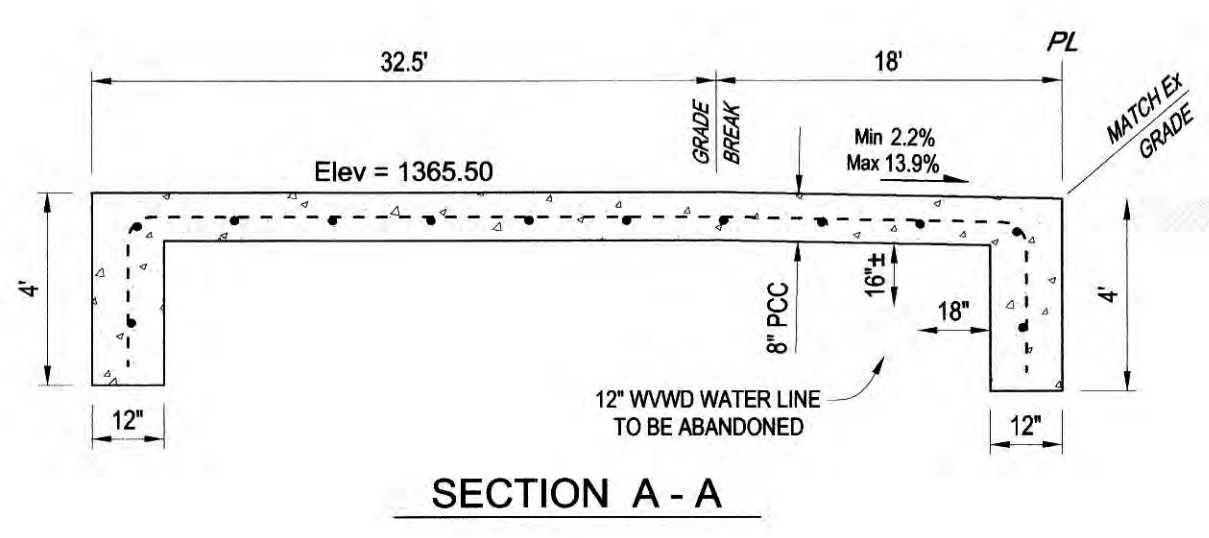
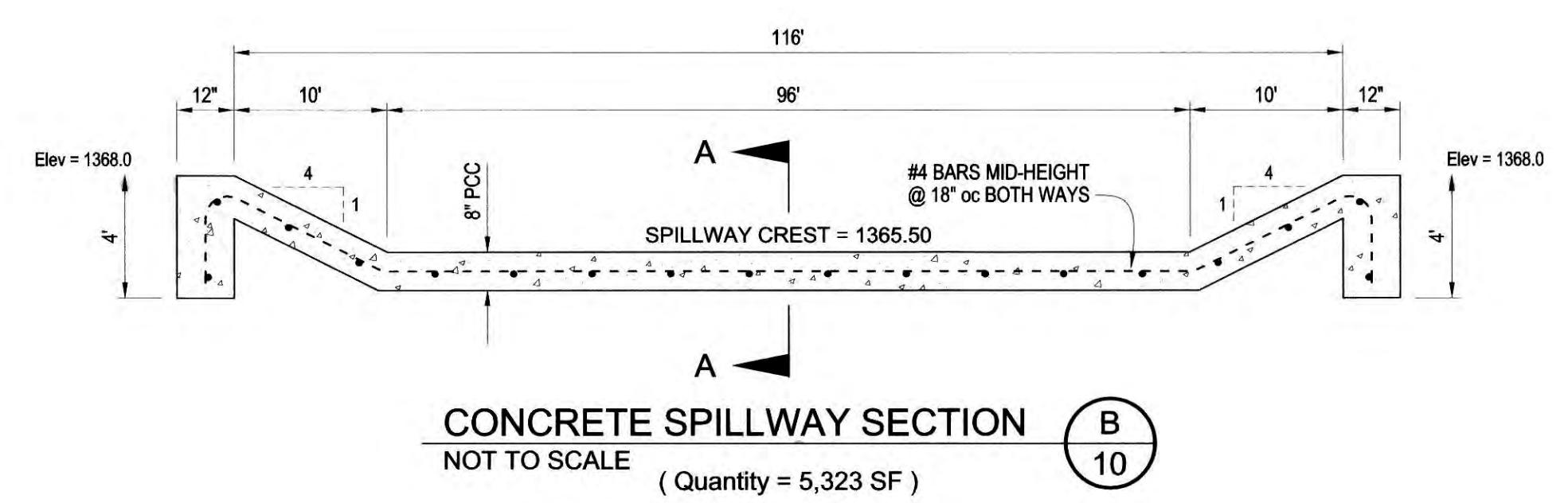
LATERAL "B-2" LATERAL "B-3"  
for PLAN VIEW, SEE SHEET 7

HORIZ.: 1" = 20'  
VERT.: 1" = 4'

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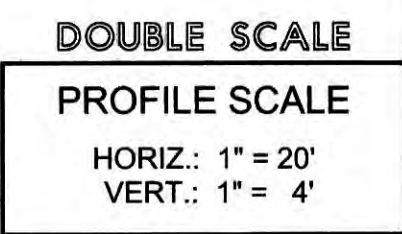


- STORM DRAIN CONSTRUCTION ITEMS**
- 18 PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
  - 19 CONSTRUCT CONCRETE SPILLWAY PER DETAIL (B 10)



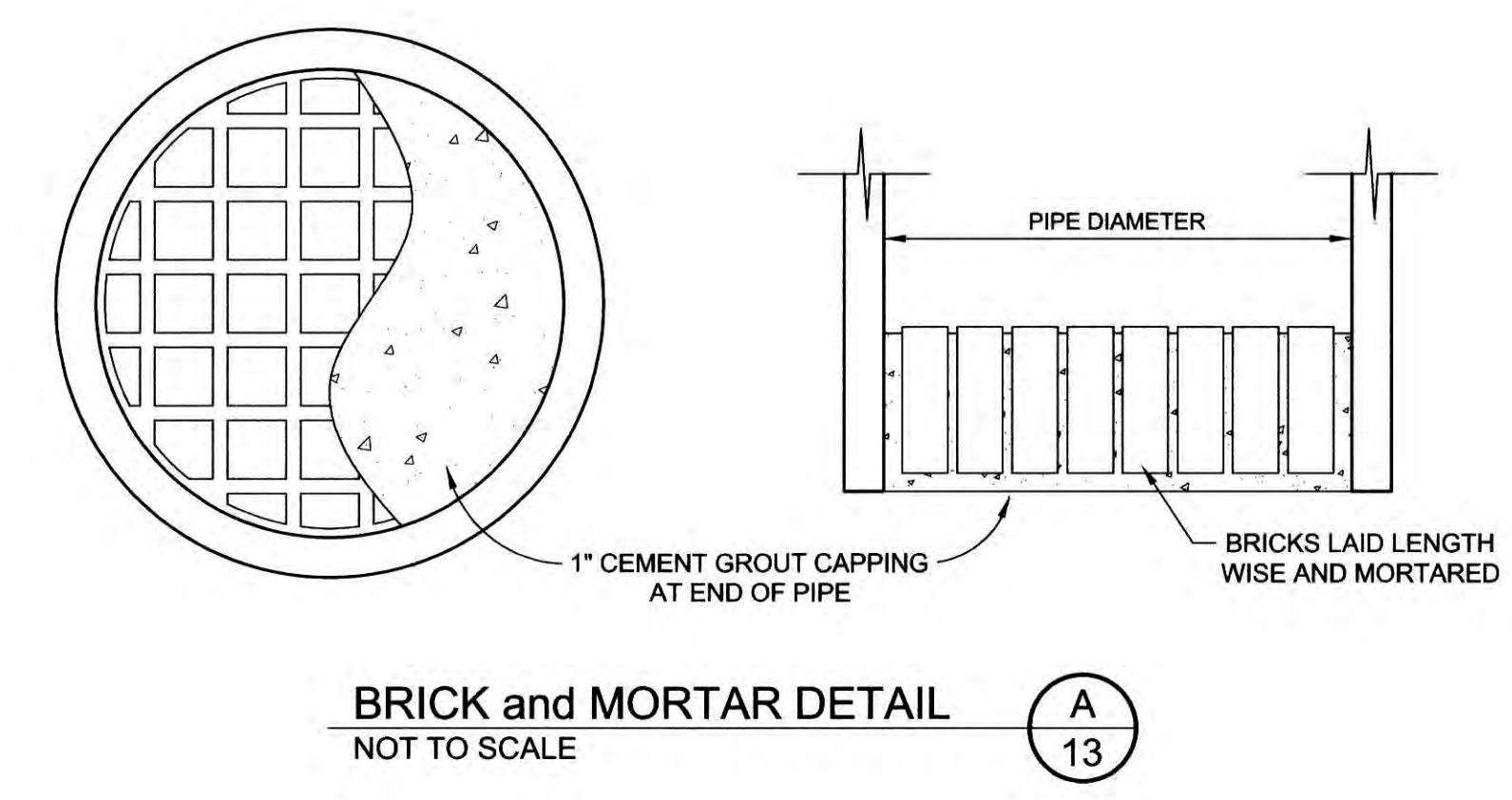
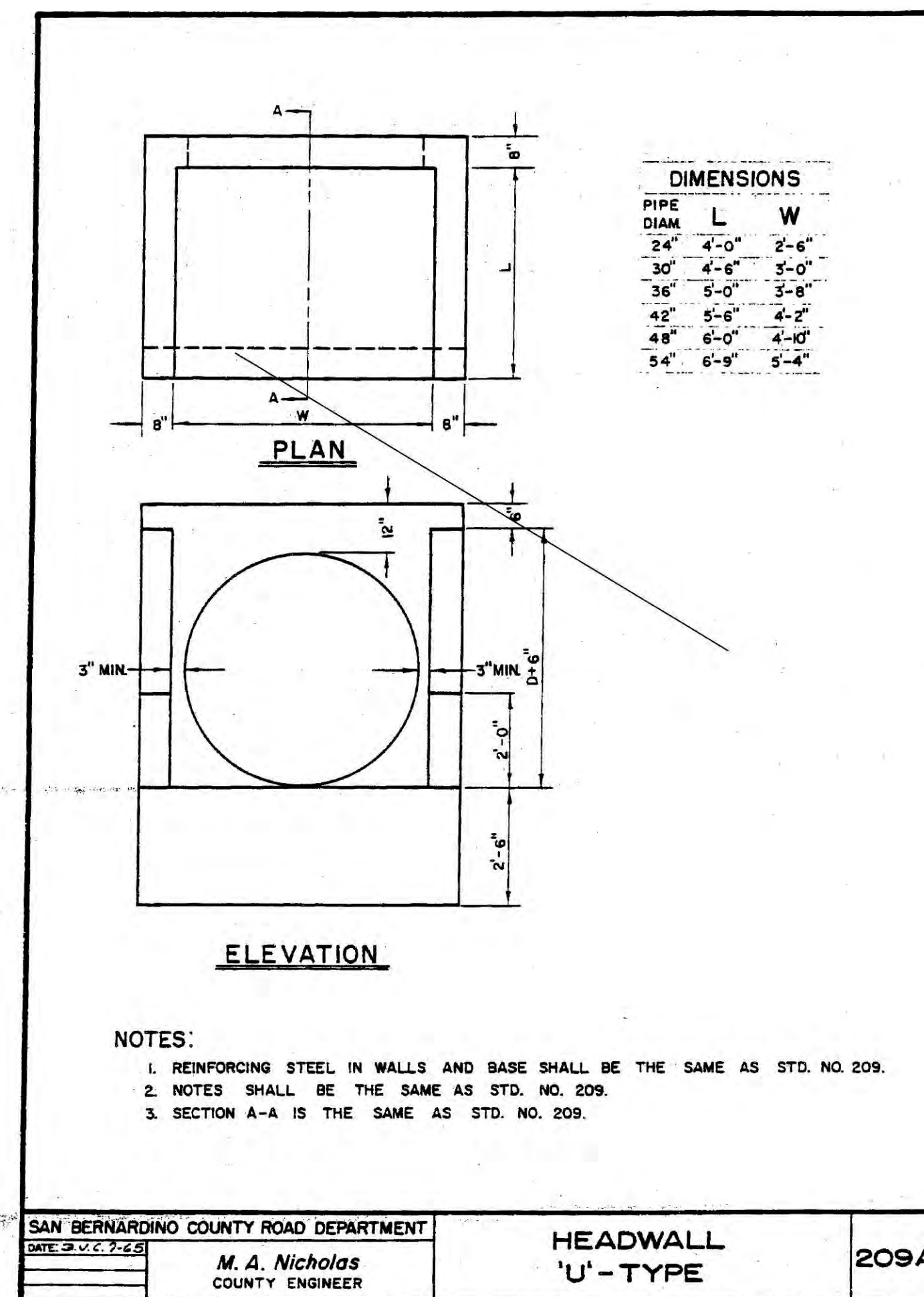
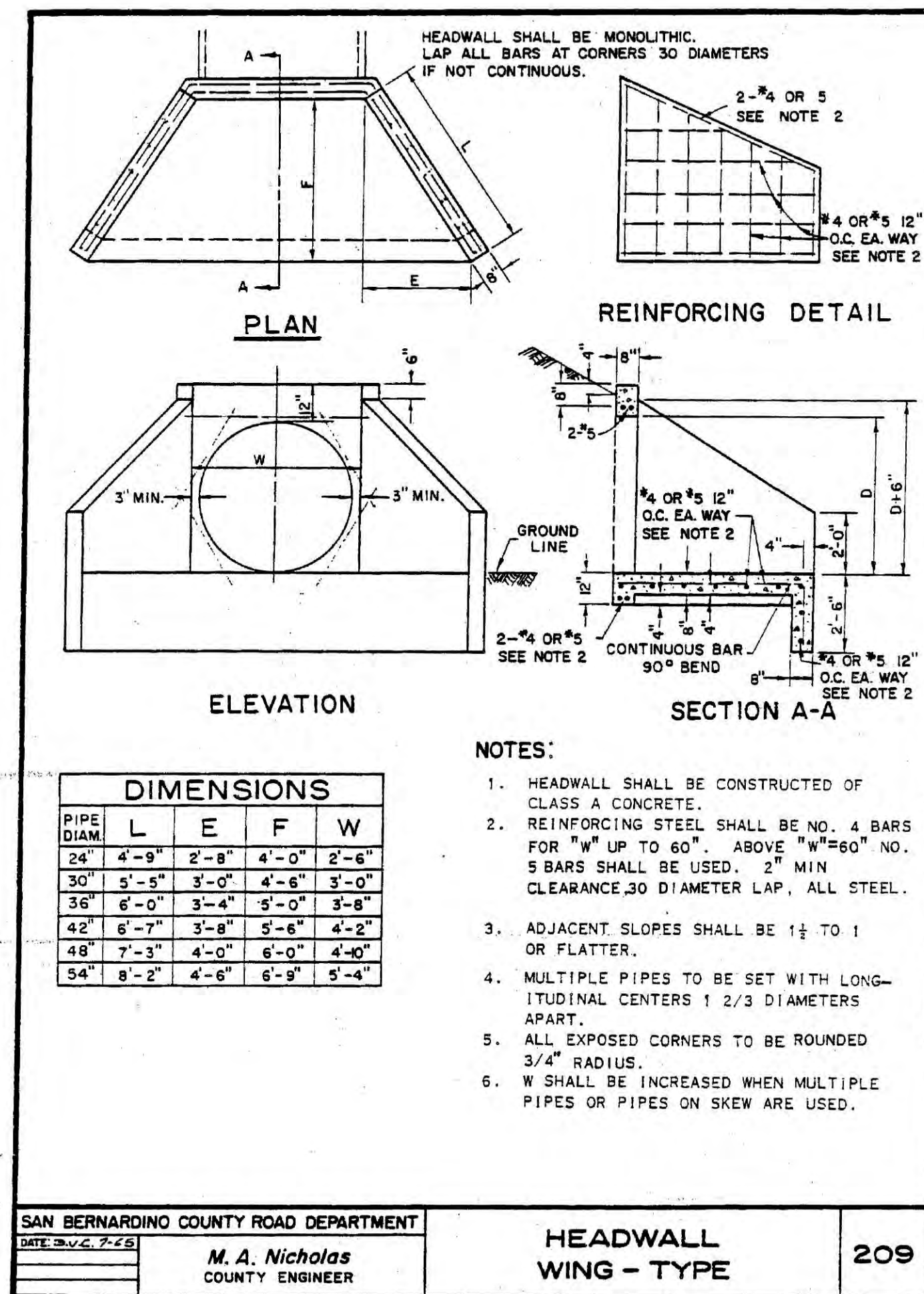
|                                                                                                             |                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                          |                           |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------|------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--------------------------|------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------|
| <b>Underground Service Alert</b><br>Call: TOLL FREE<br>1-800<br>227-2600<br>TWO WORKING DAYS BEFORE YOU DIG | <table><tr><td>MARK</td><td>REVISIONS</td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> | MARK                                                                                                                                                                                                                                                     | REVISIONS                 |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | SEAL-DESIGN ENGINEER<br> | DEPT. INIT. DATE | PREPARED UNDER THE SUPERVISION OF:<br>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20)<br>10 Aug 2020<br>DATE | <br>OTTE-BERKELEY GROUPE, INC.<br>575 E. CARREON DRIVE<br>COLTON, CALIFORNIA 92324-3000<br>TEL: (909) 370-0911 FAX: (909) 370-1211 | CITY OF RIALTO<br>TRACT MAP No. 20092<br>BASIN 1 DETAILS | SHEET<br>10<br>OF 13 SHEETS |
|                                                                                                             |                                                                                                                                                                                                                                                                                                                              | MARK                                                                                                                                                                                                                                                     | REVISIONS                 |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |
|                                                                                                             |                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                          |                           |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |
|                                                                                                             |                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                          |                           |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |
|                                                                                                             |                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                          |                           |          |                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |
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| DESIGN BY: J.F. BERKELEY DRAWN BY: J.F. BERKELEY CHECKED BY: R.R. OTTE                                      | APPROVED BY:<br>SAVAT KHAMPHOU, CITY ENGINEER, RCE No. 62019<br>9/15/20<br>DATE                                                                                                                                                                                                                                              | BENCHMARK: CITY OF RIALTO No. 036-88<br>Elev: 1490.698<br>04/01/1989<br>DESCRIPTION: CITY OF RIALTO BRASS DISC SET IN PCC BASE FOR STREET LIGHT No. 2162617E 17' SOUTH OF CENTERLINE OF RIVERSIDE OUTER HIGHWAY 68' WEST OF CENTERLINE OF CACTUS AVENUE. | FOR:<br>LYTLE DEVELOPMENT | TR 20092 | PLAN No. FCD-100 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                          |                  |                                                                                                                |                                                                                                                                    |                                                          |                             |





- ## STORM DRAIN CONSTRUCTION ITEMS
- 1 INSTALL 60" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 2 INSTALL 54" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 3 INSTALL 48" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 4 INSTALL 42" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 5 INSTALL 36" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 6 INSTALL 30" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 7 INSTALL 24" RCP STORM DRAIN PIPE, D-LOAD AS INDICATED
  - 8 CONSTRUCT MANHOLE PER STANDARD PLAN 320-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
  - 9 CONSTRUCT MANHOLE PER STANDARD PLAN 321-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
  - 10 CONSTRUCT MANHOLE PER STANDARD PLAN 322-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
  - 11 CONSTRUCT TRANSITION STRUCTURE PER STANDARD PLAN 340-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
  - 12 CONSTRUCT CURB OPENING CATCH BASIN PER STANDARD PLAN 340-3 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION (size as indicated)
  - 13 CONSTRUCT HEADWALL, WING-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209, DETAIL PROVIDED ON SHEET 13
  - 14 CONSTRUCT HEADWALL, U-TYPE PER THE COUNTY OF SAN BERNARDINO STANDARD DRAWING No. 209A, DETAIL PROVIDED ON SHEET 13
  - 15 INSTALL TRASH RACK, CASE A, PER STANDARD PLAN 361-2 OF THE STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
  - 16 CONSTRUCT 2'-THICK RIP-RAP PAD AS DIMENSIONED ON PLAN (FACING CLASS, METHOD B PLACEMENT)
  - 17 CONSTRUCT BRICK & MORTAR SEAL AT PIPE END PER DETAIL 
  - 18 PLACE 4" ASPHALT CONCRETE PAVING OVER 90% COMPACTED NATIVE
  - 19 CONSTRUCT CONCRETE SPILLWAY PER DETAIL 

[illegible]



|                                                                                                           |                                                                        |                          |                                                                                         |       |      |                                                                                                         |                                                                                                                                    |                                                                           |                                    |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|-------|------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------|
| <b>Underground Service Alert</b><br><br>Call: TOLL FREE 1-800 227-2600<br>TWO WORKING DAYS BEFORE YOU DIG | DESIGN BY: J.F. BERKELEY DRAWN BY: J.F. BERKELEY CHECKED BY: R.R. OTTE | SEAL-DESIGN ENGINEER<br> | DEPT.                                                                                   | INIT. | DATE | PREPARED UNDER THE SUPERVISION OF:<br><br>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20) 10 Aug 2020 | <br>OTTE-BERKELEY GROUPE, INC.<br>575 E. CARREON DRIVE<br>COLTON, CALIFORNIA 92324-3000<br>TEL: (909) 370-0911 FAX: (909) 370-1211 | CITY OF RIALTO<br>TRACT MAP No. 20092<br>COUNTY OF SAN BERNARDINO DETAILS | SHEET<br><b>13</b><br>OF 13 SHEETS |
|                                                                                                           |                                                                        |                          | RECOMMENDED FOR APPROVAL BY:<br><br>SAVAT KHAMPOU, CITY ENGINEER, RCE No. 62019 9/19/20 |       |      | APPROVED BY:<br><br>JOHN FORD BERKELEY, RCE No. 63652 (Exp. 09/30/20) 10 Aug 2020                       |                                                                                                                                    |                                                                           |                                    |