



Drainage Reports



**FINAL DRAINAGE REPORT
FOR
AXON PROJECT**

September 10, 2020
WP# 205133

Plan #	_____
Case #	28-DR-2020
Q-S #	_____
☒ Accepted	
☐ Corrections	
N. Baronas	9/24/2020
Reviewed By	Date



Expires 6/30/2023

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1.0 INTRODUCTION

The Axon Campus (Site) is currently on an undeveloped parcel. The parcel, Tract 14A of State Plat No. 16-B Core South, consists of a portion of the northern half of Section 36, Township 4 North, Range 4 East, in the City of Scottsdale, Arizona. The parcel is approximately 74.44 acres in size, and is located northeast of the intersection of Hayden Road and Union Hills Drive in the City of Scottsdale, Arizona. The parcel's western boundary has frontage along the east side of Hayden Road, and the parcel's southern boundary has frontage along the north side of Union Hills Drive. Additionally, the north side of the parcel parallels a portion of Arizona Department of Transportation (ADOT) State Route 101.

Phase I of the development is to include a one-story warehouse and five-story office building with associated parking, roadways, hardscape and landscape. The Site is approximately 34.03 acres on the east side of the 74.44-acre parcel. The west side of the parcel is to remain undeveloped for future uses, except for proposed access roadways to the Site.

The purpose of this report is to document the drainage design criteria utilized for the Axon project, and is intended to support the Construction Documents submittal for the project. This Preliminary Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (WOODPATEL) understanding of the City of Scottsdale's technical requirements for drainage (Ref. 1), as applicable for the Site.

2.0 EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 On-Site Drainage Conditions (Pre-Development)

The Site is vacant of surface structures, with the exception of the improvements covered in Section 2.4, and significant portions of the parcel have been cleared and covered with recycled asphalt millings to provide dust control. Reportedly, the parcel has previously served as overflow parking. Portions of the parcel that have not been cleared or disturbed display native desert terrain, common to the area. The parcel slopes to the southwest at an average slope of 1.5%. As displayed in Exhibit 3 – *Existing Drainage Map*, contour elevations range from approximately 1,605 feet to 1,583 feet.

The parcel is subject to a 100-year floodplain, as determined by the Federal Emergency Management Agency (FEMA). Section 3.0 further expands on this matter.

2.2 Off-Site Drainage Conditions

The Site is located downstream of Crossroads East Basin 53R, which is a regional flood control basin. This basin stops the majority of the historic off-site runoff from impacting the Site. However, there are several existing ADOT culverts along the north frontage of the right-of-way to collect storm water runoff from the AZ Loop 101, and carry the water south through the parcel.

Public roadway infrastructure improvements for Mayo Boulevard and Union Hills Drive are expected to include the associated storm drainage infrastructure. These storm drain systems will be capable of handling the storm water runoff generated from the associated road right-of-way.

2.2 FEMA Floodplain

ASLD Parcel Tract 14A is located within a Federal Emergency Management Agency (FEMA) floodplain designation, Zone "AO-Depth 1 Foot, Velocity 3 FPS", per *Flood Insurance Rate Map (FIRM) Map number 04013C1320L* (refer to Exhibit 2 – *FEMA FIRM*). The current FEMA floodplain is commonly referred to as the Reata Wash Floodplain.

Zone "AO-Depth 1 Foot" is defined by FEMA as follows:

"Special flood hazard area inundated by 100-year flood depths 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined."

The City of Scottsdale regulates development in FEMA-designated floodplains under its floodplain ordinance. Generally, proposed development in the floodplain is allowed if the lowest floor elevations are at or above the FEMA 100-year water surface elevations, or elevated at least two feet above the highest adjacent grade, and/or the proposed development meets protection criteria. The City of Scottsdale also considers whether the proposed development addresses

additional requirements, like conveyance corridors, and seeks to ensure the proposed development does not penalize upstream or downstream properties.

FEMA has previously refused to remove any land from this published Alluvial Fan Special Flood Hazard Area (Zone AO) unless a regional structural solution is constructed.

2.4 Crossroads East Drainage Infrastructure Improvements

There is a City owned and maintained floodwater conveyance system running through the parcel, referenced as *Crossroads East Drainage Infrastructure Phase 1*. A drainage report supporting the Crossroads East Drainage Infrastructure Phase 1 design was completed by Michael Baker International and has been included in Appendix E. The conveyance system is designed to carry storm water runoff, generated north of Arizona SR 101, through the parcel, south, to its ultimate outfall location. Improvements within Tract 14A include two 60-inch-diameter corrugated metal pipes (CMP), running in parallel, that convey storm water to an open channel. The open channel runs parallel to Union Hills Drive, and is approximately 62 feet wide, with a depth of 4.5 feet. The storm water in the channel exits the parcel through an existing box culvert, located under Union Hills Drive, near the southwest corner of the parcel, and continues south. The conveyance system is part of the *Crossroads East Drainage Infrastructure Plan* (City of Scottsdale Project No. 400-FB53B-56047). Construction of the improvements is underway, and has an estimated completion date of August 4, 2020. Excerpts from the *Crossroads East Drainage Infrastructure Plan* can be found in Appendix C.

3.0 PROPOSED DRAINAGE PLAN

3.1 On-Site Drainage Conditions (Post Development)

The proposed grading for the project is designed to direct storm water runoff away from the proposed building and into proposed retention basins. Proposed roof drains, catch basins, and storm drains will collect the majority of the runoff to store in above-ground retention basins. A majority of the Site drains to the southwest. If the catch basins become clogged, or if the on-site storm water storage system is exceeded, overland overflow routes have been incorporated into the grading and drainage design. The ultimate outfall for the project will be at the southeast corner of the Site, at an elevation of 1,582.00.

3.2 Off-Site Drainage Conditions (Post Development)

The Site will accept runoff from the north through four culverts, and convey this water through the Site and outfall at the southwest corner of the Site, as previously mentioned above. The 100-year rainfall events for the off-site flows were determined using the Rational Method for the areas located downstream of Basin 53R. The proposed access road to the Site is impacted by off-site flows that are currently not being directed to Basin 53R. Flow rates for this area were determined by using the District Online Flo-2D viewer (refer to Appendices E and F for off-site flows). The storm drain system has been designed to accommodate the 100-year off-site and on-site flows through the Site to where they outfall. On-site and off-site flows were routed through using AutoCAD's Hydraflow Hydrographs (refer to Section 5.2 for more Hydraulic Analysis).

3.3 Retention and Dissipation

It is WOODPATEL's understanding, through correspondence with the City of Scottsdale's Stormwater Management Department, there are two conditions the applicant for development will be required to satisfy regarding on-site stormwater runoff and retention.

1. Interim Condition: Until the referenced Crossroads East Drainage Infrastructure Phase 1 improvements have been completed, on-site retention will be required for 100% of the volume generated by first flush or pre vs post calculations, whichever is greater. The collected runoff is required to be disposed of within 36 hours, as required by the City of Scottsdale *Design Standards & Policies Manual*, Section 4-1.201.
2. Ultimate Condition: The City is currently sponsoring drainage improvements that may be sufficient to support a storm water waiver for on-site retention, normally required for parcel development. First flush requirements will still be required for development of the parcel. Should the applicant desire to pursue a storm water retention waiver, a separate technical drainage submittal is required for review and approval by the City of Scottsdale. The drainage submittal needs to demonstrate there is a drainage corridor sufficient to convey runoff to the Central Arizona Project's approved impoundment area for upstream drainage volumes.

In accordance with the current City of Scottsdale *Design Standards & Policies Manual*, the following required first flush retention volume equation was used for this project's ultimate condition with the current precipitation depth of 0.5 inches:

$$\text{Vol}_{\text{req}} = P/12 \times A \times C$$

P = Precipitation Depth: 0.5 inches

A = Total Area (sq. ft.)

C = Post-Development Runoff Coefficient: Varies (1.0)

Estimated first flush treatment and retention volumes, located in Appendix A: Tables 2 and 3, were calculated following the City of Scottsdale *Design Standards & Policies Manual* Section 4-1.201.C.2 and Section 4-1.201.C.1.b, respectively. Only the on-site first flush storm drain event will be retained. Basins B-3 and B-7 are capable of retaining the entire 100-year, 2-hour storm event.

3.4 Lowest Floor Elevation

The Preliminary Grading and Drainage Plan is designed to comply with the City of Scottsdale's floodplain ordinance in a Zone "AO-Depth 1 Foot, Velocity 3 FPS" floodplain. The proposed building has a finished floor elevation of 1607.70, which is 2.0 feet above the H.A.G. elevation of 1605.70, located along the northern frontage of the building.

3.5 Operation and Maintenance

The property owner shall be solely responsible for the operation and maintenance of the storm water drainage system. In accordance with the City of Scottsdale's *Design Specifications & Policies Manual*, the owner will dedicate a public drainage easement for the storm water retention facilities. Operation and maintenance reference material will be provided within the Final Drainage Report.

4.0 SPECIAL CONDITIONS

The development of the parcel must comply with Federal, State, County, and City regulations.

This section is limited to the application of the Federal Government's *Section 404 Permit – Clean Water Act*. The local office of the U.S. Army Corps of Engineers (USACOE) is the agency that determines if a watercourse or desert wash meets the criteria to be designated as "Waters of the U.S.", or commonly referred to as "jurisdictional delineation". The purpose of the *Section 404 Permit – Clean Water Act* is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

The parcel's current status with the USACOE regarding the *Section 404 Permit - Clean Water Act* is explained in the technical memorandum prepared by Logan Simpson, entitled *Clean Water Act Section 404 Technical Memorandum*, dated April 6, 2020, project name *Hayden Road/Loop 101*. A copy of this technical memorandum is provided in Appendix K. The memorandum states the USACOE identified no Waters of the U.S. under jurisdiction of the Clean Water Act within the parcel limits. Unless new information or events warrant a revision, this determination by the USACOE is valid for 5 years from the date of August 15, 2018.

Therefore, under the current 2015 definition of Waters of the U.S., if the development of the parcel occurs prior to August 15, 2023, a preparation of a Preliminary Jurisdictional Delineation (PJD) or a Section 404 permit would not be required for submission to the local USACOE.

U.S. Army Corps of Engineers
Regulatory Branch
3636 North Central Avenue, Suite 760
Phoenix, AZ 85012-1936
602.640.5385

5.0 DATA ANALYSIS

5.1 Hydrologic Analysis

The drainage improvements will be developed consistent with Chapter 4 of the City of Scottsdale's *Design Standards & Policies Manual*, 2018. The Rational Method will be used to quantify peak discharge values for on-site concentration points for the full-buildout scenario during the 100-year, 2-hour storm event. Weighted "C" coefficients will be referenced from Chapter 4 of the City of Scottsdale's *Design Standards & Policies Manual*, 2018. Refer to Appendix A for rational calculation printouts, and Exhibit 5 – *Catch Basin Map* for drainage basin tributary areas and concentration point locations.

5.2 Hydraulic Analysis

The on-site storm drain system has been designed to accommodate the 100-year, 2-hour storm event. Bentley StormCAD Version 8i was utilized to analyze the proposed storm sewer system. StormCAD printouts and storm drain profiles, as well as Hydraflow outputs, are located within Appendix B.

6.0 CONCLUSIONS

Based on our analysis of the Site, the following conclusions can be made:

1. The Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel's) understanding of the City of Scottsdale's technical drainage requirements and the *Drainage Design Manuals for Maricopa County Hydrology and Hydraulics* (2013), as applicable to the SEC Hayden-Loop 101 Project.
2. The proposed improvements lie within a Federal Emergency Management Agency (FEMA) floodplain designation, Zone "AO-Depth 1 Foot, Velocity 3 FPS" per *Flood Insurance Rate Map (FIRM) Map number 04013C1320L* (refer to Appendix A, *Figure 7 – FEMA FIRM Map*). The current FEMA floodplain is commonly referred to as the Reata Wash floodplain.
3. On-site storm water storage of the first flush storm event occurs in on-site surface retention basins.
4. All storm water runoff not retained will ultimately outfall along the Site's southern property boundary.
5. Finished floor elevations have been designed to be two feet above the highest adjacent grade, and to be free from inundation during a 100-year, 2-hour storm event.
6. Ongoing maintenance is required for all drainage systems in order to assure design performance. Maintenance is the responsibility of the private parties involved.

7.0 REFERENCES

1. *Drainage Design Manual for Maricopa County, Arizona; Volume I-Hydrology*, Flood Control District of Maricopa County, August 15, 2013.
2. *Drainage Design Manual for Maricopa County, Arizona; Volume II- Hydraulics*, Flood Control District of Maricopa County, August 15, 2013.
3. *Flood Insurance Rate Map, Maricopa County, Arizona, and Incorporated Areas Panel 1320*, Federal Emergency Management Agency, Effective October 16, 2013.
4. *Design Standards & Policies Manual, Chapter 4: Grading and Drainage*, City of Scottsdale, January 2018.

APPENDIX A – HYDROLOGY

IDF Data from FCDMC NOAA Atlas 14 Precipitation Data



NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.6519°, Longitude: -111.9038°
Elevation: 1596.05 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) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.197 (0.164-0.242)	0.258 (0.216-0.316)	0.348 (0.288-0.425)	0.417 (0.343-0.508)	0.510 (0.413-0.618)	0.580 (0.465-0.699)	0.653 (0.514-0.785)	0.726 (0.562-0.871)	0.824 (0.621-0.991)	0.899 (0.664-1.08)
10-min	0.300 (0.250-0.368)	0.393 (0.328-0.481)	0.529 (0.438-0.647)	0.634 (0.522-0.772)	0.776 (0.629-0.941)	0.884 (0.707-1.06)	0.994 (0.782-1.20)	1.11 (0.855-1.33)	1.25 (0.946-1.51)	1.37 (1.01-1.65)
15-min	0.372 (0.309-0.457)	0.487 (0.407-0.597)	0.656 (0.543-0.802)	0.786 (0.648-0.958)	0.962 (0.779-1.17)	1.10 (0.877-1.32)	1.23 (0.969-1.48)	1.37 (1.06-1.64)	1.56 (1.17-1.87)	1.70 (1.25-2.04)
30-min	0.501 (0.416-0.615)	0.655 (0.547-0.803)	0.883 (0.731-1.08)	1.06 (0.872-1.29)	1.30 (1.05-1.57)	1.48 (1.18-1.78)	1.66 (1.31-2.00)	1.84 (1.43-2.21)	2.09 (1.58-2.52)	2.28 (1.69-2.75)
60-min	0.620 (0.515-0.761)	0.811 (0.677-0.994)	1.09 (0.905-1.34)	1.31 (1.08-1.60)	1.60 (1.30-1.94)	1.83 (1.46-2.20)	2.05 (1.62-2.47)	2.28 (1.77-2.74)	2.59 (1.95-3.12)	2.83 (2.09-3.40)
2-hr	0.724 (0.609-0.868)	0.936 (0.791-1.13)	1.25 (1.05-1.49)	1.48 (1.23-1.77)	1.81 (1.49-2.15)	2.05 (1.66-2.43)	2.31 (1.84-2.72)	2.56 (2.01-3.02)	2.90 (2.22-3.42)	3.16 (2.37-3.75)
3-hr	0.798 (0.672-0.978)	1.02 (0.865-1.26)	1.34 (1.12-1.63)	1.59 (1.32-1.93)	1.93 (1.58-2.33)	2.21 (1.78-2.65)	2.49 (1.98-2.99)	2.80 (2.18-3.34)	3.20 (2.42-3.84)	3.54 (2.61-4.23)
6-hr	0.961 (0.826-1.14)	1.21 (1.04-1.44)	1.55 (1.32-1.83)	1.82 (1.54-2.14)	2.18 (1.82-2.55)	2.46 (2.03-2.88)	2.76 (2.24-3.21)	3.06 (2.44-3.57)	3.46 (2.69-4.04)	3.79 (2.87-4.42)
12-hr	1.09 (0.939-1.28)	1.37 (1.18-1.61)	1.73 (1.49-2.03)	2.01 (1.72-2.35)	2.39 (2.02-2.79)	2.68 (2.24-3.12)	2.99 (2.45-3.47)	3.29 (2.67-3.82)	3.70 (2.92-4.31)	4.01 (3.11-4.70)
24-hr	1.28 (1.12-1.48)	1.62 (1.42-1.88)	2.09 (1.83-2.42)	2.47 (2.15-2.86)	3.00 (2.59-3.46)	3.42 (2.92-3.93)	3.85 (3.26-4.44)	4.31 (3.61-4.96)	4.94 (4.06-5.71)	5.45 (4.42-6.32)
2-day	1.39 (1.21-1.60)	1.77 (1.54-2.04)	2.32 (2.01-2.67)	2.76 (2.38-3.17)	3.37 (2.89-3.87)	3.85 (3.27-4.43)	4.37 (3.68-5.03)	4.90 (4.09-5.67)	5.65 (4.63-6.56)	6.25 (5.05-7.29)
3-day	1.49 (1.31-1.71)	1.91 (1.67-2.19)	2.51 (2.20-2.88)	3.01 (2.62-3.43)	3.70 (3.20-4.22)	4.26 (3.65-4.86)	4.85 (4.13-5.56)	5.48 (4.61-6.30)	6.37 (5.28-7.34)	7.09 (5.80-8.21)
4-day	1.60 (1.41-1.82)	2.04 (1.80-2.33)	2.71 (2.39-3.09)	3.25 (2.85-3.70)	4.03 (3.51-4.58)	4.66 (4.03-5.30)	5.34 (4.58-6.08)	6.06 (5.14-6.93)	7.09 (5.92-8.13)	7.93 (6.55-9.14)
7-day	1.81 (1.58-2.07)	2.31 (2.03-2.65)	3.07 (2.69-3.51)	3.69 (3.22-4.22)	4.58 (3.97-5.22)	5.30 (4.56-6.05)	6.07 (5.18-6.94)	6.90 (5.83-7.93)	8.08 (6.72-9.31)	9.05 (7.43-10.5)
10-day	1.96 (1.73-2.25)	2.52 (2.22-2.88)	3.34 (2.93-3.81)	4.01 (3.50-4.56)	4.95 (4.30-5.62)	5.71 (4.93-6.49)	6.53 (5.58-7.44)	7.40 (6.27-8.45)	8.63 (7.20-9.90)	9.63 (7.94-11.1)
20-day	2.44 (2.15-2.78)	3.15 (2.77-3.57)	4.16 (3.66-4.72)	4.94 (4.33-5.60)	6.00 (5.24-6.80)	6.82 (5.93-7.74)	7.67 (6.62-8.72)	8.54 (7.32-9.74)	9.73 (8.25-11.2)	10.7 (8.95-12.3)
30-day	2.87 (2.52-3.26)	3.69 (3.26-4.20)	4.89 (4.30-5.53)	5.80 (5.09-6.55)	7.03 (6.14-7.95)	7.99 (6.94-9.03)	8.97 (7.75-10.2)	9.98 (8.57-11.3)	11.4 (9.64-12.9)	12.4 (10.5-14.2)
45-day	3.35 (2.97-3.80)	4.33 (3.84-4.90)	5.73 (5.06-6.47)	6.77 (5.97-7.66)	8.17 (7.16-9.23)	9.23 (8.06-10.5)	10.3 (8.95-11.7)	11.4 (9.85-13.0)	12.9 (11.0-14.8)	14.1 (11.9-16.2)
60-day	3.74 (3.32-4.22)	4.84 (4.29-5.45)	6.38 (5.65-7.19)	7.51 (6.63-8.46)	9.00 (7.92-10.1)	10.1 (8.86-11.4)	11.3 (9.80-12.7)	12.4 (10.7-14.0)	13.9 (11.9-15.8)	15.0 (12.8-17.2)

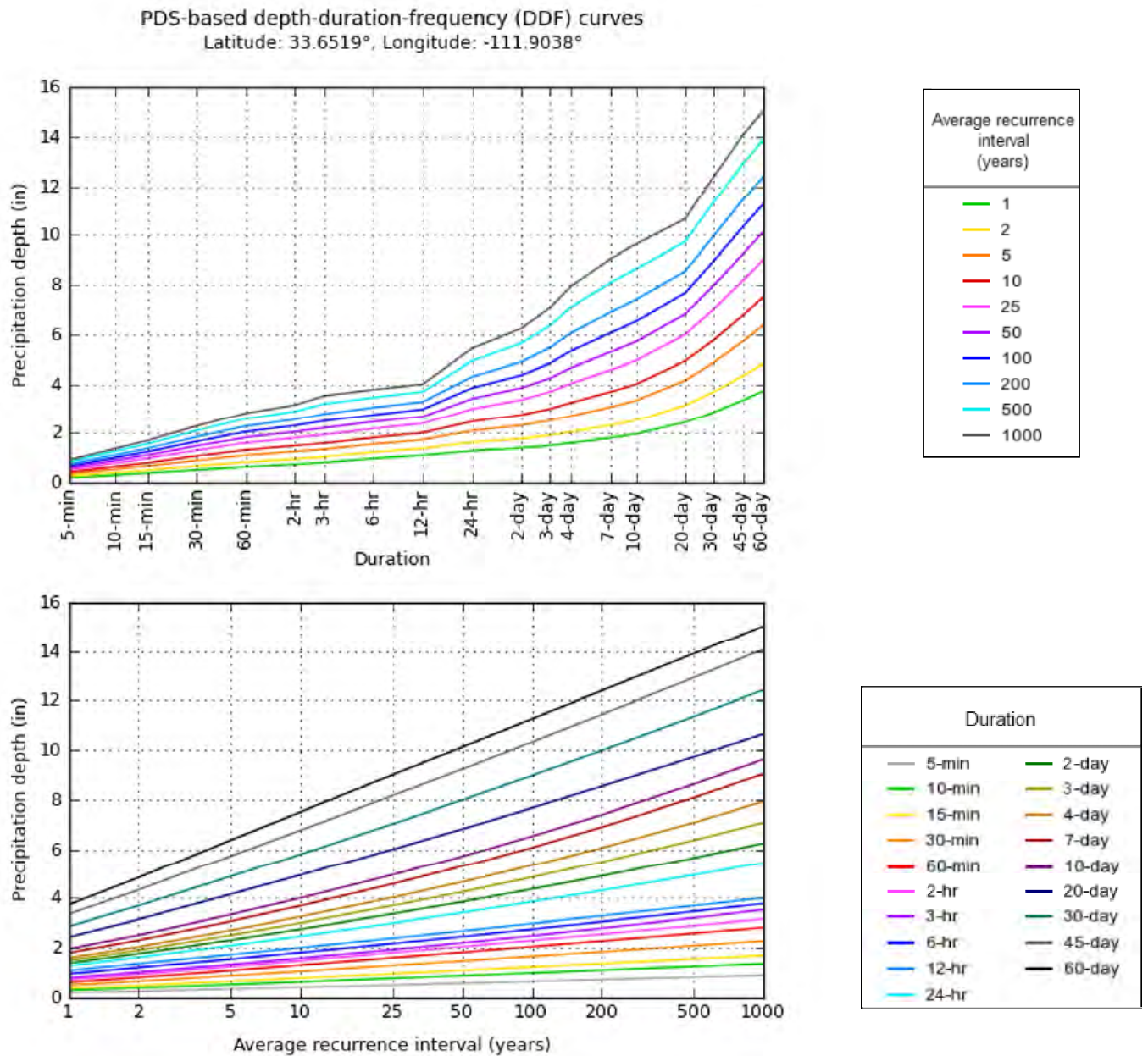
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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



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Maps & aerals

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Table 1 – Rational Method Summary



RATIONAL METHOD SUMMARY
100 YEAR, 10 YEAR, 2 YEAR

Project Axon
Location Scottsdale AZ
Project Number 205133
Project Engineer Aaron Fabian, EIT

ON-SITE WATERSHEDS										100 YEAR				10 YEAR				2 YEAR			
Drainage Subbasin ID	Longest Watercourse 'L' (ft)	Longest Watercourse 'L' (mi)	Drainage Area 'A' (sf)	Drainage Area 'A' (Acres)	'K _b ' Type ¹	Watershed Resistance Coefficient 'K _b '	Top Elevation	Bottom Elevation	Basin Slope 'S' (ft/mi)	Calculated Q100 'Tc' (See Note 2) (min)	100 YEAR Intensity 'i' (in/hr)	100 YR Runoff Coefficient 'C'	Q100 Flow (cfs)	Calculated Q10 'Tc' (See Note 2) (min)	10 YEAR Intensity 'i' (in/hr)	10 YR Runoff Coefficient 'C'	Q10 Flow (cfs)	Calculated Q2 'Tc' (See Note 2) (min)	2 YEAR Intensity 'i' (in/hr)	2 YR Runoff Coefficient 'C'	Q2 Flow (cfs)
A1	240	0.045	173,630	3.99	A	0.0362	1605.5	1599.3	136.4	2.6	7.84	0.90	28.1	3.1	5.00	0.78	15.6	3.7	3.10	0.72	8.9
A2	210	0.040	77,940	1.79	A	0.0384	1604.0	1600.5	88.0	2.9	7.84	0.90	12.6	3.4	5.00	0.78	7.0	4.1	3.10	0.72	4.0
A3	110	0.021	7,450	0.17	A	0.0448	1607.5	1600.0	360.0	1.4	7.84	0.90	1.2	1.7	5.00	0.78	0.7	2.1	3.10	0.72	0.4
A4	150	0.028	7,450	0.17	A	0.0448	1607.5	1600.0	264.0	1.9	7.84	0.90	1.2	2.2	5.00	0.78	0.7	2.6	3.10	0.72	0.4
B1	500	0.095	226,020	5.19	A	0.0355	1607.5	1592.0	163.7	3.5	7.84	0.90	36.6	4.1	5.00	0.78	20.3	5.0	3.10	0.72	11.6
B2	300	0.057	49,130	1.13	A	0.0397	1606.0	1599.0	123.2	3.1	7.84	0.90	8.0	3.7	5.00	0.78	4.4	4.5	3.10	0.72	2.5
B3	200	0.038	29,580	0.68	A	0.0411	1605.0	1598.5	171.6	2.3	7.84	0.90	4.8	2.8	5.00	0.78	2.7	3.3	3.10	0.72	1.5
B4	50	0.009	124,650	2.86	A	0.0371	1606.9	1592.5	1520.6	0.6	7.84	0.90	20.2	0.7	5.00	0.78	11.2	0.8	3.10	0.72	6.4
B5	50	0.009	22,900	0.53	A	0.0417	1607.5	1594.0	1425.6	0.6	7.84	0.90	3.7	0.7	5.00	0.78	2.1	0.9	3.10	0.72	1.2
B6	100	0.019	86,750	1.99	A	0.0381	1607.5	1604.1	179.5	1.6	7.84	0.90	14.1	1.9	5.00	0.78	7.8	2.2	3.10	0.72	4.4
B7	250	0.047	230,110	5.28	A	0.0355	1606.5	1593.0	285.1	2.1	7.84	0.90	37.3	2.5	5.00	0.78	20.7	3.0	3.10	0.72	11.8
B8	350	0.066	84,820	1.95	A	0.0382	1605.8	1591.0	223.3	2.8	7.84	0.90	13.7	3.3	5.00	0.78	7.6	3.9	3.10	0.72	4.3
B9	50	0.009	16,500	0.38	A	0.0426	1597.1	1593.0	433.0	0.9	7.84	0.90	2.7	1.1	5.00	0.78	1.5	1.3	3.10	0.72	0.8
B10	650	0.123	267,300	6.14	A	0.0351	1607.5	1587.0	166.5	3.9	7.84	0.90	43.3	4.7	5.00	0.78	24.0	5.7	2.99	0.72	13.2
B11	450	0.085	138,900	3.19	A	0.0369	1600.0	1583.0	199.5	3.2	7.84	0.90	22.5	3.8	5.00	0.78	12.5	4.5	3.10	0.72	7.1
B12	20	0.004	15,700	0.36	A	0.0428	1592.7	1590.3	633.6	0.5	7.84	0.90	2.5	0.6	5.00	0.78	1.4	0.7	3.10	0.72	0.8
B13	20	0.004	14,500	0.33	A	0.0430	1592.7	1590.0	712.8	0.5	7.84	0.90	2.3	0.6	5.00	0.78	1.3	0.7	3.10	0.72	0.7
B14	40	0.008	20,500	0.47	A	0.0420	1592.7	1590.0	356.4	0.8	7.84	0.90	3.3	1.0	5.00	0.78	1.8	1.2	3.10	0.72	1.1
B15	150	0.028	43,100	0.99	A	0.0400	1592.7	1584.5	288.6	1.7	7.84	0.90	7.0	2.0	5.00	0.78	3.9	2.4	3.10	0.72	2.2
B16	150	0.028	59,000	1.35	A	0.0392	1592.7	1584.5	288.6	1.7	7.84	0.90	9.6	2.0	5.00	0.78	5.3	2.4	3.10	0.72	3.0
B17	200	0.038	64,500	1.48	A	0.0389	1603.0	1594.0	237.6	2.1	7.84	0.90	10.4	2.4	5.00	0.78	5.8	3.0	2.96	0.72	3.2
C1	120	0.023	28,340	0.65	A	0.0412	1607.0	1604.1	127.6	2.0	7.84	0.90	4.6	2.4	5.00	0.78	2.5	2.8	3.10	0.72	1.5
C2	150	0.028	20,910	0.48	A	0.0420	1607.0	1604.1	102.1	2.4	7.84	0.90	3.4	2.9	5.00	0.78	1.9	3.4	3.10	0.72	1.1
C3	150	0.028	23,130	0.53	A	0.0417	1607.0	1604.1	102.1	2.4	7.84	0.90	3.7	2.9	5.00	0.78	2.1	3.4	3.10	0.72	1.2
C4	160	0.030	14,340	0.33	A	0.0430	1607.0	1604.1	95.7	2.6	7.84	0.90	2.3	3.1	5.00	0.78	1.3	3.7	3.10	0.72	0.7
D1	410	0.078	8,980	0.21	A	0.0443	1592.0	1587.4	59.2	4.9	7.84	0.90	1.5	5.8	5.00	0.78	0.8	6.9	3.10	0.72	0.5
D2	410	0.078	7,721	0.18	A	0.0447	1596.3	1591.8	58.0	4.9	7.84	0.90	1.3	5.8	5.00	0.78	0.7	7.0	3.10	0.72	0.4



RATIONAL METHOD SUMMARY
100 YEAR, 10 YEAR, 2 YEAR

Project Axon
Location Scottsdale AZ
Project Number 205133
Project Engineer Aaron Fabian, EIT

OFF-SITE WATERSHEDS										100 YEAR				10 YEAR				2 YEAR			
Drainage Subbasin ID	Longest Watercourse 'L' (ft)	Longest Watercourse 'L' (mi)	Drainage Area 'A' (sf)	Drainage Area 'A' (Acres)	'K _b ' Type ¹	Watershed Resistance Coefficient 'K _b '	Top Elevation	Bottom Elevation	Basin Slope 'S' (ft/mi)	Calculated Q100 'Tc' (See Note 2) (min)	100 YEAR Intensity 'i' (in/hr)	100 YR Runoff Coefficient 'C'	Q100 Flow (cfs)	Calculated Q10 'Tc' (See Note 2) (min)	10 YEAR Intensity 'i' (in/hr)	10 YR Runoff Coefficient 'C'	Q10 Flow (cfs)	Calculated Q2 'Tc' (See Note 2) (min)	2 YEAR Intensity 'i' (in/hr)	2 YR Runoff Coefficient 'C'	Q2 Flow (cfs)
A1	43	0.008	10,460	0.24	A	0.0439	1606.0	1604.0	245.6	1.0	7.81	0.50	0.9	1.2	4.98	0.43	0.5	1.6	2.35	0.40	0.2
CPA	43	0.008	10,460	0.24	A	0.0439	1606.0	1604.0	245.6	1.0	7.81	0.50	0.9	1.2	4.98	0.43	0.5	1.6	2.35	0.40	0.2
B1	740	0.140	57,020	1.31	A	0.0393	1612.0	1607.0	35.7	7.6	6.84	0.64	5.7	9.3	3.95	0.55	2.9	13.1	1.60	0.51	1.1
B2	663	0.126	44,510	1.02	A	0.0399	1632.0	1629.0	23.9	8.3	6.58	0.95	6.4	10.3	3.75	0.83	3.2	14.5	1.52	0.76	1.2
B3	163	0.031	13,336	0.31	A	0.0432	1610.0	1602.0	259.1	1.9	7.81	0.50	1.2	2.3	4.98	0.43	0.7	3.0	2.35	0.40	0.3
CPB3	1,225	0.232	114,865	2.64	A	0.0374	1612.0	1602.0	43.1	9.3	6.20	0.74	12.1	11.4	3.60	0.64	6.1	16.1	1.45	0.59	2.3
B4	926	0.175	261,250	6.00	A	0.0351	1602.0	1591.0	62.7	6.6	7.21	0.50	21.6	8.0	4.26	0.43	11.1	11.4	1.71	0.40	4.1
CPB	2,151	0.407	386,576	8.87	A	0.0341	1612.0	1591.0	51.5	11.5	5.63	0.57	28.6	14.2	3.23	0.50	14.3	19.9	1.33	0.46	5.4
C1	190	0.036	16,366	0.38	A	0.0427	1612.0	1607.0	138.9	2.5	7.81	0.64	1.9	3.0	4.98	0.55	1.0	3.9	2.35	0.51	0.4
C2	744	0.141	49,541	1.14	A	0.0397	1632.0	1628.0	28.4	8.3	6.58	0.95	7.1	10.3	3.75	0.83	3.5	14.5	1.52	0.76	1.3
C3	350	0.066	21,281	0.49	A	0.0419	1615.0	1604.0	165.9	3.2	7.81	0.50	1.9	3.8	4.98	0.43	1.1	5.0	2.35	0.40	0.5
CBC3	649	0.123	87,188	2.00	A	0.0381	1612.0	1604.0	65.1	5.6	7.59	0.78	11.9	6.8	4.55	0.68	6.2	9.5	1.85	0.62	2.3
C4	910	0.172	265,305	6.09	A	0.0351	1604.0	1592.0	69.6	6.3	7.33	0.74	33.0	7.6	4.36	0.64	17.1	10.8	1.74	0.59	6.3
CPC	1,559	0.295	352,493	8.09	A	0.0343	1612.0	1592.0	67.7	8.6	6.46	0.75	39.2	10.6	3.71	0.65	19.6	15.0	1.48	0.60	7.2
D1	445	0.084	30,576	0.70	A	0.0410	1629.0	1622.0	83.1	4.4	7.81	0.95	5.2	5.2	4.93	0.83	2.9	7.2	2.11	0.76	1.1
D2	347	0.066	21,795	0.50	A	0.0419	1627.0	1622.0	76.1	4.0	7.81	0.95	3.7	4.8	4.98	0.83	2.1	6.6	2.17	0.76	0.8
D3	178	0.034	9,946	0.23	A	0.0440	1614.0	1605.0	267.0	2.0	7.81	0.50	0.9	2.4	4.98	0.43	0.5	3.2	2.35	0.40	0.2
CBD3	723	0.137	62,317	1.43	A	0.0390	1629.0	1605.0	175.3	4.3	7.81	0.88	9.8	5.2	4.93	0.76	5.4	7.1	2.12	0.70	2.1
D4	818	0.155	185,939	4.27	A	0.0361	1605.0	1593.0	77.5	5.8	7.51	0.77	24.7	7.0	4.50	0.67	12.9	10.0	1.79	0.62	4.7
CPD	1,541	0.292	248,257	5.70	A	0.0353	1629.0	1593.0	123.3	6.9	7.10	0.80	32.3	8.5	4.14	0.69	16.4	12.0	1.67	0.64	6.1
E1	455	0.086	70,201	1.61	A	0.0387	1614.0	1607.0	81.2	4.3	7.81	0.59	7.4	5.2	4.93	0.51	4.1	7.1	2.12	0.47	1.6
E2	196	0.037	12,570	0.29	A	0.0434	1616.0	1615.0	26.9	4.3	7.81	0.95	2.1	5.1	4.96	0.83	1.2	7.0	2.13	0.76	0.5
E3	422	0.080	30,729	0.71	A	0.0409	1622.0	1615.0	87.6	4.2	7.81	0.95	5.2	5.0	4.98	0.83	2.9	6.9	2.14	0.76	1.1
E4	310	0.059	17,906	0.41	A	0.0424	1621.0	1617.0	68.1	4.0	7.81	0.95	3.0	4.7	4.98	0.83	1.7	6.4	2.20	0.76	0.7
E5	280	0.053	33,512	0.77	A	0.0407	1615.0	1613.0	37.7	4.4	7.81	0.50	3.0	5.3	4.91	0.43	1.6	7.3	2.10	0.40	0.6
CPE	800	0.152	164,917	3.79	A	0.0364	1614.0	1613.0	6.6	14.3	5.06	0.71	13.5	17.5	2.96	0.61	6.9	24.9	1.17	0.56	2.5
F1	427	0.081	42,435	0.97	A	0.0401	1615.0	1614.0	12.4	8.2	6.61	0.95	6.1	10.1	3.77	0.83	3.0	14.2	1.53	0.76	1.1
F2	209	0.040	14,340	0.33	A	0.0430	1614.0	1606.0	202.1	2.3	7.81	0.50	1.3	2.8	4.98	0.43	0.7	3.7	2.35	0.40	0.3
CPF2	636	0.120	56,776	1.30	A	0.0393	1615.0	1606.0	74.7	5.3	7.70	0.84	8.4	6.5	4.62	0.73	4.4	9.1	1.89	0.67	1.6
F3	1,358	0.257	620,369	14.24	A	0.0328	1606.0	1586.0	77.8	7.3	6.95	0.77	76.2	9.0	4.02	0.67	38.3	12.6	1.63	0.62	14.3
CPF	2,158	0.409	842,062	19.33	A	0.0320	1614.0	1586.0	68.5	10.0	5.94	0.76	87.5	12.2	3.50	0.66	44.8	17.3	1.41	0.61	16.6
G1	313	0.059	64,559	1.48	A	0.0389	1617.0	1614.0	50.6	4.2	7.81	0.95	11.0	5.0	4.98	0.83	6.1	6.8	2.15	0.76	2.4
G2	380	0.072	41,932	0.96	A	0.0401	1617.0	1613.0	55.6	4.5	7.81	0.95	7.1	5.4	4.88	0.83	3.9	7.5	2.07	0.76	1.5
G3	552	0.105	49,310	1.13	A	0.0397	1613.0	1606.0	67.0	5.2	7.74	0.50	4.4	6.2	4.69	0.43	2.3	8.7	1.94	0.40	0.9
CPG	863	0.163	155,801	3.58	A	0.0365	1617.0	1606.0	67.3	6.3	7.33	0.81	21.2	7.7	4.34	0.70	10.9	10.9	1.74	0.65	4.0
H1	752	0.142	98,232	2.26	A	0.0378	1612.0	1607.0	35.1	7.5	6.88	0.59	9.2	9.3	3.95	0.51	4.6	13.0	1.61	0.47	1.7
H2	454	0.086	40,017	0.92	A	0.0402	1615.0	1612.0	34.9	5.8	7.51	0.95	6.6	7.1	4.48	0.83	3.4	10.1	1.79	0.76	1.2
H3	224	0.042	14,122	0.32	A	0.0431	1615.0	1612.0	70.7	3.4	7.81	0.95	2.4	4.0	4.98	0.83	1.3	5.3	2.32	0.76	0.6
H4	241	0.046	46,176	1.06	A	0.0398	1613.0	1605.0	175.3	2.5	7.81	0.50	4.1	3.0	4.98	0.43	2.3	4.0	2.35	0.40	1.0
CPH	1,052	0.199	198,547	4.56	A	0.0359	1612.0	1605.0	35.1	8.9	6.35	0.67	19.3	11.0	3.65	0.58	9.7	15.5	1.47	0.53	3.6
I1	130	0.025	21,856	0.50	A	0.0419	1611.0	1607.0	162.5	1.9	7.81	0.59	2.3	2.3	4.98	0.51	1.3	3.1	2.35	0.47	0.6
I2	261	0.049	20,267	0.47	A	0.0421	1614.0	1612.0	40.5	4.3	7.81	0.95	3.5	5.1	4.96	0.83	1.9	7.0	2.13	0.76	0.8
I3	251	0.048	40,138	0.92	A	0.0402	1615.0	1613.0	42.1	4.0	7.81	0.95	6.8	4.8	4.98	0.83	3.8	6.6	2.17	0.76	1.5
I4	322	0.061	44,310	1.02	A	0.0400	1612.0	1605.0	114.8	3.3	7.81	0.50	4.0	4.0	4.98	0.43	2.2	5.3	2.32	0.40	0.9
CPI	454	0.086	126,571	2.91	A	0.0371	1611.0	1605.0	69.8	4.4	7.81	0.73	16.6	5.3	4.91	0.64	9.1	7.3	2.10	0.58	3.6
J1	352	0.067	61,379	1.41	A	0.0391	1611.0	1609.0	30.0	5.2	7.74	0.55	5.9	6.4	4.65	0.47	3.1	8.9	1.92	0.44	1.2
J2	328	0.062	26,958	0.62	A	0.0413	1616.0	1613.0	48.3	4.5	7.81	0.95	4.6	5.4	4.88	0.83	2.5	7.4	2.08	0.76	1.0
J3	366	0.069	25,575	0.59	A	0.0414	1615.0	1613.0	28.9	5.6	7.59	0.95	4.2	6.8	4.55	0.83	2.2	9.6	1.84	0.76	0.8
J4	268	0.051	29,478	0.68	A	0.0411	1610.0	1604.0	118.2	3.1	7.81	0.50	2.6	3.6	4.98	0.43	1.5	4.8	2.35	0.40	0.6
CPJ	669	0.127	143,390	3.29	A	0.0368	1611.0	1604.0	55.2	5.9	7.48	0.68	16.8	7.1	4.48	0.59	8.8	10.1	1.79	0.55	3.2

Table 2 – Retention Volumes Required

RETENTION BASIN VOLUMES
FIRST FLUSH VOLUME

Project Axon
Location Scottsdale AZ
Project Number 205133
Project Engineer Aaron Fabian, EIT

Rainfall Depth "P" = 0.5 inches

Weighted "C" Factor "C" = 1.0

Drainage Subbasin ID	Drainage Area "A" (Acres)	Runoff Coefficient "C"	A*C	Required Retention (AF)	Required Retention (cf)
B1	5.19	1.00	5.19	0.22	9,418
B2	1.13	1.00	1.13	0.05	2,047
B3	0.68	1.00	0.68	0.03	1,233
B4	2.86	1.00	2.86	0.12	5,194
B5	0.53	1.00	0.53	0.02	954
B6	1.99	1.00	1.99	0.08	3,615
B7	5.28	1.00	5.28	0.22	9,588
B8	1.95	1.00	1.95	0.08	3,534
B9	0.38	1.00	0.38	0.02	688
B10	6.14	1.00	6.14	0.26	11,138
B11	3.19	1.00	3.19	0.13	5,788
B12	0.36	1.00	0.36	0.02	654
B13	0.33	1.00	0.33	0.01	604
B14	0.47	1.00	0.47	0.02	854
B15	0.47	1.00	0.47	0.02	854
B16	0.99	1.00	0.99	0.04	1,796
B17	0.99	1.00	0.99	0.04	1,796
TOTAL	32.92			1.37	59,753

Calculated Values

Required Retention = $V_{required} = (P/12) * C * A$

Table 3 – Retention Volumes Provided

**RETENTION VOLUME PROVIDED
ON-SITE RETENTION**

Project Axon
Location Scottsdale AZ
Project Number 205133
Project Engineer Aaron Fabian, EIT

Volume Method Used **Conic Approximation**

Retention Basin ID	Bottom Elevation	Top Elevation	Bottom Area (sf)	Top Area (sf)	Volume (cf)	Cumulative Volume (cf)	Cumulative Volume (AF)	Total Volume Provided (AF)	Volume Required First Flush Retention (AF)
B1	1,589.0	1,590.0	881	2,418	1,586	1,586	0.04	0.24	0.22
	1,590.0	1,591.0	2,418	4,520	3,415	5,001	0.11		
	1,591.0	1,592.0	4,520	6,877	5,657	10,658	0.24		
B2	1,599.5	1,600.5	2,345	3,662	2,979	2,979	0.07	0.07	0.05
B3	1,598.5	1,599.5	1,684	3,150	2,379	2,379	0.05	0.28	0.02
	1,599.5	1,600.5	3,150	4,975	4,028	6,407	0.15		
	1,600.5	1,601.5	4,975	7,025	5,971	12,378	0.28		
B4	1,602.5	1,603.5	3,429	9,497	6,211	6,211	0.14	0.14	0.12
B5	1,594.0	1,595.0	1,786	3,567	2,626	2,626	0.06	0.06	0.02
B7	1,593.0	1,594.0	13,610	16,876	15,214	15,214	0.35	1.29	0.22
	1,594.0	1,595.0	16,876	20,373	18,597	33,811	0.78		
	1,595.0	1,596.0	20,373	24,085	22,203	56,014	1.29		
B8	1,591.0	1,592.0	1,712	3,215	2,424	2,424	0.06	0.22	0.08
	1,592.0	1,593.0	3,215	5,013	4,081	6,505	0.15		
	1,593.0	1,593.5	5,013	7,025	2,995	9,501	0.22		
B9	1,593.0	1,594.0	861	2,075	1,424	1,424	0.03	0.03	0.02
B10	1,587.0	1,588.0	3,648	7,325	5,381	5,381	0.12	0.34	0.26
	1,588.0	1,589.0	7,325	11,840	9,493	14,873	0.34		
B11-1	1,588.0	1,589.0	695	1,549	1,094	1,094	0.03	0.15	0.15
	1,589.0	1,590.0	1,549	2,648	2,074	3,168	0.07		
	1,590.0	1,591.0	2,648	4,010	3,306	6,473	0.15		
B11-2	1,583.0	1,584.0	564	2,217	1,300	1,300	0.03	0.24	0.07
	1,584.0	1,585.0	2,217	4,532	3,306	4,606	0.11		
	1,585.0	1,586.0	4,532	7,182	5,806	10,412	0.24		
B12	1,590.3	1,590.8	1,802	2,300	1,023	1,023	0.02	0.02	0.02
B13	1,589.0	1,589.5	1,797	2,297	1,021	1,021	0.02	0.02	0.01
B14	1,590.0	1,590.5	1,802	2,300	1,023	1,023	0.02	0.02	0.02
B15	1,584.5	1,585.0	4,115	4,922	2,256	2,256	0.05	0.05	0.02
B16	1,584.5	1,585.0	5,511	6,400	2,975	2,975	0.07	0.07	0.04
B17-1	1,596.5	1,597.5	463	1,730	1,029	1,029	0.02	0.02	0.01
B17-2	1,595.0	1,596.0	491	1,724	1,045	1,045	0.02	0.02	0.01
B17-3	1,594.0	1,595.0	533	1,819	1,112	1,112	0.03	0.03	0.01
Total								3.33	1.37

RETENTION BASIN VOLUMES
100 YEAR, 2-HOUR VOLUME

Project Axon
Location Scottsdale AZ
Project Number 205133
Project Engineer Aaron Fabian, EIT

Rainfall Depth "P" = 2.31 inches

Drainage Subbasin ID	Drainage Area "A" (Acres)	100 YR Runoff Coefficient "C"	A*C	Required Retention (AF)	Provided Retention (AF)
B3	0.68	0.90	0.61	0.12	0.28
B7	5.28	0.90	4.75	0.92	1.29
TOTAL	5.96			1.03	1.57

Calculated Values

Required Retention = $V_{required} = (P/12) * C * A$
Weighted "C" = $((A1 * C1) + (A2 * C2)) / (A1 + A2)$

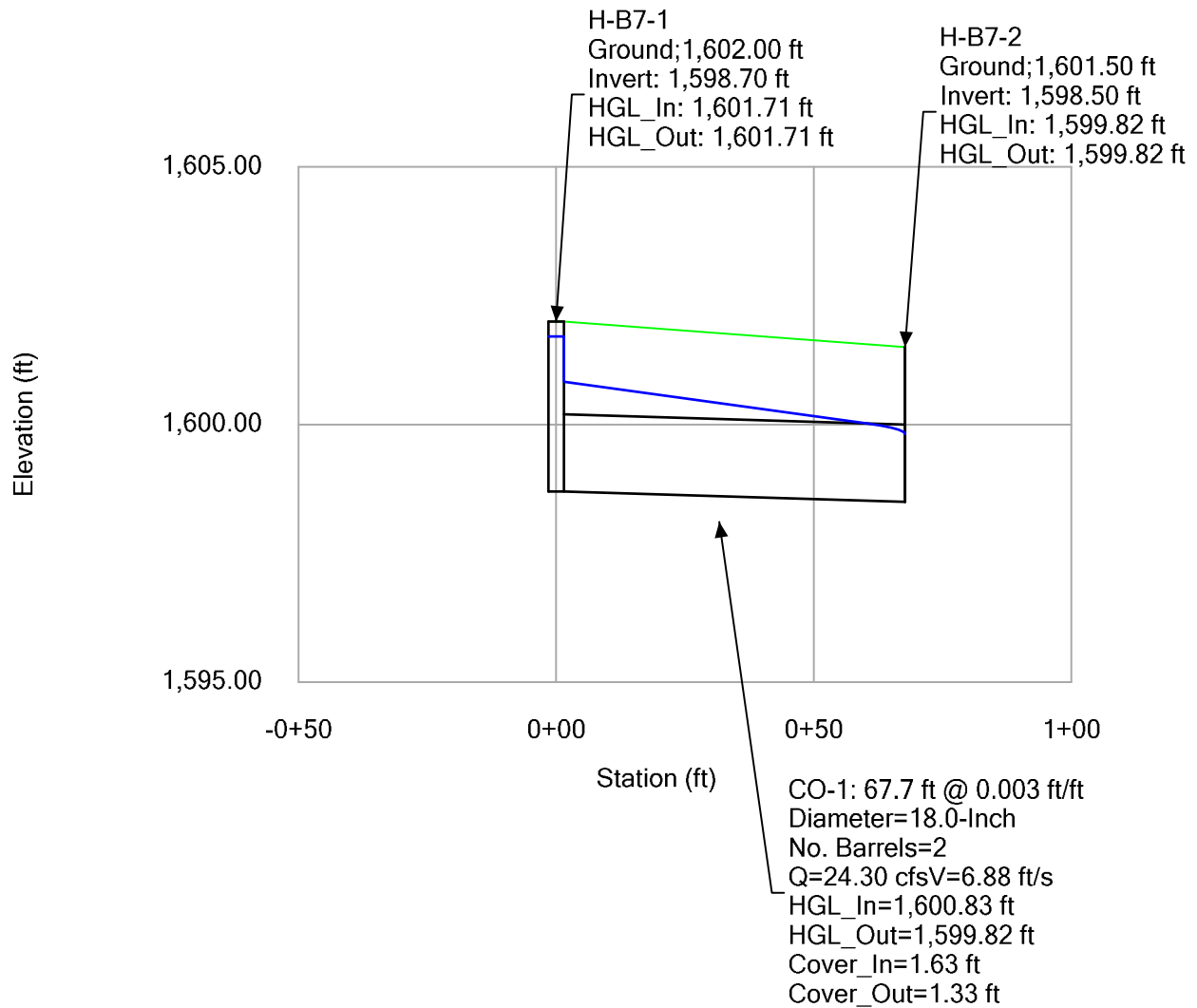
APPENDIX B – HYDRAULICS

Pipe Analysis Summary

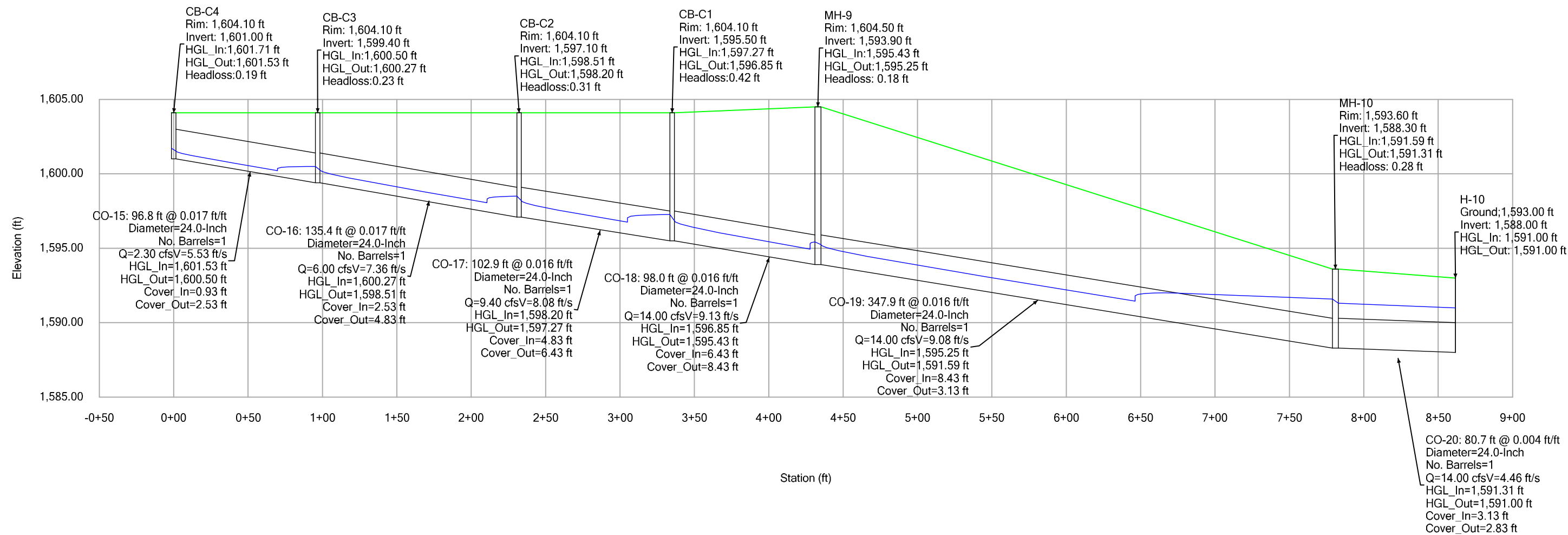
Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Diameter (in)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)
CO-1	H-B7-1	H-B7-2	1,598.70	1,598.50	18.0	67.7	0.003	24.30	6.88	1,600.83	1,599.82	1,602.00	1,601.50
CO-2	CB-B8	MH-1	1,588.00	1,587.80	36.0	50.5	0.004	55.72	7.88	1,592.60	1,592.25	1,597.00	1,598.50
CO-3	MH-1	MH-2	1,587.80	1,586.60	36.0	375.5	0.003	55.72	7.88	1,591.96	1,589.25	1,598.50	1,595.80
CO-4	MH-2	MH-3	1,586.60	1,583.40	42.0	375.0	0.009	55.72	10.09	1,588.94	1,588.09	1,595.80	1,591.80
CO-5	MH-3	JB	1,583.40	1,582.80	48.0	148.3	0.004	55.72	4.43	1,587.81	1,587.59	1,591.80	1,591.00
CO-6	JB	MH-5	1,582.80	1,582.60	60.0	83.3	0.002	213.92	7.28	1,587.02	1,586.91	1,591.00	1,590.20
CO-7	MH-5	MH-6	1,582.60	1,582.20	60.0	198.3	0.002	213.92	6.75	1,586.44	1,586.07	1,590.20	1,589.30
CO-8	MH-6	H-4	1,582.20	1,582.00	60.0	62.2	0.003	213.92	8.20	1,585.32	1,584.95	1,589.30	1,589.00
CO-10	CB-B11-2	MH-7	1,582.85	1,582.83	54.0	20.6	0.001	83.09	5.22	1,588.07	1,588.03	1,590.00	1,590.00
CO-11	MH-7	JB	1,582.83	1,582.80	54.0	31.8	0.001	83.09	5.22	1,587.65	1,587.59	1,590.00	1,591.00
CO-12	CB-D1	H-6	1,583.40	1,583.00	18.0	91.4	0.004	1.50	0.85	1,586.02	1,586.00	1,587.90	1,588.00
CO-13	CB-D2	H-7	1,588.30	1,588.00	18.0	76.7	0.004	1.30	2.89	1,589.01	1,589.00	1,592.30	1,592.00
CO-14	H-8	H-9	1,579.04	1,578.50	60.0	169.3	0.003	463.00	8.49	1,583.10	1,582.06	1,586.00	1,585.80
CO-15	CB-C4	CB-C3	1,601.00	1,599.40	24.0	96.8	0.017	2.30	5.53	1,601.53	1,600.50	1,604.10	1,604.10
CO-16	CB-C3	CB-C2	1,599.40	1,597.10	24.0	135.4	0.017	6.00	7.36	1,600.27	1,598.51	1,604.10	1,604.10
CO-17	CB-C2	CB-C1	1,597.10	1,595.50	24.0	102.9	0.016	9.40	8.08	1,598.20	1,597.27	1,604.10	1,604.10
CO-18	CB-C1	MH-9	1,595.50	1,593.90	24.0	98.0	0.016	14.00	9.13	1,596.85	1,595.43	1,604.10	1,604.50
CO-19	MH-9	MH-10	1,593.90	1,588.30	24.0	347.9	0.016	14.00	9.08	1,595.25	1,591.59	1,604.50	1,593.60
CO-20	MH-10	H-10	1,588.30	1,588.00	24.0	80.7	0.004	14.00	4.46	1,591.31	1,591.00	1,593.60	1,593.00
CO-22	H-A1	CB-A2	1,599.30	1,595.60	30.0	181.6	0.020	39.61	12.81	1,601.42	1,599.00	1,602.80	1,600.50
CO-23	CB-A2	T-1	1,595.60	1,595.00	36.0	32.2	0.019	52.21	13.33	1,598.36	1,598.24	1,600.50	1,599.90
CO-24	T-1	MH-11	1,595.00	1,592.10	36.0	172.4	0.017	53.41	12.88	1,597.37	1,595.63	1,599.90	1,597.10
CO-25	MH-11	MH-12	1,592.10	1,589.20	36.0	146.0	0.020	54.61	13.79	1,594.50	1,593.03	1,597.10	1,593.90
CO-26	MH-12	H-12	1,589.20	1,589.00	36.0	56.1	0.004	54.61	7.73	1,592.38	1,592.00	1,593.90	1,593.00
CO-27	CB-A3	T-1	1,596.00	1,595.75	18.0	79.3	0.003	1.20	0.68	1,598.25	1,598.24	1,600.70	1,599.90
CO-28	CB-A4	MH-11	1,595.00	1,592.85	18.0	118.4	0.018	1.20	4.88	1,595.62	1,595.63	1,605.50	1,597.10
CO-29	H-13	H-14	1,585.10	1,584.70	48.0	117.8	0.003	247.53	7.59	1,588.19	1,587.45	1,591.85	1,591.45
CO-32	CB-B1	JB	1,584.50	1,582.80	42.0	163.7	0.010	75.11	7.81	1,588.50	1,587.59	1,592.00	1,591.00

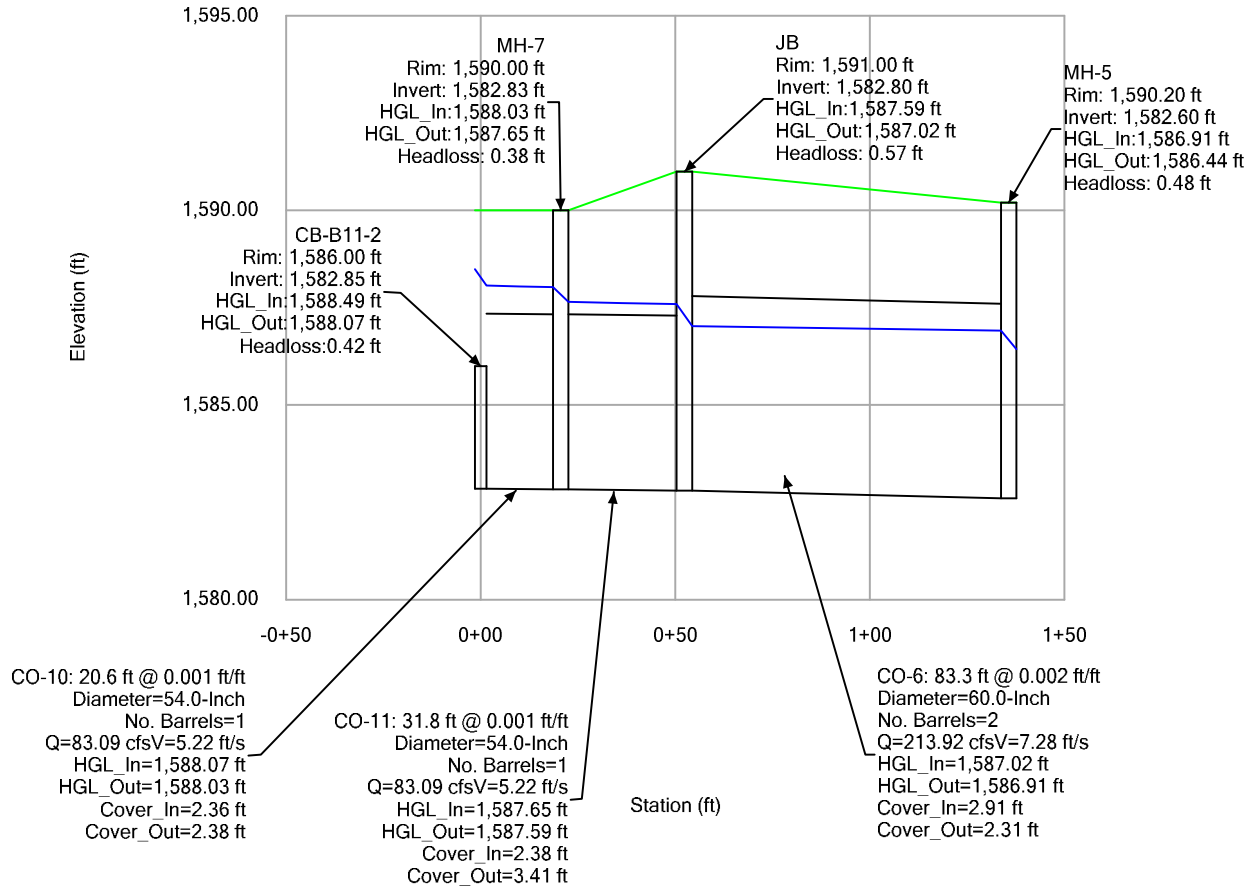
Profile Report **Engineering Profile - H-B7-1 TO H-B7-2 (5133-STORMCAD.stsw)**



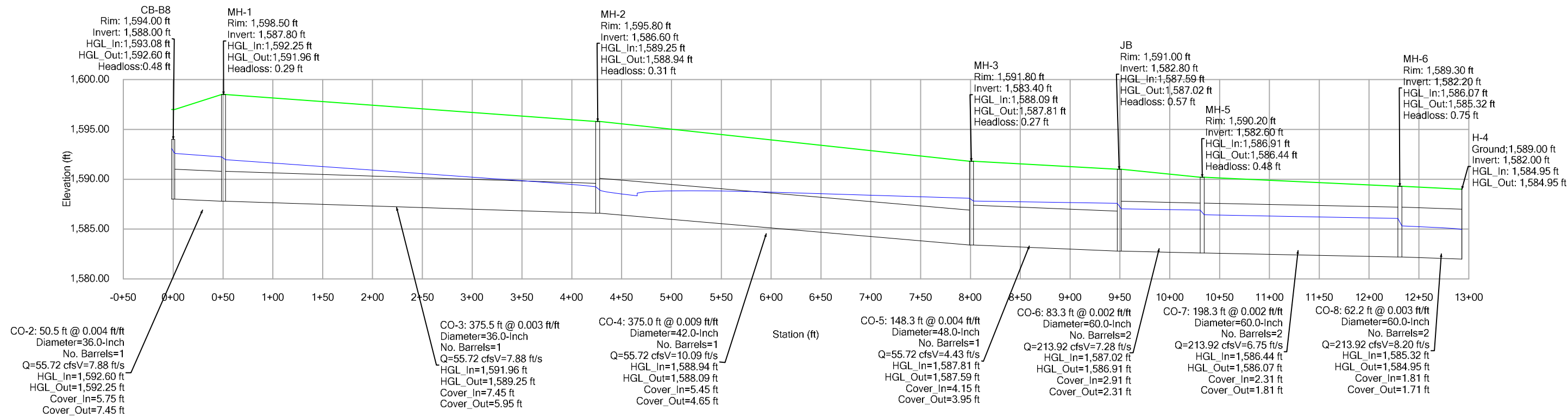
Profile Report
Engineering Profile - CB-C4 TO H-10 (5133-STORMCAD.stsw)



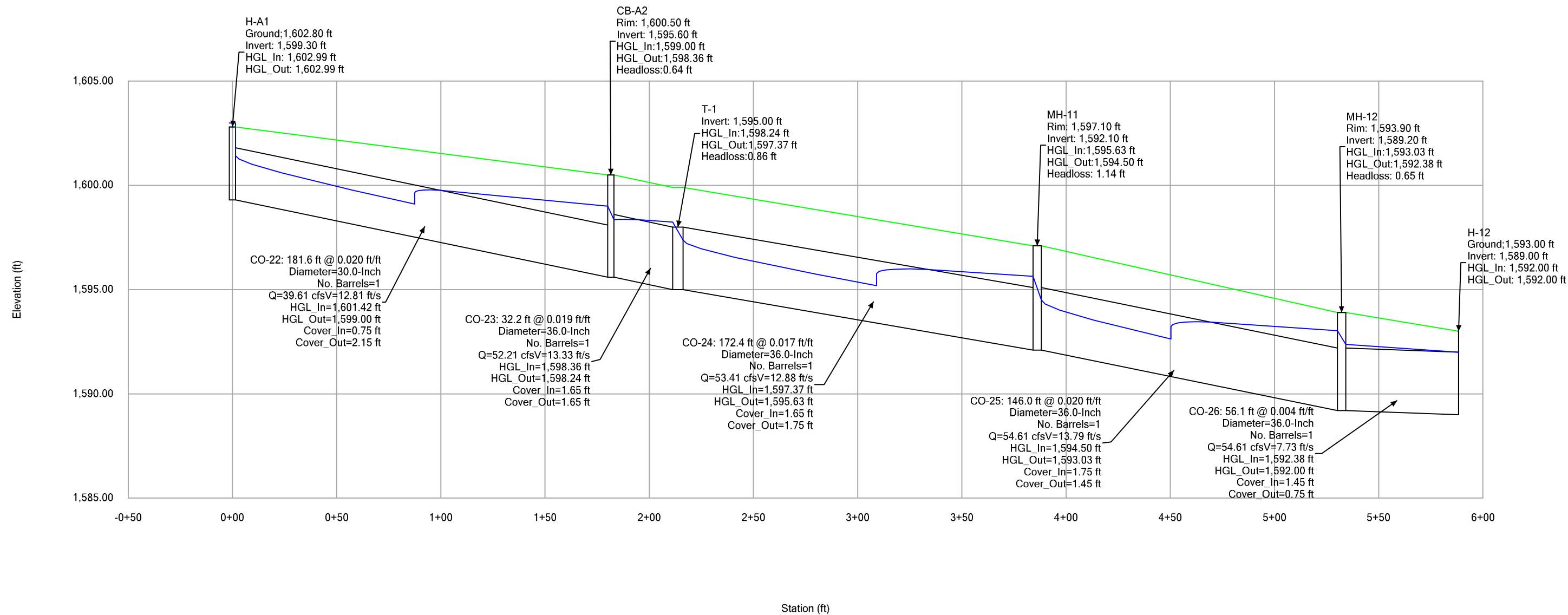
Profile Report **Engineering Profile - CB-B11-2 TO MH-5 (5133-STORMCAD.stsw)**



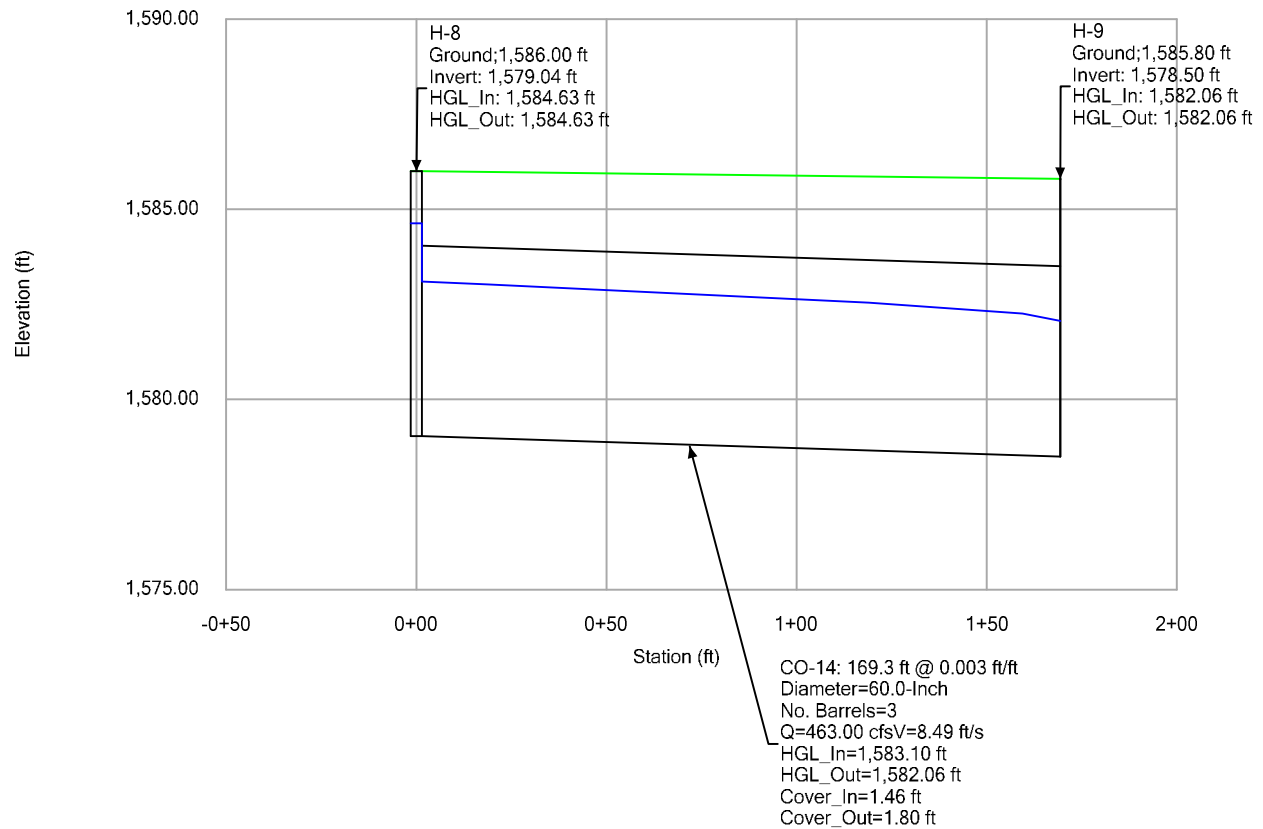
Profile Report
Engineering Profile - CB-B8 TO H-4 (5133-STORMCAD.stsw)



Profile Report
Engineering Profile - H-A1 TO H-12 (5133-STORMCAD.stsw)

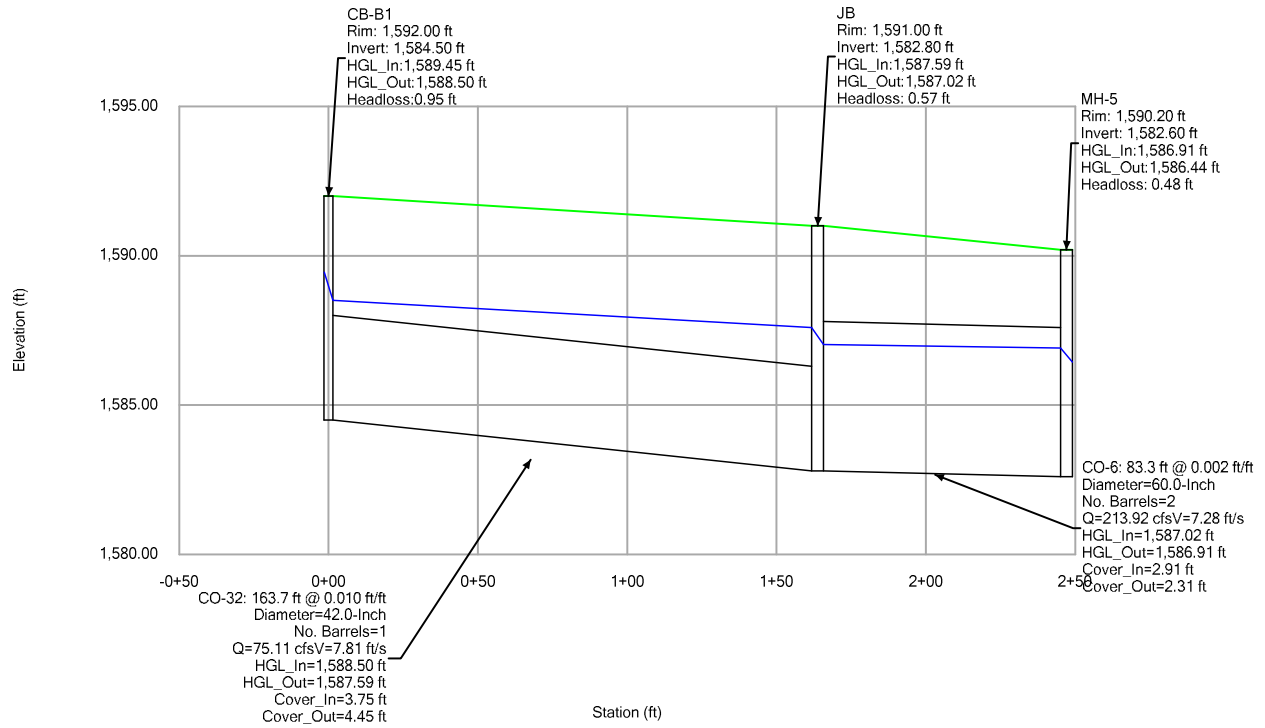


Profile Report **Engineering Profile - H-8 TO H-9 (5133-STORMCAD.stsw)**

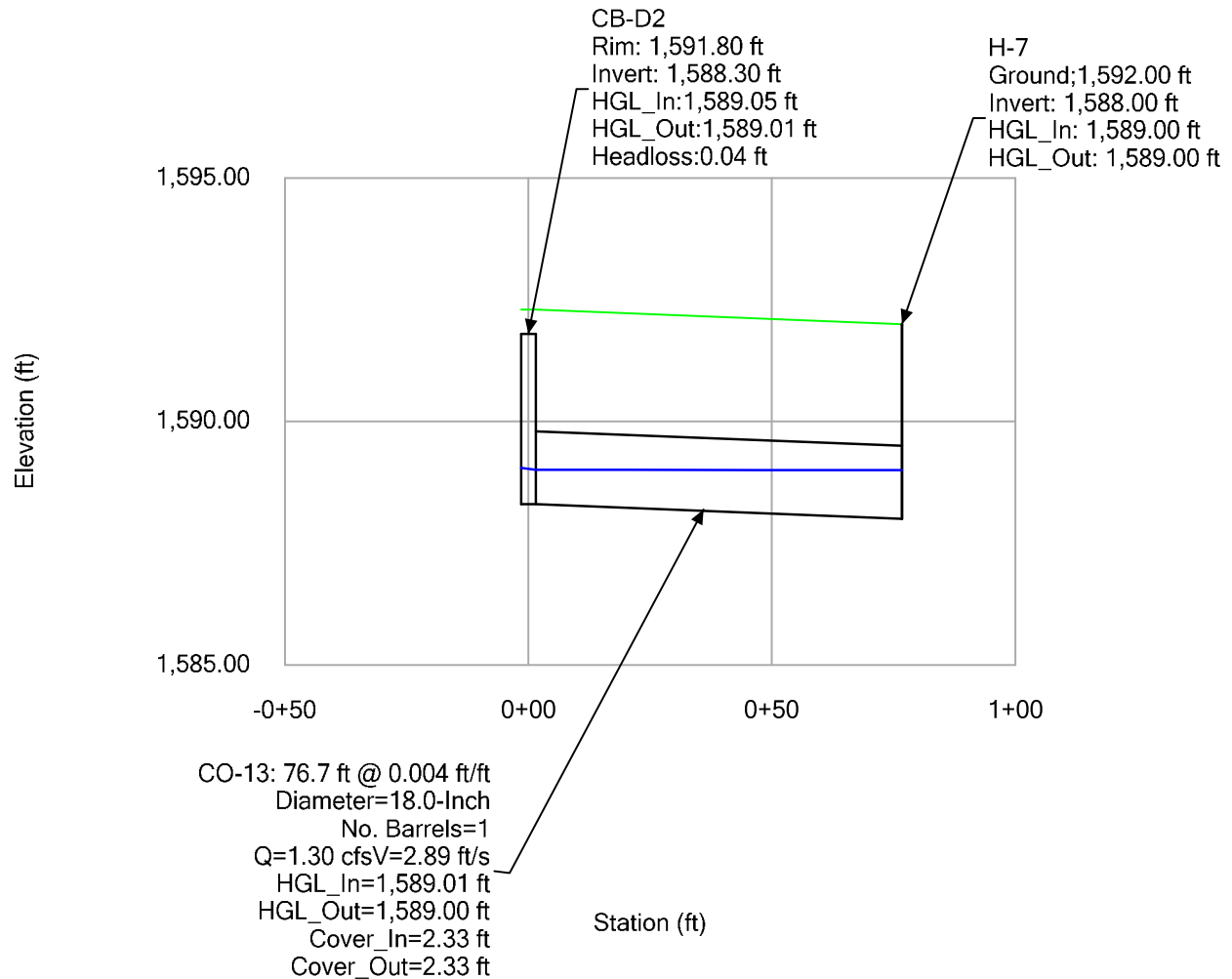


Profile Report

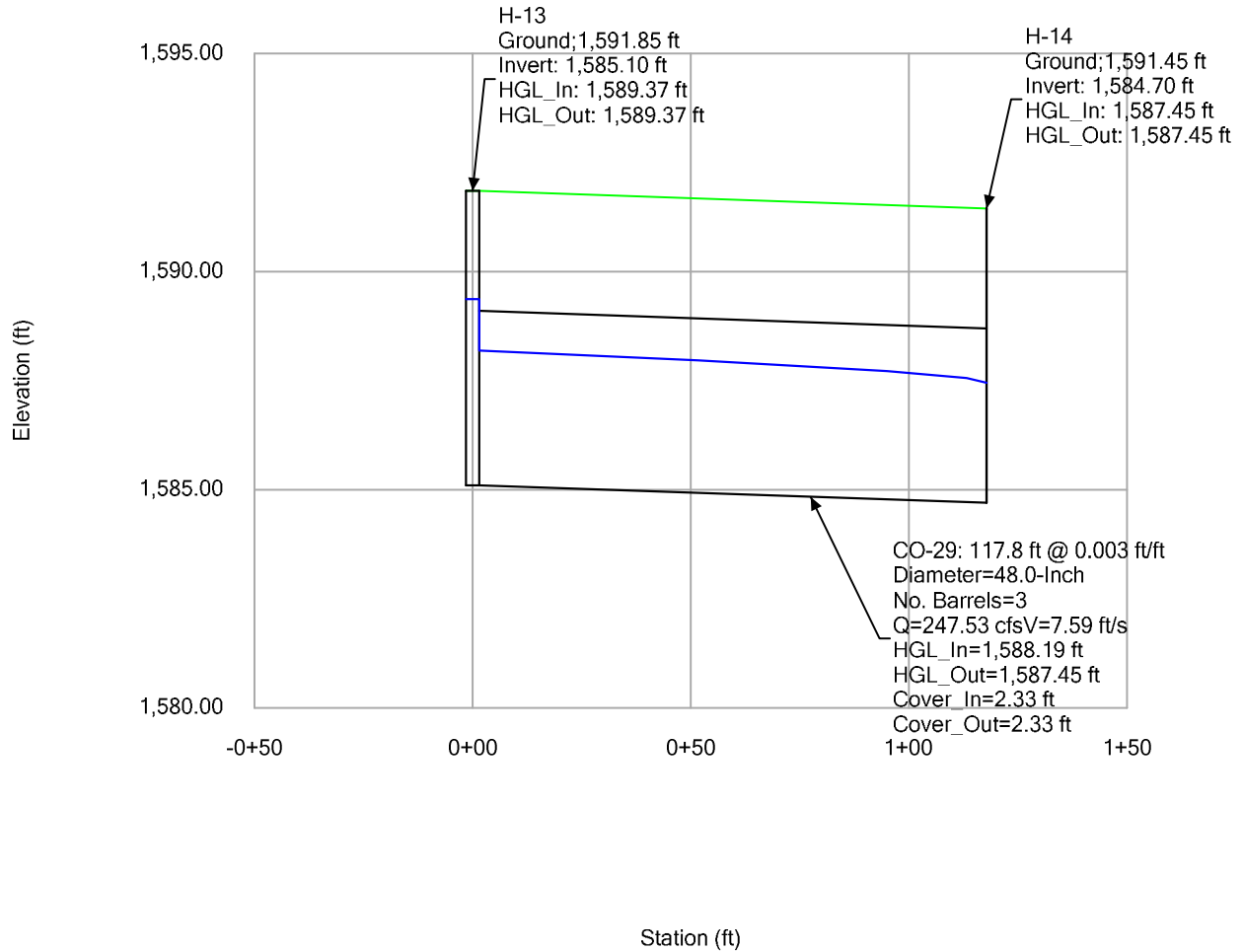
Engineering Profile - CB-B1 TO MH-5 (5133-STORMCAD.stsw)



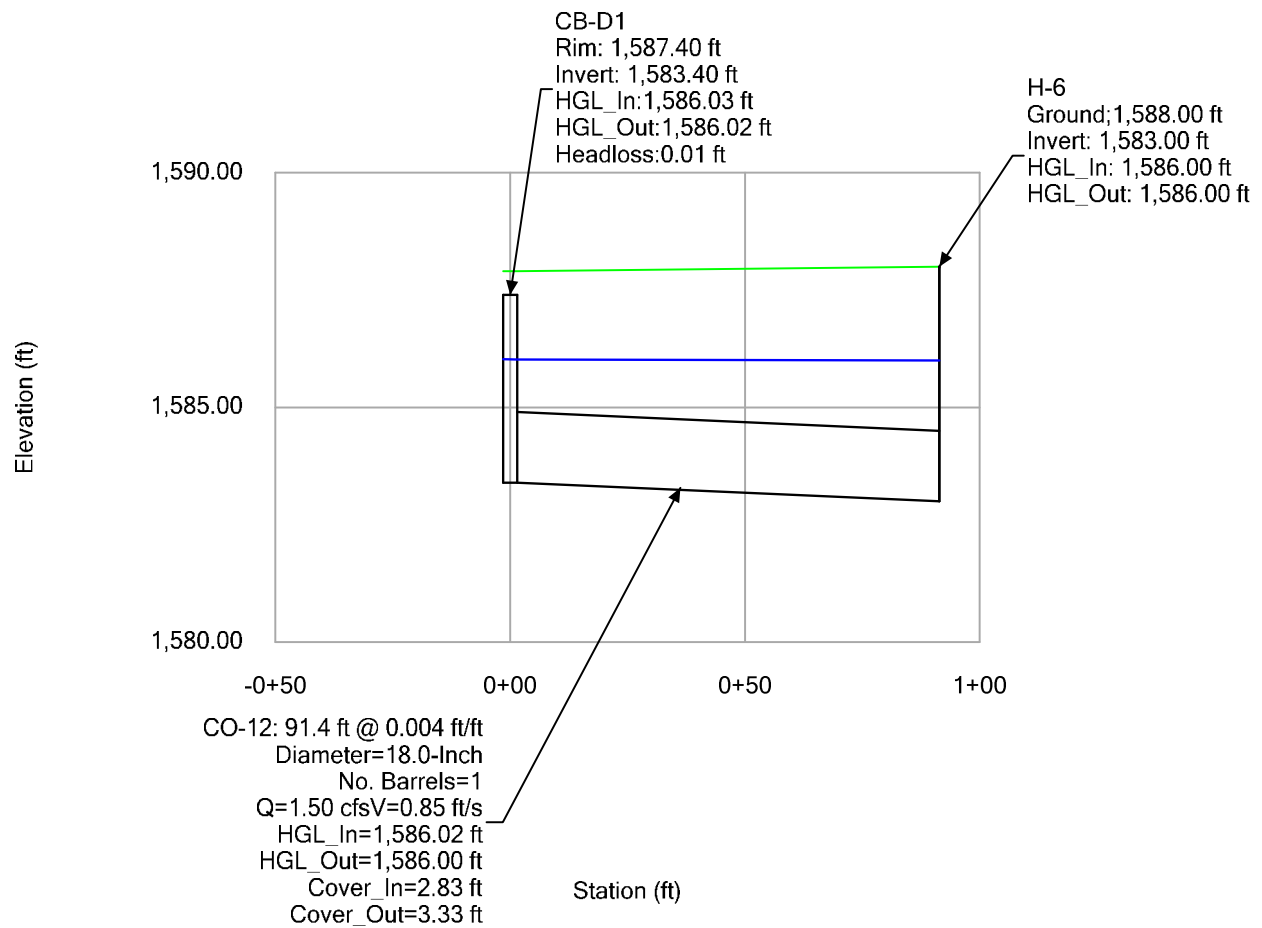
Profile Report **Engineering Profile - CB-D2 TO H-7 (5133-STORMCAD.stsw)**



Profile Report **Engineering Profile - H-13 TO H-14 (5133-STORMCAD.stsw)**



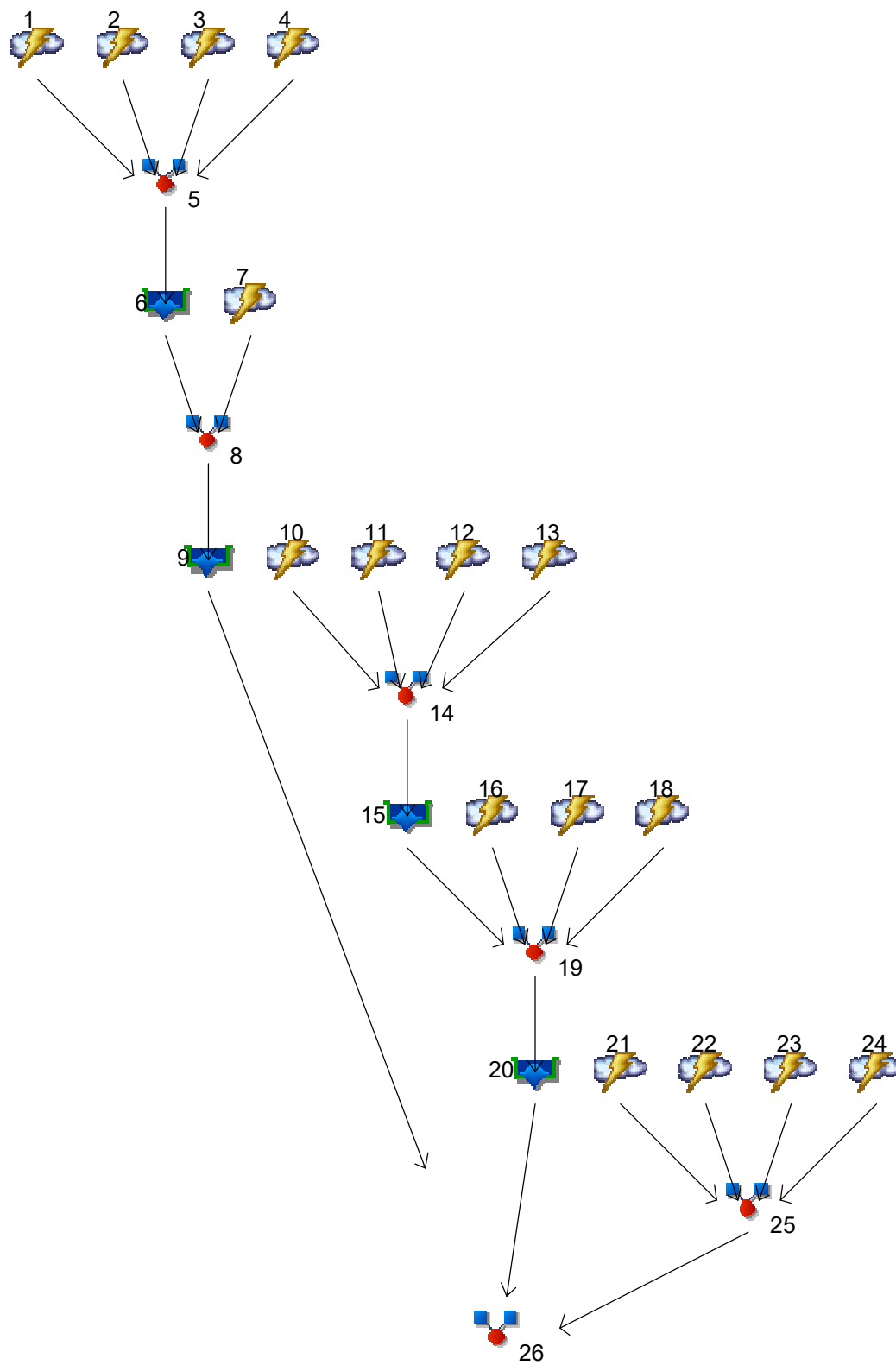
Profile Report **Engineering Profile - CB-D1 TO H-6 (5133-STORMCAD.stsw)**



Hydraflow Output Report

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	24.11	1	5	27,121	-----	-----	-----	CPH
2	Rational	16.76	1	5	18,858	-----	-----	-----	CPI
3	Rational	17.65	1	5	19,860	-----	-----	-----	CPJ
4	Rational	36.01	1	5	40,506	-----	-----	-----	ON-B7
5	Combine	94.53	1	5	104,928	1, 2, 3, 4	-----	-----	Combine at Basin B7
6	Reservoir	48.49	1	21	48,920	5	1598.44	67,474	Basin B7
7	Rational	13.85	1	5	15,579	-----	-----	-----	ON-B8
8	Combine	55.72	1	20	64,291	6, 7	-----	-----	COMBINE B8
9	Reservoir	51.88	1	23	64,282	8	1594.58	17,158	BASIN B8
10	Rational	8.617	1	5	9,694	-----	-----	-----	CPF2
11	Rational	21.23	1	5	23,888	-----	-----	-----	CPE
12	Rational	4.829	1	5	5,433	-----	-----	-----	ON-B3
13	Rational	20.31	1	5	22,850	-----	-----	-----	ON-B4
14	Combine	54.99	1	5	61,039	10, 11, 12, 13	-----	-----	CPB3
15	Reservoir	39.61	1	14	61,030	14	1602.35	19,315	BASIN B3
16	Rational	8.025	1	5	9,028	-----	-----	-----	ON-B2
17	Rational	3.764	1	5	4,234	-----	-----	-----	ON-B5
18	Rational	36.86	1	5	41,465	-----	-----	-----	ON-B1
19	Combine	76.32	1	12	115,028	15, 16, 17, 18	-----	-----	CPB1
20	Reservoir	75.11	1	14	115,022	19	1592.99	18,663	BASIN B1
21	Rational	2.699	1	5	3,036	-----	-----	-----	ON-B9
22	Rational	43.60	1	5	49,055	-----	-----	-----	ON-B10
23	Rational	14.13	1	5	15,899	-----	-----	-----	ON-B6
24	Rational	22.65	1	5	25,486	-----	-----	-----	ON-B11
25	Combine	83.09	1	5	92,230	21, 22, 23, 24	-----	-----	CP-B11
26	Combine	151.28	1	20	271,534	9, 20, 25	-----	-----	CP-SITE
SEC HAYDEN 101.gpw					Return Period: 100 Year			Thursday, 09 / 10 / 2020	
								28-DR-2020 9/11/2020	

Hydrograph Report

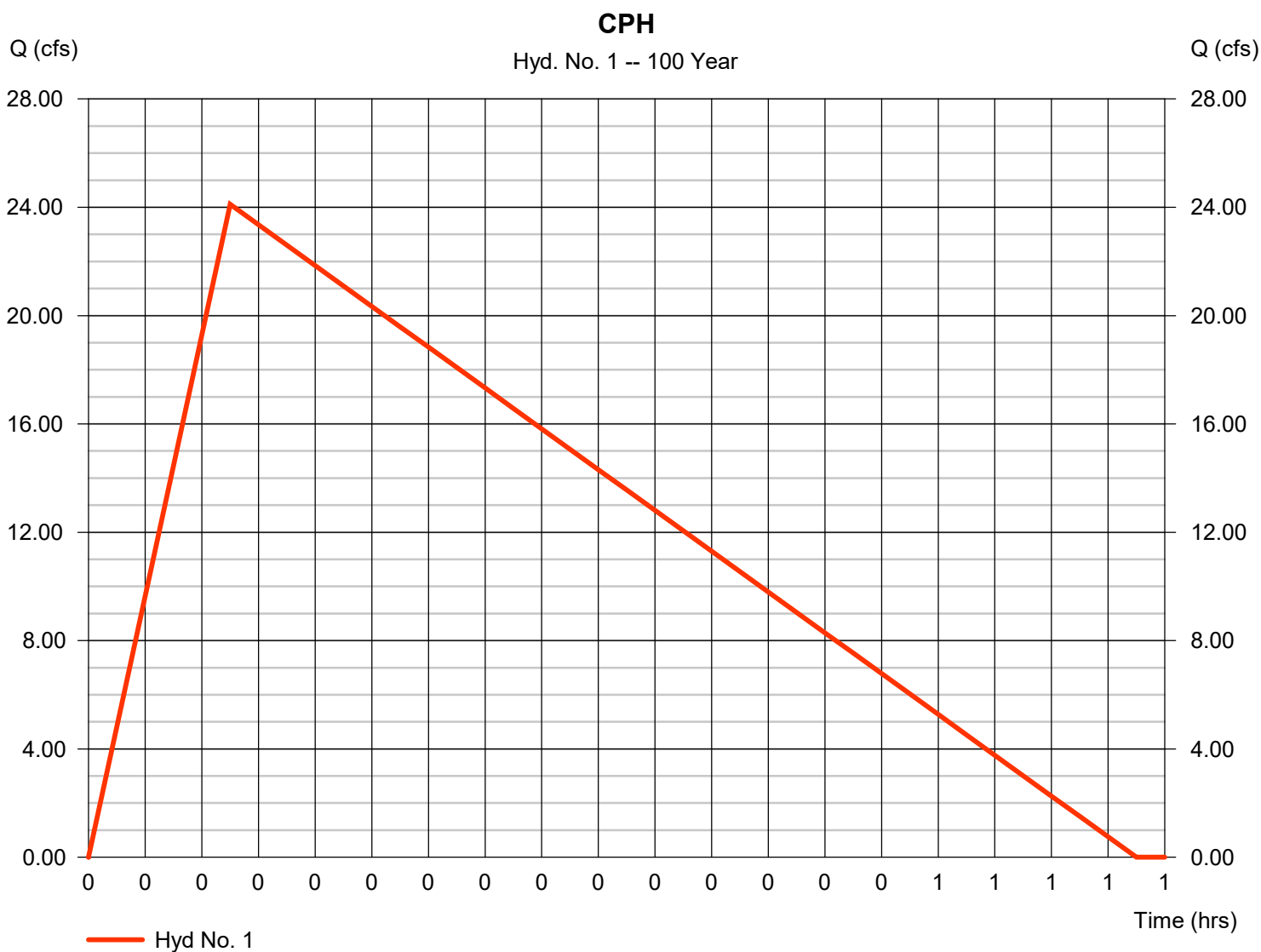
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 1

CPH

Hydrograph type	= Rational	Peak discharge	= 24.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 27,121 cuft
Drainage area	= 4.560 ac	Runoff coeff.	= 0.67
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 2

CPI

Hydrograph type	= Rational	Peak discharge	= 16.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 18,858 cuft
Drainage area	= 2.910 ac	Runoff coeff.	= 0.73
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

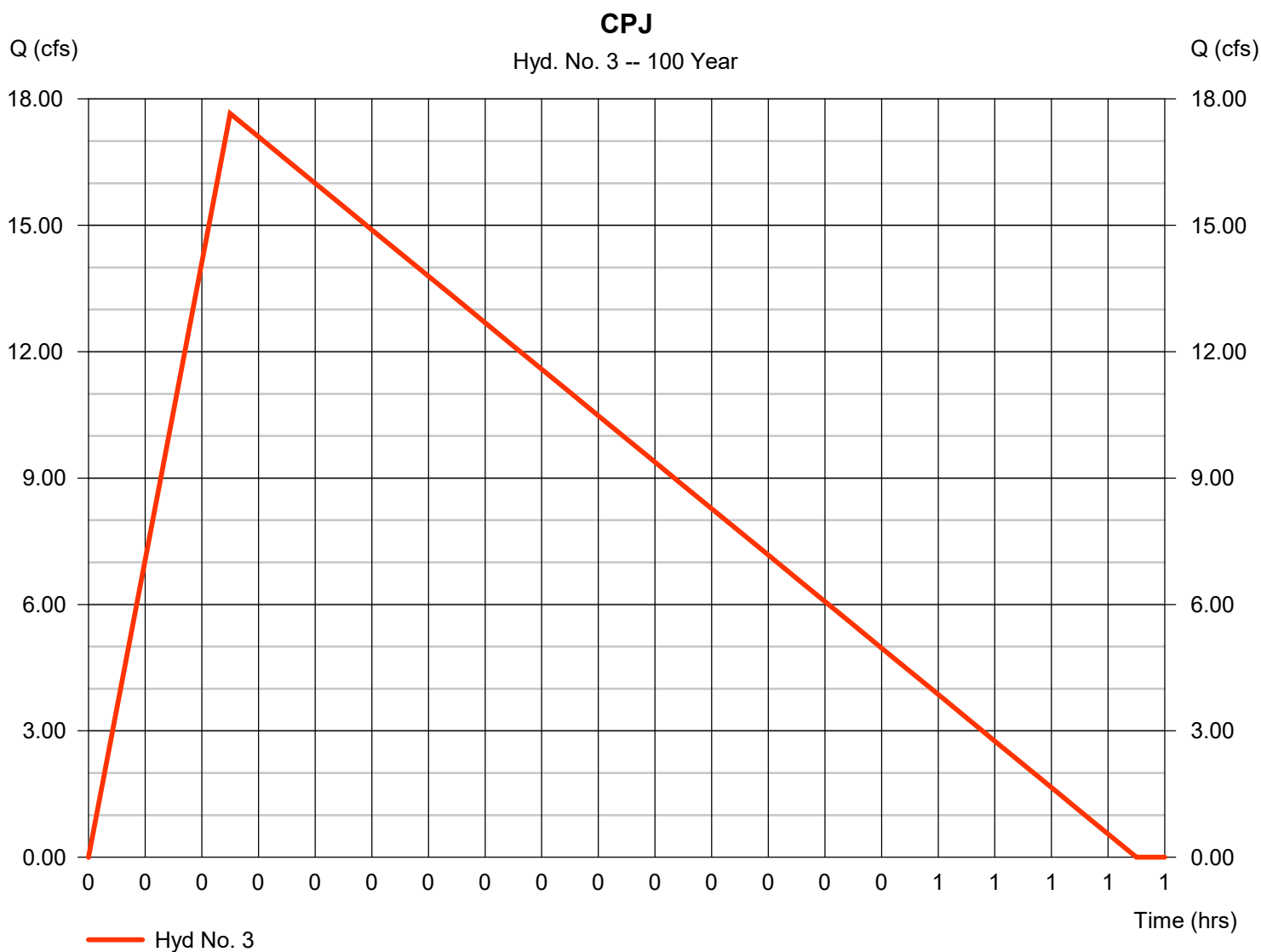
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 3

CPJ

Hydrograph type	= Rational	Peak discharge	= 17.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 19,860 cuft
Drainage area	= 3.290 ac	Runoff coeff.	= 0.68
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 4

ON-B7

Hydrograph type	= Rational	Peak discharge	= 36.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 40,506 cuft
Drainage area	= 5.070 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

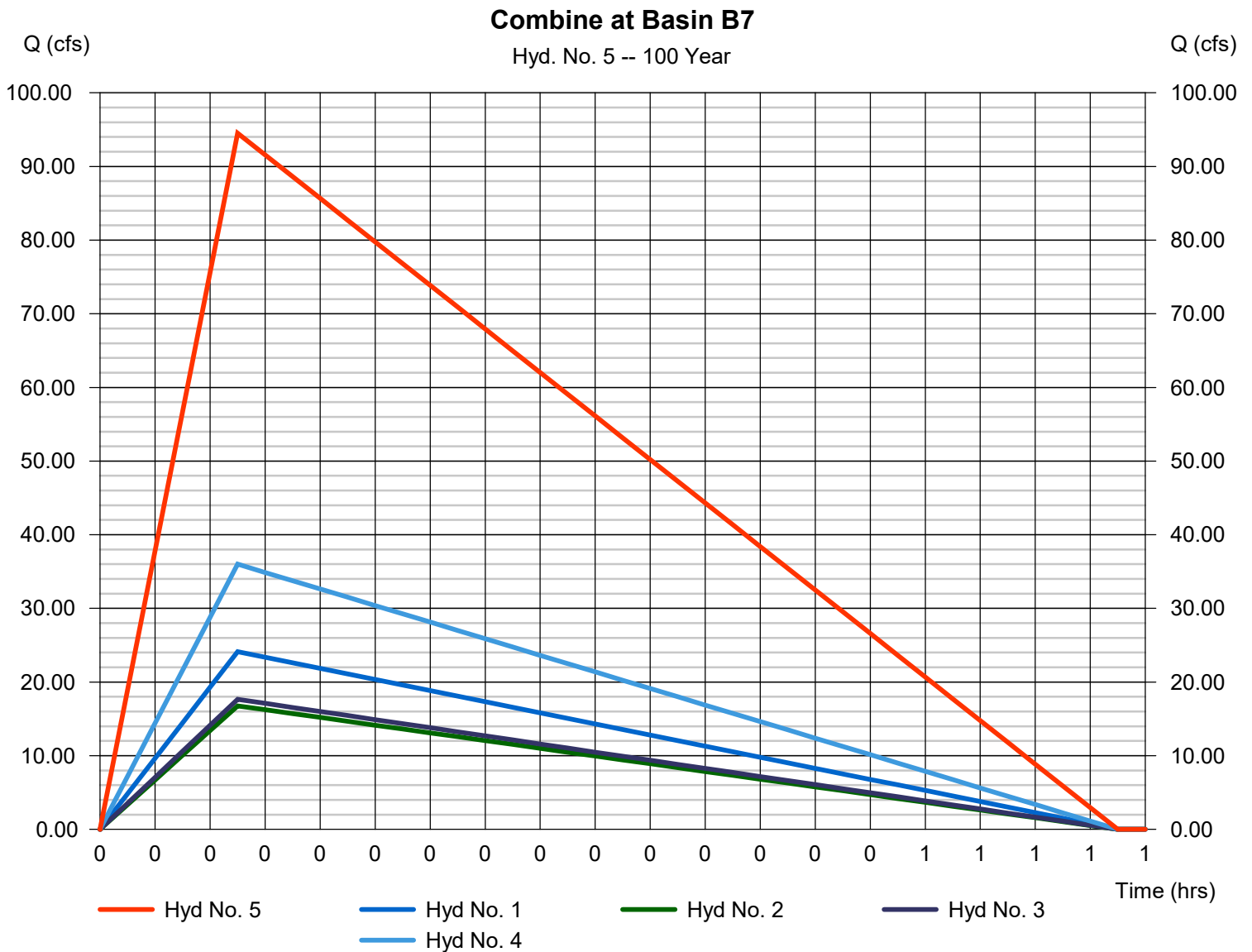
Thursday, 09 / 10 / 2020

Hyd. No. 5

Combine at Basin B7

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 2, 3, 4

Peak discharge = 94.53 cfs
 Time to peak = 0.08 hrs
 Hyd. volume = 104,928 cuft
 Contrib. drain. area = 15.830 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

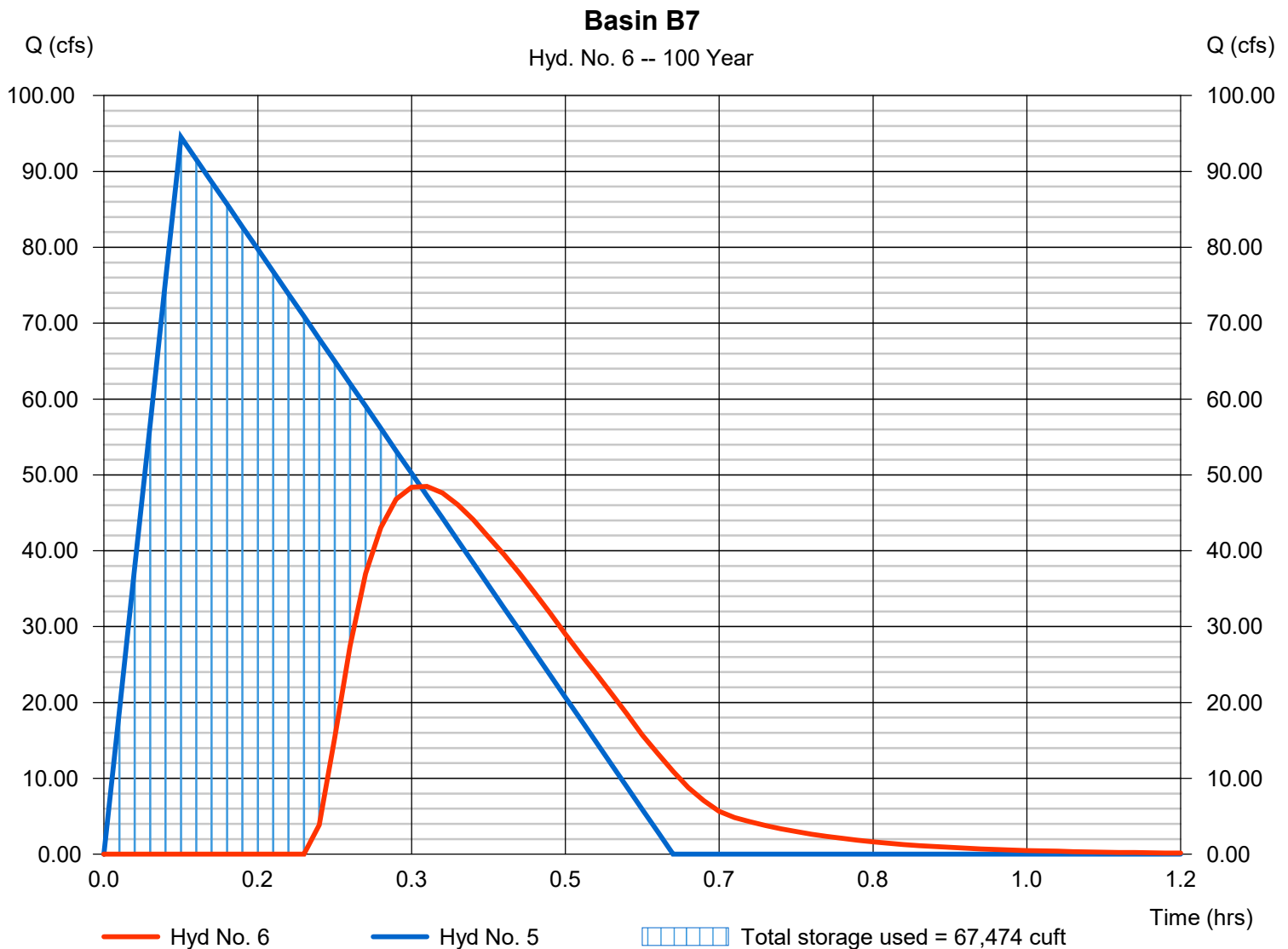
Thursday, 09 / 10 / 2020

Hyd. No. 6

Basin B7

Hydrograph type	= Reservoir	Peak discharge	= 48.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.35 hrs
Time interval	= 1 min	Hyd. volume	= 48,920 cuft
Inflow hyd. No.	= 5 - Combine at Basin B7	Max. Elevation	= 1598.44 ft
Reservoir name	= Basin B7	Max. Storage	= 67,474 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 7

ON-B8

Hydrograph type	= Rational	Peak discharge	= 13.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 15,579 cuft
Drainage area	= 1.950 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

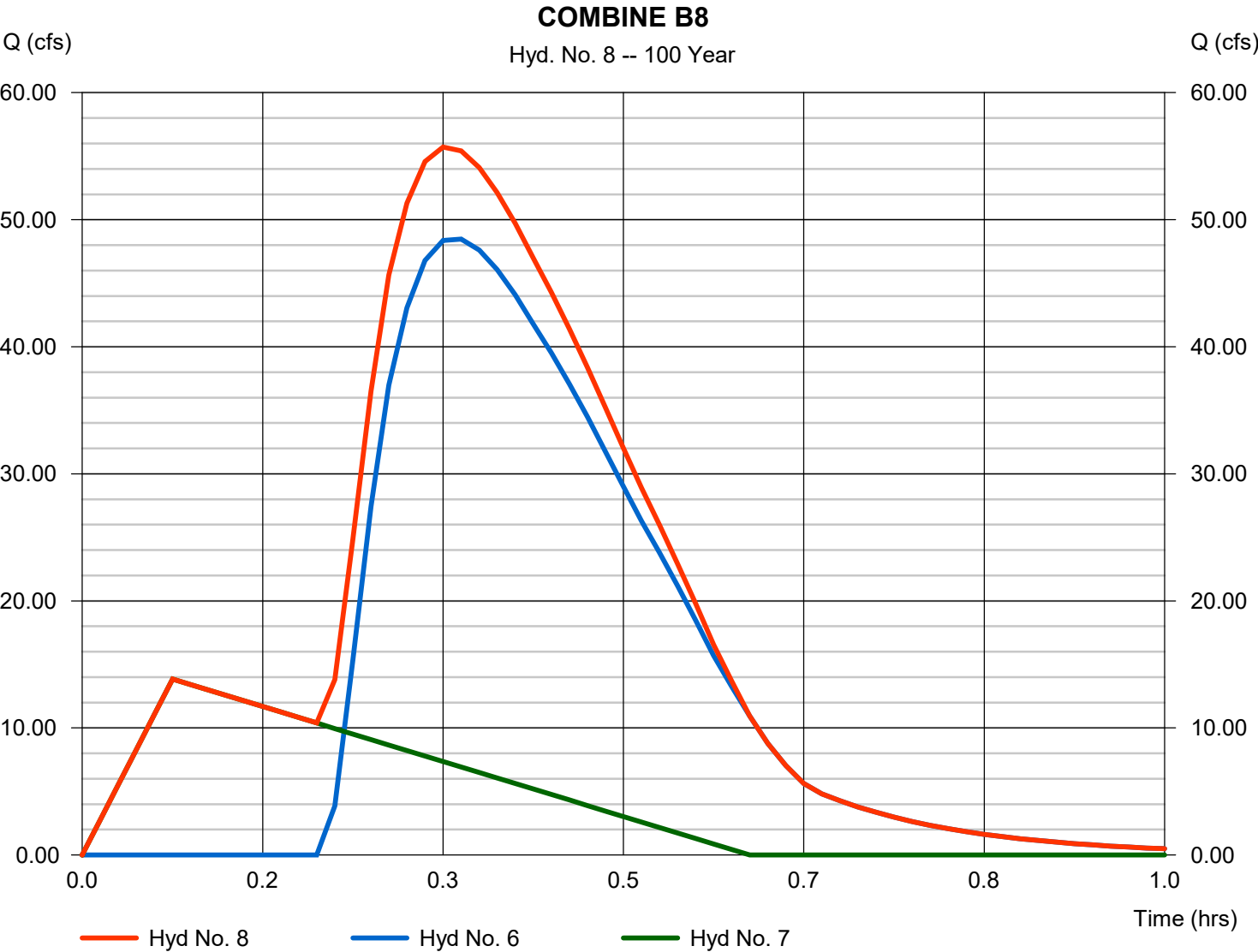
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 8

COMBINE B8

Hydrograph type	= Combine	Peak discharge	= 55.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.33 hrs
Time interval	= 1 min	Hyd. volume	= 64,291 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.950 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

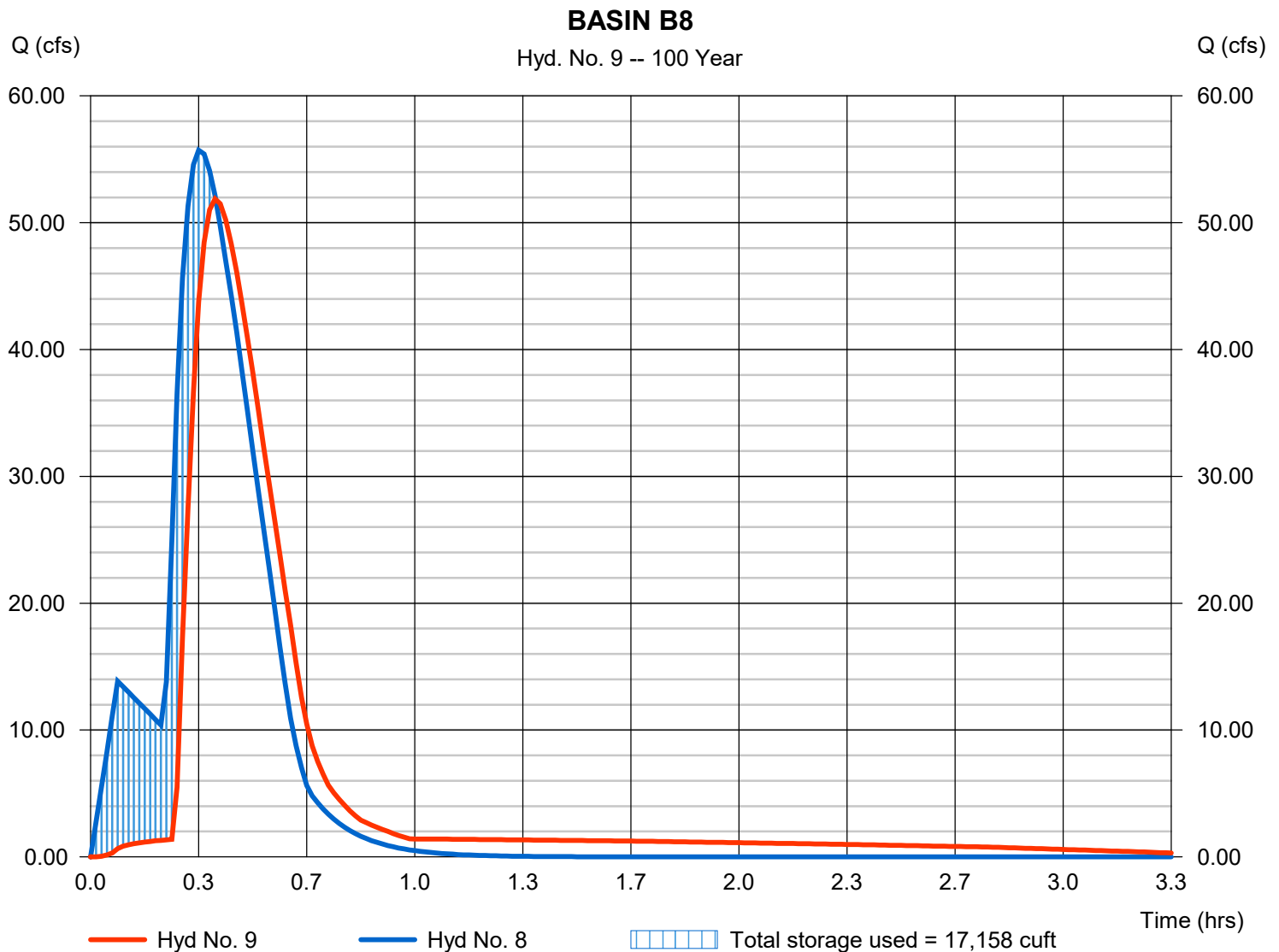
Thursday, 09 / 10 / 2020

Hyd. No. 9

BASIN B8

Hydrograph type	= Reservoir	Peak discharge	= 51.88 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.38 hrs
Time interval	= 1 min	Hyd. volume	= 64,282 cuft
Inflow hyd. No.	= 8 - COMBINE B8	Max. Elevation	= 1594.58 ft
Reservoir name	= BASIN B8	Max. Storage	= 17,158 cuft

Storage Indication method used.



Hydrograph Report

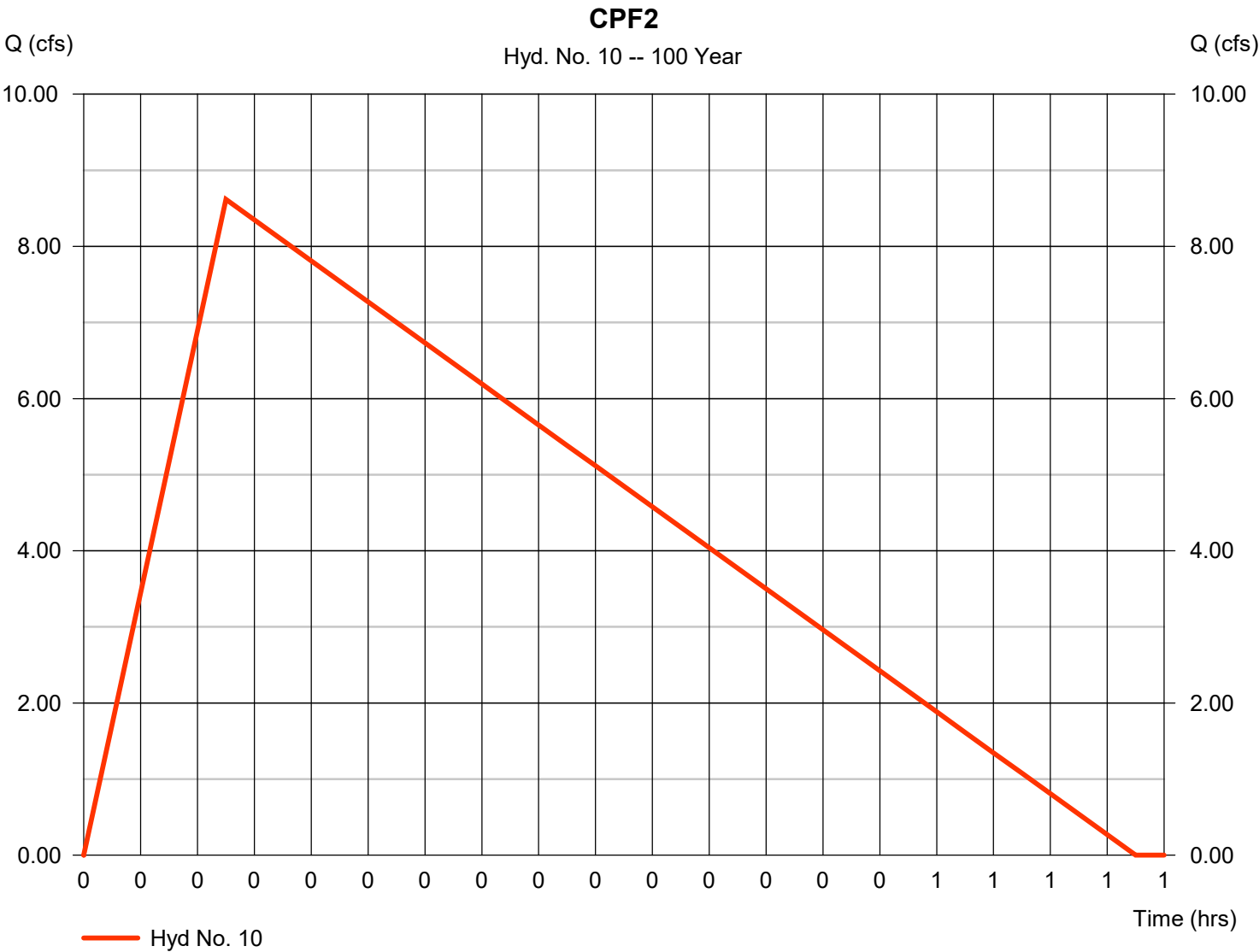
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 10

CPF2

Hydrograph type	= Rational	Peak discharge	= 8.617 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 9,694 cuft
Drainage area	= 1.300 ac	Runoff coeff.	= 0.84
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

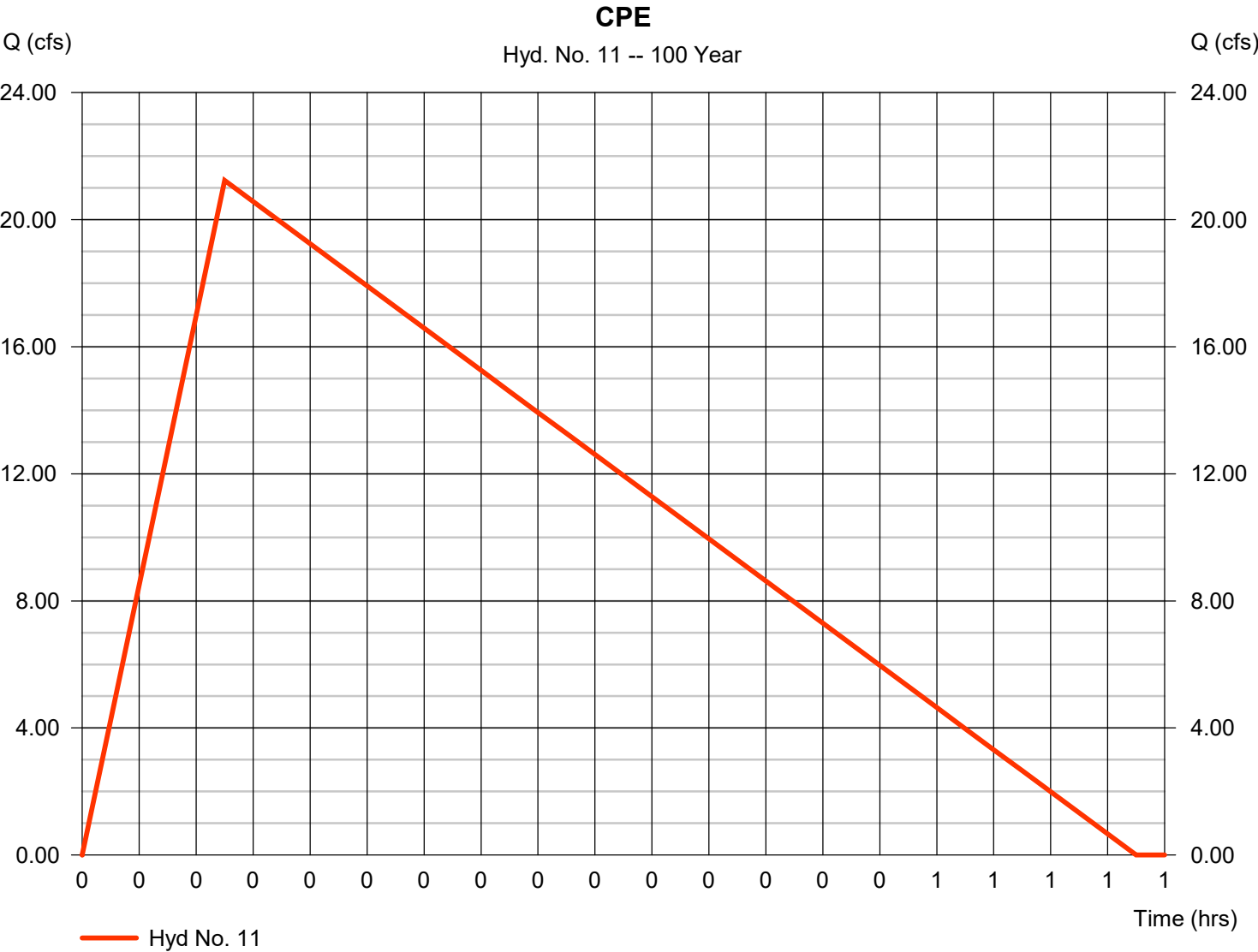
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 11

CPE

Hydrograph type	= Rational	Peak discharge	= 21.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 23,888 cuft
Drainage area	= 3.790 ac	Runoff coeff.	= 0.71
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

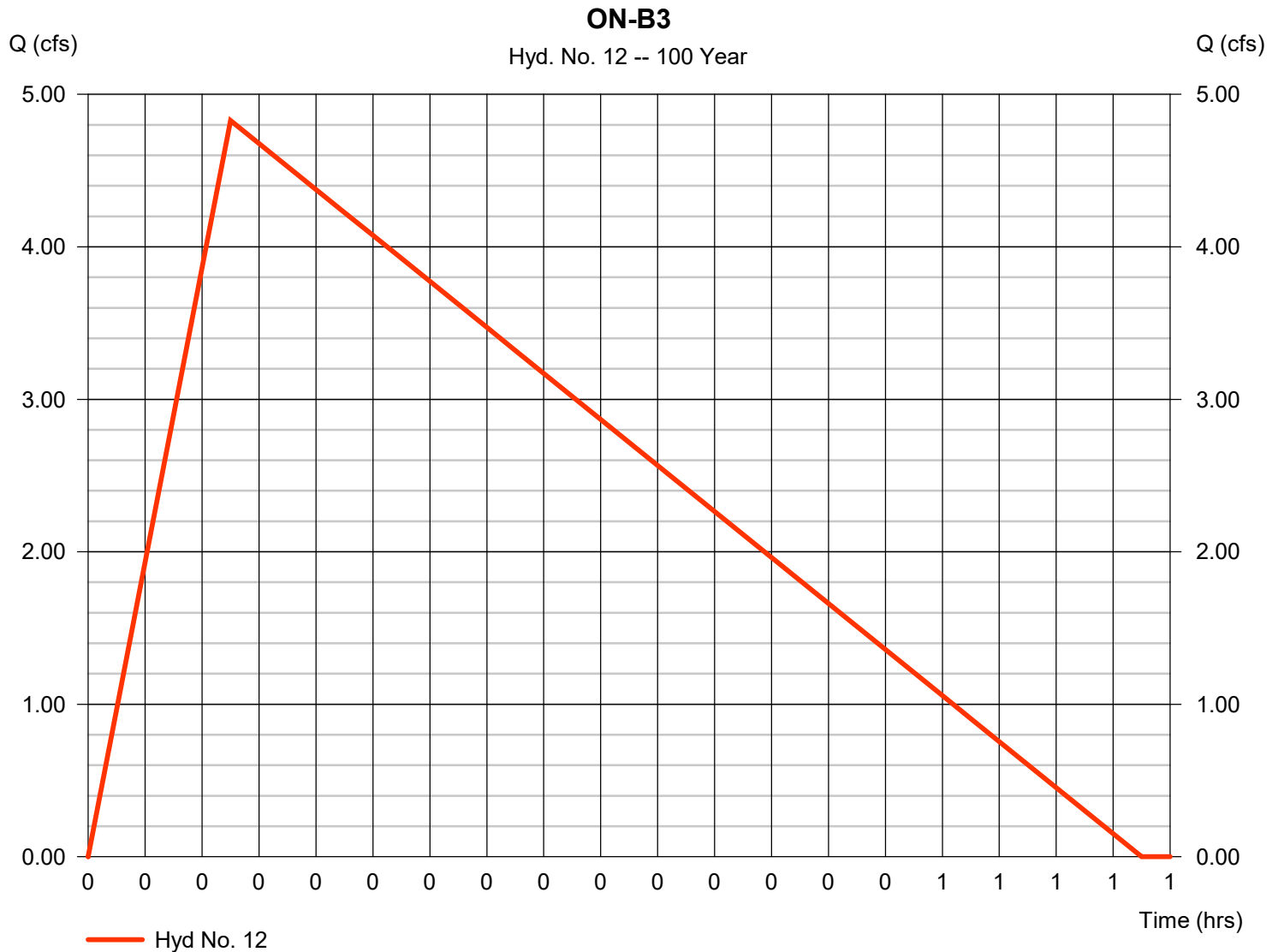
Thursday, 09 / 10 / 2020

Hyd. No. 12

ON-B3

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.680 ac
 Intensity = 7.891 in/hr
 IDF Curve = IDF.IDF

Peak discharge = 4.829 cfs
 Time to peak = 0.08 hrs
 Hyd. volume = 5,433 cuft
 Runoff coeff. = 0.9
 Tc by User = 5.00 min
 Asc/Rec limb fact = 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 13

ON-B4

Hydrograph type	= Rational	Peak discharge	= 20.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 22,850 cuft
Drainage area	= 2.860 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

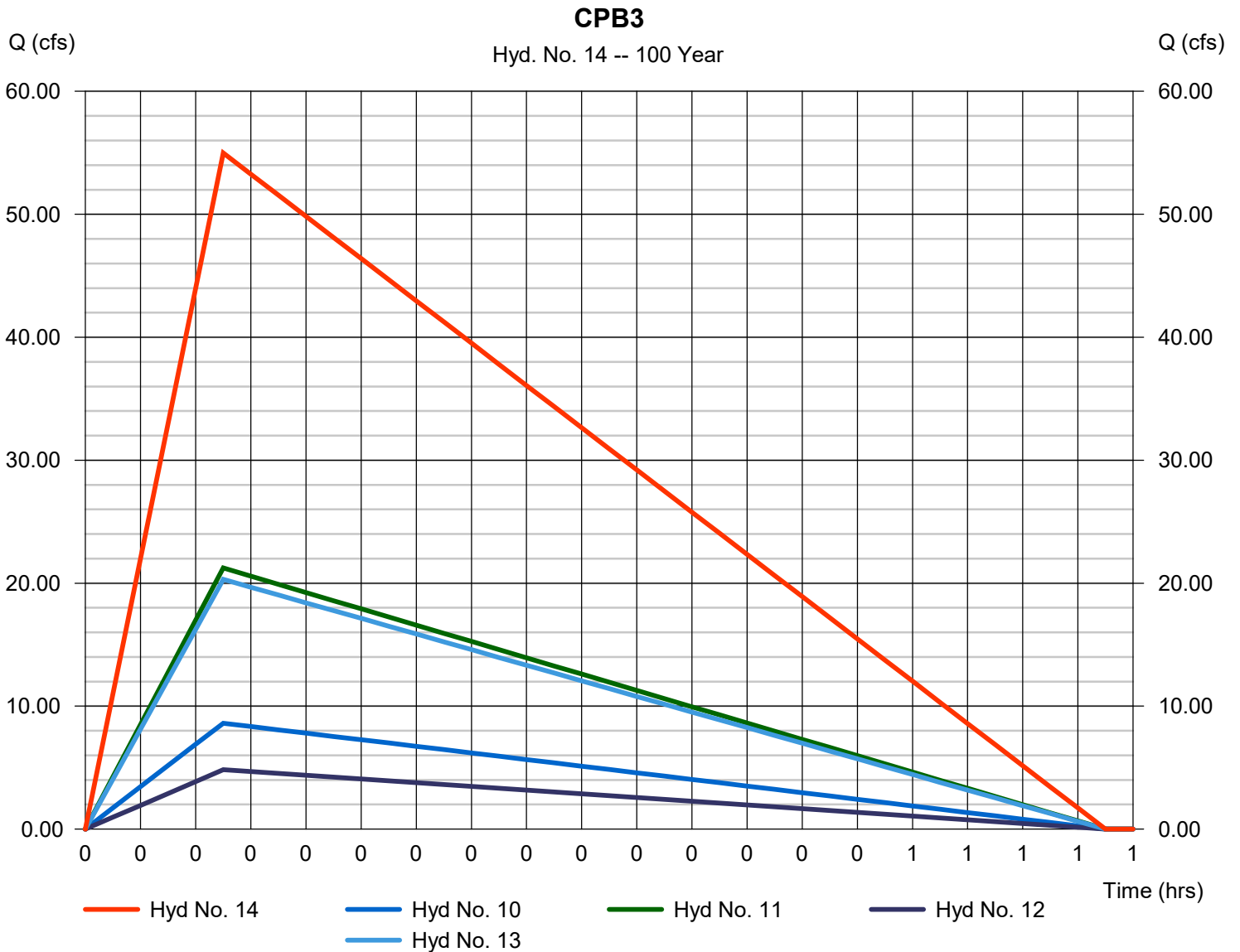
Thursday, 09 / 10 / 2020

Hyd. No. 14

CPB3

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 10, 11, 12, 13

Peak discharge = 54.99 cfs
 Time to peak = 0.08 hrs
 Hyd. volume = 61,039 cuft
 Contrib. drain. area = 8.630 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 15

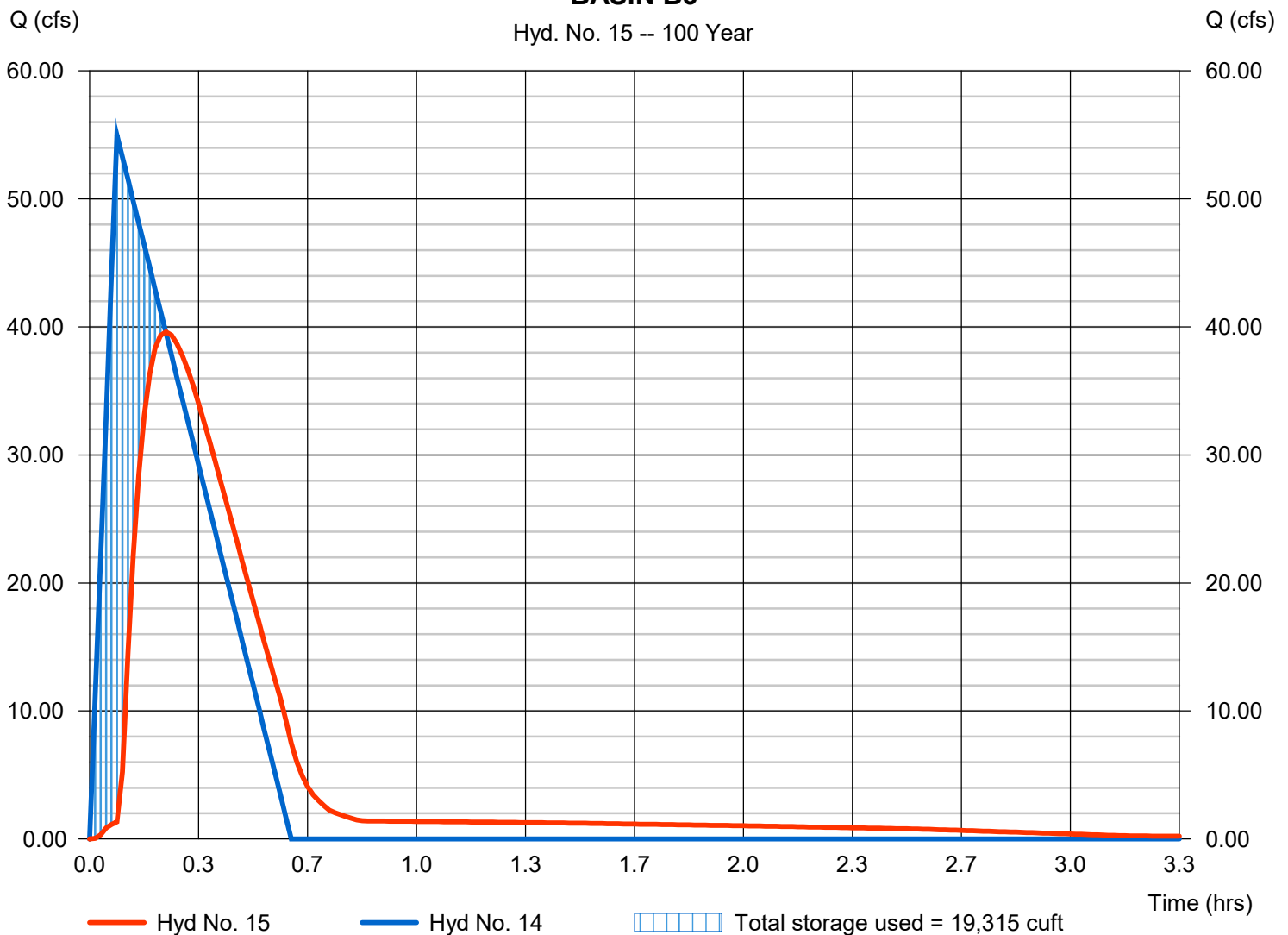
BASIN B3

Hydrograph type	= Reservoir	Peak discharge	= 39.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.23 hrs
Time interval	= 1 min	Hyd. volume	= 61,030 cuft
Inflow hyd. No.	= 14 - CPB3	Max. Elevation	= 1602.35 ft
Reservoir name	= BASIN B3	Max. Storage	= 19,315 cuft

Storage Indication method used.

BASIN B3

Hyd. No. 15 -- 100 Year



Hydrograph Report

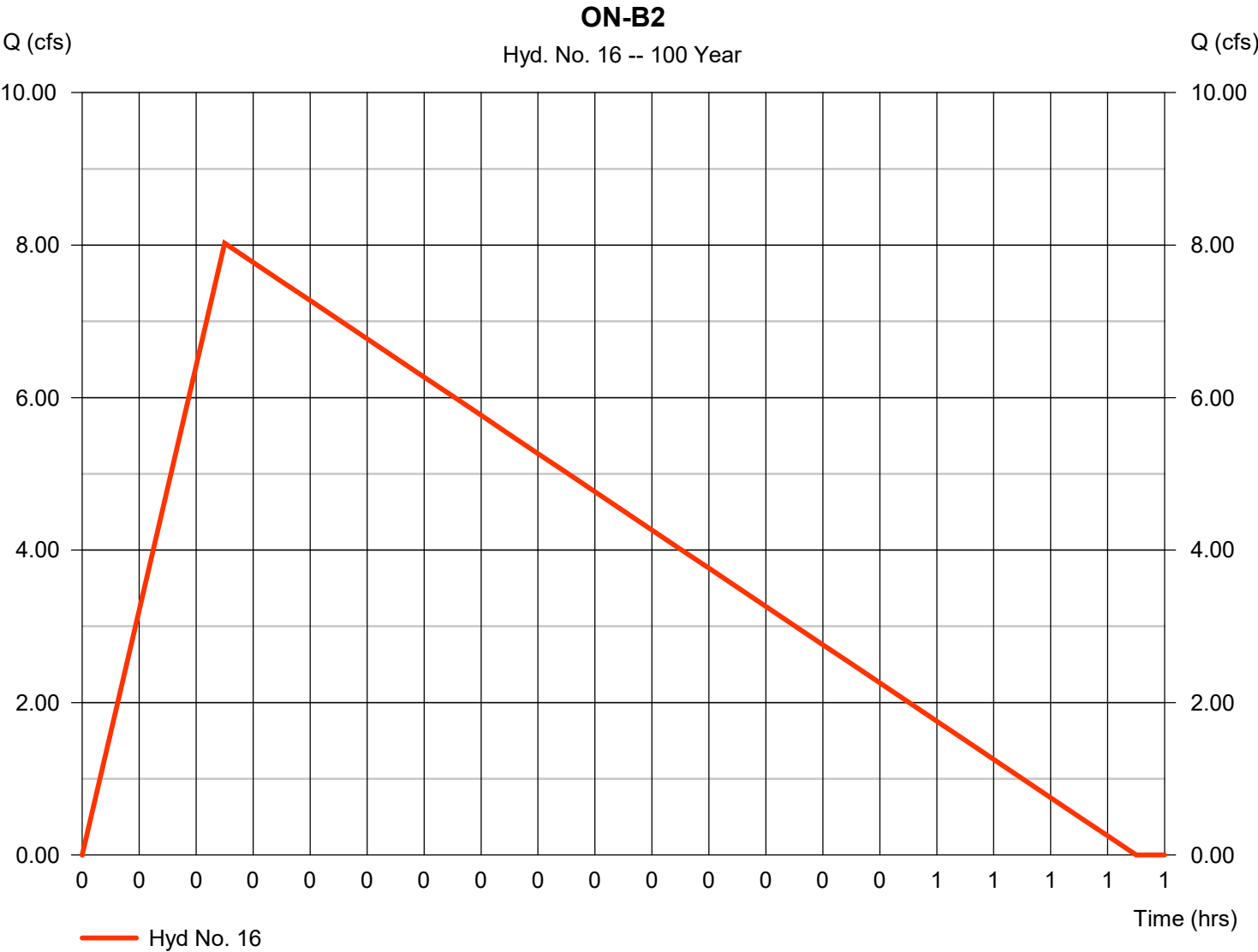
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 16

ON-B2

Hydrograph type	= Rational	Peak discharge	= 8.025 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 9,028 cuft
Drainage area	= 1.130 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

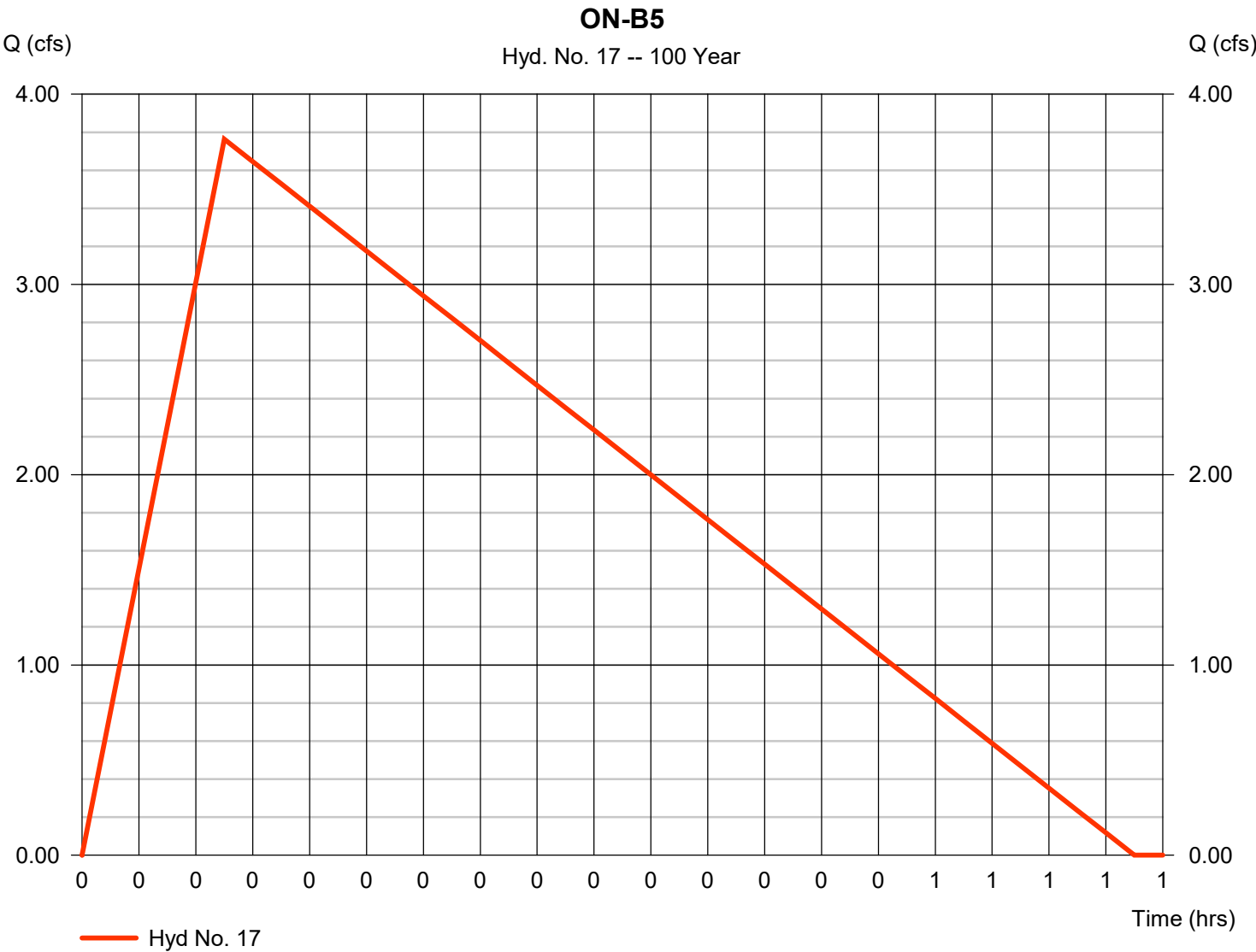
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 17

ON-B5

Hydrograph type	= Rational	Peak discharge	= 3.764 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 4,234 cuft
Drainage area	= 0.530 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

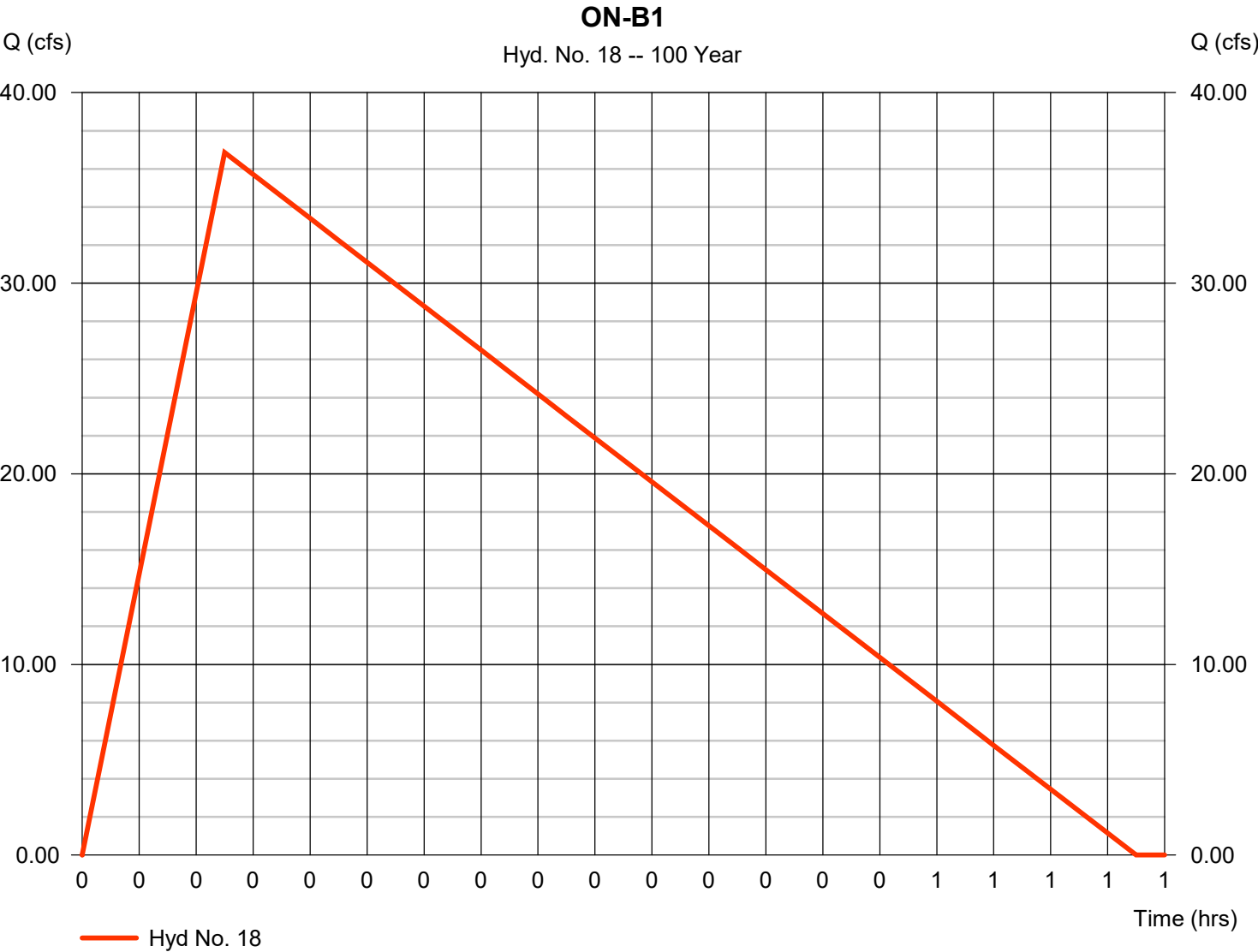
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 18

ON-B1

Hydrograph type	= Rational	Peak discharge	= 36.86 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 41,465 cuft
Drainage area	= 5.190 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

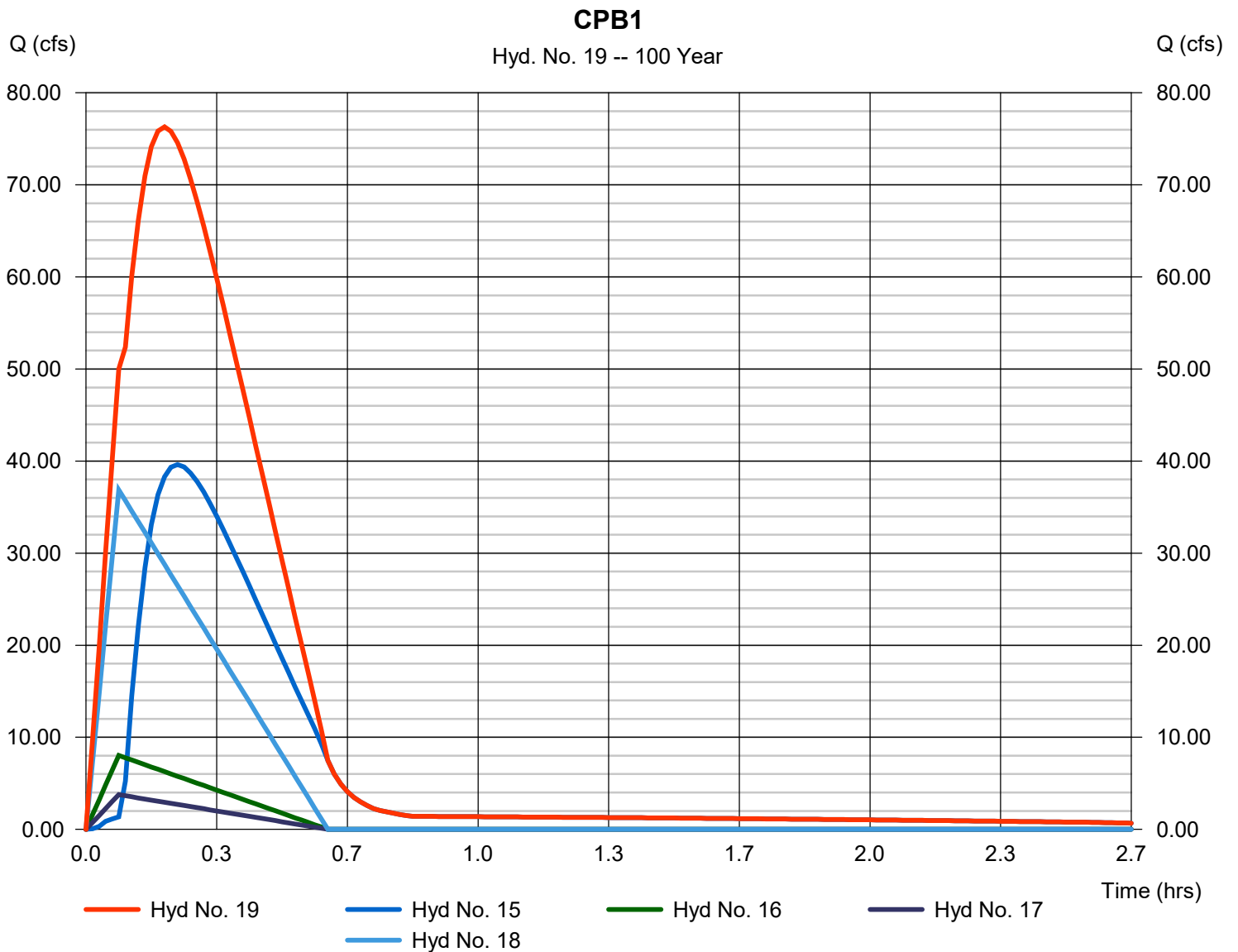
Thursday, 09 / 10 / 2020

Hyd. No. 19

CPB1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 15, 16, 17, 18

Peak discharge = 76.32 cfs
 Time to peak = 0.20 hrs
 Hyd. volume = 115,028 cuft
 Contrib. drain. area = 6.850 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 20

BASIN B1

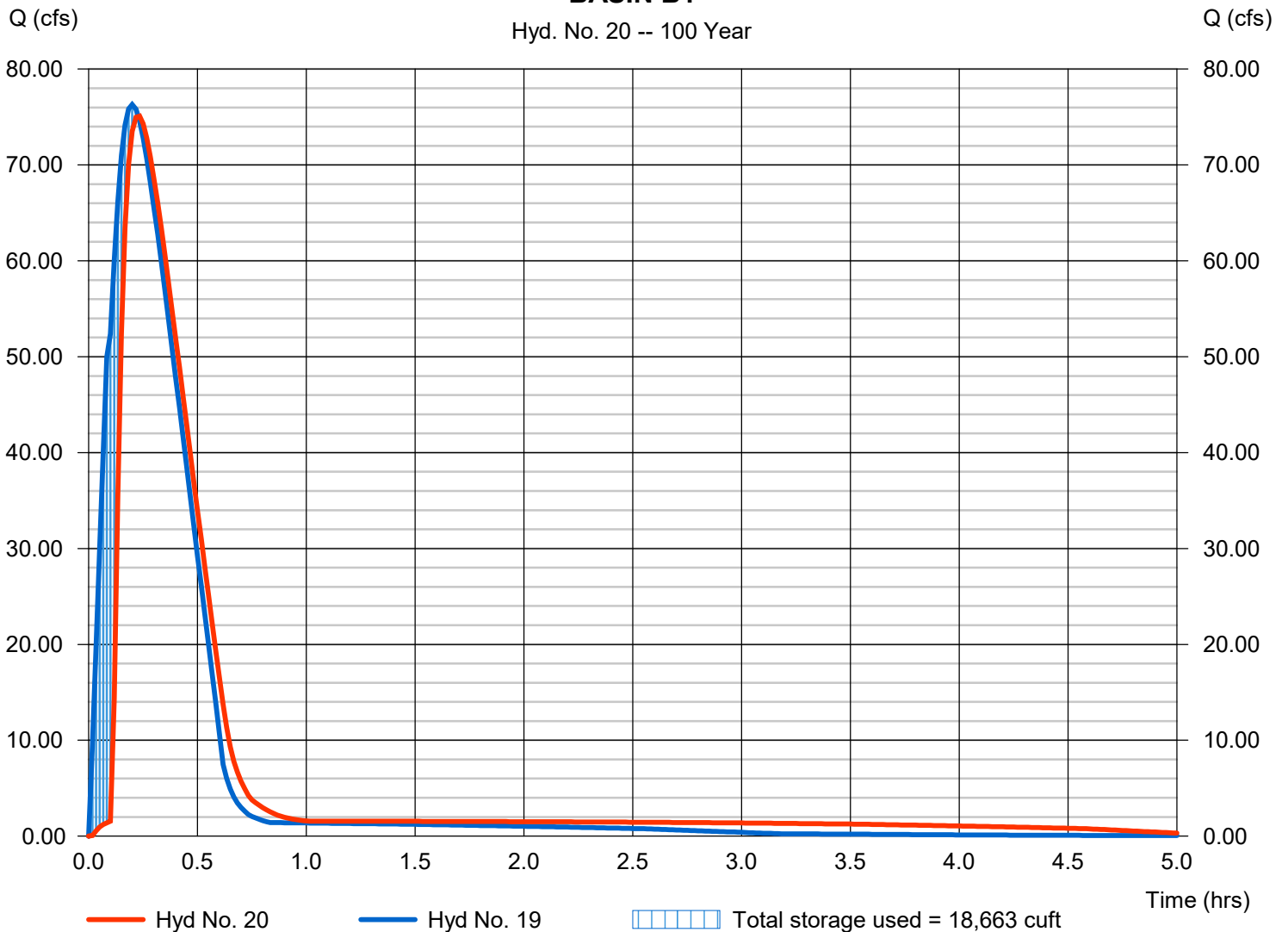
Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyd. No. = 19 - CPB1
 Reservoir name = BASIN B1

Peak discharge = 75.11 cfs
 Time to peak = 0.23 hrs
 Hyd. volume = 115,022 cuft
 Max. Elevation = 1592.99 ft
 Max. Storage = 18,663 cuft

Storage Indication method used.

BASIN B1

Hyd. No. 20 -- 100 Year



Hydrograph Report

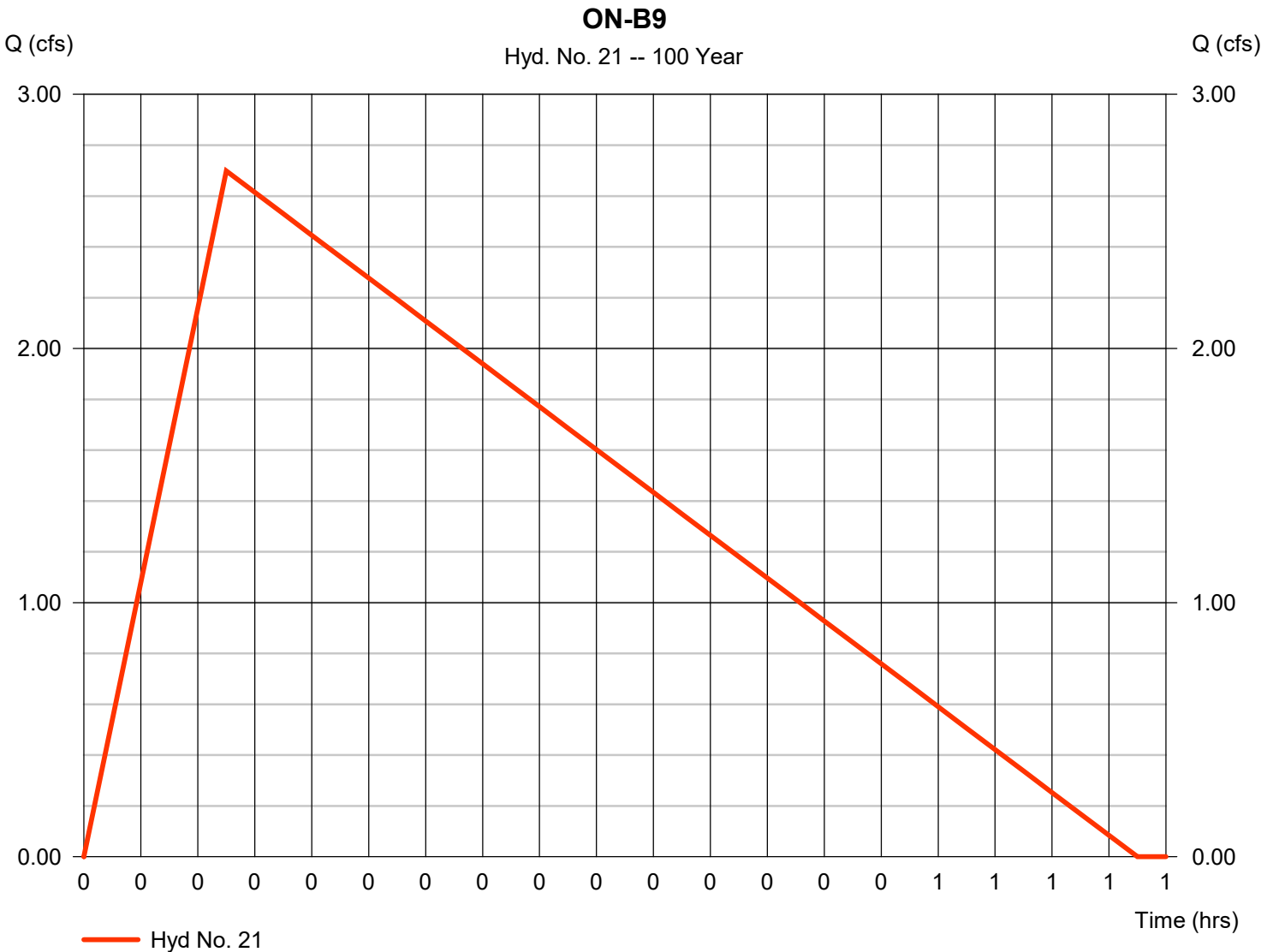
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 21

ON-B9

Hydrograph type	= Rational	Peak discharge	= 2.699 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 3,036 cuft
Drainage area	= 0.380 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

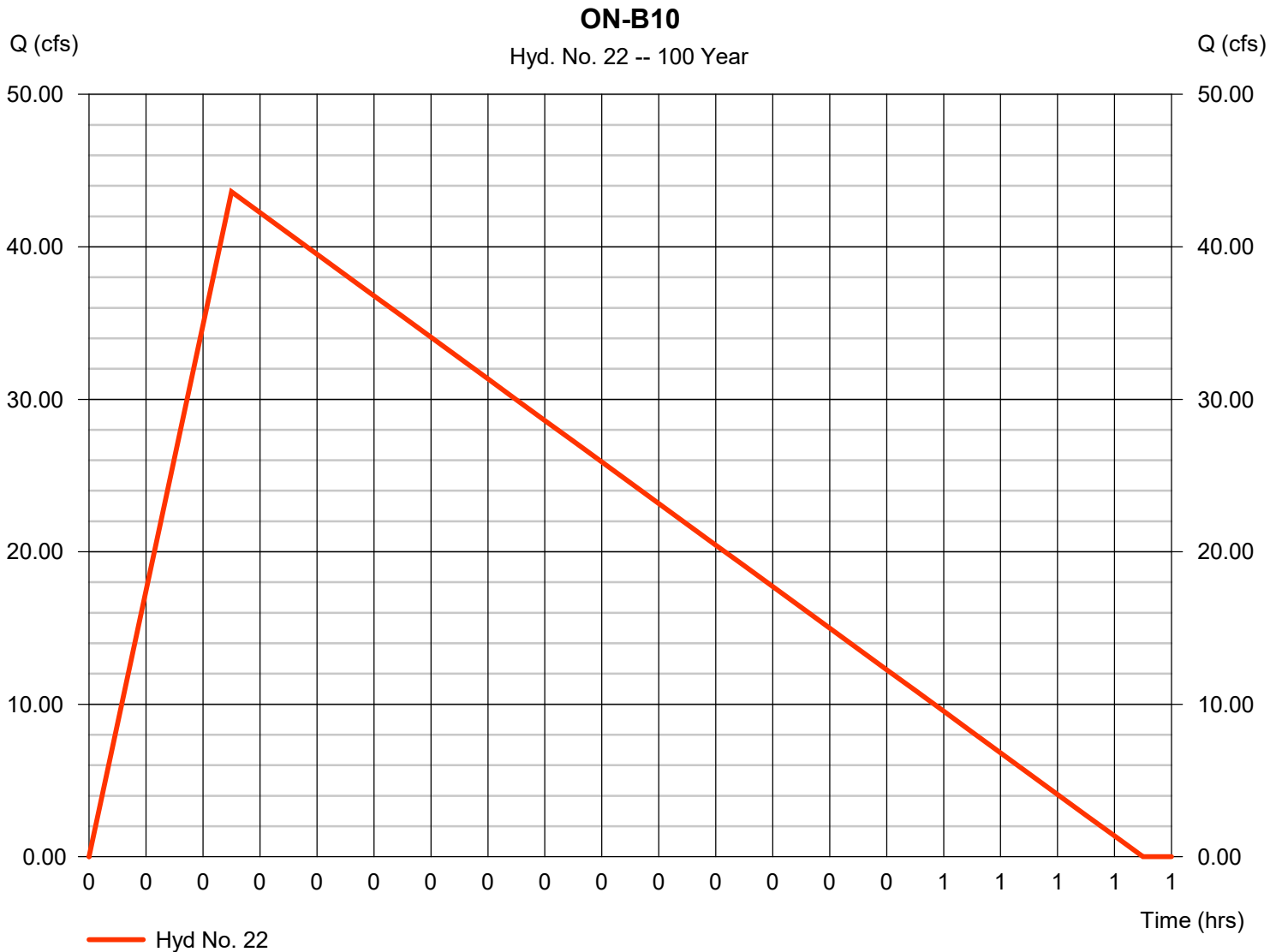
Thursday, 09 / 10 / 2020

Hyd. No. 22

ON-B10

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 6.140 ac
 Intensity = 7.891 in/hr
 IDF Curve = IDF.IDF

Peak discharge = 43.60 cfs
 Time to peak = 0.08 hrs
 Hyd. volume = 49,055 cuft
 Runoff coeff. = 0.9
 Tc by User = 5.00 min
 Asc/Rec limb fact = 1/6.5



Hydrograph Report

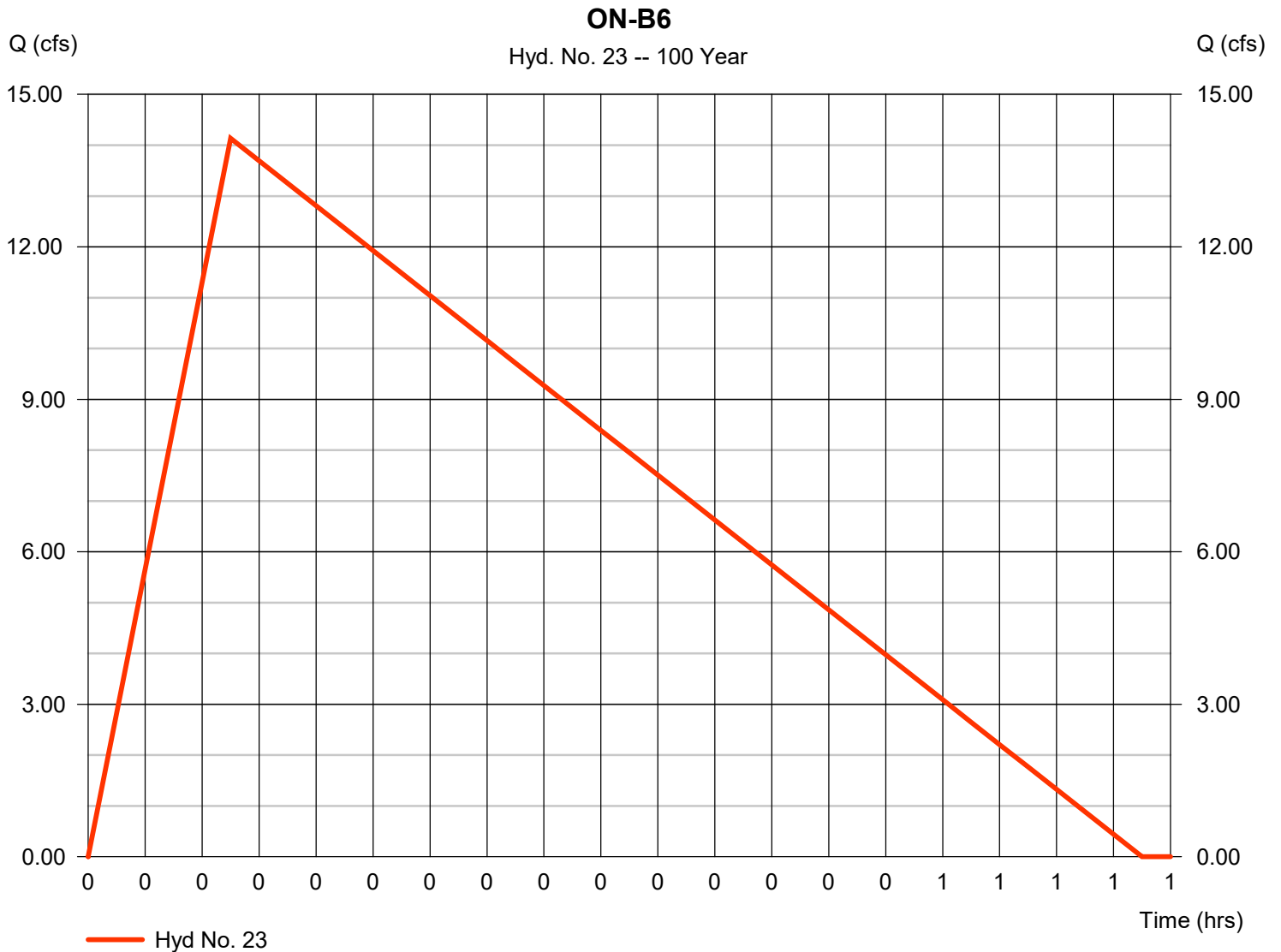
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 23

ON-B6

Hydrograph type	= Rational	Peak discharge	= 14.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 15,899 cuft
Drainage area	= 1.990 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



Hydrograph Report

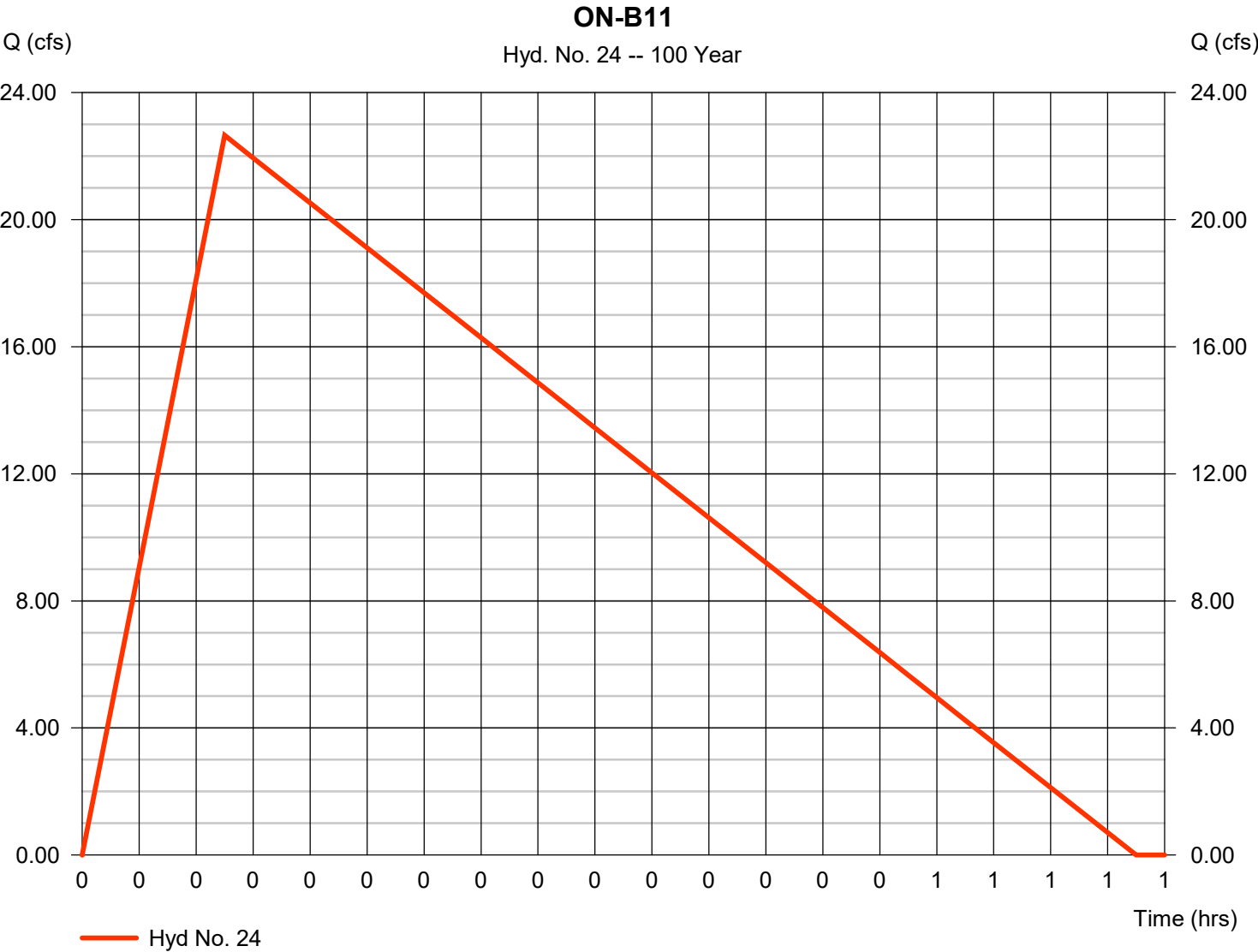
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

Thursday, 09 / 10 / 2020

Hyd. No. 24

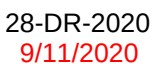
ON-B11

Hydrograph type	= Rational	Peak discharge	= 22.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 25,486 cuft
Drainage area	= 3.190 ac	Runoff coeff.	= 0.9
Intensity	= 7.891 in/hr	Tc by User	= 5.00 min
IDF Curve	= IDF.IDF	Asc/Rec limb fact	= 1/6.5



CP-B11

Peak discharge = 83.09 cfs
Time to peak = 0.08 hrs
Hyd. volume = 92,230 cuft
Contrib. drain. area = 11.700 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v2018.3

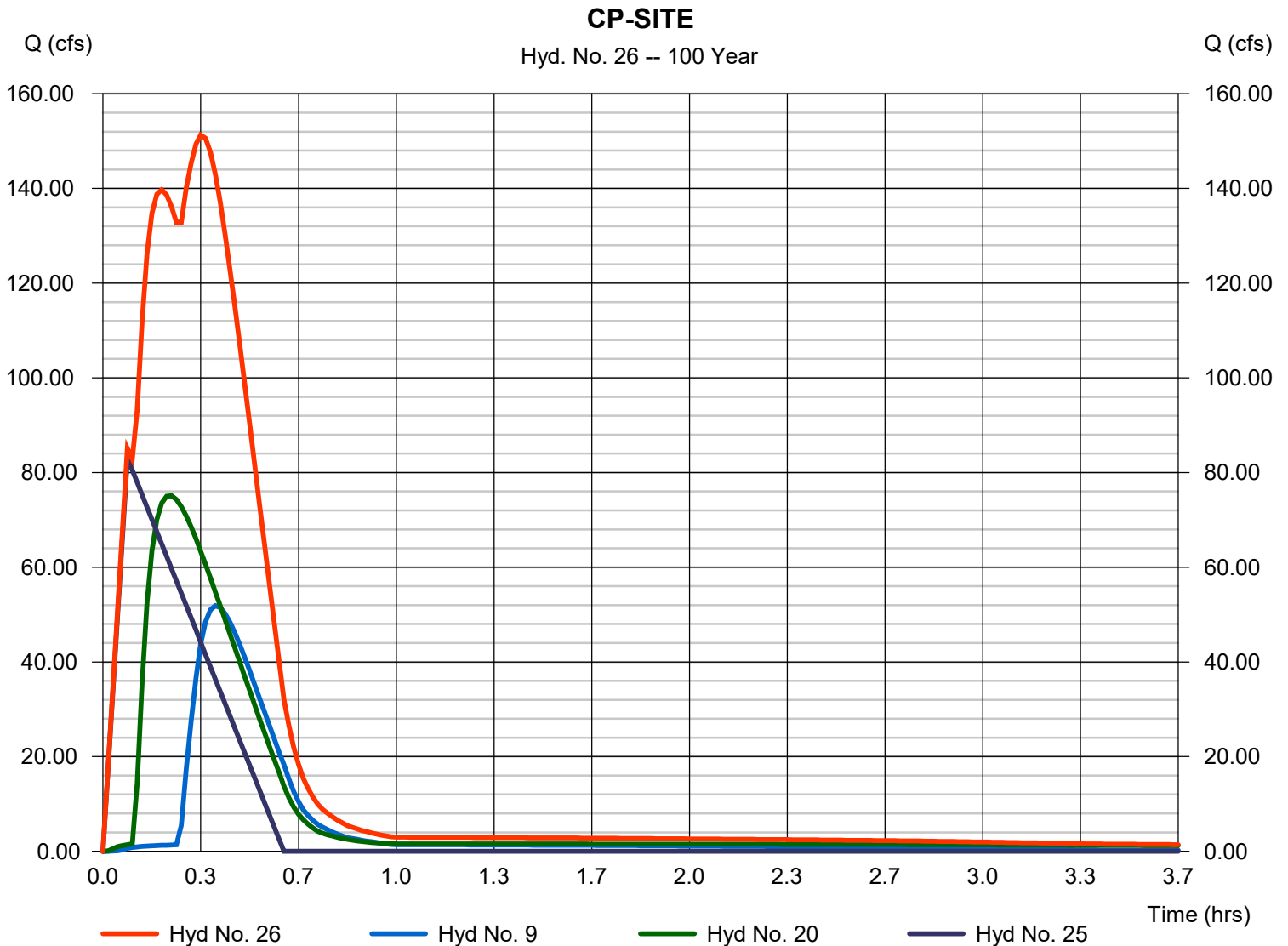
Thursday, 09 / 10 / 2020

Hyd. No. 26

CP-SITE

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 9, 20, 25

Peak discharge = 151.28 cfs
 Time to peak = 0.33 hrs
 Hyd. volume = 271,534 cuft
 Contrib. drain. area = 0.000 ac



Watershed Model Schematic..... 1

100 - Year

Summary Report..... 2

Hydrograph Reports..... 3

Hydrograph No. 1, Rational, CPH..... 3

Hydrograph No. 2, Rational, CPI..... 4

Hydrograph No. 3, Rational, CPJ..... 5

Hydrograph No. 4, Rational, ON-B7..... 6

Hydrograph No. 5, Combine, Combine at Basin B7..... 7

Hydrograph No. 6, Reservoir, Basin B7..... 8

Hydrograph No. 7, Rational, ON-B8..... 9

Hydrograph No. 8, Combine, COMBINE B8..... 10

Hydrograph No. 9, Reservoir, BASIN B8..... 11

Hydrograph No. 10, Rational, CPF2..... 12

Hydrograph No. 11, Rational, CPE..... 13

Hydrograph No. 12, Rational, ON-B3..... 14

Hydrograph No. 13, Rational, ON-B4..... 15

Hydrograph No. 14, Combine, CPB3..... 16

Hydrograph No. 15, Reservoir, BASIN B3..... 17

Hydrograph No. 16, Rational, ON-B2..... 18

Hydrograph No. 17, Rational, ON-B5..... 19

Hydrograph No. 18, Rational, ON-B1..... 20

Hydrograph No. 19, Combine, CPB1..... 21

Hydrograph No. 20, Reservoir, BASIN B1..... 22

Hydrograph No. 21, Rational, ON-B9..... 23

Hydrograph No. 22, Rational, ON-B10..... 24

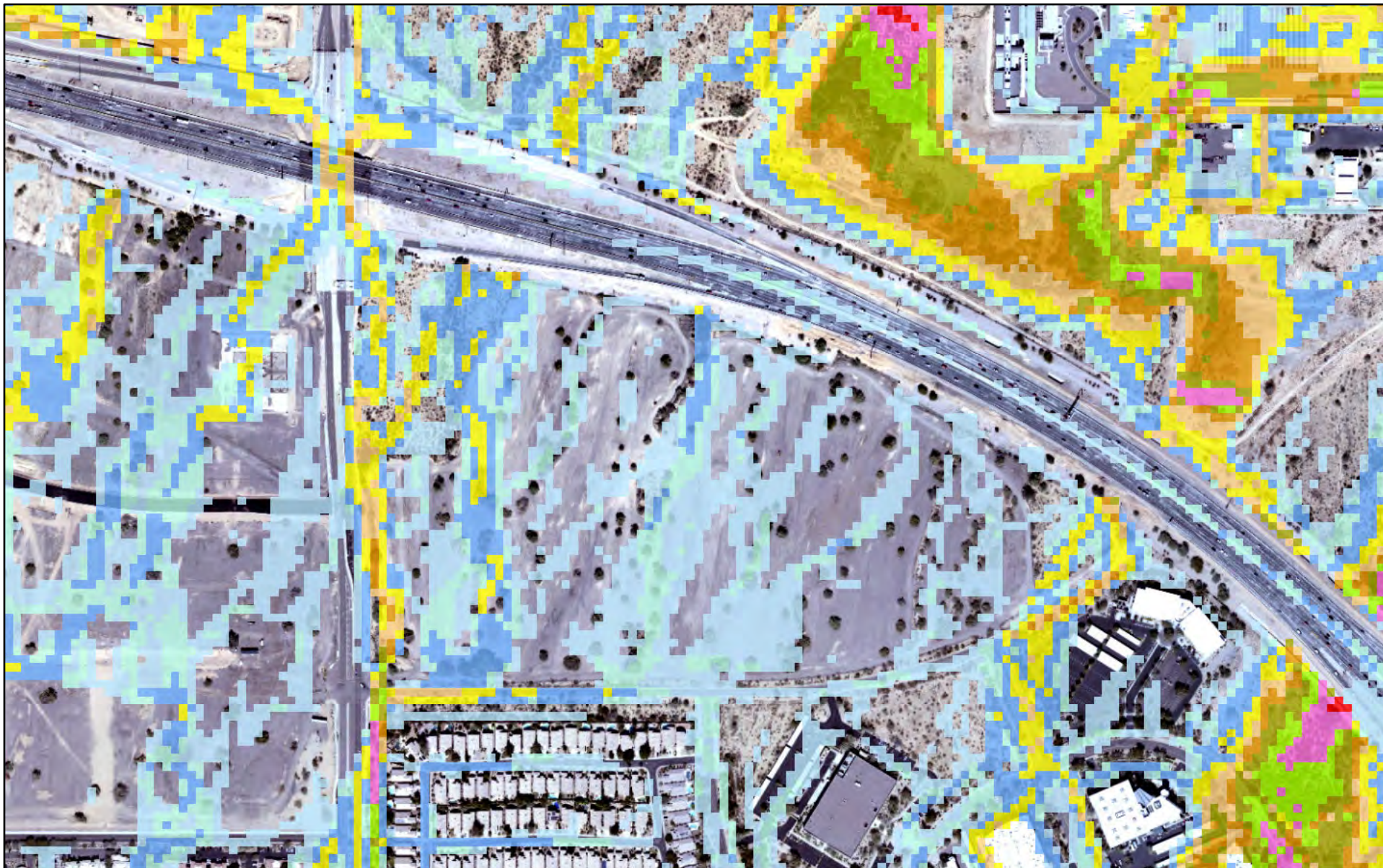
Hydrograph No. 23, Rational, ON-B6..... 25

Hydrograph No. 24, Rational, ON-B11..... 26

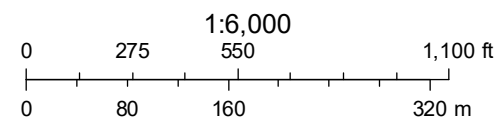
Hydrograph No. 25, Combine, CP-B11..... 27

Hydrograph No. 26, Combine, CP-SITE..... 28

122_PinnaclePeakSouth - 100YR24HR



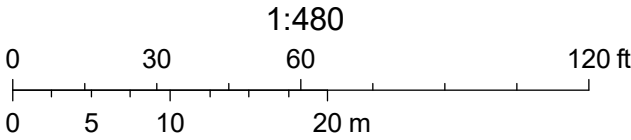
September 10, 2020



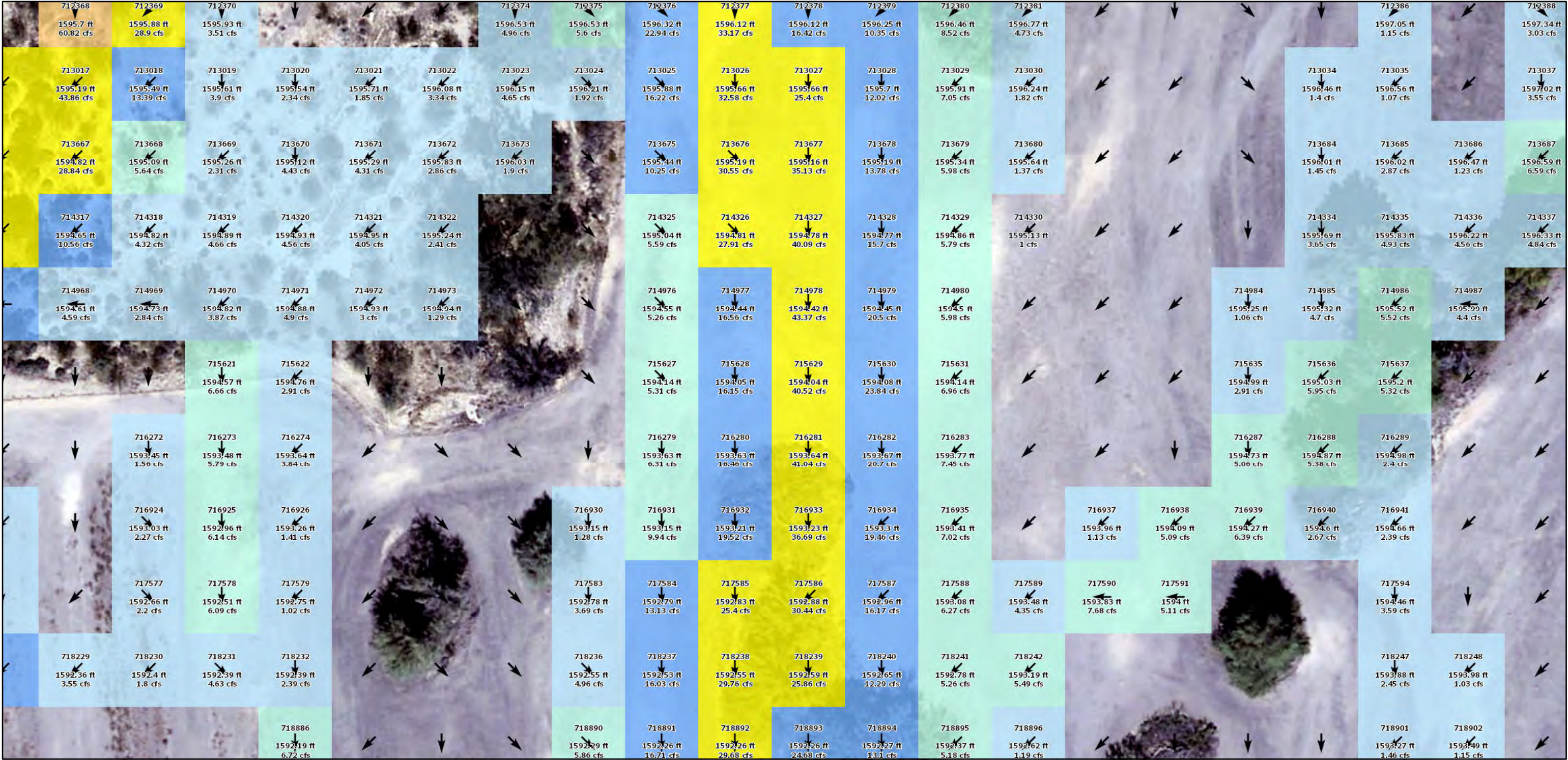
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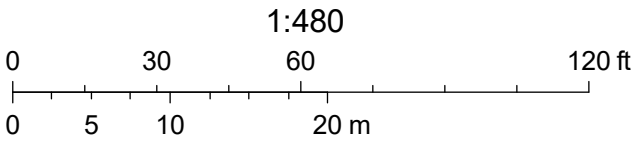
September 10, 2020



122_PinnaclePeakSouth - 100YR24HR



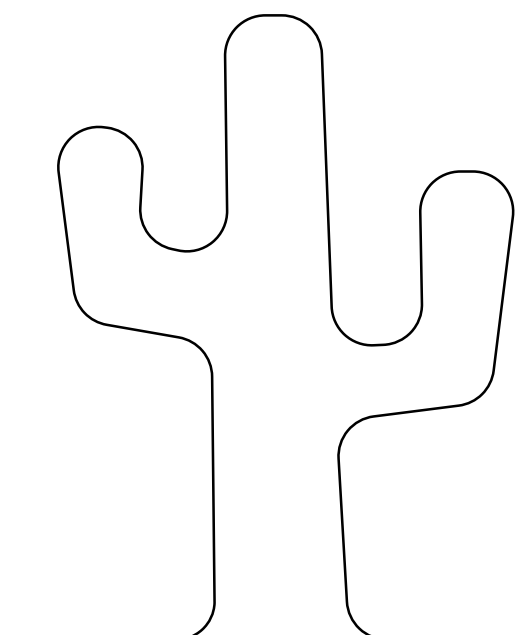
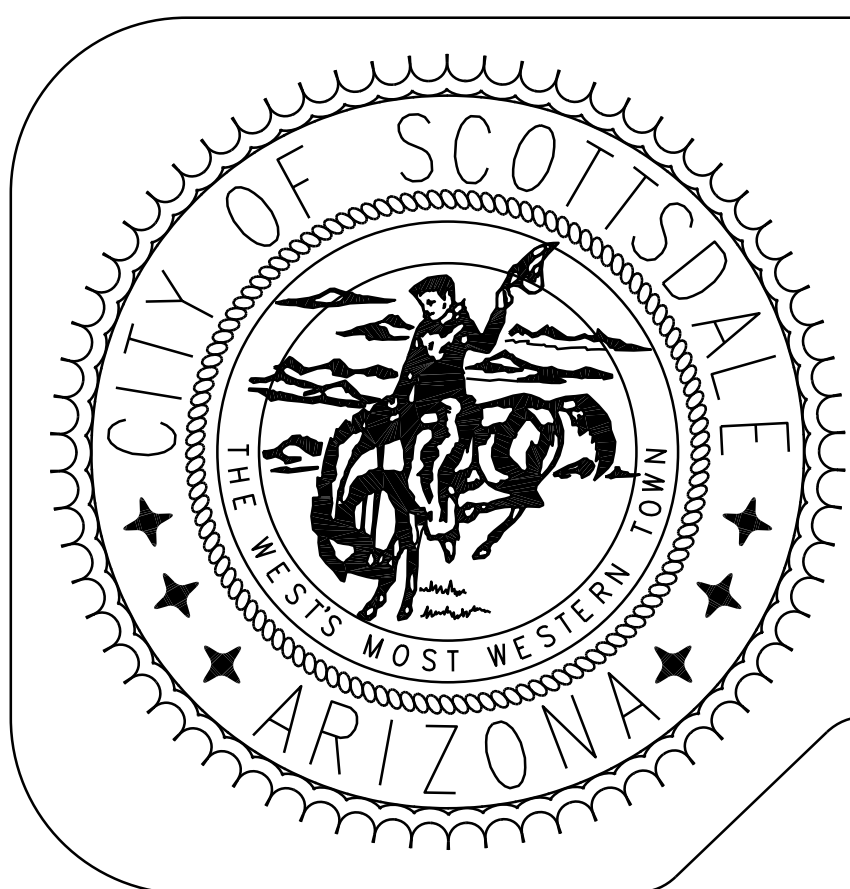
September 10, 2020



APPENDIX C – CROSS ROADS EAST TRAFFIC IMPACT MITIGATION ANALYSIS

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS



COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
SOLANGE WHITEHEAD
CITY MANAGER
JIM THOMPSON
CITY ATTORNEY
BRUCE WASHBURN
CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR DATE

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) DATE

BUILDING OFFICIAL (OR DESIGNEE) DATE



ENGINEER
Michael Baker
INTERNATIONAL
2929 N. CENTRAL AVE SUITE 800, PHOENIX, AZ, 85012
Phone: (602)279-1234- MBAKERINTL.COM

CROSSROADS EAST DRAINAGE INFRASTRUCTURE PROJECT NO. 400-FB53B-56047



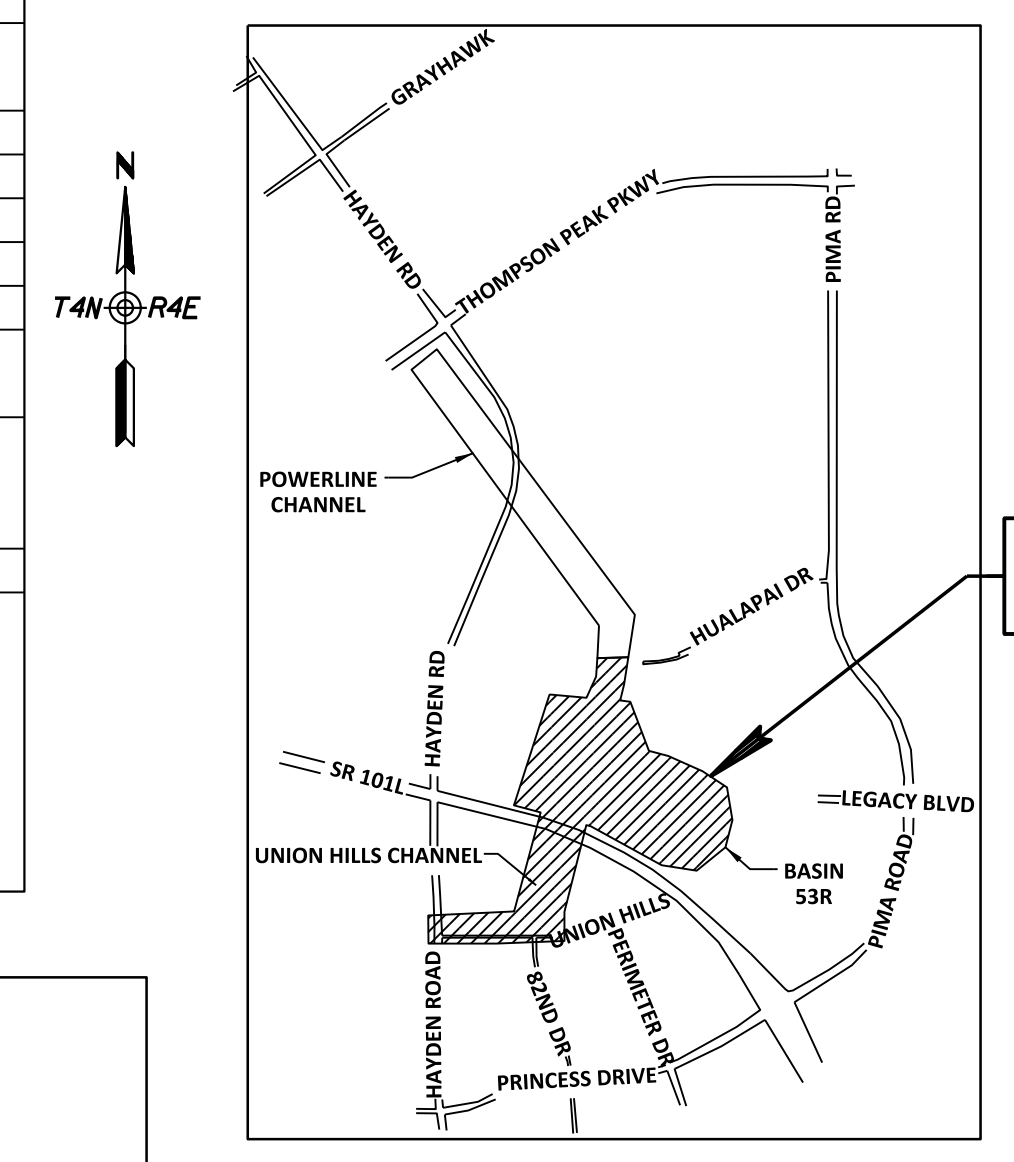
NO CONFLICT SIGNATURE BLOCK				
Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric	APS	Carby Hrober	602-493-4225	
Telephone	CenturyLink	USIC Dispatch	888-778-9140	07/02/19
	ATT	NDCl Group	800-241-3624	
Natural Gas	Southwest Gas	Aaron Newell	623-587-3163	07/10/19
Cable TV	Cox	USIC Dispatch	800-778-9140	
Water	City of Scottsdale	Elizabeth Norton	480-312-5650	
Sewer	City of Scottsdale	Elizabeth Norton	480-312-5650	
Storm	City of Scottsdale	Nerijus Baronas	480-312-2500	
ITS	City of Scottsdale	Ed Fox	480-312-5620	
	Level 3 Comm	Judy Henry	877-366-8344	
Fiber optic	City of Scottsdale	Ed Fox	480-312-5620	
	Zayo Group AGL	Dispatch	801-364-1063	
	ATT	NDCl Group	800-241-3624	
Transportation	ADOT	Dinesh Doshi	602-712-8751	
Engineer's Certification				
I, _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.				
Signature		Date		

BANK CUT, FILL, EXPORT QUANTITIES*

CUT	FILL	NET
273,460 CU. YDS.	28,651 CU. YDS.	244,808 CU. YDS.

* Not Adjusted for Swell or Shrinkage

FLOOD INSURANCE RATE MAP BLOCK (FIRM)					
Community Number	Panel # Panel Date	Suffix	Date of FIRM (Index Date)	FIRM Zone	Base Flood Elevation (in AO Zone use Depth)
045012	1320 10/16/13	L	11/04/15	AO	DEPTH 1FT VEL. 3FT/S



Vicinity Map
N.T.S.

JULY 2019

SHEET INDEX

Sht. No.	Dwg. No.	Description
1	G1	COVER SHEET
2	G2	GENERAL NOTES
3	G3	LEGEND AND ABBREVIATIONS
4	G4	CHANNEL TYPICAL SECTIONS
5	G5	QUANTITY SUMMARY SHEET
6-7	G6-G7	GEOMETRIC CONTROL PLAN
8	RW1	RIGHT OF WAY PLAN
9-15	SD1-SD7	CHANNEL PLAN & PROFILE
16-19	SD8-SD11	ACCESS ROAD PLAN & PROFILE
20-38	D1-D19	DETAILS

BENCH MARK (COS NAVD '88)

Description

HORIZONTAL CONTROL:
SET GPS BASE POINT 10000 USING VRS (FROM USURY MOUNTAIN). ALL SECTION CORNERS, CENTERLINE MONUMENTS AND S6 TOPO CONTROL POINTS WERE LOCATED FROM THIS GPS BASE POINT. AN ADDITIONAL GPS BASE POINT 10001 WAS SET. AFTER COMPLETING THIS FIELD WORK, THE PROJECT NEEDED TO BE CALIBRATED TO THE CITY OF SCOTTSDALE (COS) COORDINATE SYSTEM AND BENCHMARKS. ONLY ONE ORIGINAL COS CONTROL MONUMENT WAS FOUND SO THIS POINT WAS HELD BOTH HORIZONTALLY AND VERTICALLY. FOUR OTHER SECTION CORNERS WERE POSSIBLY ORIGINAL COS CONTROL MONUMENTS OR AT THE PERPETUATION OF THE ORIGINAL COS CONTROL MONUMENT. A CALIBRATION WAS PERFORMED HOLDING THESE FIVE MONUMENTS WITH ALL RESIDUALS BEING 0.14' OR LESS.

VERTICAL CONTROL:
3" MARICOPA COUNTY BRASS CAP STAMPED "T4N R4E S26 S25 S35 S26 LS33307 2003" FLUSH IN CONCRETE NORTHEAST CORNER SECTION 35, T4N R4E. ELEVATION = 1612.665 (NAVD88 DATUM) PER PLSS RECORD OF SURVEY RECORDED IN BOOK 693, PAGE 3, MCR.

City of Scottsdale approved plans shall be kept on the job site at all times during the course of construction.

CROSSROADS EAST DRAINAGE INFRASTRUCTURE
PROJECT NO. 400-FB53B-56047

DR/STAFF APPROVAL NO.

CASE NO. 124-SA-2018
PLAN CHECK NO: 4817-18-6

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_G2_General Notes.dgn PLOT DATE: 3/13/2020 6:52:46 AM

GENERAL CONSTRUCTION NOTES FOR CAPITAL PROJECTS

- A. All improvement construction shall comply with the 2015 Maricopa County Association of Governments Standard Specifications and Details for Public Works Construction as amended by the latest version of the City of Scottsdale Supplemental Standard Specifications and Details and City of Scottsdale's Design Standards & Policies Manual (DS&PM). If there is a conflict, the latter shall apply. All facilities construction shall comply with the latest building codes as amended and adopted by the City of Scottsdale.
- B. The engineering designs on these plans are approved by the City in scope and not in detail. If construction quantities are shown on these plans, they are not verified by the City.
- C. Based on the information submitted on the plans and associated documents, the City has reviewed and found them to be in accordance with the Scottsdale Revised Code and are acceptable for permit issuance. This acceptance by the City does not authorize violations of any applicable code, ordinance or standard as adopted by the Scottsdale Revised Code.
- D. Approval of the plans by the City is valid for six months. If a permit for the construction has not been issued within six months of review, the plans shall be resubmitted to the City for reapproval.
- E. Any deviation from the approved plans shall be reviewed and approved by the City prior to that change being incorporated into the project.
- F. A City Capital Projects Inspector will inspect all work within the City rights-of-way, easements and facilities.
- G. Any Special Inspection required shall be in addition to any routine inspection by the City.
- H. City encroachment and building permits are required for work in public rights-of-way, easements granted for public purposes and facilities. Permits will be issued by the City through the City's One Stop Shop. Copies of all permits shall be retained on-site and shall be available for inspection at all times. Failure to produce the required permits will result in immediate work stoppage until the proper permit documentation is obtained.
- I. The Contractor shall be responsible for obtaining all necessary permits for salvaging protected native plants prior to the start of construction.
- J. Wherever excavation is done contact the Blue Stake Center at (602) 263-1100 two working days before excavation is to begin. The Center will see that the location of the underground utility lines is identified for the project.
- K. All excavation and grading which is not in public rights-of-way or in easements granted for public purposes must conform to Section 1803 and Appendix J of the latest International Code Council as adopted and amended by the City of Scottsdale. A permit for this grading must be secured from the City.
- L. Thrust restraint, where required, on all City water lines shall be provided using Megalug mechanical joint restraints or City-approved equal.
- M. Any asphalt mix design used on City projects shall have been approved for that use per Section 5-10 the City's DS&PM and appear on the "Approved List of Asphalt Mixes" as distributed by the East Valley Asphalt Committee (EVAC).
- N. The Contractor shall be responsible to remove and replace, at no additional cost to the City, any and all pavement, sidewalk, curb and gutter, drainage structures, etc. outside the pay limit that are damaged due to their activities on the project. This includes, but is not limited to, the removal and replacement of newly cracked roadway infrastructure, the removal and replacement of existing cracked roadway infrastructure where the cracks have been enlarged due to the Contractor's operations, the removal and replacement of deformed roadway infrastructure. All sawcuts used for the removal of these items shall be perpendicular and parallel to the centerline controlling that item, or at the direction of the City's Capital Projects Inspector.

CONCRETE RUBBLE SPECIFICATION

1. The specific gravity shall be at least 2.3 or the specific weight shall be at least 143.5 lb per cubic foot.
2. Materials shall be free of grease, oils, paint, chemicals, and other pollutants.
3. All protruding foreign material such as rebar must be cut off.
4. The longest dimension shall not be more than three times the shortest dimension. The length shall not be greater than twice its width.
5. Materials, when trucked or imported to the site, must be sorted at the site.
6. Materials shall be stockpiled before placement to allow for inspection. Visual inspection shall ensure that materials are free of cracks, soft seams or other structural defects.
7. Materials shall be hard, durable, rough and angular in shape. Additional tests may be required subject to the Inspector's judgment. Examples of such tests include the Los Angeles Abrasion Test (AASHTO T96), Durability and Soundness Test (AASHTO T104), Absorption Test (AASHTO T85), Drop Test (USACE, 1990, EM 1110-2-2302). The requirements for these tests are a maximum loss of 45% for the Los Angeles Abrasion Test, a maximum loss of 12% for the Durability and Soundness Test, and a maximum of 5% for the Absorption Test. The Drop Test requirements are: no new cracks developed, or no existing crack widened more than an additional 0.1 inch, or final largest dimension greater than or equal to 90% of the original largest dimension of a dropped piece.
8. The maximum weight of any piece shall not exceed 500 lbs.
9. Materials shall be reasonably well graded. The gradation shall be based on general rip-rap gradation documented in Detail 1 on sheet D13. All large slabs shall be broken up to conform to the gradation requirement.
10. All material shall be placed in a manner such that the large and small sizes are evenly distributed and placed so as to fill the voids between the larger pieces without sharp exposed edges.
11. All material shall be placed in a manner such that each piece is touching the adjacent piece in a configuration creating the highest possible density while producing a reason-ably solid mass within the limits shown in the plans.
12. The largest material must be keyed into the toe and also used in the base of the riprap.

NATIVE TREE AND CACTI LOCATIONS

POINT	NORTHING	EASTING	ITEM
1	963962.16	702906.00	Tree
2	963971.75	703184.46	Tree
3	963965.63	703208.57	Tree
4	963967.70	703375.92	Tree
5	963991.35	703591.47	Tree
6	963958.36	703699.09	Tree
7	963972.47	703707.41	Tree
8	963989.50	703707.33	Tree
9	963996.57	703766.70	Tree
10	964010.86	703779.82	Tree
11	964014.30	703798.41	Tree
12	965020.74	704146.18	Tree
13	965558.07	704151.19	Tree
14	965552.01	704165.04	Tree
15	965791.45	704179.92	Tree
16	965810.21	704184.52	Tree
17	966425.56	704663.47	Tree
18	966480.75	704648.34	Tree
19	966450.98	704691.09	Tree
20	966446.39	704756.13	Tree
21	966487.03	704752.07	Tree
22	966533.45	704798.35	Cactus
23	966537.56	704774.17	Tree
24	966588.34	704686.76	Tree
25	966600.46	704766.26	Tree
26	966578.82	704801.50	Tree
27	966680.00	704859.11	Tree
28	966741.31	704786.17	Tree
29	966754.59	704920.80	Tree
30	966815.01	704811.88	Tree
31	966805.01	704840.67	Tree
32	966811.90	704859.99	Tree
33	966824.30	704867.74	Tree
34	966864.08	704848.72	Tree
35	966862.20	704883.08	Tree
36	966885.56	704848.42	Tree
37	966875.17	704860.53	Cactus
38	966843.00	704953.83	Tree
39	966862.22	704966.36	Tree
40	966902.78	704974.34	Tree
41	966911.09	704917.60	Tree
42	966941.80	704982.23	Tree
43	967000.82	705007.41	Tree
44	967024.43	704886.99	Tree
45	967051.35	704912.46	Tree
46	967057.80	704918.84	Tree
47	967059.15	704939.84	Tree
48	967065.38	704931.53	Cactus
49	967109.81	704896.94	Tree
50	967126.74	704971.84	Tree
51	967100.26	705014.36	Cactus
52	967177.19	705018.66	Cactus
53	967211.72	704956.73	Cactus
54	967224.57	704973.58	Cactus
55	967384.60	705000.34	Tree
56	967447.76	705019.39	Tree
57	967462.56	705019.85	Cactus
58	965745.20	705373.78	Tree
59	965749.89	705414.86	Tree
60	965739.32	705403.89	Tree
61	965688.87	705529.69	Tree
62	965622.85	705493.21	Tree
63	965576.02	705416.35	Tree
64	965563.58	705530.88	Tree
65	965468.81	705494.06	Tree

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POINT	NORTHING	EASTING	ITEM
66	965418.21	705498.20	Tree
67	965414.46	705512.11	Tree
68	965402.32	705502.85	Tree
69	965165.99	705093.35	Tree
70	965124.89	705123.69	Tree
71	965141.67	705175.52	Tree
72	965109.73	705233.25	Tree
73	965134.60	705260.31	Tree
74	965077.19	705266.96	Tree
75	965060.18	705279.34	Tree
76	965046.54	705270.83	Tree
77	965045.03	705287.79	Tree
78	965040.47	705299.37	Tree
79	965029.03	705299.02	Tree
80	965022.23	705318.30	Tree
81	965011.24	705356.62	Tree
82	964939.18	705456.90	Tree
83	964926.31	705505.02	Tree
84	964908.34	706015.23	Tree
85	964954.60	706049.41	Cactus
86	965213.66	705434.55	Tree
87	965217.87	705442.02	Tree
88	965229.59	705453.81	Tree
89	965235.33	705448.69	Tree
90	965243.86	705461.30	Tree
91	965379.42	705694.03	Tree
92	965373.78	705824.90	Tree
93	965333.95	705857.39	Tree
94	965291.87	705869.26	Tree
95	965269.46	705914.72	Tree
96	965524.25	706224.25	Tree
97	965423.34	706159.12	Tree
98	965374.36	706160.13	Tree
99	965357.84	706178.22	Tree
100	965359.46	706191.36	Tree
101	965350.94	706194.10	Tree
102	965346.73	706204.29	Tree
103	965343.25	706215.63	Tree
104	965339.25	706222.90	Tree
105	965354.24	706240.28	Tree
106	965280.85	706315.12	Tree
107	965322.38	706379.49	Tree
108	965446.07	706337.16	Tree
109	965449.45	706354.12	Tree



DATE: _____		REVISION: _____		BY: _____	
ENGINEER		PUBLIC WORKS			
		CAPITAL PROJECT MANAGEMENT			
7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251					
SHEET TITLE GENERAL NOTES					
PROJECT TITLE CROSSROADS EAST DRAINAGE INFRASTRUCTURE					
SCALE HORIZ. N/A VERT. N/A	DESIGNED AC	DATE 07/19	BID NO. XXXX	SHT. G2	
DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047		2 OF 38	

ACRES	AC
AGGREGATE BASE	AB
AHEAD	AHD
AIR RELEASE VALVE	ARV
ALUMINUM	AL
AMERICAN SOCIETY FOR TESTING AND MATERIALS	ASTM
AMERICAN TELEPHONE & TELEGRAPH	AT&T
ANGLE POINT	AP
APPROXIMATE	APPROX
ARIZONA DEPARTMENT OF TRANSPORTATION	ADOT
ASPHALTIC CONCRETE	AC
ASSESSORS PARCEL NUMBER	APN
AVENUE	AVE
BACK OF CURB	B/C
BACK OF CURB RETURN	BCR
BACKFLOW PREVENTER	BFP
BEGIN	BEG
BLACK	BK
BOULEVARD	BLVD
BRASS CAP	BC
BRASS CAP FLUSH	BCF
BRASS CAP IN HANDHOLE	BCHH
CALCULATED	C
CATCH BASIN	CB
CENTERLINE	CL
CONSTRUCTION	CST
CENTURYLINK	CLN
CHISLED X	CHX
CITY OF PHOENIX	COP
CITY OF SCOTTSDALE	COS/C.O.S.
CONCRETE BOX CULVERT	CBC
COTTON PICKER SPINDLE	CPS
CAST IN PLACE CONCRETE PIPE	CIP / C.I.P.
CONSTRUCTION	CONSTR / CST
CORNER	COR
COUNTY	CO
CURB AND GUTTER	C&B
DEGREES	°
DEGREE OF CURVE	D
DEPARTMENT	DEPT
DESIGN STANDARDS & POLICIES MANUAL	DS&PM
DETAIL	DTL
DOWN	DWN
DRAWING	DWG
DRAINAGE	DRAIN
DRIVE	DR
DRIVEWAY	DWY
DUCTILE IRON PIPE	DIP / D.I.P.
EACH	EA
EASEMENT	ESMT
EAST	E
EASTBOUND	EB
EAST VALLEY ASPHALT COMMITTEE	EVAC
EDGE OF PAVEMENT	EP
ELECTRIC JUNCTION BOX	EJB
ELECTRIC CABINET	CAB
ELECTRIC METER	EM
ELECTRIC STUB UP	ESU
ELECTRIC VAULT	EV
ELECTRICAL	ELEC
ELEVATION	ELEV
END CURB RETURN	ECR
EQUATION	EQUA
EQUIVALENT	EQUIV
EXISTING	EXIST
FACE OF CURB	F/C
FEDERAL	FED
FEET	FT / '
FIBER OPTIC	F/O
FINISHED GRADE	FG
FLOWLINE	FL
FOUND	FD
GAUGE	GA
GREEN	GN
GOVERNMENT LAND OFFICE	GLO
GUTTER	G
HANDHOLE	HH
HEADWALL	HDWL
HIGHWAY	HWY
HIGH WATER ELEVATION	HWE
HYDRAULIC GRADE LINE	HGL
INCH	IN / "
INTELLIGENT TRANSPORTATION SYSTEM	ITS
INVERT	INV
IRRIGATION	IRR
JUNCTION	JCT

LANE
LINEAR FEET
LEFT
LENGTH OF CURVE
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
MARICOPA COUNTY RECORDER
MARICOPA COUNTY HIGHWAY DEPARTMENT
MARICOPA ASSOCIATION OF GOVERNMENTS
MAXIMUM
MEASURED
MILE POST
MILLIMETER
MINIMUM
MINUTES
MISCELLANEOUS
MONUMENT
NATIONAL GEODETIC VERTICAL DATUM
NATURAL GROUND
NORTH
NOT TO SCALE
NUMBER
OFFSET
OUTSIDE
PARCEL
PARKWAY
PAVEMENT
PEDESTRIAN
PROPOSED GRADE LINE
PLACE
POINT OF COMPOUND
POINT OF CURVATURE
POINT OF INTERSECTION
POINT OF REVERSE CURVE
POINT OF TANGENT
POINT ON CURVE
POINT ON TANGENT
POINT ON SEMI-TANGENT
POLYETHYLENE
PORTLAND CEMENT CONCRETE PAVEMENT
PROPOSED
PROPOSED GRADE LINE
PUBLIC UTILITY EASEMENT
POINT OF VERTICAL INTERSECTION
RADIUS
RAILROAD
RAISED PAVEMENT MARKER
RANGE
REBAR AND CAP
RECORD
REFERENCE
REINFORCED CONCRETE PIPE
RUBBER GASKET REINFORCED CONCRETE PIPE
RIGHT
RIGHT OF WAY
ROAD
SALT RIVER PROJECT
SCUPPER
SECONDS
SECTION
SHEET
SIDEWALK
SIGN OR STREET SIGN
SOUTH
SOUTHWEST GAS SPECIFICATION(S)
STEEL
STORM DRAIN MANHOLE
SQUARE
SQUARE FEET
SQUARE YARD
STANDARD
STATE ROUTE
STATION
STREET
SUBDIVISION
SUPPLEMENTAL
TANGENT LENGTH
TELEPHONE
TEMPORARY CONSTRUCTION EASEMENT
TEMPORARY
TO BE VERIFIED
TOP OF CURB
TOP OF WALL
TOWNSHIP

LN
LF
L / LT
L
MUTCD
MCDOT
MCR
MCHD
MAG
MAX
(M)
MP
MM
MIN
'
MISC
MON
NGVD
NG
N
NTS
NO
OFF
OD
PAR
PKWY
PVMT
PED
PGL
PL
PCC
PC
PI
PRC
PT
POC
POT
POST
PE
PCCP
PROP
PGL
PUE
PVI
R
RR
RPM
R
R&C
(R)
REF
RCP
RGRCP
R / RT
R/W / ROW
RD
SRP
SCPR
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SEC
SHT
S/W
SGN
S
SWG
SPEC
STL
SDMH
SQ
SF
SY
STD
SR
STA
ST
SUBD
SUPPL
T
TL
TCE
TEMP
TBV
TC
TW
T

TRAFFIC BARRICADE MANUAL
TRAFFIC CONTROL PLANS
TRAFFIC INTERCHANGE
TRAFFIC SIGNAL
TRANSFORMER
TYPICAL
UNKNOWN
VALLEY GUTTER
VARIES
VEHICULAR NON-ACCESS EASEMENT
VELOCITY
VOLUME
WATER
WATER METER
WELL WATER LINE
WATER VAULT / MANHOLE
WEST
WESTBOUND
WITH
YEAR

TBM
TCP
TI
T/S
TSFM
TYP
UNKN
VG
VAR
VNA
VEL
VOL
WTR / WAT
VM
WELL
WMH
W
WB
W/
YR

SYMBOL LEGEND

—————	EXISTING R/W LINE	●——●	Proposed Gate
——□——□——□——	EXISTING TRAFFIC SIGNAL	▶——	Slope Direction
⊠	EXISTING RED LIGHT CAMERA	---1535---	Existing Contours
○——●	EXISTING STREET LIGHT	- - - - -	Proposed Centerline
○——●	RELOCATED STREET LIGHT	←——~——~	Flow Direction
▲	EXISTING TRAFFIC SIGN	——○——○——	Proposed Barrier Wire Fence
▲ ▲	NEW TRAFFIC SIGN		
▨	PAVEMENT SECTION NO. 1		
▩	MEDIAN PAVING		
▩	CONCRETE MEDIAN NOSE PAVING		
▨	ASPHAULTIC EMULSION SLURRY SEAL TYPE 1		
⊙	SEWER MANHOLE		
⊙	WATER MANHOLE		
⊙	TELEPHONE MANHOLE		
⊙	ELECTRICAL MANHOLE		
⊙	IRRIGATION MANHOLE		
⊙	STORM DRAIN MANHOLE		
⊞	ELECTRICAL METER		
⊞	TELEVISION METER		
⊞	WATER METER		
⊞	VAULT		
⊞	FIBER OPTIC VAULT		
⊞	CABLE TELEVISION VAULT		
⊞	PULL BOX		
⊞	EXISTING JUNCTION BOX/PULL BOX		
⊞	RELOCATED JUNCTION BOX/PULL BOX		
⊗	WATER VALVE		
⊕	WATER HYDRANT		
⊙	NATIVE TREE		
★	NATIVE CACTUS		



DATE: 3/13/20		REVISION:		CITY COMMENTS		BY: A.S.N.	
				PUBLIC WORKS			
				CAPITAL PROJECT MANAGEMENT			
				7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
LEGEND AND ABBREVIATIONS							
PROJECT TITLE							
CROSSROADS EAST DRAINAGE INFRASTRUCTURE							
SCALE		DESIGNED		DATE		BID NO.	
HORIZ. N/A		AC		07/19		XXXX	
VERT. N/A		DRAWN		AS-BUILT		PROJECT NO.	
		JJP		XX/XX		400-FB53B-56047	
						SHT. 63	
						3 OF 38	

PLOT DATE: 3/13/2020 8:36:15 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_G4_Typical Sections.dgn

Begin Station	End Station
204+95.94	211+90.00

Begin Station	End Station
213+11.00	213+86.88

Begin Station	End Station
10+10.68	11+76.23

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

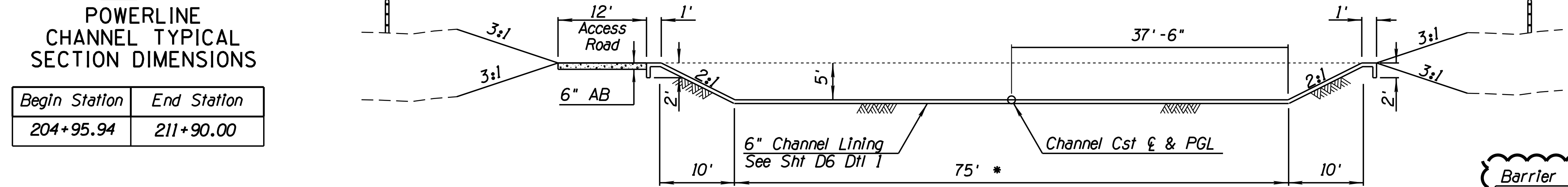
Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

Barrier Wire Fence
See Sheets D14, D16 & D17

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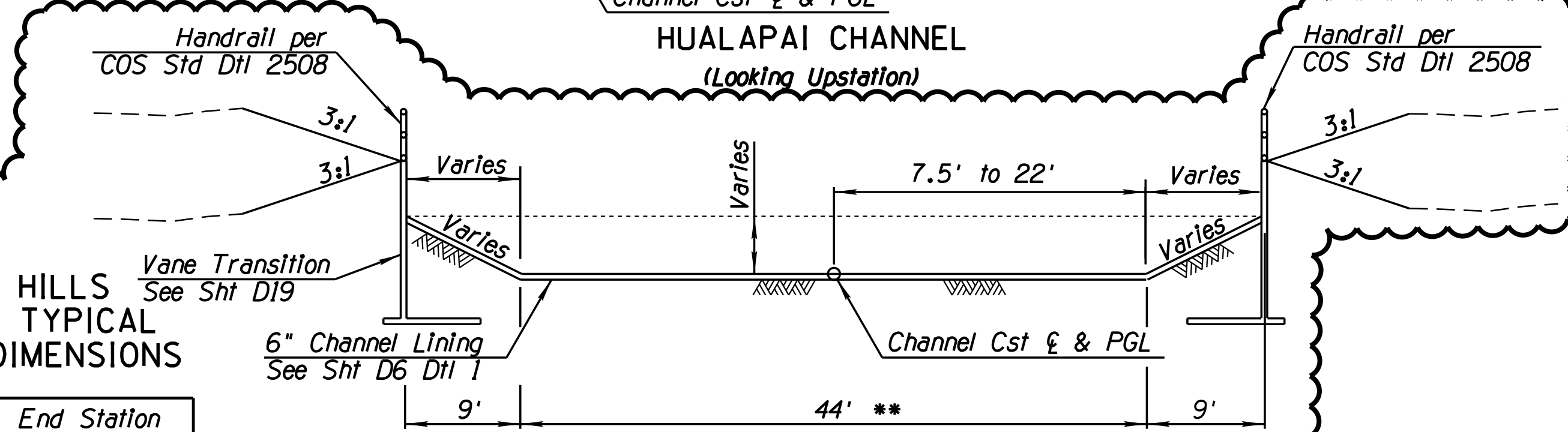
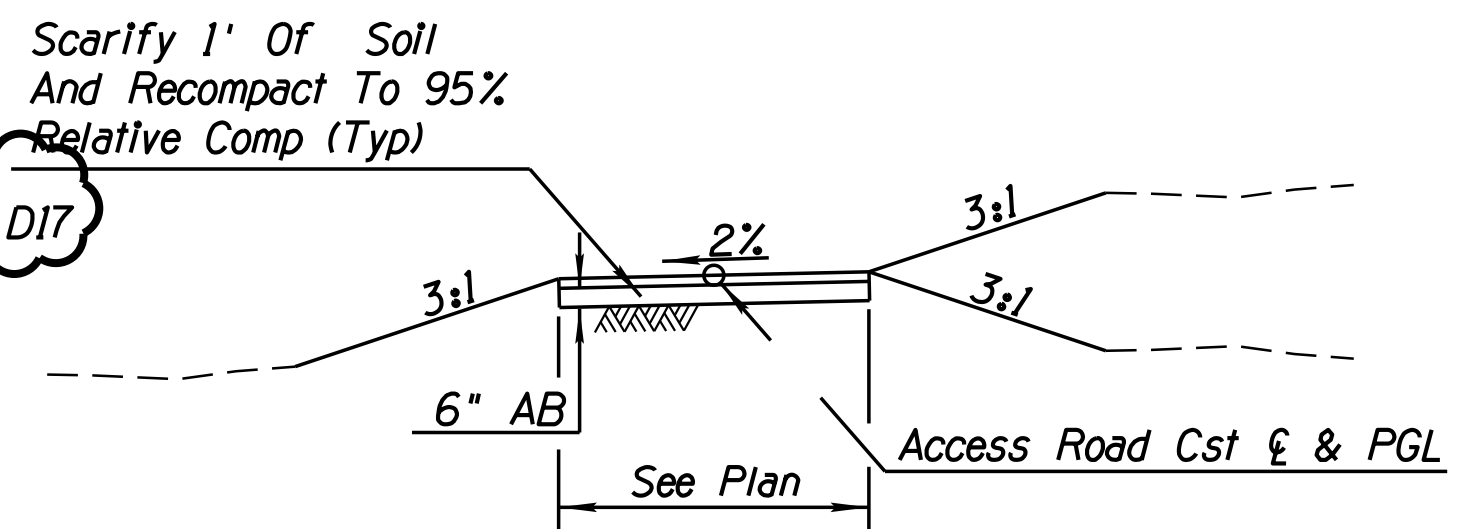
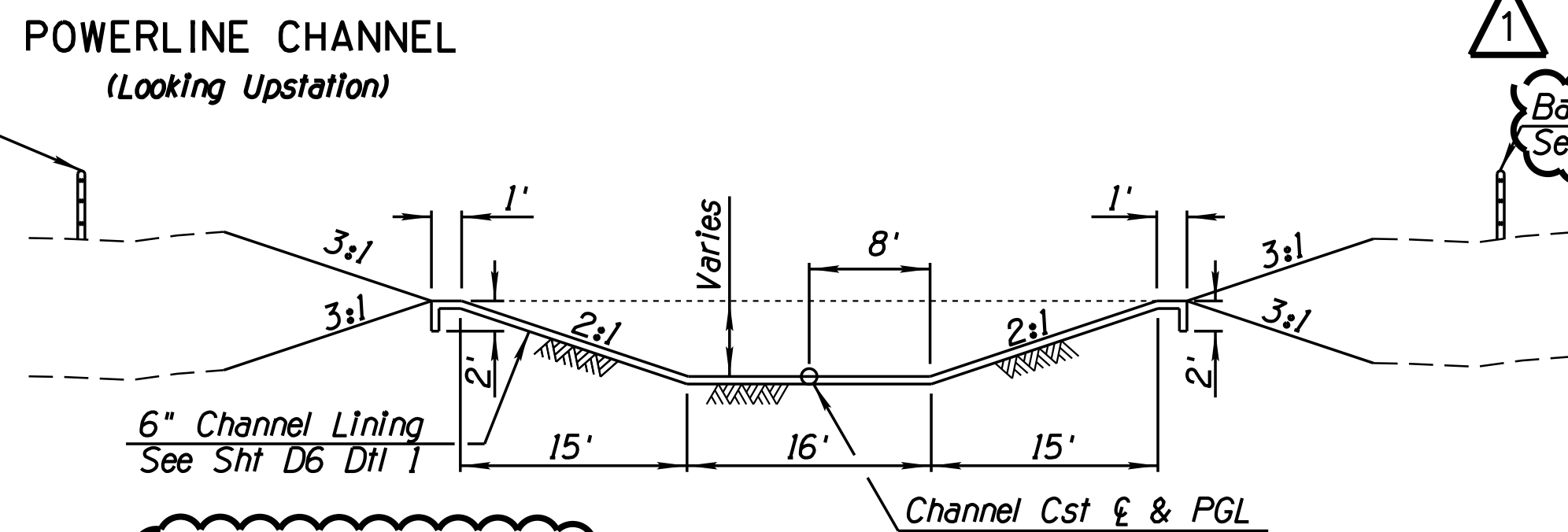
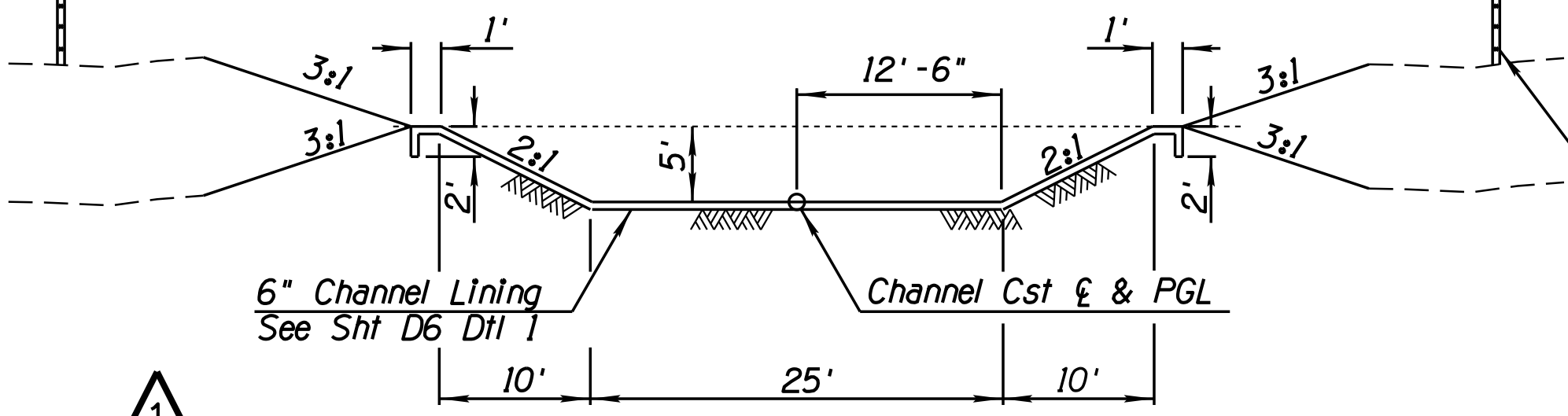
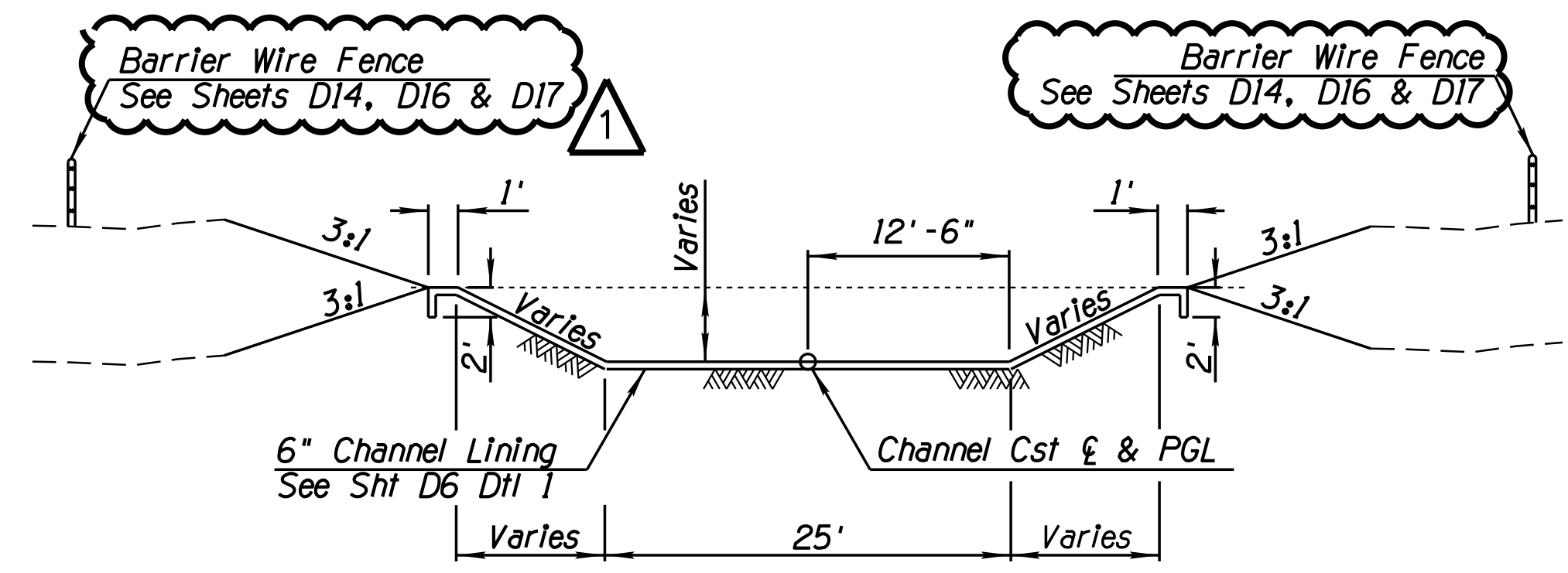
2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
MBAKERINTL.COM



POWERLINE CHANNEL
(Looking Upstation)
*Varies from Sta 211+90.00 to Sta 213+11.00

POWERLINE CHANNEL TYPICAL SECTION DIMENSIONS

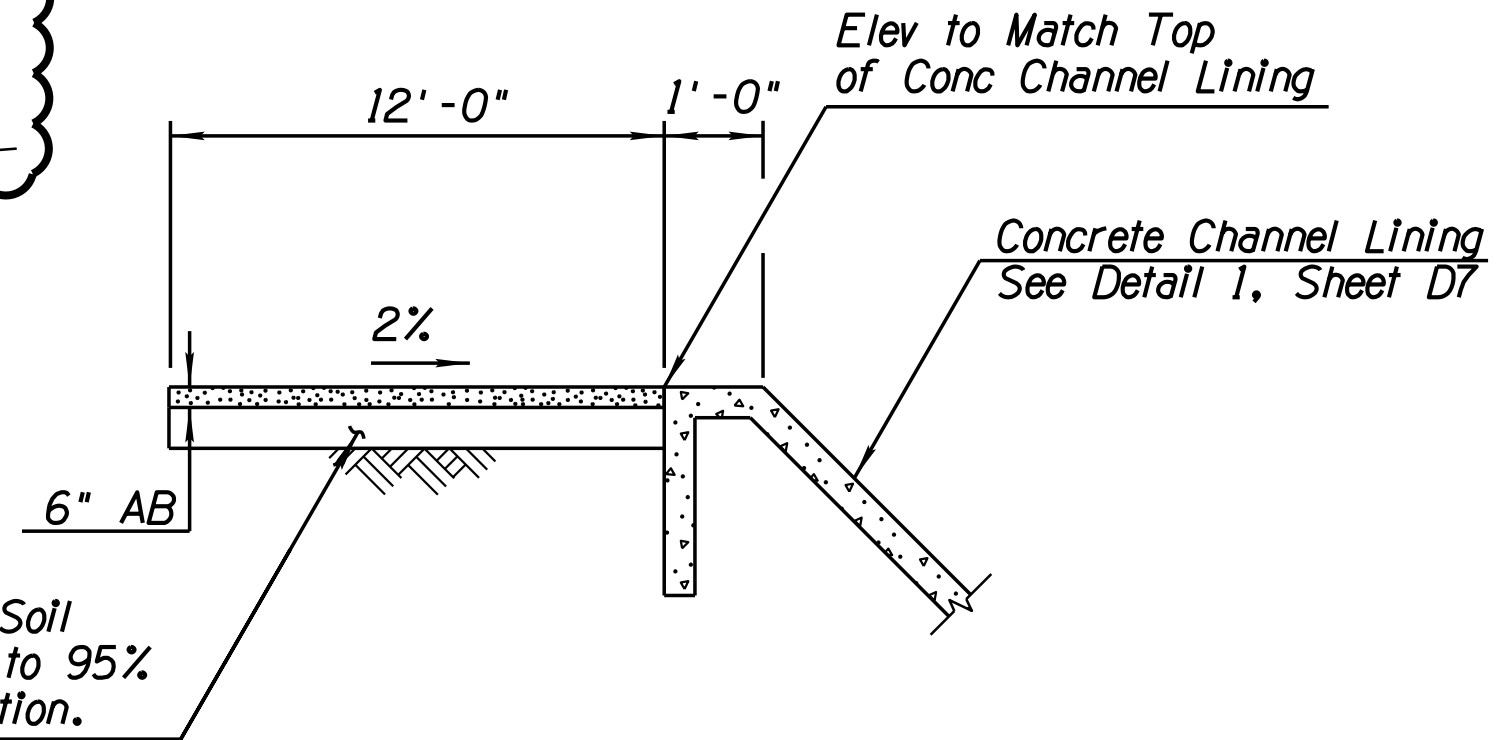
Begin Station	End Station
213+86.88	214+36.88



UNION HILLS CHANNEL TYPICAL SECTION DIMENSIONS

Begin Station	End Station
101+42.06	101+90.00

UNION HILLS CHANNEL
(Looking Upstation)
**Varies from Sta 101+90.00 to Sta 102+51.38

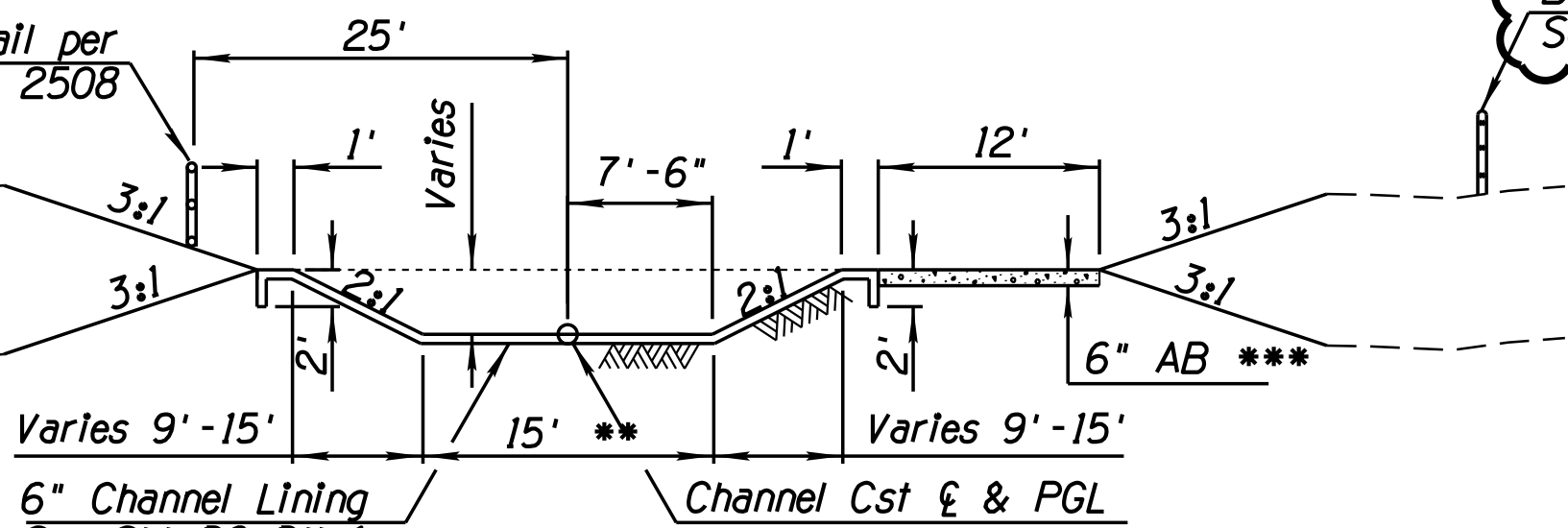


UNION HILLS CHANNEL VANES
(Looking Upstation)

Begin Station	End Station
102+26.90	101+41.08

UNION HILLS CHANNEL TYPICAL SECTION DIMENSIONS

Begin Station	End Station
102+76.89	111+53.58



Transition to Vanes between Sta 102+76.89 to 102+26.90

*** Option to Reuse Onsite Asphalt Millings

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA 811

Call 811 or click Arizona811.com

DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.

Signature: ZEEZ SALIBA

CITY OF SCOTTSDALE, ARIZONA

7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

SHEET TITLE: CHANNEL TYPICAL SECTIONS

PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE: HORIZ. N/A VERT. N/A	DESIGNED: AC	DATE: 07/19	BID NO.: XXXX	SHT. G4
DRAWN: WDF	AS-BUILT: XX/XX	PROJECT NO.: 400-FB53B-56047	4 OF 38	

28-DR-2020 9/11/2020

Plan Check No: 4817-18-6 124-SA-2018

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_G5_Quantity_Summary_Sheet.dgn PLOT DATE: 3/13/2020 2:22:50 PM

CONSTRUCTION QUANTITIES

BID ITEM NO.	BID ITEM DESCRIPTION	PLAN REF. NO.	UNITS	PLAN SHEET NUMBER																			
				SD1	SD2	SD3	SD4	SD5	SD6	SD7	SD8	SD9	SD10	SD11	D1	D5	D7	D8	D9	D16	D18	D19	TOTAL
505192	CONCRETE CHANNEL LINING (D11 1 Sheet D7)	2	SY	1,872	2,675			4,183	6,233														14,963
505191	CONCRETE MAINTENANCE RAMP (D11 3 Sheet D8)	4	EA	1				1															2
625022	STORM DRAIN MANHOLE (MAG 521 & 522)	5	EA		2	2	2																6
505131	CONCRETE HEADWALL (D11s on Sheet D9)	6	EA		1																		1
621060	60'' CMP	8	LF		264	1,800	340																2,404
515901	ACCESS BARRIER (COS 2526)	9	EA		2																		2
220403	DUMPED RIPRAP (TYPE I, D50 = 6'')	13	CY					647				55	15		1,935	20	33						2,705
220403	DUMPED RIPRAP (TYPE II, D50 = 9'')	13	CY					389															389
220403	DUMPED RIPRAP (TYPE III, D50 = 12'')	13	CY												1,220								1,220
618538	PIPE COLLER (MAG 505)	15	EA				2																2
310106	6'' AB ACCESS ROAD	17	SY	284	759				841		722	588	818	262	3,803								8,077
520001	HANDRAIL (COS 2508)	19	LF	305	46														600				951
515902	TRASH RACK	20	EA		1		1																1
403710	PAINT EXISTING HANDRAIL	21	LS	1																			1
403711	CONSTRUCT WEIR WALL	22	LS							1													1
505608	STRUCTURAL CONCRETE		CY															15	1,289		580	81	1,965
206001	STRUCTURAL EXCAVATION		CY																10,165		2,566	1,667	14,398
206101	STRUCTURAL BACKFILL		CY																941		154	100	1,195
430009	HYDROSEEDING		ACRE												21								21
505501	REINFORCING STEEL		LB															1,349	53,576		24,597	10,210	89,732
XXXXXX	BARRIER WIRE FENCE	23	LF																	9,435			9,435
XXXXXX	WIRE FENCE GATE	24	EA																	7			7

REMOVAL QUANTITIES

BID ITEM NO.	BID ITEM DESCRIPTION	PLAN REF. NO.	UNITS	PLAN SHEET NUMBER																
				SD1	SD2	SD3	SD4	SD5	SD6	SD7	SD8	SD9	SD10	SD11	D1	D5	D7	D8	D9	TOTAL
350021	REMOVE CONCRETE	1	SY							18										18
430621	SALVAGE AND RELOCATE NATIVE TREES (COS 2620)	3	EA	3	8		1	29	4						55					100
430602	SALVAGE AND RELOCATE NATIVE CATI (COS 2620)	7	EA					3	5						1					9
350801	REMOVALS (MISC)		LS																	1
350716	BANK EARTHWORK EXPORT		CY												244,808					244,808
350317	SALVAGE AND RELOCATE RIPRAP	8	SY							140										140

Note: The Estimated Quantities are Shown for Informational Purposes Only. The Contractor Shall be Responsible for the Completeness and Accuracy of a Detailed Estimate Based on these Plans.



1

ENGINEER
REGISTERED PROFESSIONAL ENGINEER (CIVIL)
NO. 45986
ZEEZ SALIBA
ARIZONA 3/13/20
EXPIRES 3/13/21

CITY OF SCOTTSDALE
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.

SHEET TITLE: QUANTITY SUMMARY SHEET

PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE: N/A
HORIZ. N/A
VERT. N/A

DESIGNED: AC
DRAWN: JJP

DATE: 07/19
AS-BUILT: XX/XX

BID NO.: XXXX
PROJECT NO.: 400-FB53B-56047

SHT.: G5
5 OF 38

PLOT DATE: 3/13/2020 6:54:34 AM

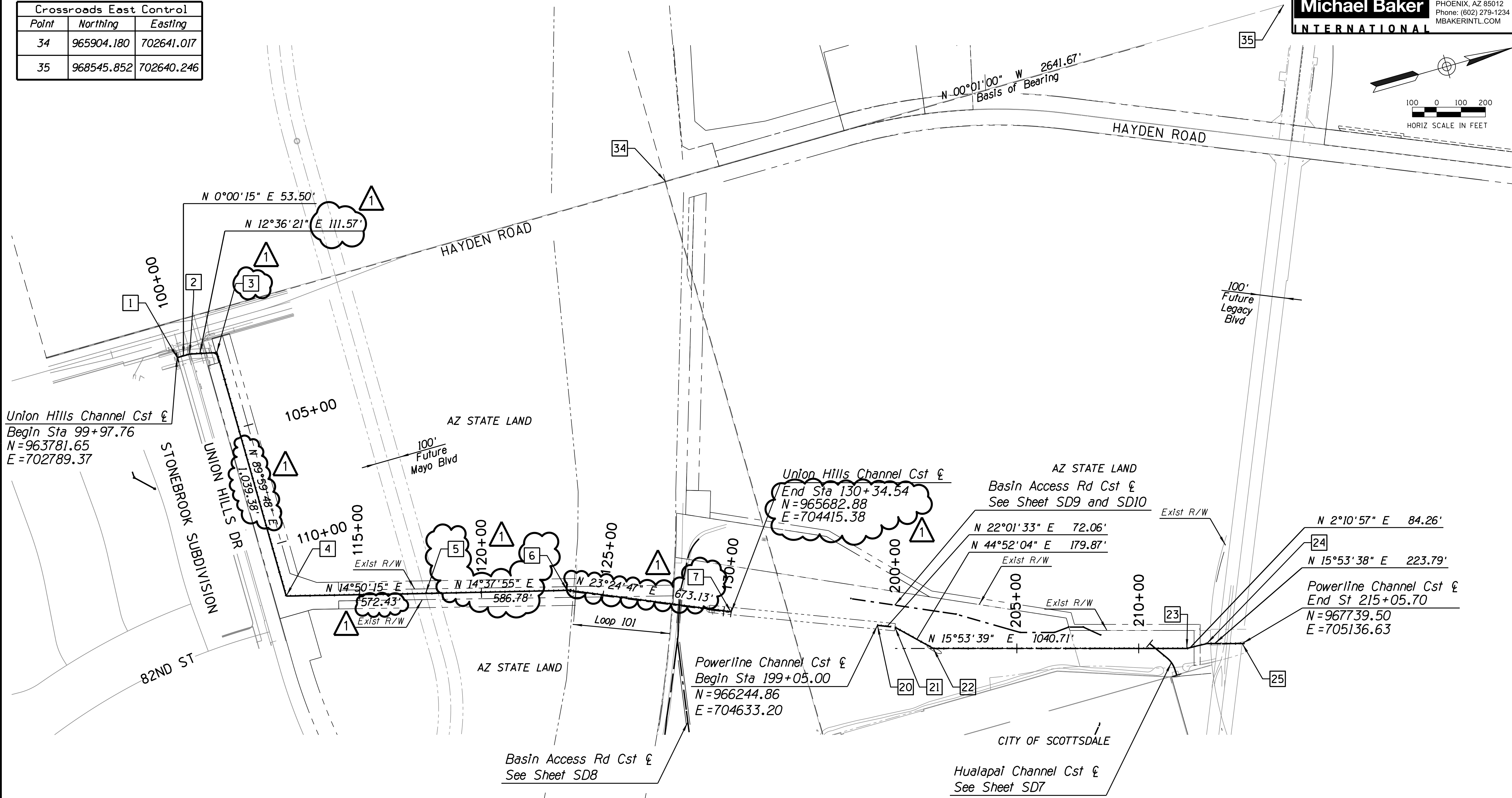
DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_G6_Channel_Geo_01.dgn

Crossroads East Control		
Point	Northing	Easting
34	965904.180	702641.017
35	968545.852	702640.246

Michael Baker
INTERNATIONAL

2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
MBAKERINTL.COM

100 0 100 200
HORIZ SCALE IN FEET



Union Hills Channel Point Table			
Point	Northing	Easting	Station
1	963781.65	702789.37	99+97.76
2	963835.15	702789.37	100+51.26
3	963944.03	702813.72	101+62.83
4	963944.09	703853.10	112+02.21
5	964497.43	703999.68	117+74.64
6	965065.18	704147.91	123+61.42
7	965682.88	704415.38	130+34.54

Powerline Channel Point Table			
Point	Northing	Easting	Station
20	966244.86	704633.20	199+05.00
21	966311.66	704660.23	199+77.06
22	966439.14	704787.13	201+56.93
23	967440.07	705072.13	211+97.64
24	967524.26	705075.34	212+81.90
25	967739.50	705136.63	215+05.70

DATE: 3/09/20	REVISION:	CITY COMMENTS	BY: A.S.N.
SHEET TITLE: GEOMETRIC CONTROL PLAN			
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE			
SCALE: HORIZ 1"=200'	DESIGNED: AC	DATE: 07/19	BID NO: XXXX
VERT. N/A	DRAWN: JJP	AS-BUILT: XX/XX	PROJECT NO: 400-FB53B-56047
			SHT. G6
			6 OF 36

Plan Check No: 4817-18-6

124-SA-2018

28-DR-2020
9/11/2020

PLOT DATE: 3/13/2020 6:55:06 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_G7_Channel_Geo_02.dgn

Crossroads East Control		
Point	Northing	Easting
34	965904.180	702641.017
35	968545.852	702640.246

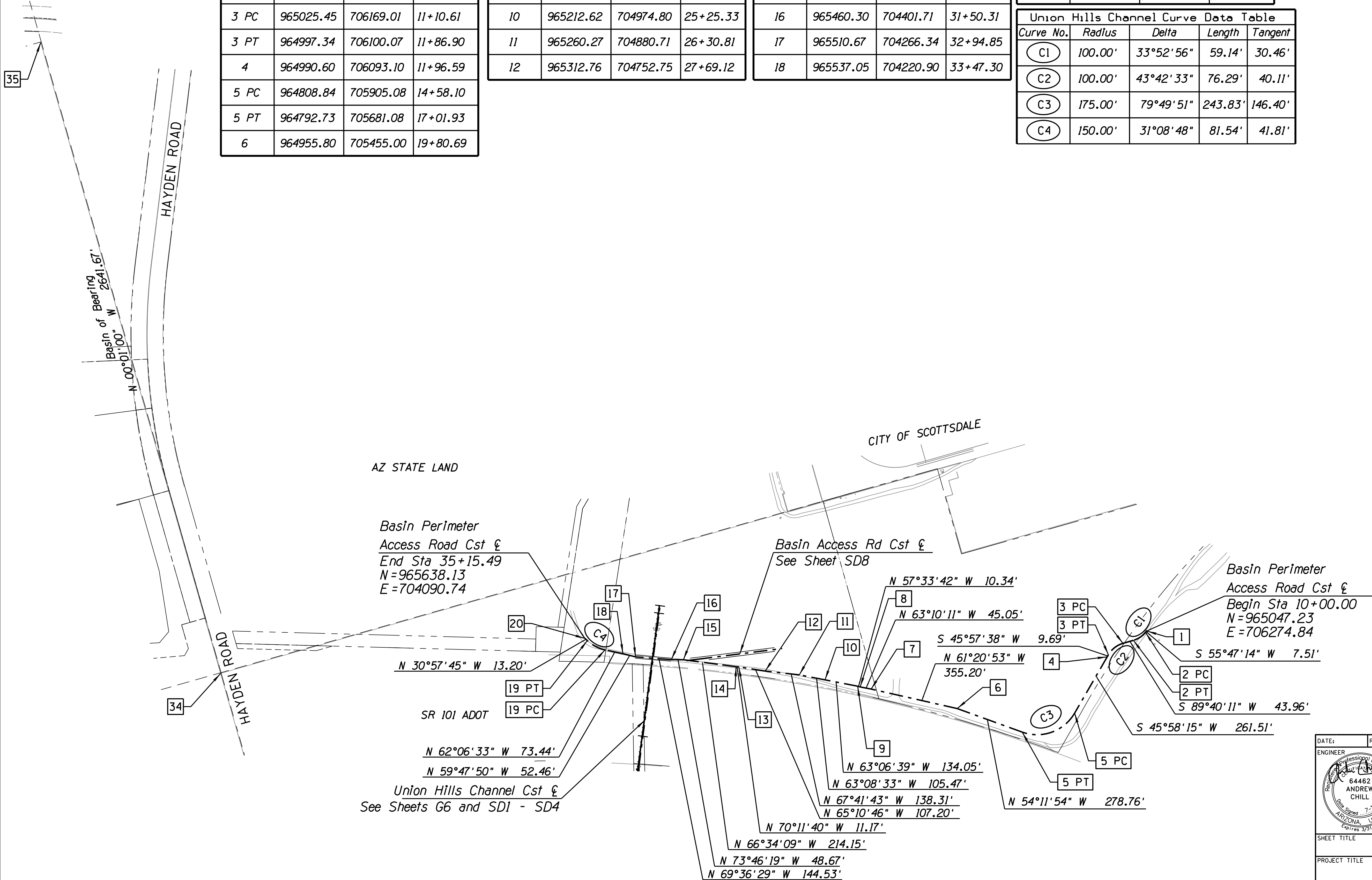
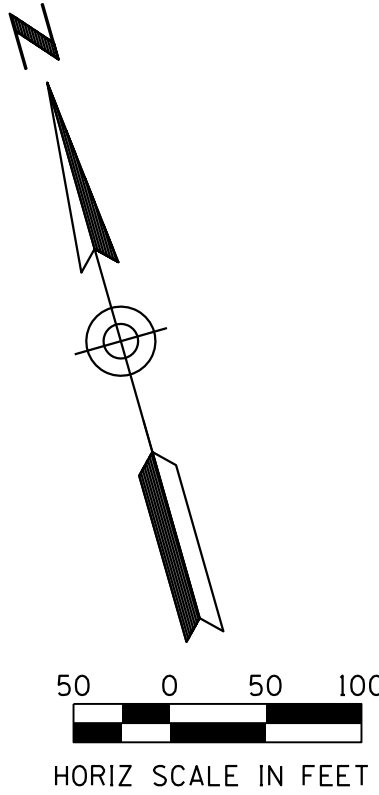
Basin Perimeter Access Road Point Table			
Point	Northing	Easting	Station
1	965047.23	706274.84	10+00.00
2 PC	965043.00	706268.62	10+07.51
2 PT	965025.70	706212.97	10+66.65
3 PC	965025.45	706169.01	11+10.61
3 PT	964997.34	706100.07	11+86.90
4	964990.60	706093.10	11+96.59
5 PC	964808.84	705905.08	14+58.10
5 PT	964792.73	705681.08	17+01.93
6	964955.80	705455.00	19+80.69

Basin Perimeter Access Road Point Table			
Point	Northing	Easting	Station
7	965126.11	705143.29	23+35.89
8	965146.45	705103.09	23+80.94
9	965151.99	705094.36	23+91.29
10	965212.62	704974.80	25+25.33
11	965260.27	704880.71	26+30.81
12	965312.76	704752.75	27+69.12

Basin Perimeter Access Road Point Table			
Point	Northing	Easting	Station
13	965357.76	704655.45	28+76.32
14	965361.55	704644.93	28+87.49
15	965446.70	704448.44	31+01.64
16	965460.30	704401.71	31+50.31
17	965510.67	704266.34	32+94.85
18	965537.05	704220.90	33+47.30

Basin Perimeter Access Road Point Table			
Point	Northing	Easting	Station
19 PC	965571.41	704155.99	34+20.74
19 PT	965626.81	704097.54	35+02.28
20	965638.13	704090.74	35+15.49

Union Hills Channel Curve Data Table				
Curve No.	Radius	Delta	Length	Tangent
C1	100.00'	33°52'56"	59.14'	30.46'
C2	100.00'	43°42'33"	76.29'	40.11'
C3	175.00'	79°49'51"	243.83'	146.40'
C4	150.00'	31°08'48"	81.54'	41.81'



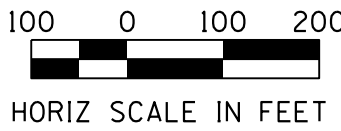
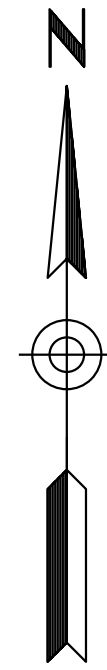
DATE:	REVISION:	BY:
ENGINEER	PUBLIC WORKS	
DESIGNED	CAPITAL PROJECT MANAGEMENT	
DRAWN	7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SHEET TITLE		
PROJECT TITLE		
SCALE	DESIGNED	BID NO.
HORIZ. 1"=200'	AC	XXXX
VERT. N/A	JJP	400-FB53B-56047
DATE		SHT.
07/19		G7
AS-BUILT		7 OF 36
XX/XX		

PLOT DATE: 3/13/2020 6:55:23 AM

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Michael Baker
INTERNATIONAL

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PHOENIX, AZ 85012
Phone: (602) 279-1234
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HAYDEN ROAD

TRACT J
BK. 352 PG. 28, M.C.R.

TRACT J
R/W DEDICATION (BY OTHERS)

TRACT 56
BK. 344 PG. 29, M.C.R.

TRACT K (PARCEL B)
R/W DEDICATION (BY OTHERS)

TRACT L
BK. 352 PG. 28, M.C.R.

TRACT L
R/W DEDICATION (BY OTHERS)

TRACT K
BK. 352 PG. 28, M.C.R.

AZ STATE LAND

TRACT K (PARCEL A)
R/W DEDICATION (BY OTHERS)

CITY OF SCOTTSDALE

TRACT N
BK. 352 PG. 28, M.C.R.

TRACT N
R/W DEDICATION (BY OTHERS)

S.R. 101
ADOT

TRACT 14A PHASE 1
R/W DEDICATION (BY OTHERS)

TRACT 14A
BK. 394 PG. 42, M.C.R.

AZ STATE LAND

AZ STATE LAND

TCE

TCE

TRACT 14A PHASE 2 (PARCEL B)
R/W DEDICATION (BY OTHERS)

TRACT 14A PHASE 2 (PARCEL A)
R/W DEDICATION (BY OTHERS)

UNION HILLS DRIVE

STONEBROOK
SUBDIVISION

Exist R/W

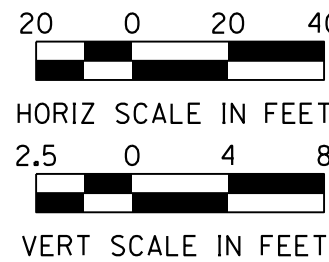
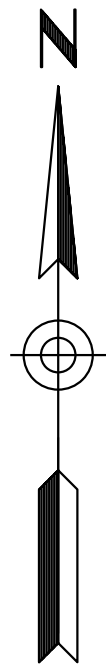
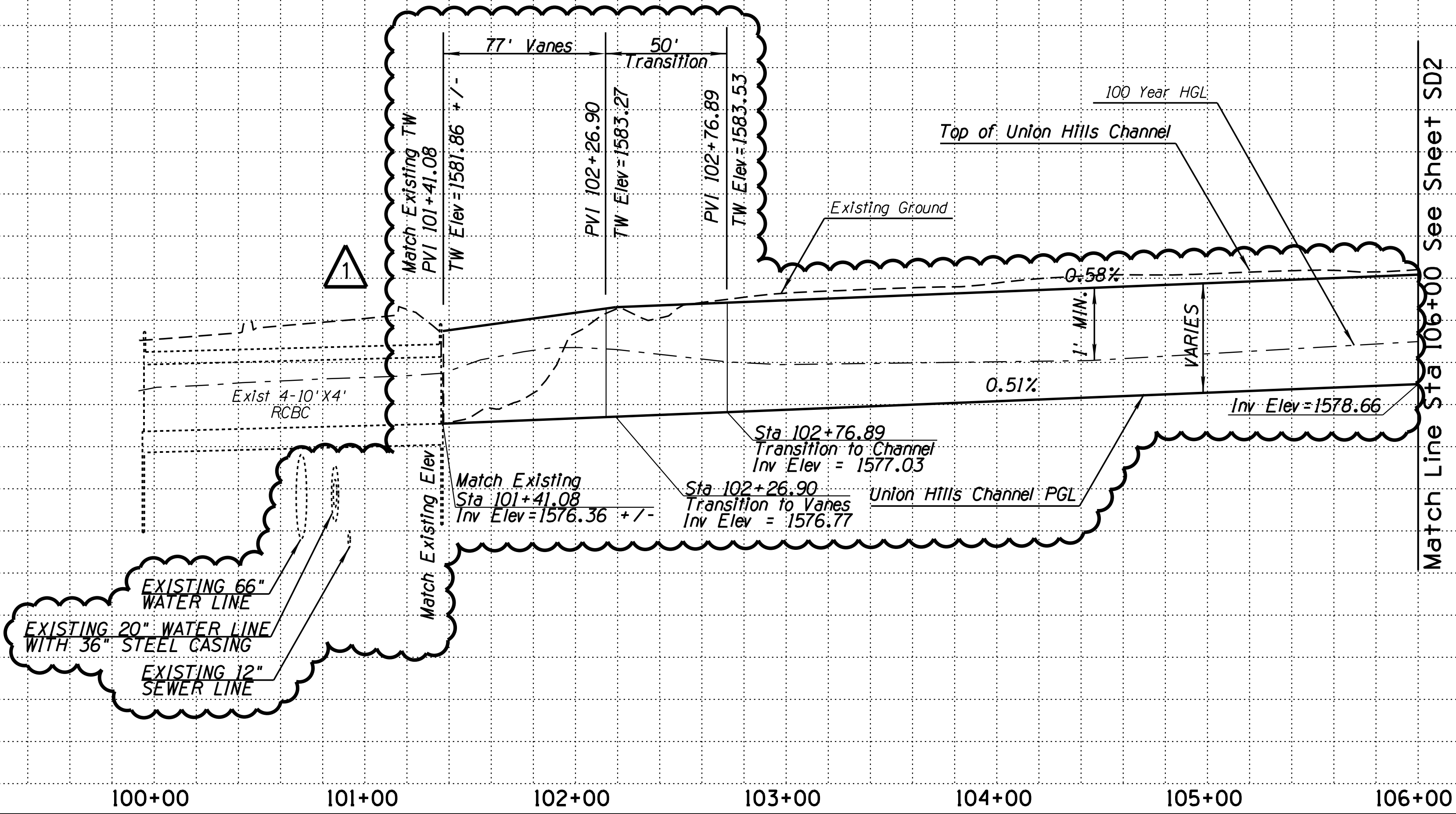
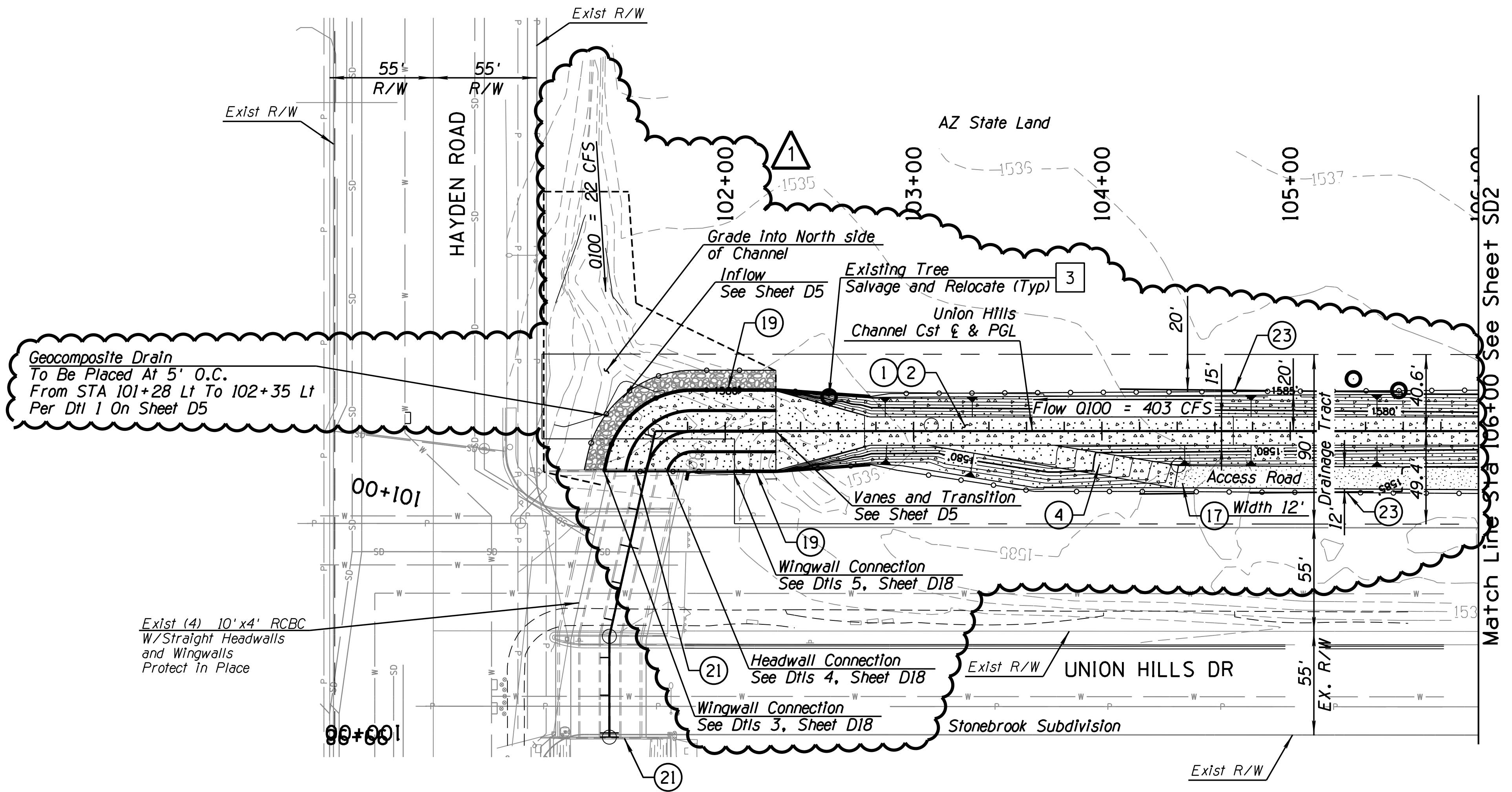


DATE:	REVISION:	BY:
ENGINEER 64462 ANDREW CHILL 7-10-19 ARIZONA, USA Expires 7/10/19	 CITY OF SCOTTSDALE ARIZONA 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	PUBLIC WORKS CAPITAL PROJECT MANAGEMENT
SHEET TITLE RIGHT OF WAY PLAN		
PROJECT TITLE CROSSROADS EAST DRAINAGE INFRASTRUCTURE		
SCALE HORIZ. 1"=200' VERT. N/A	DESIGNED AC DRAWN JJP	DATE 07/19 AS-BUILT XX/XX
BID NO. XXXX		PROJECT NO. 400-FB53B-56047
SHT. RW1		8 OF 36

Plan Check No: 4817-18-6 124-SA-2018

PLOT DATE: 3/13/2020 10:47:21 AM

DESIGN FILE: W:\Pro\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_SD1_Channel_PLPF.dgn



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PHOENIX, AZ 85012
Phone: (602) 279-1234
MBAKERINTL.COM

INTERNATIONAL REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees	EA	3

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel / Pipe		
2 Construct Trapezoidal Channel with Concrete, Bottom Width Per Plans	SY	2,248
4 Concrete Maintenance Ramp See Dtl 1 on Sheet D8	EA	1
17 6" AB Access Road per Section on Sheet G4, Width per plan	SY	284
19 Handrail per COS Std Dtl 2508 Type II, 3 Rail, and Paint SW 7055 Enduring Bronze	LF	305
21 Paint Existing Handrail, Color SW7055 Enduring Bronze	LS	1
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14	LF	650



DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

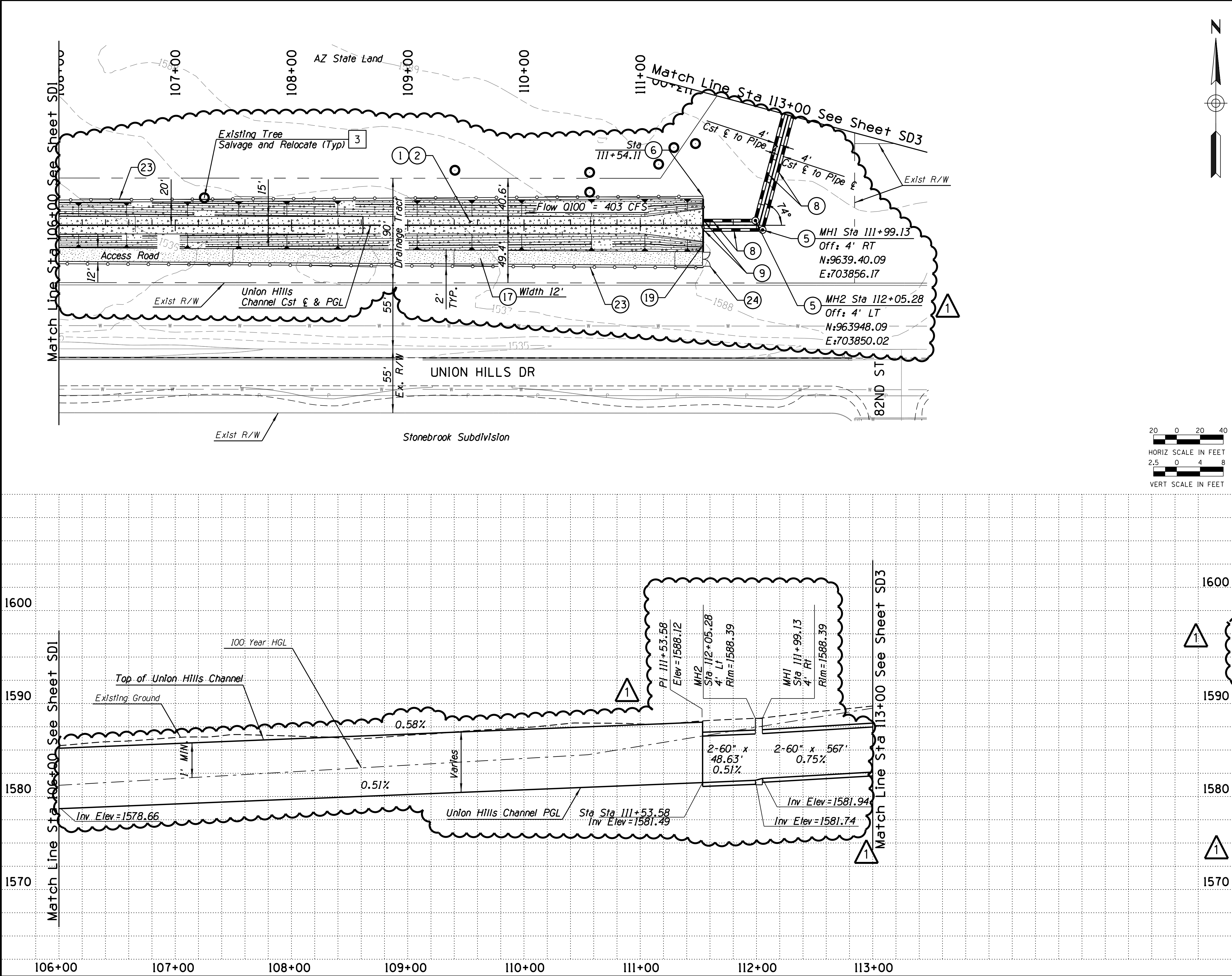
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

UNION HILLS CHANNEL PLAN & PROFILE				
PROJECT TITLE				
CROSSROADS EAST DRAINAGE INFRASTRUCTURE				
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=40'	AC	07/19	XXXX	SD1
VERT. 1"=8'	DRAWN	AS-BUILT	PROJECT NO.	9 OF 38
JJP	XX/XX	400-FB53B-56047		

Plan Check No: 4817-18-6 124-SA-2018 9/11/2020

PLOT DATE: 3/13/2020 8:41:14 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_SD2_Channel_PLPF.dgn



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INTERNATIONAL

REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees	EA	8

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
2 Construct Trapezoidal Channel with Concrete, Bottom Width Per Plans	SY	2,675
5 Manhole per MAG Std. Det 521 and 522. 30" Pressure Manhole per MAG Std Det 523-1,2 and COS Std Det 2520	EA	2
Headwall per D11s on Sheet D8, Storm Drain Inlet Marker per COS Std Det 2560-1,2 Type A	EA	1
8 2-60" CMP 16GA Galvanized Storm Drain Pipes per MAG Std. D11. 200-1 Type D and 510	LF	264
9 Install Barrier Per COS Std D11 2562-1,2	EA	2
17 6" AB Access Road per Section on Sheet G4, Width per plan	SY	759
19 Handrail per COS Std D11 2508 Type II, 3 Rail, and Paint SW 7055 Enduring Bronze	LF	46
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14	LF	1,110
24 Wire Fence Gate See Detail 2, Sheet D14	EA	1

Contact Arizona 811 at least two full working days before you begin excavation

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PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

UNION HILLS CHANNEL PLAN & PROFILE
PROJECT TITLE
CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE HORIZ. 1"=40' VERT. 1"=8'	DESIGNED AC	DATE 07/19	BID NO. XXXX	SHT. SD2
DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047	10 OF 38	

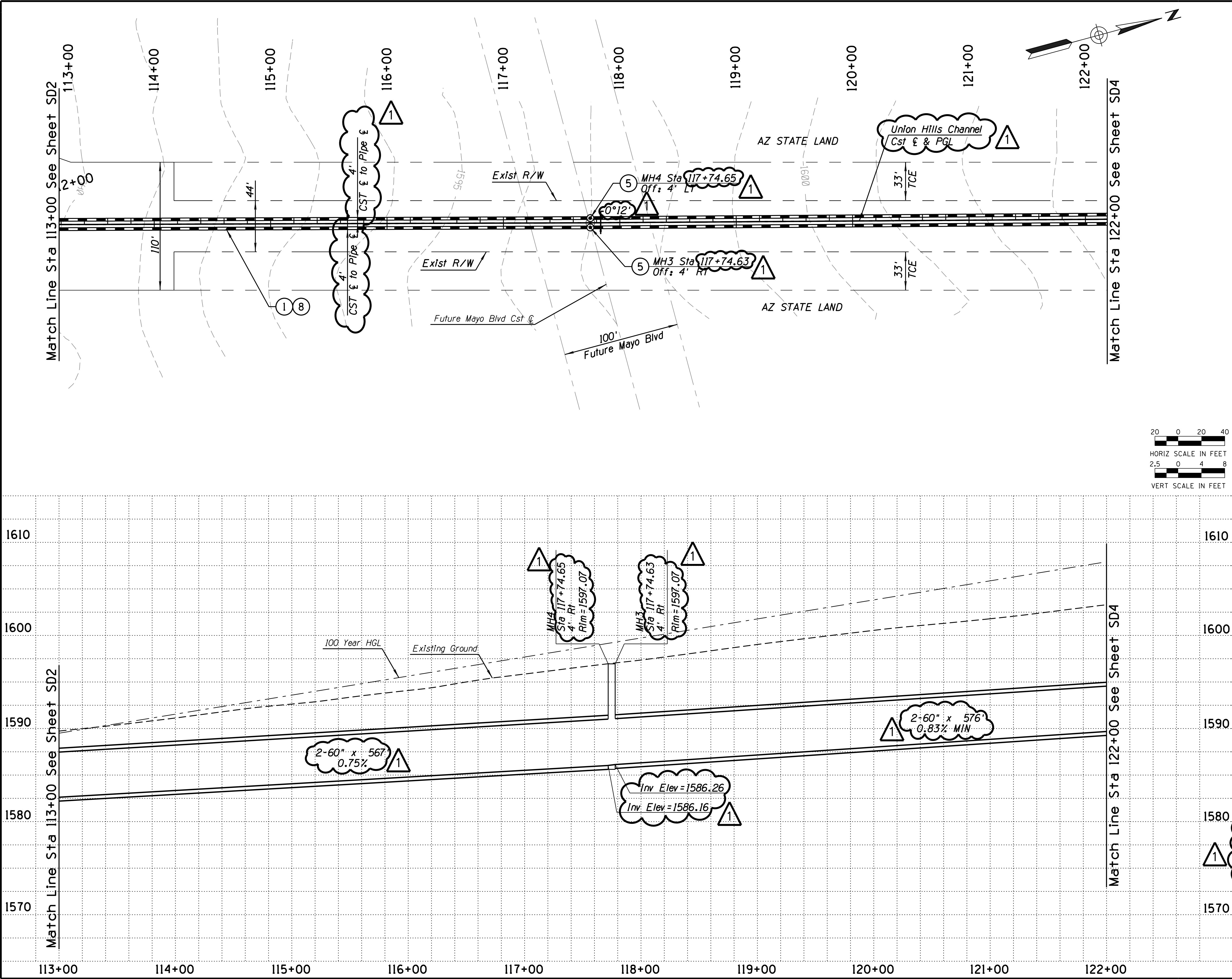
Plan Check No: 4817-18-6

124-SA-2018

28-DR-2020
9/11/2020

PLOT DATE: 3/13/2020 6:56:42 AM

DESIGN FILE: W:\Pro\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_SD3_Channel_PLPE.dgn



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REMOVAL & RELOCATION NOTES

2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
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Description	Unit	Quan
① Excavate Channel/Pipe		
⑤ Manhole per MAG Std. Det 521 and 522. 30" Pressure Manhole per MAG Std Det 523-1,2 and COS Std Det 2520	EA	2
⑧ 2-60" CMP 16GA Galvanized Storm Drain Pipes per MAG Std Det 200-1 Type D and 510	LF	1,800

20 0 20 40

HORIZ SCALE IN FEET

2.5 0 4 8

VERT SCALE IN FEET

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DATE: 3/13/20

REVISION:

CITY COMMENTS

BY: A.S.N.

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE

UNION HILLS CHANNEL PLAN & PROFILE

PROJECT TITLE

CROSSROADS EAST DRAINAGE INFRASTRUCTURE

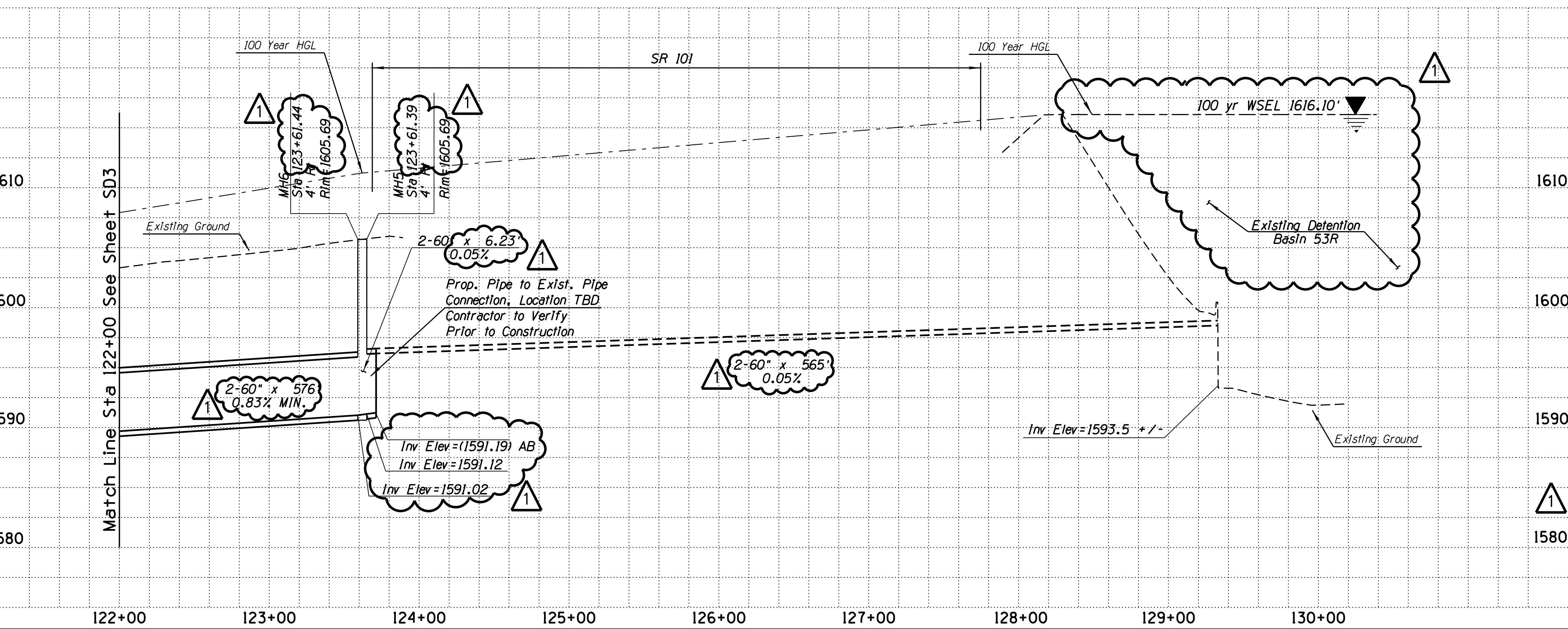
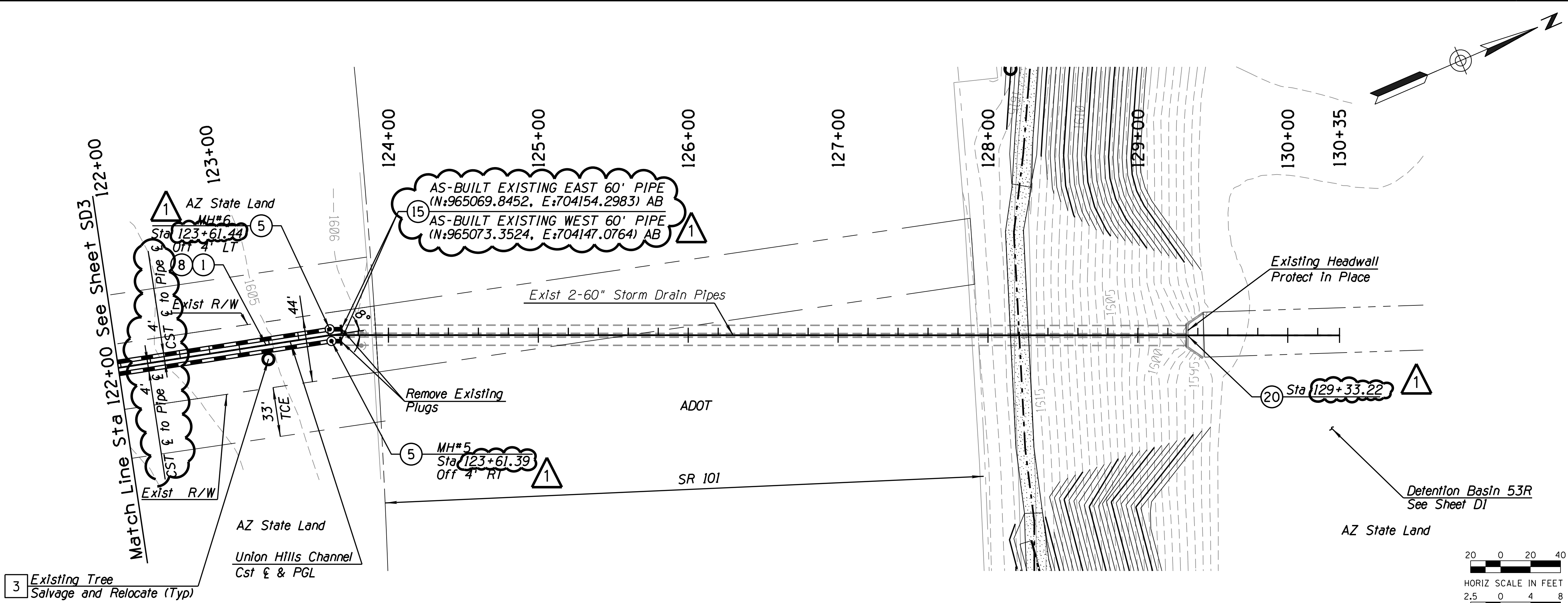
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=40'	AC	07/19	XXXX	SD3
VERT. 1"=8'	JJP	XX/XX	PROJECT NO. 400-FB53B-56047	11 OF 38

124-SA-2018 Plan Check No: 4817-18-6

28-DR-2020 9/11/2020

PLOT DATE: 3/13/2020 6:57:01 AM

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PHOENIX, AZ 85012
Phone: (602) 279-1234
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REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees	EA	1

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
Manhole per MAG Std. Det 521 and 522. 30" Presure Manhole per MAG Std Dtl 523-1,2 and COS Std Dtl 2520	EA	2
2-60" CMP 16GA Galvanized Storm Drain Pipes per MAG Std Dtl 200-1 Type D and 510	LF	340
15 Connect to Existing Pipe Per MAG Std Dtl 505	EA	2
20 Install Trash Rack See Sheet D15	EA	1

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DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.

ENGINEER

REGISTERED PROFESSIONAL ENGINEER (CIVIL)

45986

ZEZEEZ

SALIBA

3/13/20

ARIZONA

USA

CITY OF SCOTTSDALE

ARIZONA

7447 E. INDIAN SCHOOL RD.

SCOTTSDALE, ARIZONA 85251

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

UNION HILLS CHANNEL PLAN & PROFILE

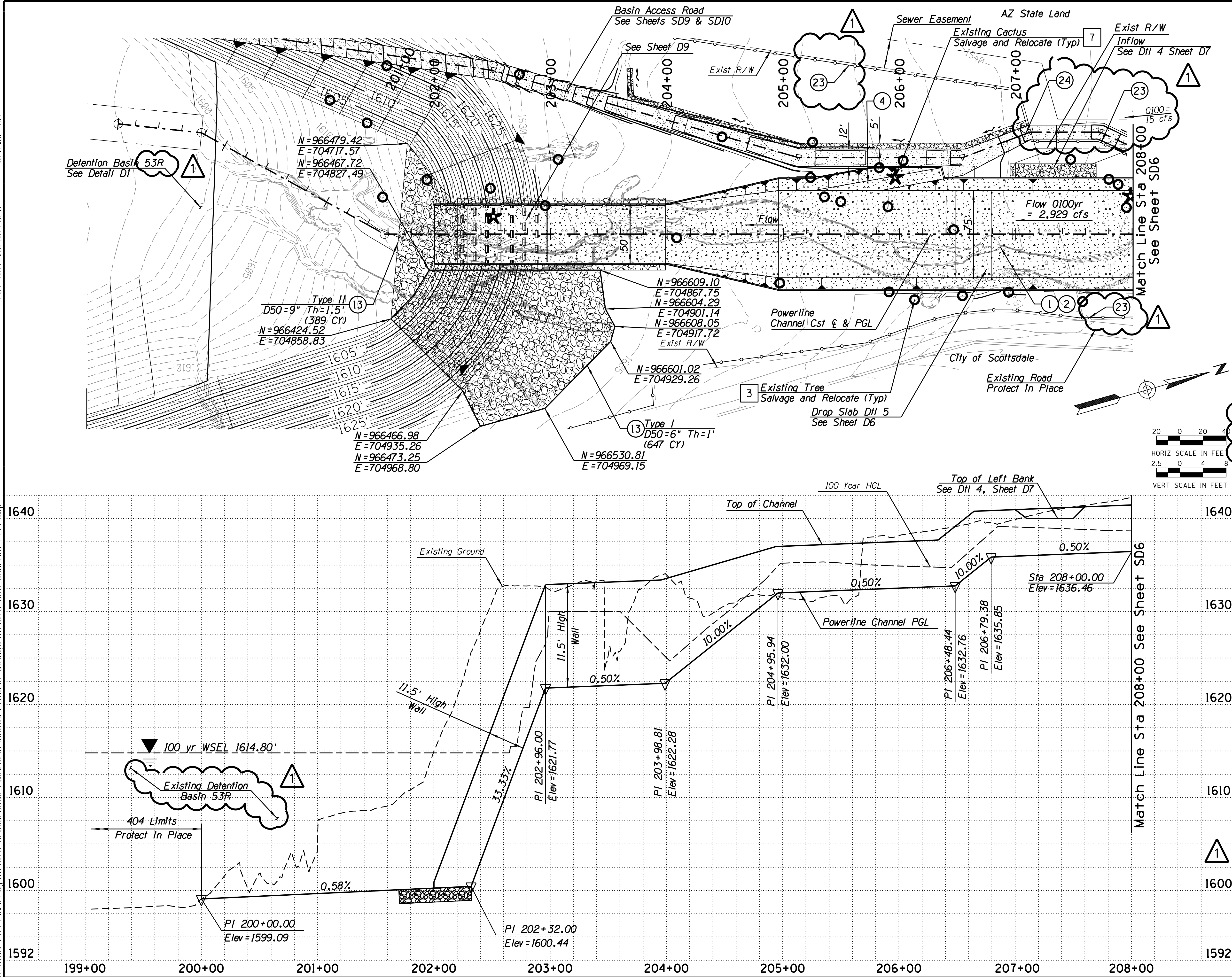
CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=40'	AC	07/19	XXXX	SD4
VERT. 1"=8'	DRAWN	XX/XX	PROJECT NO.	12 OF 38
	JJP	AS-BUILT	400-FB53B-56047	

Plan Check No: 4817-18-6 124-SA-2018 28-DR-2020 9/11/2020

PLOT DATE: 3/13/2020 8:42:52 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_SD5_Channel_PLPF.dgn



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PHOENIX, AZ 85012
Phone: (602) 279-1234
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REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees	EA	29
7 Salvage and Relocate Native Cacti	EA	3

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
2 Construct Trapezoidal Concrete Channel, Bottom Width per Plans	SY	4,183
4 Concrete Maintenance Ramp per Dtl 3 on D7	EA	1
13 Dumped Riprap D50 per Plan See Dtl 1, Sheet D13	CY	1,036
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		
24 Wire Fence Gate See Detail 2, Sheet D14		

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REVISION:
CITY COMMENTS
BY: A.S.N.

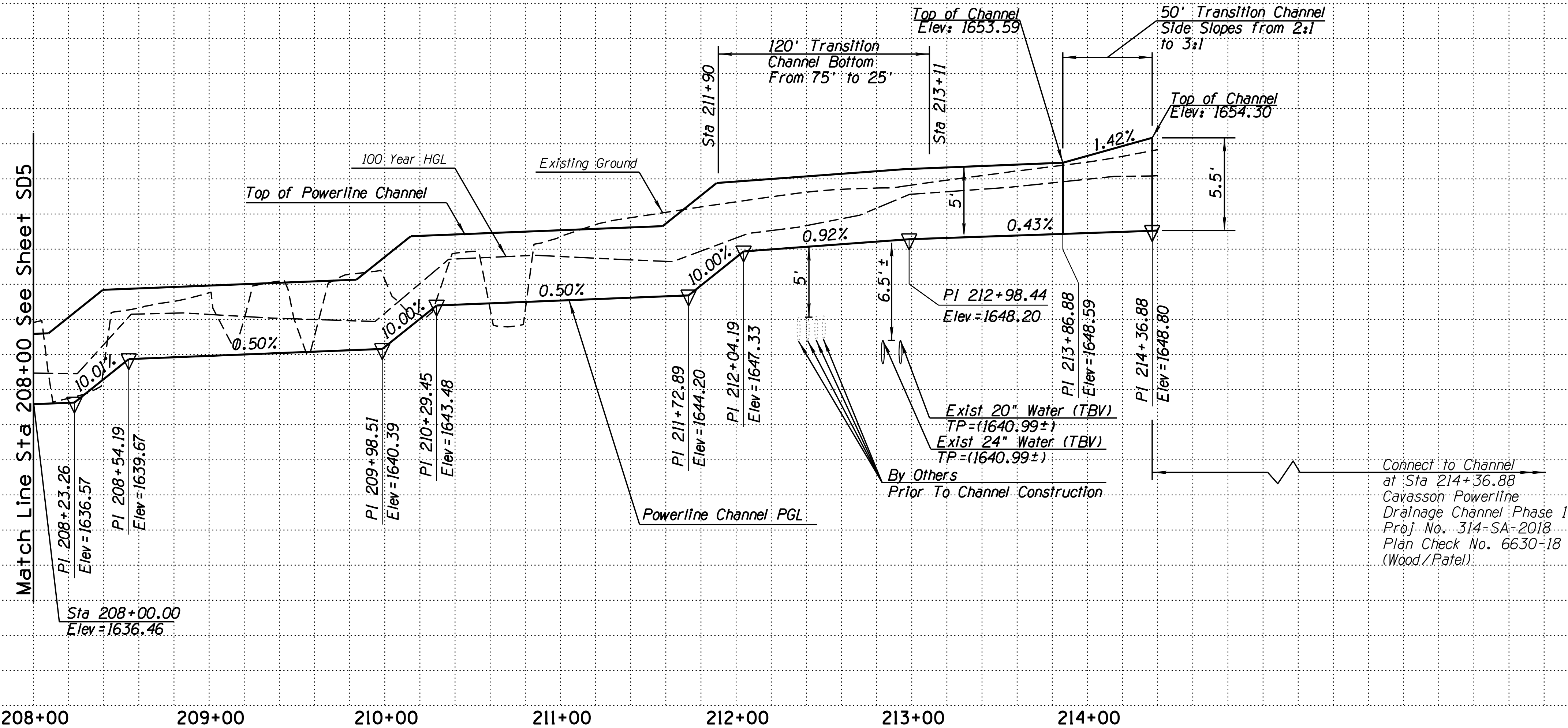
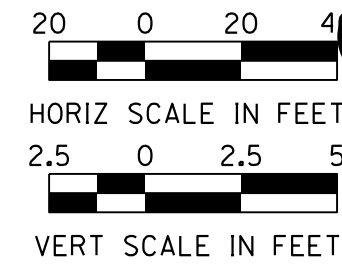
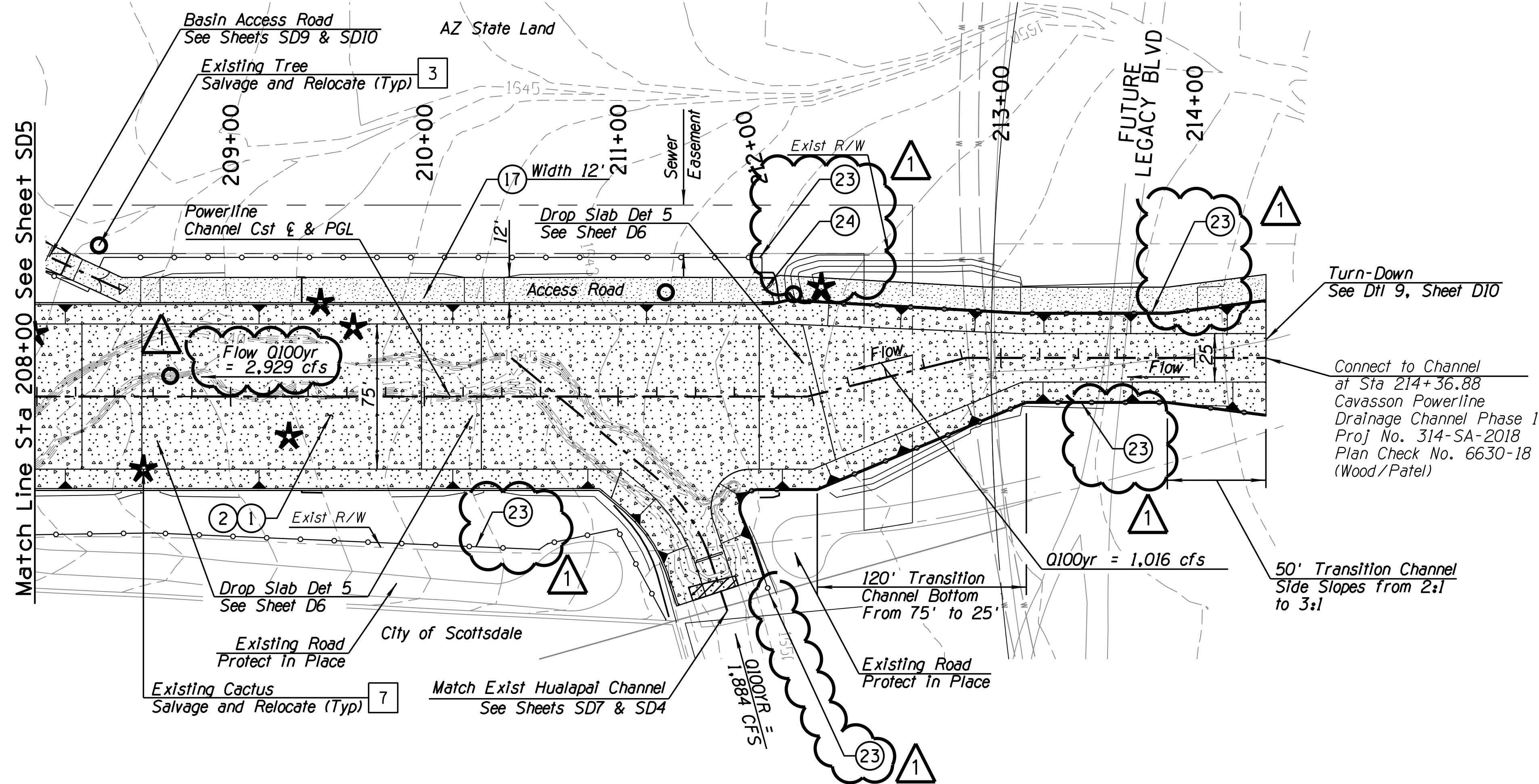
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

POWERLINE CHANNEL PLAN & PROFILE
PROJECT TITLE
CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE HORIZ. 1"=40' VERT. 1"=8'	DESIGNED AC	DATE 07/19	BID NO. XXXX	SHT. SD5
DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047	13 OF 38	

124-SA-2018 Plan Check No: 4817-18-6

28-DR-2020 9/11/2020



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INTERNATIONAL
REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees	EA	4
7 Salvage and Relocate Native Cacti	EA	5

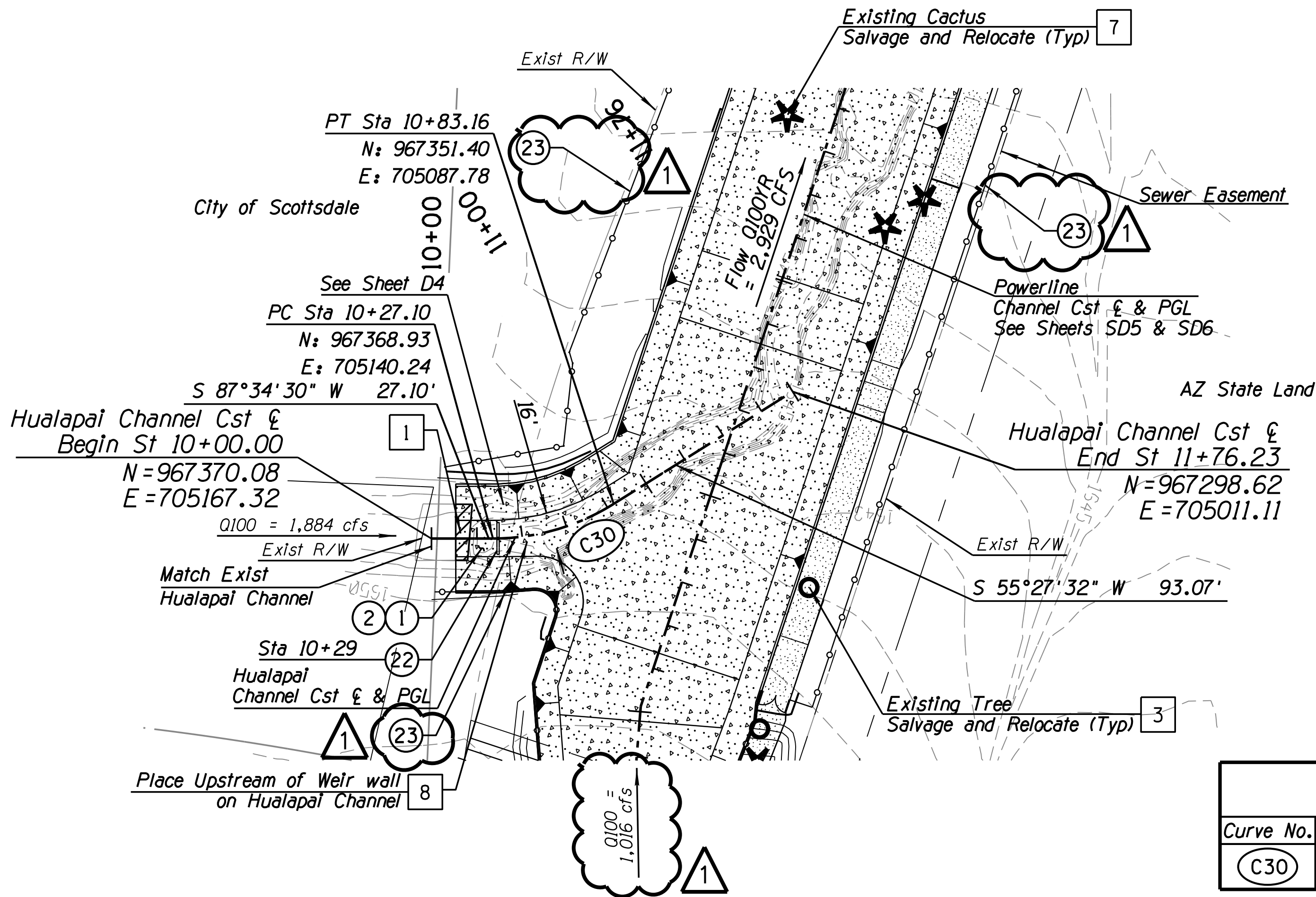
CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
2 Construct Trapezoidal Concrete Channel, Width per Plans	SY	6,233
17 6" AB Access Road per Section on Sheet G4, Width per plan	SY	841
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		
24 Wire Fence Gate See Detail 2, Sheet D14		

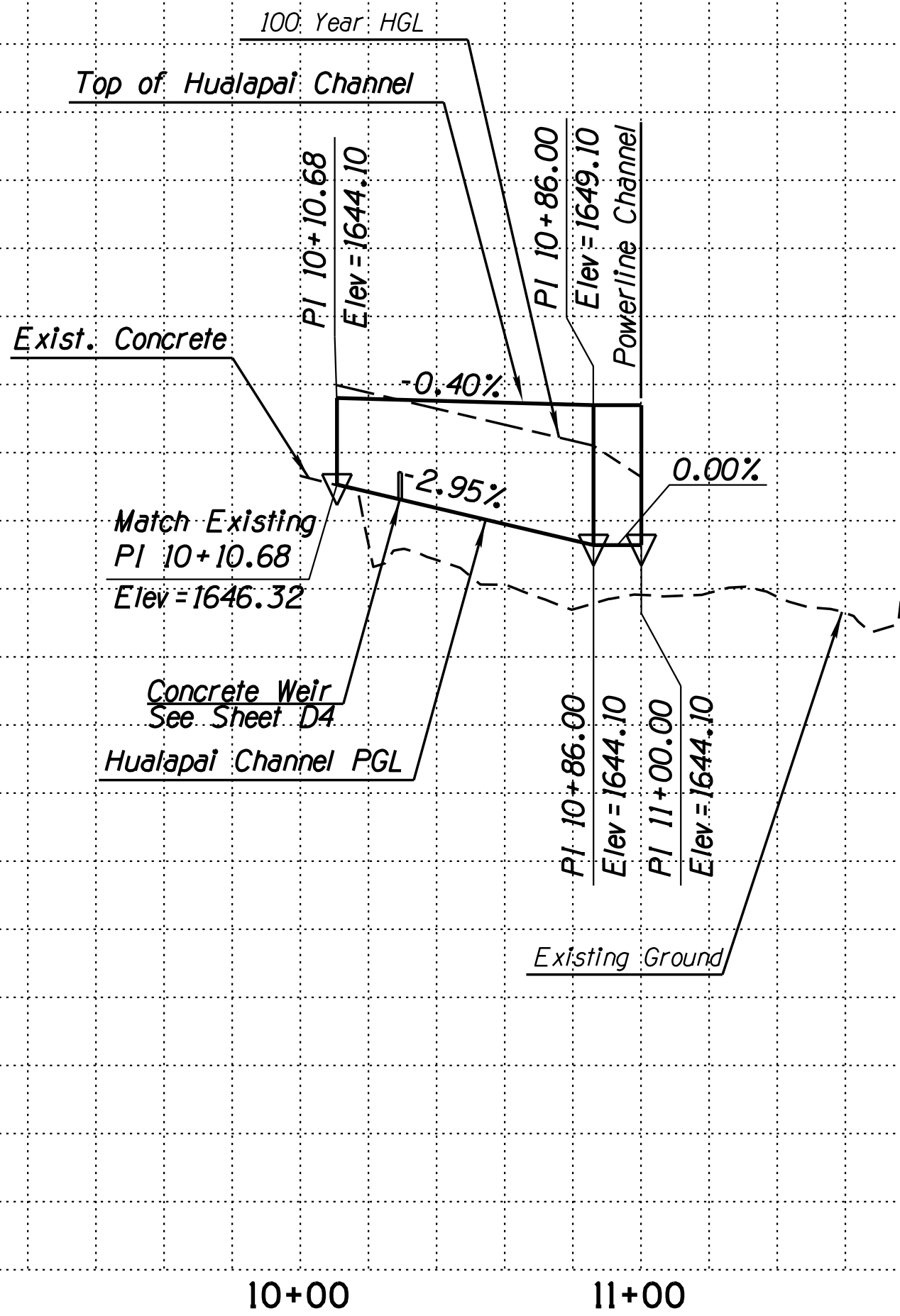
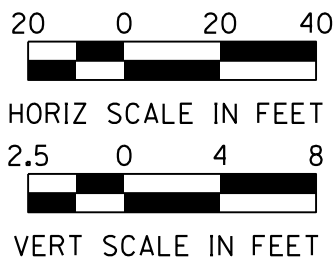


DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
ENGINEER		PUBLIC WORKS	
SHEET TITLE: POWERLINE CHANNEL PLAN & PROFILE		CAPITAL PROJECT MANAGEMENT	
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE		7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SCALE: HORIZ. 1"=40' VERT. 1"=8'	DESIGNED: AC DRAWN: JJP	DATE: 07/19 AS-BUILT: XX/XX	BID NO. XXXX PROJECT NO. 400-FB53B-56047
		SHT. SD6	14 OF 38

DESIGN FILE: W:\Pro\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_SD7_Channel_PLPE.dgn PLOT DATE: 3/13/2020 8:44:59 AM



Hualapai Channel Curve Data Table				
Curve No.	Radius	Delta	Length	Tangent
C30	100.00'	32°06'58"	56.05'	28.78'



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INTERNATIONAL

REMOVAL & RELOCATION NOTES

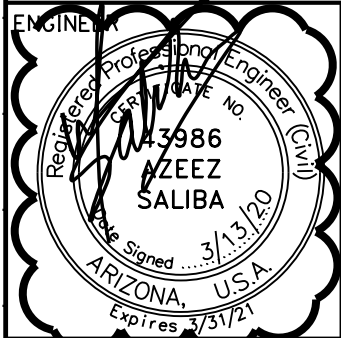
Description	Unit	Quan
1 Sawcut and Remove to Clean Edge	SY	18
3 Salvage and Relocate Native Trees		
7 Salvage and Relocate Native Cacti	SY	140
8 Salvage and Relocate Exist. Riprap		

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
2 Construct Trapezoidal Concrete Channel, Width per Plans		
22 Construct Concrete Weir Wall See Details 1 and 2, Sheet D4	LS	1
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		



DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.



PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

HUALAPAI CHANNEL PLAN & PROFILE

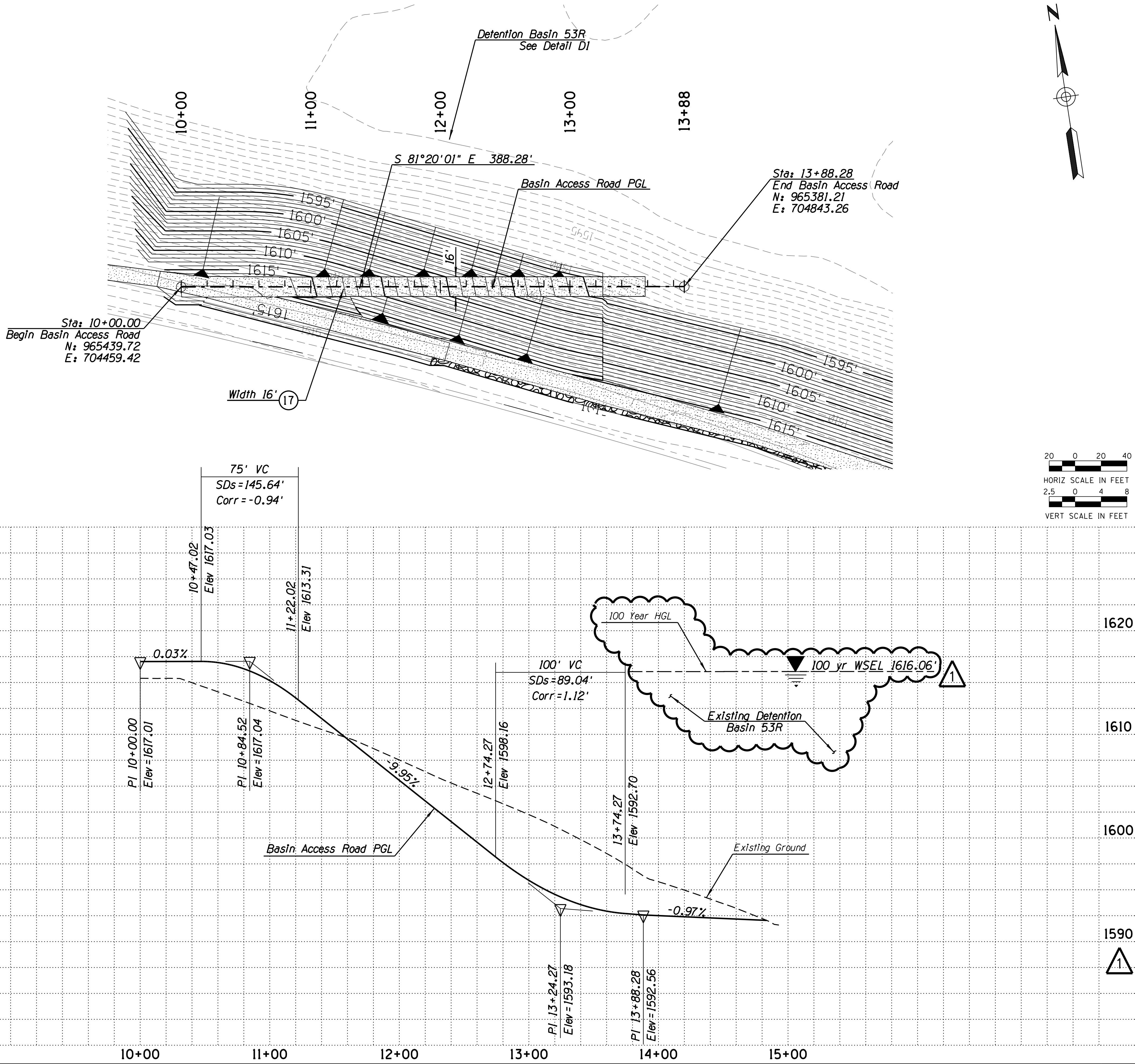
PROJECT TITLE

CROSSROADS EAST
DRAINAGE INFRASTRUCTURE

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=40'	AC	07/19	XXXX	SD7
DRAWN	AS-BUILT	PROJECT NO.		
JJP	XX/XX	400-FB53B-56047	15 OF 38	

Plan Check No: 4817-18-6 124-SA-2018 28-DR-2020 9/11/2020

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_S08_Basin_south_access_road.dgn PLOT DATE: 3/13/2020 6:58:34 AM



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PHOENIX, AZ 85012
Phone: (602) 279-1234
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REMOVAL & RELOCATION NOTES

Description	Unit	Quan

CONSTRUCTION NOTES

Description	Unit	Quan
(17) 6" AB Access Road, Per Section on Sheet G4, Width per Plan.	SY	588

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ARIZONA811
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DATE: 3/13/20
ENGINEER: [Signature]
DESIGNED: AC
DRAWN: JJP

REVISION:
CITY COMMENTS
BY: A.S.N.

ARIZONA
Professional Engineer
No. 45986
ZEEZ SALIBA
Exp. 3/13/20

CITY OF SCOTTSDALE
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

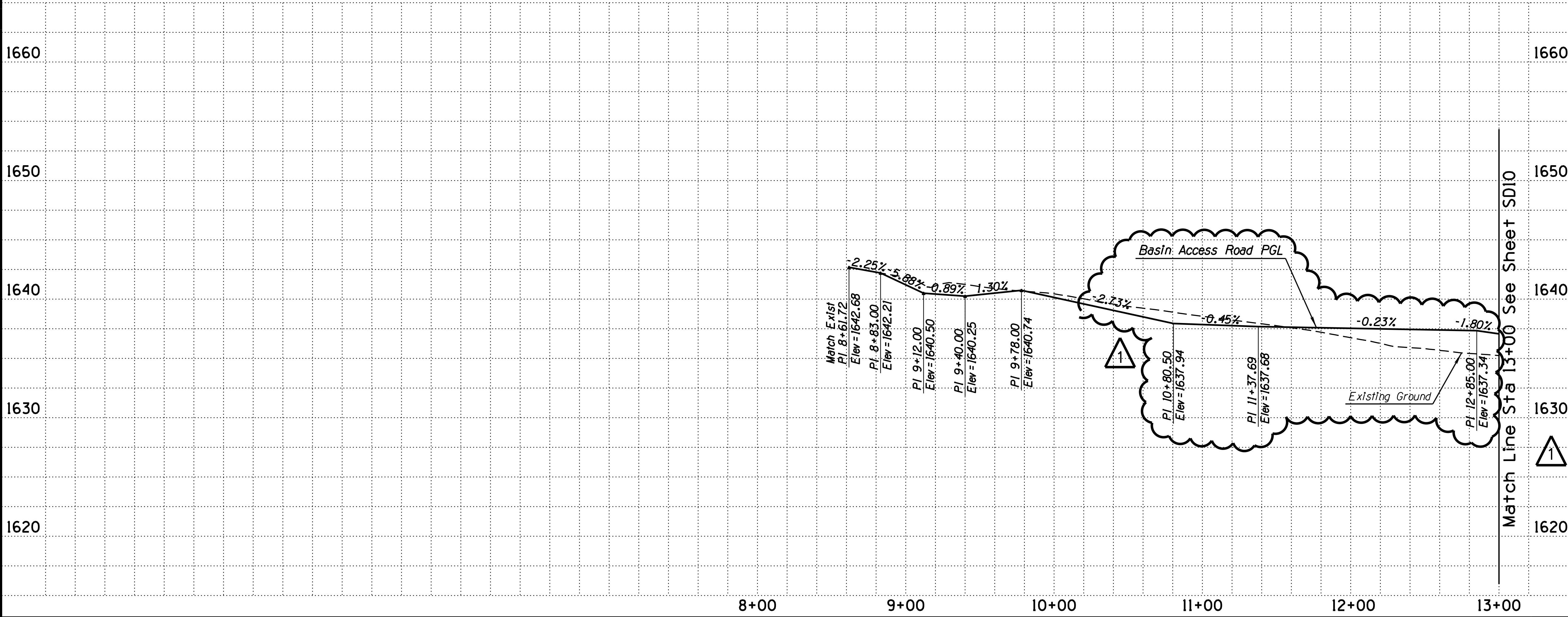
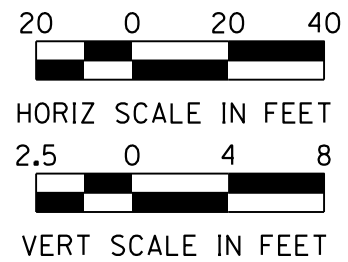
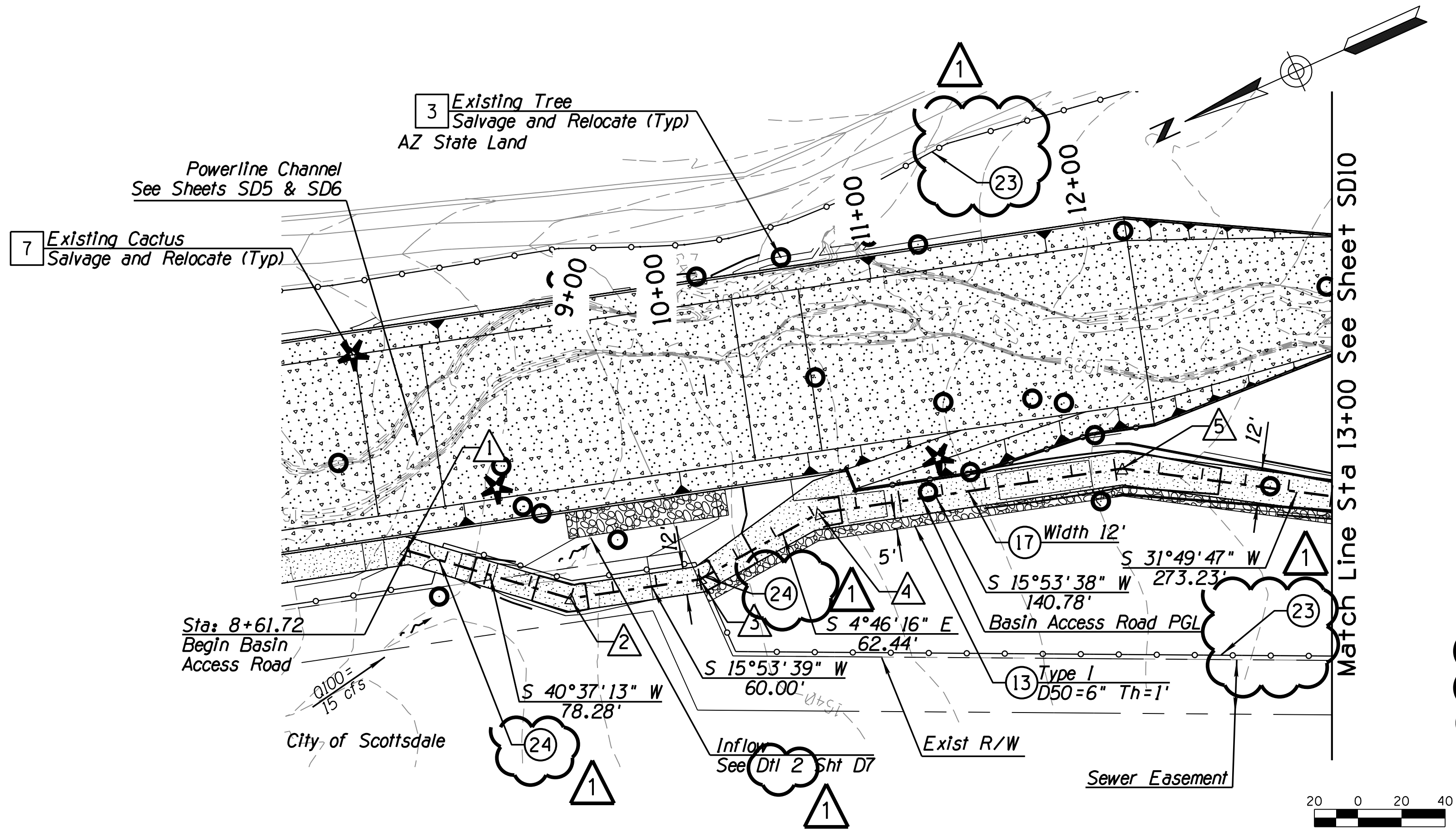
BASIN ACCESS ROAD PLAN & PROFILE
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE: HORIZ. 1"=40'	DESIGNED: AC	DATE: 07/19	BID NO. XXXX	SHT. SD8
VERT. 1"=8'	DRAWN: JJP	AS-BUILT: XX/XX	PROJECT NO. 400-FB53B-56047	16 OF 38

124-SA-2018 Plan Check No: 4817-18-6

28-DR-2020 9/11/2020

DESIGN FILE: W:\Pro\169678_Crossroads East\CAD\Sheet Files\Drainage\169678_SD9_Basin west access road.dgn PLOT DATE: 3/13/2020 8:46:05 AM



Michael Baker

INTERNATIONAL

REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees		
7 Salvage and Relocate Native Cacti		

CONSTRUCTION NOTES

Description	Unit	Quan
13 Dumped Riprap D50 per Plan See D11 1, Sheet D14	CY	55
17 6" AB Access Road per Section on Sheet G4, Width per Plan	SY	588
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14, 1		
24 Wire Fence Gate See Detail 2, Sheet D14		

GENERAL NOTES

Basin Access Road Point Table

Point	Northing	Easting	Station
1	967114.61	704922.27	8+61.72
2	967055.19	704871.31	9+40.00
3	966997.48	704854.88	10+00.00
4	966935.26	704860.07	10+62.44
5	966799.86	704821.52	12+03.22

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DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.

ENGINEER: [Signature] 45986 ZEEZ SALIBA 3/13/20

CITY OF SCOTTSDALE

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251

SHEET TITLE: BASIN ACCESS ROAD PLAN & PROFILE

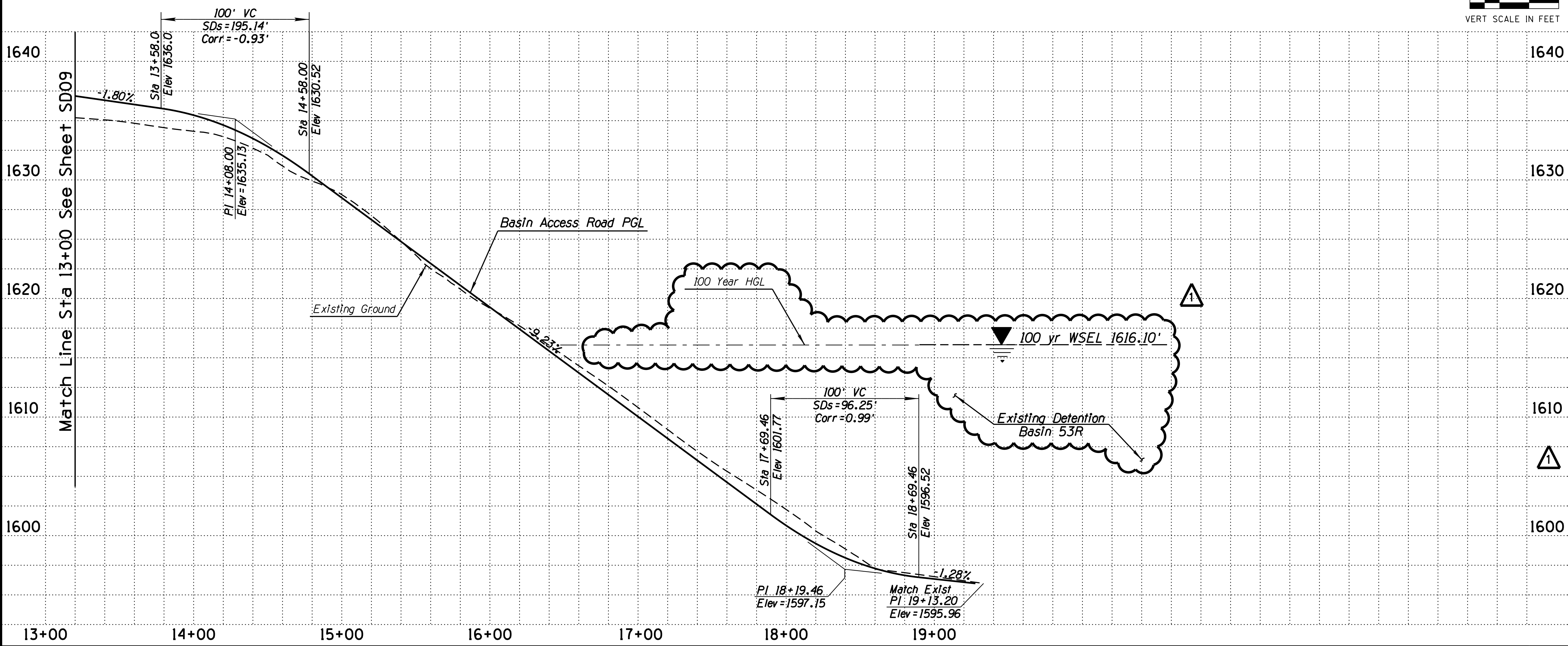
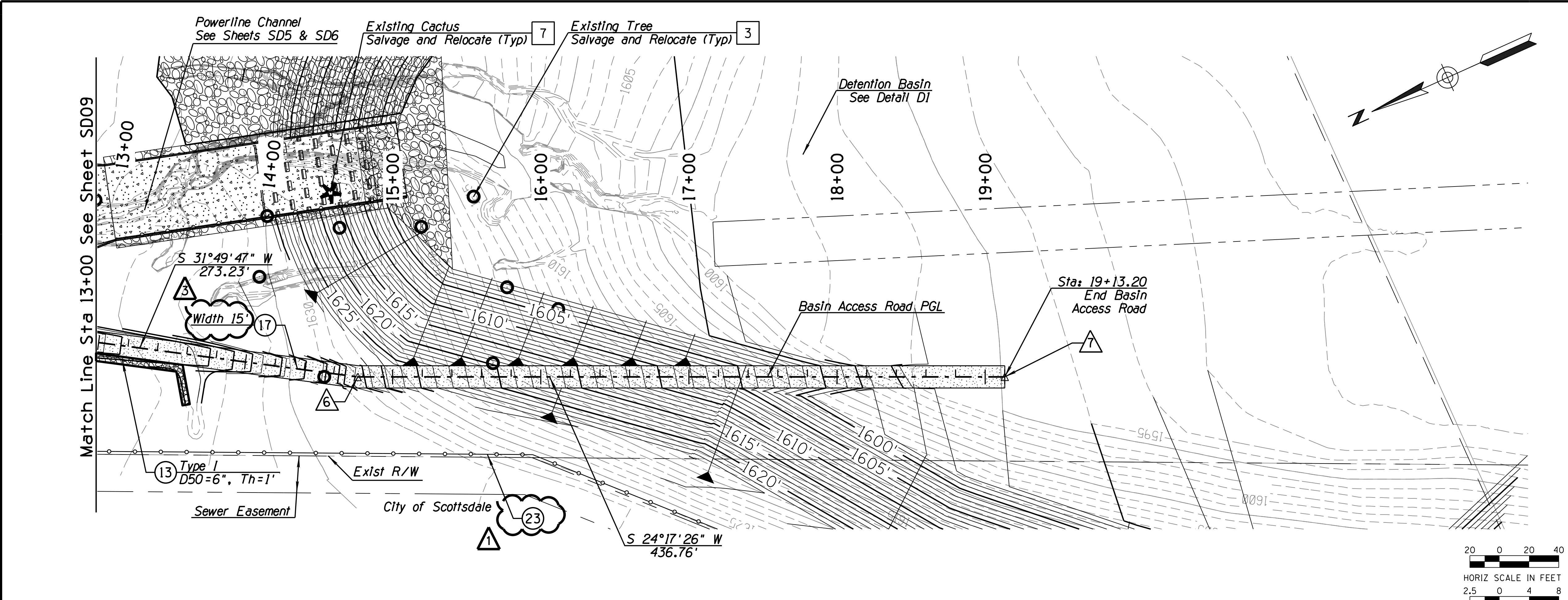
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SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=40'	AC	07/19	XXXX	SD9
VERT. 1"=8'	JJP	XX/XX	400-FB53B-56047	17 OF 38

124-SA-2018 Plan Check No: 4817-18-6

28-DR-2020 9/11/2020

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Michael Baker

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PHOENIX, AZ 85012
Phone: (602) 279-1234
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INTERNATIONAL

REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees		
7 Salvage and Relocate Native Cacti		

CONSTRUCTION NOTES

Description	Unit	Quan
13 Dumped Riprap D50 per Plan See Dtl 1, Sheet D13	CY	15
17 6" AB Access Road per Section on Sheet G4, Width per Plan	SY	818
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		

Basin Access Road Point Table

Point	Northing	Easting	Station
6	966567.72	704677.42	14+76.45
7	966169.63	704497.75	19+13.20

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

DATE: 3/13/20
ENGINEER: [Signature]
DESIGNED: AC
DRAWN: JJP

REVISION:
CITY COMMENTS
BY: A.S.N.

ARIZONA ENGINEERING, INC.
45986
ZEEZ
SALIBA
3/13/20
Arizona, USA
Expires: 3/13/21

CITY OF SCOTTSDALE
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET: 18 OF 38
PROJECT TITLE: BASIN ACCESS ROAD PLAN & PROFILE
CROSSROADS EAST DRAINAGE INFRASTRUCTURE

SCALE: HORIZ. 1"=40'
VERT. 1"=8'

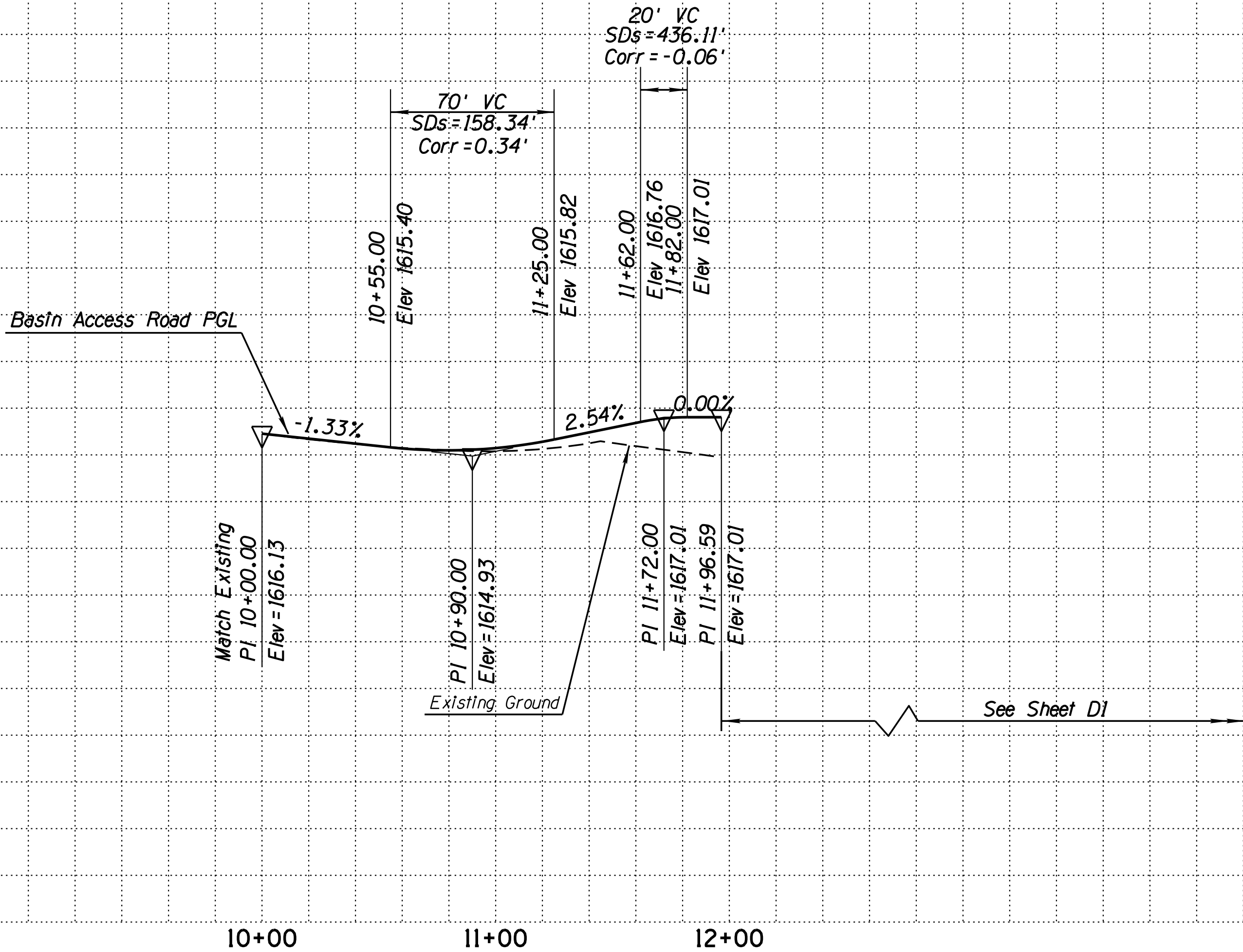
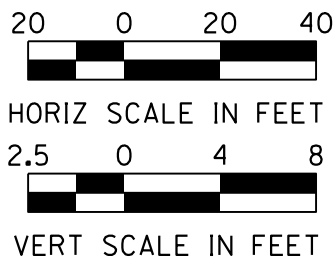
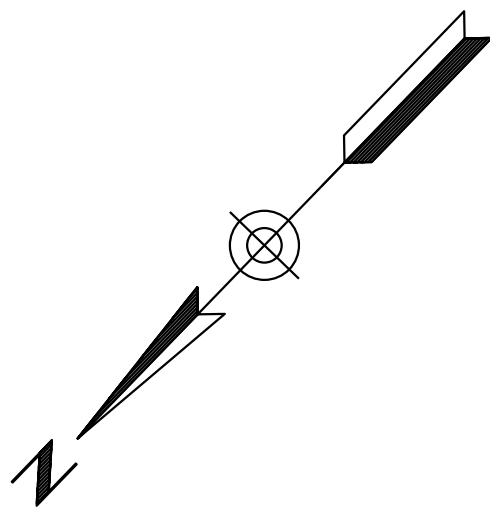
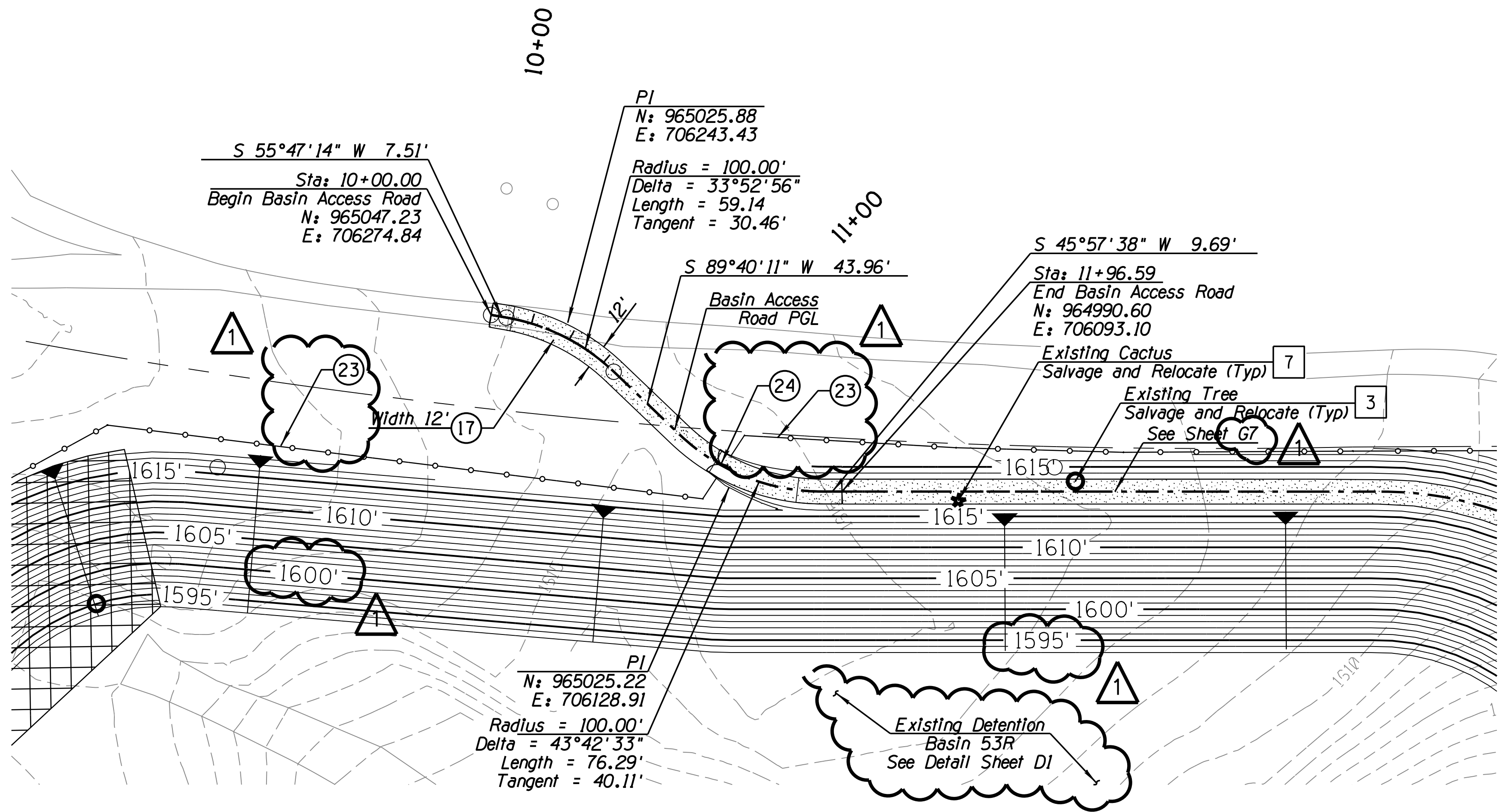
DESIGNED: AC
DATE: 07/19
AS-BUILT: XX/XX

BID NO. XXXX
PROJECT NO. 400-FB53B-56047

SHT. SD10

124-SA-2018 Plan Check No: 4817-18-6 28-DR-2020 9/11/2020

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INTERNATIONAL

REMOVAL & RELOCATION NOTES

Description	Unit	Quan
3 Salvage and Relocate Native Trees		
7 Salvage and Relocate Native Cacti		

CONSTRUCTION NOTES

Description	Unit	Quan
17 6" AB Access Road, Per Section on Sheet G4, Width per Plan.	SY	262
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		
24 Wire Fence Gate See Detail 2, Sheet D14		



DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.



SHEET TITLE BASIN ACCESS ROAD PLAN & PROFILE				
PROJECT TITLE CROSSROADS EAST DRAINAGE INFRASTRUCTURE				
SCALE HORIZ. 1"=40' VERT. 1"=8'	DESIGNED AC	DATE 07/19	BID NO. XXXX	SHT. SD11
DRAWN JJP			PROJECT NO. 400-FB53B-56047	19 OF 38

PLOT DATE: 3/13/2020 12:16:46 PM

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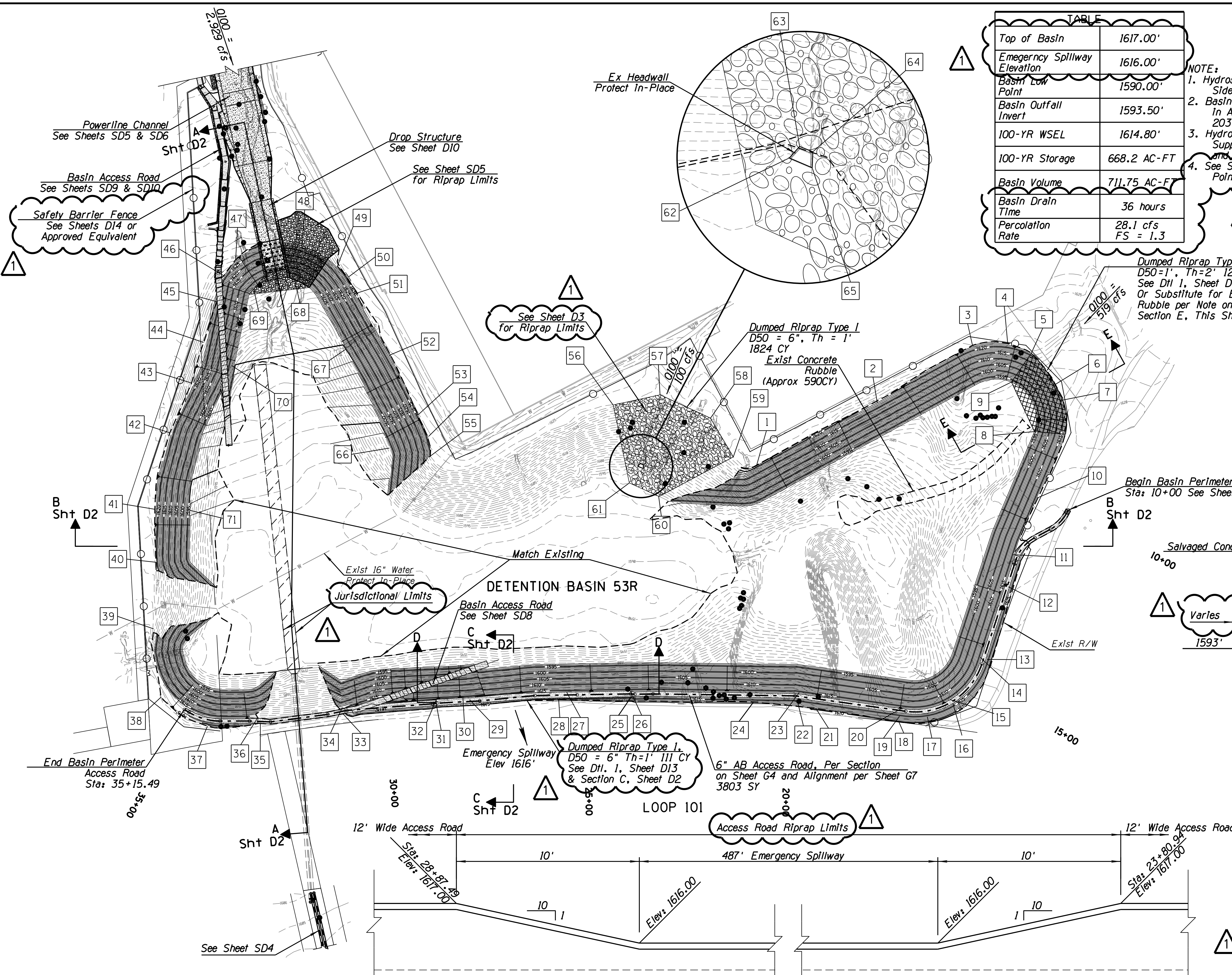
Michael Baker
INTERNATIONAL

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PHOENIX, AZ 85012
Phone: (602) 279-1234
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TABLE	
Top of Basin	1617.00'
Emergency Spillway Elevation	1616.00'
Basin Low Point	1590.00'
Basin Outfall Invert	1593.50'
100-YR WSEL	1614.80'
100-YR Storage	668.2 AC-FT
Basin Volume	711.75 AC-FT
Basin Drain Time	36 hours
Percolation Rate	28.1 cfs FS = 1.3

- NOTE:
- Hydroseed to be Added to Basin Sides. Hydroseed 21 Acres.
 - Basin Side Slopes Shall be Constructed in Accordance to ADOT Specification 203-3.03(B)
 - Hydroseed and Restoration per Supplemental Specification 430.12.13 and 430.12.14
 - See Sheet D3 & G7 for Access Road Control Point and Elevation Table.

50 0 50 100
HORIZ SCALE IN FEET



Dumped Riprap Type II
D50=1", Th=2' 1220 CY
See D11, Sheet D13.
Or Substitute for Exist Concrete Rubble per Note on G2 and Section E, This Sheet

Dumped Riprap Type I
D50 = 6", Th = 1'
1824 CY
Exist Concrete Rubble (Approx 590CY)

Begin Basin Perimeter Access Road
Sta: 10+00 See Sheet SD11

Salvaged Concrete Rubble
Varies
1593'
Maccaferri Mactex
N60.1 Filter Fabric

CONCRETE RUBBLE DETAIL

Contact Arizona 811 at least two full working days before you begin excavation
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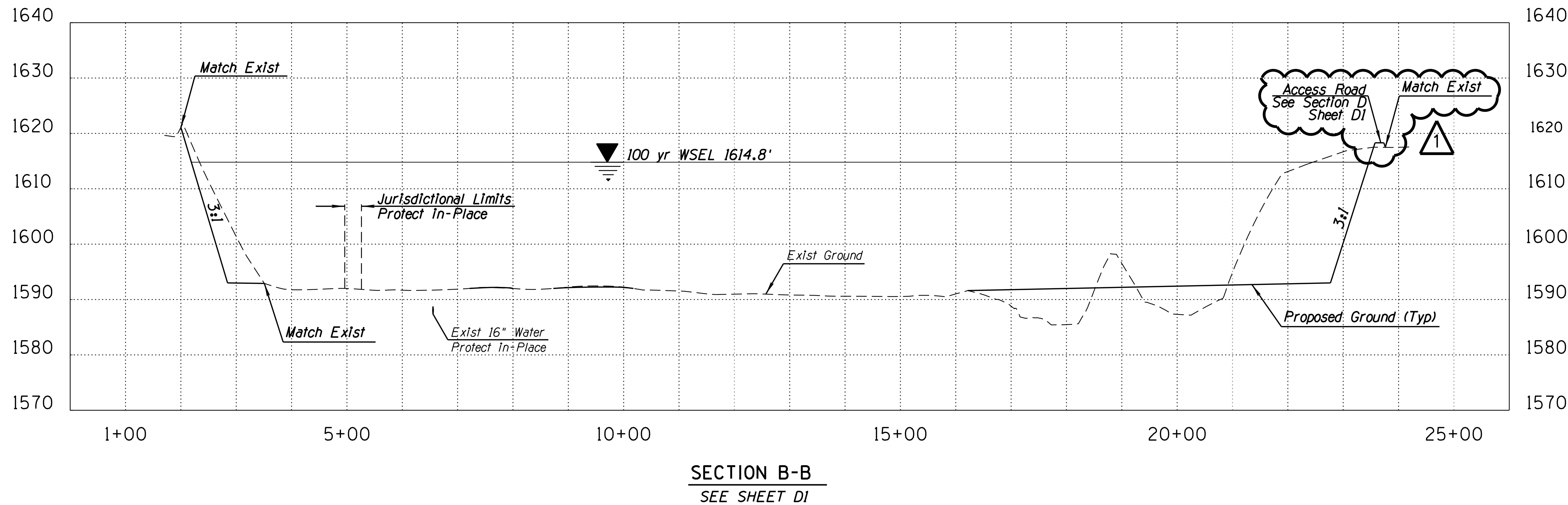
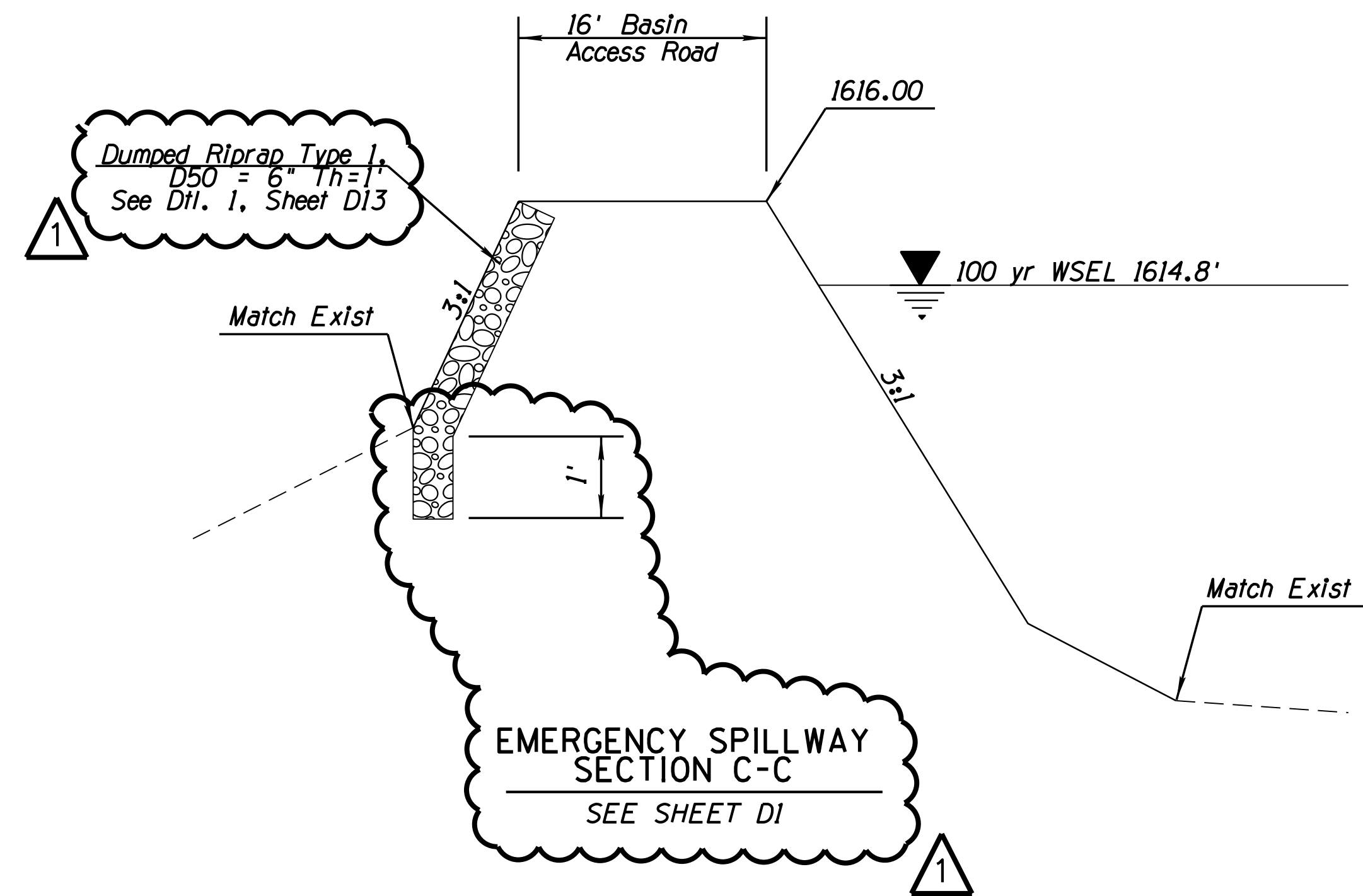
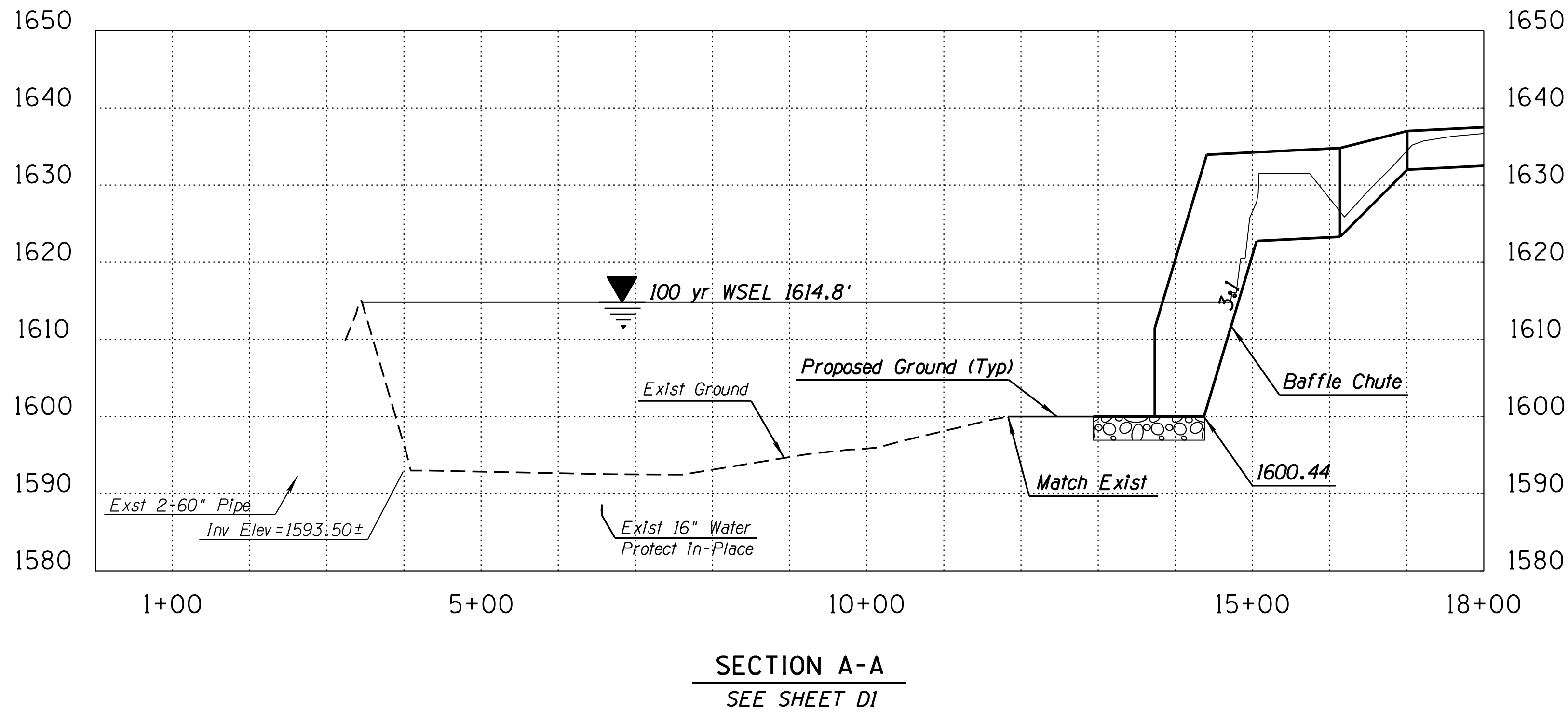
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ENGINEER: [Signature] 45986 ZEEZ SALIBA		PUBLIC WORKS	
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PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE		7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SCALE: HORIZ. 1"=100'	DESIGNED: AC	DATE: 07/19	BID NO. XXXX
VERT. N/A	DRAWN: JJP	AS-BUILT: XX/XX	PROJECT NO. 400-FB53B-56047
			SHT. D1
			20 OF 38

SECTION D

Plan Check No: 4817-18-6
124-SA-2018

PLOT DATE: 3/13/2020 7:00:45 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_D2_BASIN DETAIL.dgn



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PROJECT TITLE CROSSROADS EAST DRAINAGE INFRASTRUCTURE		PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SHEET TITLE BASIN GRADING DETAIL			
SCALE HORIZ. 1"=10" VERT. 1"=10"	DESIGNED AC	DATE 07/19	BID NO. XXXX
DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047	SHT. D2 21 OF 38

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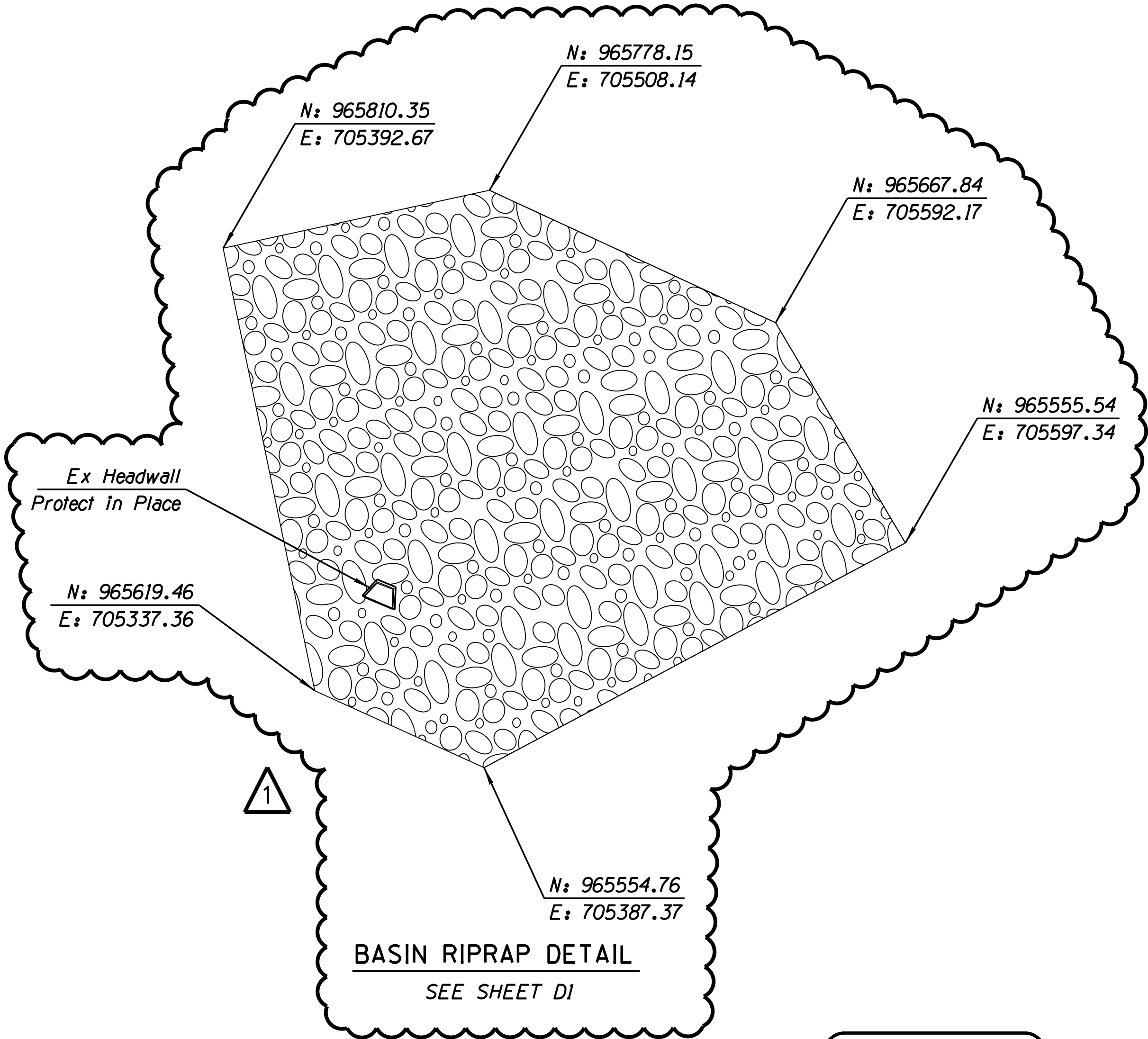
POINT	NORTHING	EASTING	ELEVATION
1	965509.35	705638.61	1621.06
2	965507.57	705978.66	1619.08
3	965522.75	706255.72	1624.02
4	965485.39	706335.47	1623.10
5	965436.87	706376.34	1621.64
6	965339.92	706392.54	1617.00
7	965217.70	706357.31	1617.01
8	965305.41	706318.62	1593.03
9	965416.27	706276.18	1593.00
10	965110.25	706220.52	1617.00
11	965013.00	706101.34	1615.30
12	964947.93	706053.08	1617.00
13	964812.53	705921.01	1617.00
14	964825.38	705908.42	1617.00
15	964766.72	705792.79	1617.00
16	964754.64	705794.52	1617.00
17	964763.11	705724.75	1617.00
18	964777.45	705653.64	1609.37
19	964793.13	705670.17	1617.00
20	964803.85	705672.61	1617.00
21	964904.70	705486.01	1609.54
22	964945.19	705454.85	1617.00
23	964958.63	705468.46	1617.00
24	964990.56	705355.62	1611.29
25	965145.02	705092.22	1616.00
26	965159.38	705096.95	1616.00
27	965223.64	704928.65	1616.00
28	965229.73	704954.94	1616.00
29	965327.15	704731.93	1616.00
30	965342.24	704720.69	1616.00
31	965352.39	704651.80	1616.00
32	965366.16	704658.35	1616.00
33	965443.86	704435.80	1617.00
34	965458.92	704441.93	1617.00
35	965518.59	704241.88	1617.00

Note: See sheet D1 for point lables.
All units are in feet.



POINT	NORTHING	EASTING	ELEVATION
36	965535.42	704244.08	1617.00
37	965574.90	704122.21	1617.00
38	965693.02	704053.41	1617.00
39	965852.09	704116.27	1618.30
40	965996.68	704199.97	1620.51
41	966115.05	704259.20	1622.56
42	966266.53	704381.43	1622.96
43	966351.03	704487.56	1620.00
44	966426.65	704561.46	1621.25
45	966500.82	704638.78	1622.35
46	966549.89	704684.26	1626.97
47	966571.50	704728.47	1629.13
48	966512.36	704891.27	1626.37
49	966438.89	704945.58	1630.00
50	966402.17	704958.77	1632.26
51	966357.86	704950.83	1629.09
52	966181.51	704955.90	1628.64
53	966016.25	704950.03	1626.81
54	965956.45	704948.31	1626.67
55	965910.98	704929.18	1625.01
56	965810.35	705392.67	1623.74
57	965778.15	705508.14	1622.91
58	965667.84	705592.167	1623.03
59	965555.54	705597.339	1622.05
60	965554.76	705387.367	1592.79
61	965619.46	705337.36	1592.72
62	965646.65	705375.39	1593.00
63	965649.99	705384.42	1593.00
64	965643.16	705390.14	1593.00
65	965634.59	705385.11	1593.00
66	965976.42	704848.66	1593.00
67	966245.63	704866.99	1600.02
68	966458.29	704835.32	1600.44
69	966484.40	704734.10	1600.44
70	966343.22	704596.31	1603.56
71	966071.04	704336.19	1593.00

Note: See sheet D1 for point lables.
All units are in feet.

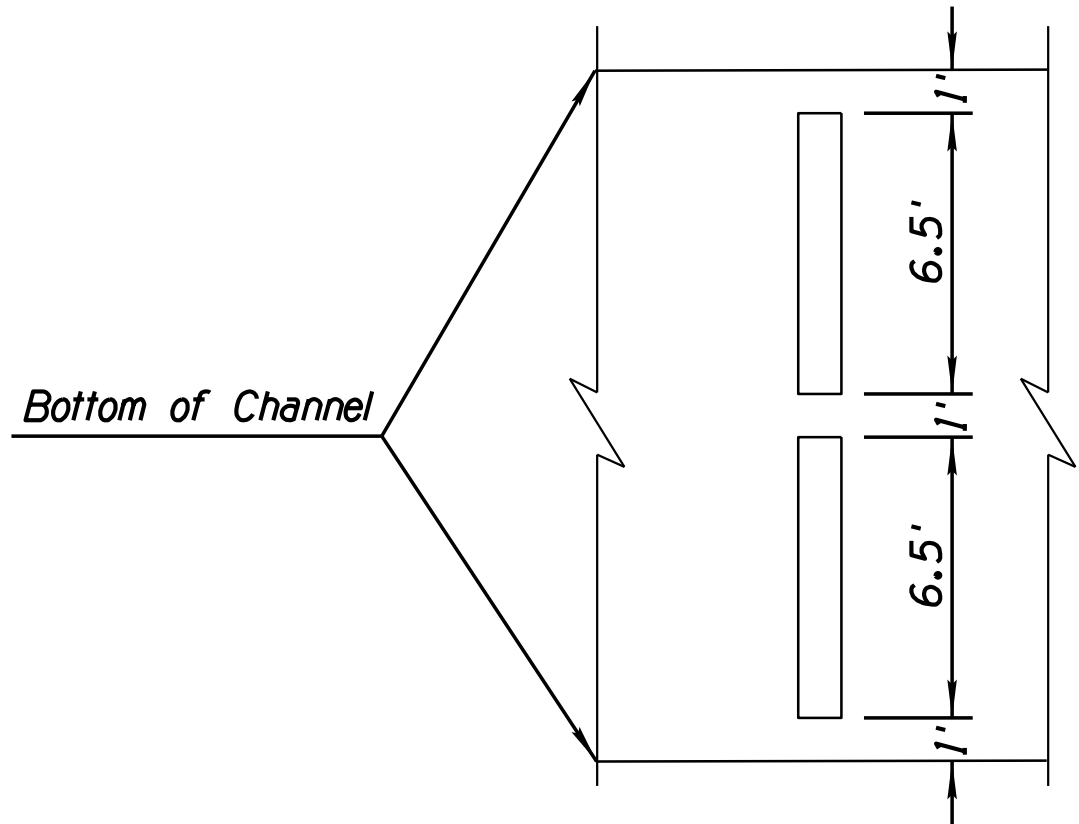
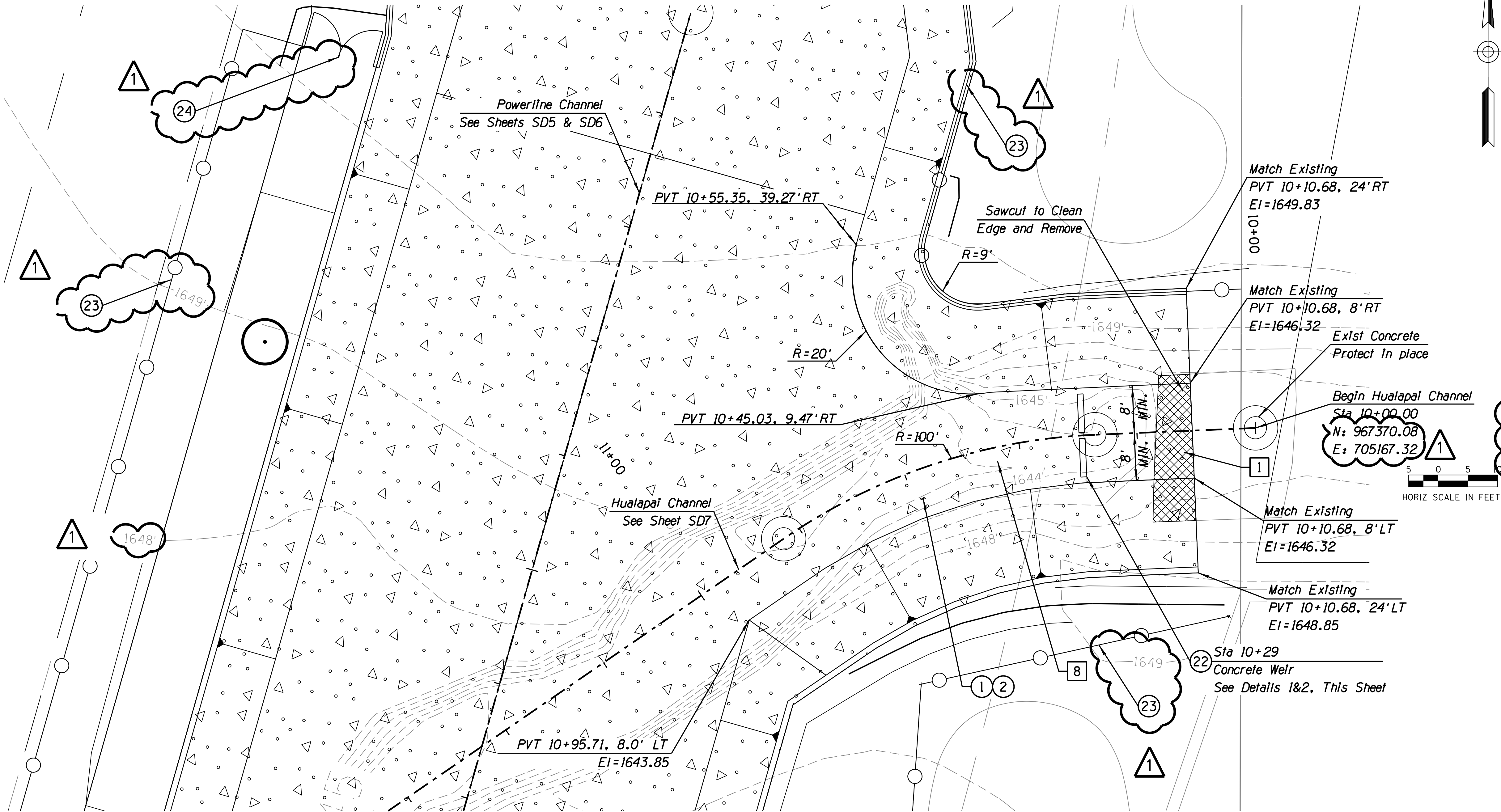


BASIN RIPRAP DETAIL
SEE SHEET D1

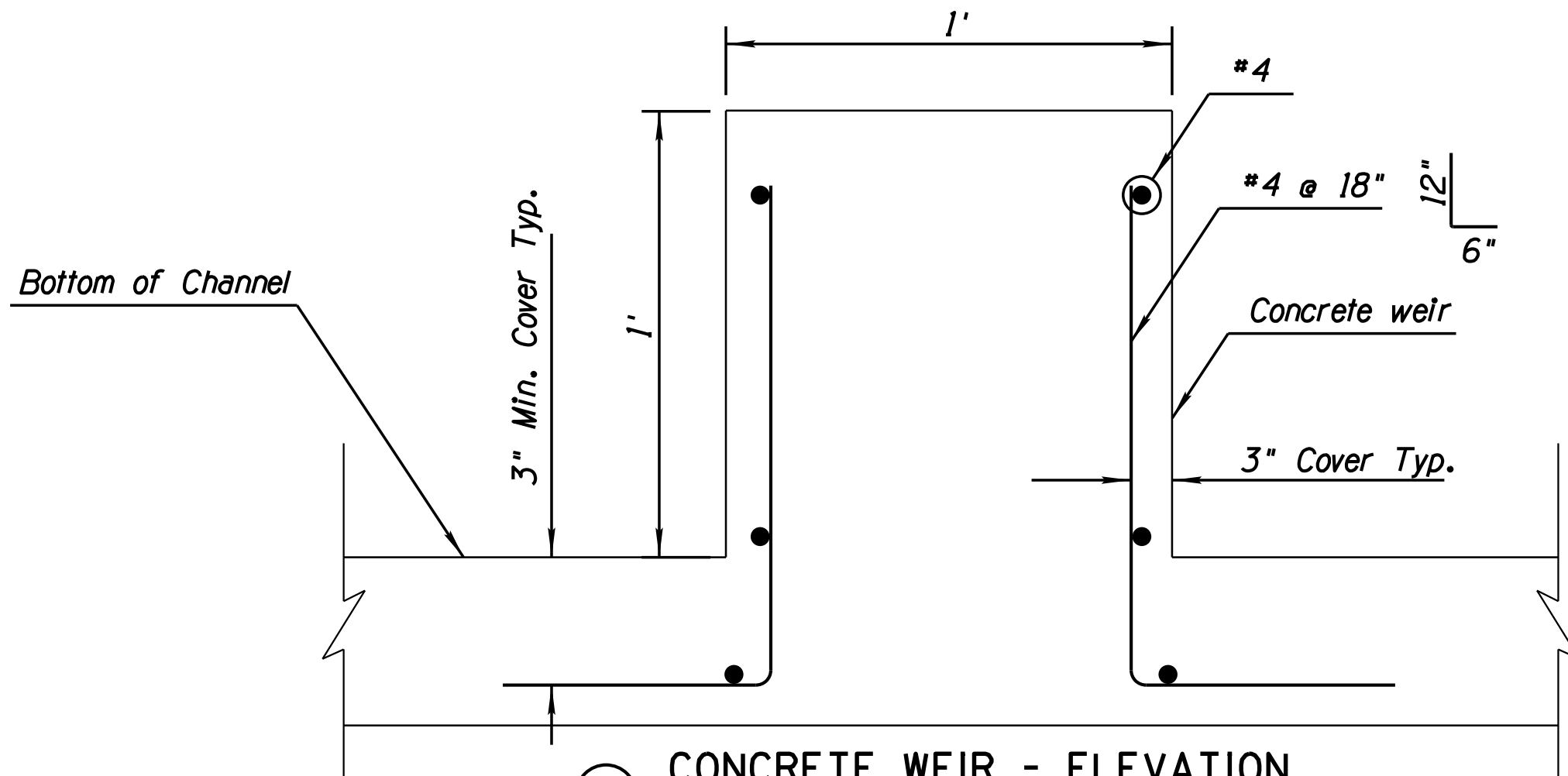


DATE: 3/13/20		REVISION:		CITY COMMENTS		BY: A.S.N.	
				PUBLIC WORKS			
				CAPITAL PROJECT MANAGEMENT			
SHEET TITLE		BASIN GRADING DETAIL					
PROJECT TITLE		CROSSROADS EAST DRAINAGE INFRASTRUCTURE					
SCALE	DESIGNED	DATE	BID NO.	SHT.			
HORIZ N/A	AC	07/19	XXXX	D3			
VERT. N/A	DRAWN	AS-BUILT	PROJECT NO.				
	JJP	XX/XX	400-FB53B-56047	22 OF 38			

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1 CONCRETE WEIR - PLAN



2 CONCRETE WEIR - ELEVATION

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REMOVAL & RELOCATION NOTES

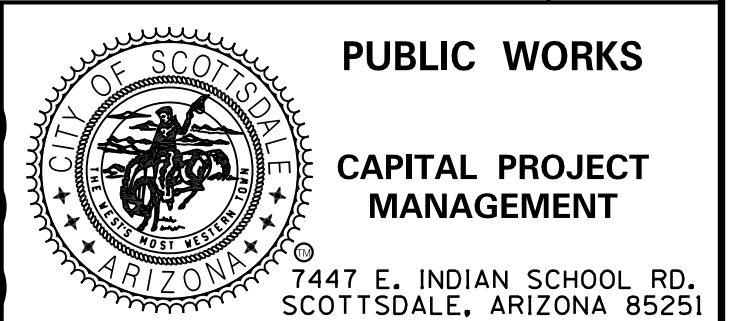
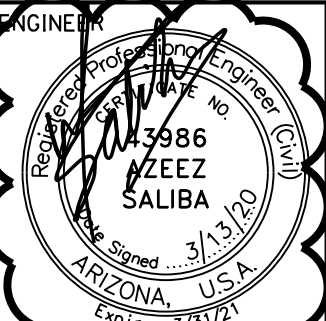
Description	Unit	Quan
1 Sawcut and Remove to Clean Edge		
8 Salvage and Relocate Existing Riprap. Place Upstream of Weir Wall on Hualapai Channel		

CONSTRUCTION NOTES

Description	Unit	Quan
1 Excavate Channel/Pipe		
2 Construct Trapezoidal Channel with Concrete, Bottom Width per Plans		
22 Construct Concrete Weir Wall. See Details 1 and 2, This Sheet		
23 Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14	1	
24 Wire Fence Gate See Detail 2, Sheet D14		

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
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DATE: 3/13/20 REVISION: CITY COMMENTS BY: A.S.N.



SHEET TITLE: **HUALAPAI CHANNEL WEIR DETAIL**

PROJECT TITLE: **CROSSROADS EAST DRAINAGE INFRASTRUCTURE**

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=10'	AC	07/19	XXXX	D4
DRAWN	AS-BUILT	PROJECT NO.	23 OF 38	
JJP	XX/XX	400-FB53B-56047		

124-SA-2018 Plan Check No: 4817-18-6 28-DR-2020 9/11/2020

REMOVAL & RELOCATION NOTES

Description	Unit	Quantity

CONSTRUCTION NOTES

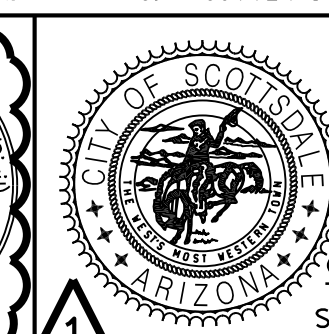
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(13)	Dumped Riprap D50 per Plan	SY	126
(19)	Handrail per COS Std Dtl 2508 Type II, 3 Rail, and Paint SW 7055 Enduring Bronze		
(23)	Barrier Wire Fence See Sheets D16, D17 & See Detail 1, Sheet D14		
(24)	Construct Concrete Vane Wall, And Bottom, Per Sheet D18.	LF	127
(25)	Wingwall Connection See Dtls 3, Sheet D18	EA	1
(26)	Headwall Connection See Dtls 2 and 3, Sheet D18	LF	45

Contact Arizona 811 at least two full working days before you begin excavating.

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BLUE STAKE, INC.

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DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
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PUBLIC WORKS

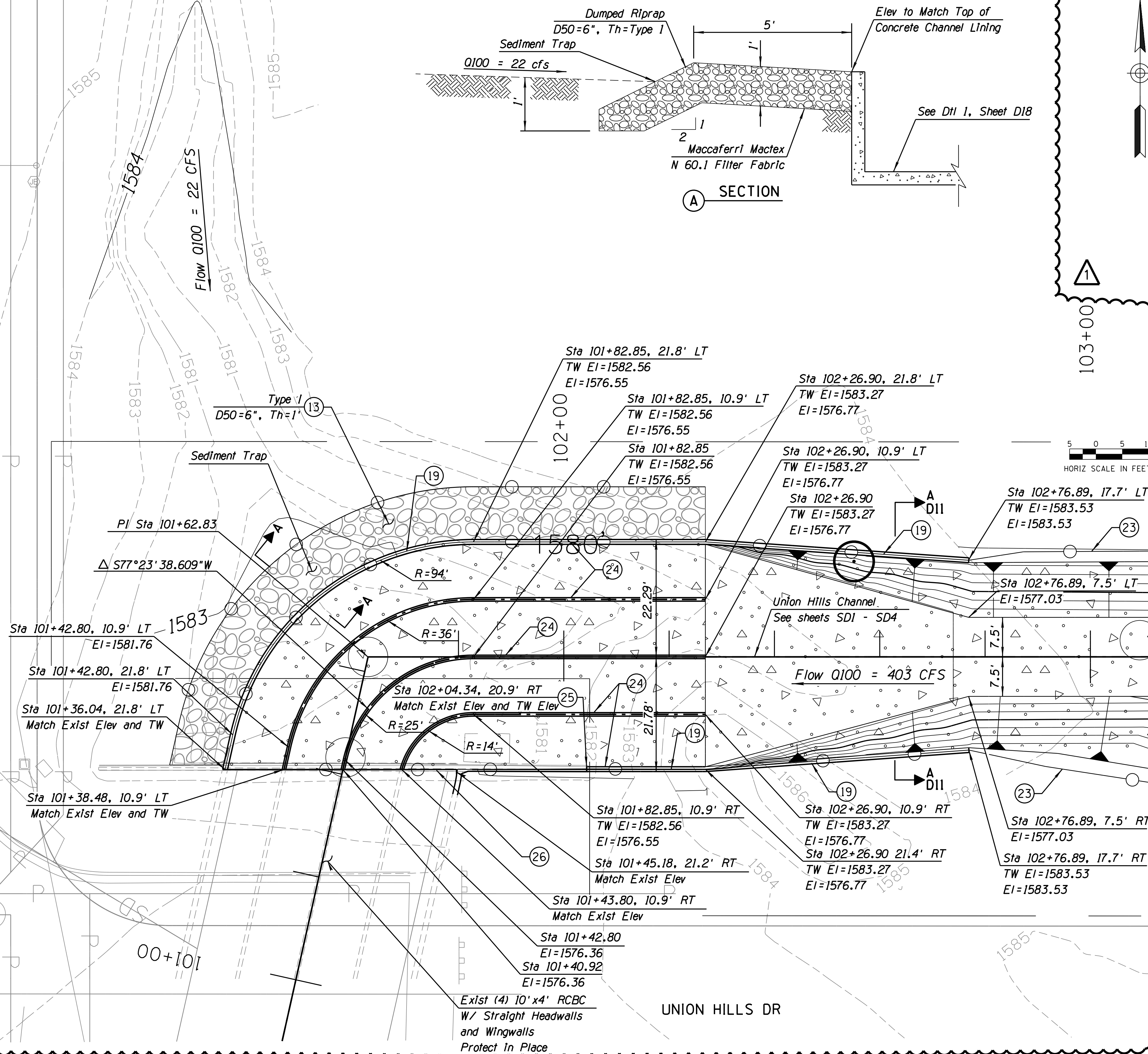
CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD
SCOTTSDALE, ARIZONA 85251

UNION HILLS CHANNEL TRANSITION

PROJECT TITLE	CROSSROADS EAST DRAINAGE INFRASTRUCTURE
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SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=10'	AC	07/19	XXXX	D5
VERT. 1"=8'	DRAWN	AS-BUILT	PROJECT NO.	
	JJP	XX/XX	400-FB53B-56047	24 OF 30



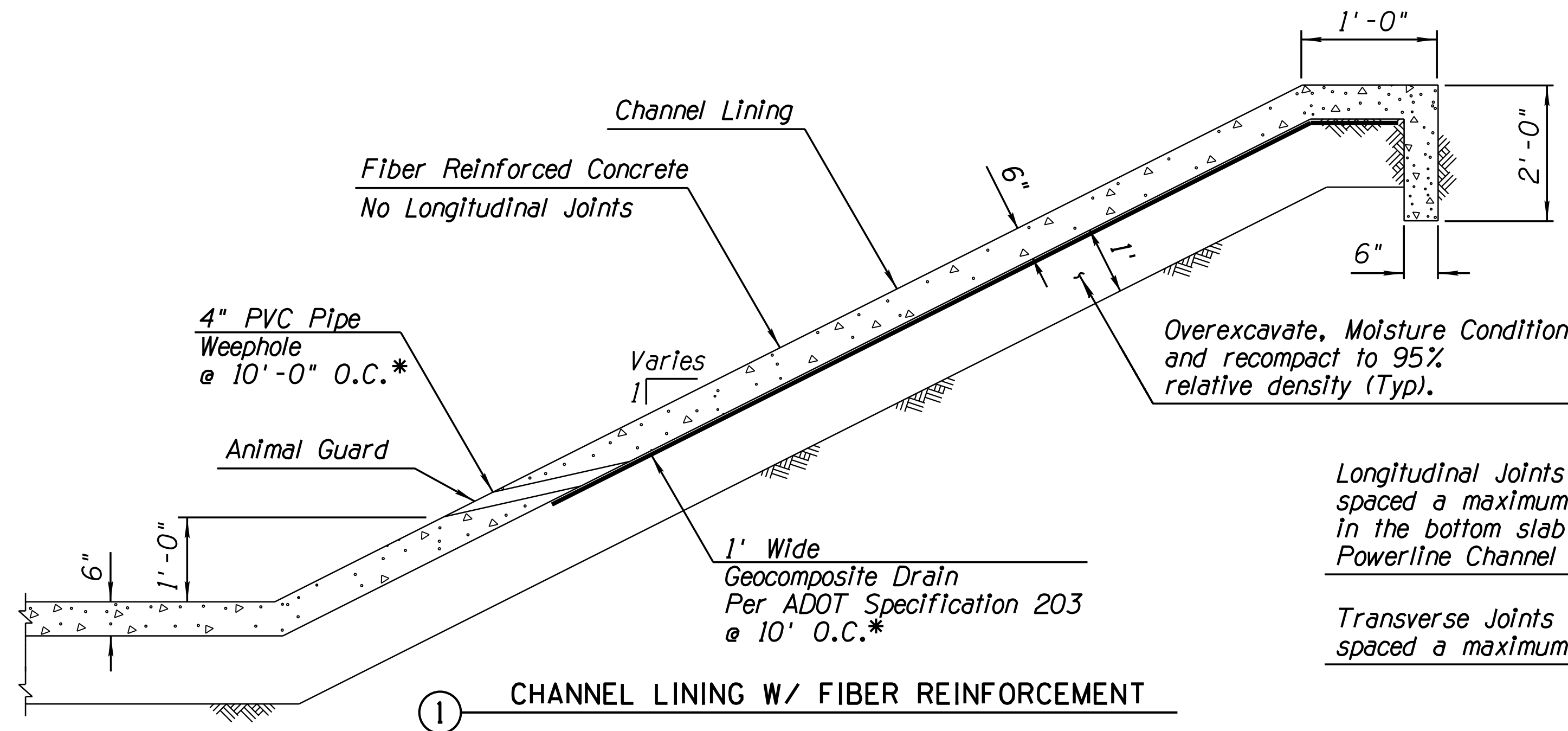
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Construction Notes:

- Joints shall be constructed to a minimum depth of 1". They shall be filled to the surface with a premium-grade high performance, moisture cured, single component, polyurethane-based non-sag elastomeric sealant, ASTM C-920, Type S, grade NS, Class 25; Sikaflex-1a or approved equal.
- Concrete Shall Have $f'c = 4000$ psi.
- Fiber reinforcement shall be Euclid Chemical Company TUF-STRAND SF Synthetic Macro-Fiber, polypropylene/polyethylene copolymer 2-inch long; or approved equivalent at 5lb per CY. Fibers shall comply with the material specifications and performance requirements of ASTM C1116. Fibers to be added at plant during batching.
- Concrete Shall be Colored to Best Match Davis Colors San Diego Buff.
- All Concrete Channel Surfaces to Remain Rough (Unfinished) using heavy rake or transverse steel tines before initial concrete to produce a rough anti skateboarding/rollerblading texture.

Michael Baker
INTERNATIONAL

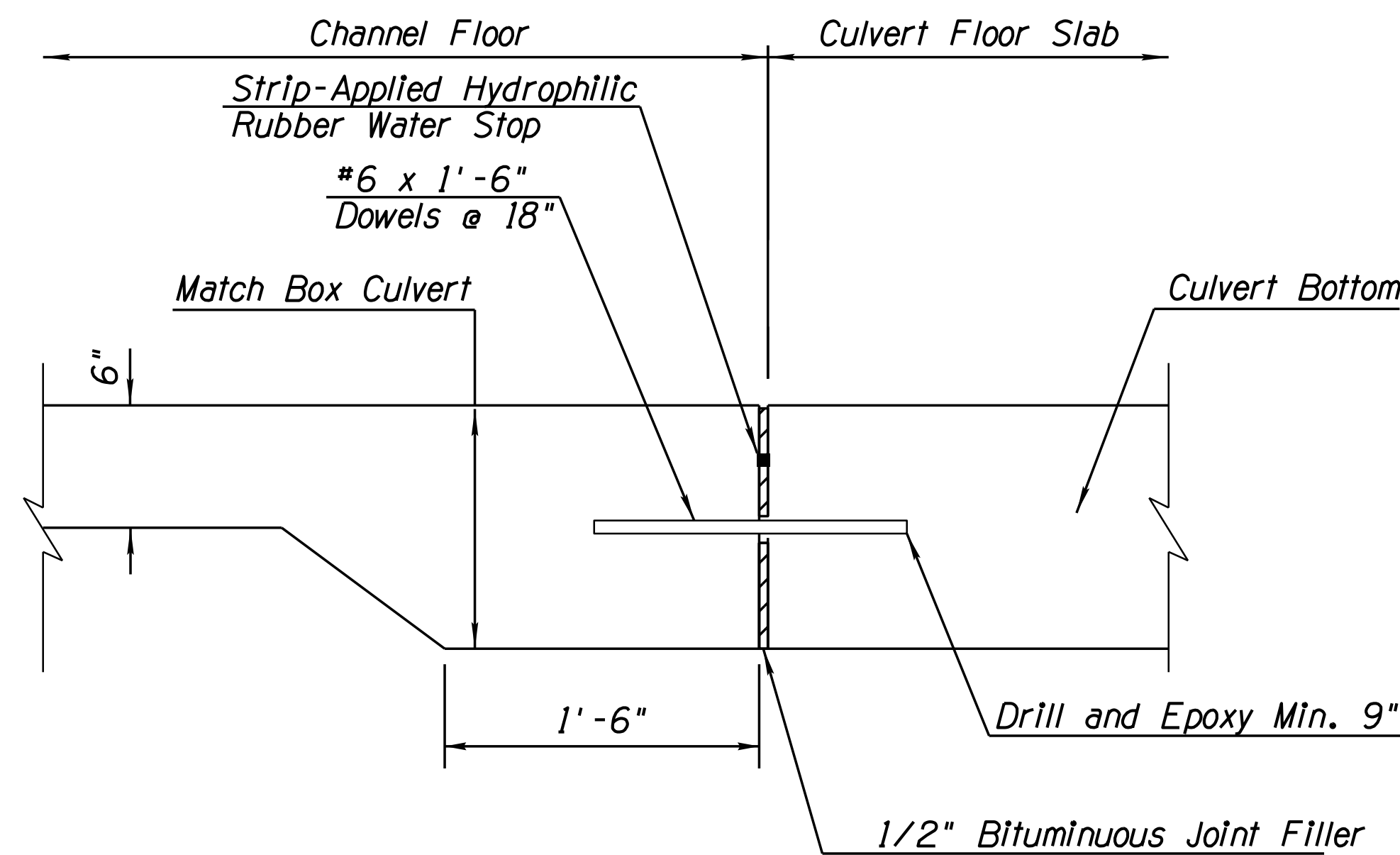
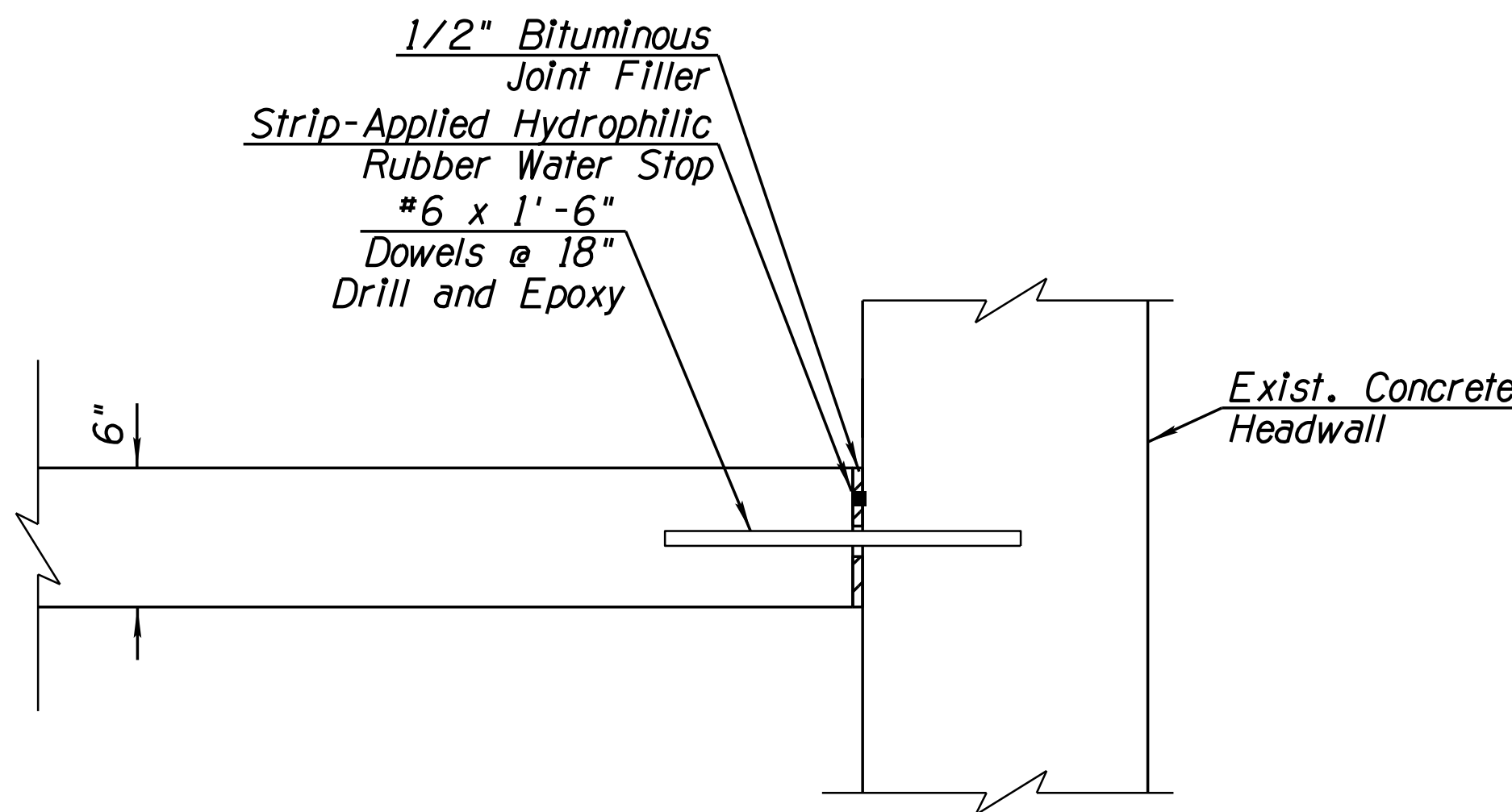
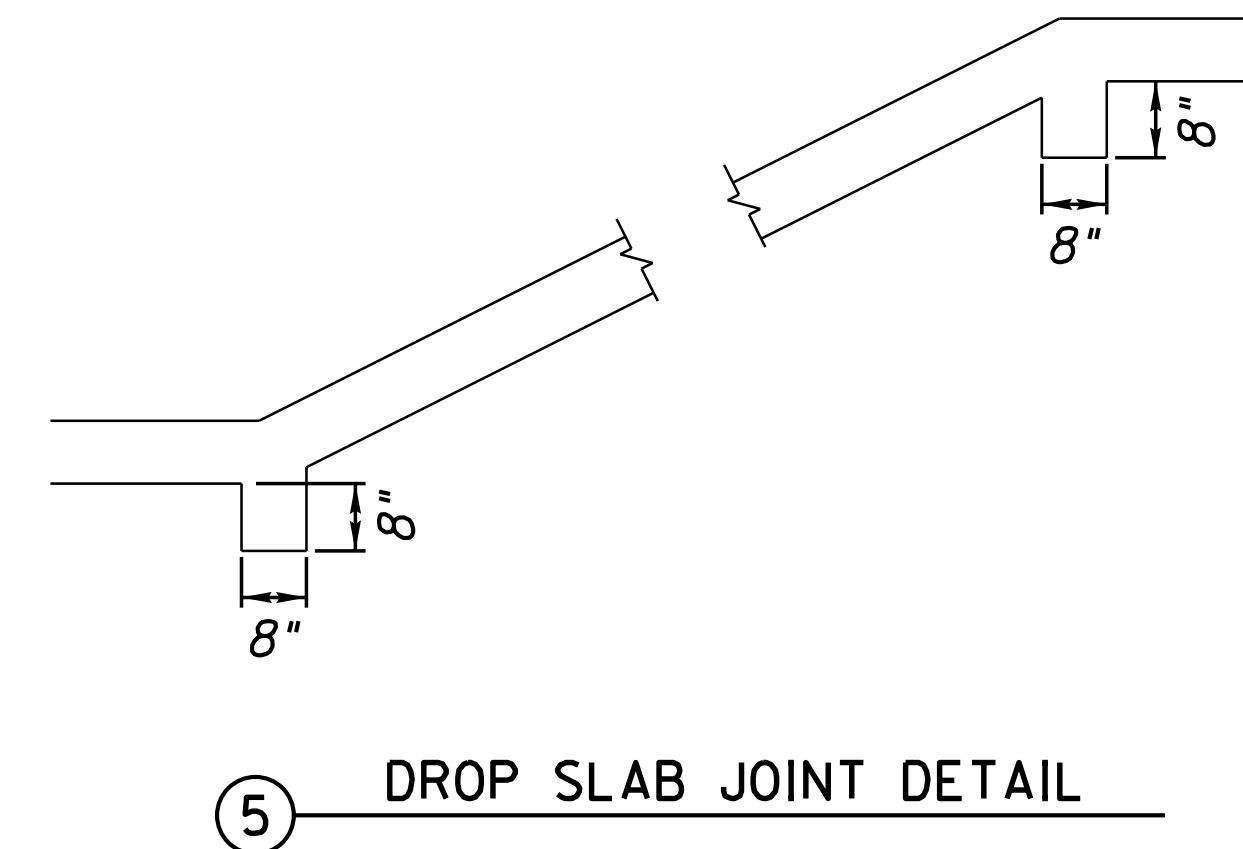
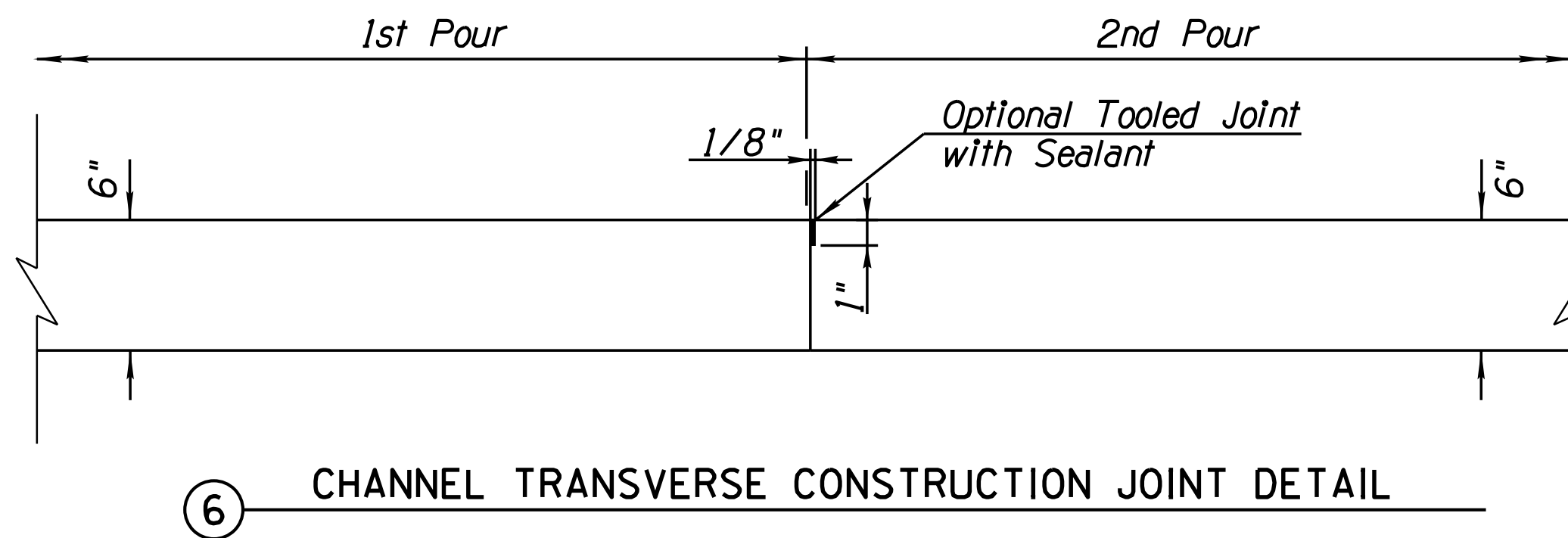
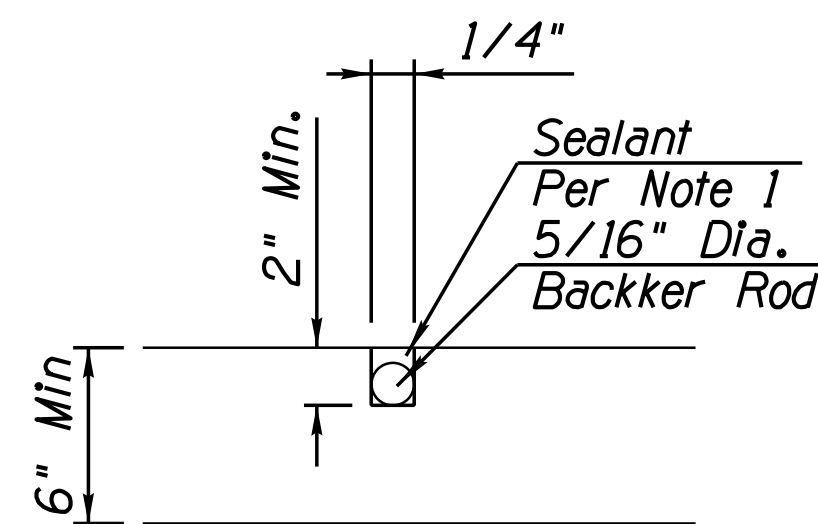
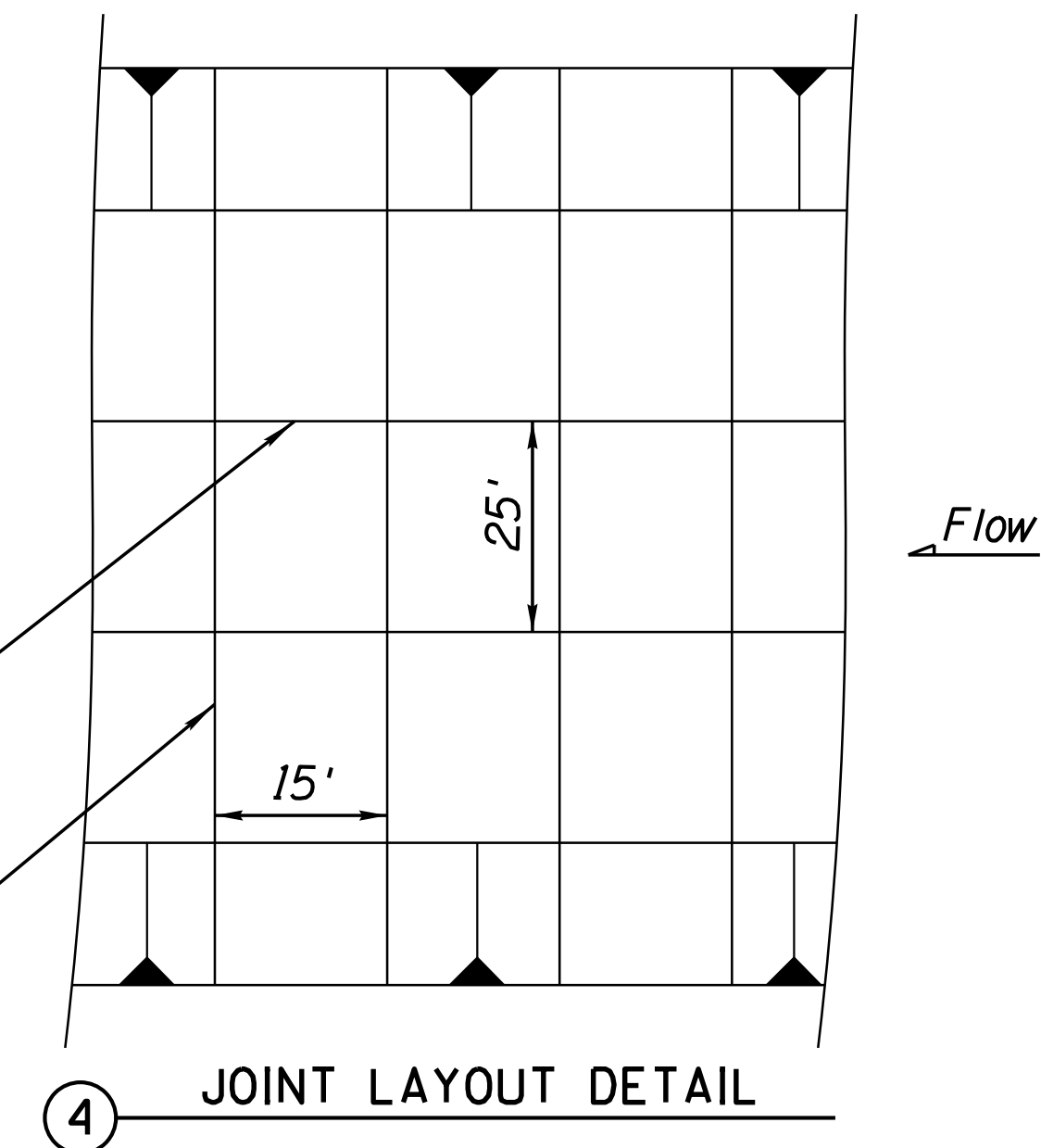
2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
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* 5' O.C. at Union Hills Channel from Sta 101+50 Lt to 101+90 Lt

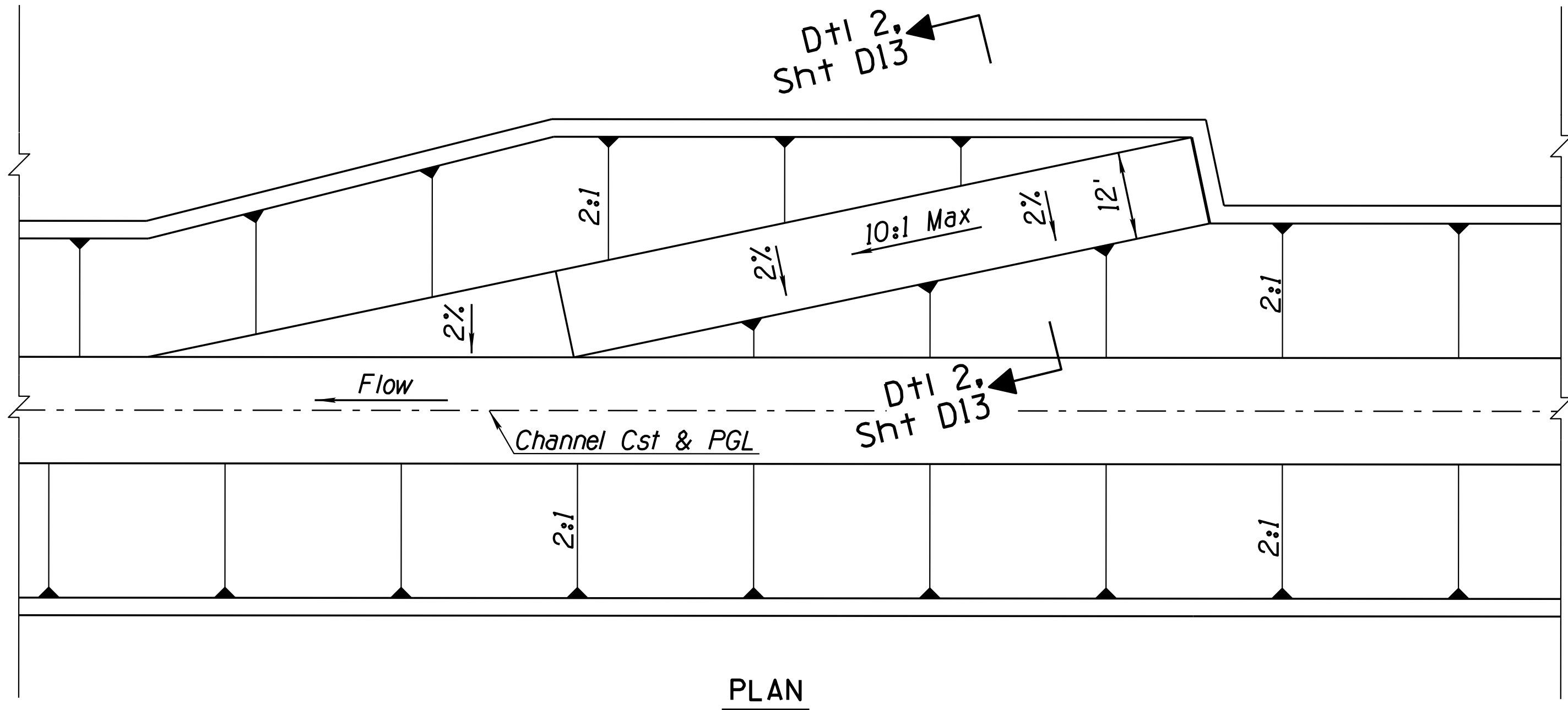
Longitudinal Joints shall be spaced a maximum of 25' in the bottom slab of Powerline Channel Only (Typ)

Transverse Joints shall be spaced a maximum of 15' (Typ)



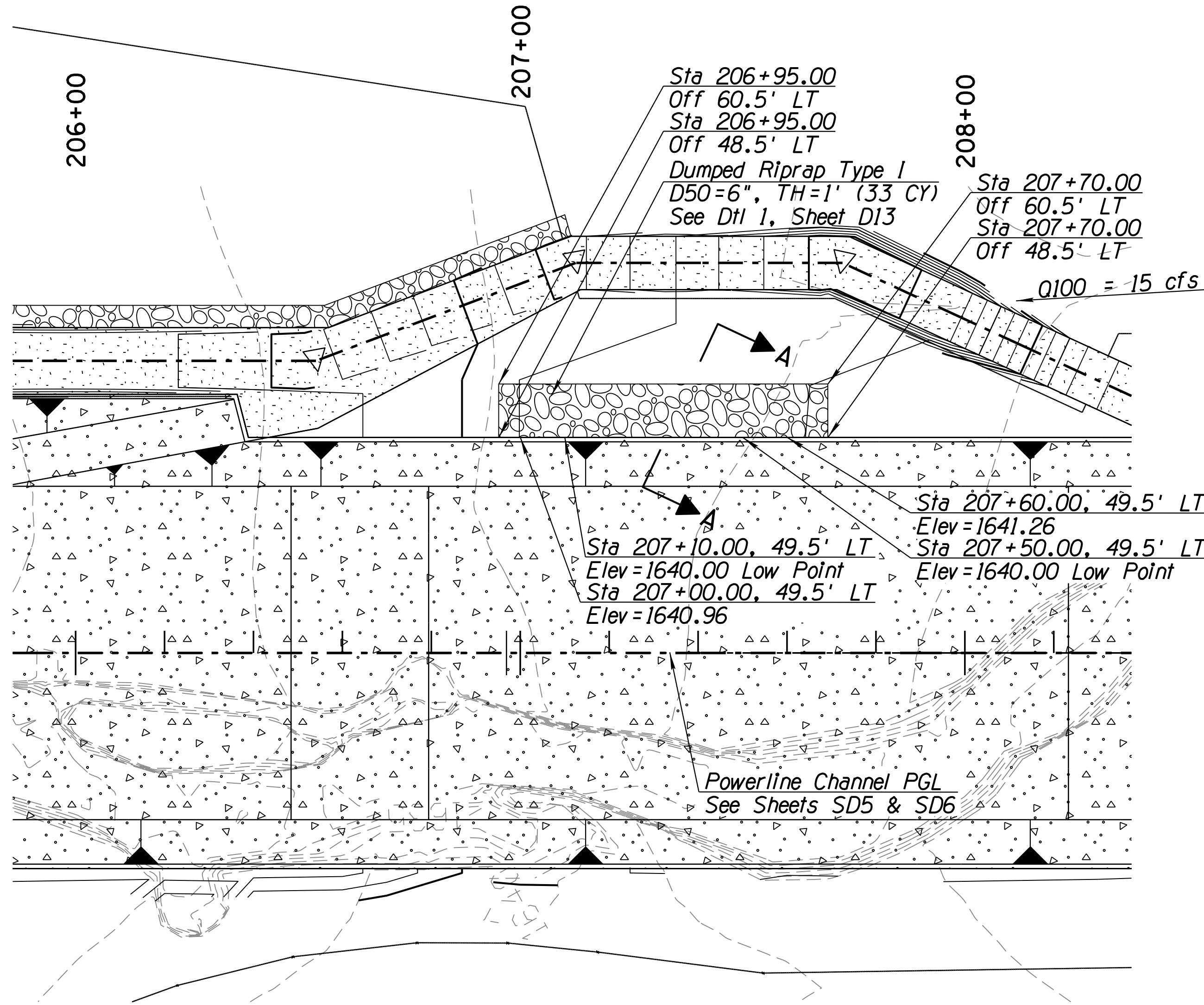
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ENGINEER	PUBLIC WORKS	
	CAPITAL PROJECT MANAGEMENT	
SHEET TITLE	CHANNEL DETAILS	
PROJECT TITLE	CROSSROADS EAST DRAINAGE INFRASTRUCTURE	
SCALE	DESIGNED AC	DATE 07/19
HORIZ. N/A	DRAWN WDF	AS-BUILT XX/XX
VERT. N/A		BID NO. XXXX
		PROJECT NO. 400-FB53B-56047
		SHT. D6
		25 OF 38

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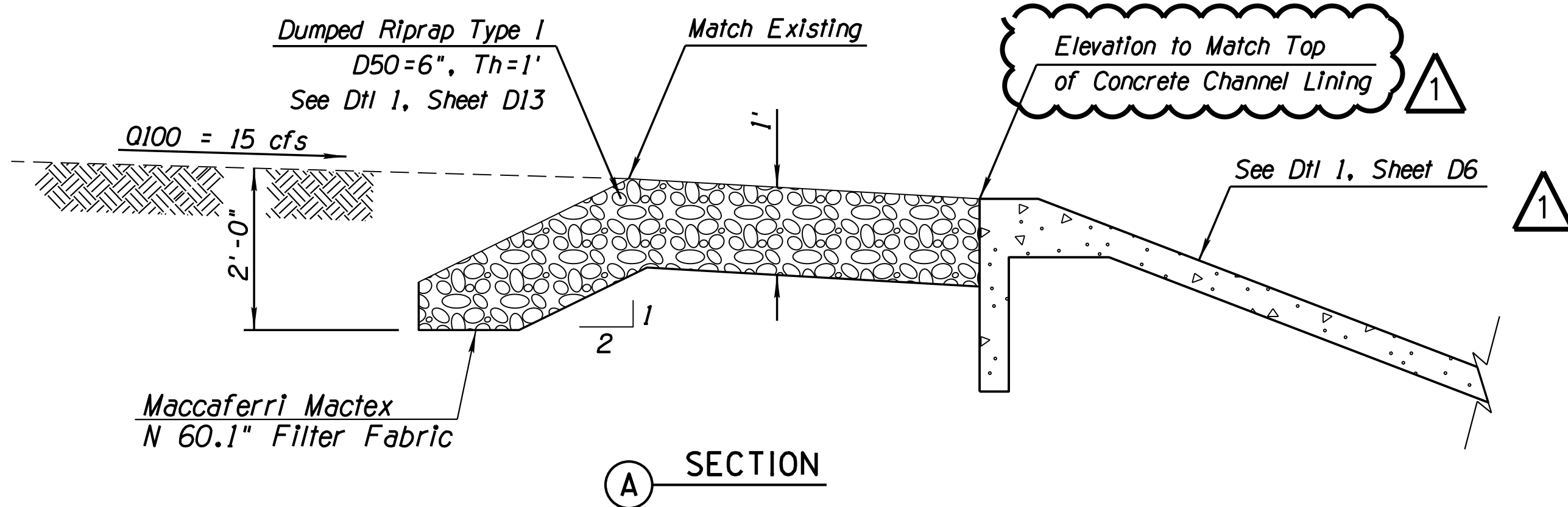


PLAN

1 CONCRETE MAINTENANCE RAMP DETAIL

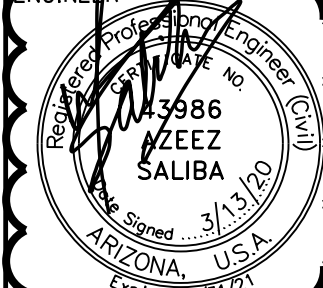


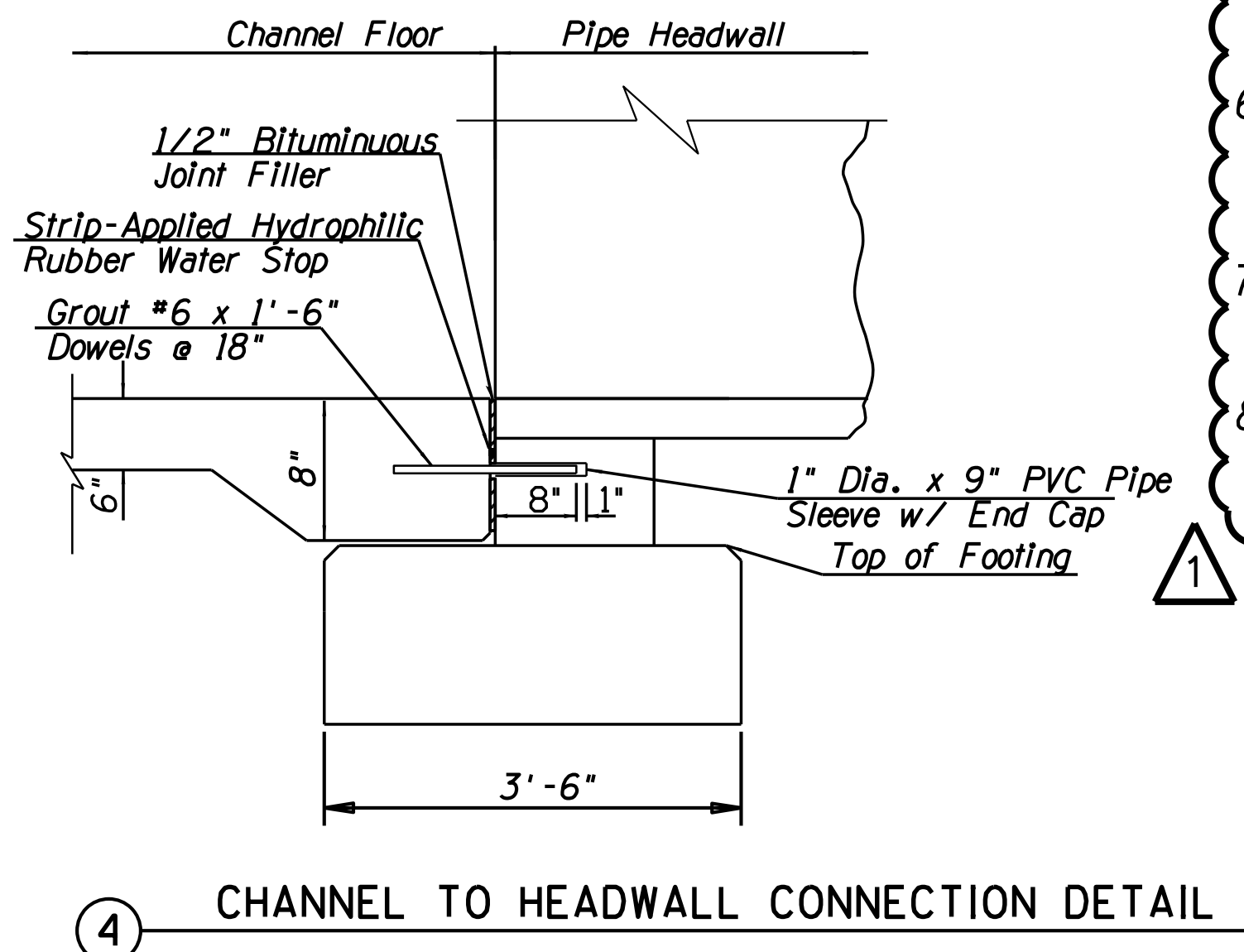
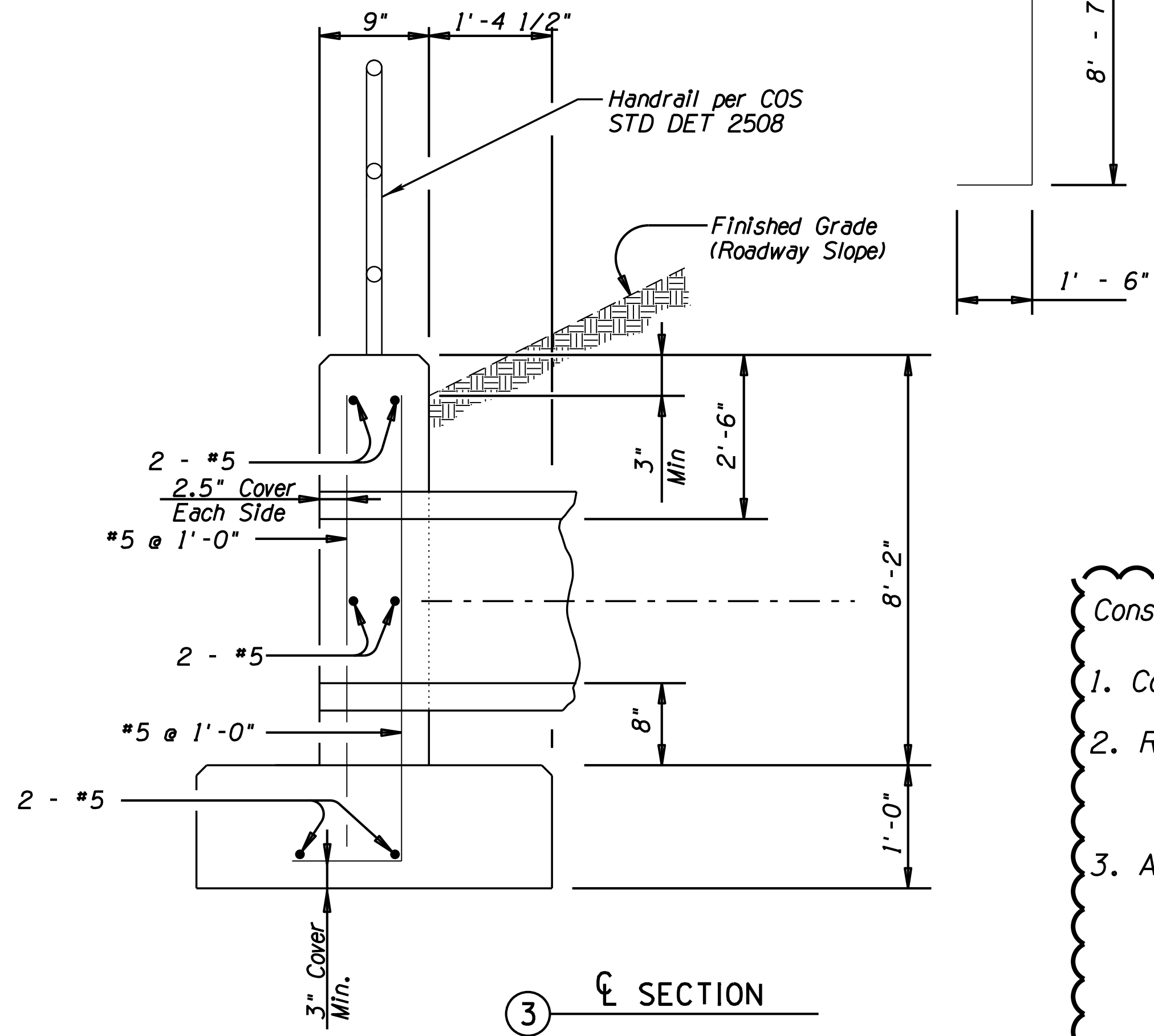
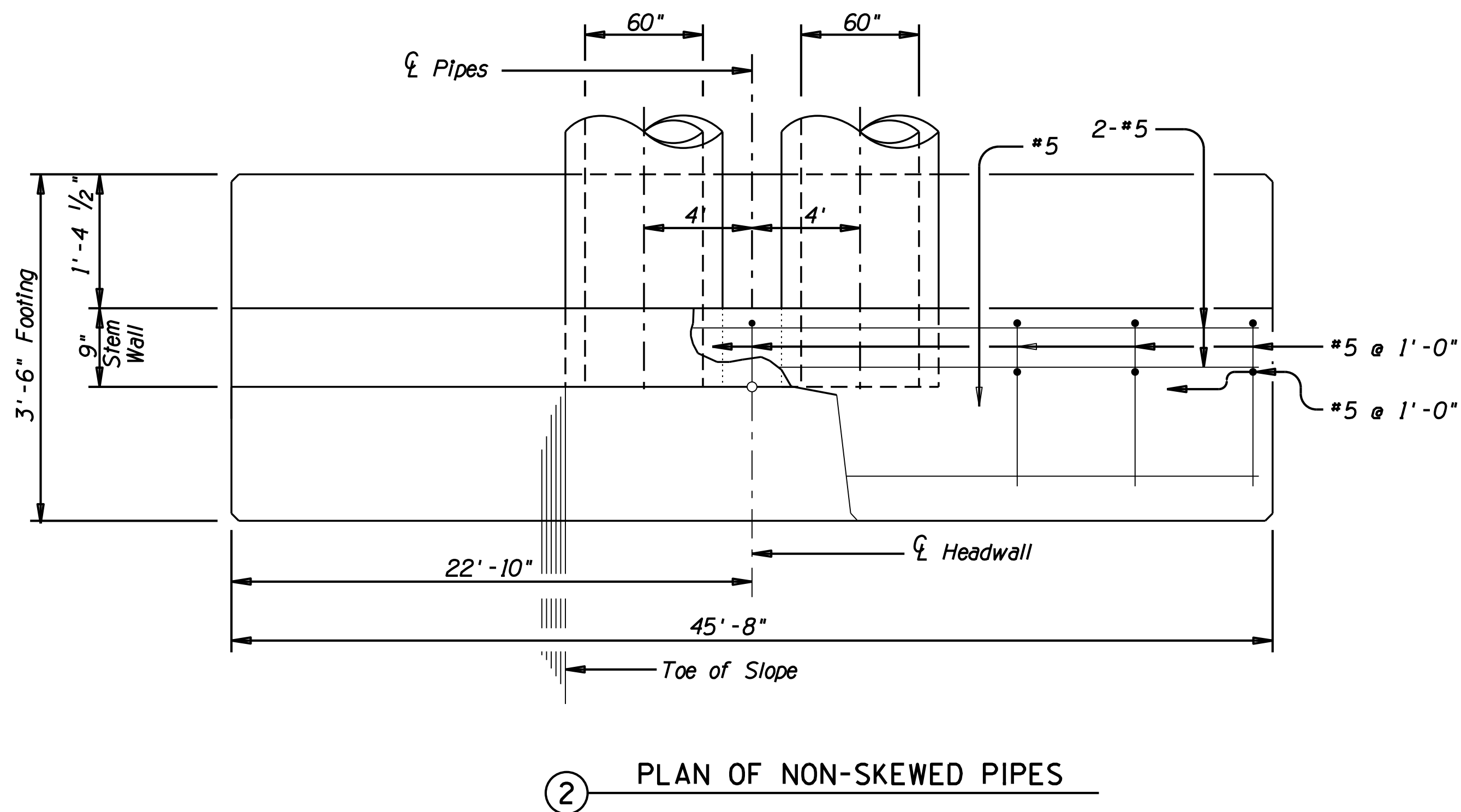
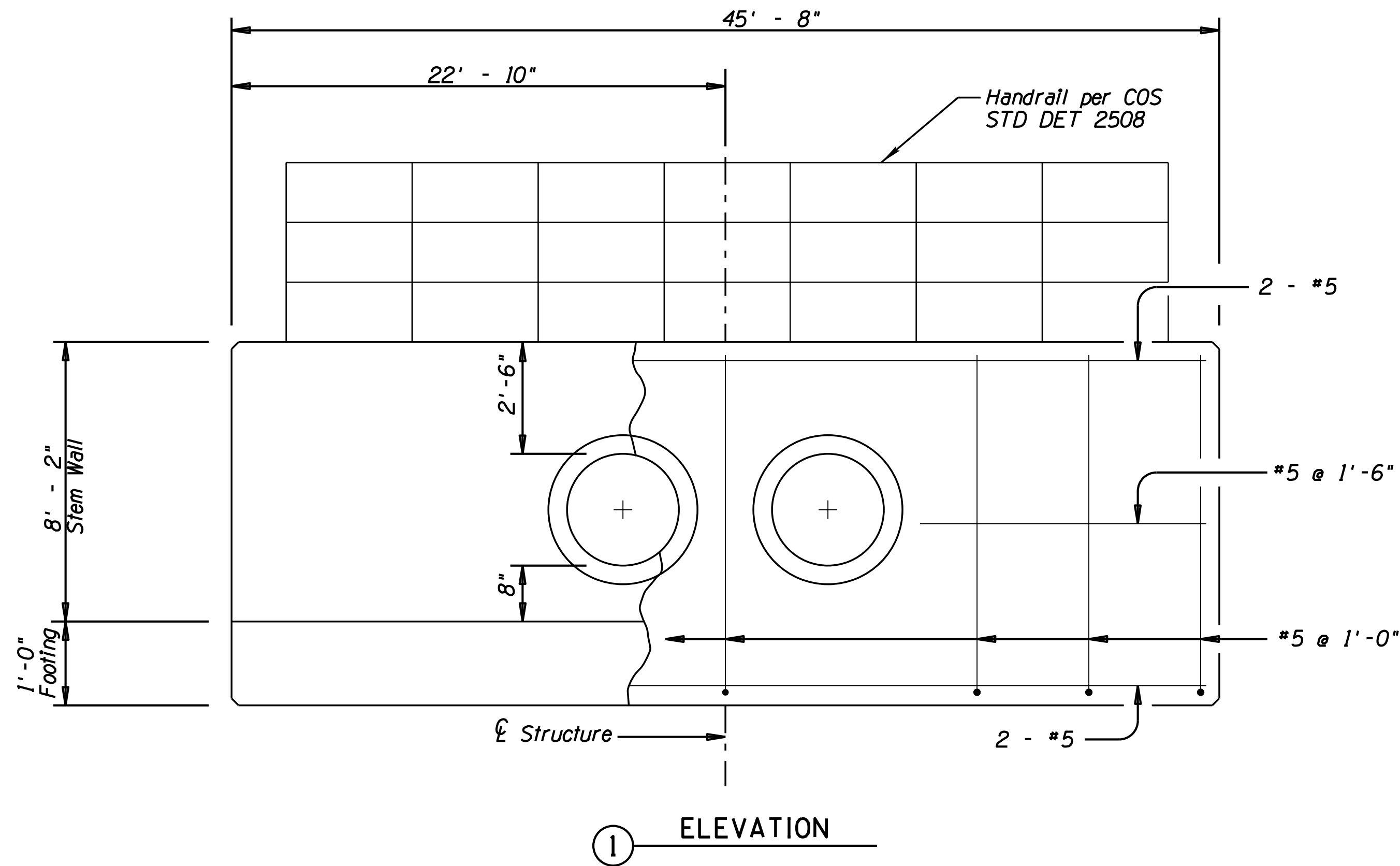
2 POWERLINE CHANNEL INFLOW DETAIL



A SECTION



DATE: 3/13/20		REVISION:	CITY COMMENTS	BY: A.S.N.
ENGINEER 		PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251		
SHEET TITLE				
DETAILS				
PROJECT TITLE				
CROSSROADS EAST DRAINAGE INFRASTRUCTURE				
SCALE	DESIGNED AC	DATE 07/19	BID NO. XXXX	SHT. D7
HORIZ. VERT.	DRAWN XX/XX	PROJECT NO. 400-FB53B-56047		26 OF 38



Michael Baker
INTERNATIONAL

2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
MBAKERINTL.COM

APPROXIMATE QUANTITIES *		
Description	Qty	Units
Reinf. Steel	1,349	LB
Concrete	15	CY

* Quantities shown are for information purposes only.

Construction Notes:

1. Concrete Shall Have $f'c = 4000$ psi.
2. Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
3. All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
4. Chamfer all exposed corners 3/4" unless noted otherwise.
5. Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
6. Fill PVC Pipe With Nonshrink Grout Complying with Section 1017 of ADOT Standard Specifications.
7. Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
8. Reinforcing Steel shall be placed with the center of the outside layer of bars 3" from the surface of the concrete.



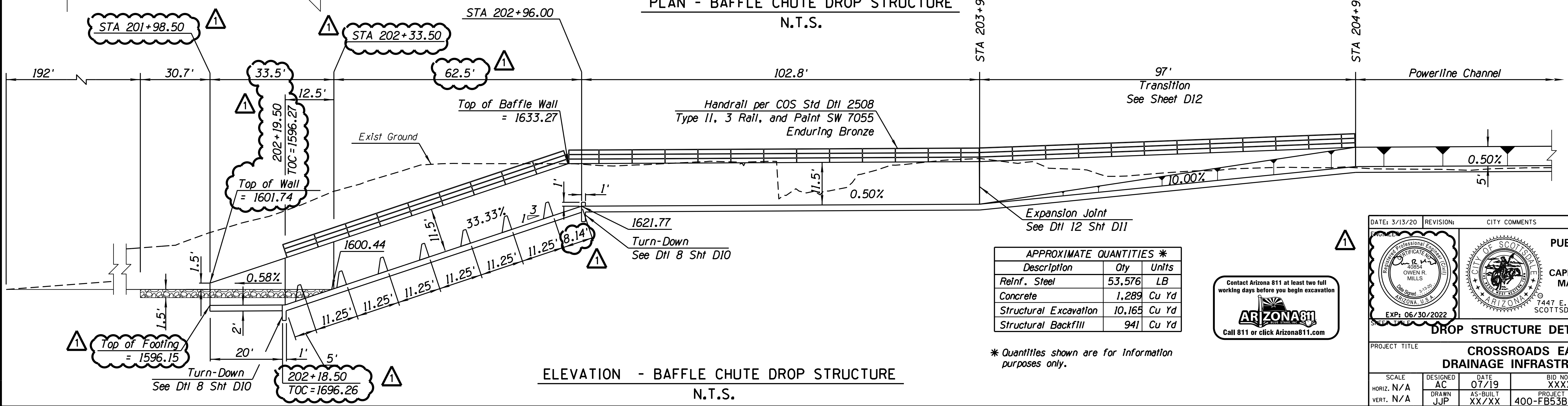
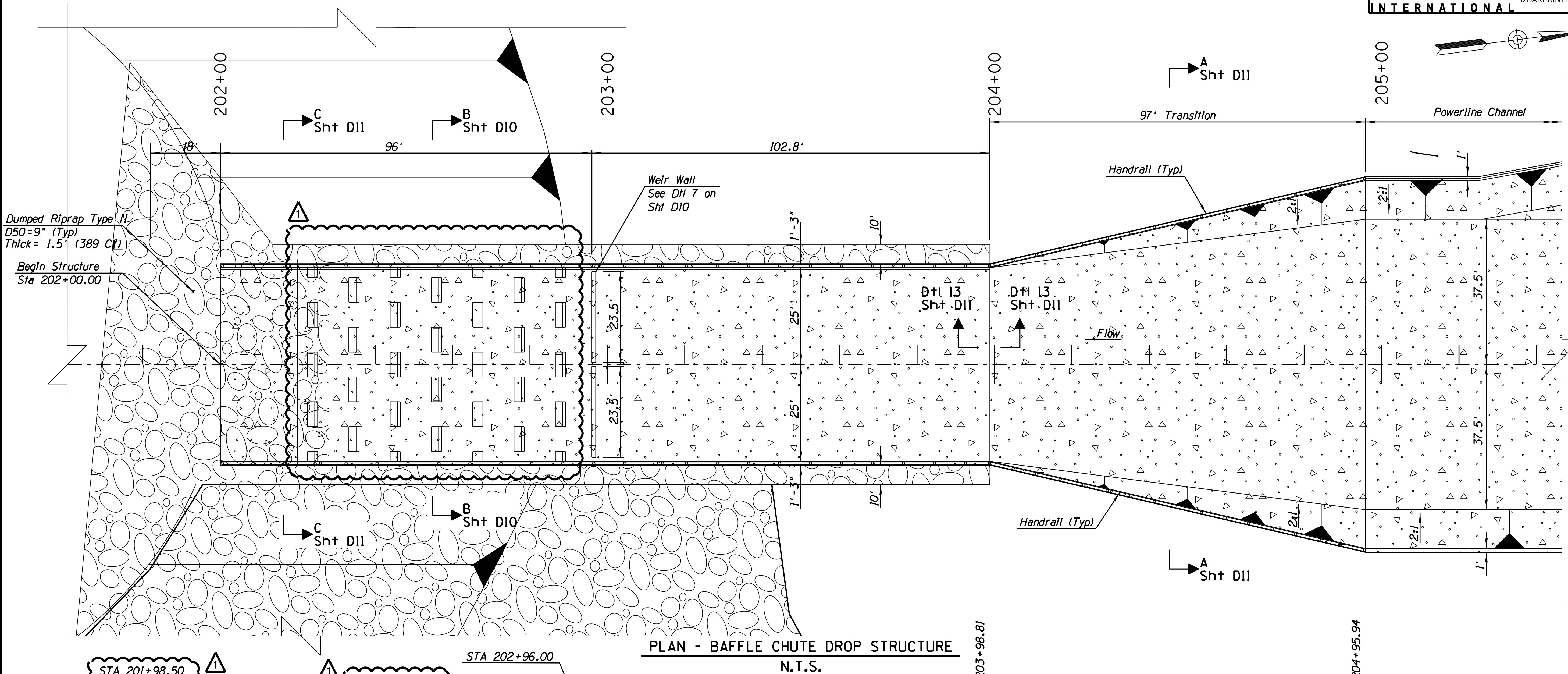
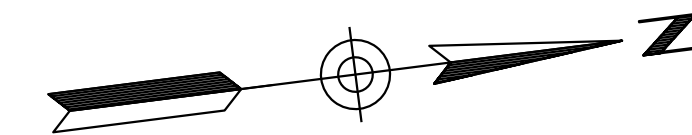
DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
ENGINEER:		PUBLIC WORKS	
SHEET: THREE		CAPITAL PROJECT MANAGEMENT	
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE		7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SCALE: HORIZ. N/A VERT. N/A	DESIGNED: AC DRAWN: WDF	DATE: 07/19 AS-BUILT: XX/XX	BID NO. XXXX PROJECT NO. 400-FB53B-56047
			SHT. D8 27 OF 38

PLOT DATE: 3/13/2020 12:10:07 PM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_D9_DROP_STRUCTURE.dgn

Michael Baker
INTERNATIONAL

2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
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PLAN - BAFFLE CHUTE DROP STRUCTURE
N.T.S.

ELEVATION - BAFFLE CHUTE DROP STRUCTURE
N.T.S.

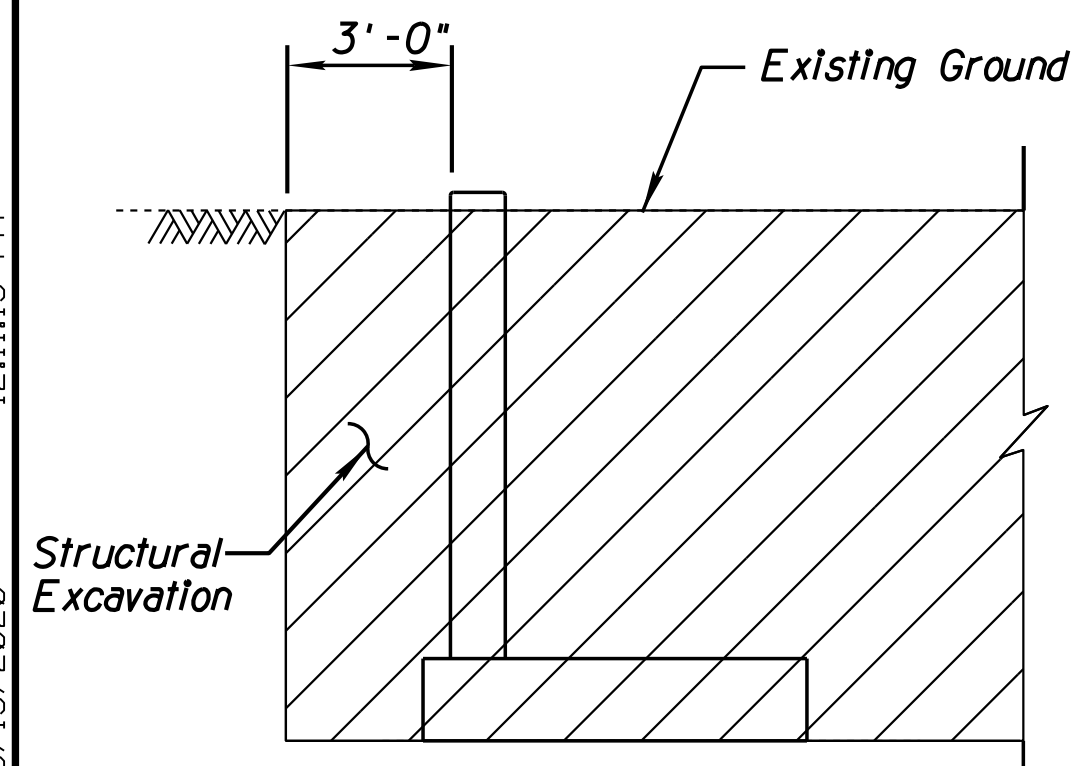
APPROXIMATE QUANTITIES *		
Description	Qty	Units
Reinf. Steel	53,576	LB
Concrete	1,289	Cu Yd
Structural Excavation	10,165	Cu Yd
Structural Backfill	941	Cu Yd

* Quantities shown are for information purposes only.

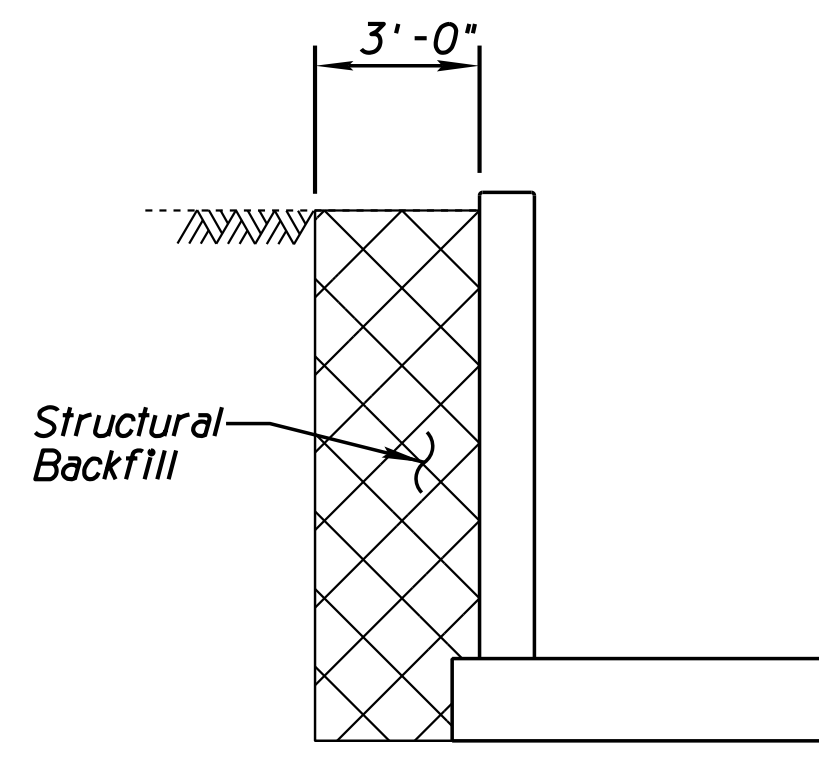


DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
PUBLIC WORKS		CAPITAL PROJECT MANAGEMENT	
PROJECT TITLE		CROSSROADS EAST DRAINAGE INFRASTRUCTURE	
SCALE	DESIGNED AC	DATE 07/19	BID NO. XXXX
HORIZ. N/A	DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047
VERT. N/A			SHT. D9
			28 OF 38

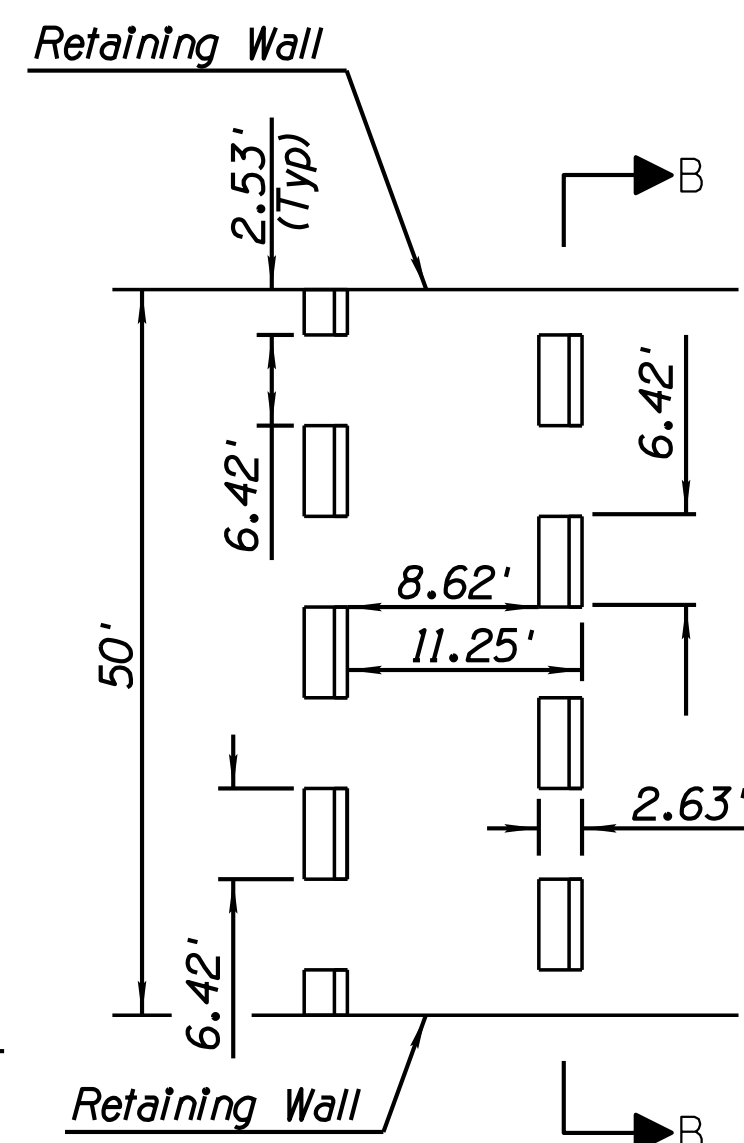
124-SA-2018 Plan Check No: 4817-18-6



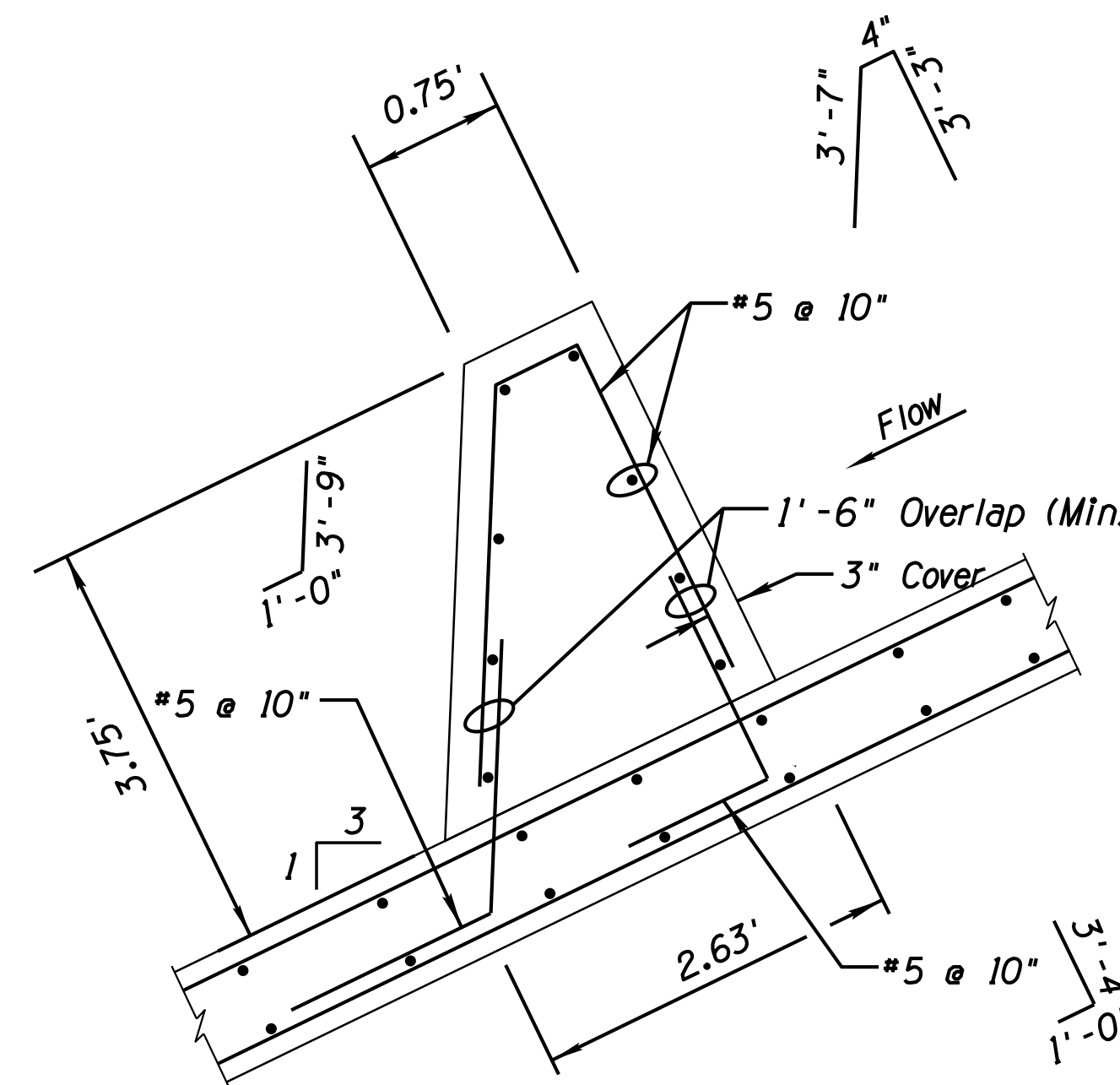
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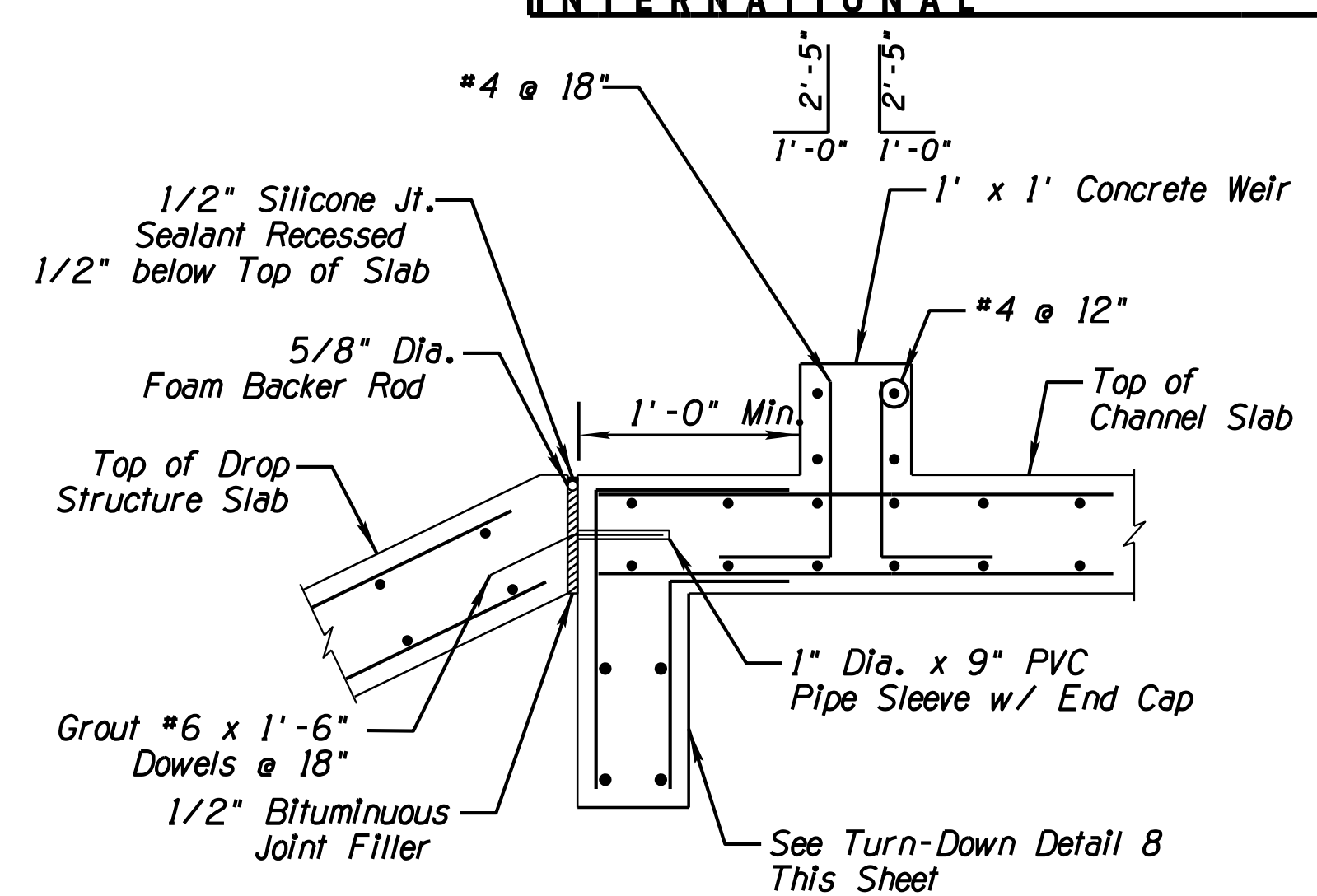
STRUCTURAL BACKFILL LIMITS



4 BAFFLE BLOCK DETAIL



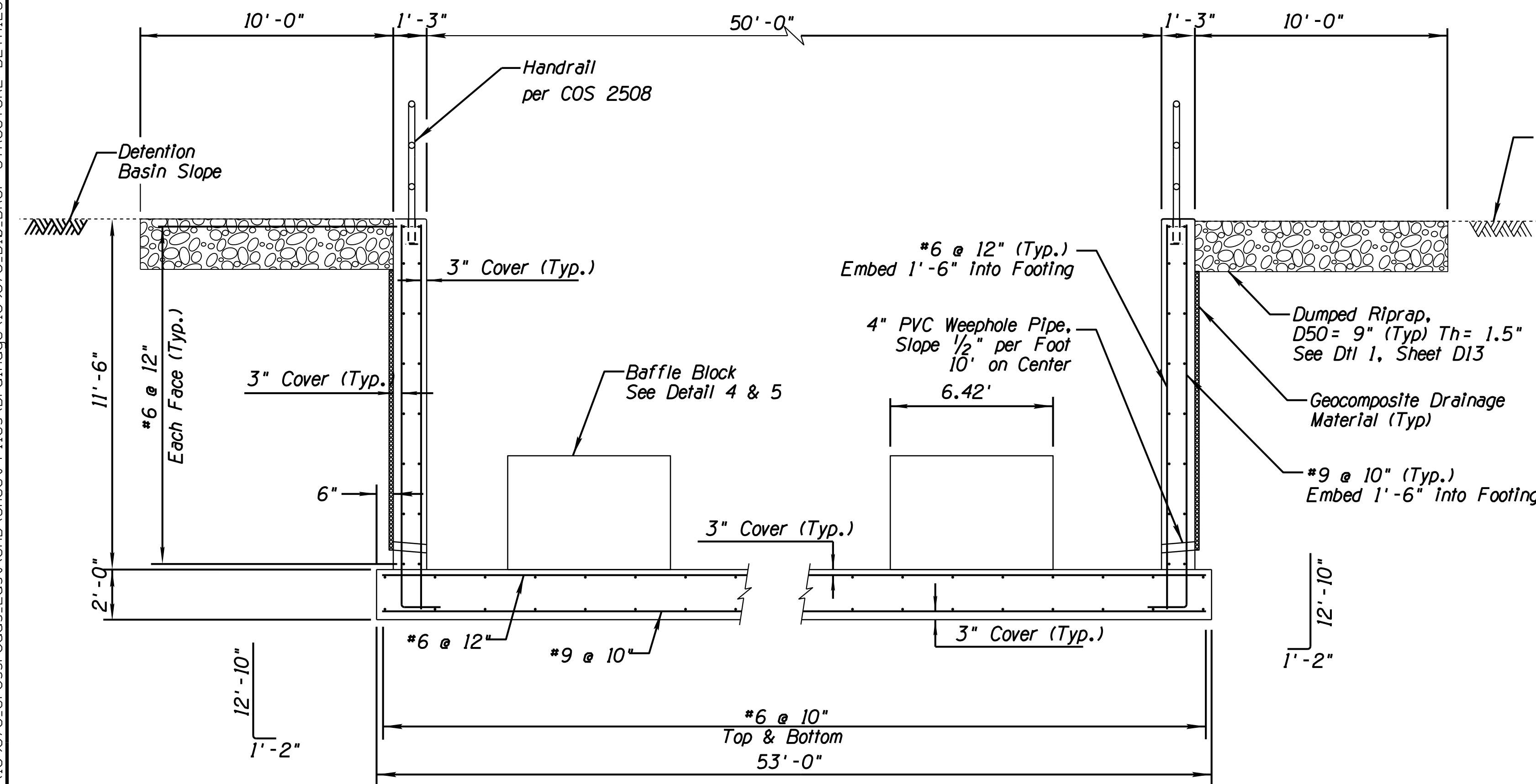
5 BAFFLE BLOCK DETAIL
Scale: N.T.S.



7 SLAB JOINT DETAIL
Scale: N.T.S.

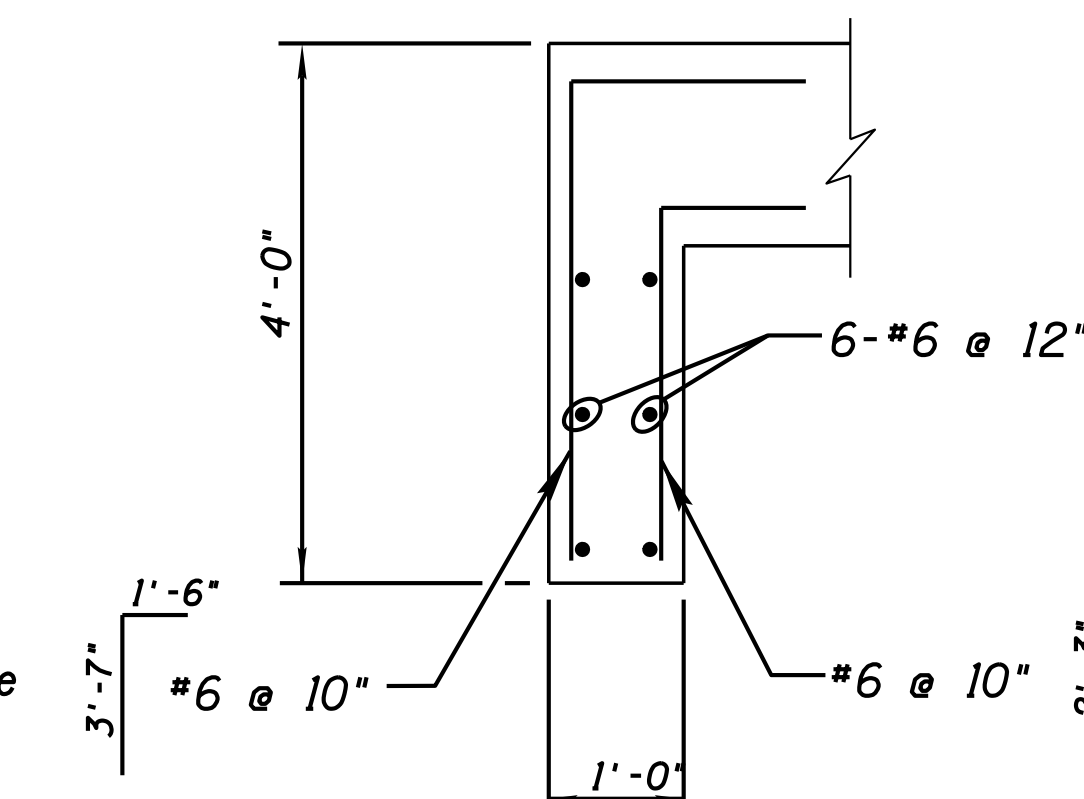
- Construction Notes:*

1. Concrete Shall Have $f'c = 4000$ psi.
2. Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
3. All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
4. Chamfer all exposed corners 3/4" unless noted otherwise.
5. Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
6. Fill PVC Pipe With Nonshrink Grout Complying with Section 1017 of ADOT Standard Specifications.
7. Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
8. Reinforcing Steel shall be placed with the center of the outside layer of bars 3" from the surface of the concrete.

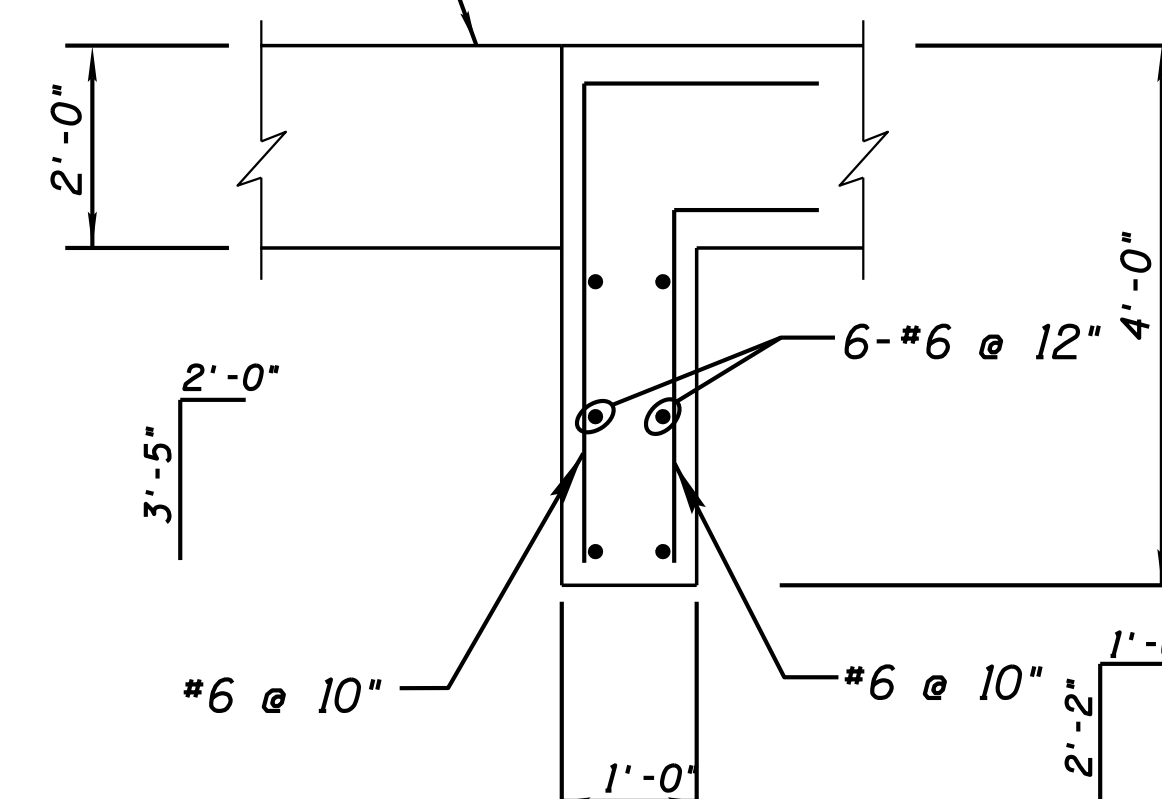
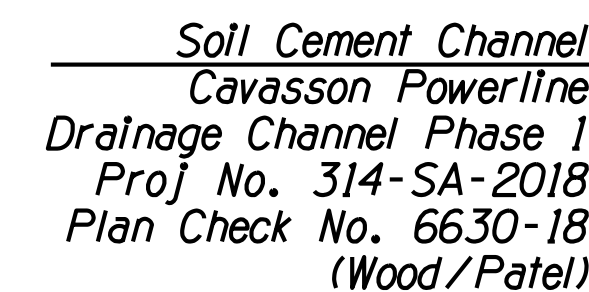


6 SECTION B
Scale: N.T.S.

STA 202+18.50 TO STA 203+99
NO BAFFLE BLOCKS BETWEEN
STA 202+96 TO STA 203+99



8 TURN-DOWN DETAIL
Scale: N.T.S.



9 TURN-DOWN DETAIL
Scale: N.T.S.



DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
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ENGINEER



PUBLIC WORKS

**CAPITAL PROJECT
MANAGEMENT**

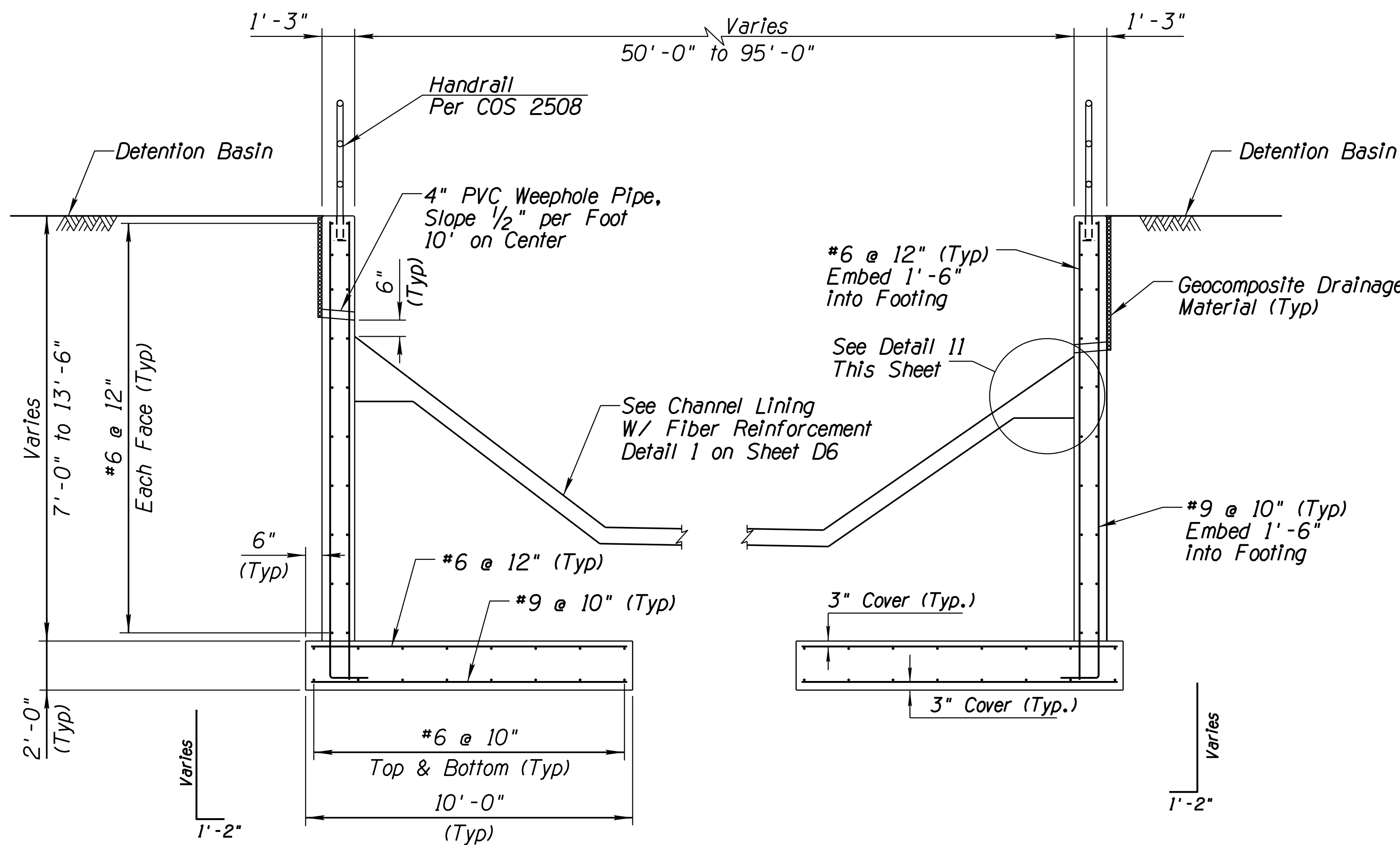
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE

DROP STRUCTURE DETAILS

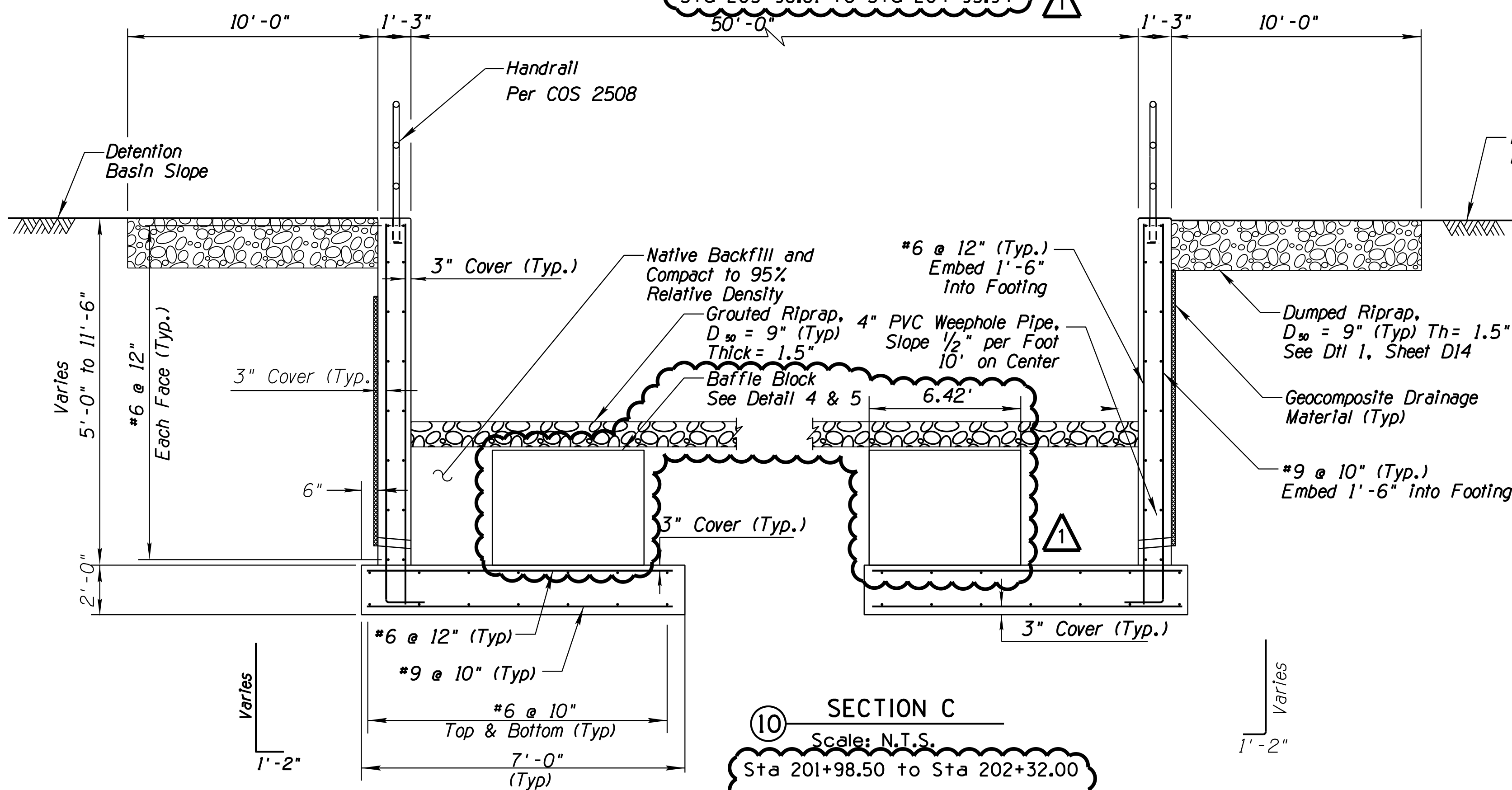
PROJECT TITLE				
CROSSROADS EAST DRAINAGE INFRASTRUCTURE				

SCALE	DESIGNED	DATE	BID NO.	SHT.
N/A	AC	07/19	XXXX	D10
VERT. N/A	DRAWN	AS-BUILT	PROJECT NO.	
	WDF	XX/XX	400-FB53B-56047	29 of 38



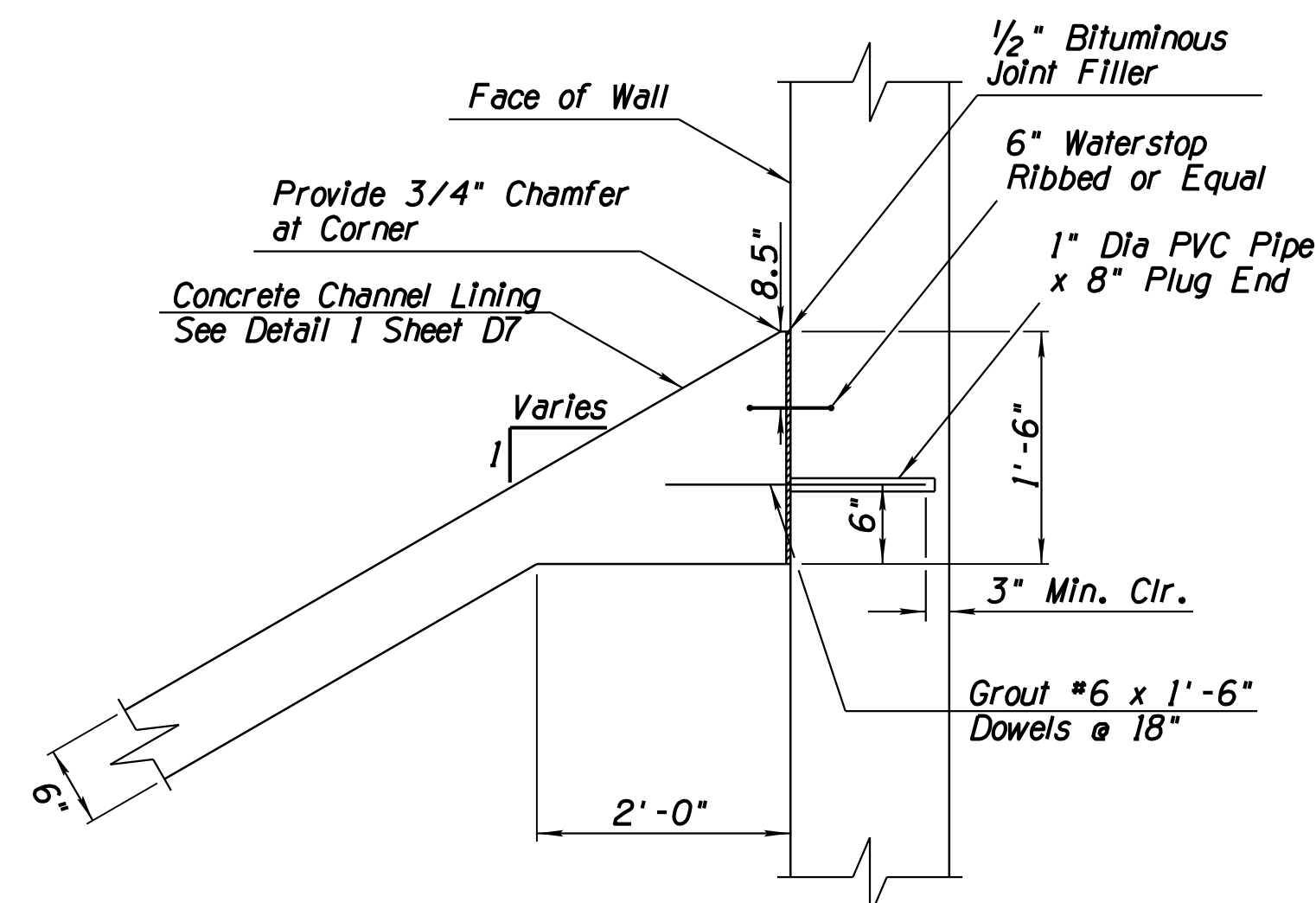
SECTION A

Scale: N.T.S.
Sta 203+98.81 to Sta 204+95.94
50'-0"



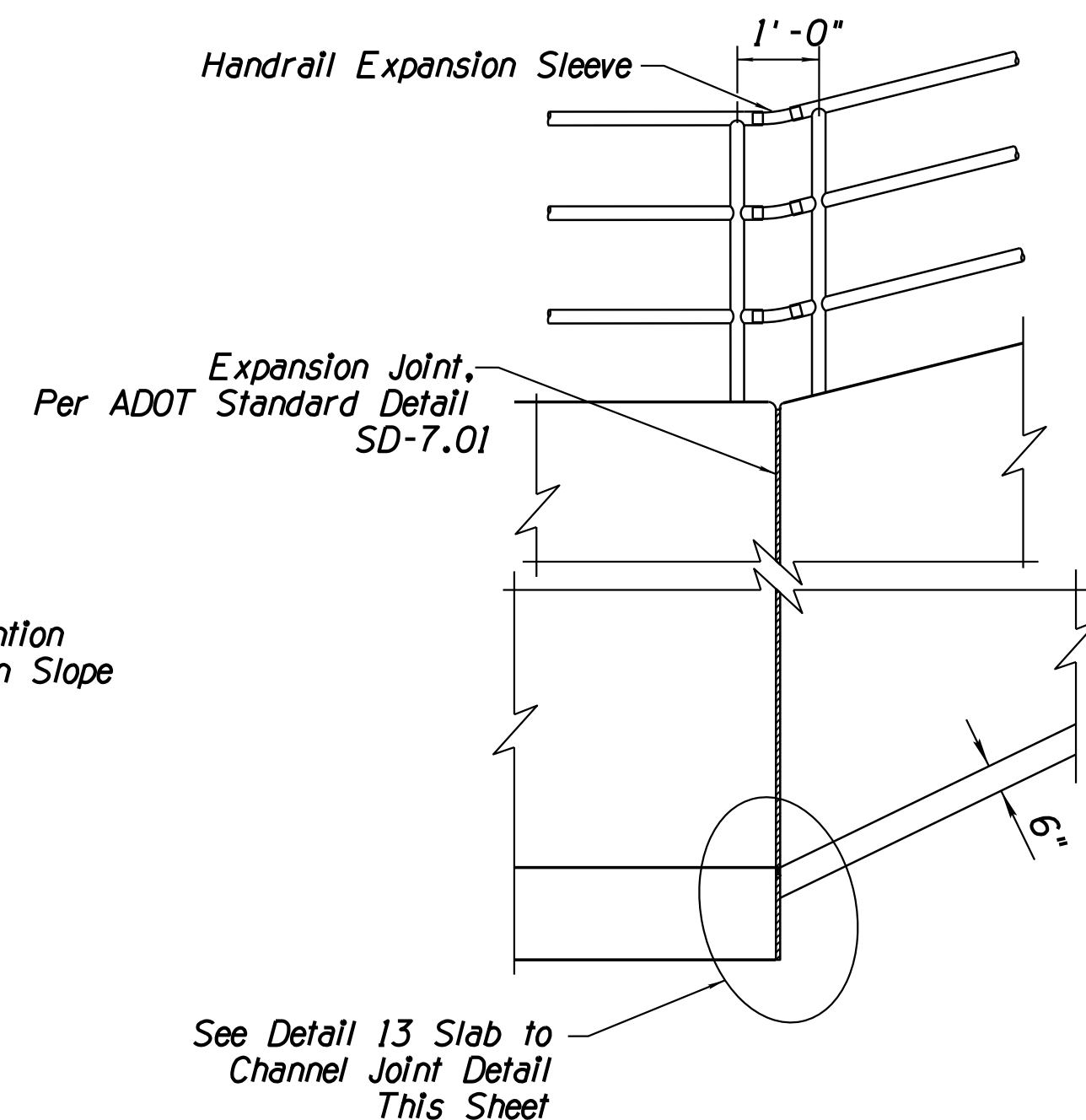
SECTION C

Scale: N.T.S.
Sta 201+98.50 to Sta 202+32.00
NO BAFFLE BLOCKS BETWEEN
Sta 201+98.50 to Sta 202+18.50



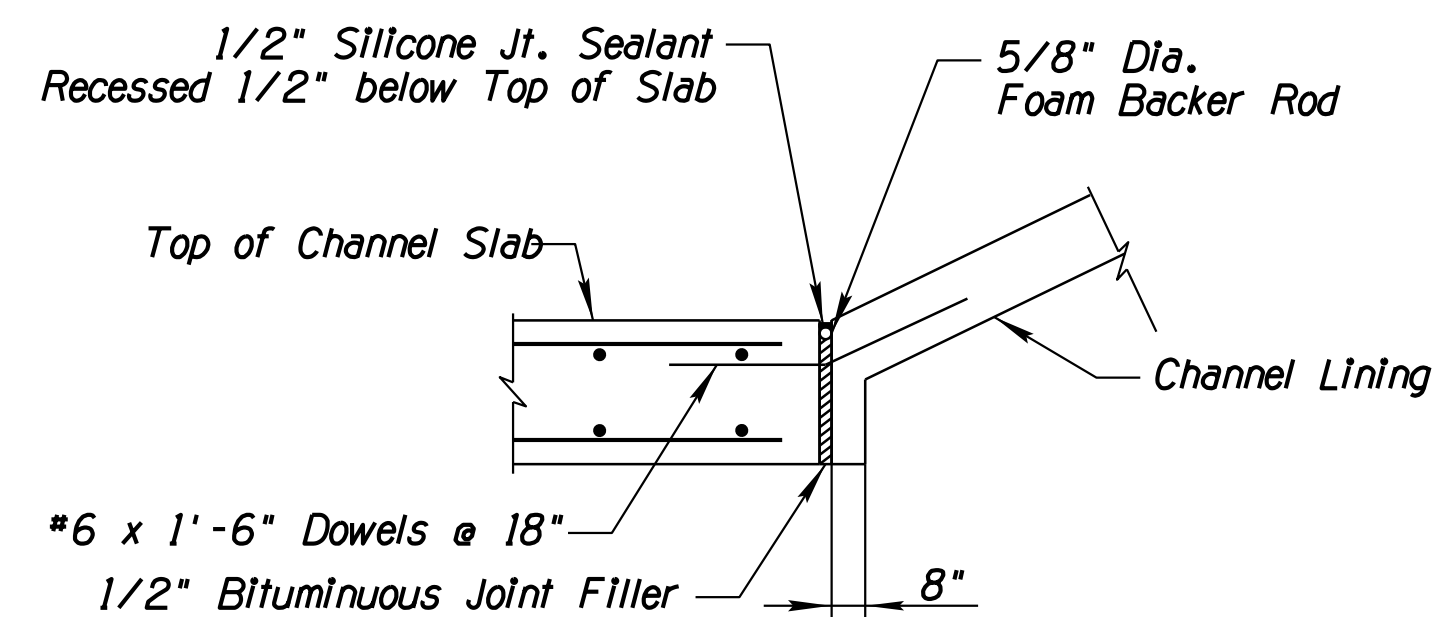
JOINT BETWEEN RETAINING WALL AND CHANNEL LINING

Scale: N.T.S.



SECTION D

Scale: N.T.S.



SLAB TO CHANNEL JOINT DETAIL

Scale: N.T.S.

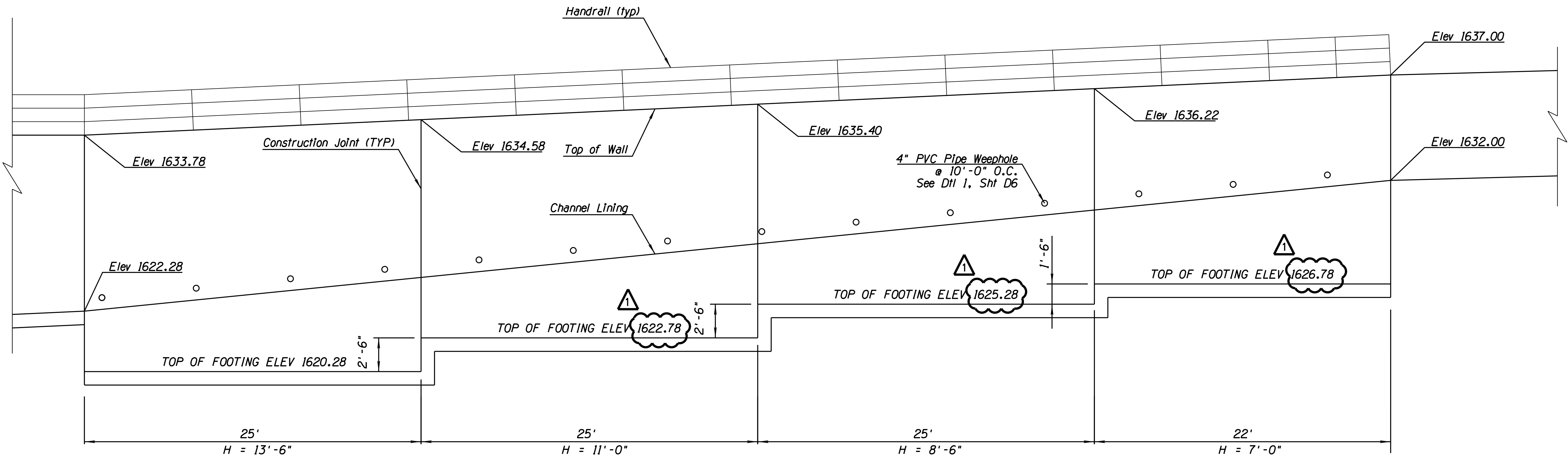
Construction Notes:

1. Concrete Shall Have $f'c = 4000 \text{ psi}$.
2. Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
3. All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
4. Chamfer all exposed corners 3/4" unless noted otherwise.
5. Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
6. Fill PVC Pipe With Nonshrink Grout Complying with Section 1017 of ADOT Standard Specifications.
7. Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
8. Reinforcing Steel shall be placed with the center of the outside layer of bars 3" from the surface of the concrete.



DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
DROP STRUCTURE DETAILS			
CROSSROADS EAST DRAINAGE INFRASTRUCTURE			
SCALE: HORIZ. N/A, VERT. N/A	DESIGNED: AC, DRAWN: WDF	DATE: 07/19, AS-BUILT: XX/XX	BID NO. XXXX, PROJECT NO. 400-FB53B-56047
SHEET: 30 OF 38			SHT. D11

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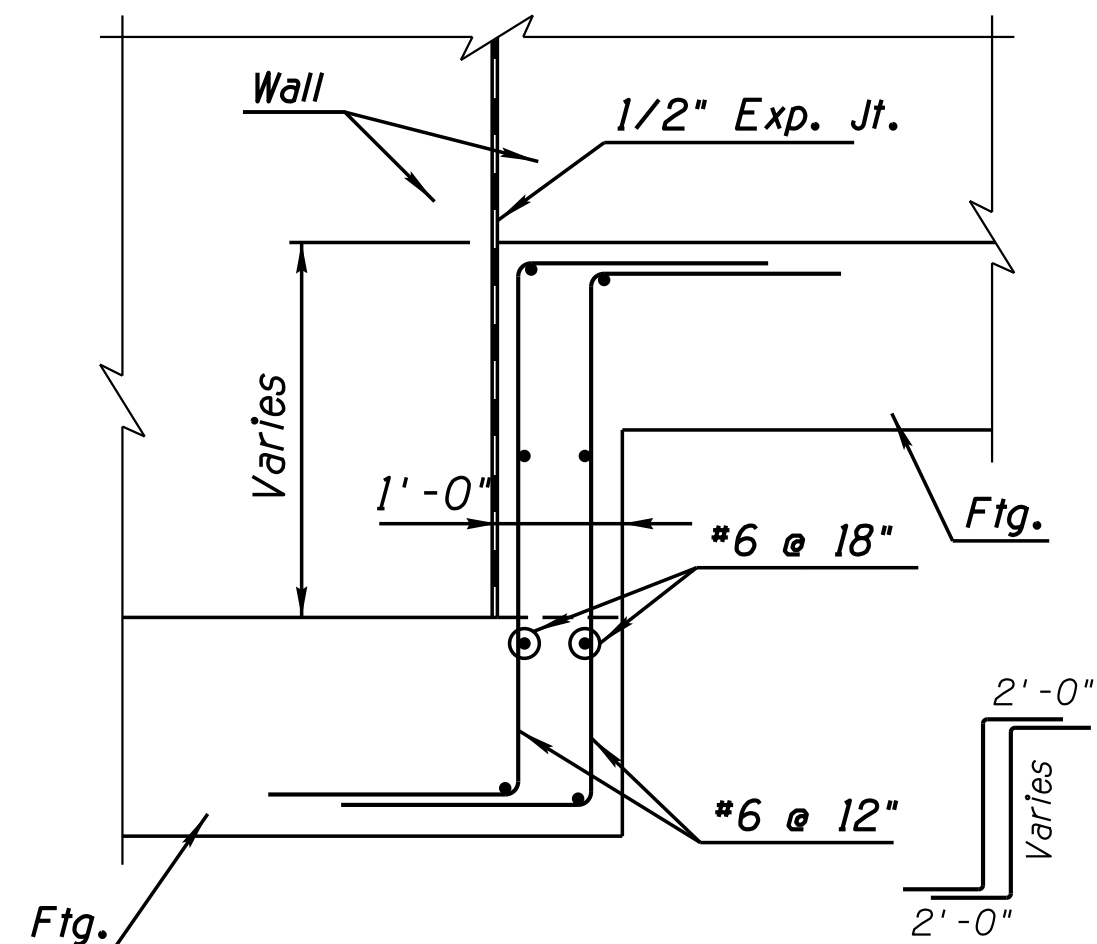


Construction Notes:

1. Concrete Shall Have $f'c = 4000$ psi.
2. Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
3. All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
4. Chamfer all exposed corners $3/4"$ unless noted otherwise.
5. Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
6. Fill PVC Pipe With Nonshrink Grout Complying with Section 1017 of ADOT Standard Specifications.
7. Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
8. Reinforcing Steel shall be placed with the center of the outside layer of bars 3" from the surface of the concrete.

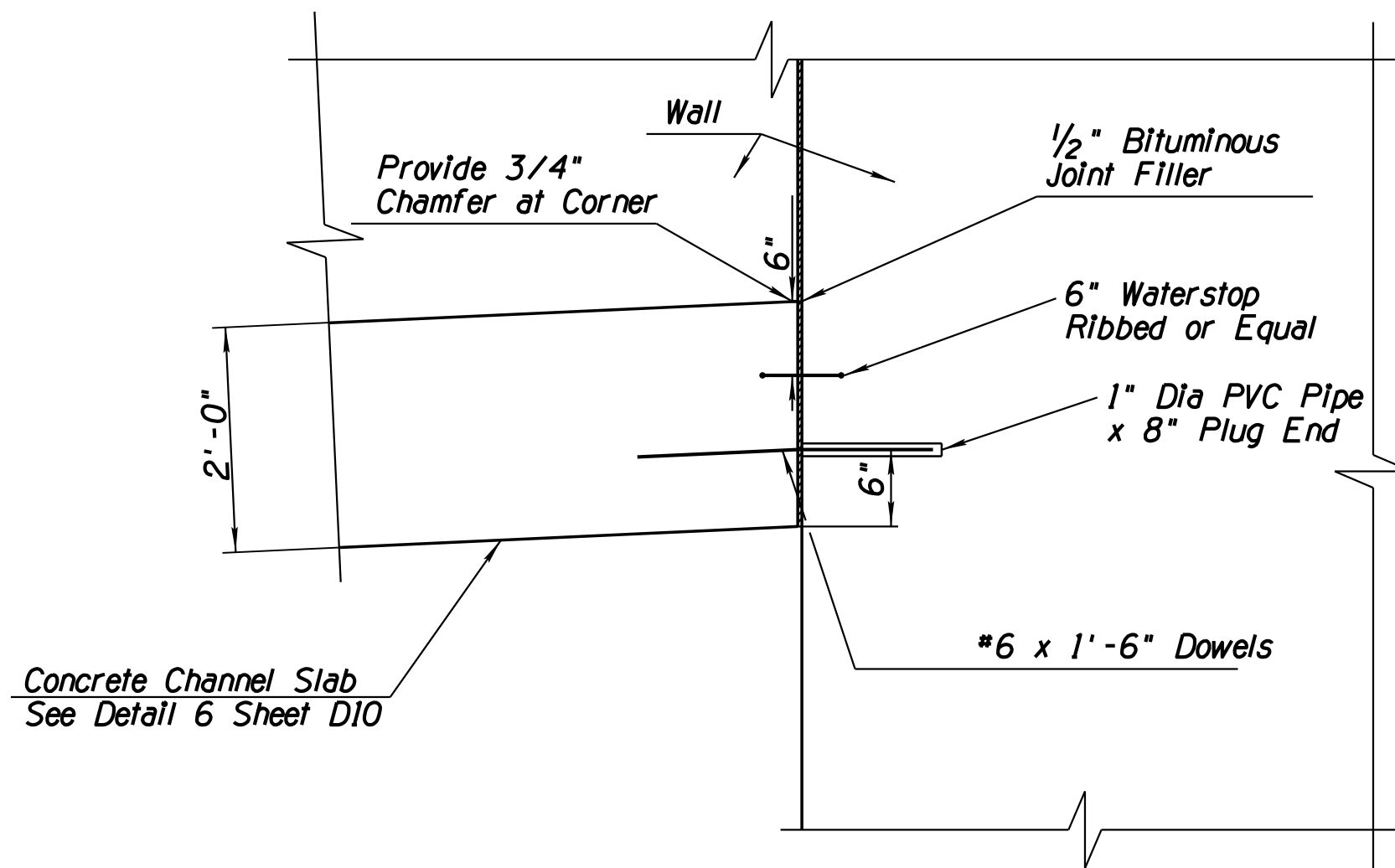
14 Retaining Wall Steps

Scale: N.T.S.
STA 203+99 TO STA 204+96



15 Footing Step Detail

Scale: N.T.S.



16 Channel Bottom to Channel Wall Joint Detail

Scale: N.T.S.

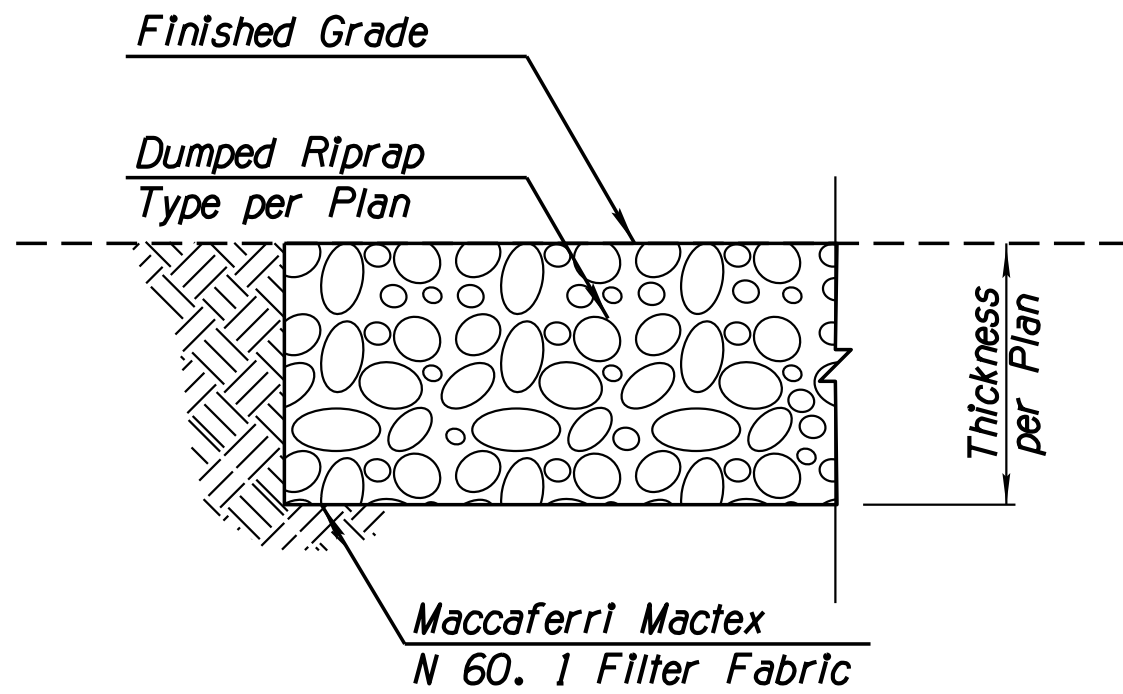


DATE: 3/13/20		REVISION:		CITY COMMENTS		BY: A.S.N.	
PROJECT TITLE		PUBLIC WORKS		CAPITAL PROJECT MANAGEMENT		7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SCALE		DESIGNED AC		DATE 07/19		BID NO. XXXX	
HORIZ. N/A		DRAWN JJP		AS-BUILT XX/XX		PROJECT NO. 400-FB53B-56047	
VERT. N/A						SHT. D12	
						31 OF 38	

RETAINING WALL FOOTING DETAIL

EXP: 06/30/2022

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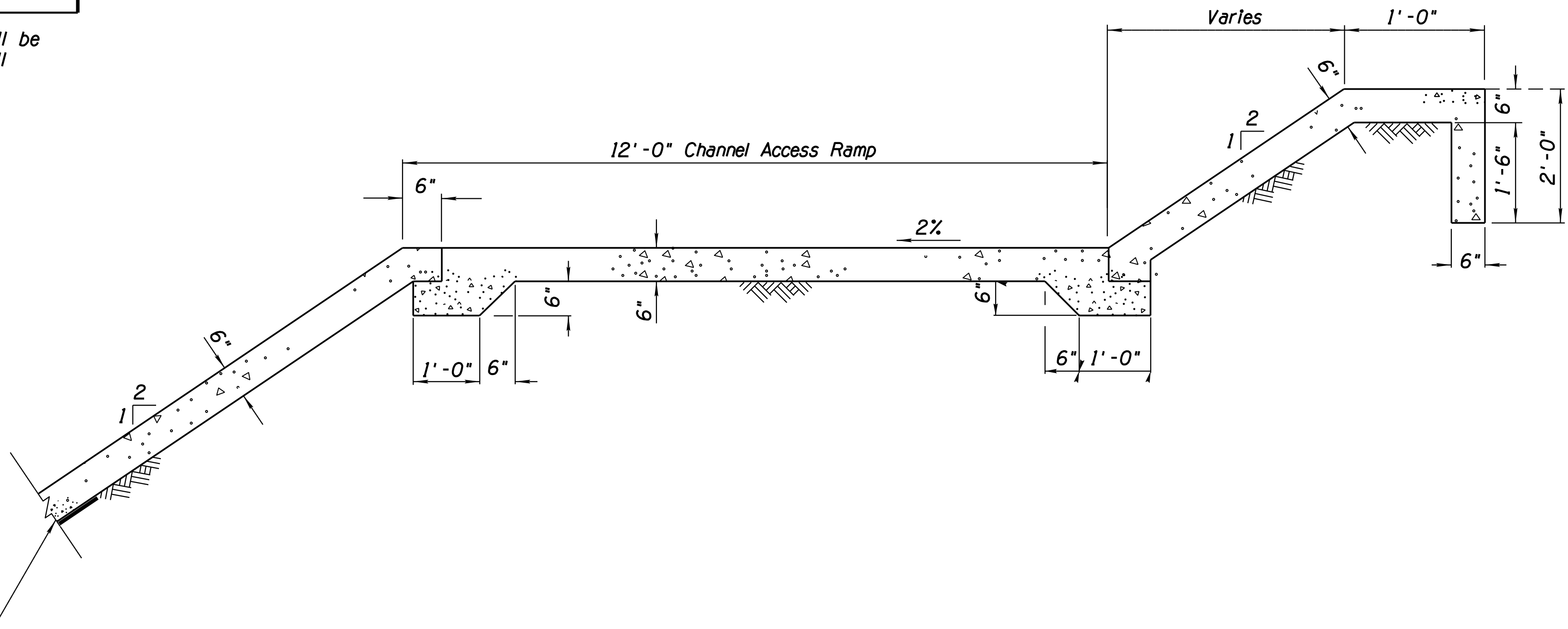
Note: Riprap to be Angular Stone

RIPRAP STONE SIZE			
STONE SIZE	TYPE I	TYPE II	TYPE III
D MINIMUM	2"	4"	4"
D50	6"	9"	12"
D100 (MAXIMUM)	12"	18"	24"

The Minimum Thickness of Riprap Linings Shall be the Greater of D100 or 1.5 Times D50. Install Loose Riprap per M.A.G. Spec. 220. Install "Maccaferri Mactex N 60.1" Filter Fabric or Approved Equal Under All Loose Riprap.

1 RIPRAP DETAIL

See Sht D6, Dtl 1
for Typical Channel
Details & Reinforcing

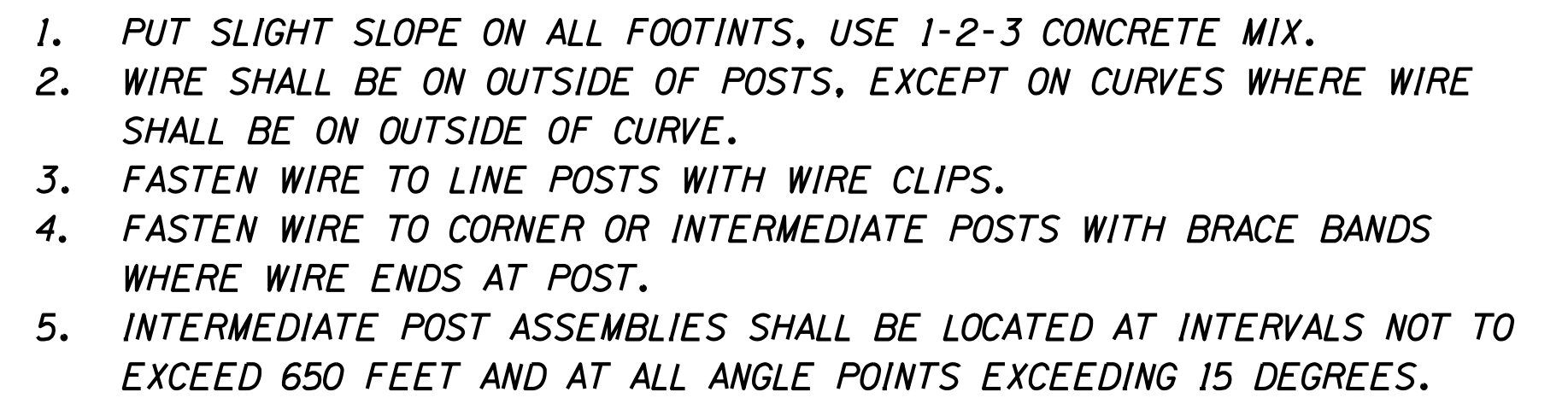


2 CONCRETE MAINTENANCE RAMP TYPICAL SECTION
N.T.S.



DATE:	REVISION:	BY:
ENGINEER		
PUBLIC WORKS		
CAPITAL PROJECT MANAGEMENT		
7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251		
SHEET TITLE		
CHANNEL ACCESS RAMP DETAIL		
PROJECT TITLE		
CROSSROADS EAST DRAINAGE INFRASTRUCTURE		
SCALE	DESIGNED	DATE
HORIZ. N/A	AC	07/19
VERT. N/A	JJP	XX/XX
BID NO.	XXXX	SHT.
400-FB53B-56047		D13
PROJECT NO.	32 OF 38	

DESIGN FILE: W:\Pro\169678_Crossroads-East\CAD\Sheet Files\Drainage\169678-D14_BARRIER WIRE.dgn



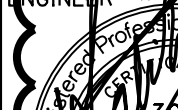
- 1) ALL BOLTS, BRACE BANDS AND HINGES SHALL BE WELDED TO POSTS AND/ OR GATE PANELS
- 2) ALL WELDED JOINTS SHALL BE COATED WITH ZINC DUST-ZINC OXIDE COATING CONFORMING TO AASHTO M-36 PER MAG 771.4 UNLESS OTHERWISE SPECIFIED. GALVANIZED SURFACES THAT ARE FIELD OR SHOP CUT, BROKEN, BURNED OR ABRADED, THUS BREAKING THE GALVANIZING, SHALL BE REPAIRED AT ALL LOCATIONS WITH ZINC DUST-ZINC OXIDE COATING CONFORMING TO AASHTO M-36 TO THE SATISFACTION OF THE PROJECT ENGINEER. ALL WIRE SHALL CONFORM TO ADOT SPEC. SECTION 903-2.04 STANDARD FENCING WIRE.

QTY.	ITEM
2	84" HORIZONTAL POSTS WITH 45° ANGLE CUTS (BOTH ENDS)
2	4'-1" VERTICAL POST OUTER FRAME WITH 45° ANGLE CUTS (BOTH ENDS)
2	3'-9 1/4" INNER VERTICLE POSTS (NOTCH EACH END TO FIT)
4	2"X3"X3/16" STEEL MOUNTING TABS (FOR SIGN ATTACHMENT) HOLES TO BE DRILLED IN FIELD
5	12.5 GA. TWISTED PAIR WIRE OR 12.5 GA. BARBED WIRE

Contact Arizona 811 at least two full working days before you begin excavation



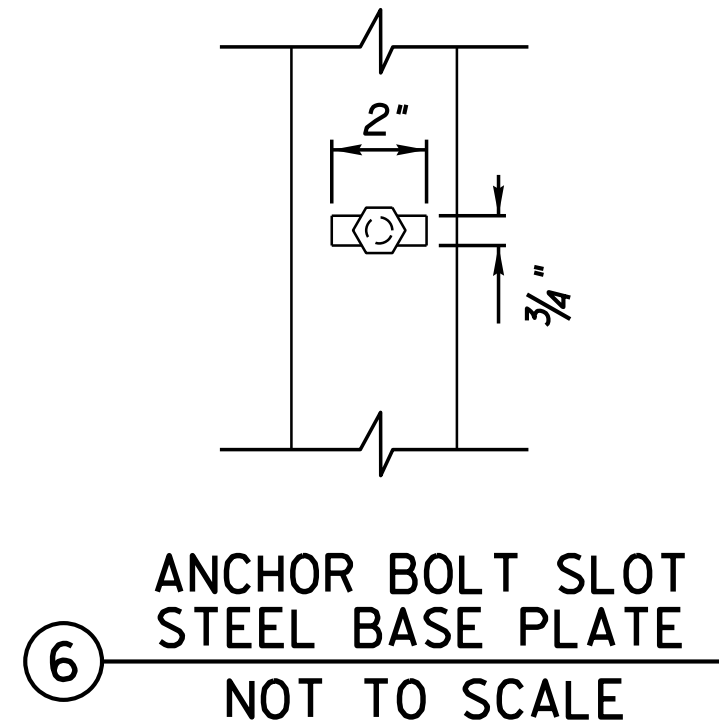
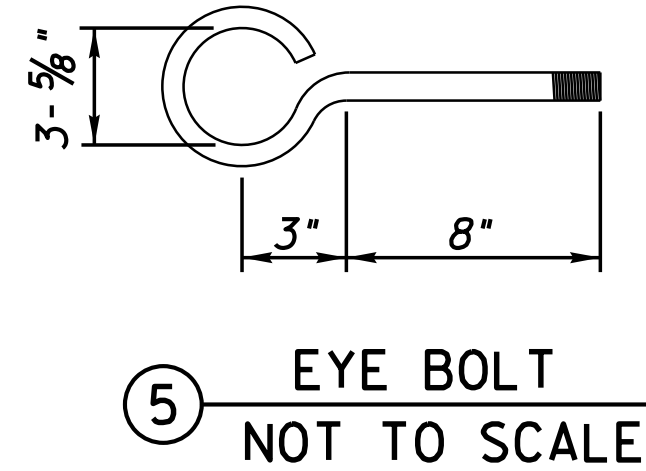
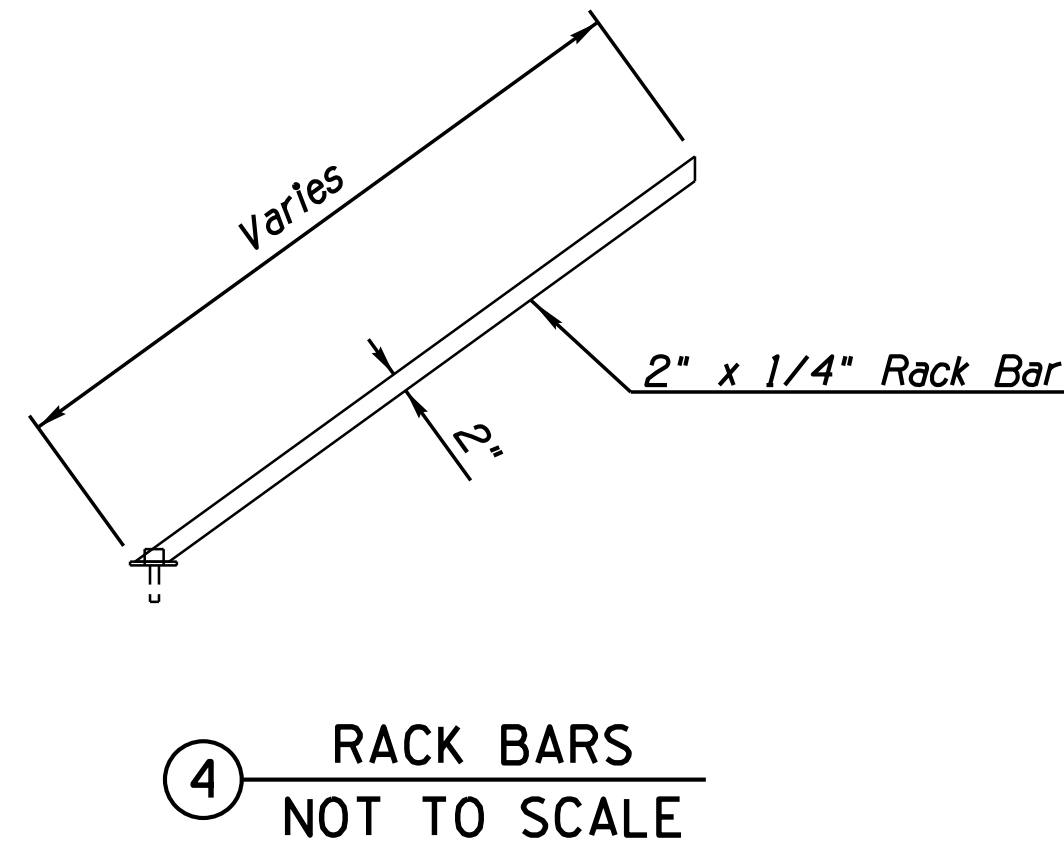
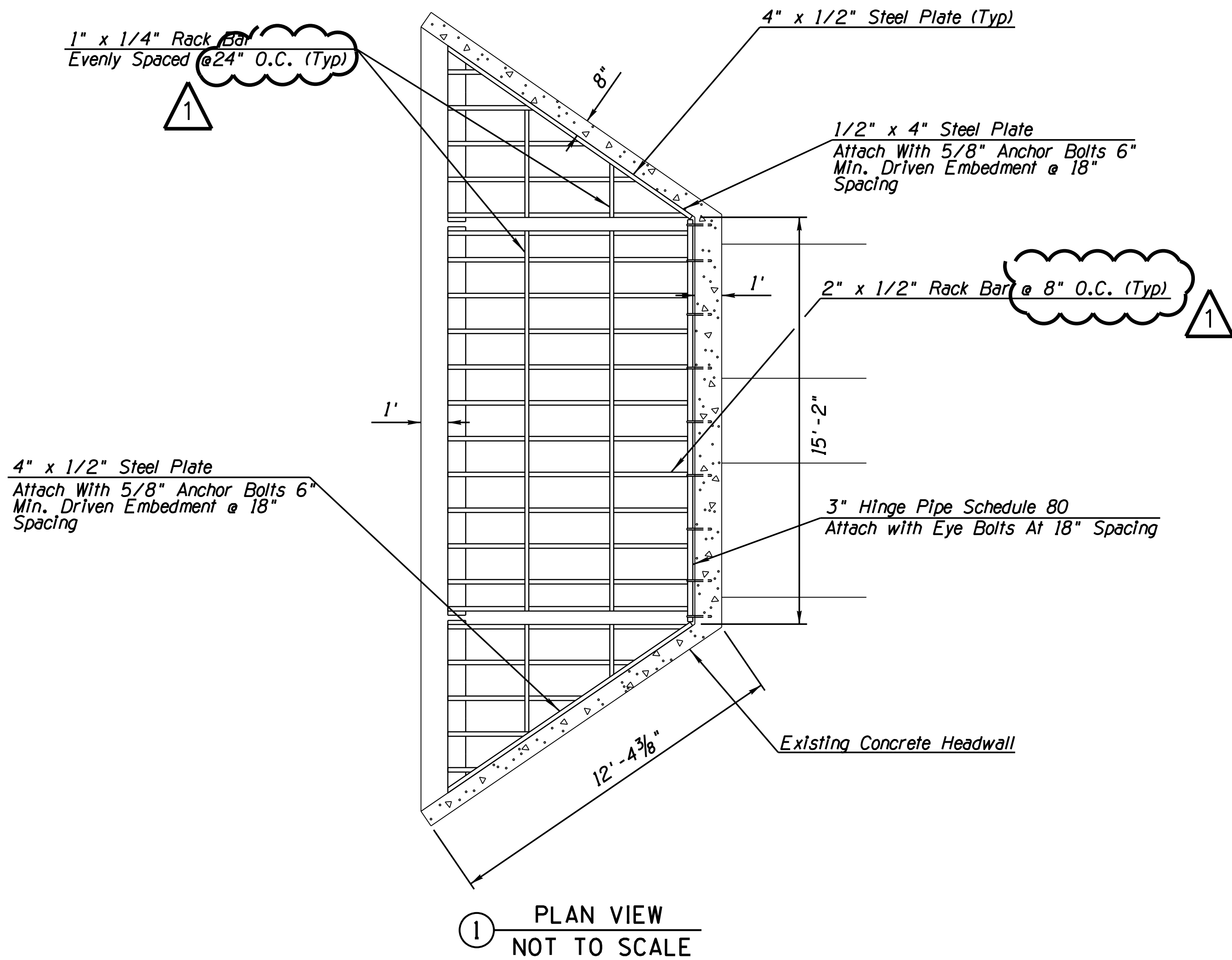
Call 811 or click Arizona811.com

DATE: 3/13/20		REVISION:		CITY COMMENTS		BY: A.S.N.	
				PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
SHEET TITLE							
BARRIER WIRE FENCE DETAIL							
PROJECT TITLE							
CROSSROADS EAST DRAINAGE INFRASTRUCTURE							
SCALE		DESIGNED AC	DATE	BID NO		SHT.	
HORIZ. 1"=100'		DRAWN	07/19	XXXX		D14	
VERT. N/A		JJP	AS-BUILT	PROJECT NO.			
		XX/XX	400-FB53B-56047	33		OF 38	

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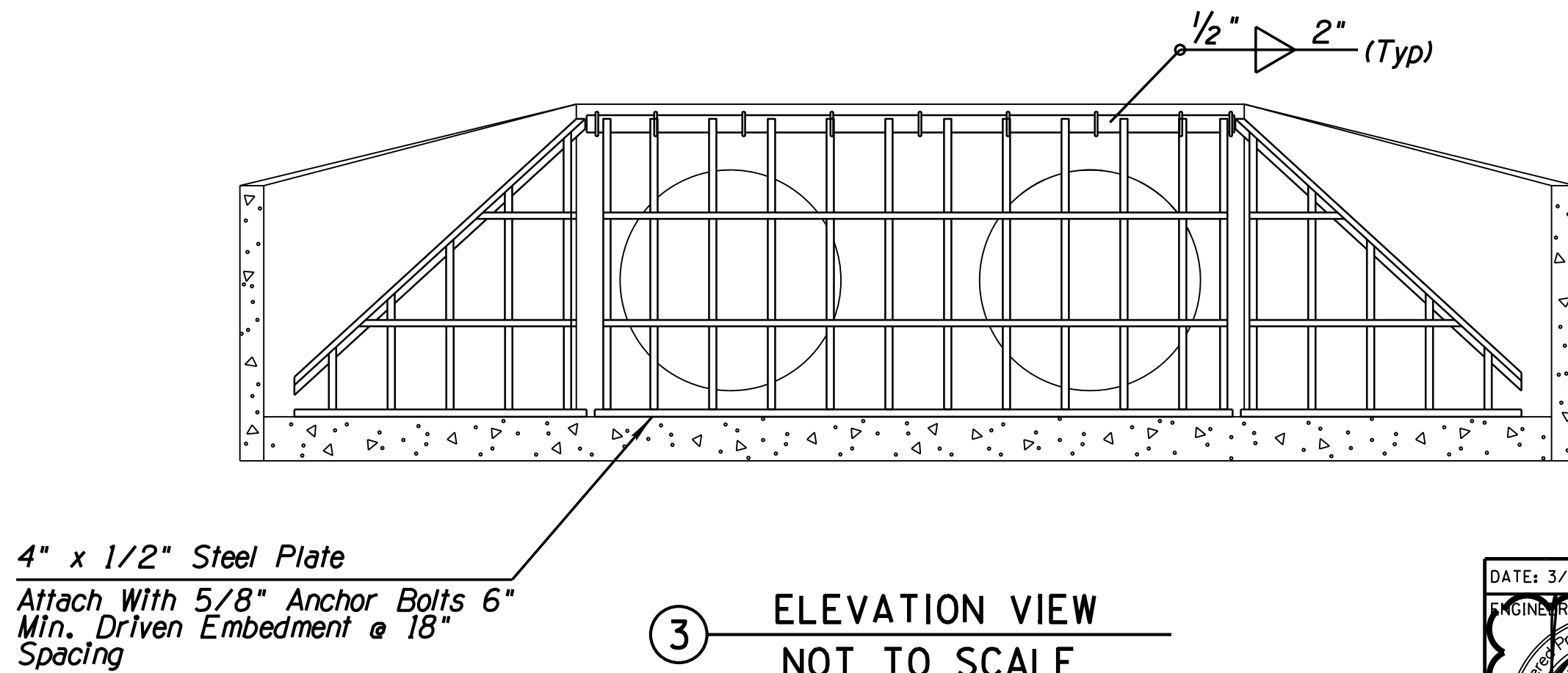
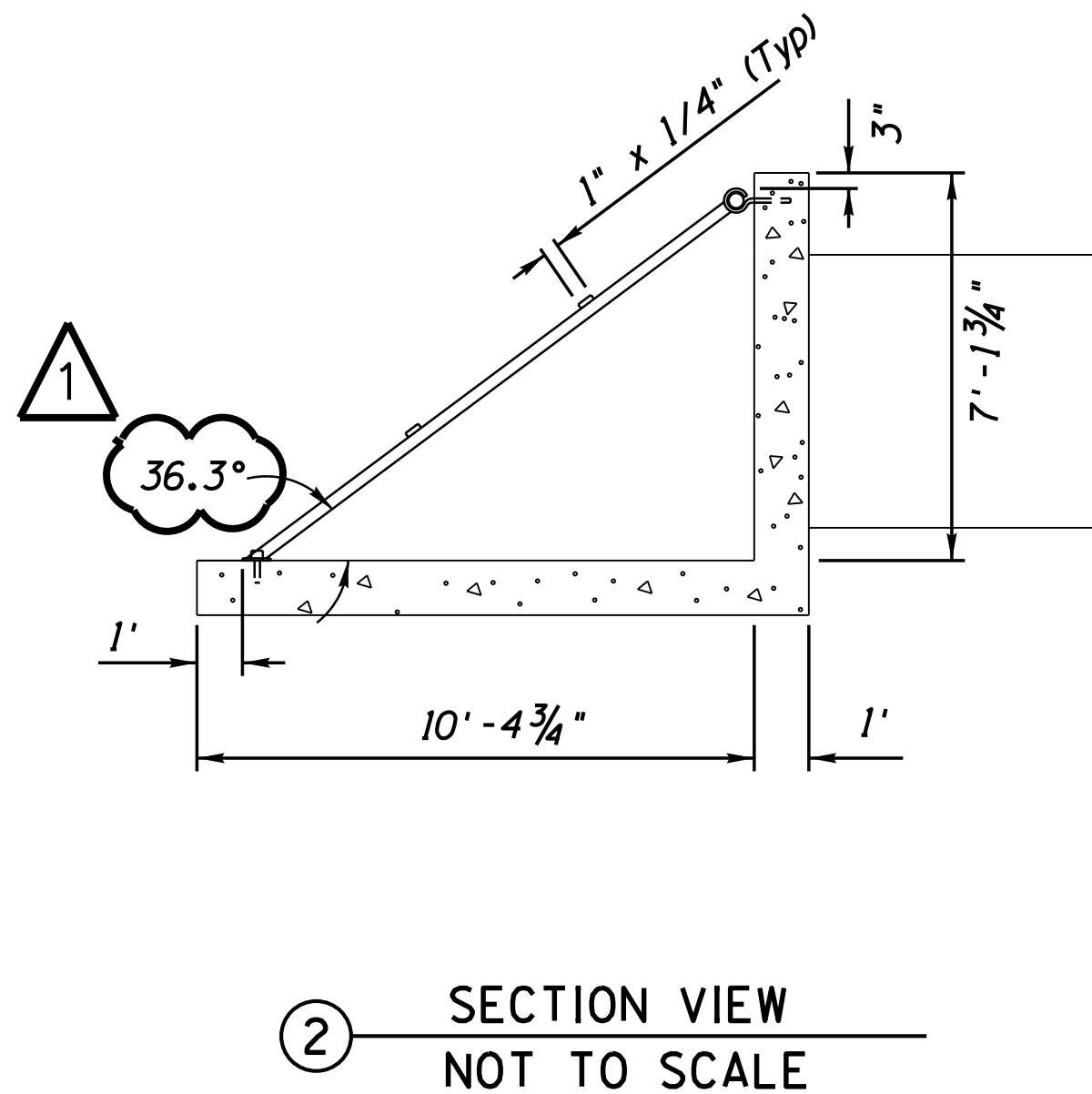
Michael Baker
INTERNATIONAL

2929 N. CENTRAL AVE. SUITE 800
PHOENIX, AZ 85012
Phone: (602) 279-1234
MBAKERINTL.COM



NOTES:

1. Paint Trash Rack per ADOT Specifications, SW 7055 Enduring Bronze.
2. All Steel shall be in accordance to ASTM A36.
3. Welding shall be in accordance with AWS Specifications.



Contact Arizona 811 at least two full
working days before you begin excavation

ARIZONA 811

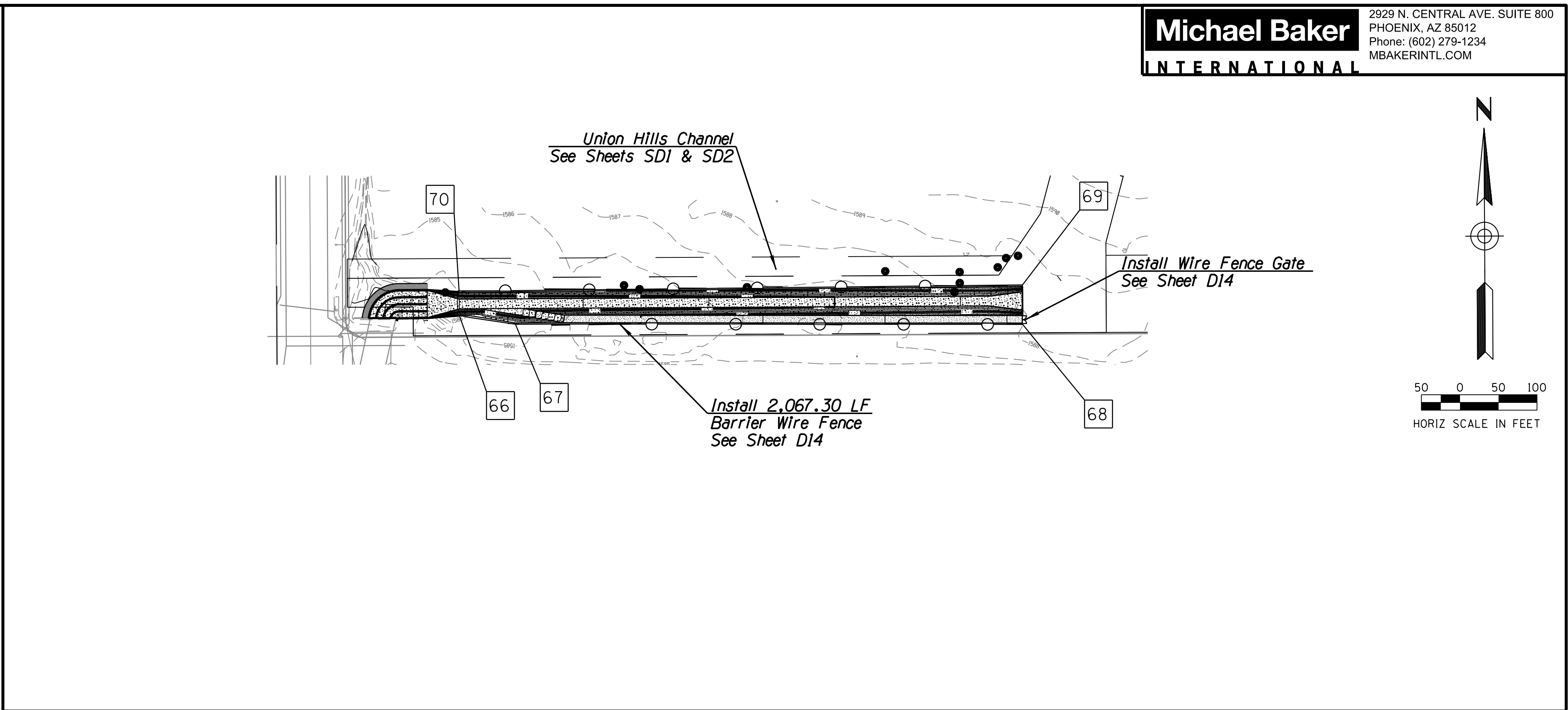
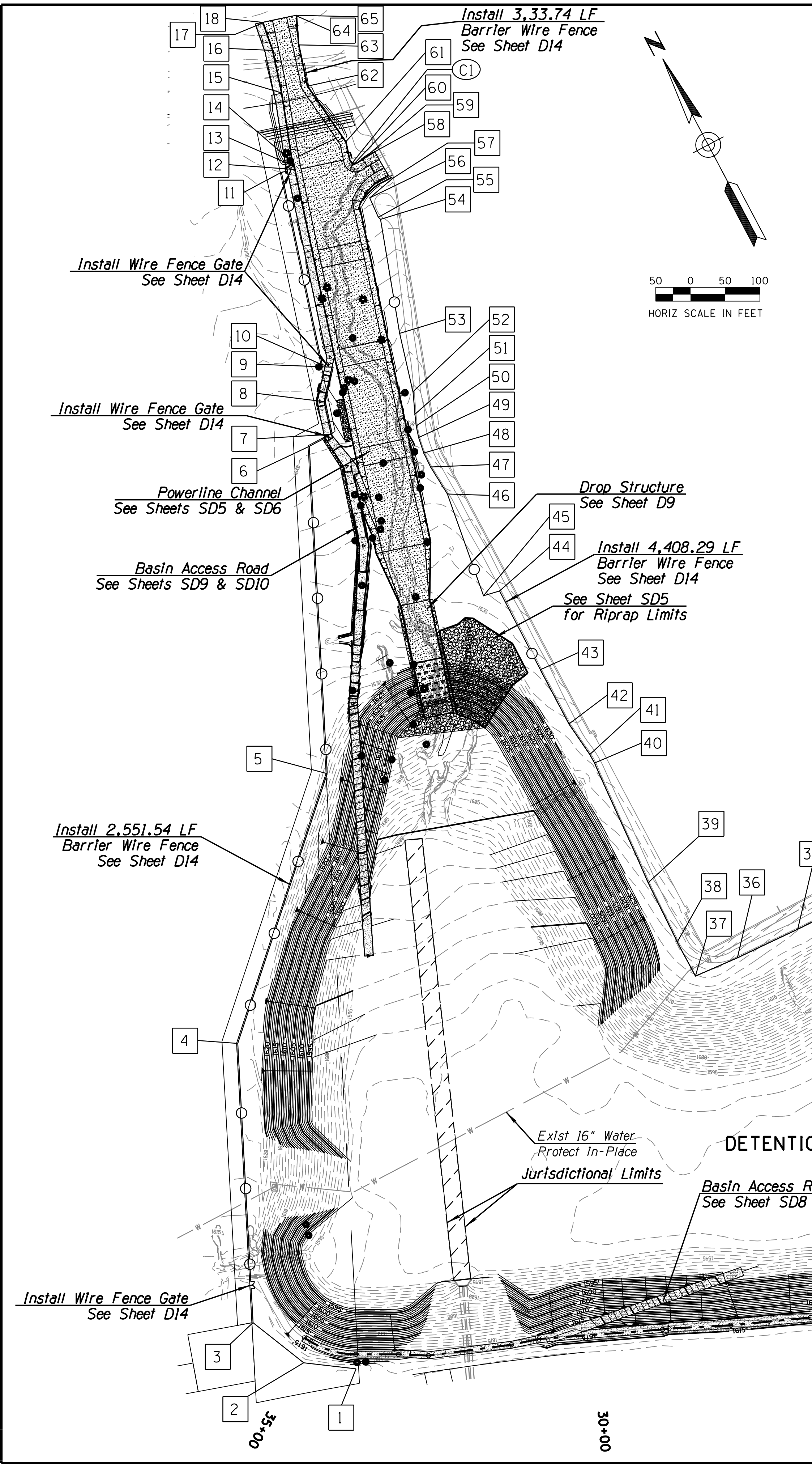
Call 811 or click Arizona811.com

DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
			PUBLIC WORKS
			CAPITAL PROJECT MANAGEMENT
			7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251
SHEET TITLE: TRASH RACK DETAIL			
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE			
SCALE: N/A	DESIGNED: AC	DATE: 07/19	BID NO. XXXX
HORIZ. N/A	DRAWN: AK	AS-BUILT: XX/XX	PROJECT NO. 400-FB53B-56047
VERT. N/A			SHT. D15
			34 OF 38

Plan Check No: 4817-18-6
124-SA-2018
28-DR-2020
9/11/2020

PLOT DATE: 3/13/2020 7:05:27 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_D16_FENCE_GEO_1 OF 2.dgn



NOTE:
1. See Sheet D17 for Point Geometry Table.

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811

Call 811 or click Arizona811.com

DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
PROJECT TITLE		PUBLIC WORKS	
BARRIER WIRE FENCE GEOMETRY		CAPITAL PROJECT MANAGEMENT	
7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
SCALE	DESIGNED AC	DATE 07/19	BID NO. XXXX
HORIZ. 1"=100'	DRAWN JJP	AS-BUILT XX/XX	PROJECT NO. 400-FB53B-56047
VERT. N/A			SHT. D16 35 OF 38

Plan Check No: 4817-18-6 124-SA-2018

PLOT DATE: 3/13/2020 7:06:28 AM

DESIGN FILE: W:\Proj\169678_Crossroads_East\CAD\Sheet Files\Drainage\169678_D17_FENCE_GEO_2_OF_2.dgn

BARRIER WIRE FENCE GEOMETRY TABLE				
Point #	Northing	Easting	Direction	Length
1	965549.00	704144.68	N 55°33' 23" W	91.25'
2	965600.61	704069.42	N 23°48' 29" W	111.74'
3	965702.84	704024.32	N 24°43' 16" E	483.37'
4	966141.91	704226.46	N 46°13' 11" E	491.14'
5	966481.73	704581.06	N 24°43' 18" E	566.34'
6	966996.17	704817.92	S 89°52' 31" E	44.88'
7	966996.07	704862.79	N 15°53' 39" E	57.44'
8	967051.31	704878.52	N 40°37' 13" E	61.25'
9	967097.80	704918.40	N 49°22' 47" W	19.52'
10	967110.51	704903.58	N 15°53' 38" E	339.77'
11	967437.29	704996.63	S 74°063' 21" E	23.86'
12	967430.75	705019.57	N 15°53' 39" E	5.65'
13	967436.19	705021.12	N 03°27' 35" E	8.24'
14	967444.41	705021.62	N 19°07' 17" E	120.81'
15	967558.56	705061.19	N 15°53' 38" E	74.95'
16	967630.65	705081.72	N 08°29' 14" E	50.42'
17	967680.52	705089.16	N 15°53' 38" E	0.91'
18	967681.39	705089.41		
19	964737.68	705709.26	S 83°05' 39" E	135.23'
20	964721.42	705843.50	N 45°46' 06" E	118.96'
21	964804.40	705928.74	N 45°39' 57" E	111.33'
22	964882.20	706008.37	N 47°32' 06" E	81.16'
23	964936.99	706068.24	N 49°15' 07" E	102.64'
24	965003.99	706146.00	N 10°42' 40" W	36.71'
25	965040.06	706139.18	N 53°01' 05" E	290.72'
26	965214.94	706371.41	N 17°14' 44" E	129.27'
27	965338.40	706409.74	N 16°28' 41" W	127.51'
28	965460.67	706373.57	N 535°27' 51" W	144.59'
29	965546.75	706257.39	N 89°54' 58" W	617.21'
30	965547.65	705640.19	N 00°05' 02" E	320.16'
31	965867.81	705640.65	S 80°42' 56" W	54.08'
32	965859.09	705587.28	S 85°00' 22" W	58.01'
33	965854.04	705529.50	N 88°27' 58" W	246.27'
34	965860.63	705283.32	N 88°20' 16" W	108.62'
35	965863.78	705174.74	N 87°29' 35" W	115.38'
36	965868.83	705059.47	N 85°37' 32" W	79.08'
37	965874.86	704980.62	N 00°27' 48" W	66.63'
38	965941.49	704980.08	N 01°47' 27" E	114.36'
39	966055.79	704983.65	N 03°43' 23" E	226.59'
40	966281.90	704998.37	N 01°10' 32" W	16.81'
41	966298.71	704998.02	N 06°32' 21" W	63.98'
42	966362.27	704990.74	N 00°03' 58" E	105.94'
43	966468.21	704990.86	N 00°26' 06" E	223.04'
44	9666621.42	704992.02	N 78°35' 27" W	28.97'
45	966627.16	704963.62	N 08°18' 19" E	186.60
46	966811.80	704990.57	N 04°05' 24" W	55.08'
47	966866.74	704986.64	N 01°58' 12" E	26.83'
48	966893.55	704987.57	N 09°27' 27" E	28.08'
49	966921.24	704992.18	N 16°03' 57" E	20.42'
50	966940.86	704997.83	N 21°37' 24" E	20.33'

BARRIER WIRE FENCE GEOMETRY TABLE				
Point #	Northing	Easting	Direction	Length
51	966959.76	705005.32	N 23°08' 26" E	37.49'
52	966994.24	705020.06	N 15°01' 54" E	105.12'
53	967095.76	705047.32	N 18°20' 16" E	199.76'
54	967285.37	705110.17	N 18°33' 46" W	5.30'
55	967290.40	705108.48	N 03°53' 43" E	36.57'
56	967326.88	705110.96	N 77°33' 17" E	53.14'
57	967338.33	705162.85		
58	967393.50	705164.92	S 87°28' 26" W	29.27'
59	967392.21	705135.67	S 83°03' 05" W	14.14'
60	967388.77	705107.43	N 15°53' 39" E	30.48'
CI SEE CURVE TABLE THIS SHEET				
61	967431.85	705119.70	N 06°44' 28" W	116.93'
62	967547.97	705105.98	N 15°55' 02" E	72.87'
63	967618.05	705125.96	N 23°18' 03" E	50.42'
64	967664.36	705145.91	N 15°53' 38" E	0.91'
65	967665.24	705146.16		
66	966503.82	706349.28	S 53°09' 17" E	88.49'
67	966450.75	706420.10	S 62°07' 22" E	789.85'
68	966081.44	707118.29	N 27°32' 45" E	61.46'
69	966135.93	707146.72	N 62°53' 05" W	877.18'
70	966535.79	706365.93		

Note: All units are in feet.

1

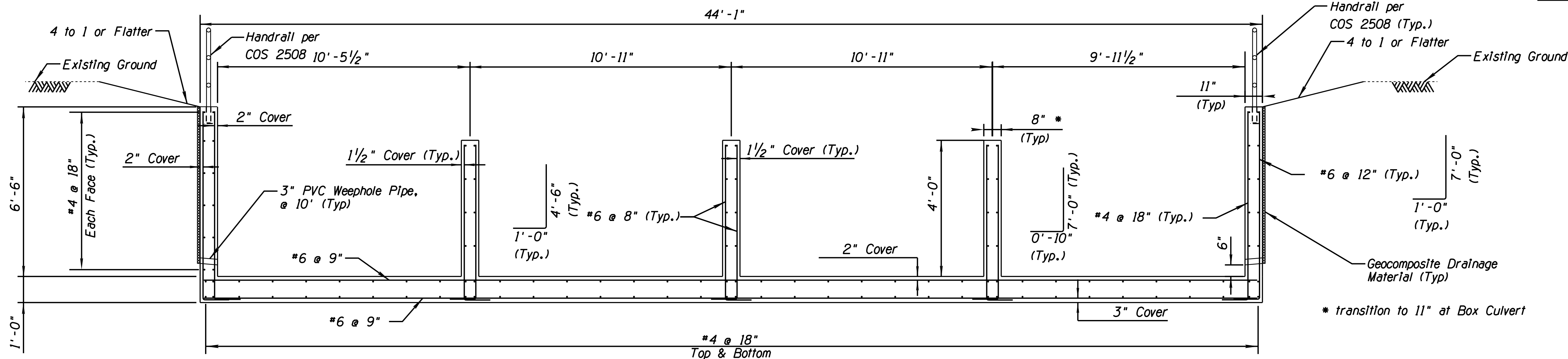
BARRIER WIRE FENCE CURVE GEOMETRY TABLE				
Point #	Northing	Easting	Radius	Delta
PC	966995.77	705020.71		
			9.50'	112°50' 34" Right
PT	967042.93	705039.35		

Contact Arizona 811 at least two full working days before you begin excavation

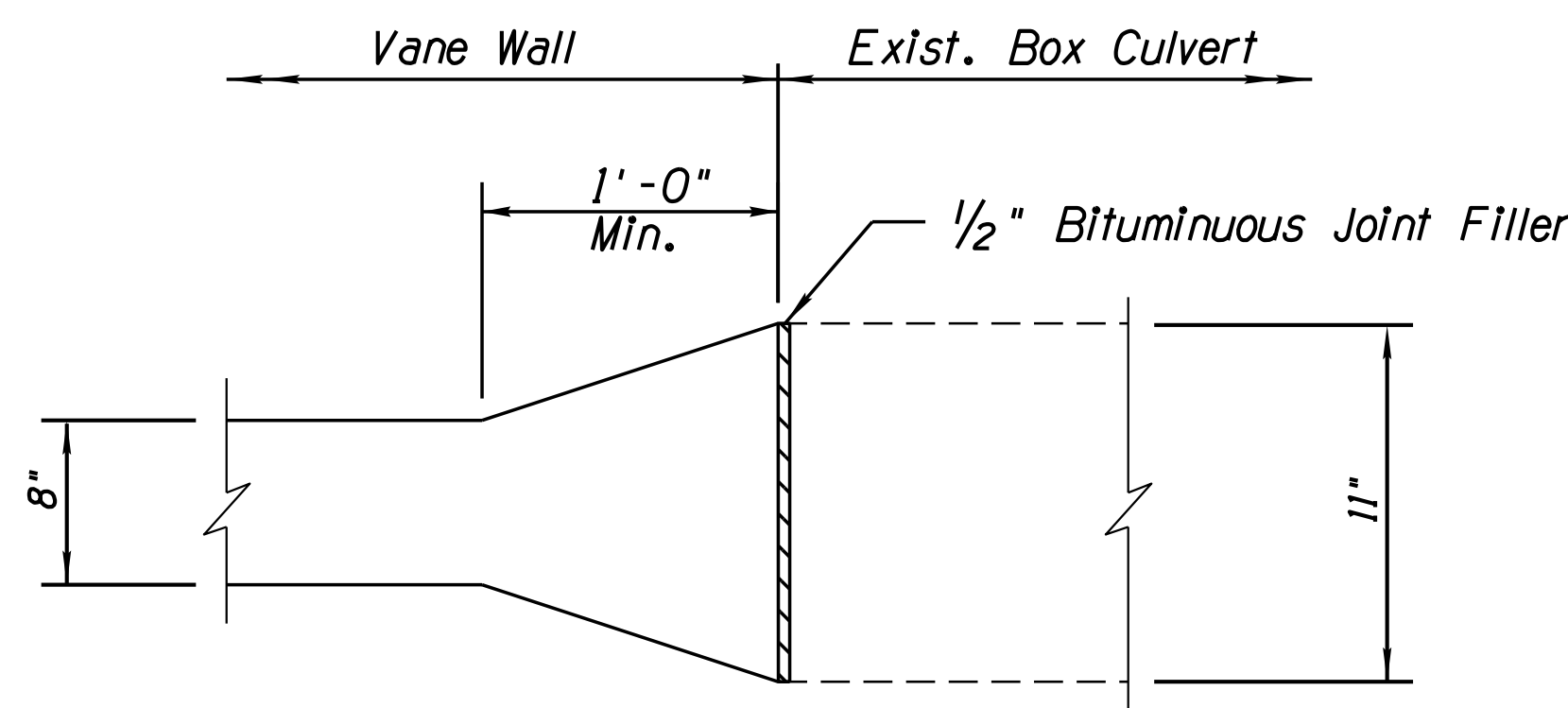
ARIZONA811

Call 811 or click Arizona811.com

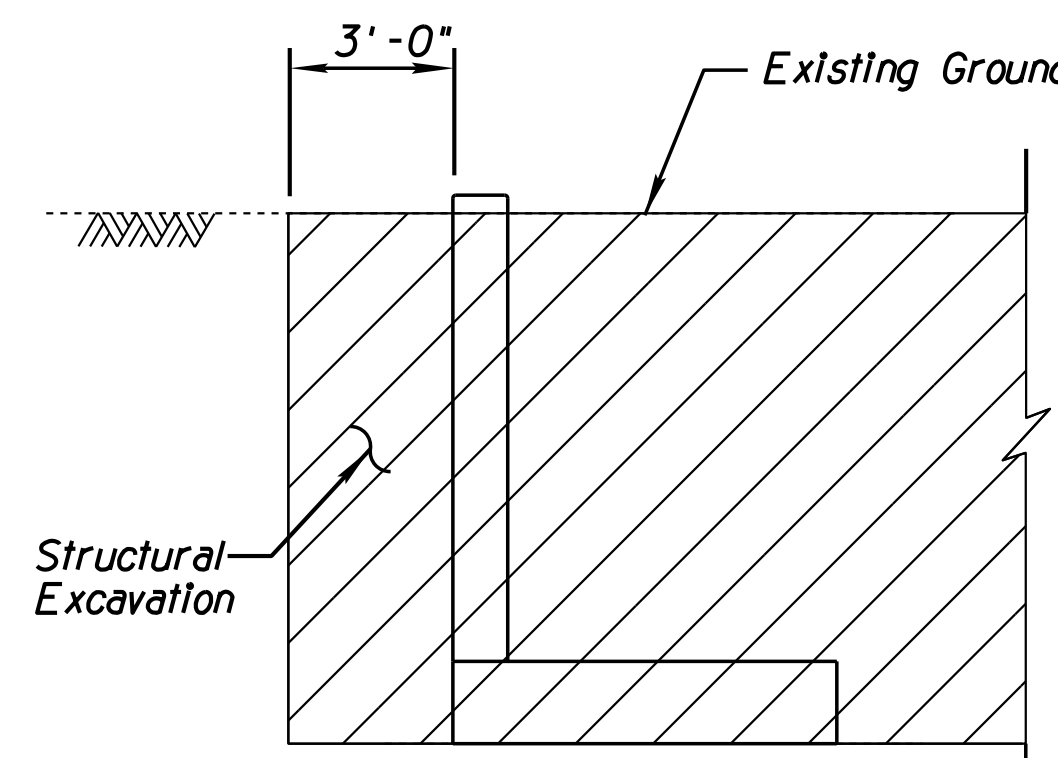
DATE: 3/13/20		REVISION:		CITY COMMENTS		BY: A.S.N.	
				PUBLIC WORKS			
				CAPITAL PROJECT MANAGEMENT			
				7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
SHEET TITLE							1
BARRIER WIRE FENCE GEOMETRY							
PROJECT TITLE							1
CROSSROADS EAST DRAINAGE INFRASTRUCTURE							
SCALE		DESIGNED	DATE	BID NO.	SHT.		
HORIZ. 1" = 100'		AC	07/19	XXXX	D17		
VERT. N/A		DRAWN	AS-BUILT	PROJECT NO.		36 OF 38	
		JJP	XX/XX	400-FB53B-56047			



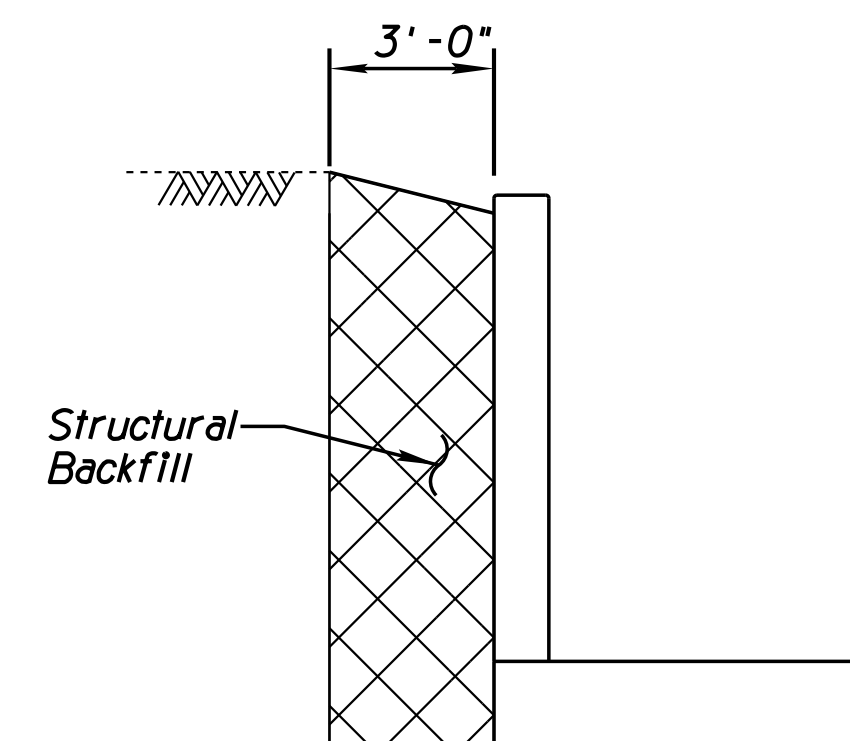
① **UNION HILLS OPEN BOX CHANNEL**
Scale: N.T.S.
STA 101+41.80 TO STA 102+76.89



② **PLAN - TRANSITION DETAIL VANE WALL**
Scale: N.T.S.



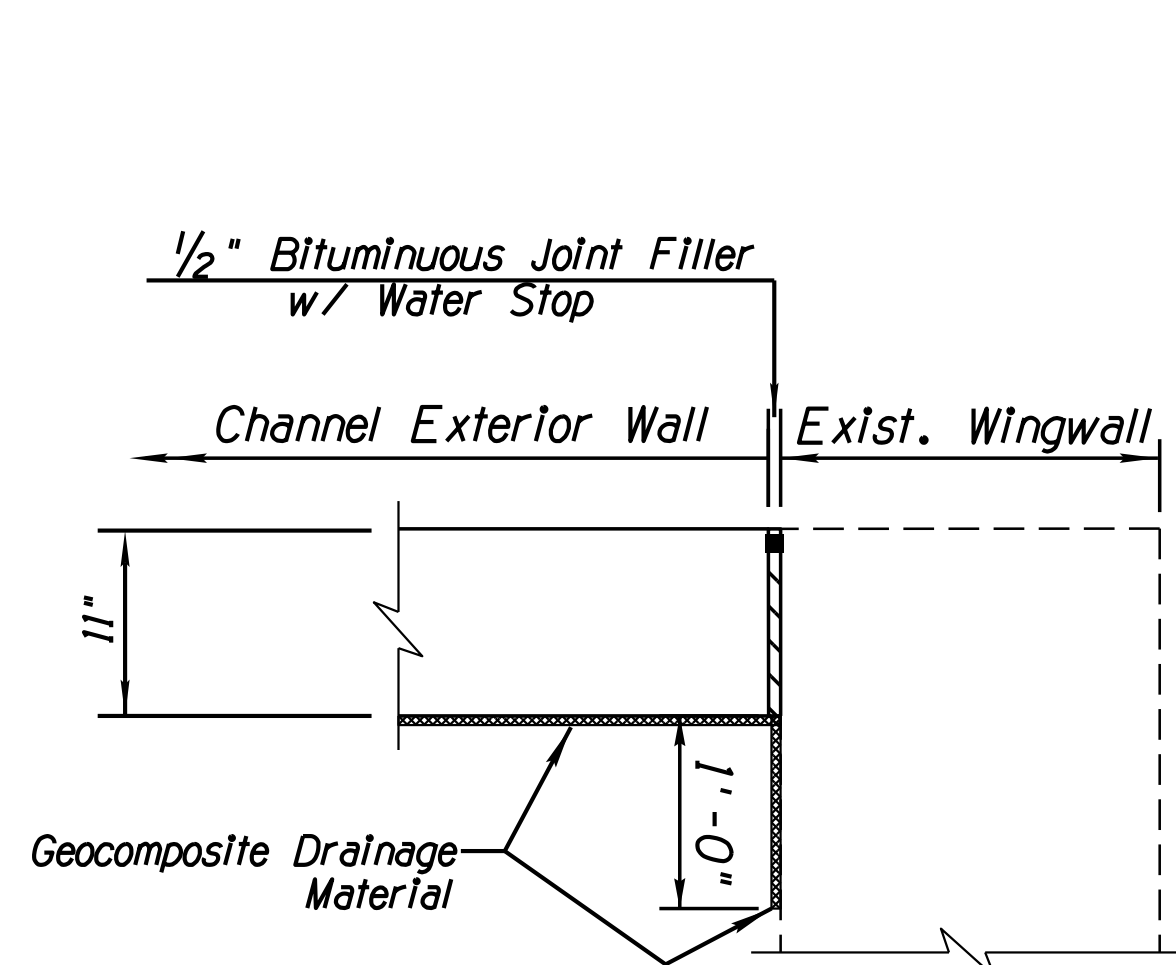
STRUCTURAL EXCAVATION LIMITS



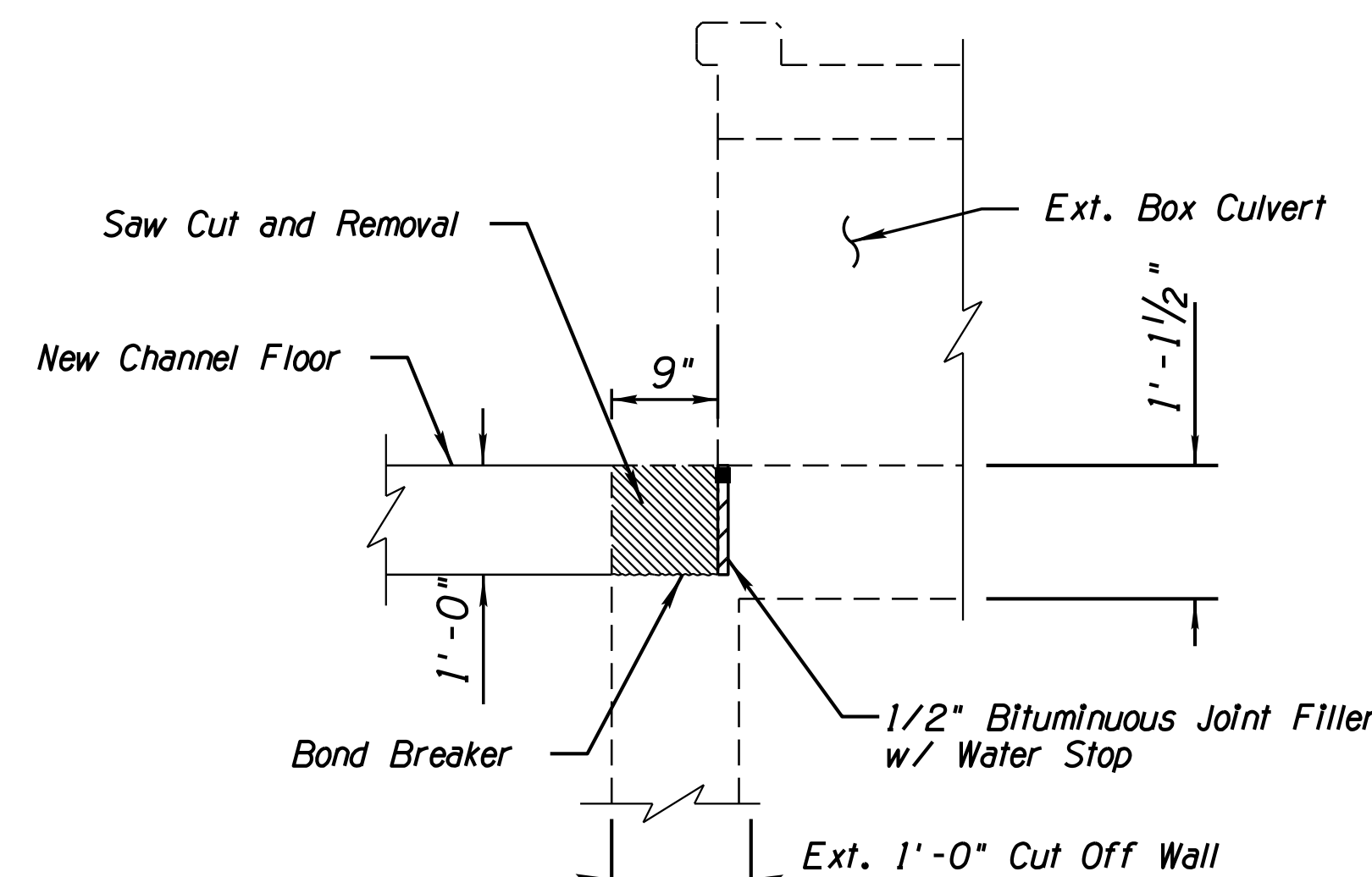
STRUCTURAL BACKFILL LIMITS

Construction Notes:

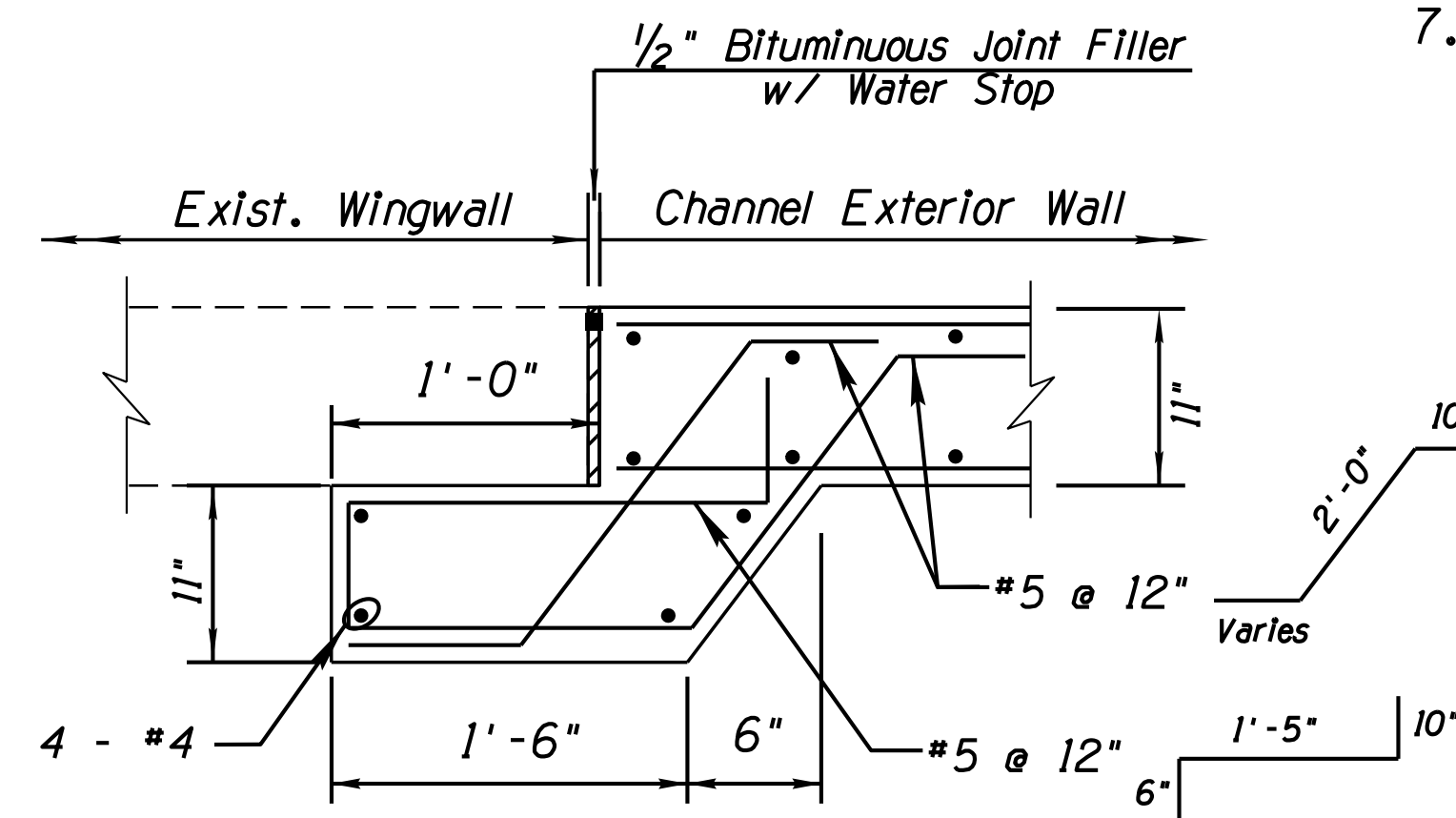
- Concrete Shall Have $f'c = 3000$ psi.
- Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
- All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
- Chamfer all exposed corners $3/4$ " unless noted otherwise.
- Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
- Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
- Reinforcing Steel shall have 2" min. clear cover unless otherwise noted.



③ **PLAN - EXTERIOR WALL TO WEST WINGWALL CONNECTION**
Scale: N.T.S.



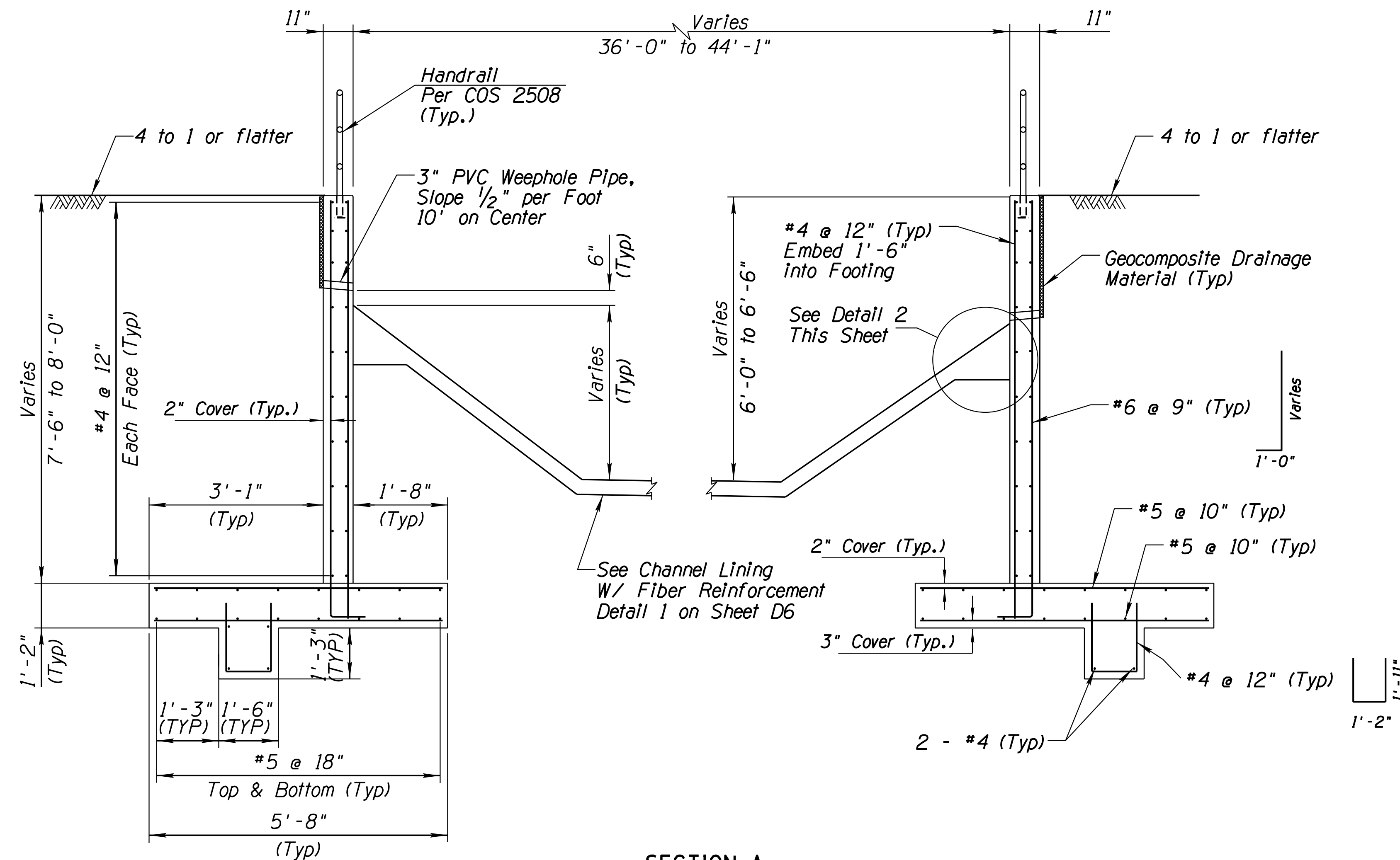
④ **SECTION - CHANNEL FLOOR TO EXISTING BOX FLOOR**
Scale: N.T.S.



⑤ **PLAN - EXTERIOR WALL TO EAST WINGWALL CONNECTION**
Scale: N.T.S.

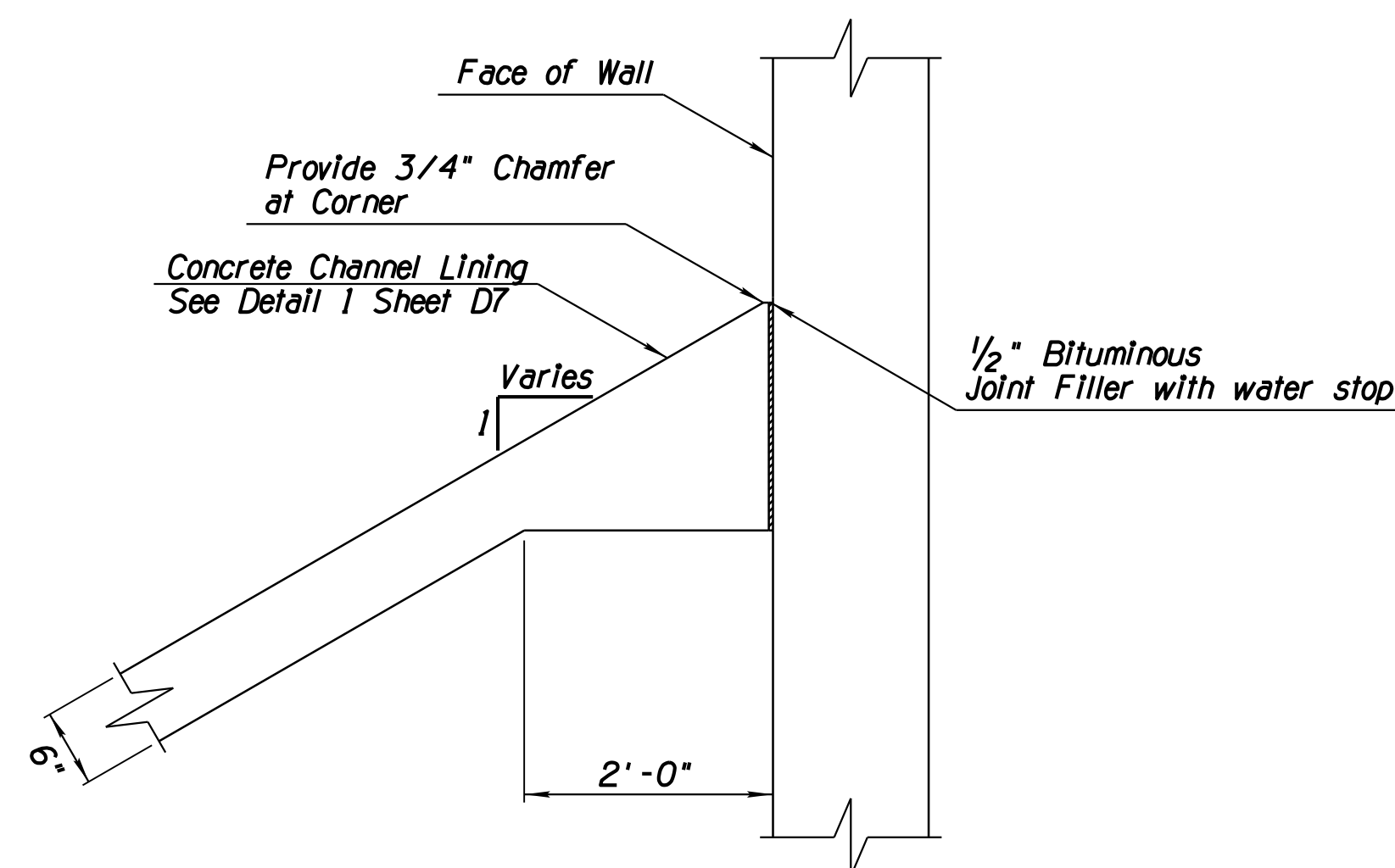


DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251			
VANE WALL CHANNEL DETAILS			
PROJECT TITLE: CROSSROADS EAST DRAINAGE INFRASTRUCTURE			
SCALE: HORIZ. N/A	DESIGNED: SK	DATE: 03/20	BID NO. XXXX
VERT. N/A	DRAWN: CC	AS-BUILT: XX/XX	PROJECT NO. 400-FB53B-56047
37 OF 38			SP: D18



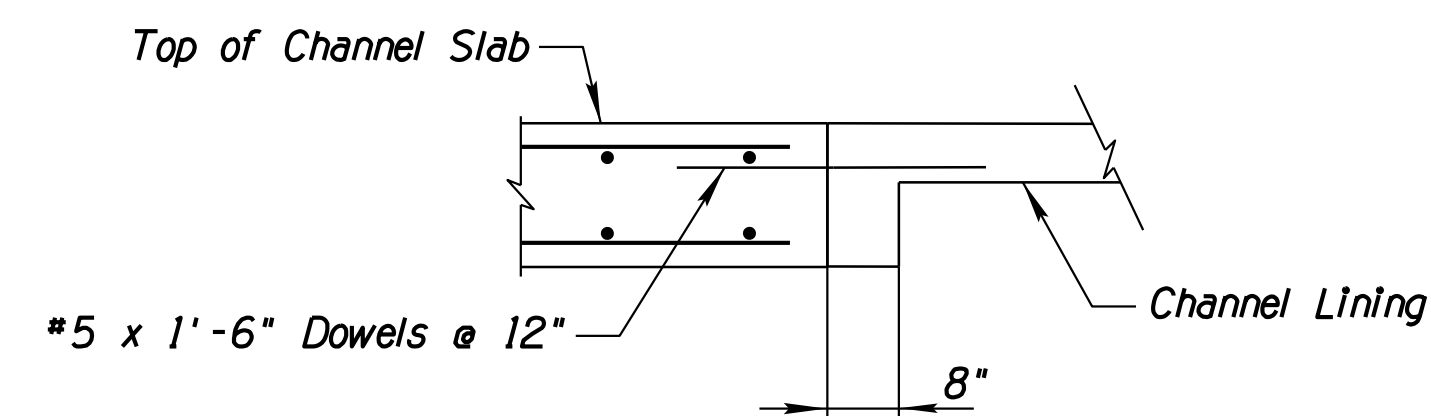
1 SECTION A
Scale: N.T.S.

Sta 102+26.90 to Sta 102+26.90



2 JOINT BETWEEN RETAINING WALL AND CHANNEL LINING

Scale: N.T.S.



⑦ SLAB TO CHANNEL JOINT DETAIL

Scale: N.T.S.

Construction Notes:

1. Concrete Shall Have $f'c = 4000$ psi.
2. Reinforcing Steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
3. All bends and hooks shall meet the requirements of ACI Chapter 25. All bend dimensions for reinforcing steel shall be out-to-out bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
4. Chamfer all exposed corners $3/4"$ unless noted otherwise.
5. Compact backfill for footing and wall base minimum 95 percent of ASTM D698 maximum dry density.
7. Overexcavate a Min of 1' Below Footing and Compact to 95% Relative Density.
8. Reinforcing Steel shall have 2' min clear cover unless otherwise noted.



DATE: 3/13/20	REVISION:	CITY COMMENTS	BY: A.S.N.
			
		PUBLIC WORKS	
		CAPITAL PROJECT MANAGEMENT	
		7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
VANES TRANSITION DETAILS			
CROSSROADS EAST			
DRAINAGE INFRASTRUCTURE			
			
SCALE	DESIGNED	DATE	BID NO.
HORIZ. N/A	SH	03/20	XXXX
VERT. N/A	DRAWN	AS-BUILT	PROJECT NO.
	CC	XX/XX	400-FB53B-56047
			SHT. D19 38 OF 38

**APPENDIX D – LOGAN SIMPSON CLEAN WATER ACT SECTION 404 TECHNICAL
MEMORANDUM**



L O G A N S I M P S O N

51 West Third Street Suite 450 Tempe, Arizona 85281
Phone: 480.967.1343 Fax: 480.966.9232 www.logansimpson.com

CLEAN WATER ACT SECTION 404 TECHNICAL MEMORANDUM

To: Joe Charles, Sales and Leasing, Arizona State Land Department
Copy: Angela Muszynski, Logan Simpson
Dylan George-Sills, Logan Simpson
From: Wayne Colebank, Logan Simpson
Date: April 6, 2020
Project Name: Hayden Road/Loop 101
Subject: Clean Water Act Section 404

INTRODUCTION

This Technical Memorandum provides a summary of findings on the presence/absence of any potential Waters of the US (Waters) on the Arizona State Land Department's (ASLD) 71-acre Parcel (Number 215-07-210B), located southeast of the intersection of North Hayden Road and State Route 101 (Loop 101) in Scottsdale, Arizona.

In 2018, a Clean Water Act (CWA) Section 404 Permit (File Number: SPL-2003-1623), including a cultural resource survey and a biological analysis, was obtained for site work and grading that occurred on the Parcel. Subsequently, the US Army Corps of Engineers (USACE), the agency that administers Section 404, issued an Approved Jurisdictional Delineation (AJD) for the Parcel. Early this year, Logan Simpson was contracted to conduct a field visit and to confirm, through correspondence with the USACE, whether Waters remain on the site subsequent to the grading permit.

As part of our due diligence for this Technical Memorandum, on March 25, 2020, prior to receiving the AJD from the USACE, Wayne Colebank, Angela Muszynski, and Dylan George-Sills of Logan Simpson completed a ground survey of the Parcel to evaluate the presence/absence of any potential Waters.

SURVEY METHODS AND ACTIVITIES

Washes previously identified in SPL-2003-1623 were mapped on Google Earth aerial images and compared to topographic maps, and the National Wetland Inventory Maps. Logan Simpson reviewed: 1) Parcel areas outside of the AJD boundaries, and 2) the previously identified washes to evaluate the physical characteristics of observed washes for consideration as a Waters and/or for the potential to remain classified as Waters. USACE guidelines for delineating Waters¹ were followed for each existing wash.

One primary wash and portions of several braids originate in the undeveloped land at the northwest corner of the Parcel (western survey area); these washes exhibit characteristics of a jurisdictional Waters. The primary wash was geographically located with a GPS-capable device and documented by ground photographs and physical characteristic descriptions.

¹ A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (USACE 2008).

No drainage features or potential Waters were observed in the easternmost limits of the Parcel (eastern survey area).

RESULTS

The primary wash in the western survey area discharges directly into the man-made wash along the Hayden Road frontage. Because the USACE has determined that the man-made channel is not jurisdictional Waters (see below), we are of the opinion the primary wash would typically not be considered jurisdictional due to the lack of connectivity to a downstream Waters. Similarly, the braids have no downstream connection and would not be considered jurisdictional as a result. Because of the lack of observed features, no Waters occur in the eastern survey area. To obtain the USACE's concurrence on the findings for the two survey areas, a Dry Land Approved Jurisdictional Determination Form and supporting information would need to be submitted to the USACE.

Subsequent to the field review, telephone coordination with the USACE identified the existence of the AJD. Per the USACE's AJD August 15, 2018 cover letter, there are no Waters under jurisdiction of the CWA Section 404 (as defined by 33 CFR part 329) within the review area shown on the enclosed Project Limits map. A personal conversation with Kathleen Tucker of the USACE confirmed that neither the red or yellow-highlighted washes on the AJD map are jurisdictional under the CWA. This determination is considered valid for five years from the date of August 15, 2018, unless new information or events warrant the revision of this determination before the expiration date.

It is important to note that the AJD determination is based on the current (2015) definition of Waters. Should this definition be revised as proposed in the Navigable Waters Protection Rule (NWPR) (January 23, 2020) which is yet to be authorized, ASLD should re-assess the results herein. At this time, based on the draft NWPR, it is likely that ephemeral washes, such as those on the Parcel, will be excluded from protections or permitting under the CWA.

CONCLUSION

We are of the opinion that no Waters exist within the eastern and western survey areas. To obtain the USACE's concurrence on the survey areas' assessments, a Dry Land Approved Jurisdictional Determination Form and supporting information would need to be submitted to the USACE.

Based on the findings of this Technical Memorandum and the USACE's 2018 AJD, under the current regulatory requirements and site conditions, there are no Waters within the Project Limits of the AJD review area map. If the AJD review area is developed prior to August 15, 2023, ASLD would not be required to prepare a Preliminary Jurisdictional Delineation (PJD) or a Section 404 permit prior to initiating construction.

If you have any questions, please call me at (480) 967-1343 or email me at wcolebank@logansimpson.com.

Thank you,



Wayne Colebank
Vice President, Landscape Architect
Logan Simpson

Enclosures: USACE Approved Jurisdictional Delineation Cover Letter (Page 1)
 USACE Approved Jurisdictional Delineation Cover Letter (Page 2)
 USACE Dry Land Approved Jurisdictional Delineation Form
 Survey Results and USACE Approved Jurisdictional Delineation Impacts to Waters of the U.S
 Ground Photographs



DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS
3636 N CENTRAL AVENUE, SUITE 900
PHOENIX, ARIZONA 85012-1939

August 15, 2018

SUBJECT: Approved Jurisdictional Determination

Mr. Wesley Mehl
Arizona State Land Department
1616 West Adams Street
Phoenix, Arizona 85007

Dear Mr. Mehl:

I am responding to your request (File No. SPL-2003-01623) dated June 8, 2018, for an approved Department of the Army jurisdictional determination (JD) for the Crossroads East project site (lat. 33.6671°N, long. -111.9146°W) located within the city of Scottsdale, Maricopa County, Arizona.

The Corps' evaluation process for determining whether or not a Department of the Army permit is needed involves two tests. If both tests are met, a permit would likely be required. The first test determines whether or not the proposed project is located within the Corps' geographic jurisdiction (i.e., it is within a water of the United States). The second test determines whether or not the proposed project is a regulated activity under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. This evaluation pertains only to geographic jurisdiction.

Based on the unauthorized activity that was resolved with an after the fact permit and settlement agreement issued on August 13, 2018, I have determined waters of the United States do not occur on the project site. The basis for our determination can be found in the enclosed Approved Jurisdictional Determination (JD) form.

This letter includes an approved jurisdictional determination for the Crossroads East project site. If you wish to submit new information regarding this jurisdictional determination, please do so within 60 days. We will consider any new information so submitted and respond within 60 days by either revising the prior determination, if appropriate, or reissuing the prior determination. If you object to this or any revised or reissued jurisdictional determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you wish to appeal this decision, you must submit a completed RFA form within 60 days of the date on the NAP to the Corps South Pacific Division Office at the following address:

Tom Cavanaugh
Administrative Appeal Review Officer
U.S. Army Corps of Engineers

-2-

South Pacific Division, CESP-D-PDS-O, 2042B
1455 Market Street
San Francisco, California 94103-1399

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5 (see below), and that it has been received by the Division Office by **October 14, 2018**.

This determination has been conducted to identify the extent of the Corps' Clean Water Act jurisdiction on the particular project site identified in your request, and is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

Thank you for participating in the regulatory program. If you have any questions, please contact me at (602) 230-6956 or via e-mail at Kathleen.A.Tucker@usace.army.mil. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,



Sallie Diebolt
Chief, Arizona Branch
Regulatory Division

Enclosure

DRY LAND APPROVED JURISDICTIONAL DETERMINATION FORM¹
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): August 15, 2018

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: SPL-2003-2623

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: Arizona County/parish/borough: Maricopa City: Scottsdale

Center coordinates of site (lat/long in degree decimal format): Lat. 33.6671 °, Long. -111.9146 °

Universal Transverse Mercator:

Name of nearest waterbody: Indian Bend Wash

Name of watershed or Hydrologic Unit Code (HUC): 1506010602

☐ Check if map/diagram of review area is available upon request.

☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: August 13, 2018

☐ Field Determination. Date(s): *Click here to enter a date.*

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **are no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **are no** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area.

SECTION III: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☐ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:

☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.

☐ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps:

☐ U.S. Geological Survey Hydrologic Atlas:

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☐ U.S. Geological Survey map(s). Cite scale & quad name:

☐ USDA Natural Resources Conservation Service Soil Survey. Citation:

☐ National wetlands inventory map(s). Cite name:

☐ State/Local wetland inventory map(s):

☐ FEMA/FIRM maps:

☐ 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)

☐ Photographs: ☒ Aerial (Name & Date): July 2017

☐ or ☒ Other (Name & Date): July 2017

☐ Previous determination(s). File no. and date of response letter:

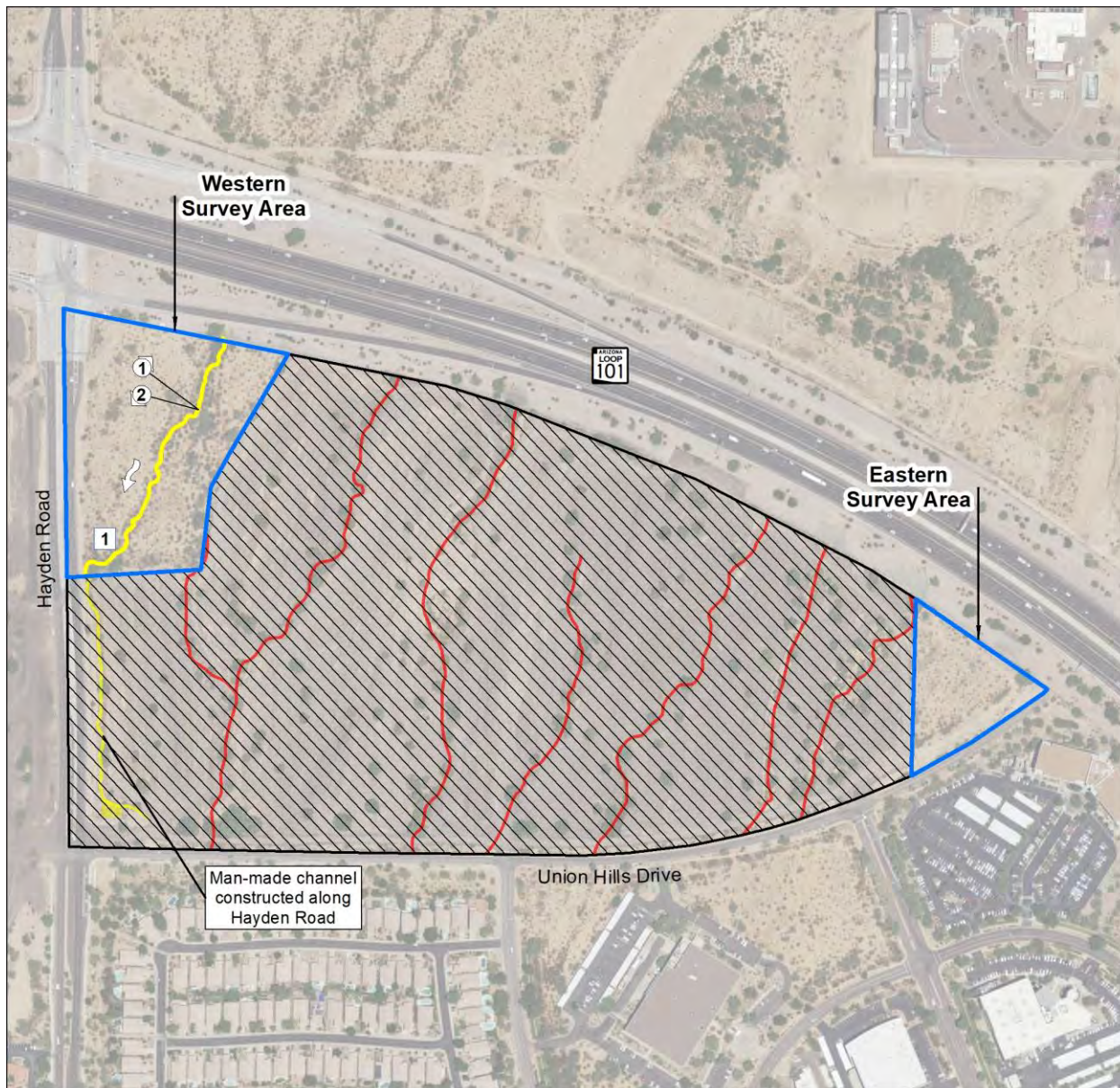
☐ Applicable/supporting case law:

☐ Applicable/supporting scientific literature:

☒ Other information (please specify): unauthorized activity that filled in washes

B. REQUIRED ADDITIONAL COMMENTS TO SUPPORT JD. EXPLAIN RATIONALE FOR DETERMINATION THAT THE REVIEW AREA ONLY INCLUDES DRY LAND: An unauthorized activity filled washes with asphalt millings and thus there is no OHWM and thus no Waters on site.

¹ This form is for use only in recording approved JDs involving dry land. It extracts the relevant elements of the longer approved JD form in use since 2007 for aquatic areas and adds no new fields.



Source: Esri, USDA Farm Service Agency

Key

- Survey Area
- AJD Area (SPL-2003-01623)
- Potentially Jurisdictional Waters
- Permanent Impacts to Jurisdictional Waters

- # Feature number
- # Photo location
- Flow direction

Feet

0 1,000



Survey Results and USACE Approved Jurisdictional Delineation Impacts to Waters of the U.S.

Photo No. 1 (Wash 1 – Potential Waters)



Upstream view facing northeast

Photo No. 2 (Wash 1 – Potential Waters)



Downstream view facing southwest

**APPENDIX E – MICHAEL BAKER INTERNATIONAL CROSSROADS EAST DRAINAGE
INFRASTRUCTURE PHASE 1 PROJECT NO. 169678**



Drainage Design Report CROSSROADS EAST DRAINAGE INFRASTRUCTURE PHASE 1

Contract No. 2018-017-COS | MBI Job No. 169678



Plan #	4817-18-19
Case #	
Q-S #	
☒ Accepted	
☐ Corrections	
	03/31/2020
Reviewed By	Date

Prepared for:
City of Scottsdale
7447 E. Indain School Rd.
Scottsdale, AZ 85251

Prepared by:

Michael Baker

INTERNATIONAL

2929 North Central Ave.
Suite 800
Phoenix, AZ 85012



1. Introduction

1.1. Purpose

This drainage report supports the design of the Crossroads East Phase I drainage infrastructure improvement project for the City of Scottsdale (City) under contract 2018-017-COS. The project consists of underground pipe, channel, spillway, and detention basin design.

1.2. Location

The project location is in the City of Scottsdale, AZ near Hayden Rd. and State Route 101L (SR 101L). It is in Sections 25 and 36 of Township 4 North and Range 4 East of the Gila and Salt River Base and Meridian.

The project extends from the future Legacy Blvd. alignment on the north, to Basin 53R, and south of SR 101L to the northeast corner of Union Hills Dr. and Hayden Rd. Figure 1.1 shows the project extents.

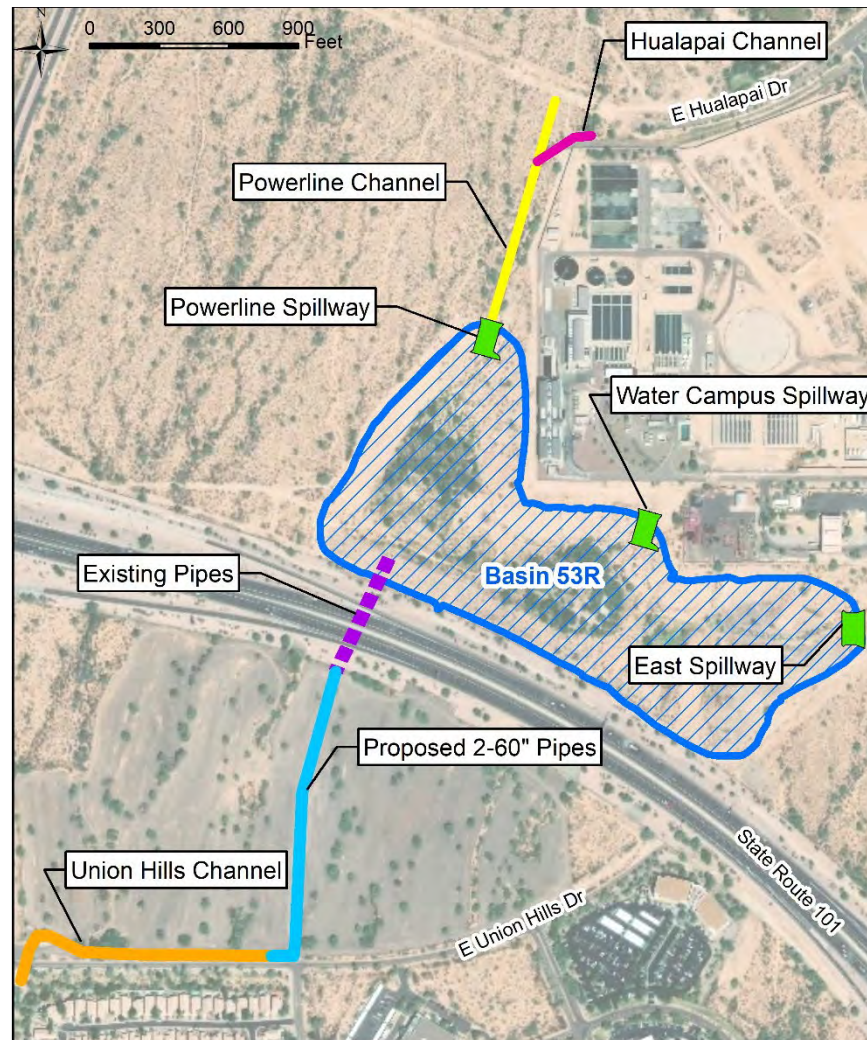


Figure 1.1: Vicinity Map

2.2. Methodology

The hydrology developed for the project is a combination of FLO-2D (Build 13.07.05) and HEC-HMS (Version 4.3). The FLO-2D offsite hydrographs were input into HEC-HMS for the detention basin design and basin routing. The onsite developed conditions hydrology was determined using HEC-HMS. Figure 7 shows the offsite inflows and the onsite sub-basin drainage areas.

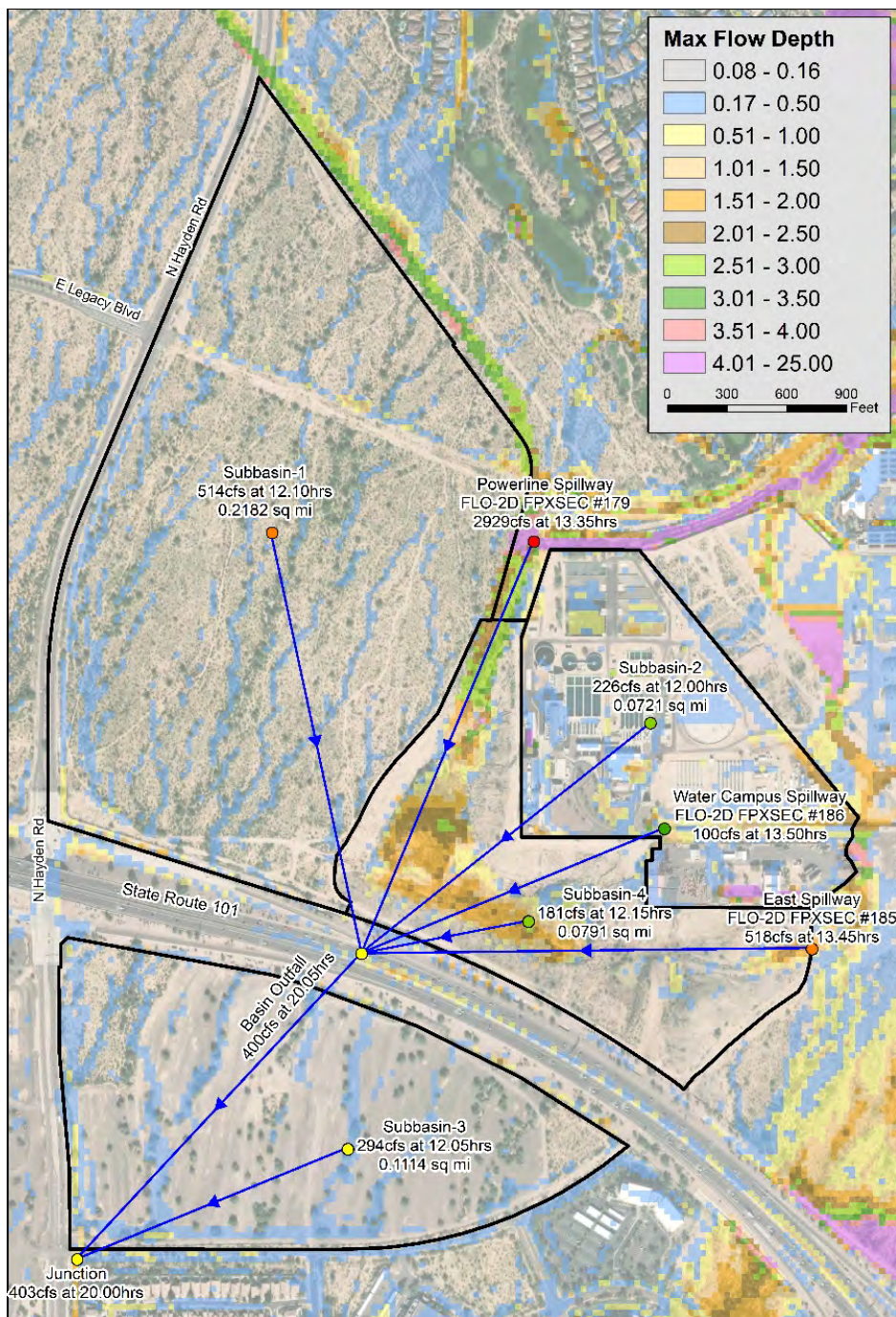


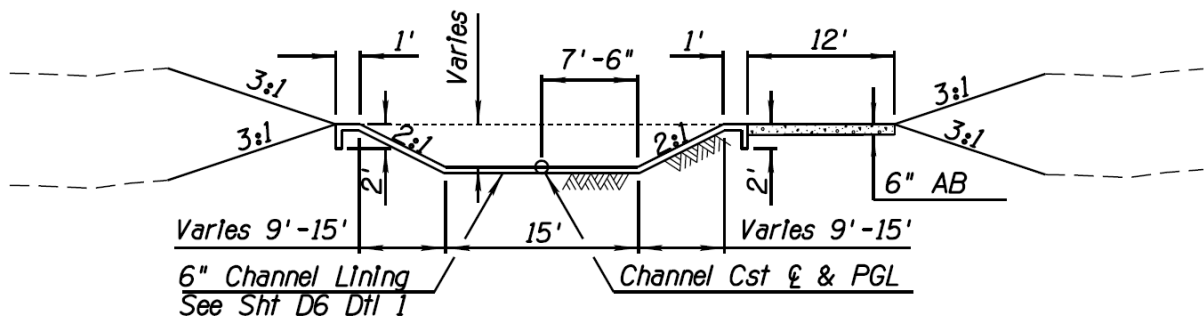
Figure 7: Hydrology Routing Schematic

5.2.3. Union Hills Channel

The Union Hills Channel receives the outfall from Basin 53R pipes and routes the flow to the existing 4 - 10' x 4' box culvert under Union Hills Dr. east of Hayden Rd. The design discharge is from Junction-1 per Table 12: 100-year Summary. Junction-1 accounts for Basin 53R flow and Sub-basin-3 at the existing Union Hills box culvert. Table 23 is a summary of the Union Hills Channel Design. The Union Hills Channel only contains the flow depths (403 cfs) from Phase I design. This section of the channel will be re-designed when Phase II design discharges additional flow into the channel.

Table 23: Union Hills Channel

100-year Design Discharge	403 cfs
Shape	Trapezoidal
Bottom Width	15 ft
Minimum Depth	6.5 ft
Side Slopes (H:V)	2:1
Minimum Slope	0.20%
Material	Concrete
n-value	0.014*
Flow Regime	Mixed
*finished grade concrete	



UNION HILLS CHANNEL
(Looking Upstation)

Figure 25: Union Hills Channel Cross-Section

5.2.4. Union Hills Upstream Channel Section

The Union Hills channel inflow model analyzed the proposed conditions from Basin 53R outfall pipes to downstream of the existing box culvert. The Basin 53R outfall pipe that discharges into the Union Hills channel is designed using StormCAD model as described in Section 5.1.1. In order to better understand the hydraulic impacts of the Basin 53R Pipe outfall discharge into the Union Hills Channel, a Los Angeles County Flood Control District hydraulic analysis program F0515P, WSPGW (Windows Version 14.06) was utilized to develop the hydraulic model of the drainage system. WSPGW computes and plots uniform and non-uniform steady flow water surface profiles and pressure gradients in open channels or closed conduits with irregular or regular sections. The computational procedure is based on solving Bernoulli's equation for the total energy between the sections in a reach. The open channel flow procedure utilizes the standard step method. Confluences are analyzed using pressure and momentum theory. The channel section was modeled in WSPGW, the assumptions and results such as channel depths and velocities are shown in Appendix D.

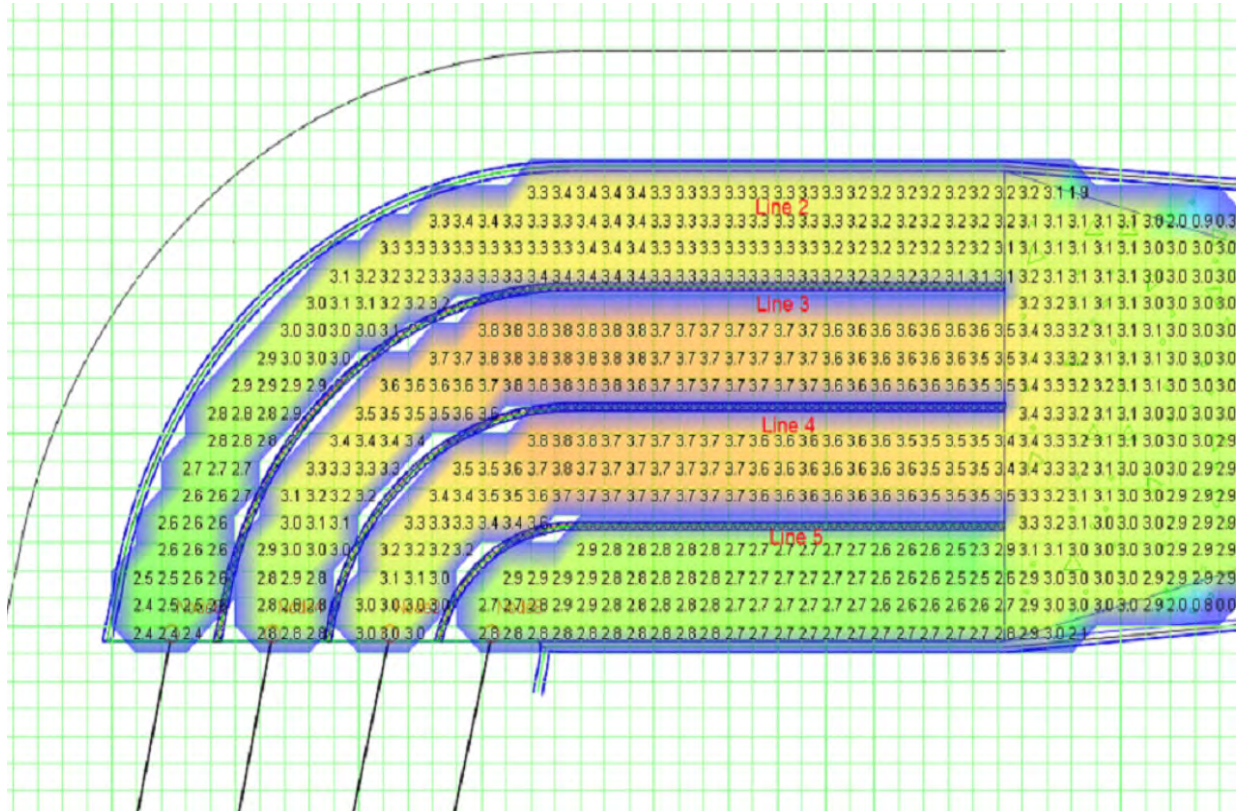
5.2.5. Union Hills Channel Bend

Before discharging into the 4 -10' x 4' box culvert under Union Hills Dr., the channel section has a bend. Channel bends, though not preferable are necessary in urban settings. Channel bends may cause changes in flow regime and oscillations. It was determined that one-dimensional models do not adequately simulate the hydraulic characteristic of flows in such a situation, so a two-dimensional XPSWMM (2019) model was developed to design the channel transition, channel bend and entrance to the culvert. XPSWMM accounts for channel transitions from trapezoidal to rectangular sections, the radius of curvature in the channel bend and super elevation. Structural Vanes were used to evenly distribute the flows between 4 -10'x 4' box culverts at the entrance. The amount of flow going through each cell will depend on hydraulic characteristics upstream. Upstream of the crossing the channel goes through a significant bend which will tend to concentrate flow toward the left (inner) side of the section (looking downstream). The 2D XPSWMM model was evaluated with different alternatives to determine if the length of the Vanes at the upstream side would have significant impact on the distribution of flows and velocities within the channel compartments. Varying the length of the Vane did not have significant impact on the distribution of flows or the depth. Figure 25 shows a typical plan view of the channel section with the Vane and Culvert entrance along with the flow depth distribution. The velocity distribution between the Vanes and depth profile for the channel with the Vane are shown in Appendix D. Please refer Appendix M for details of the structural calculation of the Vanes and Walls in the channel.

The wall height along the channel was designed such that flow depth is contained within the channel in addition to 1 ft of freeboard. The minimum height of the wall

on outside is 6.5 ft with a transition of 5.5 ft to the culvert entrance. The minimum height of the Vanes is 4 ft.

There are some additional local flows (22 cfs) coming from the north at the proposed channel bend. This flow is not included as part of the Phase I design flows (403 cfs) due to expected variance in time to peak between the channel peak flow and the local flow. The channel section at the bend is protected with riprap at the outer curve of the channel boundary.



Sections	Line 2	Line 3	Line 4	Line 5
Discharge (cfs)	94	103	106	100

Figure 26: Union Hills Channel Bend Flow depth

6. Downstream Impacts

The proposed drainage design will discharge 403 cfs (Table 12 – 100-year Peak Discharge for Junction-1) downstream along the Hayden Road Channel to Reach 11 Impoundment Area. The proposed flow will increase the flow above existing conditions, but will not exceed the flow of 2,500 cfs that the Hayden Road channel was designed for (Development Engineering, Inc., 1994). Appendix K contains the drainage report prepared for the Stonebrook development. The existing Union Hills culvert was built to convey 1500 cfs under the roadway per As-built drawings received from the City of Scottsdale from the Hayden Rd. – Frank Lloyd Wright to Loop 101 project (Appendix L). The Union Hills model was extended down to Reach 11 (downstream of the Stonebrook Subdivision) using the topography from 2010 and verifying that the flow is contained in the channel.

APPENDIX

Appendix A: Hydrology Calculations

Appendix B: HY-8 Rating Table

Appendix C: StomCAD Output

Appendix D: HEC-RAS, WSPGW and XPSWMM Output

Appendix F: Hualapai Channel FlowMaster

Appendix G: Concrete Rubble Specification (FCDMC Hydraulics Manual)

Appendix H: Riprap Spillways

Appendix I: Powerline Channel Baffle Chute Spillway

Appendix J: ADOT Permit No. 88283

Appendix K: Stonebrook Drainage Report

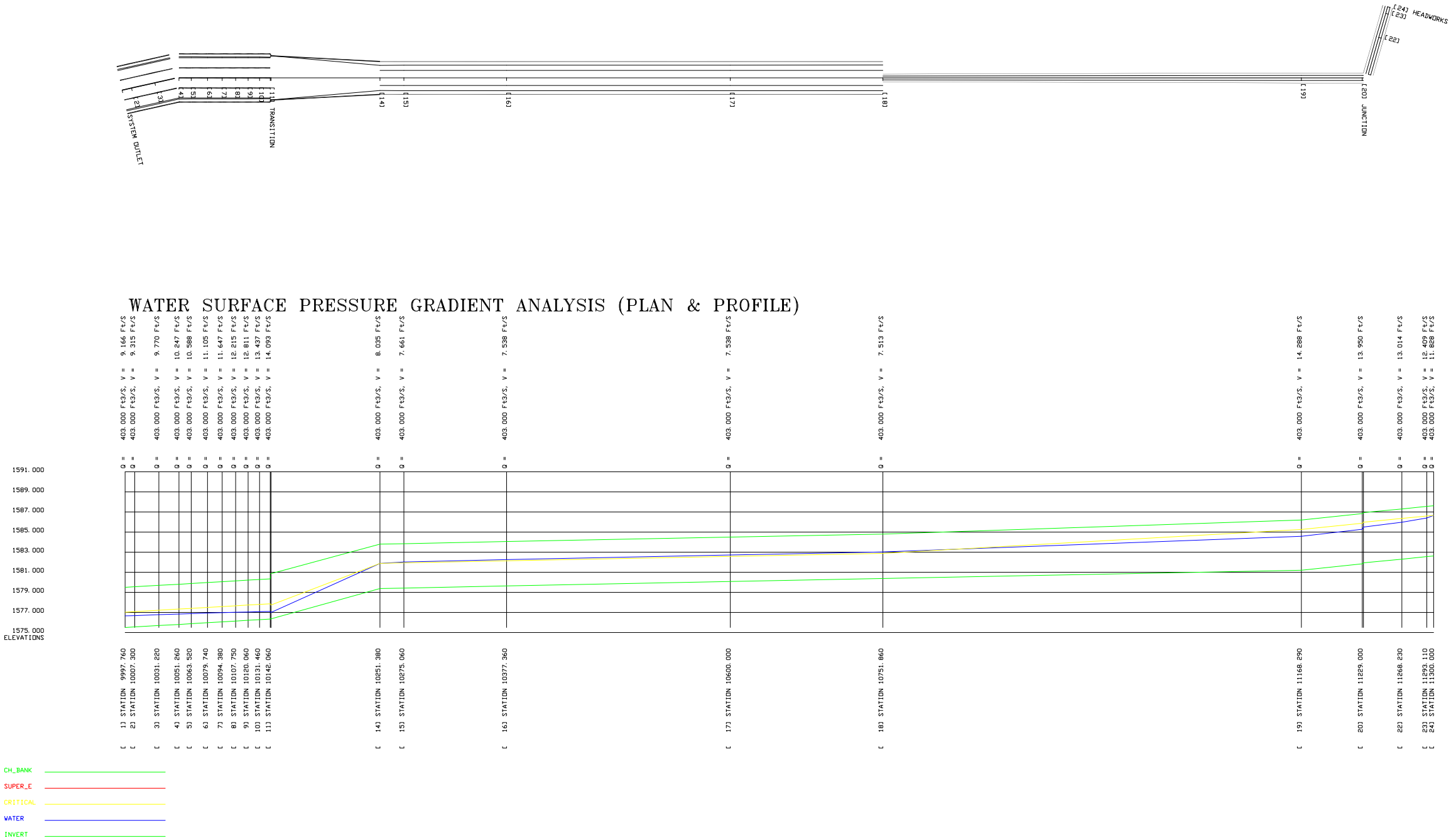
Appendix L: As-builts

Appendix M: Structural Calculations

Appendix D:HEC-RAS, WSPGW and XPSWMM Output

- **Existing Powerline Channel** (North of Thompson Peak Pkwy)
- **Proposed Powerline Channel** (South of Legacy Blvd. to Basin 53R)
- **Proposed Union Hills Channel**
 - WSPGW Model** - (Outfall of 2 – 60” CMP ties to Union Hills Dr. and Hayden Rd.)
 - XPSWMM Model** – (Channel transition, Channel bend and Culvert entrance)

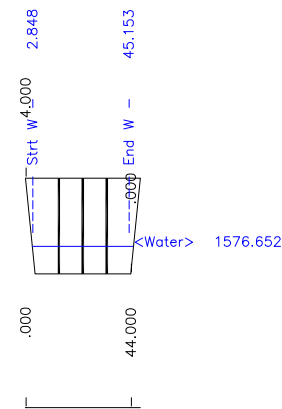
Proposed Union Hills Channel



STATION [No.]	OPERATION TYPE	STATION (FT)	INV ELEV (FT)	WATER LEVEL (FT)	CHAN HT (FT)	CHANNEL TYPE	MANNING'S "N"	# PIER/PIP	FLOW RATE (CFS)	VELOCITY (FT/S)	TOP WIDTH (FT)	CHAN WDTH PIER (FT)	PIER WIDTH (FT)	ZL	ZR	SUPEL RT B (FT)	SUPEL LT B (FT)	CRIT DPTH (FT)	RADIUS/< PT (FT)
[1]	SYSTEM OUTLET	9997.76	1575.500	1.152	4.00	BOX	0.014	3	403	9.166	42.305	40	1.00	1	1	0	0	1.523	0.000
[2]	REACH	10007.30	1575.555	1.135	4.00	BOX	0.014	3	403	9.315	42.269	40	1.00	1	1	0	0	1.523	0.000
[3]	REACH	10031.22	1575.694	1.083	4.00	BOX	0.014	3	403	9.770	42.166	40	1.00	1	1	0	0	1.523	0.000
[4]	REACH	10051.26	1575.810	1.034	4.00	BOX	0.014	3	403	10.247	42.068	40	1.00	1	1	0	0	1.523	12.602
[5]	REACH	10063.52	1575.882	1.001	4.00	BOX	0.014	3	403	10.588	42.003	40	1.00	1	1	0	0	1.523	0.000
[6]	REACH	10079.74	1575.976	0.956	4.00	BOX	0.014	3	403	11.105	41.912	40	1.00	1	1	0	0	1.523	0.000
[7]	REACH	10094.38	1576.062	0.912	4.00	BOX	0.014	3	403	11.647	41.825	40	1.00	1	1	0	0	1.523	0.000
[8]	REACH	10107.75	1576.140	0.871	4.00	BOX	0.014	3	403	12.215	41.742	40	1.00	1	1	0	0	1.523	0.000
[9]	REACH	10120.06	1576.212	0.831	4.00	BOX	0.014	3	403	12.811	41.663	40	1.00	1	1	0	0	1.523	0.000
[10]	REACH	10131.46	1576.278	0.794	4.00	BOX	0.014	3	403	13.437	41.587	40	1.00	1	1	0	0	1.523	0.000
[11]	REACH	10142.06	1576.340	0.757	4.00	BOX	0.014	3	403	14.093	41.515	40	1.00	1	1	0	0	1.523	0.000
[12]	TRANSITION	10142.90	1576.360	0.621	4.50	RECTANGULAR	0.014	0	403	14.741	44.000	44	0.00	0	0	0	0	1.376	0.000
[13]	REACH	10143.00	1576.370	0.622	4.50	RECTANGULAR	0.014	0	403	14.730	44.000	44	0.00	0	0	0	0	1.376	0.000
[14]	TRANSITION	10251.38	1579.380	2.506	4.42	TRAPEZOIDAL	0.014	0	403	8.035	25.024	15	0.00	2	2	0	0	2.506	0.000
[15]	REACH	10275.06	1579.427	2.604	4.42	TRAPEZOIDAL	0.014	0	403	7.661	25.413	15	0.00	2	2	0	0	2.506	0.000
[16]	REACH	10377.36	1579.633	2.637	4.42	TRAPEZOIDAL	0.014	0	403	7.538	25.548	15	0.00	2	2	0	0	2.506	0.000
[17]	REACH	10600.00	1580.080	2.637	4.42	TRAPEZOIDAL	0.014	0	403	7.538	25.548	15	0.00	2	2	0	0	2.506	0.000
[18]	REACH	10751.86	1580.382	2.644	4.42	TRAPEZOIDAL	0.014	0	403	7.513	25.576	15	0.00	2	2	0	0	2.506	0.000
[19]	REACH	11168.29	1581.210	3.375	5.00	PIPE	0.013	2	403	14.288	4.683	10	0.25	0	0	0	0	4.049	0.000
[20]	REACH	11229.00	1581.840	3.449	5.00	PIPE	0.013	2	403	13.950	4.626	10	0.25	0	0	0	0	4.049	0.000
[21]	JUNCTION	11230.01	1581.940	3.56	5.00	PIPE	0.013	2	403	13.475	4.528	10	0.25	0	0	0	0	4.049	-74.000
[22]	REACH	11268.23	1582.311	3.679	5.00	PIPE	0.013	2	403	13.014	4.410	10	0.25	0	0	0	0	4.049	0.000
[23]	REACH	11293.11	1582.553	3.854	5.00	PIPE	0.013	2	403	12.409	4.204	10	0.25	0	0	0	0	4.049	0.000
[24]	HEADWORKS	11300.00	1582.620	4.049	5.00	PIPE	0.013	2	403	11.828	3.924	10	0.25	0	0	0	0	4.049	0.000

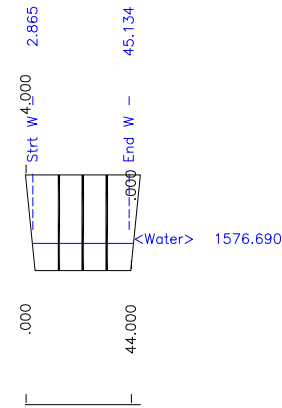
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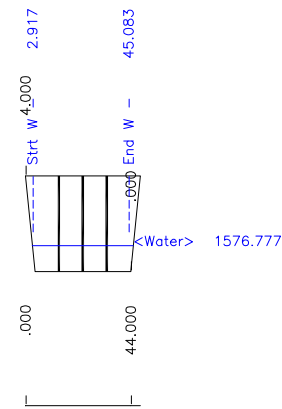
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[2] STATION = 10007.300



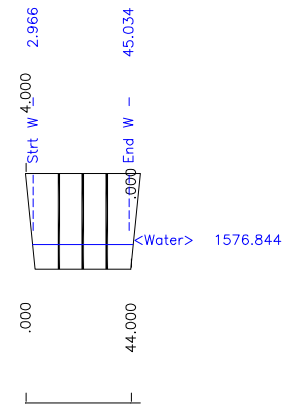
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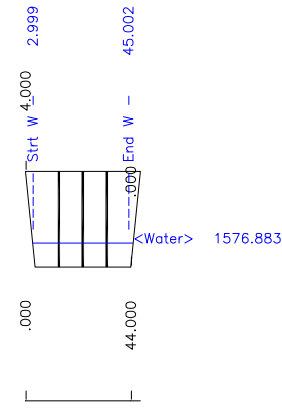
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BOX Velocity = 10.247 Flow = 403.000

[4] STATION = 10051.260



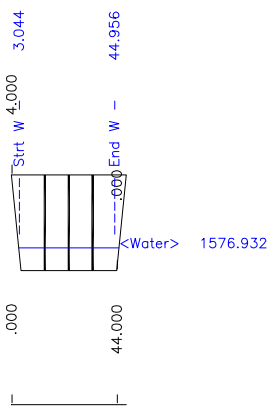
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[5] STATION = 10063.520



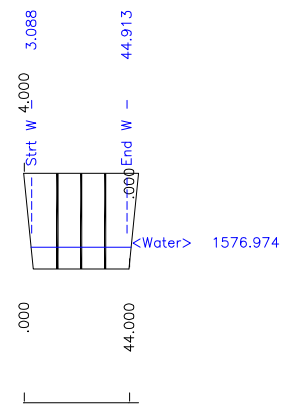
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[6] STATION = 10079.740



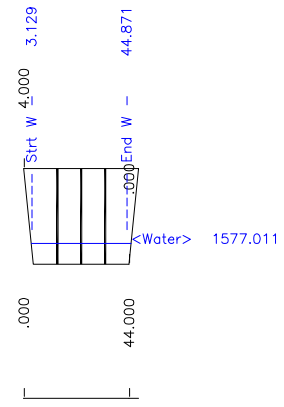
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[7] STATION = 10094.380



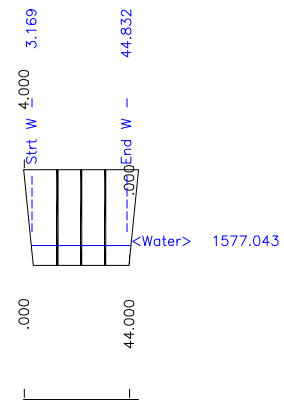
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BOX Velocity = 12.215 Flow = 403.000

[8] STATION = 10107.750



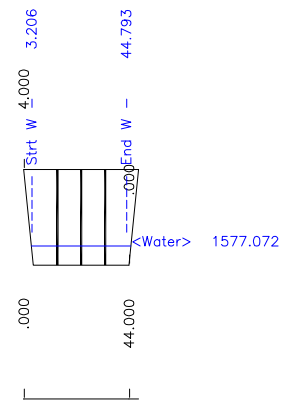
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[9] STATION = 10120.060



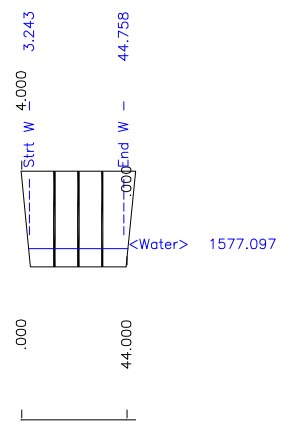
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[10] STATION = 10131.460



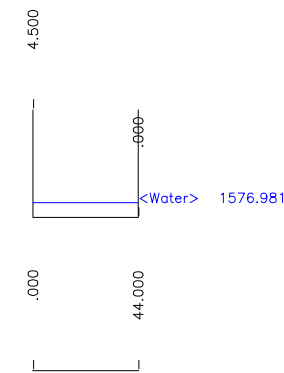
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BOX Velocity = 14.093 Flow = 403.000

[11] STATION = 10142.060



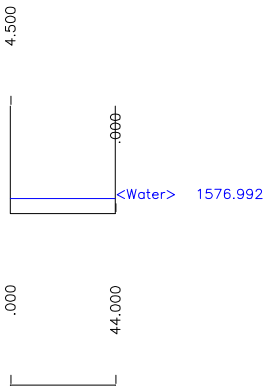
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RECTANGULAR Velocity = 14.741 Flow = 403.000

[12] STATION = 10142.900



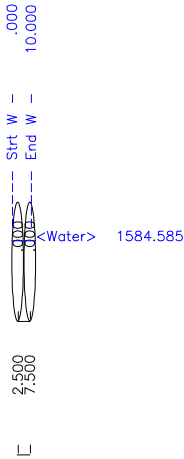
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RECTANGULAR Velocity = 14.730 Flow = 403.000

[13] STATION = 10143.000



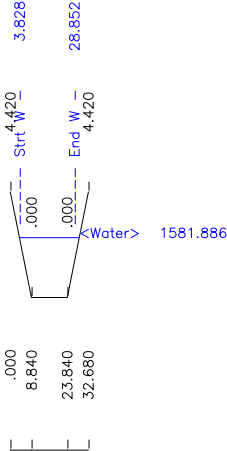
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PIPE Velocity = 14.288 Flow = 403.000

[19] STATION = 11168.290



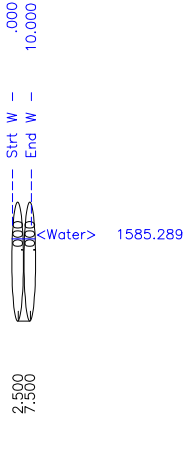
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TRAPEZOIDAL Velocity = 8.035 Flow = 403.000

[14] STATION = 10251.380



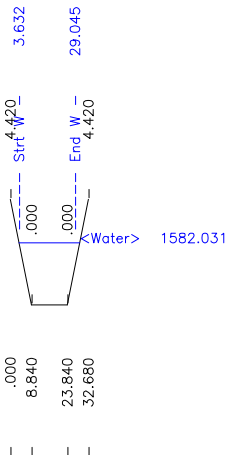
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PIPE Velocity = 13.950 Flow = 403.000

[20] STATION = 11229.000



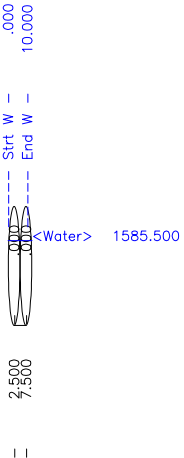
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TRAPEZOIDAL Velocity = 7.661 Flow = 403.000

[15] STATION = 10275.060



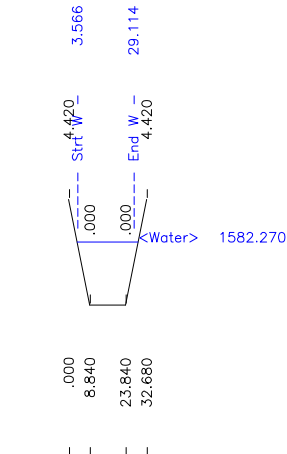
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PIPE Velocity = 13.475 Flow = 403.000

[21] STATION = 11230.010



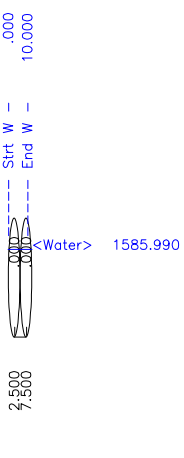
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TRAPEZOIDAL Velocity = 7.538 Flow = 403.000

[16] STATION = 10377.360



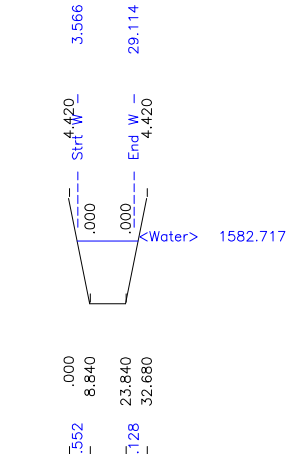
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PIPE Velocity = 13.014 Flow = 403.000

[22] STATION = 11268.230



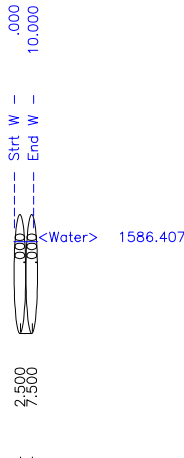
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TRAPEZOIDAL Velocity = 7.538 Flow = 403.000

[17] STATION = 10600.000



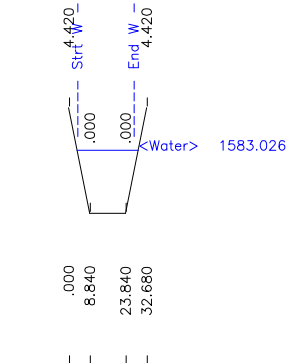
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PIPE Velocity = 12.409 Flow = 403.000

[23] STATION = 11293.110



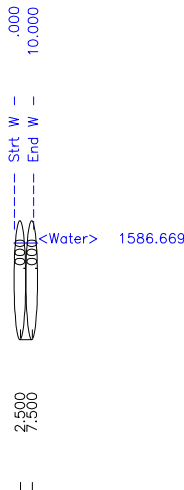
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Invert = 1580.382 Water Surface = 1583.026
TRAPEZOIDAL Velocity = 7.513 Flow = 403.000

[18] STATION = 10751.860



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HEADWORKS
Top Width = 3.924 Number of Piers/pipes = 2
Critical Depth = 4.049 Mannings N = .013
Invert = 1582.620 Water Surface = 1586.669
PIPE Velocity = 11.828 Flow = 403.000

[24] STATION = 11300.000



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T2											
T3											
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CD	1 2 0	.000	4.500	44.000	.000	.000	.00				
CD	2 4 2	.000	5.000	15.000	2.000	2.000	.00				
CD	3 3 3	1.000	4.000	40.000	1.000	1.000	.00				
CD	4 1 0	.000	4.420	15.000	2.000	2.000	.00				
Q		403.000	.0								

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING
 PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE WIDTH	PIER DIAMETER	HEIGHT 1	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	.000	4.500	44.000				.00										
CD	2	4	2		5.000															
CD	3	3	3	1.000	4.000	40.000	1.000	1.000		.00										
CD	4	1	0	.000	4.420	15.000	2.000	2.000		.00										

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

UnionHills_Channel

HEADING LINE NO 2 IS -

HEADING LINE NO 3 IS -

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H			
				9997.760	1575.500	3	1577.140							
ELEMENT NO	2 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				10051.260	1575.810	3		.000	.000	12.602	0			
ELEMENT NO	3 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				10142.060	1576.340	3		.000	.000	.000	0			
ELEMENT NO	4 IS A	TRANSITION	U/S DATA	STATION	INVERT	SECT								
				10142.900	1576.360	1		.000	.000					
ELEMENT NO	5 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				10143.000	1576.370	1		.000	.000	.000	0			
ELEMENT NO	6 IS A	TRANSITION	U/S DATA	STATION	INVERT	SECT								
				10251.380	1579.380	4		.000	.000					
ELEMENT NO	7 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				10600.000	1580.080	4		.000	.000	.000	0			
ELEMENT NO	8 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				11168.290	1581.210	4		.000	.000	.000	0			
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS														
ELEMENT NO	9 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				11229.000	1581.840	2		.000	.000	.000	0			
ELEMENT NO	10 IS A	JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
				11230.000	1581.940	2	0	0	.000	.000	.000	.000	.000	.000
											RADIUS	ANGLE		
											.000	.000		
ELEMENT NO	11 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				11230.010	1581.940	2					.000	.000	-74.000	0
W S P G W														
WATER SURFACE PROFILE - ELEMENT CARD LISTING														
ELEMENT NO	12 IS A	REACH	U/S DATA	STATION	INVERT	SECT								
				11300.000	1582.620	2					.000	.000	-74.000	1

PAGE NO 3

ELEMENT NO	13	IS A SYSTEM HEADWORKS			*	
	U/S DATA	STATION	INVERT	SECT		W S ELEV
		11300.000	1582.620	2		1582.620

UnionHills_Channel

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
9997.760	1575.500	1.152	1576.652	403.00	9.17	1.30	1577.96	.00	1.52	42.30	4.000	40.000	1.00	3 1.0
9.537	.0058					.0084	.08	1.15	1.58	1.29	.014	.00	1.00	BOX
10007.300	1575.555	1.134	1576.690	403.00	9.32	1.35	1578.04	.00	1.52	42.27	4.000	40.000	1.00	3 1.0
23.923	.0058					.0093	.22	1.13	1.62	1.29	.014	.00	1.00	BOX
10031.220	1575.694	1.083	1576.777	403.00	9.77	1.48	1578.26	.00	1.52	42.17	4.000	40.000	1.00	3 1.0
20.040	.0058					.0107	.22	1.08	1.74	1.29	.014	.00	1.00	BOX
10051.260	1575.810	1.034	1576.844	403.00	10.25	1.63	1578.47	.00	1.52	42.07	4.000	40.000	1.00	3 1.0
12.256	.0058					.0121	.15	1.03	1.87	1.28	.014	.00	1.00	BOX
10063.520	1575.882	1.002	1576.883	403.00	10.59	1.74	1578.62	.00	1.52	42.00	4.000	40.000	1.00	3 1.0
16.228	.0058					.0138	.22	1.00	1.96	1.28	.014	.00	1.00	BOX
10079.740	1575.976	.956	1576.932	403.00	11.10	1.91	1578.85	.00	1.52	41.91	4.000	40.000	1.00	3 1.0
14.642	.0058					.0159	.23	.96	2.10	1.28	.014	.00	1.00	BOX
10094.380	1576.062	.913	1576.974	403.00	11.65	2.11	1579.08	.00	1.52	41.83	4.000	40.000	1.00	3 1.0
13.369	.0058					.0185	.25	.91	2.26	1.28	.014	.00	1.00	BOX
10107.750	1576.140	.871	1577.011	403.00	12.22	2.32	1579.33	.00	1.52	41.74	4.000	40.000	1.00	3 1.0
12.308	.0058					.0214	.26	.87	2.42	1.28	.014	.00	1.00	BOX
10120.060	1576.212	.831	1577.043	403.00	12.81	2.55	1579.59	.00	1.52	41.66	4.000	40.000	1.00	3 1.0
11.397	.0058					.0249	.28	.83	2.60	1.28	.014	.00	1.00	BOX

UnionHills_Channel

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
10131.460	1576.278	.794	1577.072	403.00	13.44	2.80	1579.88	.00	1.52	41.59	4.000	40.000	1.00	3 1.0
10.601	.0058					.0289	.31	.79	2.79	1.28	.014	.00	1.00	BOX
10142.060	1576.340	.757	1577.097	403.00	14.09	3.08	1580.18	.00	1.52	41.51	4.000	40.000	1.00	3 1.0
TRANS STR	.0238					.0344	.03	.76	2.99		.014	.00	1.00	BOX
10142.900	1576.360	.621	1576.981	403.00	14.74	3.37	1580.36	.00	1.38	44.00	4.500	44.000	.00	0 .0
.100	.1005					.0377	.00	.62	3.30	.46	.014	.00	.00	RECTANG
10143.000	1576.370	.622	1576.992	403.00	14.73	3.37	1580.36	.00	1.38	44.00	4.500	44.000	.00	0 .0
TRANS STR	.0278					.0200	2.17	.62	3.29		.014	.00	.00	RECTANG
10251.380	1579.380	2.506	1581.886	403.00	8.04	1.00	1582.89	.00	2.51	25.02	4.420	15.000	2.00	0 .0
23.677	.0020					.0023	.05	2.51	1.00	2.64	.014	.00	2.00	TRAP
10275.060	1579.427	2.603	1582.031	403.00	7.66	.91	1582.94	.00	2.51	25.41	4.420	15.000	2.00	0 .0
102.306	.0020					.0021	.21	2.60	.94	2.64	.014	.00	2.00	TRAP
10377.360	1579.633	2.637	1582.270	403.00	7.54	.88	1583.15	.00	2.51	25.55	4.420	15.000	2.00	0 .0
222.639	.0020					.0020	.45	2.64	.92	2.64	.014	.00	2.00	TRAP
10600.000	1580.080	2.637	1582.717	403.00	7.54	.88	1583.60	.00	2.51	25.55	4.420	15.000	2.00	0 .0
151.856	.0020					.0020	.30	2.64	.92	2.64	.014	.00	2.00	TRAP
10751.860	1580.382	2.644	1583.026	403.00	7.51	.88	1583.90	.00	2.51	25.58	4.420	15.000	2.00	0 .0
416.434	.0020					.0020	.83	2.64	.91	2.64	.014	.00	2.00	TRAP

UnionHills_Channel

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
11168.290	1581.210	2.644	1583.854	403.00	7.51	.88	1584.73	.00	2.51	25.58	4.420	15.000	2.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
11168.290	1581.210	3.375	1584.585	403.00	14.29	3.17	1587.76	.00	4.05	4.68	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
60.710	.0104					.0091	.56	3.38	1.03	3.26	.013	.00	.00	PIPE
11229.000	1581.840	3.449	1585.289	403.00	13.95	3.02	1588.31	.00	4.05	4.63	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.1000					.0085	.01	3.45	.98		.013	.00	.00	PIPE
11230.010	1581.940	3.560	1585.500	403.00	13.47	2.82	1588.32	.00	4.05	4.53	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
38.223	.0097					.0079	.30	3.56	.92	3.34	.013	.00	.00	PIPE
11268.230	1582.311	3.678	1585.990	403.00	13.01	2.63	1588.62	.00	4.05	4.41	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
24.879	.0097					.0072	.18	3.68	.87	3.34	.013	.00	.00	PIPE
11293.110	1582.553	3.854	1586.407	403.00	12.41	2.39	1588.80	.00	4.05	4.20	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.889	.0097					.0064	.04	3.85	.79	3.34	.013	.00	.00	PIPE
11300.000	1582.620	4.049	1586.669	403.00	11.83	2.17	1588.84	.00	4.05	3.92	5.000	.000	.00	2 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Worksheet for Station 9997.76

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.009 ft/ft
Discharge	403.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1,580.14
0+02.14	1,580.08
0+04.16	1,579.97
0+14.14	1,579.27
0+18.16	1,578.97
0+26.14	1,578.47
0+28.14	1,578.16
0+30.14	1,577.78
0+38.14	1,576.16
0+40.14	1,575.79
0+42.14	1,575.52
0+54.14	1,575.08
0+62.12	1,575.08
0+64.14	1,575.05
0+66.14	1,575.14
0+76.12	1,576.57
0+78.12	1,576.93
0+86.14	1,578.71
0+88.14	1,579.27
0+94.14	1,579.17
0+96.14	1,578.88
0+98.14	1,578.84
1+00.14	1,578.86
1+01.85	1,578.90

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1,580.14)	(0+26.14, 1,578.47)	0.035
(0+26.14, 1,578.47)	(0+88.14, 1,579.27)	0.030
(0+88.14, 1,579.27)	(1+01.85, 1,578.90)	0.035

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

Worksheet for Station 9997.76

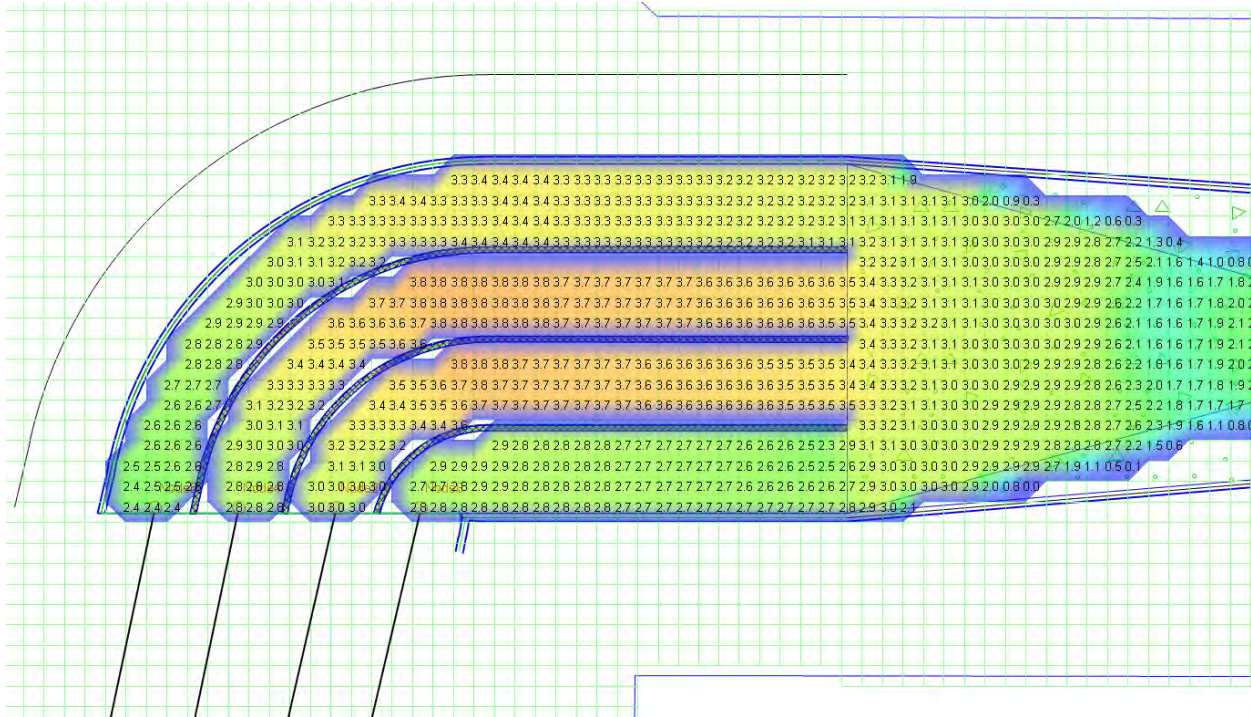
Options	
Closed Channel Weighting Method	Pavlovskii's Method
Results	
Normal Depth	2.09 ft
Elevation Range	1,575.1 to 1,580.1 ft
Flow Area	68.1 ft ²
Wetted Perimeter	46.1 ft
Hydraulic Radius	1.48 ft
Top Width	45.75 ft
Normal Depth	2.09 ft
Critical Depth	1.92 ft
Critical Slope	0.012 ft/ft
Velocity	5.92 ft/s
Velocity Head	0.55 ft
Specific Energy	2.63 ft
Froude Number	0.856
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.09 ft
Critical Depth	1.92 ft
Channel Slope	0.009 ft/ft
Critical Slope	0.012 ft/ft

**XPSWMM Model Results for
Proposed Union Hills Channel**

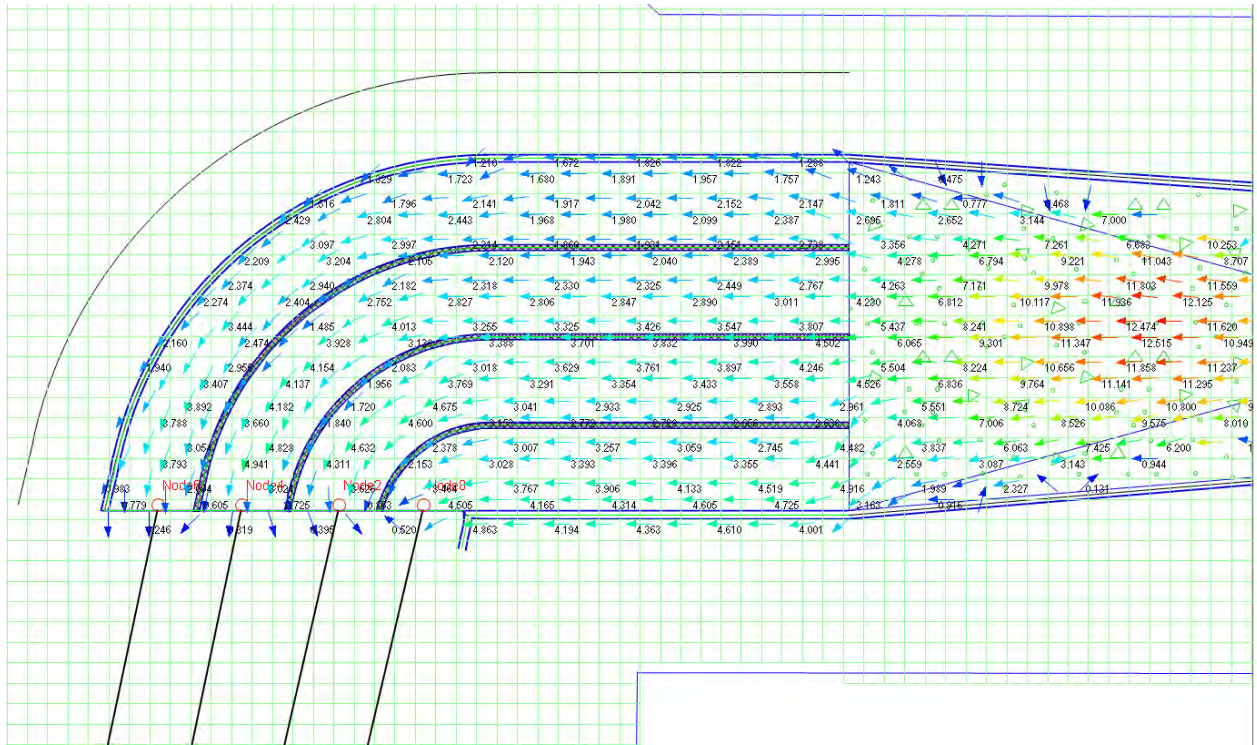
Flowrates: Flowlines defined in image below.

Alternatie	Line 2	Line 3	Line 4	Line 5
Base	94	103	106	100

Max Depth



Max Velocity





Appendix L: As-builts



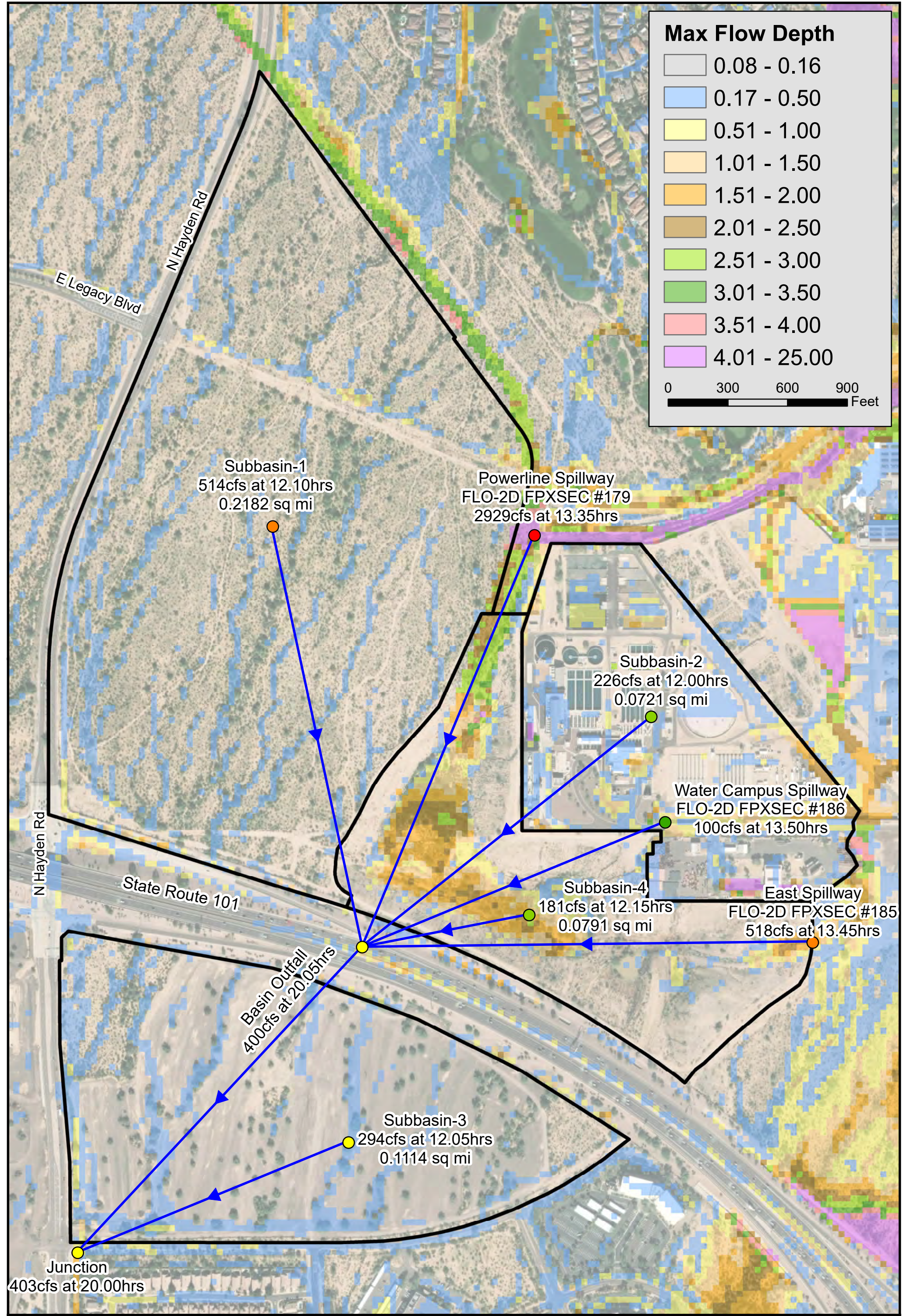
EXHIBITS

Exhibit 1: Soil Data

Exhibit 2: Land Use

Exhibit 3: Sub-basin Flow Paths

Exhibit 4: Developed Conditions Peak Discharge Exhibit



APPENDIX F – TY LIN INTERNATIONAL HEC-1 SCHEMATIC PHASE 1

Sub-basin ID	Sub-basin Area (acres)	Peak Discharge 100yr-24hr (cfs)
SB01	71.7	278
SB02	100.5	410
SB03	30.7	111
SB04	92.2	440
SB05	80.6	340
SB06	87.0	355
SB07	47.4	322
SB08	143.4	660
SB09	33.3	147
SB10	25.6	141
SB11	45.4	195

Concentration Point ID	Peak Discharge 100yr-24hr (cfs)
CP-1	276
CP-2	627
CP-3	720
CP-5	1,265
CP-6	1,466
CP-8	903
CP-9	985
BINFLO	3,884
CP-10	463
CP-11	463

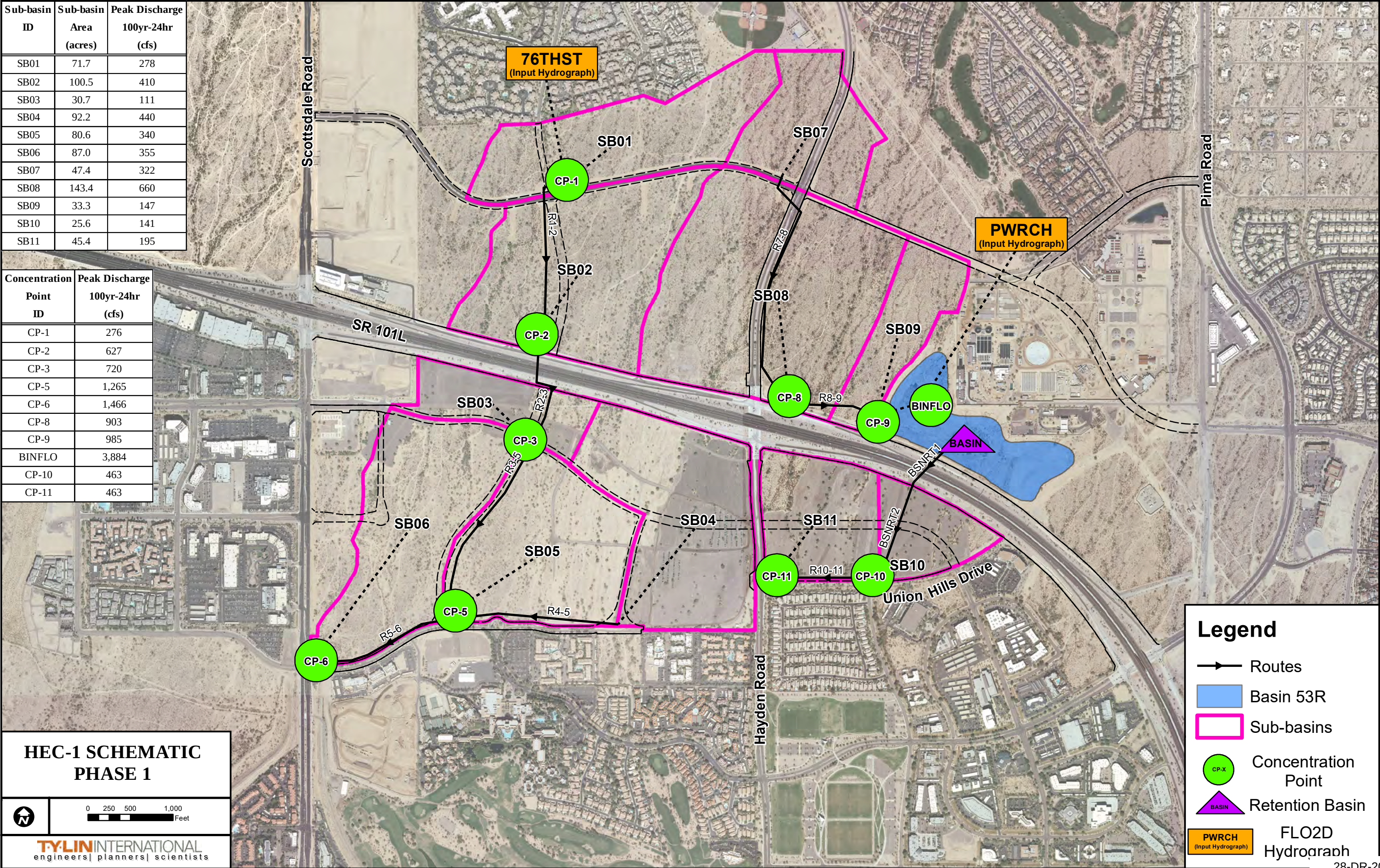
HEC-1 SCHEMATIC
PHASE 1

02505001,000
Feet

TYLIN

INTERNATIONAL

engineers | planners | scientists



Legend

Routes

Basin 53R

Sub-basins

CP-X

Concentration Point

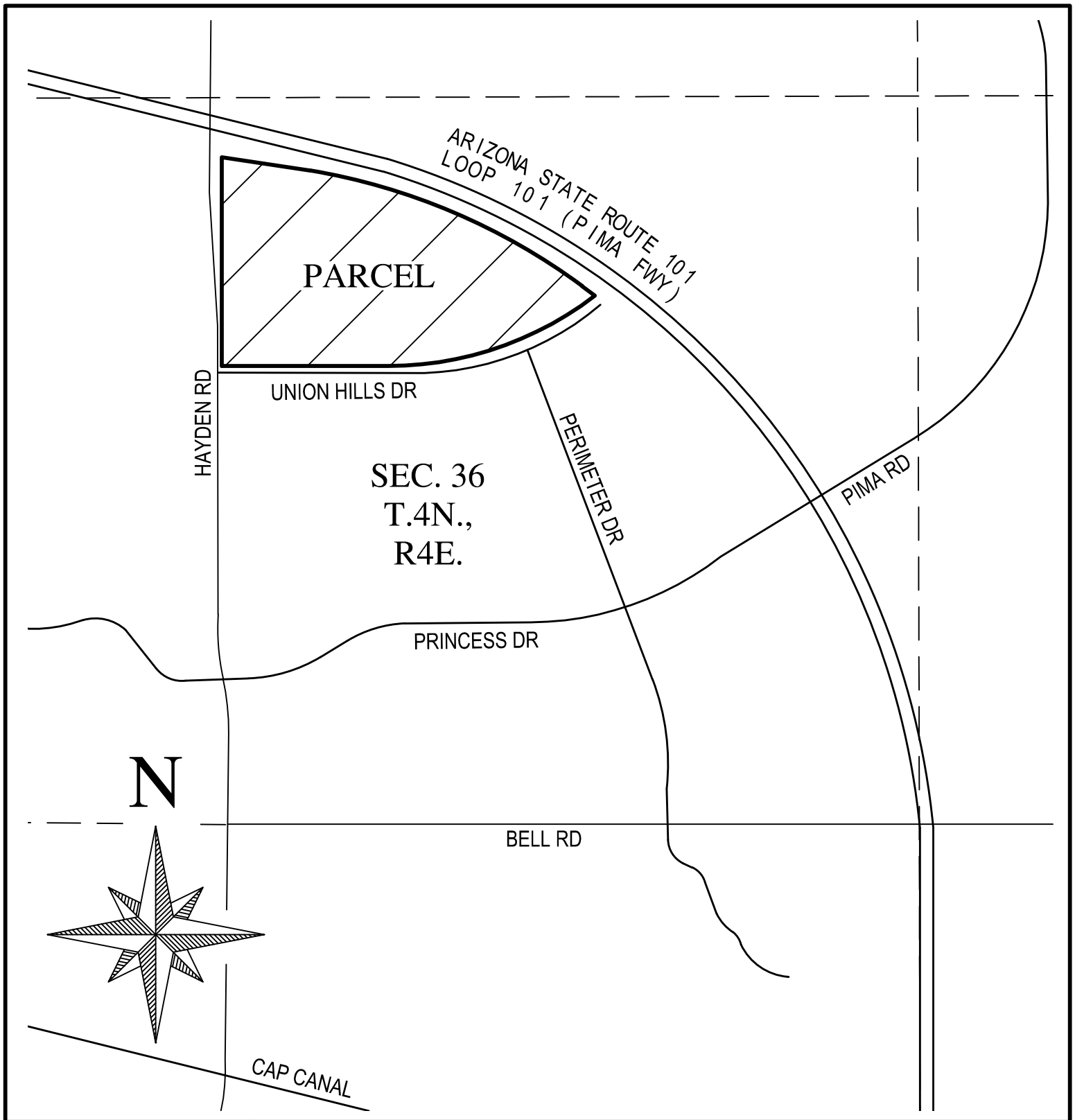
BASIN

Retention Basin

PWRCH (Input Hydrograph)

FLO2D Hydrograph

EXHIBIT 1 – VICINITY MAP

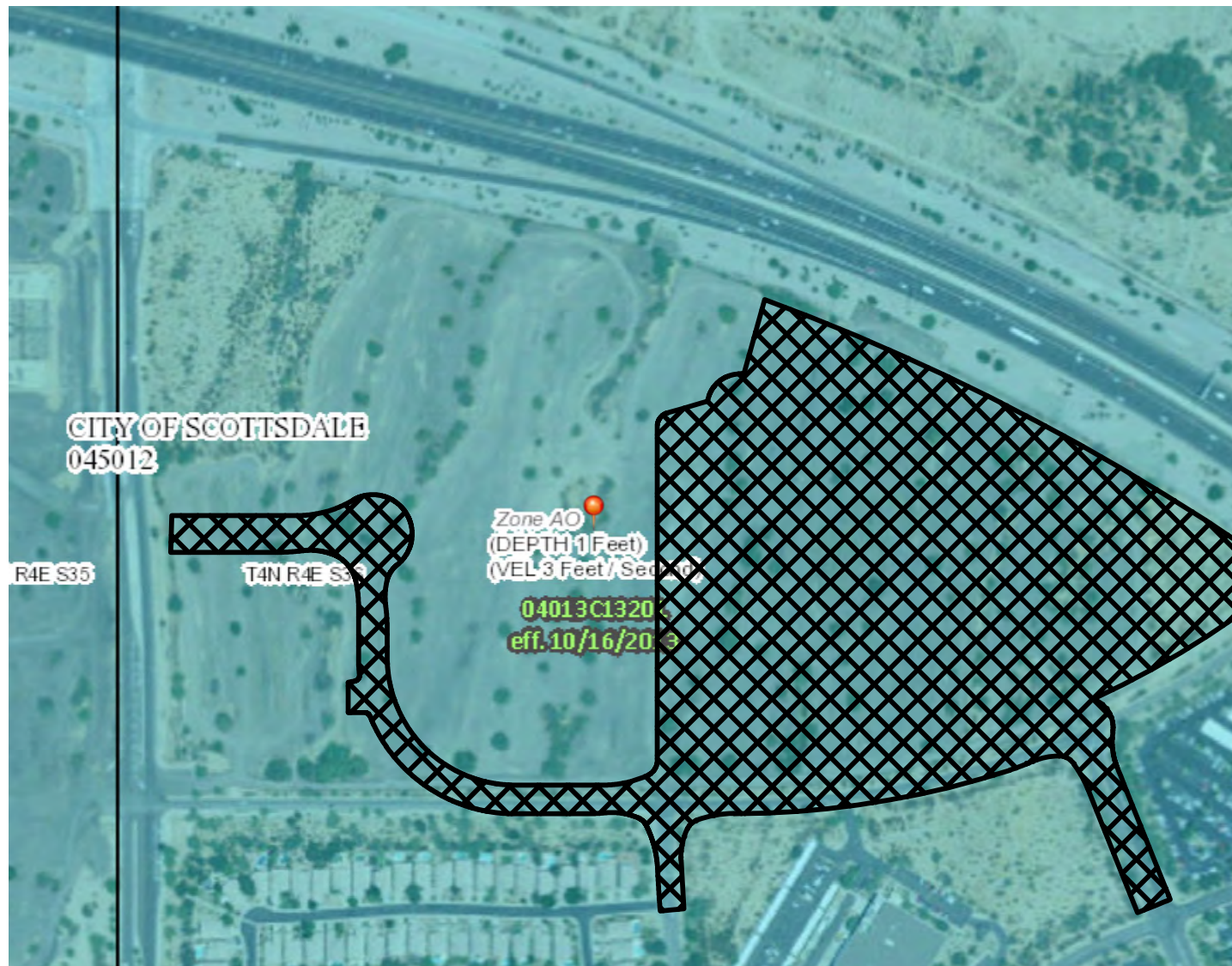


AXON

**VICINITY MAP - STATE PLATE NO. 16-B
CORE SOUTH TRACT 14A**

DATE	9/11/20	SCALE	1" = 1000'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	AF	CHECK	JB
		DRAWN	AF		

EXHIBIT 2 – FEMA FIRM



Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation 20.2 17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		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

PROJECT AREA

**NOT
FOR
CONSTRUCTION
OR RECORDING**

**WOOD
PATEL**

AXON

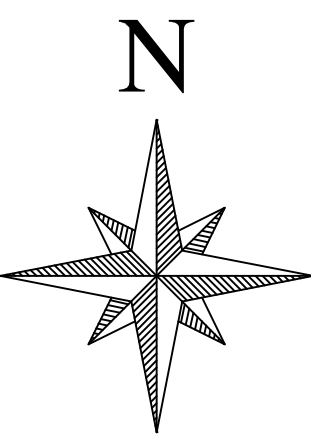
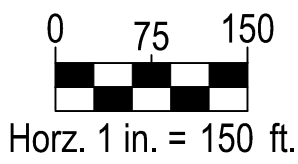
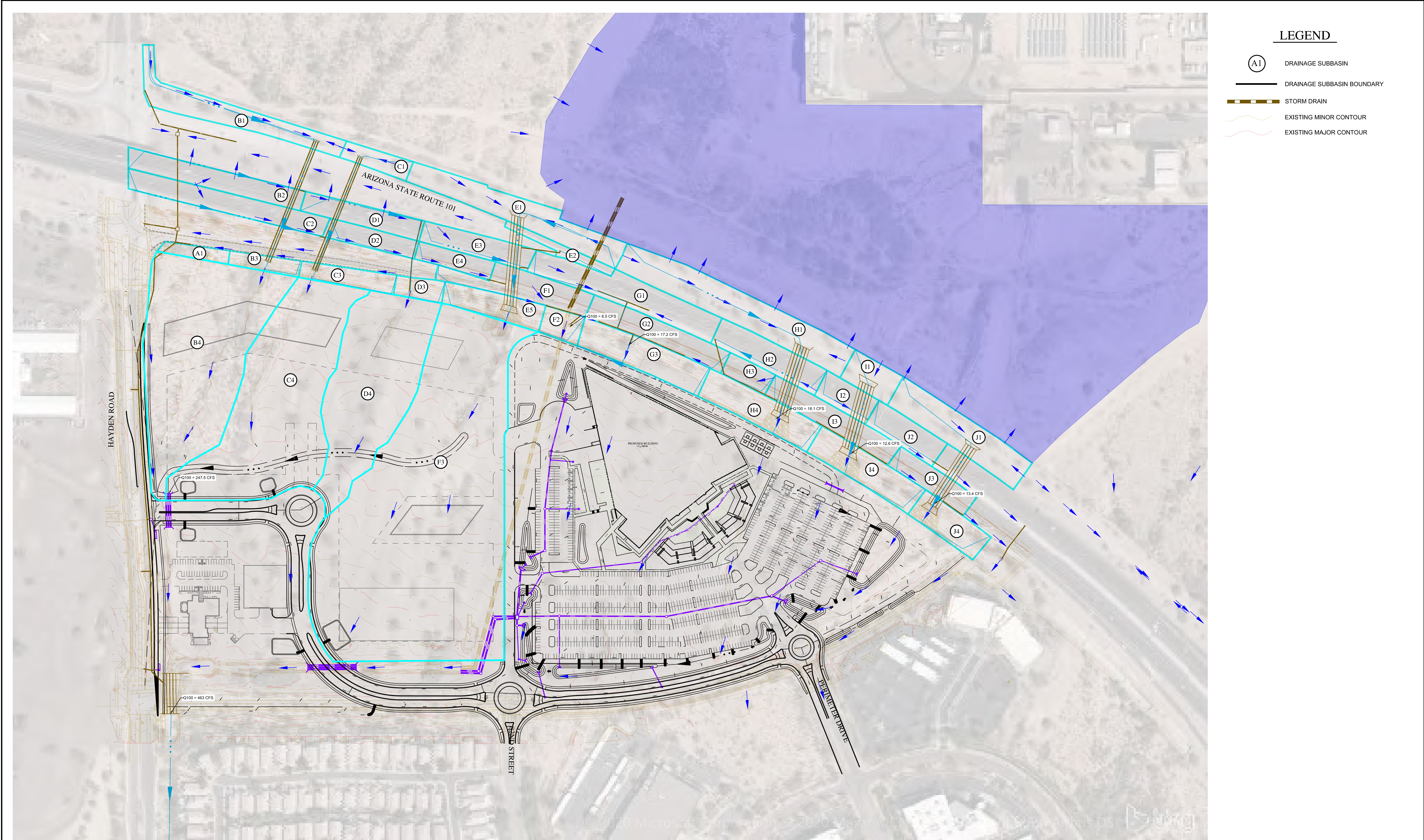
FEMO FIRM MAP

DATE	9-11-20	SCALE	N/A	SHEET	01 OF 01
JOB NO.	205133	DESIGN	AF	DRAWN	AF

Z:\2020\205133\Project Support\Reports\Drainage\Exhibits\5133-EXH2-FM.dwg

28-DR-2020
9/11/2020

EXHIBIT 3 – EXISTING DRAINAGE MAP



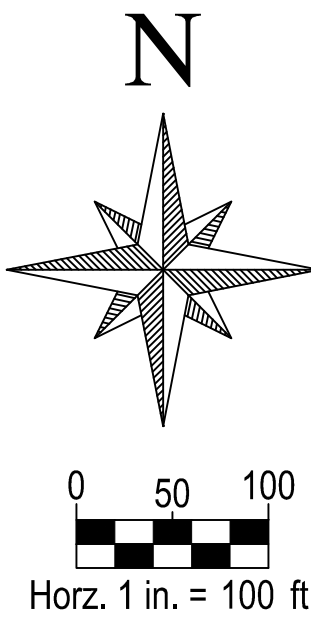
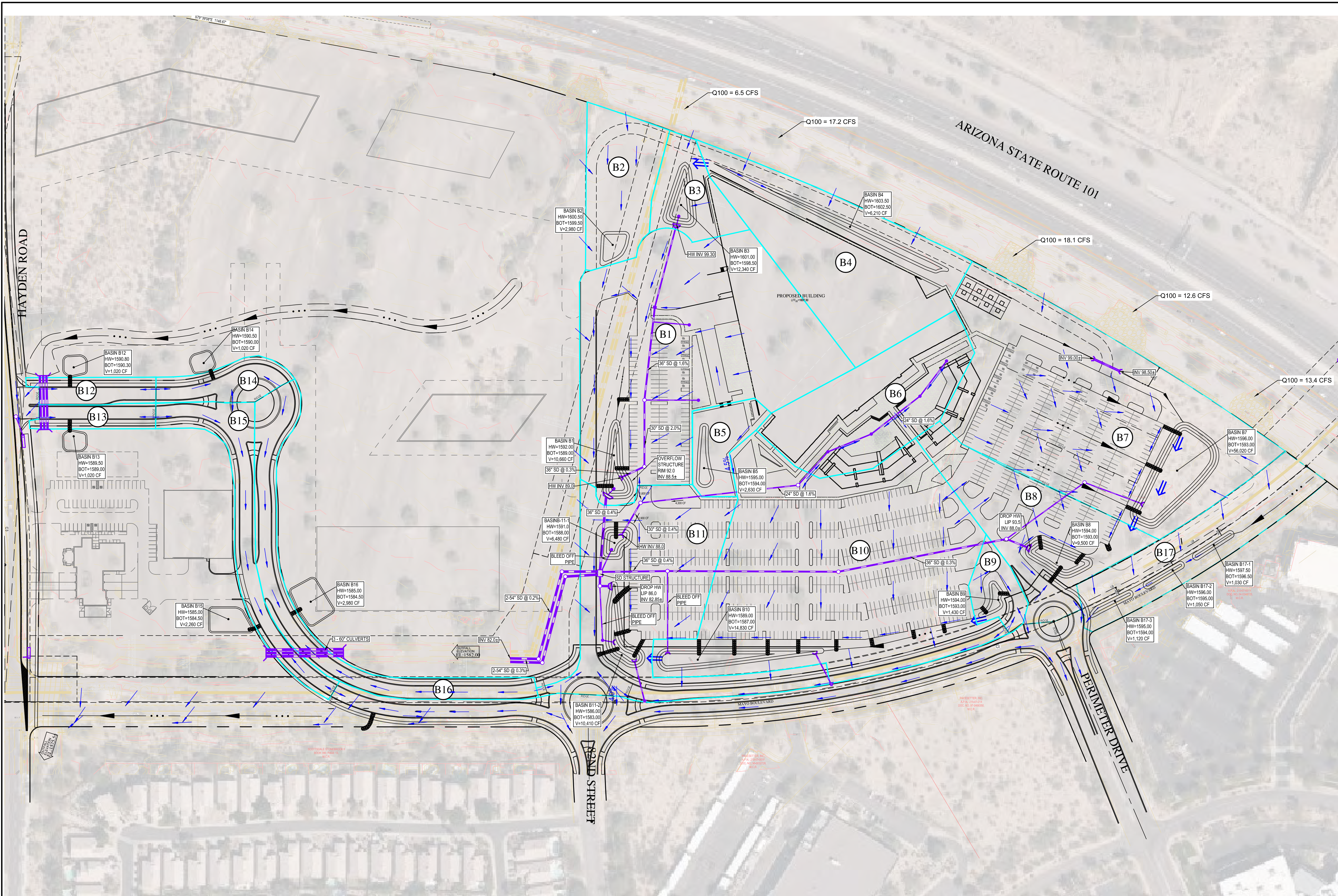
**NOT
FOR
CONSTRUCTION
OR RECORDING**



AXON			
OFFSITE DRAINAGE MAP			
DATE	09-11-20	SCALE	1" = 150'
JOB NO.	205133	DESIGN	JB/AF
		DRAWN	AF
SHEET 01 OF 01			

Z:\2020\205133\Project Support\Reports\Drainage\Exhibits\5133-EXH3-OFFDM.dwg

EXHIBIT 4 – PROPOSED DRAINAGE MAP



LEGEND

- (A1) DRAINAGE SUBBASIN
- DRAINAGE SUBBASIN BOUNDARY
- PROPOSED RETENTION BASIN
- STORM DRAIN
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR

**NOT
FOR
CONSTRUCTION
OR RECORDING**



AXON

PRELIMINARY DRAINAGE MAP

DATE	09-11-2020	SCALE	1" = 100'	SHEET	1 OF 1
JOB NO.	205133	DESIGN	JB	DRAWN	MP

Z:\2020\205133\Project Support\Reports\Drainage\Exhibits\5133-EXH4-ONDM.dwg

EXHIBIT 5 – CATCH BASIN INLET MAP

