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Subject: [EXTERNAL] PIRATE I/L Drainage Study

Maggie:

I have uploaded the drainage study for the project. You can find it on the sftp site under the folder 'Drainage Study'.

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HYDROLOGIC & HYDRAULIC EVALUATION

Construct Industrial Lead Track

Mesa, Arizona

MP 934.79 to MP 937.83 Phoenix Subdivision



Prepared for:

Union Pacific Railroad Company
Omaha, Nebraska

June 2022

Olsson Project No. 020-0927-C



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EXECUTIVE SUMMARY

Olsson has conducted a hydrologic and hydraulic evaluation for UPRR for the PIRATE Industrial Lead track on the Phoenix subdivision. The project site is situated in Maricopa County, AZ. The purpose of the evaluation was to make appropriate recommendations for ditches, culverts, and detention ponds associated with the proposed project improvements. Results of this investigation and recommendations for proposed drainage features are summarized below.

- The project area is located in Mesa, Arizona, south of the Phoenix-Mesa Gateway Airport. The project is generally bound by Germann Road on the south and Pecos Road on the north. S. Power Road is at the west end and Signal Butte is at the east end.
- Existing drainage is from east to west, primarily as overland flow. The project area west of Ellsworth Road will drain to the Rittenhouse Channel. The project area to the east of Ellsworth Road drains to the Ellsworth Channel. Rittenhouse Channel is described in more detail in the Final Conceptual Design Report for Rittenhouse Road Channel (Gannet Fleming 1993).
- Two detention ponds are proposed near the downstream end of the project, one adjacent to Sossaman Road, and the other south of Pecos Road. The detention ponds reduce peak runoff rates from the proposed Industrial Lead Track ditches to the Rittenhouse Channel, for ultimate development conditions.
- The Cubes industrial development is proposed between Crismon Road and Merrill Road, near the east end of the project area. Olsson coordinated with the design engineers for The Cubes project to appropriately size railroad drainage features in and around The Cubes development site. Hydrologic data from the approved Cubes development plan was used for analysis of UPRR drainage features in the vicinity (Stock & Associates 2022).
- Except for the drainage in the vicinity of The Cubes development, Olsson used the parameters from the HEC-1 model for the “Final Hydrology Report – Ellsworth Channel Relocation” provided by the Premier Engineering Corporation (PEC 2016).
- Drainage features are sized to handle ultimate development conditions and designed in accordance with the Drainage Policies and Standards for Maricopa County (Flood Control District of Maricopa County 2018), as well as UPRR hydraulic design standards.

1. INTRODUCTION

The Union Pacific Railroad Company (UPRR) is proposing to construct an Industrial Lead Track off the Phoenix Subdivision, located in Maricopa County, Arizona. UPRR's proposed track will provide a rail connection to existing and proposed industrial/commercial customers.

The purpose of the proposed project is to construct an Industrial Lead Track in compliance with UPRR's standard hydraulic design criteria and regulatory requirements including a "*no adverse impacts*" condition. The purpose is also to construct the Industrial Lead Track in compliance with the Flood Control District of Maricopa County drainage criteria and design standards. This report summarizes results of the hydrologic and hydraulic modeling and evaluations, resulting in drainage improvements including a proposed trackside ditch, structures under UPRR's track, detention ponds, and structures under public roads.

2. SITE DESCRIPTION

UPRR's proposed Industrial Lead Track will be located off the Phoenix Subdivision of the Tucson Division Service Unit in Maricopa County, Arizona. The Industrial Lead Track connection is located on a tangent section of Union Pacific Railroad (UPRR) track running generally in a northwest-southeast direction. The Industrial Lead Track will run generally west to east through the study area. More specifically, the Industrial Lead Track is centrally located at latitude 33.29073° N and longitude 111.63619° W. Refer to Figures 1 and 2, Hydrology Work Maps in Appendix A, for a depiction of the location and surrounding vicinity. The site is shown on USGS 7.5-Minute Topographic Quadrangle Map (USGS 1981).

Soils in the project area generally consist of loamy fine sand, fine sandy loam, and loam with small amounts of clay loam. Half the area soils are Hydrologic Soil Group (HSG) B, moderately high infiltration rates. A third of the soils are HSG A, with high infiltration rates. The remainder are HSG C, with moderately low infiltration rates. Refer to Figures 3 and 4, NRCS Soils Maps in Appendix A, for a depiction of area soils (USDA-NRCS 2019).

UPRR's proposed industrial Lead Track is located outside a FEMA mapped 100-year floodplain, Zone X, as shown on the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas (Map Number 04013 C 2770 L, revised date October 16, 2013). A copy of the FIRM is provided in Appendix B.

A photolog showing current conditions at the site (April 2019 site visit) is included in Appendix C of this report.

3. HYDROLOGY

The hydrology for the relevant drainage subbasins was studied for both the existing and proposed conditions. To understand the existing conditions, subbasin parameters were gathered and confirmed from the report previously prepared by Premier Engineering Corporation (now Olsson-owned) for the Phoenix-Mesa Gateway Airport and the City of Mesa, AZ, "Final Hydrology Report – Ellsworth Channel Relocation". Existing subbasin delineations were confirmed using LiDAR data available from the county. In the previous report, the hydrologic analysis was performed in HEC-1. HEC-1 is no longer widely used. In order to keep consistent calculation methods, HEC-HMS version 4.8, a successor to HEC-1 with a more user-friendly graphical interface, was selected as the computational engine for the proposed conditions modifications. Relevant subbasins were further refined and subdivided to provide accurate tributary areas and peak flows for sizing of the hydraulic structures. Loss methods for the subbasins were kept consistent with the previous study and confirmed using Green and Ampt method. Input parameters can be found in Figures 5 and 6 for existing conditions and Figures 7 and 8 for proposed conditions, Appendix A.

In accordance with MCFCD drainage criteria and design standards, the 100-year, 2-hour precipitation event was used to evaluate proposed detention ponds. The 100-year, 6-hour precipitation event was used to evaluate proposed ditches and conveyance structures. East of Ellsworth Road, the peak flows from the approved drainage study for the proposed Cubes development were used to design the proposed drainage features. Proposed channels, structures, and detention ponds were designed to accommodate runoff from the contributing subbasins for ultimate development conditions.

Upstream of Signal Butte Road

Existing Conditions:

East of Signal Butte Road and west of the existing industrial development a large, regional detention pond has been constructed to collect all the runoff from the contributing industrial areas. North of the existing industrial development, the runoff is conveyed as sheet flow or shallow surface flow from east to west, also draining to the existing detention pond.

Proposed Conditions:

East of Signal Butte Road, the proposed track embankment will cross the existing detention pond. East of Signal Butte Road, 3 @ 48" CMP culverts will equalize pond elevations across the track embankment. Further to the east, and north of the existing industrial development, 1 @ 48" CMP culvert will equalize pond elevations across the track embankment. The 100-year pond elevations will not be impacted by the proposed track embankment. Runoff discharged to the

existing regional detention pond will spread throughout the pond until it infiltrates. The existing pond will be expanded to offset fill required for the track embankment, as shown in the plans.

Signal Butte Road to Ellsworth Road

Existing Conditions:

Runoff east of Ellsworth Road generally drains from east to west, to the Ellsworth Channel, which then conveys runoff north. The subbasins east of Crismon Road drain west and north to Pecos Road, at the intersection with South Crismon Road. The runoff then flows north across Pecos Road, via an existing 24" CMP culvert, or over the road. On the north side of Pecos Road, runoff is conveyed west to the Ellsworth Channel. West of Crismon Road, runoff sheet flows west towards Ellsworth Road. At Ellsworth Road, runoff enters the Ellsworth Channel and is conveyed north.

Proposed Conditions:

East of Crismon Road, the proposed track will intercept runoff from the subbasins located south of the track, between the proposed track and Germann Road. East of Merrill Road, 4 @ 48" SSP culverts, depressed 1.5 feet, will drain runoff north, under the proposed track, to the existing irrigation return pond, located along the east side of Merrill Road, south of Pecos Road. The 100-year headwater elevation for the proposed culverts will be contained within the trackside ditch on the south side. Runoff from the irrigation return pond flows west in the roadside ditch, along the south side of Pecos Road, to the existing 24" CMP culvert at the intersection with Crismon Road.

An industrial development, The Cubes, is proposed between Crismon Road and Merrill Road. The proposed development includes a ditch to drain runoff north to the existing discharge location at the intersection of Pecos Road and South Crismon Road. At the proposed Industrial Track Lead crossing of The Cubes' proposed ditch, 3 @ 72" SSP culverts, depressed 1.5 feet, will convey the ditch flows north, under the proposed track.

West of Crismon Road, runoff from adjacent drainage areas does not flow onto the right-of-way for the proposed Industrial Lead Track. Trackside ditches will convey runoff from the proposed Industrial Track Lead right-of-way west, to the Ellsworth Channel. Ditches will be located on the north and south sides of the proposed track. In each ditch 1 @ 36" CMP culvert will be constructed at two locations. The downstream culverts in each ditch will stub into the east wingwall on the downstream (north) side of the Ellsworth Channel crossing. The upstream culverts will convey runoff west, under Crismon Road.

The proposed Industrial Lead Track crosses Ellsworth Channel east of Ellsworth Road, approximately 200 feet downstream of an existing access road crossing of the Ellsworth Channel and 250 feet upstream of the Ellsworth Road crossing of the Ellsworth Channel. At the access road crossing of the channel, 2 @ 10-ft x 6-ft culverts pass the flows. At the Ellsworth Road crossing, existing 2 @ 12-ft x 6-ft culverts pass the flows. Three @ 9-ft x 6-ft CBC culverts are proposed for the Industrial Lead Track crossing of the Ellsworth Channel. The triple box culverts will pass the 100-year design flows without increasing tailwater for the upstream access road crossing.

Ellsworth Road to Rittenhouse Channel

Existing Conditions:

Within the subbasins of this reach, runoff generally flows towards the west-northwest. In subbasin R19, where the primary track switch is located, flow is generally captured in an unnamed ditch just to the south of the Airport. This flow is then conveyed downstream to the Rittenhouse channel. Additionally, subbasins 20 and 24, add to flows captured at the intersection of Pecos Road and S Sossaman Road via undefined ditches along Pecos Road. This flow generally spills directly into Rittenhouse channel in subbasin 25.

Proposed Conditions:

For proposed conditions in this reach, overland flow south of the proposed track is captured within the ditch along the south side of the track and conveyed westward. Subbasin R19, was divided into 5 sections, one for the unaffected area north of the proposed Industrial Lead Track, and 4 subbasins to the south to determine accurate ditch flow loading calculations. Runoff from the subbasins to the south of the proposed Industrial Lead Track is conveyed west, within the ditch along the south side of the track, to 4 @ 72" CMP culverts, which divert runoff from the trackside ditch into the North Detention Pond. A berm will be constructed across the trackside ditch, downstream of the culverts. The top of berm elevation will be slightly lower than the channel bank. Excess flows that are not diverted to the culverts will overtop the berm and continue to flow downstream. This diversion structure will divert approximately 331 cfs (100-YR, 6-HR design storm) into the North Detention Pond, located east of Sossaman Road on the TCA Development, LLC Property. Approximately 101 cfs will flow in the south trackside ditch downstream of the bypass.

The North Detention Pond will detain a peak storage volume of 23.0 ac-ft of stormwater runoff, while draining the water quality capture volume over 40 hours. The peak inflow is 356 cfs and the tailwater will effectively limit peak discharge to 20 cfs. The North Detention Pond discharges back into the trackside ditch via 1 @ 48" CMP pipe, at the downstream end of the pond.

The segment of the trackside ditch downstream of the North Detention Pond intercepts runoff from subbasins R20 and R23 and drains the flows to the South Detention Pond, located on the Trio Forest Products, Inc. and Gilbert-Chandler Heights, LLC properties. An 8-ft x 6-ft CBC passes the flows under Sossaman Road. Another 8-ft x 6-ft CBC culvert drains flows from the trackside ditch, under the track lead and into the South Detention Pond, at the intersection of the proposed Industrial Track Lead and Pecos Road. An additional 10-ft x 8-ft CBC drains runoff from the southwest side of Pecos Road under the track lead and into the South Detention Pond.

The South Detention Pond will hold a peak volume of approximately 54.4 ac-ft for the 100-YR, 6-HR design storm. The peak inflow is 962 cfs and the peak discharge is 451 cfs. The South Detention Pond discharges into the Rittenhouse Channel via 2 @ 48" CMP culverts. Runoff also overtops the berm between the South Pond and the Rittenhouse Channel and discharges into the Rittenhouse Channel. The berm will be hard armored with riprap to protect from erosion or scour.

UPRR Phoenix Subdivision Main Track Adjacent to Rittenhouse Channel

Existing Conditions:

The proposed modifications to the Phoenix Sub Main Track are between UPRR STA 1482+25 to STA 1644+50. Existing culverts at UPRR STA 1492+36.56 and STA 1586+48.26 convey runoff from the south trackside ditch north under the track(s) to Rittenhouse Channel. One @ 36" RCP culvert at UPRR STA 1528+45 conveys runoff west under Sossaman Road, along the south trackside ditch.

Proposed Conditions:

The existing culverts under the UPRR main and siding tracks will be plugged and filled. New culverts will be constructed at UPRR STA 1506+00, STA 1535+00, and STA 1586+55. One @ 36" SSP culvert will be installed at each location by jacking and boring under the tracks. The culvert at STA 1535+00 will drain flows from a small area north of the Phoenix Sub Main Track to the trackside ditch on the south side. One @ 36" CMP culvert will be installed under Sossaman Road at UPRR STA 1528+45 to replace the existing culvert. The proposed culverts are not at the same location as the existing. Thus, the existing culverts were not evaluated. The proposed culverts were evaluated to ensure the proposed HGL is within the south trackside ditch for the 100-YR, 6-HR event.

Peak flows were established for the project area for existing and proposed conditions. The 100-year peak flow rates and runoff hydrographs were generated for the 6-hour design storms for both the detention pond and conveyance analyses. The results of the existing and proposed hydrologic analyses are summarized in Tables 1 and 2, below. Detention Pond stage-storage rating curves are provided in Tables 3 and 4, below. Hydrologic routing results for the diversion structure and the two proposed detention ponds are provided in Figures 1, 2, and 3, below.

Table 1: Existing Conditions Subbasin Results (100-YR, 6-HR)

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Volume (ac-ft)
E29A	0.126855	115	1.1
E29B	0.128471	125	1.3
E29C	0.004197	6	1.3
E29D	0.005347	6	1.2
E29E	0.005346	7	1.2
E29F	0.161177	150	1.2
E29G	0.354359	335	1.2
E29H	0.214054	210	1.3
E29I	0.015573	19	1.2
E31A	0.254911	216	1.1
E31B	0.008497	8	1.2
E31C	0.010512	10	1.2
E31D	0.487279	345	1.1
E32	0.247906	177	1
Ellsworth Channel	1.670125	928	1.1
R19A	0.673234	416	1

Table 1: Existing Conditions Subbasin Results (100-YR, 6-HR) Cont'd

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Volume (ac-ft)
R19B	0.024871	26	1.9
R19C	0.054444	61	1.8
R19D	0.282575	230	1
R19E	0.168503	115	1
R19F	0.31971	216	1
R20	0.497025	336	0.8
R23	0.494474	439	1.1
R24A	0.268765	226	1.2
R24B	0.026877	33	1.2
R25A	0.137877	158	1.3
R25B	0.012806	18	1.3
R25C	0.123741	141	1.3
Rittenhouse Outfall	1.969662	1147	1.1

Table 2: Proposed Conditions Subbasin Results (100-YR, 6-HR)

Hydrologic Element	Drainage Area (MI²)	Peak Discharge (CFS)	Volume (ac-ft)
Ellsworth Outfall	1.670125	924	100.1
E29A	0.126855	115	7.3
E29B	0.128471	125	8.8
E29C	0.004197	6	0.3
E29D	0.005347	6	0.3
E29E	0.005346	7	0.4
E29F	0.161177	150	10.5
E29G	0.354359	335	23.4
E29H	0.214054	210	14.3
E29I	0.015573	19	1
E31A	0.254911	216	14.4
E31B	0.008497	8	0.6
E31C	0.010512	10	0.7
E31D	0.487279	345	29
E32	0.247906	177	12.9
Diversion-1	0.505522	311	29.3
North Pond Outfall	0.530393	21	0.2

Table 2: Proposed Conditions Subbasin Results (100-YR, 6-HR) Cont'd

Hydrologic Element	Drainage Area (MI²)	Peak Discharge (CFS)	Volume (ac-ft)
R19A	0.673234	416	35.1
R19B	0.024871	26	2.5
R19C	0.054444	61	5.3
R19D	0.282575	230	14.7
R19E	0.168503	115	9.2
R19F	0.31971	216	16.7
R20	0.497025	336	21.7
R23	0.494474	439	30
R24A	0.268765	226	16.9
R24B	0.026877	33	1.7
R25A	0.137877	158	9.7
R25B	0.012806	18	0.9
R25C	0.123741	141	8.7
R30	0.0102	14	0.7
R31	0.0183	25	1.3
@32	0.0219	30	1.5
Rittenhouse Outfall	2.554509	931	99

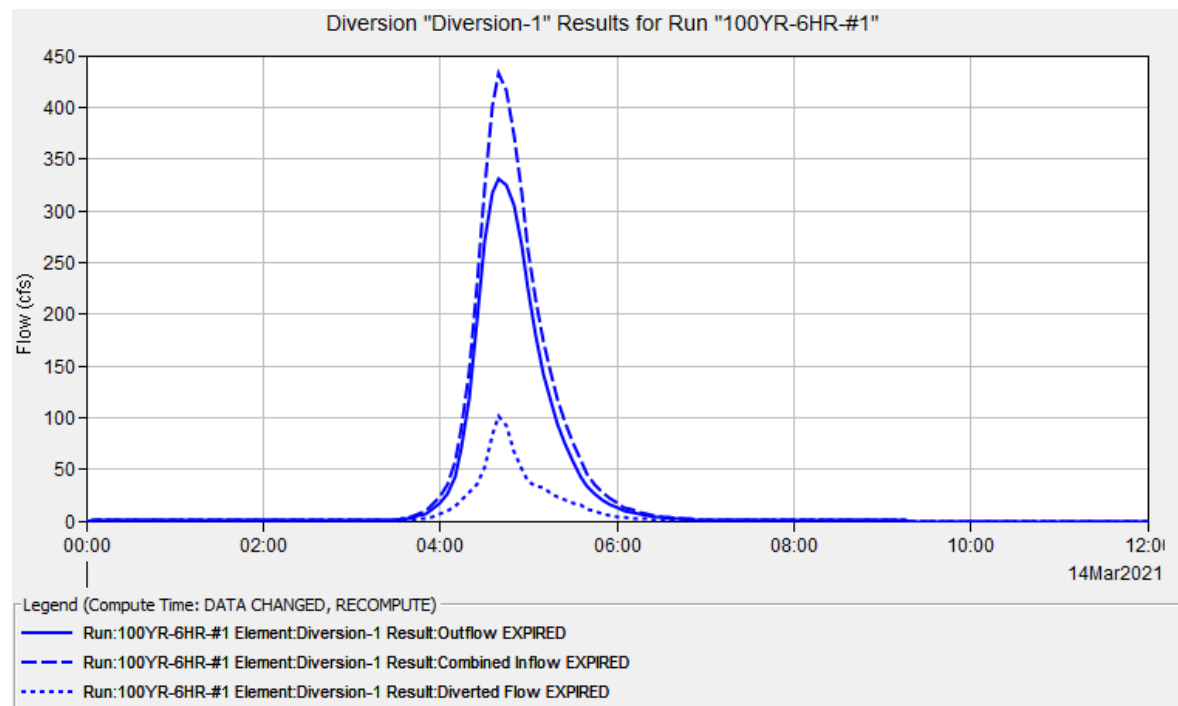


Figure 1: North Pond Diversion Structure Inflow and Outflow Hydrograph for the 100-YR Design Storm

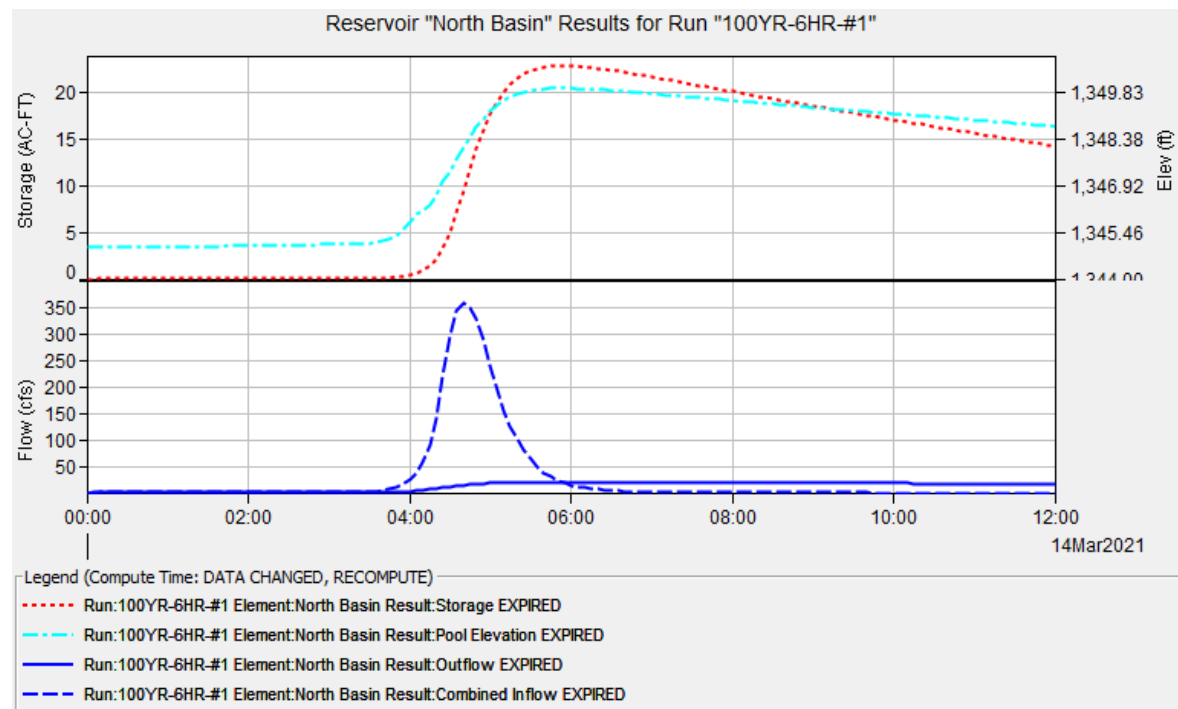


Figure 2: North Pond Hydrographs

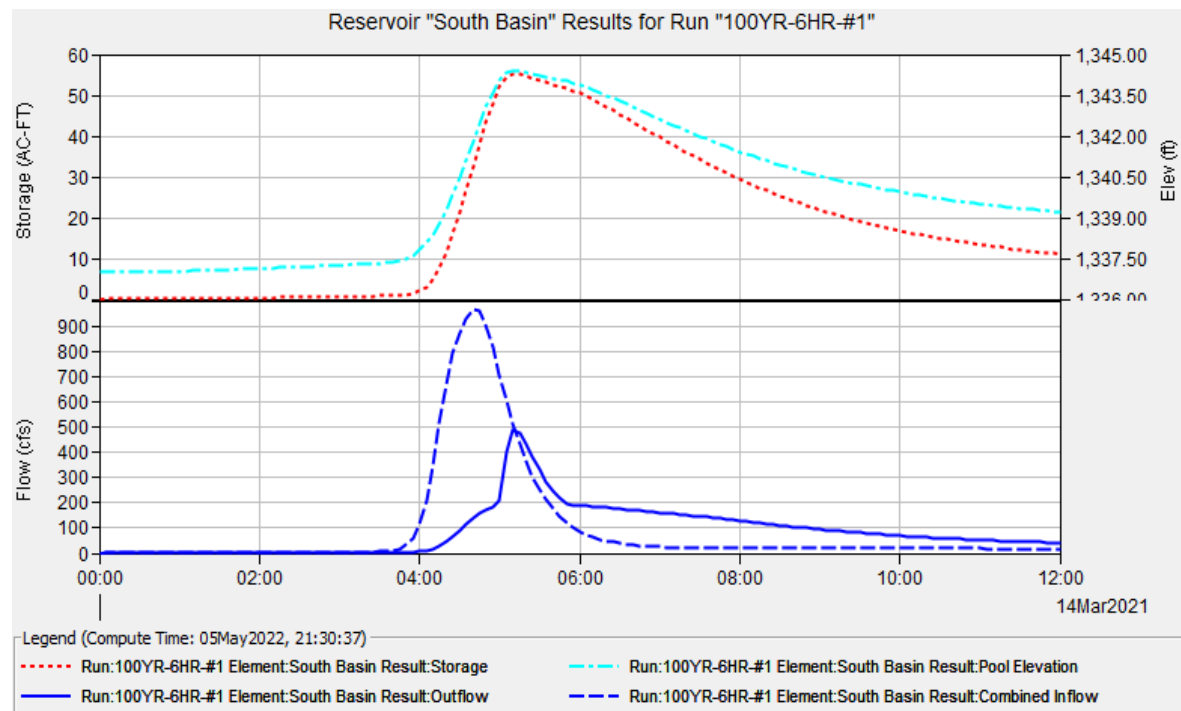


Figure 3: South Overflow Pond Hydrographs

Table 3: Stage-Storage North Detention Pond

Elevation	Area (acre)	Volume (ac-ft)
1345	0.1	0.1
1346	1.2	0.6
1347	4.1	3.1
1348	7.0	9.2
1349	7.3	16.0
1350	7.6	22.8
1351	7.9	31.0
1352	9.0	39.8

Table 4: Stage-Storage South Detention Pond

Elevation	Area (acre)	Volume (ac-ft)
1337	0.1	0.0
1338	6.3	3.0
1339	7.7	10.5
1340	8.1	17.0
1341	8.3	26.0
1342	8.6	34.0
1343	8.8	43.0
1344	9.0	51.0
1345	9.5	60.0
1346	10.0	69.0

4. HYDRAULICS

Trackside Ditches

The hydraulic modeling and analyses performed for this study were based on LiDAR and traditional survey of existing conditions for UPRR's PIRATE Industrial Lead Track project. Design information was compiled to represent plan and profile data along the track, the existing/proposed structure(s), and surrounding waterway sections. Olsson's survey was based on NAVD 1988 datum. Riprap will be placed along channel banks and at inlets and outlets of culverts, per MCFCD standards. See Appendix E for proposed structure inlet face schematics. Structure locations are provided in Appendix F.

This report includes the use of river stations and track stations. River Station and Track Station are not the same, although they are often close in value. River Station is distance along ditch or channel. Track Station is distance along railroad track. River Station is provided as a plain number, such as 15600. Track Station is provided as stationing, such as 157+22.

South Trackside Ditch Main Track to Rittenhouse Channel

The hydrology for the area west of Ellsworth Road was studied for future conditions with a trackside ditch along the geographic south side of the Phoenix Sub main track. Runoff to the trackside ditch is from the railroad property. The drainage area for the proposed culvert at UPRR STA 1535+00 is extremely small. Thus, the culvert was not hydraulically analyzed. The peak discharges were computed based on a fully developed watershed, as required by the local floodplain regulations. HEC-HMS was used to compute peak flows, which are summarized in the tables above. The structures and design flows are listed in Table 5 below.

Table 5: South Trackside Ditch Main Track Hydraulic Summary

UPRR Track Station	Location	Drainage Area	Q ₁₀₀	Proposed Structure
1506+00	Drains to Wye	0.0285 mi ²	39	1 @ 36" SSP
1586+55	West of Ellsworth	0.0219 mi ²	30	1 @ 36" SSP
1528+45*	Under Sossaman Road	0.0023 mi ²	25	1 @ 36" CMP

*Culvert is under Sossaman Road, not the railroad, conveys flows from east to west under Sossaman Road in south trackside ditch of Phoenix Sub Main Track.

Table 6: South Trackside Ditch Main Track Hydraulic Computation Output Summary

UPRR Track Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	$\Delta WSE_{100} - \text{Crown}$	$\Delta EGL_{100} - \text{Sub-grade}$	Top Ditch Elevation
1506+00	1351.4	1348.3	1349.13	+0.36	-2.27	1349.5
1586+55	1376.5	1372.8	1373.41	-0.13	-3.09	1373.0
1528+45*	1358.1	1354.3	1354.58	--0.27	-3.52	1354.5

*Culvert is under Sossaman Road, not the railroad, conveys flows from east to west under Sossaman Road in south trackside ditch of Phoenix Sub Main Track.

Rittenhouse Channel to Ellsworth Road

The hydrology for the area west of Ellsworth Road was studied for future conditions with a trackside ditch along the geographic south side of the track. Runoff approaches the track as sheet flow from an agricultural area south of the future track. The peak discharges were computed based on a fully developed watershed, as required by the local floodplain regulations. HEC-HMS was used to compute peak flows, which are summarized in the tables above. The structures and design flows are listed in Table 7 below.

Table 7: South Trackside Ditch Hydraulic Summary

UPRR Track Station	Location	Drainage Area	Q ₁₀₀	Proposed Structure
5+00	Outlet South Detention	1.97 mi ²	451 cfs **	2 @ 48" CMP
19+35	Wye Track	1.12 mi ²	605 cfs	1 @ 10' x 8' CBC
20+00	Inlet South Detention	1.97 mi ²	962 cfs	54.4 ac-ft Storage
26+00	Pecos Road	0.85 mi ²	310 cfs	1 @ 8' x 6' CBC
38+47	Sossaman Road	0.83 mi ²	312 cfs	1 @ 8' x 6' CBC
41+40	Downstream Diversion	0.83 mi ²	101 cfs	2 @ 18" CMP
56+10	Upstream Diversion	0.83 mi ²	432 cfs	4 @ 72" CMPs
65+00	Ditch	0.45 mi ²	377 cfs	2:1; BW=10'; 4' deep
122+00	Ditch	0.17 mi ²	191 cfs	2:1; BW=10'; 4' deep

* Weir 300' long; Elev. 1343.0; depth 0.2' height.

** Includes overtopping of armored berm between pond and channel

UPRR's proposed trackside ditch from UPRR STA 0+00 (Rittenhouse Channel) to STA 158+00 (Ellsworth Road), was designed to accommodate the 100-year flow from the Industrial Track Lead project area, ultimately discharging into Rittenhouse Channel similar to the existing condition. Table 8 below summarized the proposed culverts and typical trackside ditches:

Table 8: South Trackside Ditch Hydraulic Computation Output Summary

UPRR Track Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	ΔWSE_{100} - Crown	ΔEGL_{100} - Sub-grade	Top Ditch Elevation
19+35	1352.80 (1350.80)	1348.90	1349.10	+0.19	-1.70	1349.00
26+00	1352.47 (1350.47)	1347.90	1348.04	+0.09	-2.43	1350.00
38+47	1354.90 (1352.90)	1350.00	1350.17	+0.13	-2.73	1352.00
56+10	1360.22 (1358.22)	1354.00	1351.22	-3.08	-7.00	1352.40

Ellsworth Road to Signal Butte Road

The hydrology for the area east of Ellsworth Road was studied for future conditions with flow accommodated via a trackside ditch to generally from geographic east to west. Runoff approaches the track as sheet flow from an agricultural area southeast of the future tracks. As recommended by the local floodplain permitting requirements, peak discharges were computed based on a fully developed watershed. Drainage areas were delineated from LiDAR and HEC-HMS was used to compute peak flows.

UPRR's proposed trackside ditch from UPRR STA 158+00 (Ellsworth Road) to STA 261+00 (Signal Butte Road), was designed such that it will fully contain the 100-year flow within the trackside ditch, ultimately discharging into Ellsworth Channel similar to the existing conditions. The hydraulic modeling and analyses performed for this study were based on LiDAR and topographic survey of existing conditions within UPRR's project limits. Design information was compiled to represent plan and profile data along the track, the existing/proposed structure(s) and surrounding waterway sections. There are several proposed culvert crossings to accommodate the future track work. Table 9 and Table 10 below summarize the hydrology, proposed structure sizes, and typical trackside ditches:

Table 9: North Trackside Ditch Summary

UPRR Track Station	Location	Drainage Area	Q₁₀₀	Proposed Structure	Typical Ditch Section
158+00	Ellsworth Channel	8.1 acres	13 cfs	1 @ 36" CMP	2:1; BW=10'; 3-4' deep
209+00	Crismon Road	2.7 acres	6 cfs	1 @ 36" CMP	2:1; BW=10'; 3-4' deep

Table 10: South Trackside Ditch Summary

UPRR Track Station	Location	Drainage Area	Q₁₀₀	Proposed Structure	Typical Ditch Section
158+00	Ellsworth Channel	10 acres	16 cfs	1 @ 36" CMP	2:1; BW=10'; 3'-4' deep
209+12	Crismon Road	3.4 acres	7 cfs	1 @ 36" CMP	2:1; BW=10'; 4'-5' deep
222+00	The Cubes	95 acres	195 cfs	3 @ 72" SSPs**	2:1; BW=12'; 5'-6' deep
236+00	Merrill Road	115 acres	134 cfs	4 @ 48" SSPs*	

*Culverts drain local runoff across lead track north into irrigation return pond. 48" pipes are buried 1.5 ft.

**72" pipes are buried 1.5 ft.

Table 11 below summarizes the Post Project Water Surface Elevations (WSE) and Energy Grade Lines (EGL) in relation to culvert crown and track subgrade along the north trackside ditch. Table 12 provides the same information for the south trackside ditch.

Table 11: North Trackside Structure Summary

UPRR Structure Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	ΔWSE_{100} - Crown	ΔEGL_{100} - Sub-grade	Top Ditch Elevation
158+00	1392.85 (1390.85)	1389.50	1388.60	-0.90*	-2.25	1390.00
209+12	1406.90 (1404.90)	1404.00	1402.17	-1.84*	-2.73	1404.00

* Although the 50-year is not reported in the table, the WSE100 is below the crown, meeting UPRR's 50-year criteria.

Table 12: South Trackside Structure Summary

UPRR Structure Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	ΔWSE_{100} - Crown	ΔEGL_{100} - Sub-grade	Top Ditch Elevation
158+00	1392.85 (1390.85)	1389.50	1388.78	-0.72*	-2.07	1390.00
209+12	1406.90 (1404.90)	1403.18	1401.54	-1.64*	-3.36	1405.00
222+00	1413.80 (1411.80)	1409.74	1409.44	-0.43	-2.36	1409.00
236+00	1416.70 (1414.70)	1412.60	1412.64	+0.03*	-2.06	1413.00

* Although the 50-year is not reported in the table, the WSE100 is below the crown, meeting UPRR's 50-year criteria.

East of Signal Butte Road

The proposed PIRATE Industrial Lead Track crosses through the existing regional detention pond between UPRR STA 263+00 and STA 270+00 and again between UPRR STA 275+00 and STA 284+00. An industrial area is located along the south side of the proposed track.

Runoff approaches the track from the area south of the future tracks. There are two proposed culvert crossings to accommodate the future track work and equalize pond water surface elevations in the existing detention pond. Three @ 48" CMP culverts are proposed at UPRR STA 268+00. One @ 48" CMP is proposed at UPRR STA 278+00. The culverts will be placed at the bottom elevation of the detention pond. The large culverts have adequate capacity to equalize the pond elevations across the proposed PIRATE Industrial Lead Track and hydraulic modeling was not performed.

Ellsworth Channel

The hydraulic analysis for Ellsworth Channel was based on the Ellsworth Channel steady flow HEC-RAS 3.1.2 model developed as part of the City of Mesa Ellsworth Channel Relocation project. The 100-year design discharge of 600 cfs was taken directly from the model.

The geometry file titled “Ellsworth Existing” represents the existing channel geometry of Ellsworth Channel. UPRR is proposing to construct a new crossing immediately upstream of Ellsworth Road to accommodate a future track. The post project geometry “Ellsworth _PostProject” incorporates the existing geometry and UPRR’s proposed structure crossing Ellsworth Channel.

The proposed structure located at UPRR STA 157+22 is between existing HEC-RAS River Station 15600 and 15800. To accommodate the new crossing, two new HEC-RAS cross sections were added to the model, at River Stations 15685.15 and 15731.15, with the UPRR culvert located at River Station 15708.15. The proposed structure was designed such that it minimizes increases in backwater, consisting of 3 @ 9.0-ft x 6.0-ft, CBCs. The proposed culverts will have an opening area of 162 ft². The computed outlet velocity for the 100-year runoff events is 5.30 ft/s. The inlet and outlet elevations will be 1383.40 and 1383.30. The proposed culverts will have a minimum of 3.5 ft of cover height. The proposed culvert’s base of rail elevation is 1392.90 (subgrade elevation is 1390.90) and the inlet crown elevation is 1389.40. Table 13 below summarizes the computed elevations for the proposed CBC in the Ellsworth Channel.

Table 13: Proposed CBC along Ellsworth Channel

UPRR Track Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	ΔWSE_{100} – Crown	ΔEGL_{100} - Subgrade	Top Ditch Elevation
157+22	1392.85 (1390.85)	1389.35	1388.58	-1.04*	-2.27	1391.20

* Although the 50-year is not reported in the table, the EGL₁₀₀ is below the crown, meeting UPRR’s 50-year criteria.

Although computed outlet velocities associated with the rare flood event do not warrant scour protection measures, a 15-ft long, Class I (9” – 14” diameter) rock riprap apron is recommended at the outlet.

The proposed culverts meet UPRR’s standard hydraulic design criteria for both the 50-year (WSE_{50} below low chord) and for the 100-year (EGL₁₀₀ below base of rail) runoff events. As noted previously, although the 50-year is not reported in the table, the EGL₁₀₀ is below the

crown, therefore the UPRR's 50-year hydraulic design criteria (WSE below crown) is met. Table 14 below summarizes the computed water surface elevations in the Ellsworth Channel.

Table 14: 100-yr WSE Summary – Ellsworth Channel

HEC-RAS River Station	WSE ₁₀₀ Existing	WSE ₁₀₀ Post Project	Δ WSE _{EX - PP}	Top of Bank	WSE _{100, PP} - Top of Bank (Freeboard)
15870.67	1388.39	1388.40	+0.01	1392.00	-3.6
15855.5	1388.59	1388.60	+0.01	1391.29	2.7
15845.5	1388.60	1388.61	+0.01	1391.28	-2.7
15826.6	1388.47	1388.48	+0.01	1391.27	-2.8
15809	1388.43	1388.44	+0.01	1391.27	-2.8
15800	1388.41	1388.43	+0.01	1391.26	-2.8
15731.15*	---	1388.31*	---	1391.21	-2.9
15708.15*	UPRR STA 157+22: 3 @ 9' x 6' CBC				
15685.15*	---	1388.10*	---	1391.19	-3.2
15600	1387.90	1387.90	0.00	1391.14	-3.2
15550	1387.66	1387.66	0.00	1391.11	-3.5
15460	1386.14	1386.14	0.00	1390.99	-4.9
15450	1386.45	1386.45	0.00	1390.09	-3.6

* Cross Sections added to model to accommodate new box culvert.

Rittenhouse Channel

The hydraulic analysis was based on utilizing the Rittenhouse Channel steady flow HEC-2 model, converting to HEC-RAS 5.0.7, and adjusting elevations from NGVD 1929 to NAVD 1988. The 100-year design discharge of 804 cfs is taken directly from the model.

The existing geometry titled "Rittenhouse_Existing" represents the existing channel geometry of Rittenhouse. UPRR is proposing to construct two new Rittenhouse channel crossings south of Pecos Road to accommodate future wye tracks. The location of the proposed crossings was designed such that it does not conflict with the existing concrete grade control structures. The post project geometry "Rittenhouse_PostProject" incorporates the existing geometry and UPRR's proposed structures crossing Rittenhouse Channel.

The proposed structure located at UPRR STA 7+92 is between existing HEC-RAS River Stations (not the same as UPRR Track Station) 7500 and 7900. To accommodate the new crossing, two new cross sections were added to the model at HEC-RAS River Stations 7601 and 7745, with the UPRR culvert located at River Station 7673. The proposed structure was

designed to minimize increases in backwater, consisting of 3 @ 12.0-ft x 8.0-ft, CBCs. The proposed culverts will have an opening area of 288 ft². The computed outlet velocity for the 100-year runoff events is 3.67 ft/s. The inlet and outlet elevations should be 1335.20 and 1335.10. The proposed culverts will have a minimum of 2.5 ft of cover height. The proposed culvert's base of rail elevation is 1347.70 (subgrade elevation is 1345.70) and the inlet crown elevation is 1343.20.

The proposed structure located at UPRR STA 7+88 is between existing HEC-RAS River Station 7981 and 8900. To accommodate the new crossing, two new cross sections were added to the model at River Stations 8379 and 8523, with the UPRR culvert located at HEC-RAS River Station 8451. The proposed structure was designed to minimize increases in backwater, consisting of 3 @ 12.0-ft x 8.0-ft, CBCs. The proposed culverts will have an opening area of 288 ft². The computed outlet velocity for the 100-year runoff events is 3.68 ft/s. The inlet and outlet elevations will be 1338.60 and 1338.50. The proposed culverts will have a minimum of 2.9 ft of cover height. The proposed culvert's base of rail elevation is 1351.50 (subgrade elevation is 1349.50) and the inlet crown elevation is 1346.60. Table 15 below summarizes the computed water surface elevations for the proposed CBC in the Rittenhouse Channel.

Table 15: Proposed CBC Crossings along Rittenhouse Channel

UPRR Track Station	Base of Rail (Subgrade)	Inlet Crown Elev.	EGL ₁₀₀	$\Delta WSE_{100} - \text{Crown}$	$\Delta EGL_{100} - \text{Sub-grade}$	Top Ditch Elevation
7+92	1348.59 (1346.59)	1343.24	1341.58	-1.84*	-5.01	1342.64
7+88	1350.90 (1348.90)	1346.64	1344.94	-1.88*	-3.96	1346.00

* Although the 50-year is not reported in the table, the EGL₁₀₀ is below the crown, meeting UPRR's 50-year criteria.

Although computed outlet velocities associated with the rare flood event do not warrant scour protection measures, a 15-ft long, Class I (9" – 14" diameter) rock riprap apron is recommended at the outlet.

The proposed culverts meet UPRR's standard hydraulic design criteria for both the 50-year (WSE_{50} below low chord) and for the 100-year (EGL₁₀₀ below base of rail) runoff events. As noted previously, although the 50-year is not reported in the table, the EGL₁₀₀ is below the crown, therefore the UPRR's 50-year hydraulic design criteria (WSE below crown) is met. Table 16 below summarizes the computed water surface elevations in the Rittenhouse Channel.

Table 16: 100-yr WSE Summary – Rittenhouse Channel

HEC-RAS River Station	WSE ₁₀₀ Existing	WSE ₁₀₀ Post Project	ΔWSE_{EX-PP}	Top of Bank	$\Delta \text{Top of Bank}_{-PP}$
8959	1345.02	1345.07	+0.05	1349.25	-4.18
8910	1344.98	1345.04	+0.06	1346.23	-1.19
8900	1344.93	1344.99	+0.06	1346.22	-1.23
8523*	---	1344.76	---		
8451	UPRR STA 7+88: 3 @ 12' x 8' CBC				
8379*	---	1344.63	---		
7981	1344.51	1344.50	-0.01	1345.76	-1.26
7980	1344.51	1344.50	+0.01	1345.76	-1.26
7960	1342.14	1342.16	+0.02	1345.75	-3.59
7959	1341.52	1341.61	+0.09	1345.75	-4.14
7910	1341.49	1341.58	+0.09	1342.73	-1.15
7900	1341.43	1341.53	+0.10	1342.72	-1.19
7745*	---	1341.40	---		

Table 16: 100-yr WSE Summary – Rittenhouse Channel (Cont'd)

7673	UPRR STA 7+92: 3 @ 12' x 8' CBC				
7601*	---	1341.26	---		
7500	1341.25	1341.25	0.00	1342.52	-1.27
7121	1341.08	1341.08	0.00	1342.33	-1.25
7120	1341.08	1341.08	0.00	1342.33	-1.25

* Cross Sections added to model to accommodate the new box culverts.

Summary of Discharges

HMS results provide a comparison of total discharge from the project area to the Rittenhouse and Ellsworth channels. Discharges to the channels, from the project area will not increase for proposed conditions.

Table 17: Computed Peak Flows from Project Area (cfs)

HEC-HMS Location	Description	Existing	Proposed
Sink-1	Total Discharge from West of Ellsworth Road	1,807	864
Reach-6	Flows from north side of area, west of Ellsworth Road (for proposed conditions, area north of Industrial Lead Track)	963	633
South Basin	Discharge from South Detention Pond to Rittenhouse Channel	665	453
Ellsworth Channel	Total Discharge to Ellsworth Channel	928	924

5. REFERENCES

Flood Control District of Maricopa County. *Drainage Policies and Standards for Maricopa County, AZ.*, (August 2018). [Drainage-Policies-and-Standards-Manual-for-Maricopa-County---revised-82218-PDF](#)

Gannet Fleming, Inc., *Final Conceptual Design Report for Rittenhouse Road Channel from Signal Butte Road to the East Maricopa Floodway*. August 1993.

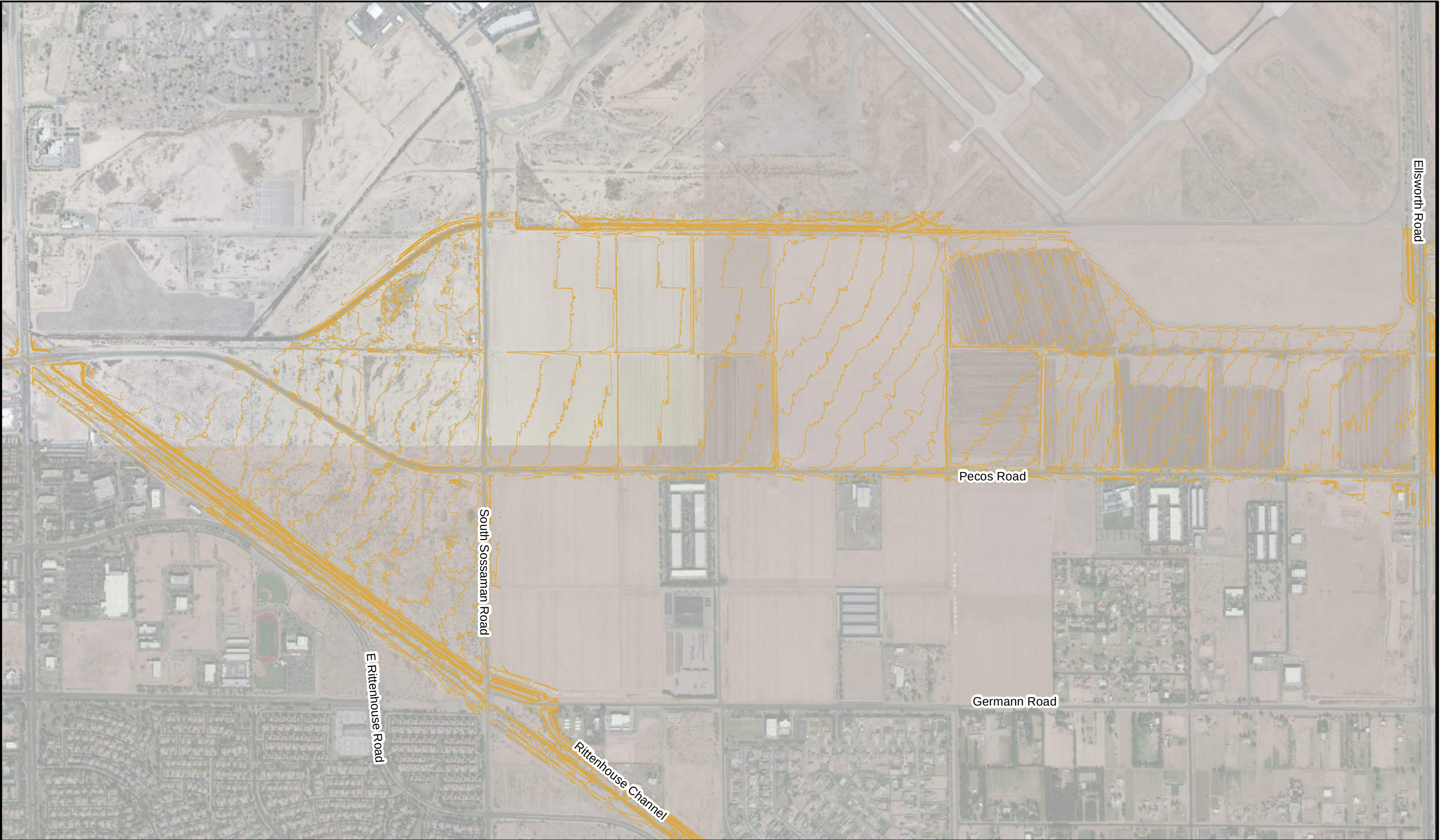
Premier Engineering Corp., *Final Hydrology Report – Ellsworth Channel Relocation*. April 2016.

Stock & Associates Consulting Engineers, Inc, *Offsite Drainage Report: Infrastructure Improvements at The Cubes at Mesa Gateway, Mesa, Arizona*, Revised January 17, 2022.

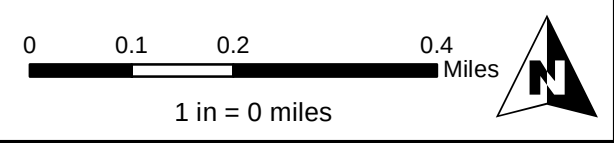
USDA-NRCS *Web Soil Survey*. July 31, 2019. [Web Soil Survey - Home \(usda.gov\)](#)

USGS *7.5-minute Topographic Quadrangle Map. Higley, AZ and Desert Well, AZ*. 1956 – Photo revised 1981.

Appendix A - Figures



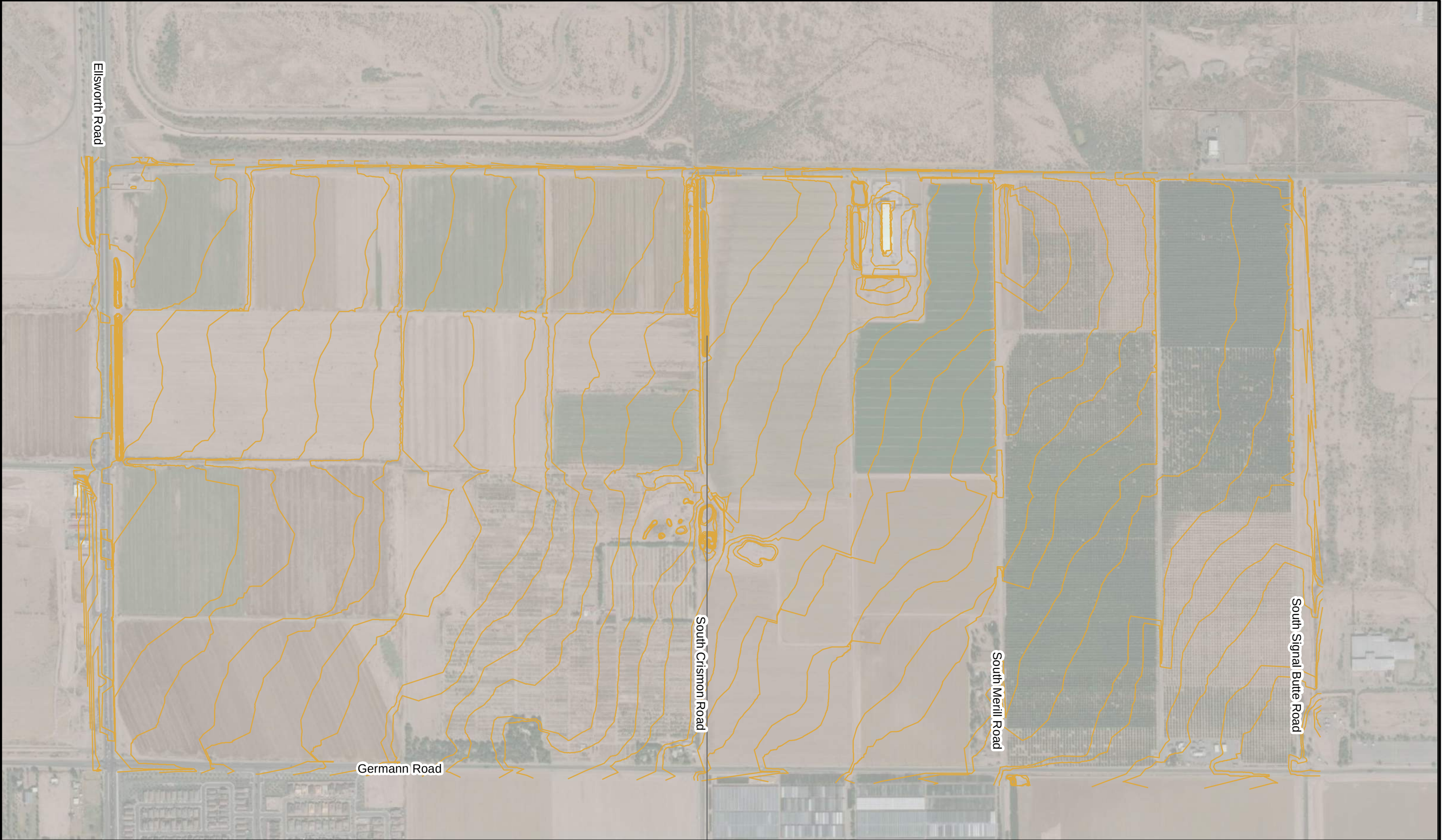
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DRAWN BY: JMG	
DATE: March 18, 2022	



UPRR Industrial Lead Track
Mesa, AZ
Hydrology Work Map

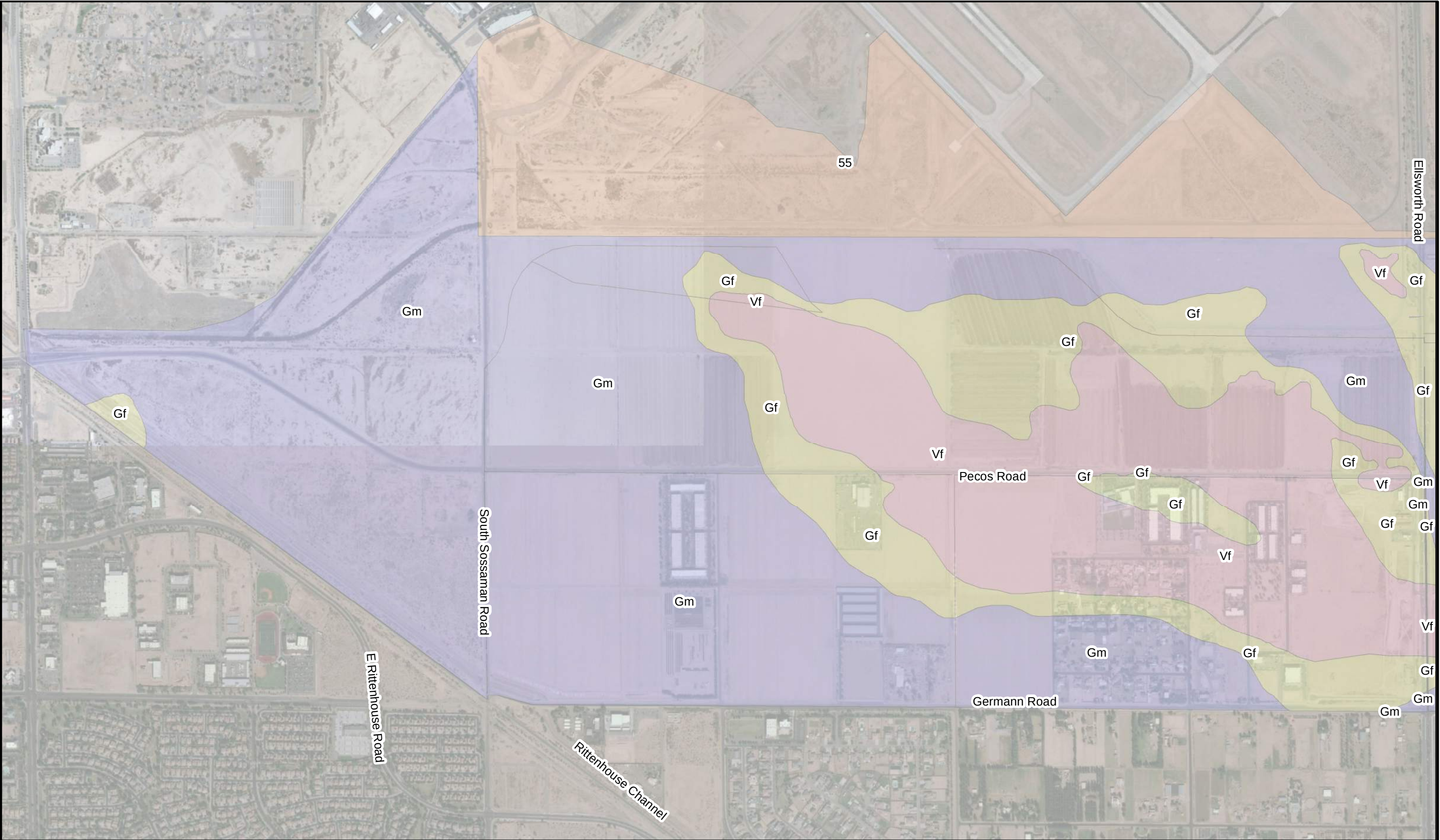


FIGURE
1



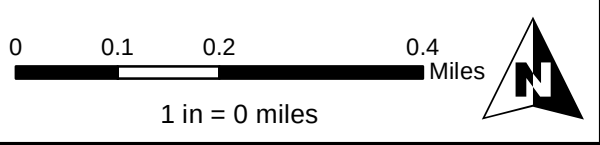
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DRAWN BY: JMG						
DATE: March 18, 2022						

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DATE: March 18, 2022

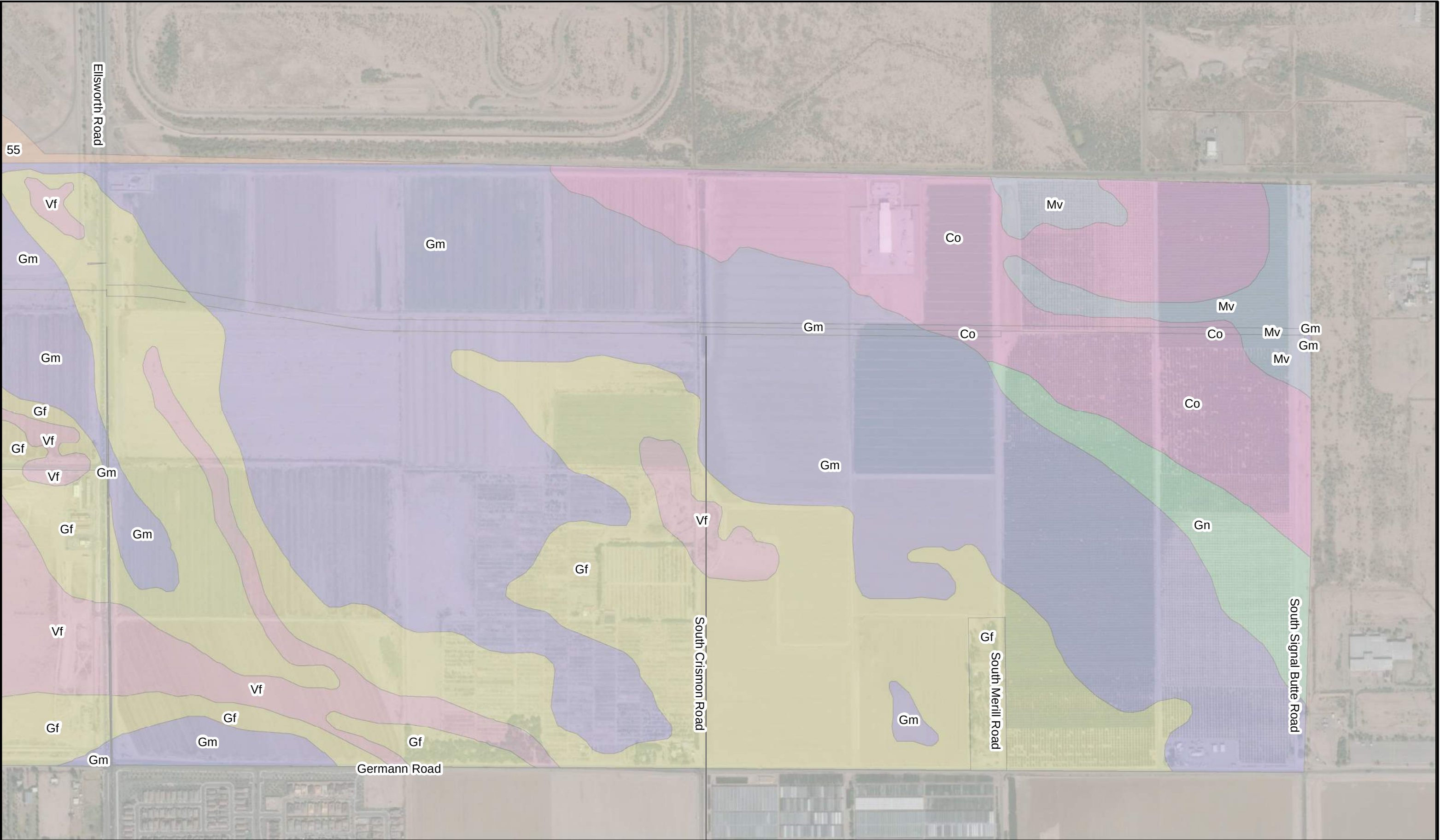
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**UPRR Industrial Lead Track
Mesa, AZ
NRCS Soil Map**

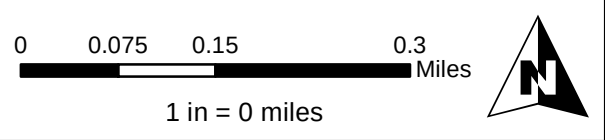


FIGURE
3



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DATE: March 18, 2022

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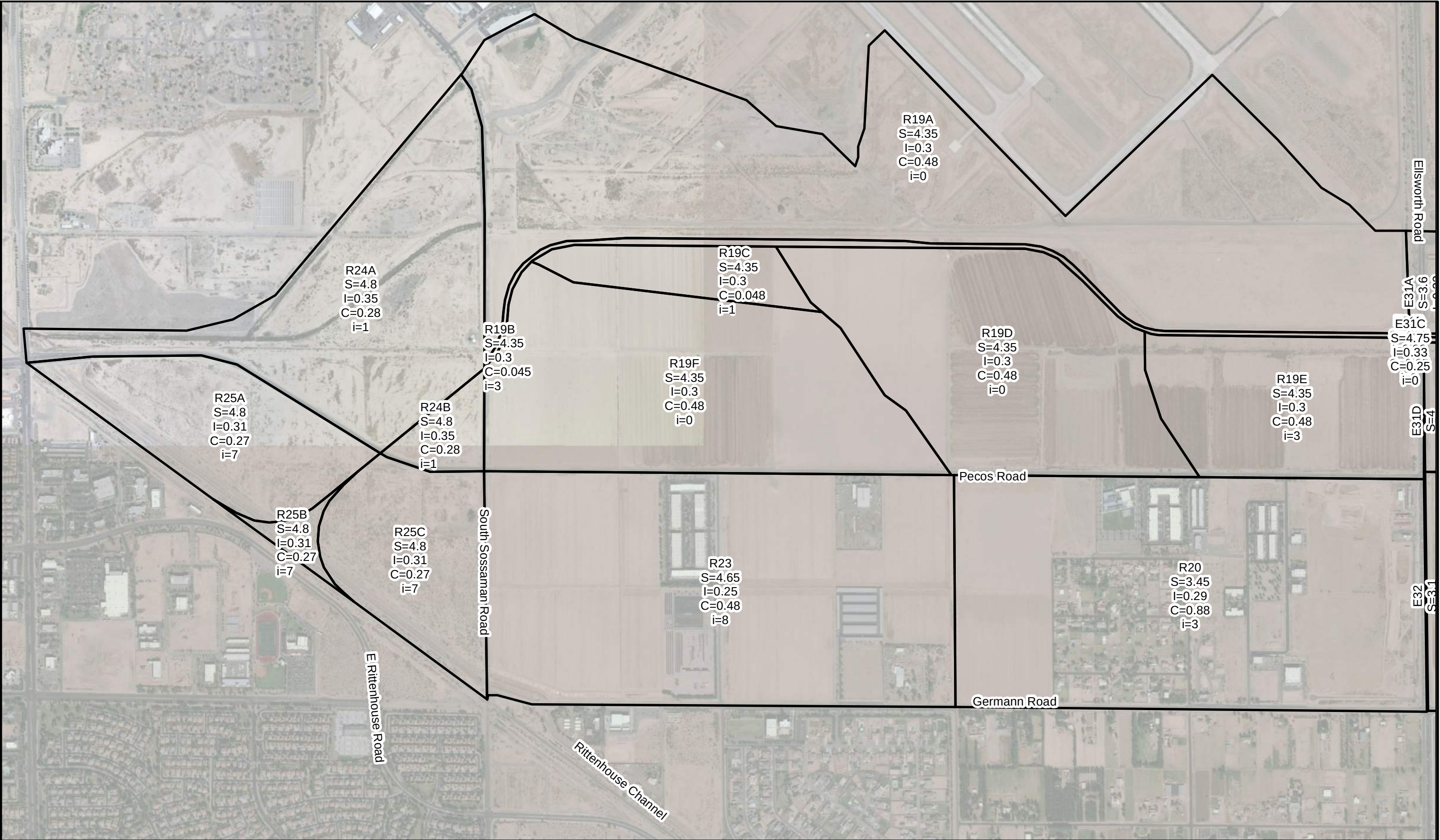


UPRR Industrial Lead Track
Mesa, AZ
NRCS Soil Map



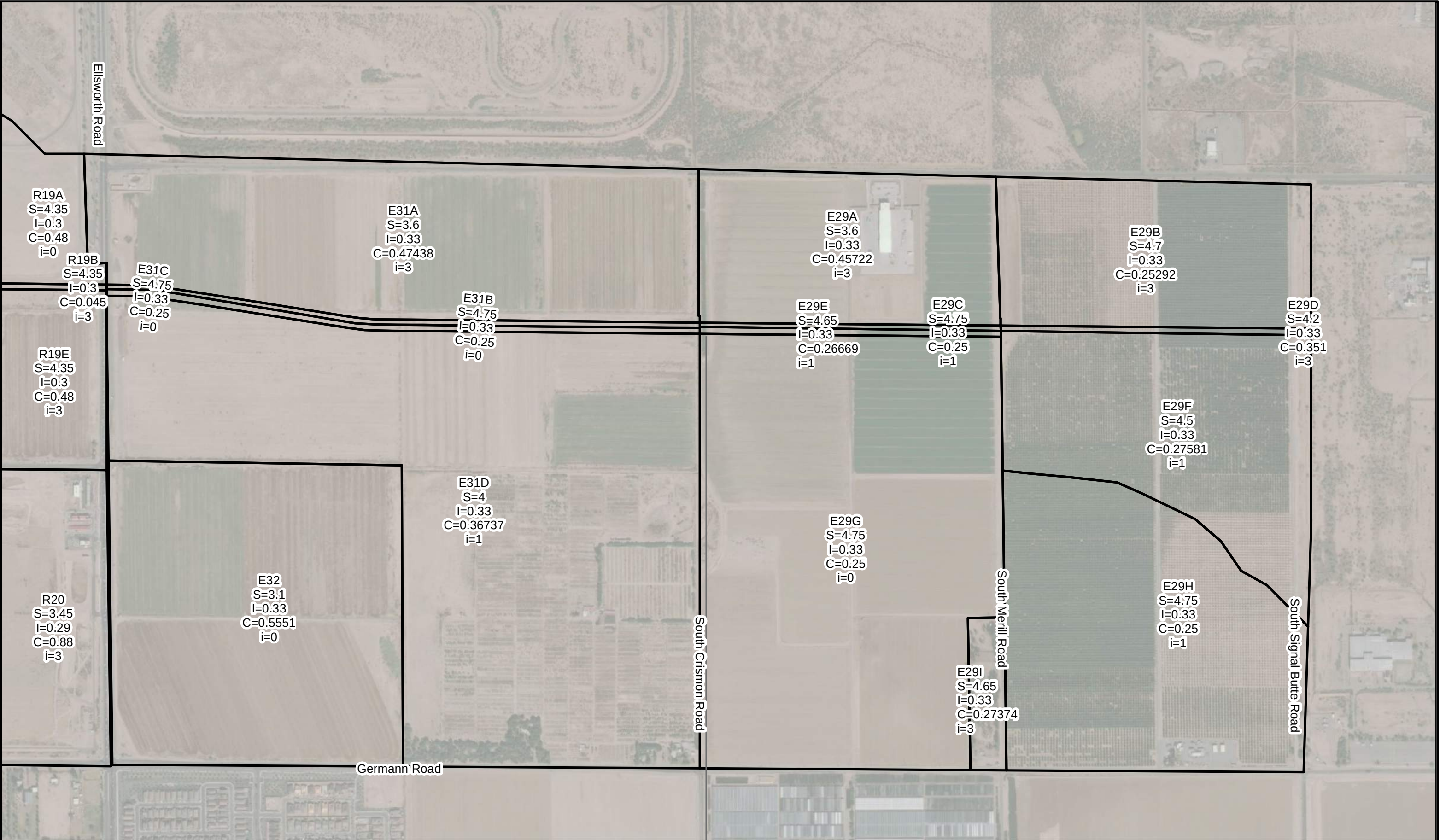
FIGURE
4

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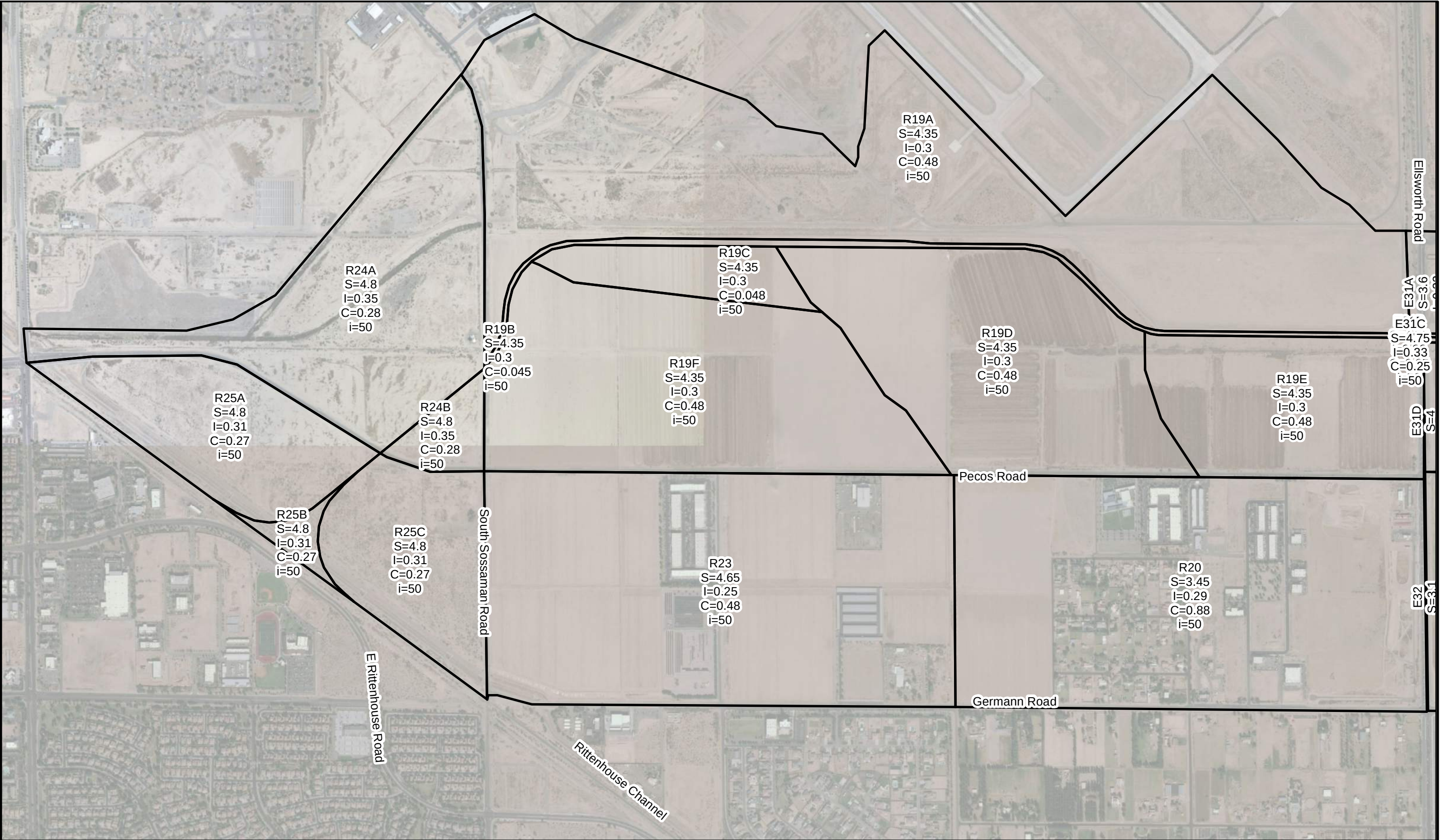
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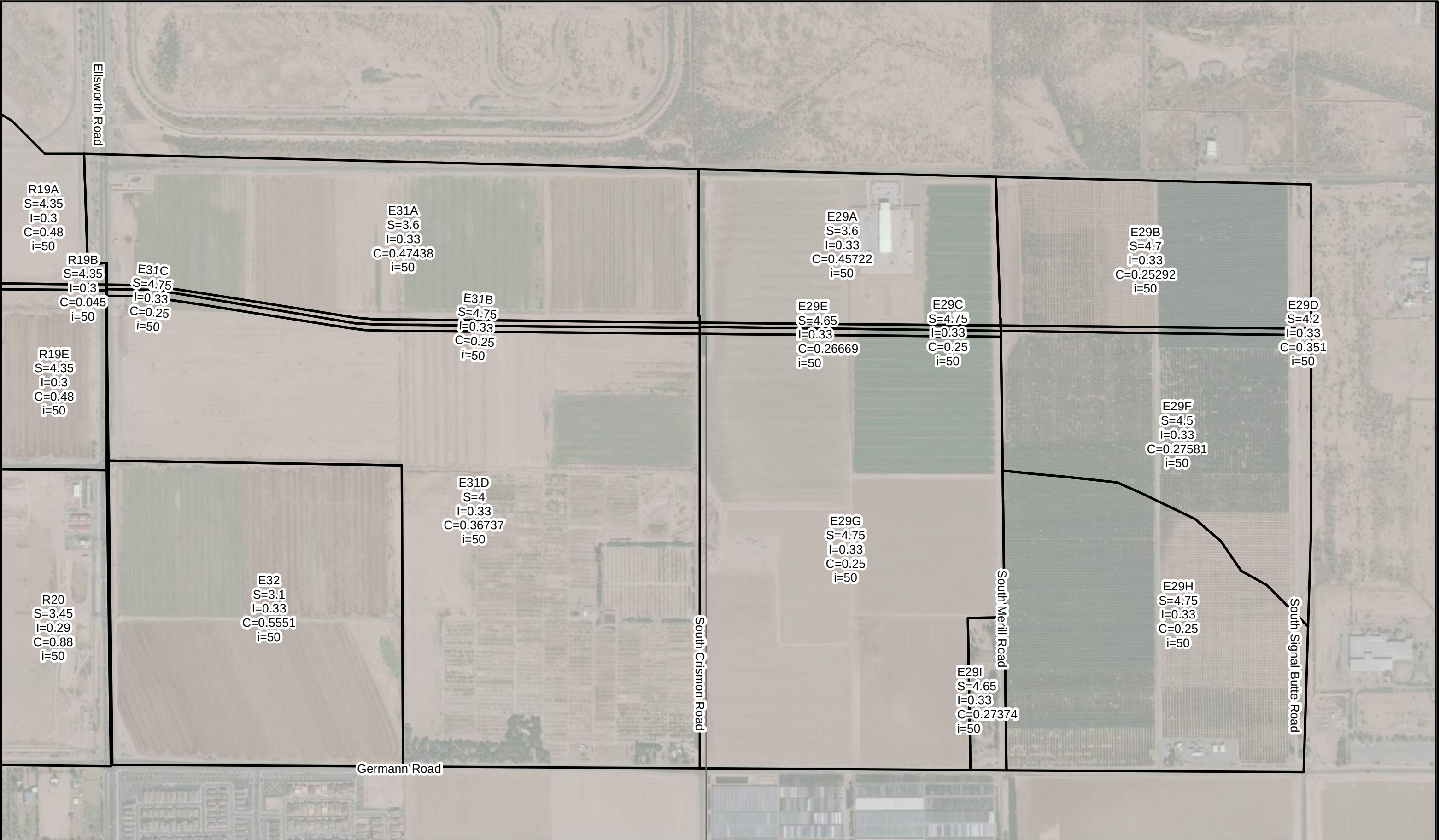
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DATE: March 18, 2022							

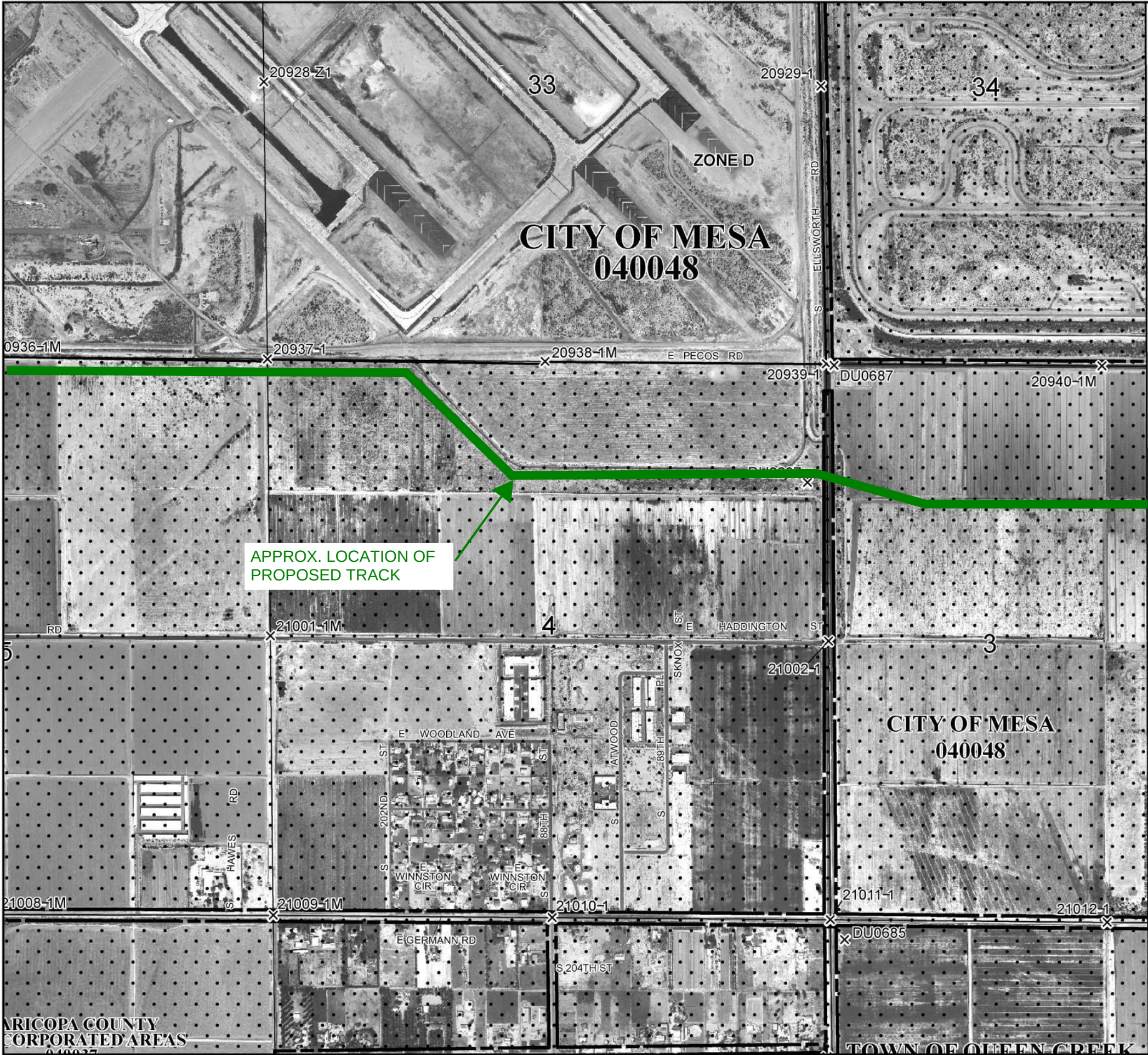
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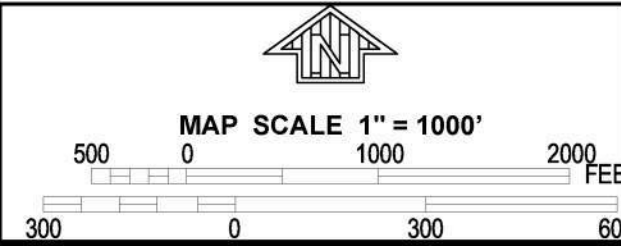
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Appendix B - FIRM



APPROX. LOCATION OF
PROPOSED TRACK



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2770L

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS

PANEL 2770 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2770	L
GILBERT, TOWN OF	040044	2770	L
MESA, CITY OF	040048	2770	L
QUEEN CREEK, TOWN OF	040132	2770	L

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2770L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

36 84 000m N

T. 1 S.
T. 2 S.

36 83 000m N

JOINS PANEL 2790

PANEL 2709 NOT
PRINTED

36 82 000m N

MARICOPA COUNTY
INCORPORATED AREAS
040037

TOWN OF QUEEN CREEK

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

Appendix C - Photolog



UPRR PIRATE INDUSTRIAL LEAD PROPOSED TRACK

Photolog Phoenix Subdivision | 4/19/2021



PHOTO 1: Rittenhouse Channel and weir, looking upstream near proposed Wye track.



PHOTO 2: Rittenhouse Channel, looking downstream near proposed Wye track.



PHOTO 3: Rittenhouse Channel near UPRR sta. 1500+00, looking northeast.



PHOTO 4: Rittenhouse Channel near UPRR sta. 1500+00, looking northwest.



PHOTO 5: Armored drainage swells into Rittenhouse Channel near UPRR sta. 1500+00, looking northeast.



PHOTO 6: Typical Rittenhouse channel armoring, looking southeast.



PHOTO 7: Upstream face of Rittenhouse Channel culvert at S. Sossaman Road, looking northwest.



PHOTO 8: Downstream face of Rittenhouse Channel culvert at S. Sossaman Road, looking northeast.



PHOTO 9: Upstream view of Rittenhouse Channel at E. Pecos Road, looking southeast.



PHOTO 10: Upstream face of Rittenhouse Channel culvert at E. Pecos Road, looking northwest.



PHOTO 11: Upstream side of Pecos Road, UPRR sta. 24+00, looking northwest.



PHOTO 12: Looking upstream at Pecos Road, UPRR sta. 24+00, looking northeast.



PHOTO 13: Upstream side of Pecos Road, UPRR sta. 24+00, looking southeast.



PHOTO 14: Top of Pecos Road near proposed track crossing, UPRR sta. 24+00, looking northwest.



PHOTO 15: Downstream side of Pecos Road, UPRR sta. 24+00, looking northwest.



PHOTO 16: Looking downstream at Pecos Road, UPRR sta. 24+00, looking southeast.



PHOTO 17: Downstream side of Pecos Road, UPRR sta. 24+00, looking southeast.



PHOTO 18: Upstream side of Sossaman Road, UPRR sta. 40+00, looking north.



PHOTO 19: Upstream side of Sossaman Road, UPRR sta. 39+00, looking north.



PHOTO 20: Upstream side of Sossaman Road, UPRR sta. 39+00, looking east.



PHOTO 21: Upstream side of Sossaman Road, UPRR sta. 39+00, looking south.



PHOTO 22: Downstream side of Sossaman Road, UPRR sta. 40+00, looking north.



PHOTO 23: Downstream side of Sossaman Road, UPRR sta. 39+00, looking west.



PHOTO 24: Downstream side of Sossaman Road, UPRR sta. 39+00, looking south.



PHOTO 25: Looking northwest at Doppler and water line air release standpipe, UPRR sta. 40+00.



PHOTO 26: View of borehole B-6.



PHOTO 27: Near UPRR sta. 99+00, looking west.



PHOTO 28: Near UPRR sta. 99+00, looking southwest.



PHOTO 29: Near UPRR sta. 99+00, looking south.



PHOTO 30: Near UPRR sta. 99+00, looking southeast.



PHOTO 31: Near UPRR sta. 99+00, looking east.



PHOTO 32: Gateway airport property near UPRR sta. 99+00, looking north.



PHOTO 33: View of culvert in Ellsworth Channel at UPRR sta. 157+22, looking east.



PHOTO 34: Upstream view of Ellsworth Channel at UPRR sta. 157+22, looking south.



PHOTO 35: Downstream view of Ellsworth Channel at UPRR sta. 157+22, looking north.



PHOTO 36: Upstream Ellsworth Channel culvert under private access road, looking south.



PHOTO 37: Looking downstream from private access road culvert, looking north.



PHOTO 38: Downstream Ellsworth Channel culvert under Ellsworth Road, looking west.



PHOTO 39: Edge of Ellsworth Road near proposed track crossing, looking north.



PHOTO 40: Edge of Ellsworth Road near proposed track crossing, looking south.



PHOTO 41: Top of access road culvert, looking east.



PHOTO 42: View from edge of Ellsworth Road looking west along proposed track alignment.



PHOTO 43: Irrigation flume on east side of Crismon Road, looking south.



PHOTO 44: View from Pecos Road and Merrill Road, looking southwest



PHOTO 45: View from Pecos Road and Merrill Road, looking south.



PHOTO 46: View from Pecos Road and Merrill Road, looking southeast.



PHOTO 47: View from Signal Butte Road, looking southwest.



PHOTO 48: View from Signal Butte Road, looking south.

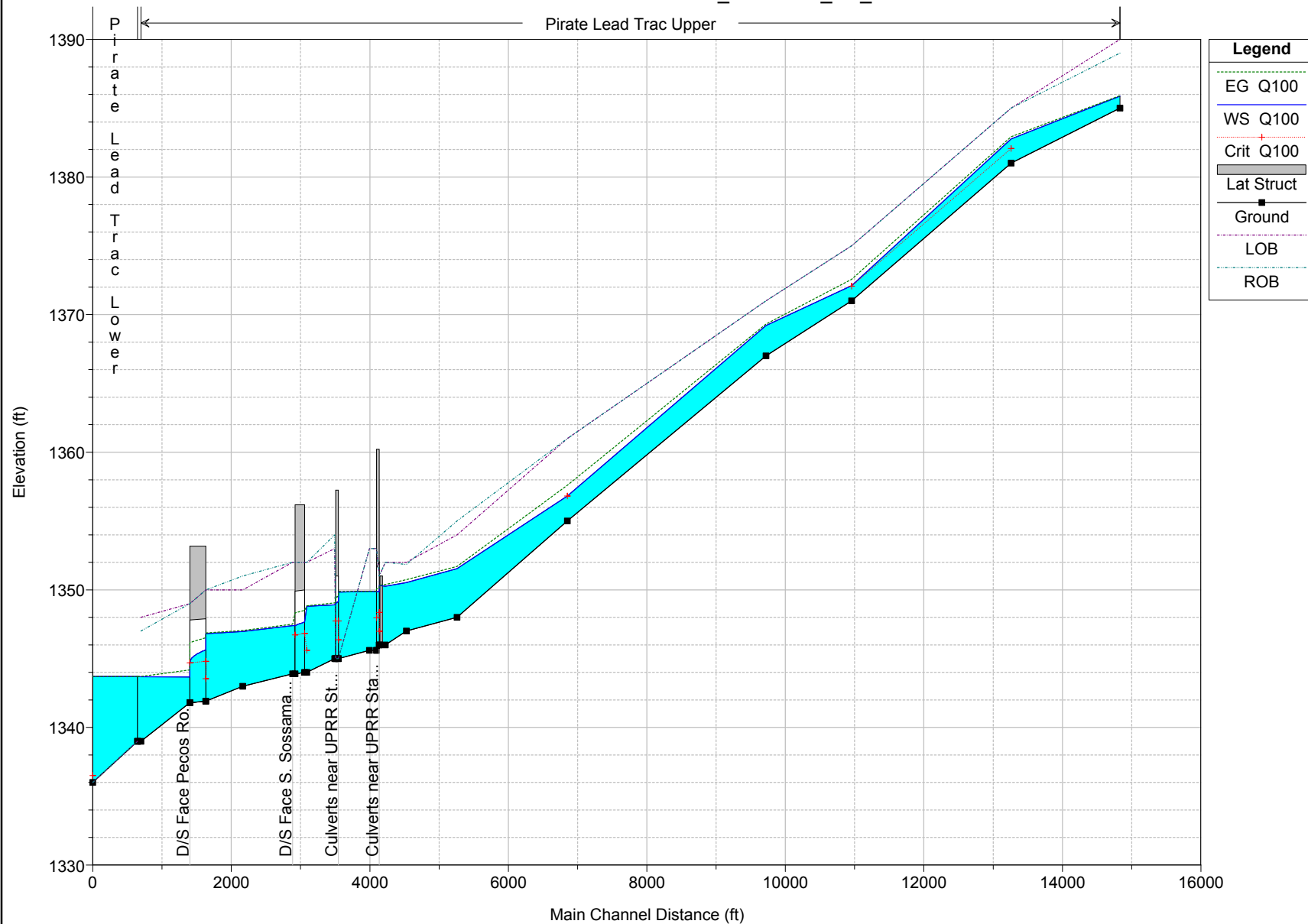


PHOTO 49: View from Signal Butte Road, looking southeast.

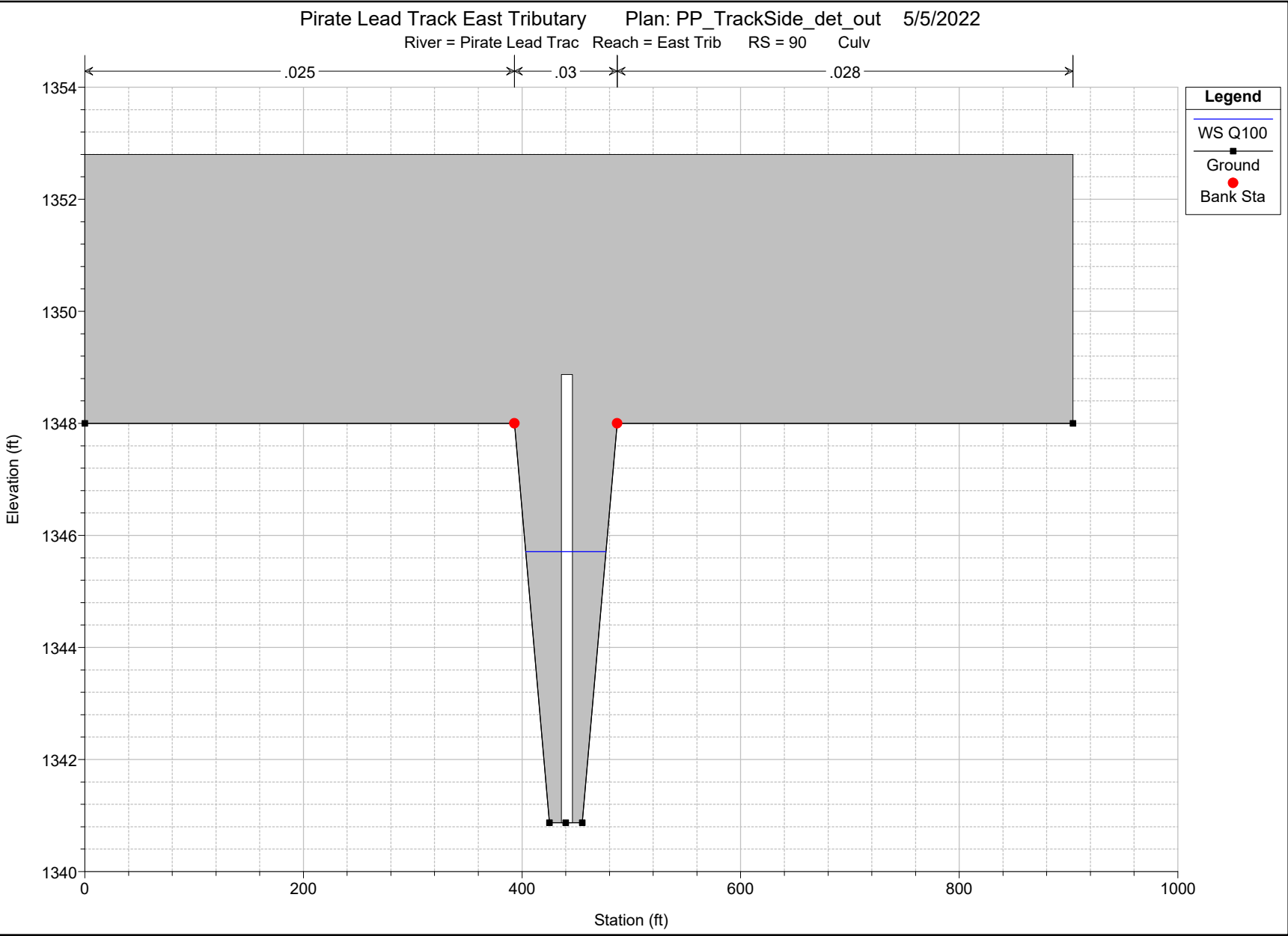


PHOTO 50: View from Signal Butte Road, looking east

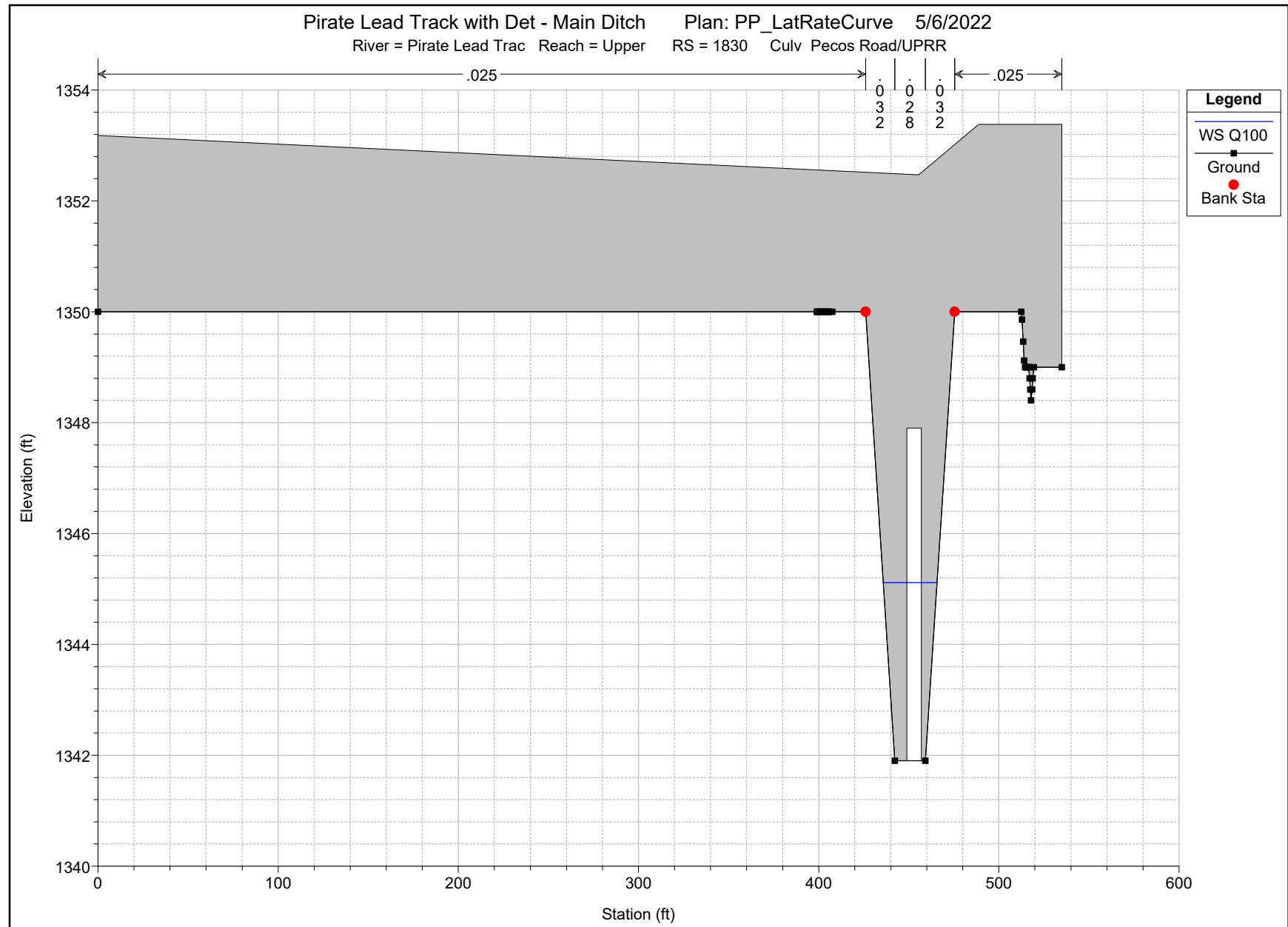
Pirate Lead Track with detention Plan: PP_TrackSide_det_out 2/24/2022



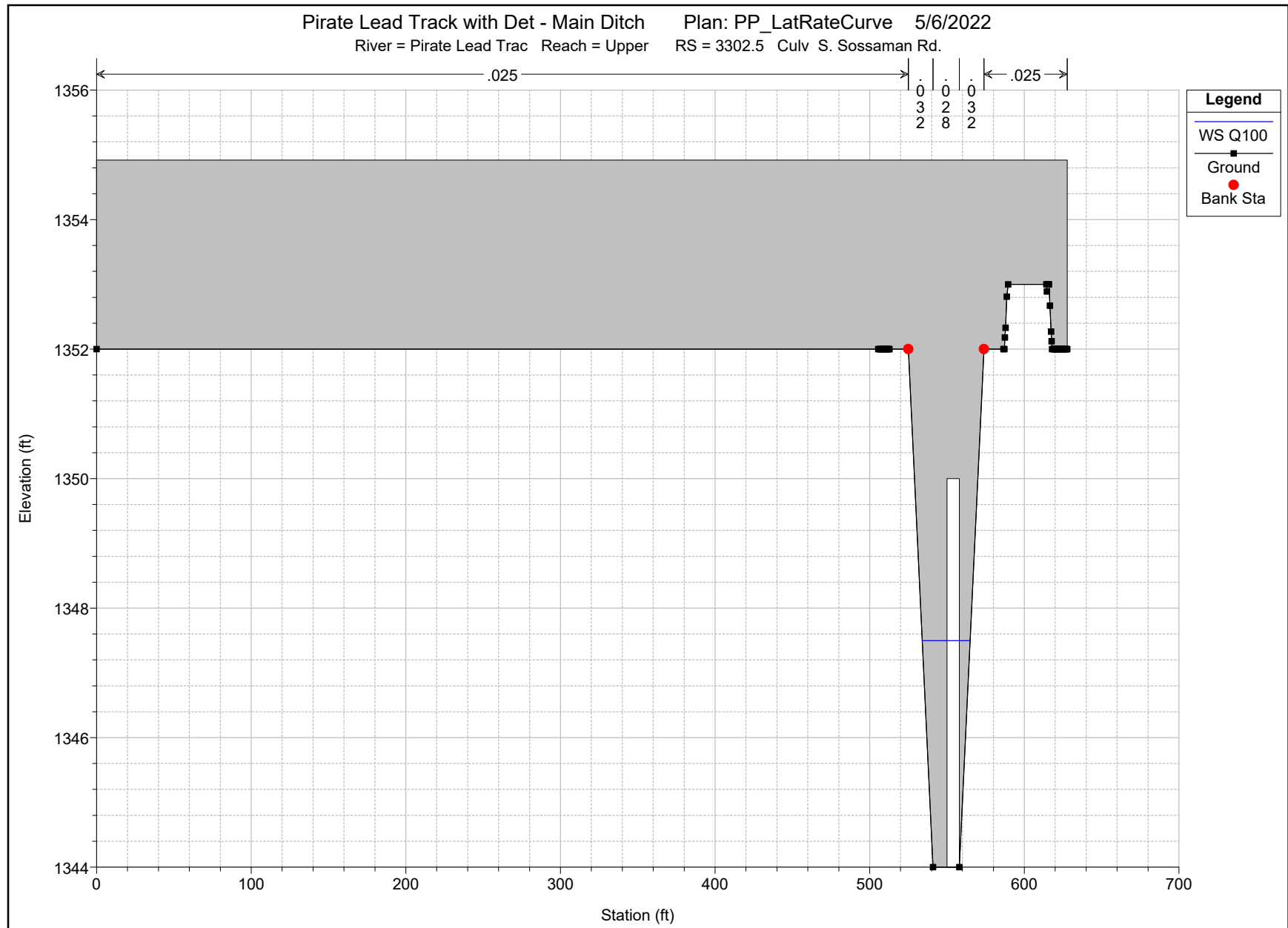
Culvert Draining to South Pond 19+35



Pecos Road Crossing of South Trackside Ditch Industrial Lead Track



Sossaman Road Crossing of South Trackside Ditch Industrial Lead Track



Culvert Draining to South Pond 19+35

HEC-RAS Plan: TrckSideDet River: Pirate Lead Trac Reach: East Trib Profile: Q100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East Trib	573	Q100	604.00	1349.00	1349.19	1349.19	1349.29	0.022650	2.47	244.63	1283.00	1.00
East Trib	146	Q100	604.00	1347.00	1349.10		1349.10	0.000008	0.22	2692.08	1283.00	0.03
East Trib	110	Q100	604.00	1340.87	1349.09	1342.95	1349.10	0.000019	0.69	1430.27	904.01	0.05
East Trib	90		Culvert									
East Trib	10	Q100	604.00	1338.52	1343.90		1343.90	0.000001	0.14	4203.38	781.30	0.01
East Trib	0	Q100	604.00	1339.00	1343.90	1339.26	1343.90	0.000001	0.16	3828.38	781.30	0.01

South Trackside Ditch from Rittenhouse Channel to Ellsworth Road

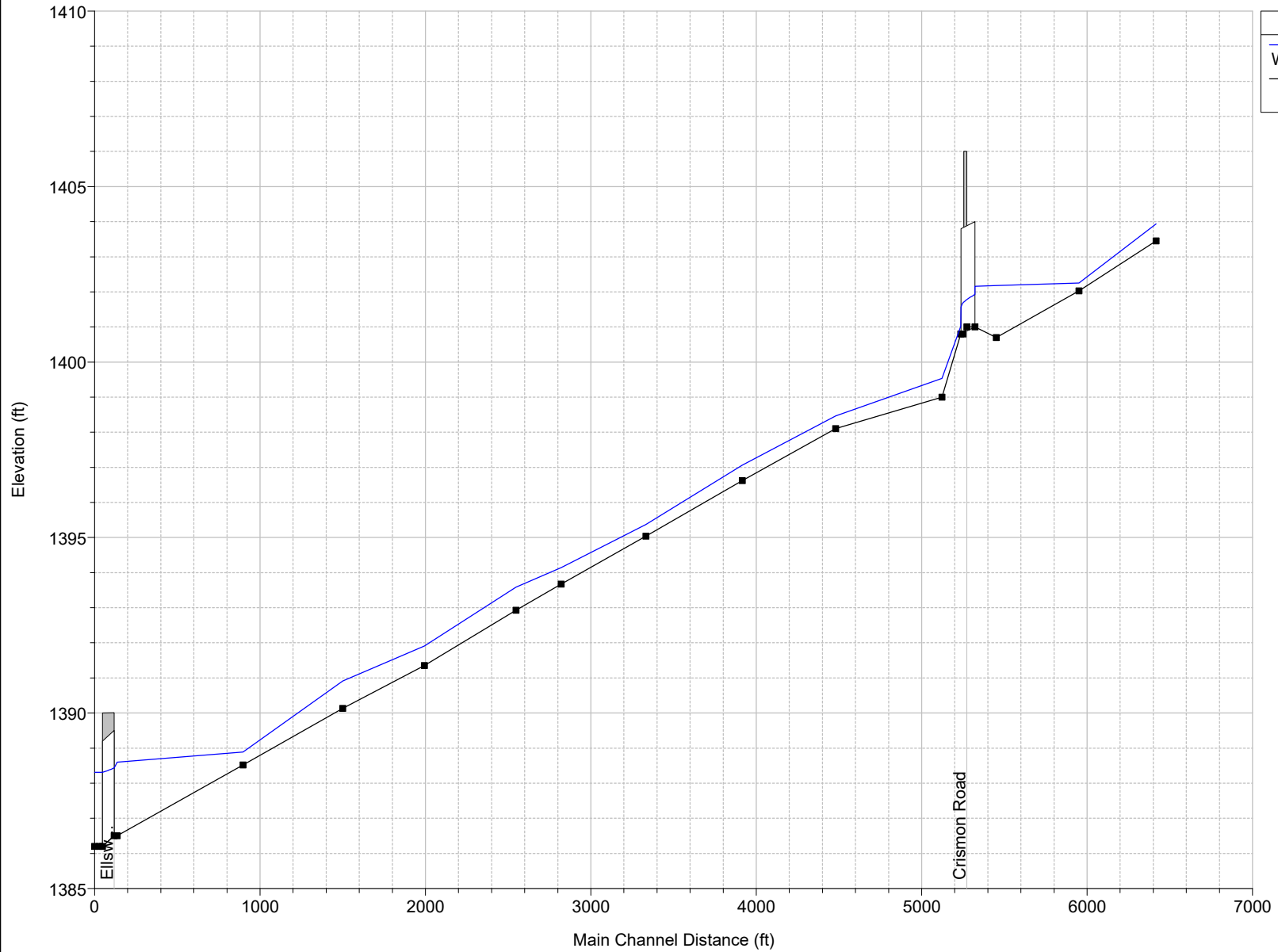
HEC-RAS Plan: LatRateCurve River: Pirate Lead Trac Reach: Upper Profile: Q100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper	15169	Q100	20.00	1385.00	1386.34		1386.35	0.000182	0.75	26.74	23.01	0.12
Upper	13601	Q100	191.00	1381.00	1383.20		1383.46	0.003059	4.05	47.12	25.81	0.53
Upper	11295	Q100	191.00	1371.00	1372.73		1373.18	0.007038	5.40	35.35	23.91	0.78
Upper	10060	Q100	191.00	1367.00	1369.82		1369.96	0.001294	3.00	63.72	28.26	0.35
Upper	7194	Q100	377.00	1355.00	1357.25	1357.25	1358.19	0.011022	7.79	48.42	26.01	1.01
Upper	5600	Q100	377.00	1348.00	1352.32		1352.50	0.001078	3.40	110.80	34.28	0.33
Upper	4867	Q100	432.00	1347.00	1349.44	1349.44	1350.45	0.010847	8.05	53.65	26.92	1.01
Upper	4562	Q100	101.00	1346.00	1349.36		1349.39	0.000193	1.27	79.72	30.44	0.14
Upper	4500		Lat Struct									
Upper	4392	Q100	10.36	1346.00	1349.37		1349.37	0.000002	0.13	79.94	30.47	0.01
Upper	4292	Q100	10.36	1346.00	1349.37		1349.37	0.000002	0.13	79.94	30.47	0.01
Upper	4242	Q100	10.36	1346.00	1349.37	1346.22	1349.37	0.000002	0.13	79.93	30.47	0.01
Upper	4240		Inl Struct									
Upper	3805	Q100	221.36	1345.00	1348.89		1349.05	0.001263	3.20	69.14	25.56	0.34
Upper	3555	Q100	221.36	1344.00	1348.85		1348.90	0.000242	1.71	129.54	36.40	0.16
Upper	3505	Q100	221.36	1344.00	1348.84		1348.88	0.000244	1.71	129.09	36.35	0.16
Upper	3455	Q100	221.36	1344.00	1348.83		1348.87	0.000247	1.72	128.62	36.30	0.16
Upper	3405	Q100	221.36	1344.00	1348.81	1345.62	1348.86	0.000249	1.73	128.15	36.25	0.16
Upper	3302.5		Culvert									
Upper	3200	Q100	221.36	1343.80	1347.30		1347.40	0.000808	2.65	83.55	30.81	0.28
Upper	2480	Q100	219.36	1343.00	1346.82		1346.91	0.000572	2.33	94.16	32.28	0.24
Upper	1946	Q100	219.36	1341.90	1346.65	1343.51	1346.70	0.000257	1.74	125.88	36.00	0.16
Upper	1830		Culvert									
Upper	1714	Q100	219.36	1341.50	1343.98		1344.24	0.002694	4.06	53.98	26.53	0.50
Upper	1009	Q100	219.36	1339.00	1343.93		1343.95	0.000081	1.09	201.40	50.47	0.10
Upper	910	Q100	871.36	1339.00	1343.80	1340.90	1343.93	0.000446	2.98	297.80	358.80	0.24
Upper	264	Q100	871.36	1336.00	1343.70	1338.21	1343.77	0.000130	2.20	414.66	359.78	0.14

Ellsworth to Crismon Road - North Ditch

Ditch US Ells Steady Plan: PP_1@36 CMP 5/6/2022

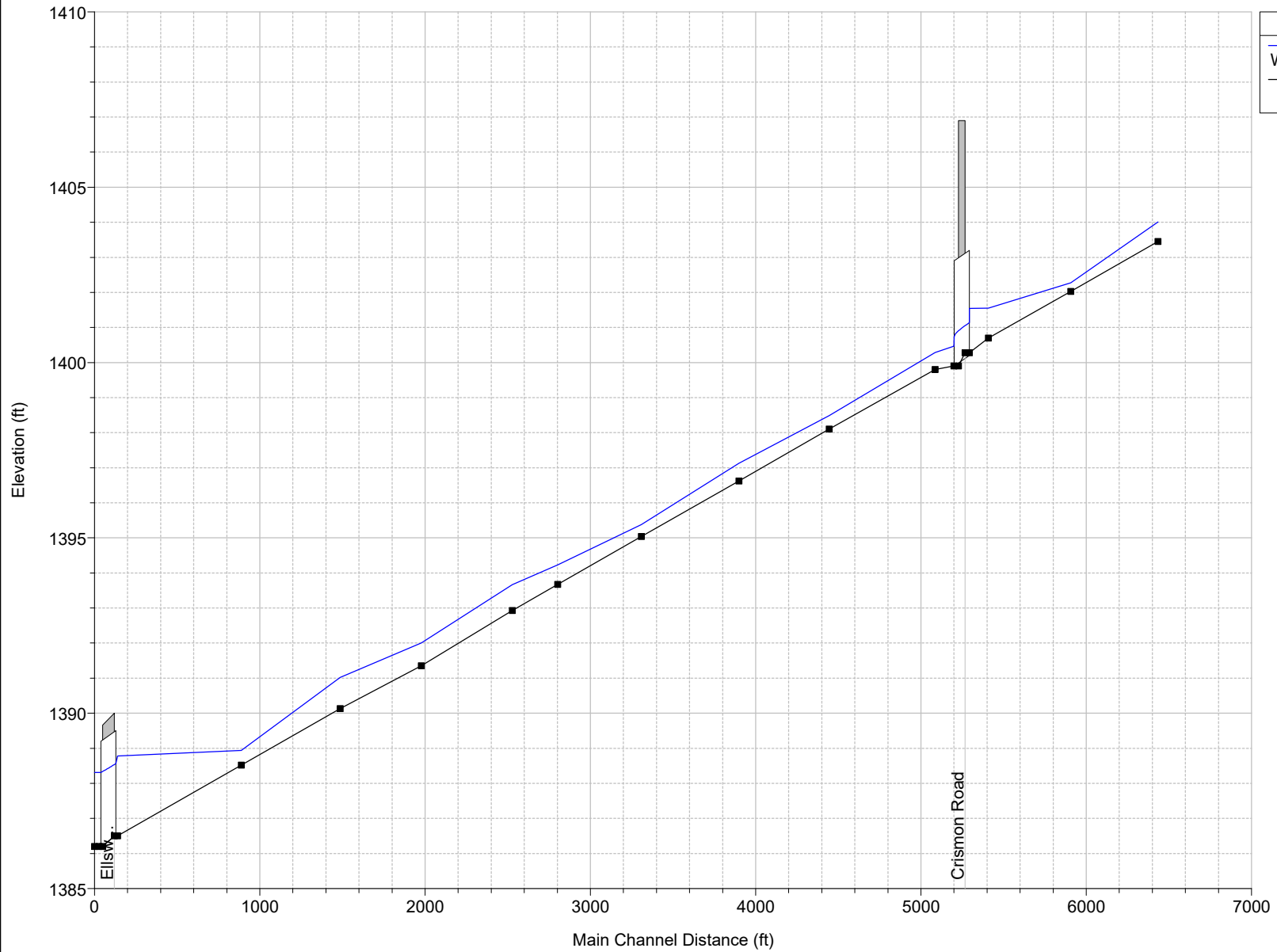
Legend	
WS Q100	
Ground	



Ellsworth to Crismon Road - South Ditch

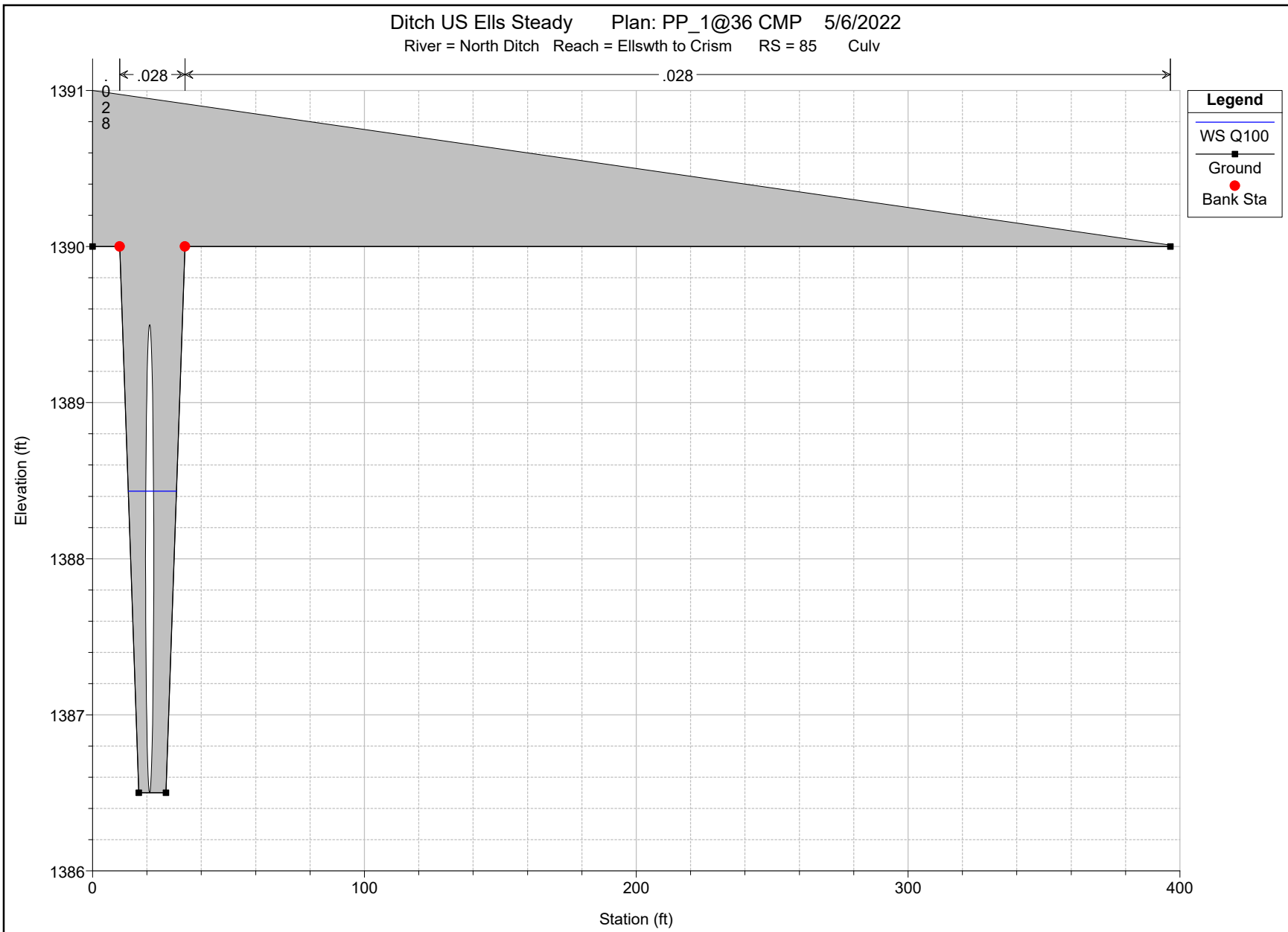
Ditch US Ells Steady Plan: PP_1@36 CMP 5/6/2022

Legend	
WS Q100	
Ground	

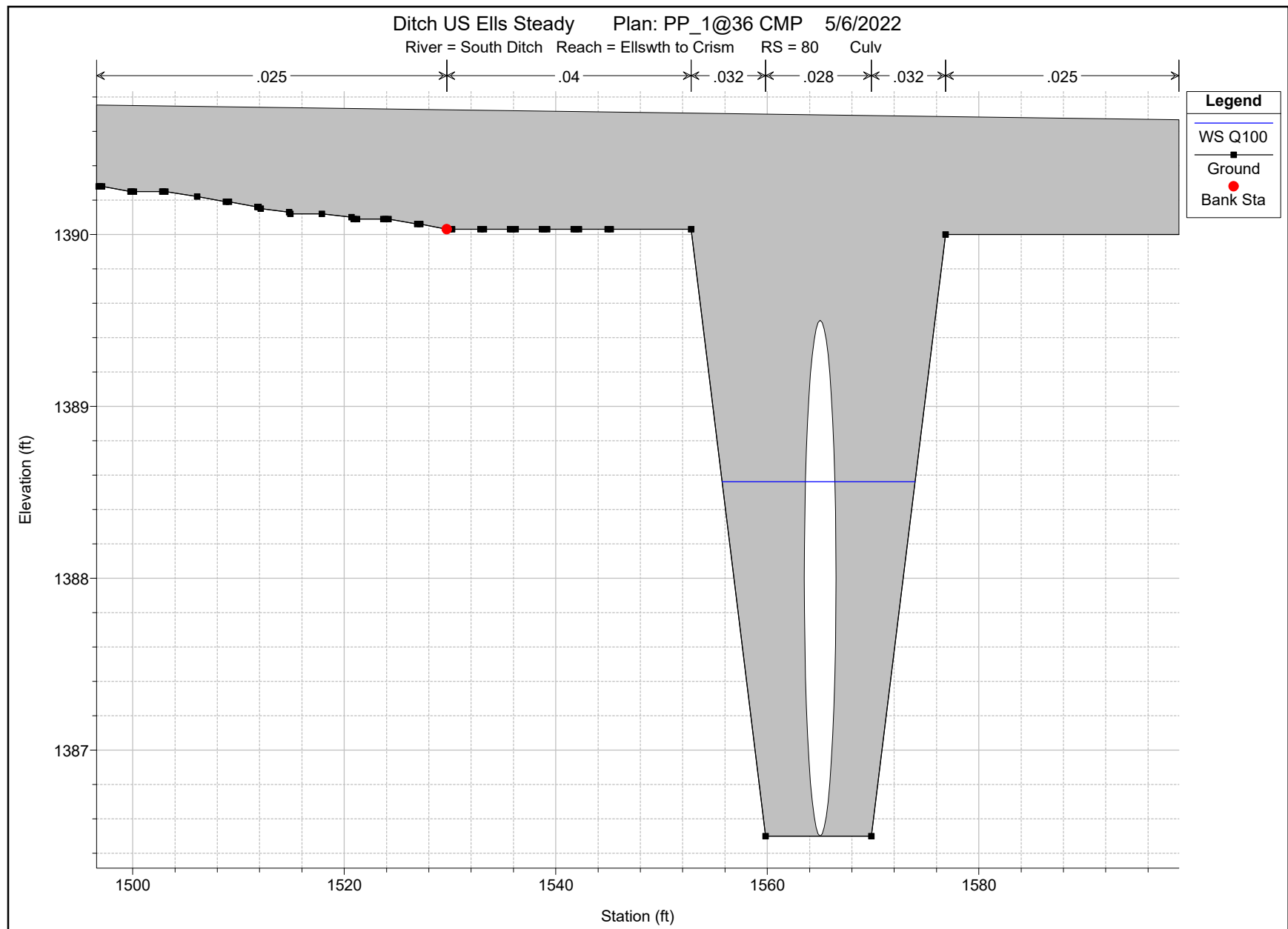


Culvert in North Ditch - Drains to Ellsworth Channel 158+00

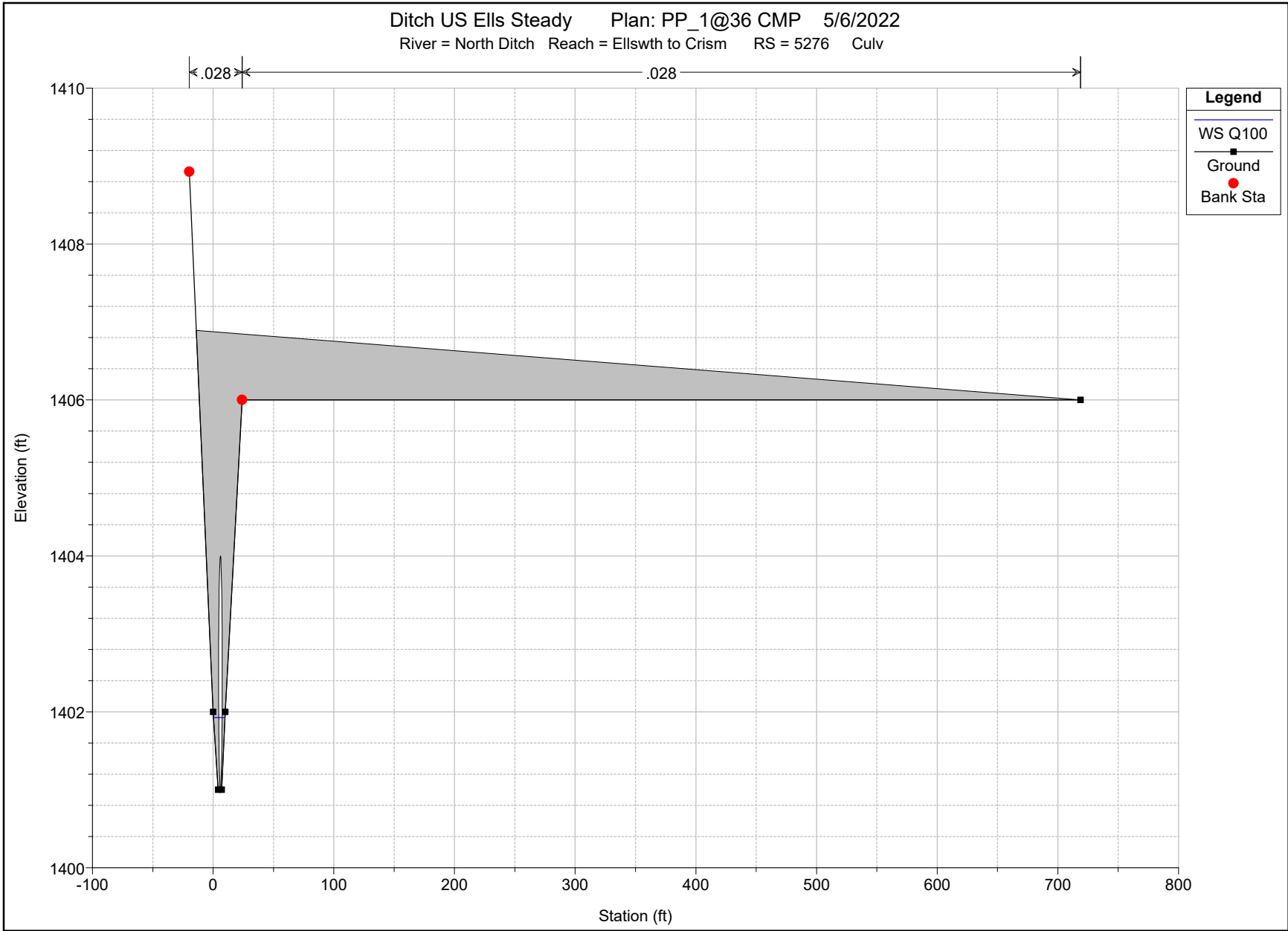
Ditch US Ells Steady Plan: PP_1@36 CMP 5/6/2022
River = North Ditch Reach = Ellswth to Crism RS = 85 Culv



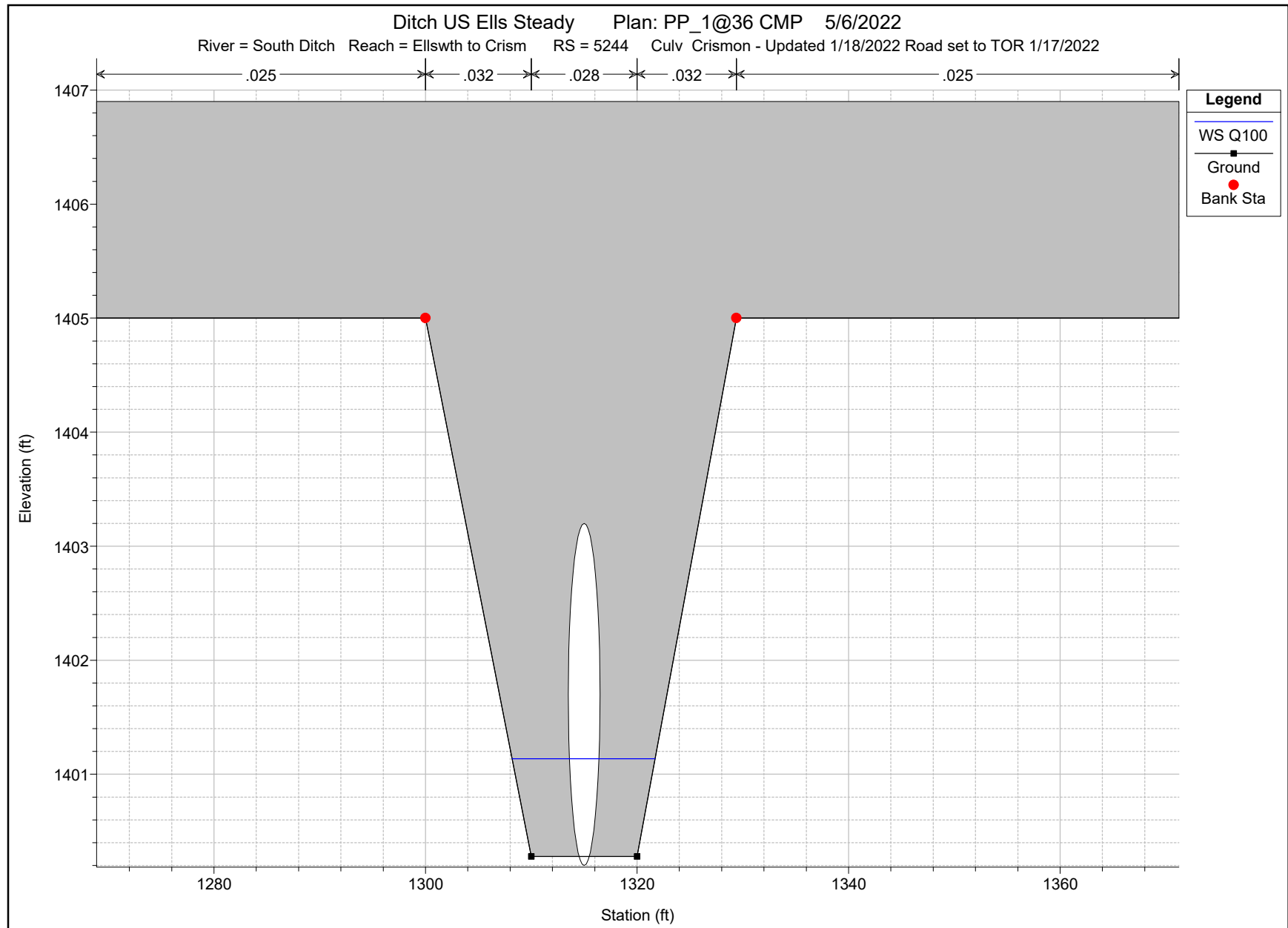
Culvert in South Ditch - Drains to Ellsworth Channel 158+00



Culvert in North Ditch at Crismon Road 209+00



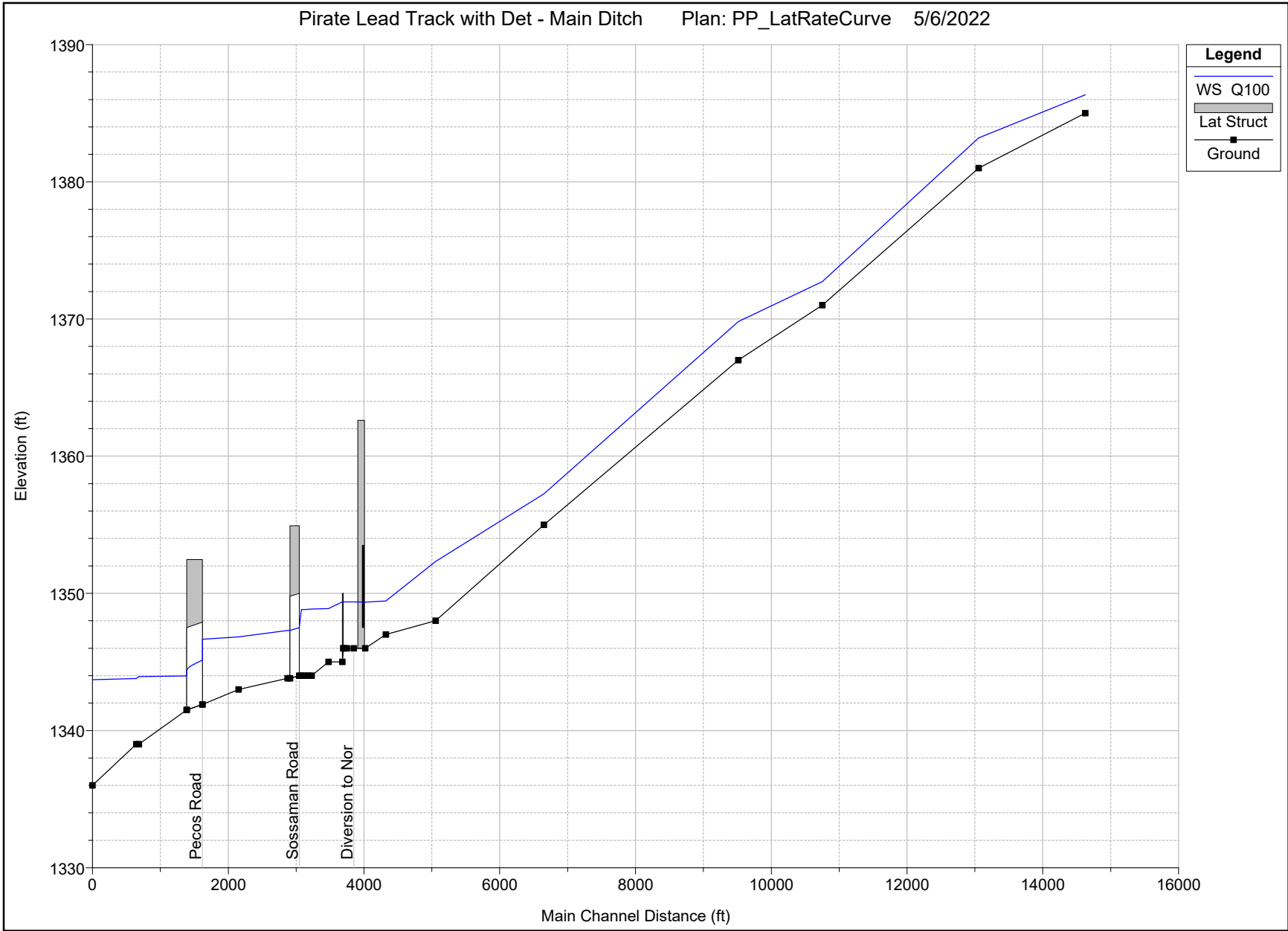
Culvert in South Ditch at Crismon Road 209+12



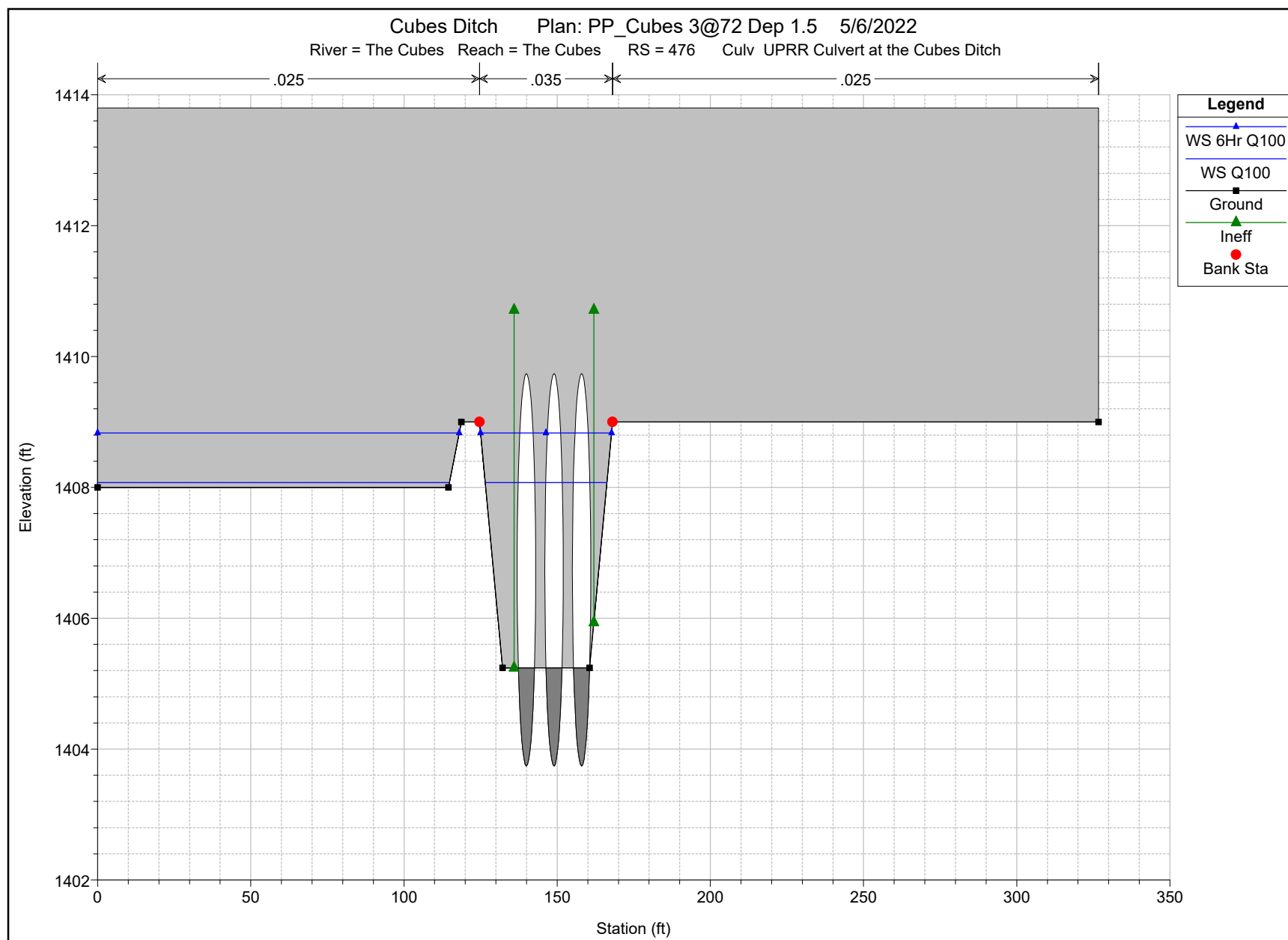
HEC-RAS Plan: PP_1@36 CMP Profile: Q100

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
South Ditch	Ellswth to Crism	6432	Q100	7.00	1403.45	1404.01	1403.69	1404.03	0.001203	1.12	6.23	12.24	0.28
South Ditch	Ellswth to Crism	5905	Q100	7.00	1402.03	1402.28	1402.28	1402.39	0.019157	2.73	2.57	10.98	0.99
South Ditch	Ellswth to Crism	5407	Q100	7.00	1400.70	1401.55		1401.56	0.000288	0.69	10.10	13.69	0.14
South Ditch	Ellswth to Crism	5266	Q100	7.00	1400.28	1401.54	1400.52	1401.54	0.000076	0.44	15.87	15.18	0.08
South Ditch	Ellswth to Crism	5244	Crismon Road	Culvert									
South Ditch	Ellswth to Crism	5224	Q100	7.00	1399.90	1400.47		1400.48	0.001166	1.11	6.30	12.30	0.27
South Ditch	Ellswth to Crism	5085	Q100	7.00	1399.80	1400.29		1400.31	0.001945	1.31	5.34	12.02	0.35
South Ditch	Ellswth to Crism	4444	Q100	7.00	1398.10	1398.48		1398.53	0.004271	1.69	4.13	11.53	0.50
South Ditch	Ellswth to Crism	3898	Q100	7.00	1396.62	1397.13		1397.15	0.001652	1.25	5.62	12.04	0.32
South Ditch	Ellswth to Crism	3308	Q100	7.00	1395.04	1395.38		1395.44	0.006289	1.92	3.65	11.37	0.60
South Ditch	Ellswth to Crism	2801	Q100	7.00	1393.67	1394.23		1394.25	0.001199	1.12	6.24	12.24	0.28
South Ditch	Ellswth to Crism	2528	Q100	16.00	1392.93	1393.67		1393.72	0.002474	1.89	8.48	12.96	0.41
South Ditch	Ellswth to Crism	1977	Q100	16.00	1391.35	1392.01		1392.08	0.003715	2.16	7.41	12.62	0.50
South Ditch	Ellswth to Crism	1486	Q100	16.00	1390.13	1391.02	1390.55	1391.06	0.001300	1.52	10.53	13.57	0.30
South Ditch	Ellswth to Crism	888	Q100	16.00	1388.52	1388.94	1388.94	1389.13	0.016926	3.54	4.51	11.67	1.00
South Ditch	Ellswth to Crism	139	Q100	16.00	1386.50	1388.78	1386.92	1388.78	0.000049	0.48	33.20	19.12	0.06
South Ditch	Ellswth to Crism	80	Ellsworth Channe	Culvert									
South Ditch	Ellswth to Crism	28	Q100	16.00	1386.20	1388.31		1388.32	0.000065	0.53	30.04	18.45	0.07
South Ditch	Ellswth to Crism	0	Q100	16.00	1386.20	1388.31	1386.62	1388.31	0.000057	0.53	30.01	18.44	0.07
North Ditch	Ellswth to Crism	6413	Q100	6.00	1403.45	1403.94	1403.67	1403.96	0.001357	1.13	5.32	11.94	0.30
North Ditch	Ellswth to Crism	5946	Q100	6.00	1402.03	1402.25	1402.25	1402.36	0.019420	2.61	2.30	10.88	1.00
North Ditch	Ellswth to Crism	5447	Q100	6.00	1400.70	1402.18		1402.18	0.000029	0.31	19.14	15.91	0.05
North Ditch	Ellswth to Crism	5306	Q100	6.00	1401.00	1402.16	1401.42	1402.17	0.000290	0.73	8.26	11.12	0.15
North Ditch	Ellswth to Crism	5276	Crismon Road	Culvert									
North Ditch	Ellswth to Crism	5246	Q100	6.00	1400.80	1401.02	1401.02	1401.12	0.019307	2.57	2.34	11.32	1.00
North Ditch	Ellswth to Crism	5119	Q100	6.00	1399.00	1399.54		1399.55	0.000957	1.01	5.96	12.15	0.25
North Ditch	Ellswth to Crism	4476	Q100	6.00	1398.10	1398.47		1398.50	0.003460	1.52	3.95	11.49	0.46
North Ditch	Ellswth to Crism	3911	Q100	6.00	1396.62	1397.06		1397.08	0.001895	1.25	4.79	11.80	0.35
North Ditch	Ellswth to Crism	3329	Q100	6.00	1395.04	1395.37		1395.42	0.004785	1.68	3.57	11.35	0.53
North Ditch	Ellswth to Crism	2817	Q100	6.00	1393.67	1394.14		1394.17	0.001467	1.16	5.19	11.90	0.31
North Ditch	Ellswth to Crism	2544	Q100	13.00	1392.93	1393.58		1393.63	0.002309	1.76	7.40	12.64	0.40
North Ditch	Ellswth to Crism	1991	Q100	13.00	1391.35	1391.91		1391.98	0.003998	2.10	6.19	12.23	0.52
North Ditch	Ellswth to Crism	1496	Q100	13.00	1390.13	1390.91	1390.50	1390.94	0.001265	1.44	9.01	13.12	0.31
North Ditch	Ellswth to Crism	894	Q100	13.00	1388.52	1388.89	1388.89	1389.06	0.016566	3.31	3.93	11.47	1.00
North Ditch	Ellswth to Crism	139	Q100	13.00	1386.50	1388.60	1386.87	1388.60	0.000038	0.44	29.83	18.40	0.06
North Ditch	Ellswth to Crism	85	Ellsworth Channe	Culvert									
North Ditch	Ellswth to Crism	33	Q100	13.00	1386.20	1388.31		1388.31	0.000038	0.44	29.76	18.22	0.06
North Ditch	Ellswth to Crism	3	Q100	13.00	1386.20	1388.31	1386.55	1388.31	0.000012	0.27	57.86	51.70	0.03

South Trackside Ditch from Rittenhouse Channel to Ellsworth Road



The Cubes Ditch 222+00

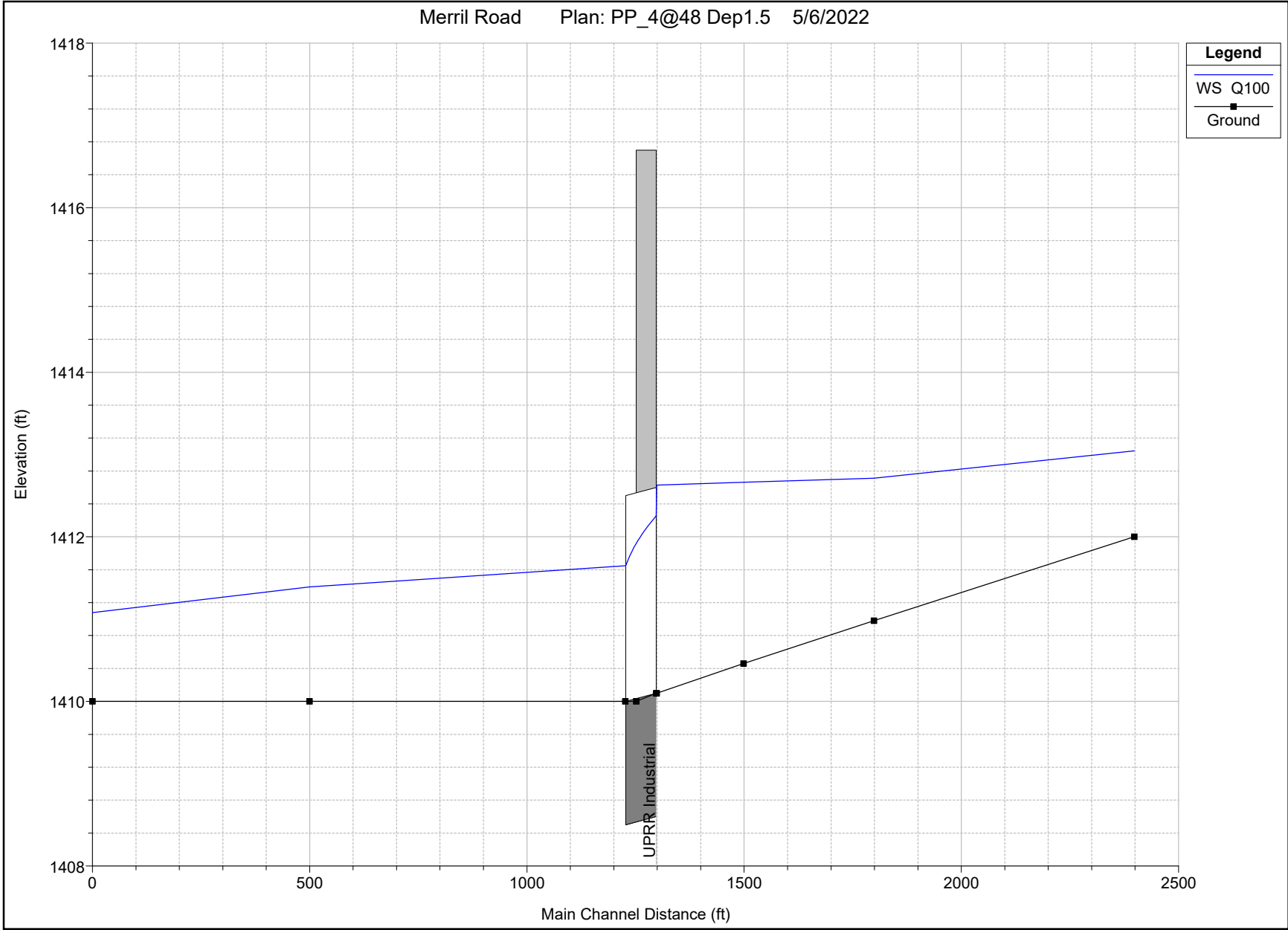


The Cubes Ditch 222+00

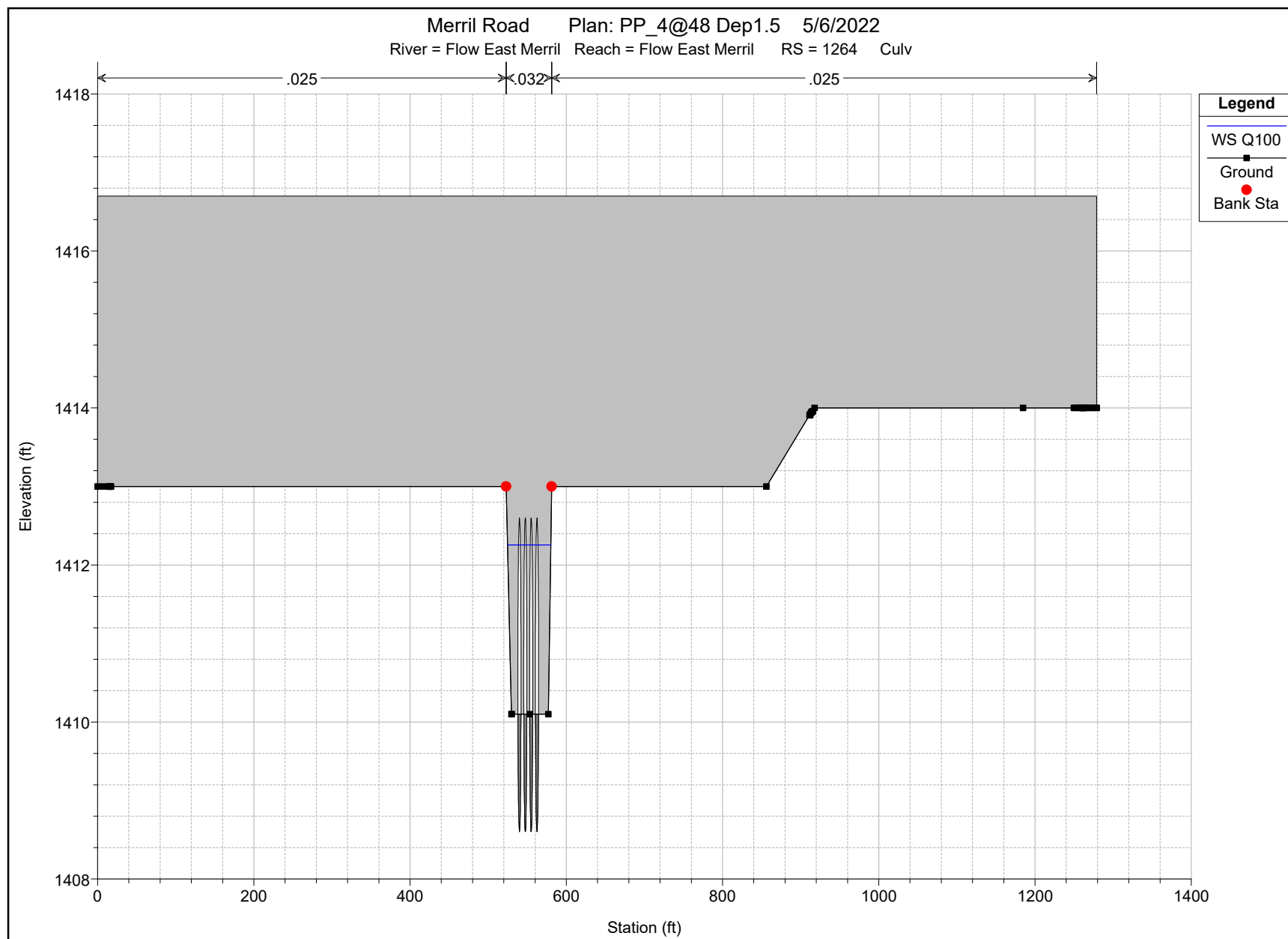
HEC-RAS Plan: PP_Cubes 3@72 Dep 1.5 River: The Cubes Reach: The Cubes

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
The Cubes	1784	Q100	195.00	1408.00	1410.91		1411.05	0.002197	2.98	65.34	34.91	0.38
The Cubes	1784	6Hr Q100	308.00	1408.00	1411.60		1411.78	0.002205	3.37	91.44	156.31	0.40
The Cubes	1325	Q100	195.00	1407.00	1409.85		1410.00	0.002410	3.09	63.16	34.37	0.40
The Cubes	1325	6Hr Q100	308.00	1407.00	1410.53		1410.72	0.002387	3.47	88.80	155.47	0.41
The Cubes	866	Q100	195.00	1406.00	1408.83		1408.96	0.002104	2.95	66.11	34.78	0.38
The Cubes	866	6Hr Q100	308.00	1406.00	1409.50		1409.67	0.002182	3.38	91.20	155.23	0.40
The Cubes	538	Q100	195.00	1405.34	1408.41		1408.47	0.001027	2.15	112.01	153.51	0.27
The Cubes	538	6Hr Q100	308.00	1405.34	1409.47		1409.48	0.000177	1.10	341.22	326.70	0.12
The Cubes	498	Q100	195.00	1405.24	1408.35	1406.46	1408.44	0.000731	2.43	80.40	156.85	0.24
The Cubes	498	6Hr Q100	308.00	1405.24	1409.31	1406.89	1409.44	0.000742	2.93	105.26	326.70	0.26
The Cubes	476	Cubes Ditch Cros	Culvert									
The Cubes	456	Q100	195.00	1405.14	1407.85		1407.97	0.001164	2.79	69.92	38.96	0.30
The Cubes	456	6Hr Q100	308.00	1405.14	1408.50		1408.69	0.001414	3.55	86.77	158.09	0.34
The Cubes	400	Q100	195.00	1405.00	1407.74		1407.89	0.002395	3.10	62.94	33.88	0.40
The Cubes	400	6Hr Q100	308.00	1405.00	1408.42		1408.61	0.002406	3.51	87.79	155.64	0.41
The Cubes	222	Q100	195.00	1404.55	1407.36		1407.50	0.002057	2.93	66.50	148.27	0.37
The Cubes	222	6Hr Q100	308.00	1404.55	1408.07	1406.66	1408.23	0.001896	3.22	113.14	326.70	0.37
The Cubes	0	Q100	195.00	1404.00	1406.94	1405.65	1407.06	0.001802	2.78	70.02	35.74	0.35
The Cubes	0	6Hr Q100	308.00	1404.00	1407.66	1406.14	1407.82	0.001802	3.15	97.70	158.51	0.36

Culverts East of Merrill Road 236+00



Culvert East of Merrill Road 236+00



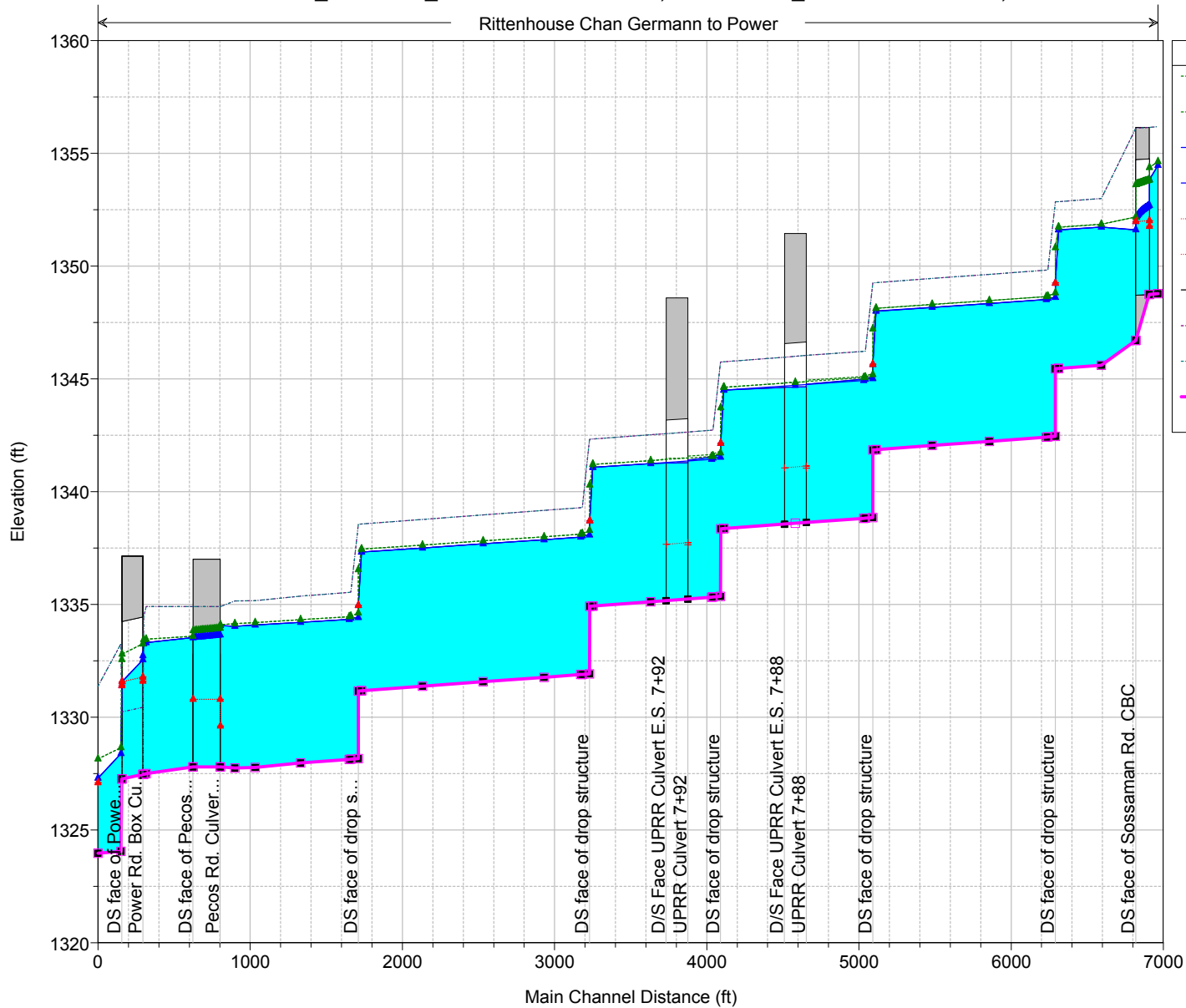
Culvert East of Merrill 236+00

HEC-RAS Plan: PP_4@48 Dep1.5 River: Flow East Merrill Reach: Flow East Merrill Profile: Q100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Flow East Merrill	2400	Q100	20.00	1412.00	1413.04		1413.08	0.001426	1.59	12.61	14.17	0.30
Flow East Merrill	1800	Q100	20.00	1410.98	1412.71		1412.73	0.000314	0.92	21.81	15.17	0.13
Flow East Merrill	1500	Q100	20.00	1410.46	1412.66		1412.67	0.000118	0.70	28.43	15.82	0.09
Flow East Merrill	1288	Q100	126.00	1410.10	1412.63	1410.70	1412.64	0.000143	0.96	131.76	56.95	0.11
Flow East Merrill	1264 UPRR Industrial		Culvert									
Flow East Merrill	1240	Q100	126.00	1410.00	1411.65		1411.66	0.000303	0.90	139.23	117.38	0.15
Flow East Merrill	501	Q100	126.00	1410.00	1411.39		1411.41	0.000377	1.15	109.40	109.69	0.20
Flow East Merrill	0	Q100	126.00	1410.00	1411.08	1410.56	1411.12	0.001000	1.63	77.31	95.70	0.32

Rittenhouse_Corrected_Effective Plan: 1) Rittenhouse_PP 1/14/2022 2) ExsCond 10/28/2021

Rittenhouse Chan Germann to Power



HEC-RAS River: Rittenhouse Chan Reach: Germann to Power Profile: Q100

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Germann to Power	10834	Q100	ExsCond	804.00	1348.78	1354.47		1354.63	0.001068	3.21	250.10	69.52	0.30
Germann to Power	10834	Q100	Rittenhouse_PP	804.00	1348.78	1354.47		1354.63	0.001068	3.21	250.10	69.52	0.30
Germann to Power	10777	Q100	ExsCond	804.00	1348.75	1353.84	1351.76	1354.37	0.000390	5.85	137.42	26.99	0.46
Germann to Power	10777	Q100	Rittenhouse_PP	804.00	1348.75	1353.84	1351.76	1354.37	0.000390	5.85	137.42	26.99	0.46
Germann to Power	10732			Culvert									
Germann to Power	10687	Q100	ExsCond	804.00	1346.71	1351.61		1352.19	0.000438	6.08	132.26	26.99	0.48
Germann to Power	10687	Q100	Rittenhouse_PP	804.00	1346.71	1351.60		1352.18	0.000440	6.09	132.02	26.99	0.49
Germann to Power	10462	Q100	ExsCond	804.00	1345.60	1351.73		1351.86	0.000457	2.85	281.70	73.07	0.26
Germann to Power	10462	Q100	Rittenhouse_PP	804.00	1345.60	1351.73		1351.85	0.000460	2.86	281.04	73.00	0.26
Germann to Power	10181	Q100	ExsCond	804.00	1345.46	1351.61		1351.73	0.000453	2.84	282.62	73.17	0.26
Germann to Power	10181	Q100	Rittenhouse_PP	804.00	1345.46	1351.60		1351.72	0.000456	2.85	281.90	73.09	0.26
Germann to Power	10180	Q100	ExsCond	804.00	1345.46	1351.61		1351.73	0.000762	2.85	282.57	73.16	0.26
Germann to Power	10180	Q100	Rittenhouse_PP	804.00	1345.46	1351.60		1351.72	0.000767	2.85	281.85	73.09	0.26
Germann to Power	10160	Q100	ExsCond	804.00	1345.45	1349.24	1349.24	1350.82	0.015883	10.07	79.83	25.65	1.01
Germann to Power	10160	Q100	Rittenhouse_PP	804.00	1345.45	1349.26	1349.26	1350.82	0.015653	10.02	80.21	25.65	1.00
Germann to Power	10159	Q100	ExsCond	804.00	1342.45	1348.61		1348.81	0.001011	3.59	223.80	48.65	0.30
Germann to Power	10159	Q100	Rittenhouse_PP	804.00	1342.45	1348.61		1348.81	0.001015	3.60	223.50	48.62	0.30
Germann to Power	10110	Q100	ExsCond	804.00	1342.43	1348.58		1348.67	0.000520	2.50	322.04	75.68	0.21
Germann to Power	10110	Q100	Rittenhouse_PP	804.00	1342.43	1348.57		1348.67	0.000522	2.50	321.57	75.64	0.21
Germann to Power	10100	Q100	ExsCond	804.00	1342.42	1348.52		1348.65	0.000468	2.88	279.29	72.81	0.26
Germann to Power	10100	Q100	Rittenhouse_PP	804.00	1342.42	1348.51		1348.64	0.000470	2.88	278.82	72.75	0.26
Germann to Power	9725	Q100	ExsCond	804.00	1342.23	1348.35		1348.48	0.000463	2.87	280.48	72.94	0.26
Germann to Power	9725	Q100	Rittenhouse_PP	804.00	1342.23	1348.34		1348.47	0.000465	2.87	279.95	72.88	0.26
Germann to Power	9350	Q100	ExsCond	804.00	1342.05	1348.17		1348.30	0.000460	2.86	281.02	73.00	0.26
Germann to Power	9350	Q100	Rittenhouse_PP	804.00	1342.05	1348.17		1348.29	0.000463	2.87	280.41	72.93	0.26
Germann to Power	8981	Q100	ExsCond	804.00	1341.86	1348.01		1348.13	0.000453	2.84	282.67	73.18	0.26
Germann to Power	8981	Q100	Rittenhouse_PP	804.00	1341.86	1348.00		1348.12	0.000456	2.85	281.99	73.10	0.26
Germann to Power	8980	Q100	ExsCond	804.00	1341.86	1348.01		1348.13	0.000761	2.84	282.62	73.17	0.26
Germann to Power	8980	Q100	Rittenhouse_PP	804.00	1341.86	1348.00		1348.12	0.000766	2.85	281.94	73.10	0.26
Germann to Power	8960	Q100	ExsCond	804.00	1341.85	1345.64	1345.64	1347.22	0.015900	10.07	79.80	25.65	1.01

HEC-RAS River: Rittenhouse Chan Reach: Germann to Power Profile: Q100 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Germann to Power	8960	Q100	Rittenhouse_PP	804.00	1341.85	1345.66	1345.66	1347.22	0.015685	10.03	80.16	25.65	1.00
Germann to Power	8959	Q100	ExsCond	804.00	1338.85	1345.02		1345.19	0.000905	3.36	239.47	53.67	0.28
Germann to Power	8959	Q100	Rittenhouse_PP	804.00	1338.85	1345.07		1345.24	0.000875	3.32	242.37	53.93	0.28
Germann to Power	8910	Q100	ExsCond	804.00	1338.83	1344.98		1345.08	0.000518	2.49	322.57	75.72	0.21
Germann to Power	8910	Q100	Rittenhouse_PP	804.00	1338.83	1345.04		1345.13	0.000499	2.46	326.74	76.05	0.21
Germann to Power	8900	Q100	ExsCond	804.00	1338.82	1344.93		1345.06	0.000466	2.87	279.82	72.86	0.26
Germann to Power	8900	Q100	Rittenhouse_PP	804.00	1338.82	1344.99		1345.11	0.000447	2.83	284.02	73.32	0.25
Germann to Power	8523	Q100	Rittenhouse_PP	804.00	1338.64	1344.76	1341.04	1344.94	0.000403	3.46	232.48	72.44	0.25
Germann to Power	8450	Q100	ExsCond	804.00	1338.60	1344.72		1344.85	0.000462	2.86	280.70	72.96	0.26
Germann to Power	8379	Q100	Rittenhouse_PP	804.00	1338.56	1344.63		1344.82	0.000409	3.49	230.49	72.51	0.25
Germann to Power	7981	Q100	ExsCond	804.00	1338.36	1344.51		1344.63	0.000453	2.84	282.65	73.17	0.26
Germann to Power	7981	Q100	Rittenhouse_PP	804.00	1338.36	1344.50		1344.62	0.000456	2.85	281.99	73.10	0.26
Germann to Power	7980	Q100	ExsCond	804.00	1338.36	1344.51		1344.63	0.000762	2.84	282.61	73.17	0.26
Germann to Power	7980	Q100	Rittenhouse_PP	804.00	1338.36	1344.50		1344.62	0.000766	2.85	281.94	73.10	0.26
Germann to Power	7960	Q100	ExsCond	804.00	1338.35	1342.14	1342.14	1343.72	0.015896	10.07	79.81	25.65	1.01
Germann to Power	7960	Q100	Rittenhouse_PP	804.00	1338.35	1342.16	1342.16	1343.72	0.015683	10.03	80.16	25.65	1.00
Germann to Power	7959	Q100	ExsCond	804.00	1335.35	1341.52		1341.72	0.001004	3.58	224.38	48.69	0.29
Germann to Power	7959	Q100	Rittenhouse_PP	804.00	1335.35	1341.61		1341.80	0.000952	3.52	228.68	49.04	0.29
Germann to Power	7910	Q100	ExsCond	804.00	1335.33	1341.49		1341.59	0.000516	2.49	322.97	75.75	0.21
Germann to Power	7910	Q100	Rittenhouse_PP	804.00	1335.33	1341.58		1341.67	0.000486	2.44	329.79	76.29	0.21
Germann to Power	7900	Q100	ExsCond	804.00	1335.32	1341.43		1341.56	0.000464	2.87	280.23	72.91	0.26
Germann to Power	7900	Q100	Rittenhouse_PP	804.00	1335.32	1341.53		1341.65	0.000434	2.80	287.07	73.66	0.25
Germann to Power	7745	Q100	Rittenhouse_PP	804.00	1335.24	1341.40	1337.64	1341.58	0.000398	3.44	233.88	72.47	0.24
Germann to Power	7601	Q100	Rittenhouse_PP	804.00	1335.17	1341.26		1341.45	0.000412	3.47	231.55	71.91	0.25
Germann to Power	7500	Q100	ExsCond	804.00	1335.12	1341.25		1341.38	0.000458	2.86	281.42	73.04	0.26
Germann to Power	7500	Q100	Rittenhouse_PP	804.00	1335.12	1341.25		1341.38	0.000458	2.86	281.42	73.04	0.26
Germann to Power	7121	Q100	ExsCond	804.00	1334.93	1341.08		1341.20	0.000453	2.84	282.75	73.19	0.26
Germann to Power	7121	Q100	Rittenhouse_PP	804.00	1334.93	1341.08		1341.20	0.000453	2.84	282.75	73.19	0.26

HEC-RAS River: Rittenhouse Chan Reach: Germann to Power Profile: Q100 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Germann to Power	7120	Q100	ExsCond	804.00	1334.93	1341.08		1341.20	0.000761	2.84	282.70	73.18	0.26
Germann to Power	7120	Q100	Rittenhouse_PP	804.00	1334.93	1341.08		1341.20	0.000761	2.84	282.70	73.18	0.26
Germann to Power	7100	Q100	ExsCond	804.00	1334.92	1338.71	1338.71	1340.29	0.015919	10.08	79.77	25.65	1.01
Germann to Power	7100	Q100	Rittenhouse_PP	804.00	1334.92	1338.71	1338.71	1340.29	0.015919	10.08	79.77	25.65	1.01
Germann to Power	7099	Q100	ExsCond	804.00	1331.92	1338.08		1338.28	0.001015	3.60	223.50	48.62	0.30
Germann to Power	7099	Q100	Rittenhouse_PP	804.00	1331.92	1338.08		1338.28	0.001015	3.60	223.50	48.62	0.30
Germann to Power	7050	Q100	ExsCond	804.00	1331.90	1338.04		1338.14	0.000522	2.50	321.57	75.64	0.21
Germann to Power	7050	Q100	Rittenhouse_PP	804.00	1331.90	1338.04		1338.14	0.000522	2.50	321.57	75.64	0.21
Germann to Power	7040	Q100	ExsCond	804.00	1331.89	1337.98		1338.11	0.000470	2.88	278.82	72.75	0.26
Germann to Power	7040	Q100	Rittenhouse_PP	804.00	1331.89	1337.98		1338.11	0.000470	2.88	278.82	72.75	0.26
Germann to Power	6800	Q100	ExsCond	804.00	1331.77	1337.87		1338.00	0.000468	2.88	279.38	72.82	0.26
Germann to Power	6800	Q100	Rittenhouse_PP	804.00	1331.77	1337.87		1338.00	0.000468	2.88	279.38	72.82	0.26
Germann to Power	6400	Q100	ExsCond	804.00	1331.57	1337.69		1337.81	0.000463	2.87	280.46	72.93	0.26
Germann to Power	6400	Q100	Rittenhouse_PP	804.00	1331.57	1337.69		1337.81	0.000463	2.87	280.46	72.93	0.26
Germann to Power	6000	Q100	ExsCond	804.00	1331.37	1337.50		1337.63	0.000457	2.85	281.69	73.07	0.26
Germann to Power	6000	Q100	Rittenhouse_PP	804.00	1331.37	1337.50		1337.63	0.000457	2.85	281.69	73.07	0.26
Germann to Power	5601	Q100	ExsCond	804.00	1331.17	1337.32		1337.45	0.000451	2.84	283.12	73.23	0.25
Germann to Power	5601	Q100	Rittenhouse_PP	804.00	1331.17	1337.32		1337.45	0.000451	2.84	283.12	73.23	0.25
Germann to Power	5600	Q100	ExsCond	804.00	1331.17	1337.32		1337.45	0.000758	2.84	283.06	73.22	0.25
Germann to Power	5600	Q100	Rittenhouse_PP	804.00	1331.17	1337.32		1337.45	0.000758	2.84	283.06	73.22	0.25
Germann to Power	5580	Q100	ExsCond	804.00	1331.16	1334.96	1334.96	1336.54	0.015887	10.07	79.80	25.65	1.01
Germann to Power	5580	Q100	Rittenhouse_PP	804.00	1331.16	1334.96	1334.96	1336.54	0.015887	10.07	79.80	25.65	1.01
Germann to Power	5579	Q100	ExsCond	804.00	1328.16	1334.42		1334.62	0.000951	3.51	228.78	49.05	0.29
Germann to Power	5579	Q100	Rittenhouse_PP	804.00	1328.16	1334.42		1334.62	0.000951	3.51	228.78	49.05	0.29
Germann to Power	5530	Q100	ExsCond	804.00	1328.14	1334.39		1334.48	0.000485	2.44	329.95	76.31	0.21
Germann to Power	5530	Q100	Rittenhouse_PP	804.00	1328.14	1334.39		1334.48	0.000485	2.44	329.95	76.31	0.21
Germann to Power	5520	Q100	ExsCond	804.00	1328.13	1334.34		1334.46	0.000433	2.80	287.23	73.67	0.25
Germann to Power	5520	Q100	Rittenhouse_PP	804.00	1328.13	1334.34		1334.46	0.000433	2.80	287.23	73.67	0.25
Germann to Power	5200	Q100	ExsCond	804.00	1327.97	1334.20		1334.32	0.000426	2.78	288.97	73.86	0.25
Germann to Power	5200	Q100	Rittenhouse_PP	804.00	1327.97	1334.20		1334.32	0.000426	2.78	288.97	73.86	0.25

HEC-RAS River: Rittenhouse Chan Reach: Germann to Power Profile: Q100 (Continued)

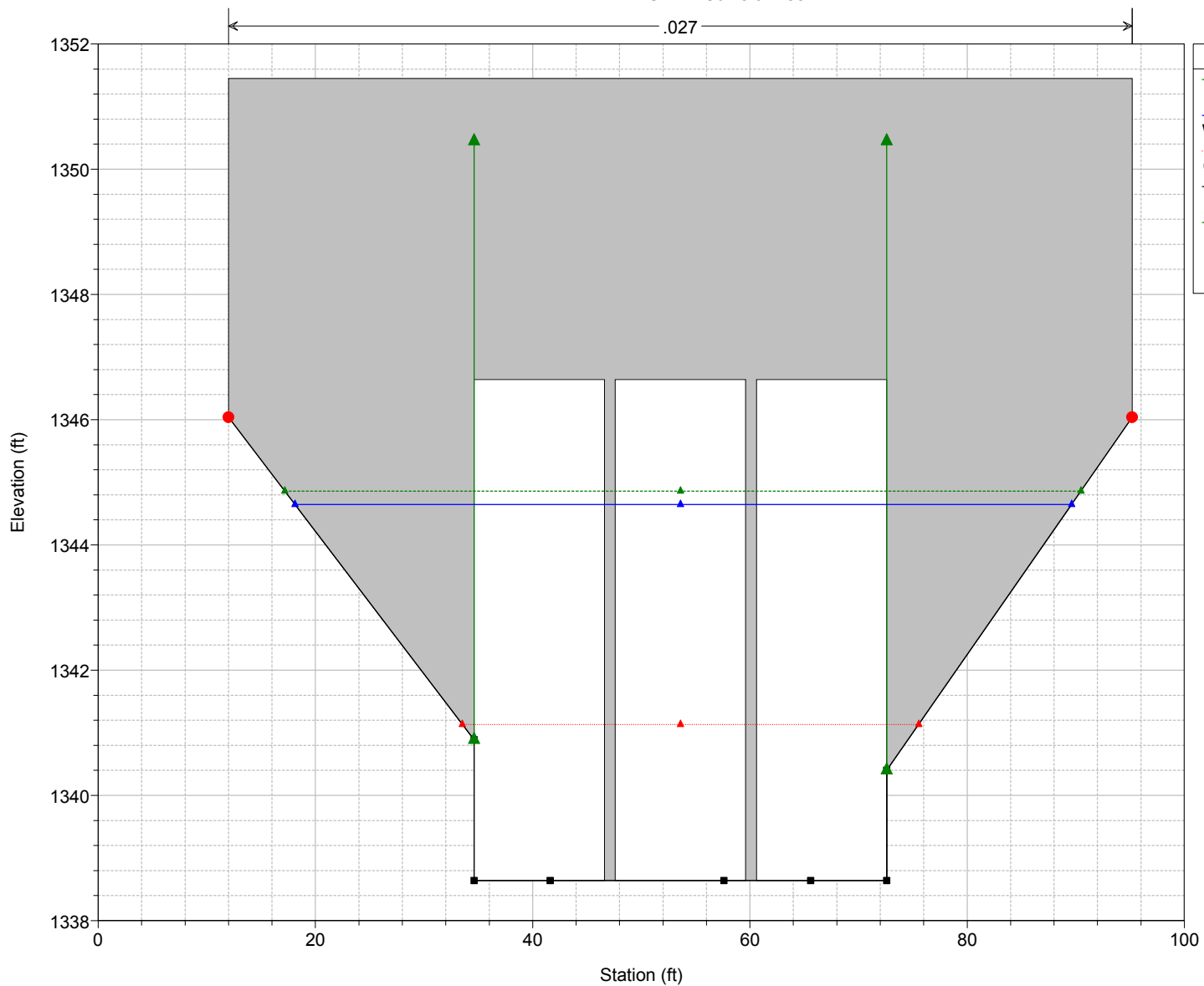
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Germann to Power	4901	Q100	ExsCond	804.00	1327.77	1334.08		1334.20	0.000403	2.73	294.85	74.50	0.24
Germann to Power	4901	Q100	Rittenhouse_PP	804.00	1327.77	1334.08		1334.20	0.000403	2.73	294.85	74.50	0.24
Germann to Power	4768	Q100	ExsCond	804.00	1327.75	1334.03		1334.14	0.000413	2.75	292.15	74.20	0.24
Germann to Power	4768	Q100	Rittenhouse_PP	804.00	1327.75	1334.03		1334.14	0.000413	2.75	292.15	74.20	0.24
Germann to Power	4673	Q100	ExsCond	804.00	1327.80	1334.06	1329.61	1334.10	0.000112	1.63	492.43	103.31	0.13
Germann to Power	4673	Q100	Rittenhouse_PP	804.00	1327.80	1334.06	1329.61	1334.10	0.000112	1.63	492.43	103.31	0.13
Germann to Power	4583			Culvert									
Germann to Power	4493	Q100	ExsCond	804.00	1327.80	1333.53		1333.59	0.000155	1.83	439.04	99.16	0.15
Germann to Power	4493	Q100	Rittenhouse_PP	804.00	1327.80	1333.53		1333.59	0.000155	1.83	439.04	99.16	0.15
Germann to Power	4250	Q100	ExsCond	1047.00	1327.50	1333.30		1333.46	0.000580	3.21	325.88	84.91	0.29
Germann to Power	4250	Q100	Rittenhouse_PP	1047.00	1327.50	1333.30		1333.46	0.000580	3.21	325.88	84.91	0.29
Germann to Power	4235	Q100	ExsCond	1047.00	1327.47	1333.26		1333.45	0.001039	3.52	297.70	62.80	0.28
Germann to Power	4235	Q100	Rittenhouse_PP	1047.00	1327.47	1333.26		1333.45	0.001039	3.52	297.70	62.80	0.28
Germann to Power	4230	Q100	ExsCond	1047.00	1327.46	1332.72	1331.60	1333.25	0.000445	5.80	180.59	52.79	0.55
Germann to Power	4230	Q100	Rittenhouse_PP	1047.00	1327.46	1332.72	1331.60	1333.25	0.000445	5.80	180.59	52.79	0.55
Germann to Power	4145.5			Bridge									
Germann to Power	4091	Q100	ExsCond	1047.00	1327.26	1331.40	1331.40	1332.56	0.001669	8.62	121.46	52.79	1.00
Germann to Power	4091	Q100	Rittenhouse_PP	1047.00	1327.26	1331.40	1331.40	1332.56	0.001669	8.62	121.46	52.79	1.00
Germann to Power	4085	Q100	ExsCond	1047.00	1324.05	1328.39		1328.65	0.001558	4.07	257.26	59.34	0.34
Germann to Power	4085	Q100	Rittenhouse_PP	1047.00	1324.05	1328.39		1328.65	0.001558	4.07	257.26	59.34	0.34
Germann to Power	3934	Q100	ExsCond	1047.00	1323.97	1327.30	1327.10	1328.16	0.006605	7.45	140.58	64.60	0.89
Germann to Power	3934	Q100	Rittenhouse_PP	1047.00	1323.97	1327.30	1327.10	1328.16	0.006605	7.45	140.58	64.60	0.89

Rittenhouse_Corrected_Effective

Plan: 1) ExsCond 10/28/2021
UPRR Culvert 7+88

2) Rittenhouse_PP 1/14/2022

.027



Legend

- EG Q100 - Rittenhouse_PP
- WS Q100 - Rittenhouse_PP
- Crit Q100 - Rittenhouse_PP
- Ground
- Ineff
- Bank Sta

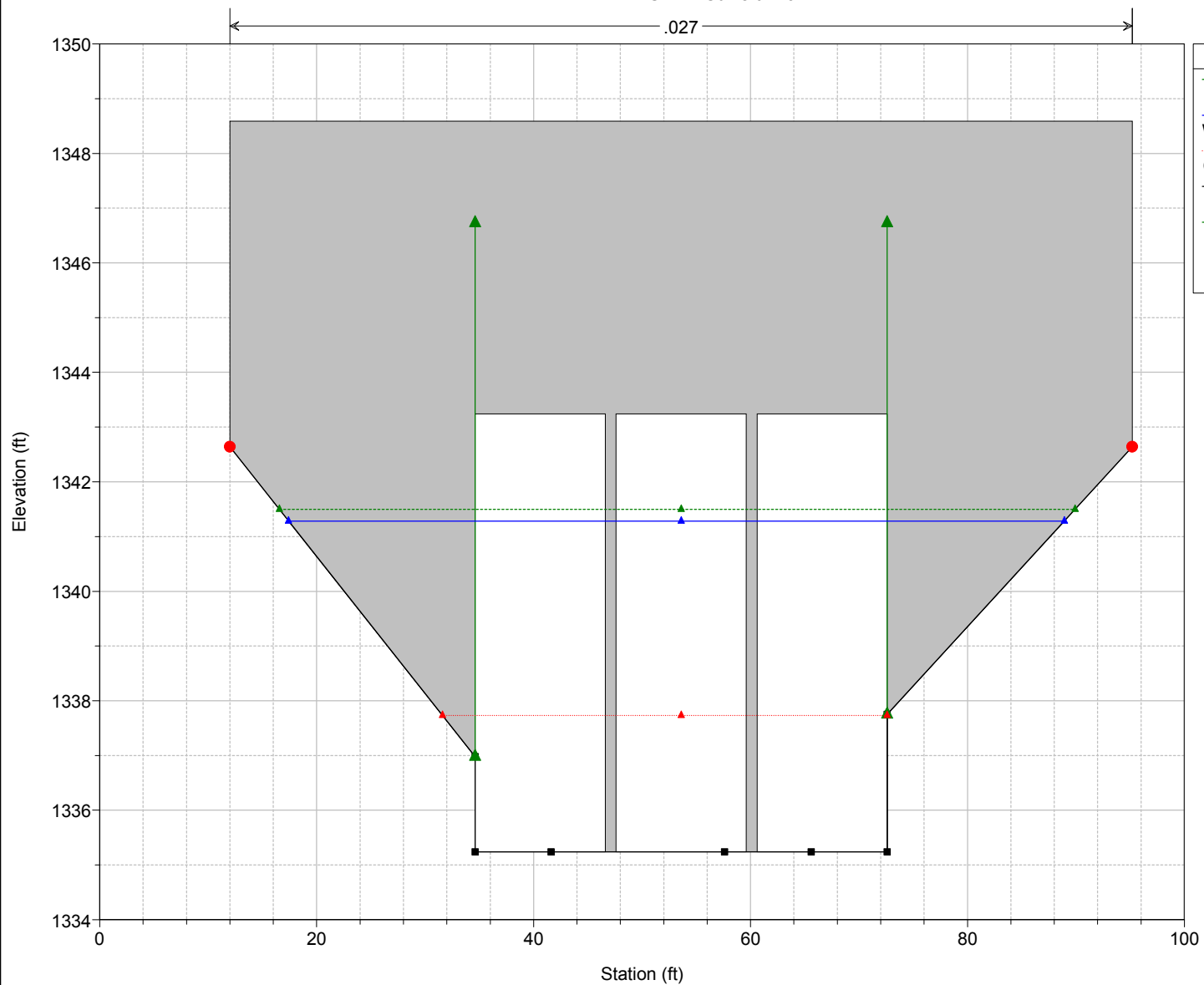
Rittenhouse_Corrected_Effective

Plan: 1) ExsCond 10/28/2021

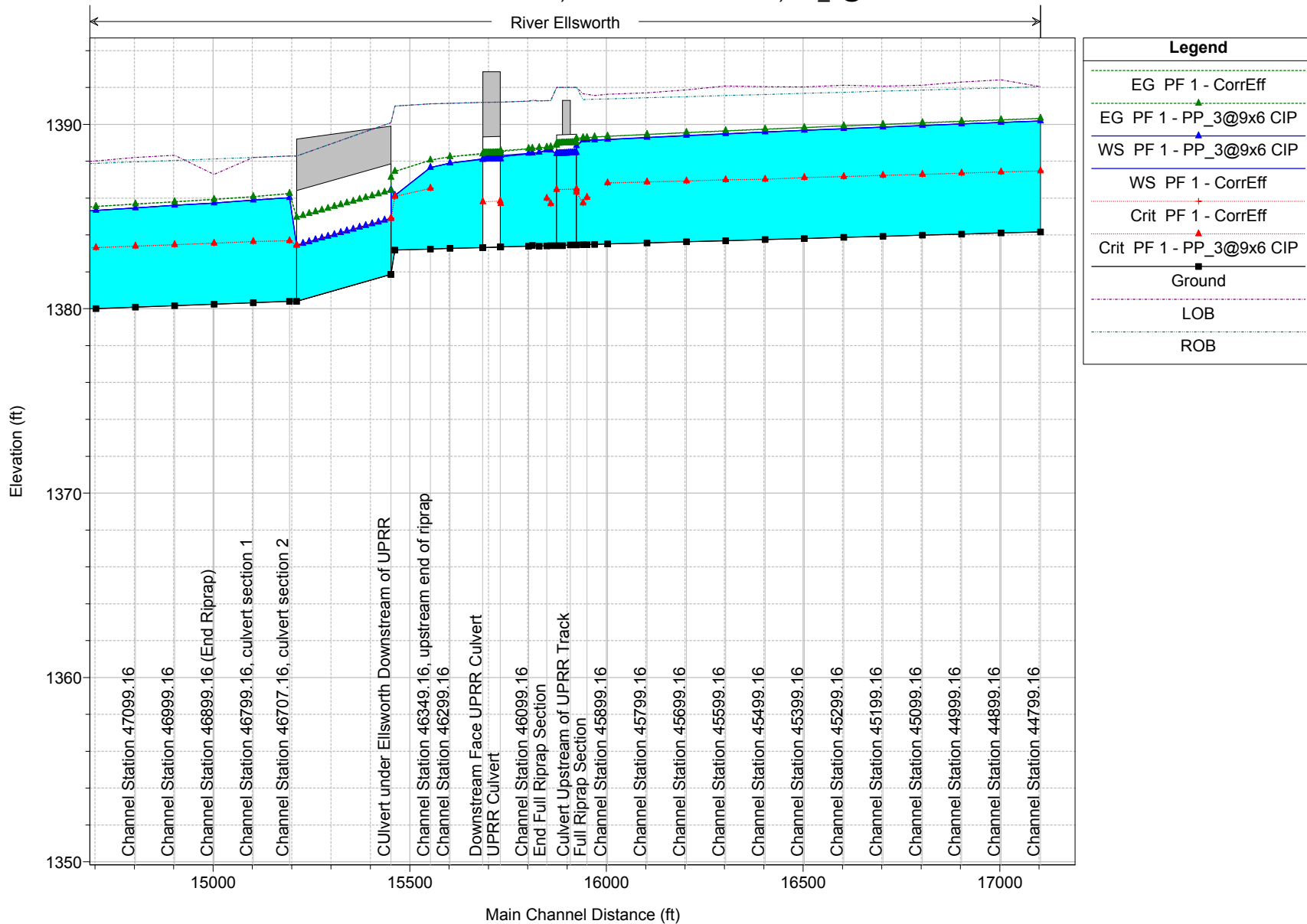
2) Rittenhouse_PP 1/14/2022

UPRR Culvert 7+92

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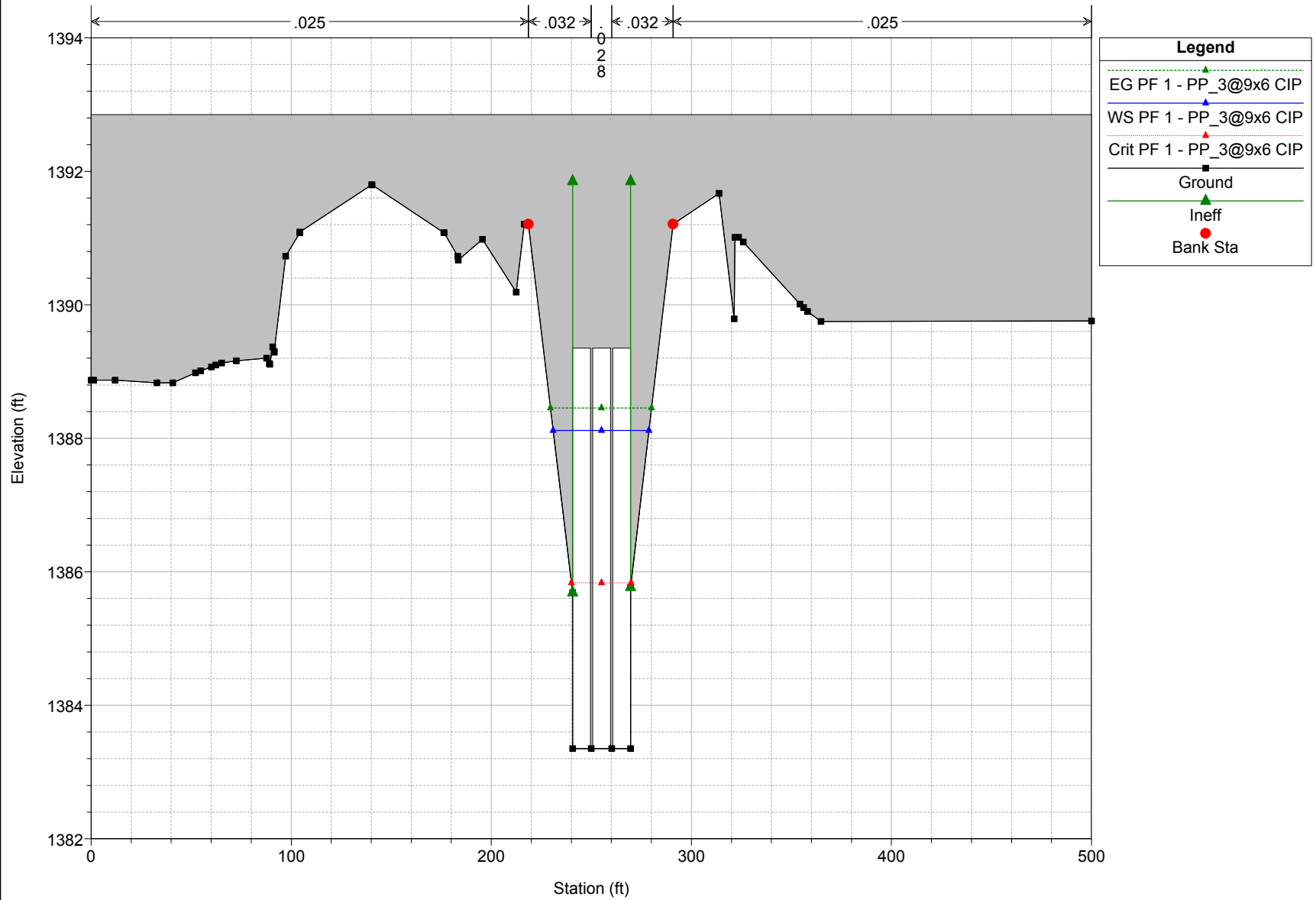


Ellsworth Channel Plan: 1) CorrEff 1/7/2022 2) PP_3@9x6 CIP 1/11/2022



Ellsworth Channel Plan: 1) CorrEff 1/7/2022 2) PP_3@9x6 CIP 1/11/2022

UPRR Culvert



HEC-RAS River: River Reach: Ellsworth Profile: PF 1

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	17100	PF 1	CorrEff	600.00	1384.17	1390.18	1387.48	1390.32	0.000785	3.00	199.97	59.32	0.28
Ellsworth	17100	PF 1	PP_3@9x6 CIP	600.00	1384.17	1390.19	1387.48	1390.33	0.000782	3.00	200.19	59.36	0.28
Ellsworth	17000	PF 1	CorrEff	600.00	1384.11	1390.10	1387.42	1390.24	0.000796	3.02	198.87	61.68	0.29
Ellsworth	17000	PF 1	PP_3@9x6 CIP	600.00	1384.11	1390.11	1387.42	1390.25	0.000794	3.01	199.11	61.79	0.29
Ellsworth	16900	PF 1	CorrEff	600.00	1384.05	1390.02	1387.36	1390.16	0.000810	3.04	197.59	66.44	0.29
Ellsworth	16900	PF 1	PP_3@9x6 CIP	600.00	1384.05	1390.02	1387.36	1390.17	0.000807	3.03	197.85	66.63	0.29
Ellsworth	16800	PF 1	CorrEff	600.00	1383.99	1389.94	1387.29	1390.08	0.000825	3.06	196.21	72.06	0.29
Ellsworth	16800	PF 1	PP_3@9x6 CIP	600.00	1383.99	1389.94	1387.29	1390.09	0.000822	3.05	196.48	72.32	0.29
Ellsworth	16700	PF 1	CorrEff	600.00	1383.93	1389.85	1387.24	1390.00	0.000842	3.08	194.75	78.72	0.29
Ellsworth	16700	PF 1	PP_3@9x6 CIP	600.00	1383.93	1389.86	1387.24	1390.00	0.000839	3.08	195.04	79.00	0.29
Ellsworth	16600	PF 1	CorrEff	600.00	1383.87	1389.76	1387.17	1389.91	0.000861	3.11	193.15	76.74	0.30
Ellsworth	16600	PF 1	PP_3@9x6 CIP	600.00	1383.87	1389.77	1387.17	1389.92	0.000857	3.10	193.46	77.05	0.30
Ellsworth	16500	PF 1	CorrEff	600.00	1383.81	1389.67	1387.12	1389.83	0.000881	3.13	191.51	64.73	0.30
Ellsworth	16500	PF 1	PP_3@9x6 CIP	600.00	1383.81	1389.68	1387.12	1389.83	0.000876	3.13	191.85	65.26	0.30
Ellsworth	16400	PF 1	CorrEff	600.00	1383.75	1389.58	1387.03	1389.74	0.000903	3.16	189.72	59.14	0.30
Ellsworth	16400	PF 1	PP_3@9x6 CIP	600.00	1383.75	1389.59	1387.03	1389.74	0.000898	3.16	190.08	59.33	0.30
Ellsworth	16300	PF 1	CorrEff	600.00	1383.69	1389.49	1387.00	1389.64	0.000928	3.20	187.74	57.54	0.31
Ellsworth	16300	PF 1	PP_3@9x6 CIP	600.00	1383.69	1389.49	1387.00	1389.65	0.000923	3.19	188.13	57.66	0.31
Ellsworth	16200	PF 1	CorrEff	600.00	1383.63	1389.39	1386.93	1389.55	0.000957	3.23	185.64	116.15	0.31
Ellsworth	16200	PF 1	PP_3@9x6 CIP	600.00	1383.63	1389.40	1386.93	1389.56	0.000951	3.22	186.06	116.24	0.31
Ellsworth	16100	PF 1	CorrEff	600.00	1383.57	1389.29	1386.87	1389.45	0.000989	3.27	183.33	73.28	0.32
Ellsworth	16100	PF 1	PP_3@9x6 CIP	600.00	1383.57	1389.29	1386.87	1389.46	0.000983	3.26	183.79	99.59	0.32
Ellsworth	16000	PF 1	CorrEff	600.00	1383.51	1389.18	1386.82	1389.35	0.001029	3.32	180.65	92.23	0.32
Ellsworth	16000	PF 1	PP_3@9x6 CIP	600.00	1383.51	1389.19	1386.82	1389.36	0.001021	3.31	181.15	95.81	0.32
Ellsworth	15966.5	PF 1	CorrEff	600.00	1383.49	1389.13		1389.31	0.001542	3.34	179.45	54.55	0.32
Ellsworth	15966.5	PF 1	PP_3@9x6 CIP	600.00	1383.49	1389.14		1389.32	0.001530	3.33	179.97	54.63	0.32
Ellsworth	15947.5	PF 1	CorrEff	600.00	1383.48	1389.15	1386.03	1389.27	0.000735	2.74	218.98	61.08	0.23
Ellsworth	15947.5	PF 1	PP_3@9x6 CIP	600.00	1383.48	1389.16	1386.03	1389.28	0.000730	2.73	219.42	61.13	0.23

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	15937.5	PF 1	CorrEff	600.00	1383.47	1389.13	1385.74	1389.27	0.000096	2.95	203.66	62.86	0.22
Ellsworth	15937.5	PF 1	PP_3@9x6 CIP	600.00	1383.47	1389.14	1385.74	1389.28	0.000095	2.94	204.02	62.90	0.22
Ellsworth	15920.67	PF 1	CorrEff	600.00	1383.46	1388.83	1386.31	1389.24	0.000484	5.12	117.21	21.83	0.39
Ellsworth	15920.67	PF 1	PP_3@9x6 CIP	600.00	1383.46	1388.84	1386.31	1389.25	0.000482	5.11	117.43	21.83	0.39
Ellsworth	15895			Culvert									
Ellsworth	15870.67	PF 1	CorrEff	600.00	1383.42	1388.39		1388.86	0.000607	5.53	108.45	21.83	0.44
Ellsworth	15870.67	PF 1	PP_3@9x6 CIP	600.00	1383.42	1388.40		1388.88	0.000602	5.52	108.75	21.83	0.44
Ellsworth	15855.5	PF 1	CorrEff	600.00	1383.42	1388.59	1385.70	1388.76	0.000957	3.30	181.80	60.28	0.26
Ellsworth	15855.5	PF 1	PP_3@9x6 CIP	600.00	1383.42	1388.60	1385.70	1388.77	0.000949	3.29	182.26	60.34	0.26
Ellsworth	15845.5	PF 1	CorrEff	600.00	1383.41	1388.60	1385.98	1388.75	0.000613	3.08	194.71	58.28	0.27
Ellsworth	15845.5	PF 1	PP_3@9x6 CIP	600.00	1383.41	1388.61	1385.98	1388.76	0.000607	3.07	195.30	58.35	0.27
Ellsworth	15826.6	PF 1	CorrEff	600.00	1383.40	1388.47		1388.72	0.001713	4.02	149.19	49.90	0.41
Ellsworth	15826.6	PF 1	PP_3@9x6 CIP	600.00	1383.40	1388.48		1388.73	0.001691	4.00	149.92	50.02	0.41
Ellsworth	15809	PF 1	CorrEff	600.00	1383.43	1388.43		1388.69	0.001801	4.10	146.40	49.44	0.42
Ellsworth	15809	PF 1	PP_3@9x6 CIP	600.00	1383.43	1388.44		1388.70	0.001777	4.08	147.15	49.56	0.42
Ellsworth	15800	PF 1	CorrEff	600.00	1383.39	1388.41		1388.67	0.001785	4.08	146.91	49.53	0.42
Ellsworth	15800	PF 1	PP_3@9x6 CIP	600.00	1383.39	1388.43		1388.68	0.001760	4.06	147.67	49.66	0.42
Ellsworth	15731.15	PF 1	PP_3@9x6 CIP	600.00	1383.35	1388.31	1385.71	1388.58	0.001083	4.17	143.89	49.42	0.33
Ellsworth	15700	PF 1	CorrEff	600.00	1383.33	1388.18		1388.47	0.002079	4.32	138.74	48.20	0.45
Ellsworth	15685.15	PF 1	PP_3@9x6 CIP	600.00	1383.32	1388.10		1388.39	0.001223	4.32	138.73	47.98	0.35
Ellsworth	15600	PF 1	CorrEff	600.00	1383.27	1387.90		1388.24	0.002576	4.69	128.03	46.39	0.50
Ellsworth	15600	PF 1	PP_3@9x6 CIP	600.00	1383.27	1387.90		1388.24	0.002576	4.69	128.03	46.39	0.50
Ellsworth	15550	PF 1	CorrEff	600.00	1383.24	1387.66	1386.53	1388.05	0.005239	5.07	118.40	44.69	0.55
Ellsworth	15550	PF 1	PP_3@9x6 CIP	600.00	1383.24	1387.66	1386.53	1388.05	0.005239	5.07	118.40	44.69	0.55
Ellsworth	15460	PF 1	CorrEff	600.00	1383.18	1386.14	1386.10	1387.45	0.002776	9.18	65.35	24.07	0.98
Ellsworth	15460	PF 1	PP_3@9x6 CIP	600.00	1383.18	1386.14	1386.10	1387.45	0.002776	9.18	65.35	24.07	0.98
Ellsworth	15450	PF 1	CorrEff	600.00	1381.86	1386.45	1384.91	1387.12	0.000770	6.60	90.87	20.11	0.54

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	15450	PF 1	PP_3@9x6 CIP	600.00	1381.86	1386.45	1384.91	1387.12	0.000770	6.60	90.87	20.11	0.54
Ellsworth	15350			Culvert									
Ellsworth	15192	PF 1	CorrEff	600.00	1380.41	1386.02	1383.69	1386.26	0.001564	3.89	154.20	54.27	0.33
Ellsworth	15192	PF 1	PP_3@9x6 CIP	600.00	1380.41	1386.02	1383.69	1386.26	0.001564	3.89	154.20	54.27	0.33
Ellsworth	15100	PF 1	CorrEff	600.00	1380.33	1385.89	1383.64	1386.07	0.001833	3.43	174.90	53.87	0.34
Ellsworth	15100	PF 1	PP_3@9x6 CIP	600.00	1380.33	1385.89	1383.64	1386.07	0.001833	3.43	174.90	53.87	0.34
Ellsworth	15000	PF 1	CorrEff	600.00	1380.25	1385.74	1383.55	1385.93	0.001194	3.51	170.80	53.25	0.35
Ellsworth	15000	PF 1	PP_3@9x6 CIP	600.00	1380.25	1385.74	1383.55	1385.93	0.001194	3.51	170.80	53.25	0.35
Ellsworth	14900	PF 1	CorrEff	600.00	1380.17	1385.61	1383.48	1385.80	0.001243	3.57	168.27	52.88	0.35
Ellsworth	14900	PF 1	PP_3@9x6 CIP	600.00	1380.17	1385.61	1383.48	1385.80	0.001243	3.57	168.27	52.88	0.35
Ellsworth	14800	PF 1	CorrEff	600.00	1380.09	1385.47	1383.40	1385.68	0.001301	3.63	165.41	52.45	0.36
Ellsworth	14800	PF 1	PP_3@9x6 CIP	600.00	1380.09	1385.47	1383.40	1385.68	0.001301	3.63	165.41	52.45	0.36
Ellsworth	14700	PF 1	CorrEff	600.00	1380.01	1385.33	1383.32	1385.54	0.001372	3.70	162.13	51.94	0.37
Ellsworth	14700	PF 1	PP_3@9x6 CIP	600.00	1380.01	1385.33	1383.32	1385.54	0.001372	3.70	162.13	51.94	0.37
Ellsworth	14600	PF 1	CorrEff	600.00	1379.93	1385.18	1383.23	1385.40	0.001461	3.79	158.37	51.35	0.38
Ellsworth	14600	PF 1	PP_3@9x6 CIP	600.00	1379.93	1385.18	1383.23	1385.40	0.001461	3.79	158.37	51.35	0.38
Ellsworth	14579	PF 1	CorrEff	600.00	1379.90	1385.15	1383.21	1385.37	0.001463	3.79	158.26	51.32	0.38
Ellsworth	14579	PF 1	PP_3@9x6 CIP	600.00	1379.90	1385.15	1383.21	1385.37	0.001463	3.79	158.26	51.32	0.38
Ellsworth	14569	PF 1	CorrEff	600.00	1379.90	1385.13		1385.35	0.001486	3.81	157.36	51.18	0.38
Ellsworth	14569	PF 1	PP_3@9x6 CIP	600.00	1379.90	1385.13		1385.35	0.001486	3.81	157.36	51.18	0.38
Ellsworth	14501	PF 1	CorrEff	600.00	1379.85	1385.01		1385.25	0.001573	3.90	154.02	50.66	0.39
Ellsworth	14501	PF 1	PP_3@9x6 CIP	600.00	1379.85	1385.01		1385.25	0.001573	3.90	154.02	50.66	0.39
Ellsworth	14491	PF 1	CorrEff	600.00	1379.84	1385.00	1383.15	1385.23	0.001583	3.90	153.66	50.60	0.39
Ellsworth	14491	PF 1	PP_3@9x6 CIP	600.00	1379.84	1385.00	1383.15	1385.23	0.001583	3.90	153.66	50.60	0.39
Ellsworth	14451	PF 1	CorrEff	600.00	1379.81	1384.93	1383.12	1385.17	0.001641	3.96	151.59	50.27	0.40
Ellsworth	14451	PF 1	PP_3@9x6 CIP	600.00	1379.81	1384.93	1383.12	1385.17	0.001641	3.96	151.59	50.27	0.40
Ellsworth	14400	PF 1	CorrEff	600.00	1379.77	1384.83	1383.06	1385.08	0.001722	4.03	148.90	49.86	0.41
Ellsworth	14400	PF 1	PP_3@9x6 CIP	600.00	1379.77	1384.83	1383.06	1385.08	0.001722	4.03	148.90	49.86	0.41

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	14300	PF 1	CorrEff	600.00	1379.69	1384.62	1382.99	1384.90	0.001932	4.21	142.61	48.84	0.43
Ellsworth	14300	PF 1	PP_3@9x6 CIP	600.00	1379.69	1384.62	1382.99	1384.90	0.001932	4.21	142.61	48.84	0.43
Ellsworth	14200	PF 1	CorrEff	600.00	1379.61	1384.38	1382.91	1384.69	0.002253	4.46	134.62	47.51	0.47
Ellsworth	14200	PF 1	PP_3@9x6 CIP	600.00	1379.61	1384.38	1382.91	1384.69	0.002253	4.46	134.62	47.51	0.47
Ellsworth	14100	PF 1	CorrEff	600.00	1379.53	1384.06	1382.85	1384.43	0.002821	4.85	123.74	45.64	0.52
Ellsworth	14100	PF 1	PP_3@9x6 CIP	600.00	1379.53	1384.06	1382.85	1384.43	0.002821	4.85	123.74	45.64	0.52
Ellsworth	14000	PF 1	CorrEff	600.00	1379.45	1384.06	1381.74	1384.19	0.001153	2.87	208.71	64.64	0.28
Ellsworth	14000	PF 1	PP_3@9x6 CIP	600.00	1379.45	1384.06	1381.74	1384.19	0.001153	2.87	208.71	64.64	0.28
Ellsworth	13900	PF 1	CorrEff	600.00	1379.37	1383.97	1381.66	1384.09	0.000738	2.89	207.95	64.55	0.28
Ellsworth	13900	PF 1	PP_3@9x6 CIP	600.00	1379.37	1383.97	1381.66	1384.09	0.000738	2.89	207.95	64.55	0.28
Ellsworth	13800	PF 1	CorrEff	600.00	1379.29	1383.89	1381.57	1384.02	0.000734	2.88	208.36	64.60	0.28
Ellsworth	13800	PF 1	PP_3@9x6 CIP	600.00	1379.29	1383.89	1381.57	1384.02	0.000734	2.88	208.36	64.60	0.28
Ellsworth	13700	PF 1	CorrEff	600.00	1379.21	1383.82	1381.49	1383.95	0.000730	2.87	208.79	77.72	0.28
Ellsworth	13700	PF 1	PP_3@9x6 CIP	600.00	1379.21	1383.82	1381.49	1383.95	0.000730	2.87	208.79	77.72	0.28
Ellsworth	13600	PF 1	CorrEff	600.00	1379.13	1383.75	1381.41	1383.87	0.000725	2.87	209.32	77.75	0.28
Ellsworth	13600	PF 1	PP_3@9x6 CIP	600.00	1379.13	1383.75	1381.41	1383.87	0.000725	2.87	209.32	77.75	0.28
Ellsworth	13500	PF 1	CorrEff	600.00	1379.05	1383.67	1381.34	1383.80	0.000720	2.86	209.81	80.14	0.28
Ellsworth	13500	PF 1	PP_3@9x6 CIP	600.00	1379.05	1383.67	1381.34	1383.80	0.000720	2.86	209.81	80.14	0.28
Ellsworth	13400	PF 1	CorrEff	600.00	1378.97	1383.60	1381.26	1383.73	0.000715	2.85	210.34	80.33	0.28
Ellsworth	13400	PF 1	PP_3@9x6 CIP	600.00	1378.97	1383.60	1381.26	1383.73	0.000715	2.85	210.34	80.33	0.28
Ellsworth	13300	PF 1	CorrEff	600.00	1378.89	1383.53	1381.17	1383.66	0.000710	2.84	210.98	70.44	0.28
Ellsworth	13300	PF 1	PP_3@9x6 CIP	600.00	1378.89	1383.53	1381.17	1383.66	0.000710	2.84	210.98	70.44	0.28
Ellsworth	13200	PF 1	CorrEff	600.00	1378.81	1383.46	1381.08	1383.59	0.000704	2.84	211.56	64.99	0.28
Ellsworth	13200	PF 1	PP_3@9x6 CIP	600.00	1378.81	1383.46	1381.08	1383.59	0.000704	2.84	211.56	64.99	0.28
Ellsworth	13100	PF 1	CorrEff	600.00	1378.73	1383.39	1381.02	1383.52	0.000698	2.83	212.24	65.07	0.28
Ellsworth	13100	PF 1	PP_3@9x6 CIP	600.00	1378.73	1383.39	1381.02	1383.52	0.000698	2.83	212.24	65.07	0.28
Ellsworth	13000	PF 1	CorrEff	600.00	1378.65	1383.32	1380.94	1383.45	0.000692	2.82	212.96	65.16	0.27
Ellsworth	13000	PF 1	PP_3@9x6 CIP	600.00	1378.65	1383.32	1380.94	1383.45	0.000692	2.82	212.96	65.16	0.27

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	12900	PF 1	CorrEff	600.00	1378.57	1383.25	1380.86	1383.38	0.000685	2.81	213.73	65.25	0.27
Ellsworth	12900	PF 1	PP_3@9x6 CIP	600.00	1378.57	1383.25	1380.86	1383.38	0.000685	2.81	213.73	65.25	0.27
Ellsworth	12800	PF 1	CorrEff	600.00	1378.49	1383.19	1380.78	1383.31	0.000678	2.80	214.54	65.35	0.27
Ellsworth	12800	PF 1	PP_3@9x6 CIP	600.00	1378.49	1383.19	1380.78	1383.31	0.000678	2.80	214.54	65.35	0.27
Ellsworth	12700	PF 1	CorrEff	600.00	1378.41	1383.12	1380.69	1383.24	0.000670	2.79	215.41	65.46	0.27
Ellsworth	12700	PF 1	PP_3@9x6 CIP	600.00	1378.41	1383.12	1380.69	1383.24	0.000670	2.79	215.41	65.46	0.27
Ellsworth	12600	PF 1	CorrEff	600.00	1378.33	1383.05	1380.61	1383.17	0.000662	2.77	216.32	65.57	0.27
Ellsworth	12600	PF 1	PP_3@9x6 CIP	600.00	1378.33	1383.05	1380.61	1383.17	0.000662	2.77	216.32	65.57	0.27
Ellsworth	12500	PF 1	CorrEff	600.00	1378.25	1382.99	1380.54	1383.11	0.000654	2.76	217.29	65.69	0.27
Ellsworth	12500	PF 1	PP_3@9x6 CIP	600.00	1378.25	1382.99	1380.54	1383.11	0.000654	2.76	217.29	65.69	0.27
Ellsworth	12400	PF 1	CorrEff	600.00	1378.17	1382.92	1380.45	1383.04	0.000646	2.75	218.32	65.81	0.27
Ellsworth	12400	PF 1	PP_3@9x6 CIP	600.00	1378.17	1382.92	1380.45	1383.04	0.000646	2.75	218.32	65.81	0.27
Ellsworth	12300	PF 1	CorrEff	600.00	1378.09	1382.86	1380.38	1382.98	0.000637	2.73	219.41	65.95	0.26
Ellsworth	12300	PF 1	PP_3@9x6 CIP	600.00	1378.09	1382.86	1380.38	1382.98	0.000637	2.73	219.41	65.95	0.26
Ellsworth	12200	PF 1	CorrEff	600.00	1378.01	1382.80	1380.30	1382.91	0.000628	2.72	220.56	66.09	0.26
Ellsworth	12200	PF 1	PP_3@9x6 CIP	600.00	1378.01	1382.80	1380.30	1382.91	0.000628	2.72	220.56	66.09	0.26
Ellsworth	12100	PF 1	CorrEff	600.00	1377.93	1382.74	1380.21	1382.85	0.000619	2.71	221.79	66.23	0.26
Ellsworth	12100	PF 1	PP_3@9x6 CIP	600.00	1377.93	1382.74	1380.21	1382.85	0.000619	2.71	221.79	66.23	0.26
Ellsworth	12000	PF 1	CorrEff	600.00	1377.85	1382.68	1380.13	1382.79	0.000609	2.69	223.08	66.39	0.26
Ellsworth	12000	PF 1	PP_3@9x6 CIP	600.00	1377.85	1382.68	1380.13	1382.79	0.000609	2.69	223.08	66.39	0.26
Ellsworth	11900	PF 1	CorrEff	600.00	1377.77	1382.62	1380.06	1382.73	0.000599	2.67	224.44	66.55	0.26
Ellsworth	11900	PF 1	PP_3@9x6 CIP	600.00	1377.77	1382.62	1380.06	1382.73	0.000599	2.67	224.44	66.55	0.26
Ellsworth	11800	PF 1	CorrEff	600.00	1377.69	1382.56	1379.98	1382.67	0.000589	2.66	225.86	66.73	0.25
Ellsworth	11800	PF 1	PP_3@9x6 CIP	600.00	1377.69	1382.56	1379.98	1382.67	0.000589	2.66	225.86	66.73	0.25
Ellsworth	11700	PF 1	CorrEff	600.00	1377.61	1382.50	1379.89	1382.61	0.000578	2.64	227.37	66.90	0.25
Ellsworth	11700	PF 1	PP_3@9x6 CIP	600.00	1377.61	1382.50	1379.89	1382.61	0.000578	2.64	227.37	66.90	0.25
Ellsworth	11600	PF 1	CorrEff	600.00	1377.53	1382.44	1379.82	1382.55	0.000567	2.62	228.98	67.11	0.25
Ellsworth	11600	PF 1	PP_3@9x6 CIP	600.00	1377.53	1382.44	1379.82	1382.55	0.000567	2.62	228.98	67.11	0.25

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	11500	PF 1	CorrEff	600.00	1377.45	1382.39	1379.73	1382.49	0.000556	2.60	230.61	67.29	0.25
Ellsworth	11500	PF 1	PP_3@9x6 CIP	600.00	1377.45	1382.39	1379.73	1382.49	0.000556	2.60	230.61	67.29	0.25
Ellsworth	11400	PF 1	CorrEff	600.00	1377.37	1382.35	1379.69	1382.44	0.000458	2.31	259.66	77.60	0.22
Ellsworth	11400	PF 1	PP_3@9x6 CIP	600.00	1377.37	1382.35	1379.69	1382.44	0.000458	2.31	259.66	77.60	0.22
Ellsworth	11300	PF 1	CorrEff	600.00	1377.29	1382.28	1379.57	1382.39	0.000532	2.56	234.34	67.74	0.24
Ellsworth	11300	PF 1	PP_3@9x6 CIP	600.00	1377.29	1382.28	1379.57	1382.39	0.000532	2.56	234.34	67.74	0.24
Ellsworth	11200	PF 1	CorrEff	600.00	1377.21	1382.23	1379.49	1382.33	0.000521	2.54	236.21	67.95	0.24
Ellsworth	11200	PF 1	PP_3@9x6 CIP	600.00	1377.21	1382.23	1379.49	1382.33	0.000521	2.54	236.21	67.95	0.24
Ellsworth	11100	PF 1	CorrEff	600.00	1377.13	1382.18	1379.41	1382.28	0.000509	2.52	238.21	68.18	0.24
Ellsworth	11100	PF 1	PP_3@9x6 CIP	600.00	1377.13	1382.18	1379.41	1382.28	0.000509	2.52	238.21	68.18	0.24
Ellsworth	11000	PF 1	CorrEff	600.00	1377.05	1382.13	1379.34	1382.23	0.000497	2.50	240.35	68.44	0.23
Ellsworth	11000	PF 1	PP_3@9x6 CIP	600.00	1377.05	1382.13	1379.34	1382.23	0.000497	2.50	240.35	68.44	0.23
Ellsworth	10900	PF 1	CorrEff	600.00	1376.97	1382.08	1379.25	1382.18	0.000484	2.47	242.55	68.70	0.23
Ellsworth	10900	PF 1	PP_3@9x6 CIP	600.00	1376.97	1382.08	1379.25	1382.18	0.000484	2.47	242.55	68.70	0.23
Ellsworth	10800	PF 1	CorrEff	600.00	1376.89	1382.04	1379.17	1382.13	0.000472	2.45	244.89	68.98	0.23
Ellsworth	10800	PF 1	PP_3@9x6 CIP	600.00	1376.89	1382.04	1379.17	1382.13	0.000472	2.45	244.89	68.98	0.23
Ellsworth	10700	PF 1	CorrEff	600.00	1376.81	1381.99	1379.10	1382.08	0.000460	2.43	247.21	69.24	0.23
Ellsworth	10700	PF 1	PP_3@9x6 CIP	600.00	1376.81	1381.99	1379.10	1382.08	0.000460	2.43	247.21	69.24	0.23
Ellsworth	10650.9	PF 1	CorrEff	600.00	1376.77	1381.97		1382.06	0.000610	2.42	248.19	69.34	0.23
Ellsworth	10650.9	PF 1	PP_3@9x6 CIP	600.00	1376.77	1381.97		1382.06	0.000610	2.42	248.19	69.34	0.23
Ellsworth	10623.7	PF 1	CorrEff	600.00	1376.75	1381.97	1378.74	1382.03	0.000363	1.82	329.18	78.69	0.16
Ellsworth	10623.7	PF 1	PP_3@9x6 CIP	600.00	1376.75	1381.97	1378.74	1382.03	0.000363	1.82	329.18	78.69	0.16
Ellsworth	10613.7	PF 1	CorrEff	600.00	1376.74	1381.97	1378.44	1382.02	0.000040	1.80	332.46	79.67	0.14
Ellsworth	10613.7	PF 1	PP_3@9x6 CIP	600.00	1376.74	1381.97	1378.44	1382.02	0.000040	1.80	332.46	79.67	0.14
Ellsworth	10600.87	PF 1	CorrEff	600.00	1376.73	1381.96	1378.26	1382.02	0.000061	2.07	289.97	55.50	0.16
Ellsworth	10600.87	PF 1	PP_3@9x6 CIP	600.00	1376.73	1381.96	1378.26	1382.02	0.000061	2.07	289.97	55.50	0.16
Ellsworth	10570			Culvert									

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	10539.74	PF 1	CorrEff	600.00	1376.68	1381.90		1381.96	0.000061	2.07	289.50	55.50	0.16
Ellsworth	10539.74	PF 1	PP_3@9x6 CIP	600.00	1376.68	1381.90		1381.96	0.000061	2.07	289.50	55.50	0.16
Ellsworth	10528.5	PF 1	CorrEff	600.00	1376.67	1381.90	1378.37	1381.96	0.000299	1.85	323.71	80.75	0.15
Ellsworth	10528.5	PF 1	PP_3@9x6 CIP	600.00	1376.67	1381.90	1378.37	1381.96	0.000299	1.85	323.71	80.75	0.15
Ellsworth	10518.5	PF 1	CorrEff	600.00	1376.66	1381.90	1378.64	1381.96	0.000189	1.82	330.54	79.60	0.15
Ellsworth	10518.5	PF 1	PP_3@9x6 CIP	600.00	1376.66	1381.90	1378.64	1381.96	0.000189	1.82	330.54	79.60	0.15
Ellsworth	10490.7	PF 1	CorrEff	600.00	1376.64	1381.85		1381.94	0.000449	2.41	249.36	69.49	0.22
Ellsworth	10490.7	PF 1	PP_3@9x6 CIP	600.00	1376.64	1381.85		1381.94	0.000449	2.41	249.36	69.49	0.22
Ellsworth	10400	PF 1	CorrEff	600.00	1376.57	1381.81	1378.85	1381.90	0.000439	2.39	251.49	69.73	0.22
Ellsworth	10400	PF 1	PP_3@9x6 CIP	600.00	1376.57	1381.81	1378.85	1381.90	0.000439	2.39	251.49	69.73	0.22
Ellsworth	10300	PF 1	CorrEff	600.00	1376.49	1381.77	1378.77	1381.86	0.000426	2.36	254.14	70.03	0.22
Ellsworth	10300	PF 1	PP_3@9x6 CIP	600.00	1376.49	1381.77	1378.77	1381.86	0.000426	2.36	254.14	70.03	0.22
Ellsworth	10200	PF 1	CorrEff	600.00	1376.41	1381.73	1378.69	1381.82	0.000414	2.34	256.90	70.35	0.22
Ellsworth	10200	PF 1	PP_3@9x6 CIP	600.00	1376.41	1381.73	1378.69	1381.82	0.000414	2.34	256.90	70.35	0.22
Ellsworth	10100	PF 1	CorrEff	600.00	1376.33	1381.69	1378.62	1381.77	0.000402	2.31	259.75	70.67	0.21
Ellsworth	10100	PF 1	PP_3@9x6 CIP	600.00	1376.33	1381.69	1378.62	1381.77	0.000402	2.31	259.75	70.67	0.21
Ellsworth	10000	PF 1	CorrEff	600.00	1376.25	1381.65	1378.53	1381.73	0.000390	2.28	262.71	71.01	0.21
Ellsworth	10000	PF 1	PP_3@9x6 CIP	600.00	1376.25	1381.65	1378.53	1381.73	0.000390	2.28	262.71	71.01	0.21
Ellsworth	9900	PF 1	CorrEff	600.00	1376.17	1381.62	1378.46	1381.70	0.000377	2.26	265.81	71.36	0.21
Ellsworth	9900	PF 1	PP_3@9x6 CIP	600.00	1376.17	1381.62	1378.46	1381.70	0.000377	2.26	265.81	71.36	0.21
Ellsworth	9800	PF 1	CorrEff	600.00	1376.09	1381.58	1378.38	1381.66	0.000366	2.23	268.93	71.70	0.20
Ellsworth	9800	PF 1	PP_3@9x6 CIP	600.00	1376.09	1381.58	1378.38	1381.66	0.000366	2.23	268.93	71.70	0.20
Ellsworth	9700	PF 1	CorrEff	600.00	1376.01	1381.54	1378.29	1381.61	0.000618	2.21	271.38	71.98	0.20
Ellsworth	9700	PF 1	PP_3@9x6 CIP	600.00	1376.01	1381.54	1378.29	1381.61	0.000618	2.21	271.38	71.98	0.20
Ellsworth	9600	PF 1	CorrEff	1172.00	1375.93	1381.33	1378.65	1381.50	0.001307	3.33	351.82	88.82	0.29
Ellsworth	9600	PF 1	PP_3@9x6 CIP	1172.00	1375.93	1381.33	1378.65	1381.50	0.001307	3.33	351.82	88.82	0.29
Ellsworth	9500	PF 1	CorrEff	1172.00	1375.85	1381.30	1378.22	1381.40	0.000411	2.62	447.91	108.19	0.23
Ellsworth	9500	PF 1	PP_3@9x6 CIP	1172.00	1375.85	1381.30	1378.22	1381.40	0.000411	2.62	447.91	108.19	0.23

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	9400	PF 1	CorrEff	1172.00	1375.77	1381.26	1378.14	1381.36	0.000400	2.59	452.26	108.50	0.22
Ellsworth	9400	PF 1	PP_3@9x6 CIP	1172.00	1375.77	1381.26	1378.14	1381.36	0.000400	2.59	452.26	108.50	0.22
Ellsworth	9340.54	PF 1	CorrEff	1172.00	1375.72	1381.23		1381.33	0.000480	2.58	454.89	108.70	0.22
Ellsworth	9340.54	PF 1	PP_3@9x6 CIP	1172.00	1375.72	1381.23		1381.33	0.000480	2.58	454.89	108.70	0.22
Ellsworth	9314.67	PF 1	CorrEff	1172.00	1375.70	1381.23	1378.00	1381.31	0.000486	2.33	503.69	121.34	0.19
Ellsworth	9314.67	PF 1	PP_3@9x6 CIP	1172.00	1375.70	1381.23	1378.00	1381.31	0.000486	2.33	503.69	121.34	0.19
Ellsworth	9304.67	PF 1	CorrEff	1172.00	1375.69	1381.21	1377.85	1381.31	0.000072	2.47	474.95	124.80	0.19
Ellsworth	9304.67	PF 1	PP_3@9x6 CIP	1172.00	1375.69	1381.21	1377.85	1381.31	0.000072	2.47	474.95	124.80	0.19
Ellsworth	9288.82	PF 1	CorrEff	1172.00	1375.68	1381.19	1377.57	1381.30	0.000090	2.69	435.15	79.00	0.20
Ellsworth	9288.82	PF 1	PP_3@9x6 CIP	1172.00	1375.68	1381.19	1377.57	1381.30	0.000090	2.69	435.15	79.00	0.20
Ellsworth	9248			Culvert									
Ellsworth	9207.65	PF 1	CorrEff	1172.00	1375.61	1381.09		1381.21	0.000092	2.71	433.00	79.00	0.20
Ellsworth	9207.65	PF 1	PP_3@9x6 CIP	1172.00	1375.61	1381.09		1381.21	0.000092	2.71	433.00	79.00	0.20
Ellsworth	9193.48	PF 1	CorrEff	1172.00	1375.60	1381.10	1377.77	1381.19	0.000518	2.48	472.56	125.45	0.19
Ellsworth	9193.48	PF 1	PP_3@9x6 CIP	1172.00	1375.60	1381.10	1377.77	1381.19	0.000518	2.48	472.56	125.45	0.19
Ellsworth	9183.48	PF 1	CorrEff	1172.00	1375.59	1381.10	1377.84	1381.18	0.000236	2.33	503.33	122.82	0.19
Ellsworth	9183.48	PF 1	PP_3@9x6 CIP	1172.00	1375.59	1381.10	1377.84	1381.18	0.000236	2.33	503.33	122.82	0.19
Ellsworth	9154.01	PF 1	CorrEff	1172.00	1375.57	1381.07		1381.17	0.000397	2.59	453.24	108.58	0.22
Ellsworth	9154.01	PF 1	PP_3@9x6 CIP	1172.00	1375.57	1381.07		1381.17	0.000397	2.59	453.24	108.58	0.22
Ellsworth	9143	PF 1	CorrEff	1172.00	1375.56	1381.06	1377.93	1381.17	0.000396	2.58	453.88	108.63	0.22
Ellsworth	9143	PF 1	PP_3@9x6 CIP	1172.00	1375.56	1381.06	1377.93	1381.17	0.000396	2.58	453.88	108.63	0.22
Ellsworth	9100	PF 1	CorrEff	1172.00	1375.53	1381.04	1377.91	1381.15	0.000392	2.57	455.33	108.74	0.22
Ellsworth	9100	PF 1	PP_3@9x6 CIP	1172.00	1375.53	1381.04	1377.91	1381.15	0.000392	2.57	455.33	108.74	0.22
Ellsworth	9000	PF 1	CorrEff	1172.00	1375.45	1381.01	1377.81	1381.11	0.000381	2.55	459.99	109.08	0.22
Ellsworth	9000	PF 1	PP_3@9x6 CIP	1172.00	1375.45	1381.01	1377.81	1381.11	0.000381	2.55	459.99	109.08	0.22
Ellsworth	8900	PF 1	CorrEff	1172.00	1375.37	1380.97	1377.74	1381.07	0.000370	2.52	464.79	109.42	0.22
Ellsworth	8900	PF 1	PP_3@9x6 CIP	1172.00	1375.37	1380.97	1377.74	1381.07	0.000370	2.52	464.79	109.42	0.22
Ellsworth	8800	PF 1	CorrEff	1172.00	1375.29	1380.96	1377.35	1381.02	0.000397	2.04	575.78	120.97	0.16

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	8800	PF 1	PP_3@9x6 CIP	1172.00	1375.29	1380.96	1377.35	1381.02	0.000397	2.04	575.78	120.97	0.16
Ellsworth	8700	PF 1	CorrEff	1172.00	1375.21	1380.89	1377.59	1380.98	0.000352	2.48	472.94	110.02	0.21
Ellsworth	8700	PF 1	PP_3@9x6 CIP	1172.00	1375.21	1380.89	1377.59	1380.98	0.000352	2.48	472.94	110.02	0.21
Ellsworth	8600	PF 1	CorrEff	1744.00	1375.13	1380.69	1378.09	1380.91	0.000842	3.79	460.08	109.07	0.33
Ellsworth	8600	PF 1	PP_3@9x6 CIP	1744.00	1375.13	1380.69	1378.09	1380.91	0.000842	3.79	460.08	109.07	0.33
Ellsworth	8500	PF 1	CorrEff	1744.00	1375.05	1380.60	1377.99	1380.83	0.000845	3.79	459.59	109.05	0.33
Ellsworth	8500	PF 1	PP_3@9x6 CIP	1744.00	1375.05	1380.60	1377.99	1380.83	0.000845	3.79	459.59	109.05	0.33
Ellsworth	8400	PF 1	CorrEff	1744.00	1374.97	1380.52	1377.93	1380.74	0.000848	3.80	459.02	109.01	0.33
Ellsworth	8400	PF 1	PP_3@9x6 CIP	1744.00	1374.97	1380.52	1377.93	1380.74	0.000848	3.80	459.02	109.01	0.33
Ellsworth	8300	PF 1	CorrEff	1744.00	1374.89	1380.43		1380.66	0.000851	3.80	458.37	108.95	0.33
Ellsworth	8300	PF 1	PP_3@9x6 CIP	1744.00	1374.89	1380.43		1380.66	0.000851	3.80	458.37	108.95	0.33
Ellsworth	8200	PF 1	CorrEff	1744.00	1374.81	1380.35		1380.57	0.000855	3.81	457.74	108.91	0.33
Ellsworth	8200	PF 1	PP_3@9x6 CIP	1744.00	1374.81	1380.35		1380.57	0.000855	3.81	457.74	108.91	0.33
Ellsworth	8100	PF 1	CorrEff	1744.00	1374.73	1380.26		1380.49	0.000859	3.82	457.04	108.86	0.33
Ellsworth	8100	PF 1	PP_3@9x6 CIP	1744.00	1374.73	1380.26		1380.49	0.000859	3.82	457.04	108.86	0.33
Ellsworth	8000	PF 1	CorrEff	1744.00	1374.65	1380.17		1380.40	0.000863	3.82	456.26	108.79	0.33
Ellsworth	8000	PF 1	PP_3@9x6 CIP	1744.00	1374.65	1380.17		1380.40	0.000863	3.82	456.26	108.79	0.33
Ellsworth	7900	PF 1	CorrEff	1744.00	1374.57	1380.09	1377.53	1380.31	0.000867	3.83	455.45	168.73	0.33
Ellsworth	7900	PF 1	PP_3@9x6 CIP	1744.00	1374.57	1380.09	1377.53	1380.31	0.000867	3.83	455.45	168.73	0.33
Ellsworth	7800	PF 1	CorrEff	1744.00	1374.49	1380.00	1377.45	1380.23	0.000872	3.84	454.59	265.38	0.33
Ellsworth	7800	PF 1	PP_3@9x6 CIP	1744.00	1374.49	1380.00	1377.45	1380.23	0.000872	3.84	454.59	265.38	0.33
Ellsworth	7700	PF 1	CorrEff	1744.00	1374.41	1379.91	1377.36	1380.14	0.000877	3.84	453.71	195.41	0.33
Ellsworth	7700	PF 1	PP_3@9x6 CIP	1744.00	1374.41	1379.91	1377.36	1380.14	0.000877	3.84	453.71	195.41	0.33
Ellsworth	7600	PF 1	CorrEff	1744.00	1374.33	1379.82	1377.28	1380.05	0.000882	3.85	452.80	115.22	0.33
Ellsworth	7600	PF 1	PP_3@9x6 CIP	1744.00	1374.33	1379.82	1377.28	1380.05	0.000882	3.85	452.80	115.22	0.33
Ellsworth	7500	PF 1	CorrEff	1744.00	1374.25	1379.73	1377.21	1379.96	0.000888	3.86	451.72	108.47	0.33
Ellsworth	7500	PF 1	PP_3@9x6 CIP	1744.00	1374.25	1379.73	1377.21	1379.96	0.000888	3.86	451.72	108.47	0.33
Ellsworth	7400	PF 1	CorrEff	1744.00	1374.17	1379.64		1379.87	0.000894	3.87	450.54	108.37	0.33

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	7400	PF 1	PP_3@9x6 CIP	1744.00	1374.17	1379.64		1379.87	0.000894	3.87	450.54	108.37	0.33
Ellsworth	7300	PF 1	CorrEff	1744.00	1374.09	1379.55		1379.78	0.000901	3.88	449.33	108.28	0.34
Ellsworth	7300	PF 1	PP_3@9x6 CIP	1744.00	1374.09	1379.55		1379.78	0.000901	3.88	449.33	108.28	0.34
Ellsworth	7200	PF 1	CorrEff	1744.00	1374.01	1379.46		1379.69	0.000909	3.89	448.08	108.20	0.34
Ellsworth	7200	PF 1	PP_3@9x6 CIP	1744.00	1374.01	1379.46		1379.69	0.000909	3.89	448.08	108.20	0.34
Ellsworth	7100	PF 1	CorrEff	1744.00	1373.93	1379.37		1379.60	0.000917	3.90	446.66	108.09	0.34
Ellsworth	7100	PF 1	PP_3@9x6 CIP	1744.00	1373.93	1379.37		1379.60	0.000917	3.90	446.66	108.09	0.34
Ellsworth	7000	PF 1	CorrEff	1744.00	1373.85	1379.27		1379.51	0.000926	3.92	445.21	107.99	0.34
Ellsworth	7000	PF 1	PP_3@9x6 CIP	1744.00	1373.85	1379.27		1379.51	0.000926	3.92	445.21	107.99	0.34
Ellsworth	6900	PF 1	CorrEff	1744.00	1373.77	1379.18		1379.42	0.000935	3.93	443.61	107.87	0.34
Ellsworth	6900	PF 1	PP_3@9x6 CIP	1744.00	1373.77	1379.18		1379.42	0.000935	3.93	443.61	107.87	0.34
Ellsworth	6800	PF 1	CorrEff	1744.00	1373.69	1379.08		1379.32	0.000946	3.95	441.82	107.74	0.34
Ellsworth	6800	PF 1	PP_3@9x6 CIP	1744.00	1373.69	1379.08		1379.32	0.000946	3.95	441.82	107.74	0.34
Ellsworth	6700	PF 1	CorrEff	1744.00	1373.61	1378.98		1379.23	0.000959	3.97	439.77	107.58	0.35
Ellsworth	6700	PF 1	PP_3@9x6 CIP	1744.00	1373.61	1378.98		1379.23	0.000959	3.97	439.77	107.58	0.35
Ellsworth	6687.62	PF 1	CorrEff	1744.00	1373.60	1378.97		1379.21	0.001171	3.97	439.33	107.54	0.35
Ellsworth	6687.62	PF 1	PP_3@9x6 CIP	1744.00	1373.60	1378.97		1379.21	0.001171	3.97	439.33	107.54	0.35
Ellsworth	6675.17*	PF 1	CorrEff	1744.00	1373.59	1378.95	1376.42	1379.19	0.001403	3.92	445.22	113.69	0.32
Ellsworth	6675.17*	PF 1	PP_3@9x6 CIP	1744.00	1373.59	1378.95	1376.42	1379.19	0.001403	3.92	445.22	113.69	0.32
Ellsworth	6662.73	PF 1	CorrEff	1744.00	1373.58	1378.88	1376.39	1379.18	0.000237	4.40	396.45	118.15	0.35
Ellsworth	6662.73	PF 1	PP_3@9x6 CIP	1744.00	1373.58	1378.88	1376.39	1379.18	0.000237	4.40	396.45	118.15	0.35
Ellsworth	6646.88	PF 1	CorrEff	1744.00	1373.56	1378.76	1376.34	1379.16	0.000354	5.08	343.41	66.00	0.39
Ellsworth	6646.88	PF 1	PP_3@9x6 CIP	1744.00	1373.56	1378.76	1376.34	1379.16	0.000354	5.08	343.41	66.00	0.39
Ellsworth	6615			Culvert									
Ellsworth	6585.95	PF 1	CorrEff	1744.00	1373.47	1378.32		1378.78	0.000443	5.45	320.06	66.00	0.44
Ellsworth	6585.95	PF 1	PP_3@9x6 CIP	1744.00	1373.47	1378.32		1378.78	0.000443	5.45	320.06	66.00	0.44
Ellsworth	6571.49	PF 1	CorrEff	1744.00	1373.45	1378.36	1376.30	1378.72	0.002229	4.78	364.71	117.05	0.40
Ellsworth	6571.49	PF 1	PP_3@9x6 CIP	1744.00	1373.45	1378.36	1376.30	1378.72	0.002229	4.78	364.71	117.05	0.40

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	6559.04*	PF 1	CorrEff	1744.00	1373.44	1378.37	1376.26	1378.67	0.001183	4.37	398.73	111.67	0.37
Ellsworth	6559.04*	PF 1	PP_3@9x6 CIP	1744.00	1373.44	1378.37	1376.26	1378.67	0.001183	4.37	398.73	111.67	0.37
Ellsworth	6546.60	PF 1	CorrEff	1744.00	1373.42	1378.34		1378.65	0.001330	4.44	392.40	103.99	0.40
Ellsworth	6546.60	PF 1	PP_3@9x6 CIP	1744.00	1373.42	1378.34		1378.65	0.001330	4.44	392.40	103.99	0.40
Ellsworth	6527	PF 1	CorrEff	1744.00	1373.39	1378.32		1378.62	0.001326	4.44	392.88	104.04	0.40
Ellsworth	6527	PF 1	PP_3@9x6 CIP	1744.00	1373.39	1378.32		1378.62	0.001326	4.44	392.88	104.04	0.40
Ellsworth	6500	PF 1	CorrEff	1744.00	1373.35	1378.28		1378.59	0.001322	4.43	393.27	104.05	0.40
Ellsworth	6500	PF 1	PP_3@9x6 CIP	1744.00	1373.35	1378.28		1378.59	0.001322	4.43	393.27	104.05	0.40
Ellsworth	6400	PF 1	CorrEff	1744.00	1373.21	1378.15		1378.45	0.001312	4.42	394.23	104.13	0.40
Ellsworth	6400	PF 1	PP_3@9x6 CIP	1744.00	1373.21	1378.15		1378.45	0.001312	4.42	394.23	104.13	0.40
Ellsworth	6300	PF 1	CorrEff	1744.00	1373.07	1378.02		1378.32	0.001303	4.41	395.17	104.19	0.40
Ellsworth	6300	PF 1	PP_3@9x6 CIP	1744.00	1373.07	1378.02		1378.32	0.001303	4.41	395.17	104.19	0.40
Ellsworth	6200	PF 1	CorrEff	1744.00	1372.93	1377.89		1378.19	0.001292	4.40	396.37	104.29	0.40
Ellsworth	6200	PF 1	PP_3@9x6 CIP	1744.00	1372.93	1377.89		1378.19	0.001292	4.40	396.37	104.29	0.40
Ellsworth	6100	PF 1	CorrEff	1744.00	1372.79	1377.76		1378.06	0.001280	4.39	397.67	104.40	0.40
Ellsworth	6100	PF 1	PP_3@9x6 CIP	1744.00	1372.79	1377.76		1378.06	0.001280	4.39	397.67	104.40	0.40
Ellsworth	6000	PF 1	CorrEff	1744.00	1372.65	1377.64		1377.93	0.001266	4.37	399.12	104.49	0.39
Ellsworth	6000	PF 1	PP_3@9x6 CIP	1744.00	1372.65	1377.64		1377.93	0.001266	4.37	399.12	104.49	0.39
Ellsworth	5900	PF 1	CorrEff	1744.00	1372.51	1377.51		1377.81	0.001251	4.35	400.79	104.63	0.39
Ellsworth	5900	PF 1	PP_3@9x6 CIP	1744.00	1372.51	1377.51		1377.81	0.001251	4.35	400.79	104.63	0.39
Ellsworth	5800	PF 1	CorrEff	1744.00	1372.37	1377.39		1377.68	0.001235	4.33	402.61	104.77	0.39
Ellsworth	5800	PF 1	PP_3@9x6 CIP	1744.00	1372.37	1377.39		1377.68	0.001235	4.33	402.61	104.77	0.39
Ellsworth	5700	PF 1	CorrEff	1744.00	1372.23	1377.27		1377.56	0.001218	4.31	404.53	104.92	0.39
Ellsworth	5700	PF 1	PP_3@9x6 CIP	1744.00	1372.23	1377.27		1377.56	0.001218	4.31	404.53	104.92	0.39
Ellsworth	5600	PF 1	CorrEff	1744.00	1372.09	1377.15		1377.44	0.001199	4.29	406.73	105.08	0.38
Ellsworth	5600	PF 1	PP_3@9x6 CIP	1744.00	1372.09	1377.15		1377.44	0.001199	4.29	406.73	105.08	0.38
Ellsworth	5500	PF 1	CorrEff	1744.00	1371.95	1377.03		1377.32	0.001179	4.26	409.16	105.27	0.38
Ellsworth	5500	PF 1	PP_3@9x6 CIP	1744.00	1371.95	1377.03		1377.32	0.001179	4.26	409.16	105.27	0.38

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	5400	PF 1	CorrEff	1744.00	1371.81	1376.92		1377.20	0.001157	4.24	411.78	105.45	0.38
Ellsworth	5400	PF 1	PP_3@9x6 CIP	1744.00	1371.81	1376.92		1377.20	0.001157	4.24	411.78	105.45	0.38
Ellsworth	5300	PF 1	CorrEff	1744.00	1371.67	1376.81		1377.08	0.001134	4.21	414.71	105.67	0.37
Ellsworth	5300	PF 1	PP_3@9x6 CIP	1744.00	1371.67	1376.81		1377.08	0.001134	4.21	414.71	105.67	0.37
Ellsworth	5200	PF 1	CorrEff	1744.00	1371.53	1376.70		1376.97	0.001110	4.17	417.90	105.93	0.37
Ellsworth	5200	PF 1	PP_3@9x6 CIP	1744.00	1371.53	1376.70		1376.97	0.001110	4.17	417.90	105.93	0.37
Ellsworth	5100	PF 1	CorrEff	1744.00	1371.39	1376.59		1376.86	0.001083	4.14	421.41	106.17	0.37
Ellsworth	5100	PF 1	PP_3@9x6 CIP	1744.00	1371.39	1376.59		1376.86	0.001083	4.14	421.41	106.17	0.37
Ellsworth	5000	PF 1	CorrEff	1744.00	1371.25	1376.49		1376.75	0.001054	4.10	425.39	106.48	0.36
Ellsworth	5000	PF 1	PP_3@9x6 CIP	1744.00	1371.25	1376.49		1376.75	0.001054	4.10	425.39	106.48	0.36
Ellsworth	4900	PF 1	CorrEff	1744.00	1371.11	1376.39		1376.64	0.001025	4.06	429.63	106.80	0.36
Ellsworth	4900	PF 1	PP_3@9x6 CIP	1744.00	1371.11	1376.39		1376.64	0.001025	4.06	429.63	106.80	0.36
Ellsworth	4800	PF 1	CorrEff	1744.00	1370.97	1376.29		1376.54	0.000995	4.02	434.14	107.15	0.35
Ellsworth	4800	PF 1	PP_3@9x6 CIP	1744.00	1370.97	1376.29		1376.54	0.000995	4.02	434.14	107.15	0.35
Ellsworth	4700	PF 1	CorrEff	1744.00	1370.83	1376.20		1376.44	0.000962	3.97	439.14	107.52	0.35
Ellsworth	4700	PF 1	PP_3@9x6 CIP	1744.00	1370.83	1376.20		1376.44	0.000962	3.97	439.14	107.52	0.35
Ellsworth	4674	PF 1	CorrEff	1744.00	1370.82	1376.17		1376.42	0.000974	3.99	437.34	107.40	0.35
Ellsworth	4674	PF 1	PP_3@9x6 CIP	1744.00	1370.82	1376.17		1376.42	0.000974	3.99	437.34	107.40	0.35
Ellsworth	4664	PF 1	CorrEff	1744.00	1370.80	1376.16		1376.40	0.000972	3.99	437.62	107.40	0.35
Ellsworth	4664	PF 1	PP_3@9x6 CIP	1744.00	1370.80	1376.16		1376.40	0.000972	3.99	437.62	107.40	0.35
Ellsworth	4600	PF 1	CorrEff	1744.00	1370.69	1376.10		1376.34	0.000932	3.93	444.14	107.90	0.34
Ellsworth	4600	PF 1	PP_3@9x6 CIP	1744.00	1370.69	1376.10		1376.34	0.000932	3.93	444.14	107.90	0.34
Ellsworth	4500	PF 1	CorrEff	1744.00	1370.55	1376.01		1376.25	0.000899	3.88	449.80	108.32	0.34
Ellsworth	4500	PF 1	PP_3@9x6 CIP	1744.00	1370.55	1376.01		1376.25	0.000899	3.88	449.80	108.32	0.34
Ellsworth	4400	PF 1	CorrEff	1744.00	1370.41	1375.93		1376.16	0.000864	3.82	455.95	108.77	0.33
Ellsworth	4400	PF 1	PP_3@9x6 CIP	1744.00	1370.41	1375.93		1376.16	0.000864	3.82	455.95	108.77	0.33
Ellsworth	4300	PF 1	CorrEff	1744.00	1370.27	1375.85		1376.07	0.000830	3.77	462.47	109.25	0.32
Ellsworth	4300	PF 1	PP_3@9x6 CIP	1744.00	1370.27	1375.85		1376.07	0.000830	3.77	462.47	109.25	0.32

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	4200	PF 1	CorrEff	1744.00	1370.13	1375.77		1375.99	0.000796	3.72	469.35	109.75	0.32
Ellsworth	4200	PF 1	PP_3@9x6 CIP	1744.00	1370.13	1375.77		1375.99	0.000796	3.72	469.35	109.75	0.32
Ellsworth	4100	PF 1	CorrEff	1744.00	1369.99	1375.70		1375.91	0.000761	3.66	476.75	110.30	0.31
Ellsworth	4100	PF 1	PP_3@9x6 CIP	1744.00	1369.99	1375.70		1375.91	0.000761	3.66	476.75	110.30	0.31
Ellsworth	4000	PF 1	CorrEff	1744.00	1369.85	1375.63		1375.83	0.000727	3.60	484.50	110.85	0.30
Ellsworth	4000	PF 1	PP_3@9x6 CIP	1744.00	1369.85	1375.63		1375.83	0.000727	3.60	484.50	110.85	0.30
Ellsworth	3900	PF 1	CorrEff	1744.00	1369.71	1375.56		1375.76	0.000693	3.54	492.70	111.44	0.30
Ellsworth	3900	PF 1	PP_3@9x6 CIP	1744.00	1369.71	1375.56		1375.76	0.000693	3.54	492.70	111.44	0.30
Ellsworth	3800	PF 1	CorrEff	1744.00	1369.57	1375.50		1375.69	0.000660	3.48	501.31	112.06	0.29
Ellsworth	3800	PF 1	PP_3@9x6 CIP	1744.00	1369.57	1375.50		1375.69	0.000660	3.48	501.31	112.06	0.29
Ellsworth	3700	PF 1	CorrEff	1744.00	1369.43	1375.44		1375.62	0.000627	3.42	510.35	112.71	0.28
Ellsworth	3700	PF 1	PP_3@9x6 CIP	1744.00	1369.43	1375.44		1375.62	0.000627	3.42	510.35	112.71	0.28
Ellsworth	3600	PF 1	CorrEff	1744.00	1369.29	1375.39		1375.56	0.000595	3.36	519.79	113.38	0.28
Ellsworth	3600	PF 1	PP_3@9x6 CIP	1744.00	1369.29	1375.39		1375.56	0.000595	3.36	519.79	113.38	0.28
Ellsworth	3505.64	PF 1	CorrEff	1744.00	1369.17	1375.35		1375.52	0.000298	3.30	528.69	113.98	0.27
Ellsworth	3505.64	PF 1	PP_3@9x6 CIP	1744.00	1369.17	1375.35		1375.52	0.000298	3.30	528.69	113.98	0.27
Ellsworth	3473.65	PF 1	CorrEff	1744.00	1369.13	1375.34		1375.51	0.000293	3.28	532.27	114.23	0.27
Ellsworth	3473.65	PF 1	PP_3@9x6 CIP	1744.00	1369.13	1375.34		1375.51	0.000293	3.28	532.27	114.23	0.27
Ellsworth	3473.64	PF 1	CorrEff	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.31	70.00	0.29
Ellsworth	3473.64	PF 1	PP_3@9x6 CIP	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.31	70.00	0.29
Ellsworth	3461.64	PF 1	CorrEff	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.18	70.00	0.29
Ellsworth	3461.64	PF 1	PP_3@9x6 CIP	1744.00	1369.13	1375.22		1375.48	0.000143	4.09	426.18	70.00	0.29
Ellsworth	3461.63	PF 1	CorrEff	1744.00	1370.13	1375.04		1375.44	0.000282	5.08	343.39	70.00	0.40
Ellsworth	3461.63	PF 1	PP_3@9x6 CIP	1744.00	1370.13	1375.04		1375.44	0.000282	5.08	343.39	70.00	0.40
Ellsworth	3460.63	PF 1	CorrEff	1744.00	1371.13	1373.80	1373.80	1375.15	0.001983	9.33	186.95	70.00	1.01
Ellsworth	3460.63	PF 1	PP_3@9x6 CIP	1744.00	1371.13	1373.80	1373.80	1375.15	0.001983	9.33	186.95	70.00	1.01
Ellsworth	3444.63	PF 1	CorrEff	1744.00	1363.13	1364.18	1365.80	1372.87	0.041565	23.65	73.73	70.00	4.06
Ellsworth	3444.63	PF 1	PP_3@9x6 CIP	1744.00	1363.13	1364.18	1365.80	1372.87	0.041565	23.65	73.73	70.00	4.06

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	3444.62	PF 1	CorrEff	1744.00	1363.13	1364.18	1365.80	1372.86	0.392765	23.64	73.78	70.00	4.06
Ellsworth	3444.62	PF 1	PP_3@9x6 CIP	1744.00	1363.13	1364.18	1365.80	1372.86	0.392765	23.64	73.78	70.00	4.06
Ellsworth	3432.91	PF 1	CorrEff	1744.00	1363.13	1368.26	1365.80	1368.62	0.002326	4.86	358.73	70.00	0.38
Ellsworth	3432.91	PF 1	PP_3@9x6 CIP	1744.00	1363.13	1368.26	1365.80	1368.62	0.002326	4.86	358.73	70.00	0.38
Ellsworth	3425.08	PF 1	CorrEff	1744.00	1363.13	1368.35		1368.56	0.001485	3.75	465.49	108.53	0.32
Ellsworth	3425.08	PF 1	PP_3@9x6 CIP	1744.00	1363.13	1368.35		1368.56	0.001485	3.75	465.49	108.53	0.32
Ellsworth	3400	PF 1	CorrEff	1744.00	1363.02	1368.27		1368.53	0.001158	4.09	426.43	106.59	0.36
Ellsworth	3400	PF 1	PP_3@9x6 CIP	1744.00	1363.02	1368.27		1368.53	0.001158	4.09	426.43	106.59	0.36
Ellsworth	3300	PF 1	CorrEff	1744.00	1362.78	1368.17		1368.41	0.001054	3.96	440.87	107.65	0.34
Ellsworth	3300	PF 1	PP_3@9x6 CIP	1744.00	1362.78	1368.17		1368.41	0.001054	3.96	440.87	107.65	0.34
Ellsworth	3200	PF 1	CorrEff	1744.00	1362.55	1368.08	1365.50	1368.31	0.000954	3.82	456.83	247.54	0.33
Ellsworth	3200	PF 1	PP_3@9x6 CIP	1744.00	1362.55	1368.08	1365.50	1368.31	0.000954	3.82	456.83	247.54	0.33
Ellsworth	3100	PF 1	CorrEff	1744.00	1362.32	1367.97	1365.27	1368.19	0.001455	3.71	470.25	124.95	0.32
Ellsworth	3100	PF 1	PP_3@9x6 CIP	1744.00	1362.32	1367.97	1365.27	1368.19	0.001455	3.71	470.25	124.95	0.32
Ellsworth	3000	PF 1	CorrEff	1744.00	1362.06	1367.89		1368.08	0.000706	3.56	489.46	111.22	0.30
Ellsworth	3000	PF 1	PP_3@9x6 CIP	1744.00	1362.06	1367.89		1368.08	0.000706	3.56	489.46	111.22	0.30
Ellsworth	2900	PF 1	CorrEff	1744.00	1361.83	1367.83	1364.79	1368.01	0.000632	3.43	508.81	112.59	0.28
Ellsworth	2900	PF 1	PP_3@9x6 CIP	1744.00	1361.83	1367.83	1364.79	1368.01	0.000632	3.43	508.81	112.59	0.28
Ellsworth	2800	PF 1	CorrEff	1744.00	1361.60	1367.78		1367.95	0.000565	3.30	529.25	114.04	0.27
Ellsworth	2800	PF 1	PP_3@9x6 CIP	1744.00	1361.60	1367.78		1367.95	0.000565	3.30	529.25	114.04	0.27
Ellsworth	2700	PF 1	CorrEff	1744.00	1361.37	1367.75		1367.88	0.000416	2.88	606.27	125.95	0.23
Ellsworth	2700	PF 1	PP_3@9x6 CIP	1744.00	1361.37	1367.75		1367.88	0.000416	2.88	606.27	125.95	0.23
Ellsworth	2654.00*	PF 1	CorrEff	1744.00	1361.27	1367.72		1367.86	0.000438	2.96	588.55	121.41	0.24
Ellsworth	2654.00*	PF 1	PP_3@9x6 CIP	1744.00	1361.27	1367.72		1367.86	0.000438	2.96	588.55	121.41	0.24
Ellsworth	2608.01	PF 1	CorrEff	1744.00	1361.16	1367.54	1364.16	1367.79	0.001062	4.02	433.48	115.65	0.29
Ellsworth	2608.01	PF 1	PP_3@9x6 CIP	1744.00	1361.16	1367.54	1364.16	1367.79	0.001062	4.02	433.48	115.65	0.29
Ellsworth	2598.02	PF 1	CorrEff	1744.00	1361.14	1367.42	1364.36	1367.76	0.000210	4.72	369.81	114.89	0.34
Ellsworth	2598.02	PF 1	PP_3@9x6 CIP	1744.00	1361.14	1367.42	1364.36	1367.76	0.000210	4.72	369.81	114.89	0.34

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	2581.04	PF 1	CorrEff	1744.00	1361.10	1366.96	1364.71	1367.65	0.000586	6.67	261.36	44.60	0.49
Ellsworth	2581.04	PF 1	PP_3@9x6 CIP	1744.00	1361.10	1366.96	1364.71	1367.65	0.000586	6.67	261.36	44.60	0.49
Ellsworth	2569			Culvert									
Ellsworth	2557.04	PF 1	CorrEff	1744.00	1361.08	1365.19		1366.60	0.001756	9.51	183.29	44.60	0.83
Ellsworth	2557.04	PF 1	PP_3@9x6 CIP	1744.00	1361.08	1365.19		1366.60	0.001756	9.51	183.29	44.60	0.83
Ellsworth	2554.53*	PF 1	CorrEff	1744.00	1361.07	1365.23		1366.54	0.006185	9.20	189.57	48.41	0.82
Ellsworth	2554.53*	PF 1	PP_3@9x6 CIP	1744.00	1361.07	1365.23		1366.54	0.006185	9.20	189.57	48.41	0.82
Ellsworth	2552.03*	PF 1	CorrEff	1744.00	1361.06	1365.27		1366.47	0.006562	8.82	197.76	53.57	0.81
Ellsworth	2552.03*	PF 1	PP_3@9x6 CIP	1744.00	1361.06	1365.27		1366.47	0.006562	8.82	197.76	53.57	0.81
Ellsworth	2549.52*	PF 1	CorrEff	1744.00	1361.06	1365.33		1366.38	0.006724	8.24	211.53	61.35	0.78
Ellsworth	2549.52*	PF 1	PP_3@9x6 CIP	1744.00	1361.06	1365.33		1366.38	0.006724	8.24	211.53	61.35	0.78
Ellsworth	2547.02*	PF 1	CorrEff	1744.00	1361.05	1365.43		1366.24	0.006118	7.25	240.51	74.11	0.71
Ellsworth	2547.02*	PF 1	PP_3@9x6 CIP	1744.00	1361.05	1365.43		1366.24	0.006118	7.25	240.51	74.11	0.71
Ellsworth	2544.51*	PF 1	CorrEff	1744.00	1361.04	1365.54		1366.10	0.004490	6.00	290.89	87.83	0.58
Ellsworth	2544.51*	PF 1	PP_3@9x6 CIP	1744.00	1361.04	1365.54		1366.10	0.004490	6.00	290.89	87.83	0.58
Ellsworth	2542.01	PF 1	CorrEff	1744.00	1361.03	1364.96	1364.31	1365.96	0.008294	8.00	218.09	96.07	0.74
Ellsworth	2542.01	PF 1	PP_3@9x6 CIP	1744.00	1361.03	1364.96	1364.31	1365.96	0.008294	8.00	218.09	96.07	0.74
Ellsworth	2532.01	PF 1	CorrEff	1744.00	1361.01	1365.06	1364.04	1365.77	0.002816	6.74	258.93	96.96	0.62
Ellsworth	2532.01	PF 1	PP_3@9x6 CIP	1744.00	1361.01	1365.06	1364.04	1365.77	0.002816	6.74	258.93	96.96	0.62
Ellsworth	2513.15*	PF 1	CorrEff	1744.00	1360.96	1365.12		1365.60	0.002565	5.56	313.45	97.85	0.55
Ellsworth	2513.15*	PF 1	PP_3@9x6 CIP	1744.00	1360.96	1365.12		1365.60	0.002565	5.56	313.45	97.85	0.55
Ellsworth	2400	PF 1	CorrEff	1744.00	1360.68	1364.84		1365.32	0.002525	5.54	314.64	97.82	0.54
Ellsworth	2400	PF 1	PP_3@9x6 CIP	1744.00	1360.68	1364.84		1365.32	0.002525	5.54	314.64	97.82	0.54
Ellsworth	2300	PF 1	CorrEff	1744.00	1360.43	1364.59		1365.06	0.002514	5.53	315.11	97.85	0.54
Ellsworth	2300	PF 1	PP_3@9x6 CIP	1744.00	1360.43	1364.59		1365.06	0.002514	5.53	315.11	97.85	0.54
Ellsworth	2200	PF 1	CorrEff	1744.00	1360.18	1364.34		1364.81	0.002520	5.54	314.88	97.84	0.54
Ellsworth	2200	PF 1	PP_3@9x6 CIP	1744.00	1360.18	1364.34		1364.81	0.002520	5.54	314.88	97.84	0.54

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ellsworth	2100	PF 1	CorrEff	1744.00	1359.93	1364.08		1364.56	0.002527	5.54	314.56	97.82	0.54
Ellsworth	2100	PF 1	PP_3@9x6 CIP	1744.00	1359.93	1364.08		1364.56	0.002527	5.54	314.56	97.82	0.54
Ellsworth	2000	PF 1	CorrEff	1744.00	1359.67	1363.83		1364.31	0.002528	5.55	314.49	97.79	0.54
Ellsworth	2000	PF 1	PP_3@9x6 CIP	1744.00	1359.67	1363.83		1364.31	0.002528	5.55	314.49	97.79	0.54
Ellsworth	1900	PF 1	CorrEff	1744.00	1359.42	1363.58		1364.05	0.002516	5.54	315.06	97.87	0.54
Ellsworth	1900	PF 1	PP_3@9x6 CIP	1744.00	1359.42	1363.58		1364.05	0.002516	5.54	315.06	97.87	0.54
Ellsworth	1800	PF 1	CorrEff	1744.00	1359.17	1363.32		1363.80	0.002523	5.54	314.73	97.83	0.54
Ellsworth	1800	PF 1	PP_3@9x6 CIP	1744.00	1359.17	1363.32		1363.80	0.002523	5.54	314.73	97.83	0.54
Ellsworth	1700	PF 1	CorrEff	1744.00	1358.92	1363.07	1361.87	1363.55	0.002531	5.55	314.43	97.82	0.55
Ellsworth	1700	PF 1	PP_3@9x6 CIP	1744.00	1358.92	1363.07	1361.87	1363.55	0.002531	5.55	314.43	97.82	0.55
Ellsworth	1600	PF 1	CorrEff	1744.00	1358.66	1362.82	1361.61	1363.29	0.002531	5.55	314.36	97.79	0.55
Ellsworth	1600	PF 1	PP_3@9x6 CIP	1744.00	1358.66	1362.82	1361.61	1363.29	0.002531	5.55	314.36	97.79	0.55
Ellsworth	1500	PF 1	CorrEff	1744.00	1358.41	1362.56		1363.04	0.002523	5.54	314.74	97.83	0.54
Ellsworth	1500	PF 1	PP_3@9x6 CIP	1744.00	1358.41	1362.56		1363.04	0.002523	5.54	314.74	97.83	0.54
Ellsworth	1400	PF 1	CorrEff	1744.00	1358.16	1362.31		1362.79	0.002533	5.55	314.30	97.79	0.55
Ellsworth	1400	PF 1	PP_3@9x6 CIP	1744.00	1358.16	1362.31		1362.79	0.002533	5.55	314.30	97.79	0.55
Ellsworth	1300	PF 1	CorrEff	1744.00	1357.91	1362.05		1362.53	0.002544	5.56	313.89	97.78	0.55
Ellsworth	1300	PF 1	PP_3@9x6 CIP	1744.00	1357.91	1362.05		1362.53	0.002544	5.56	313.89	97.78	0.55
Ellsworth	1200	PF 1	CorrEff	1744.00	1357.65	1361.80		1362.28	0.002527	5.54	314.55	97.81	0.54
Ellsworth	1200	PF 1	PP_3@9x6 CIP	1744.00	1357.65	1361.80		1362.28	0.002527	5.54	314.55	97.81	0.54
Ellsworth	1100	PF 1	CorrEff	1744.00	1357.40	1361.55		1362.03	0.002537	5.55	314.12	97.78	0.55
Ellsworth	1100	PF 1	PP_3@9x6 CIP	1744.00	1357.40	1361.55		1362.03	0.002537	5.55	314.12	97.78	0.55
Ellsworth	1000	PF 1	CorrEff	1744.00	1357.15	1361.29		1361.77	0.002554	5.56	313.44	97.73	0.55
Ellsworth	1000	PF 1	PP_3@9x6 CIP	1744.00	1357.15	1361.29		1361.77	0.002554	5.56	313.44	97.73	0.55
Ellsworth	900	PF 1	CorrEff	1744.00	1356.89	1361.03		1361.52	0.002560	5.57	313.16	97.69	0.55
Ellsworth	900	PF 1	PP_3@9x6 CIP	1744.00	1356.89	1361.03		1361.52	0.002560	5.57	313.16	97.69	0.55
Ellsworth	800	PF 1	CorrEff	1744.00	1356.64	1360.78		1361.26	0.002560	5.57	313.16	97.71	0.55
Ellsworth	800	PF 1	PP_3@9x6 CIP	1744.00	1356.64	1360.78		1361.26	0.002560	5.57	313.16	97.71	0.55

HEC-RAS River: River Reach: Ellsworth Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Ellsworth	700	PF 1	CorrEff	1744.00	1356.39	1360.51		1361.00	0.002593	5.59	311.81	97.60	0.55
Ellsworth	700	PF 1	PP_3@9x6 CIP	1744.00	1356.39	1360.51		1361.00	0.002593	5.59	311.81	97.60	0.55
Ellsworth	600	PF 1	CorrEff	1744.00	1356.14	1360.25	1359.09	1360.72	0.002852	5.49	317.44	111.70	0.57
Ellsworth	600	PF 1	PP_3@9x6 CIP	1744.00	1356.14	1360.25	1359.09	1360.72	0.002852	5.49	317.44	111.70	0.57
Ellsworth	500	PF 1	CorrEff	1744.00	1355.88	1359.92	1358.83	1360.43	0.002819	5.76	302.99	108.84	0.57
Ellsworth	500	PF 1	PP_3@9x6 CIP	1744.00	1355.88	1359.92	1358.83	1360.43	0.002819	5.76	302.99	108.84	0.57
Ellsworth	400	PF 1	CorrEff	1744.00	1355.63	1359.61	1358.59	1360.14	0.002966	5.86	297.81	109.82	0.59
Ellsworth	400	PF 1	PP_3@9x6 CIP	1744.00	1355.63	1359.61	1358.59	1360.14	0.002966	5.86	297.81	109.82	0.59
Ellsworth	300	PF 1	CorrEff	1744.00	1355.38	1358.32	1358.32	1359.48	0.018021	8.63	202.03	101.13	1.00
Ellsworth	300	PF 1	PP_3@9x6 CIP	1744.00	1355.38	1358.32	1358.32	1359.48	0.018021	8.63	202.03	101.13	1.00
Ellsworth	244	PF 1	CorrEff	1744.00	1355.30	1357.50	1357.86	1359.09	0.003148	10.12	172.40	106.67	1.26
Ellsworth	244	PF 1	PP_3@9x6 CIP	1744.00	1355.30	1357.50	1357.86	1359.09	0.003148	10.12	172.40	106.67	1.26
Ellsworth	243	PF 1	CorrEff	1744.00	1355.24	1357.33	1357.78	1359.08	0.003716	10.61	164.35	86.94	1.36
Ellsworth	243	PF 1	PP_3@9x6 CIP	1744.00	1355.24	1357.33	1357.78	1359.08	0.003716	10.61	164.35	86.94	1.36
Ellsworth	204	PF 1	CorrEff	1744.00	1355.14	1357.29	1357.65	1358.92	0.003145	10.23	170.53	103.43	1.26
Ellsworth	204	PF 1	PP_3@9x6 CIP	1744.00	1355.14	1357.29	1357.65	1358.92	0.003145	10.23	170.53	103.43	1.26
Ellsworth	203.9	PF 1	CorrEff	1744.00	1353.14	1358.23	1355.65	1358.48	0.000170	4.02	433.42	205.59	0.33
Ellsworth	203.9	PF 1	PP_3@9x6 CIP	1744.00	1353.14	1358.23	1355.65	1358.48	0.000170	4.02	433.42	205.59	0.33
Ellsworth	183.9	PF 1	CorrEff	1744.00	1353.20	1358.21	1355.70	1358.47	0.001698	4.09	426.01	203.95	0.34
Ellsworth	183.9	PF 1	PP_3@9x6 CIP	1744.00	1353.20	1358.21	1355.70	1358.47	0.001698	4.09	426.01	203.95	0.34
Ellsworth	163.9	PF 1	CorrEff	1744.00	1353.03	1358.20	1355.53	1358.44	0.000747	3.95	441.34	207.32	0.32
Ellsworth	163.9	PF 1	PP_3@9x6 CIP	1744.00	1353.03	1358.20	1355.53	1358.44	0.000747	3.95	441.34	207.32	0.32
Ellsworth	100	PF 1	CorrEff	1744.00	1352.14	1358.32		1358.37	0.000144	1.87	930.27	182.22	0.15
Ellsworth	100	PF 1	PP_3@9x6 CIP	1744.00	1352.14	1358.32		1358.37	0.000144	1.87	930.27	182.22	0.15
Ellsworth	0	PF 1	CorrEff	1744.00	1352.26	1358.27	1354.38	1358.35	0.000209	2.27	768.55	149.23	0.18
Ellsworth	0	PF 1	PP_3@9x6 CIP	1744.00	1352.26	1358.27	1354.38	1358.35	0.000209	2.27	768.55	149.23	0.18

Culvert at 1506+00 South Trackside Ditch Phoenix Main HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

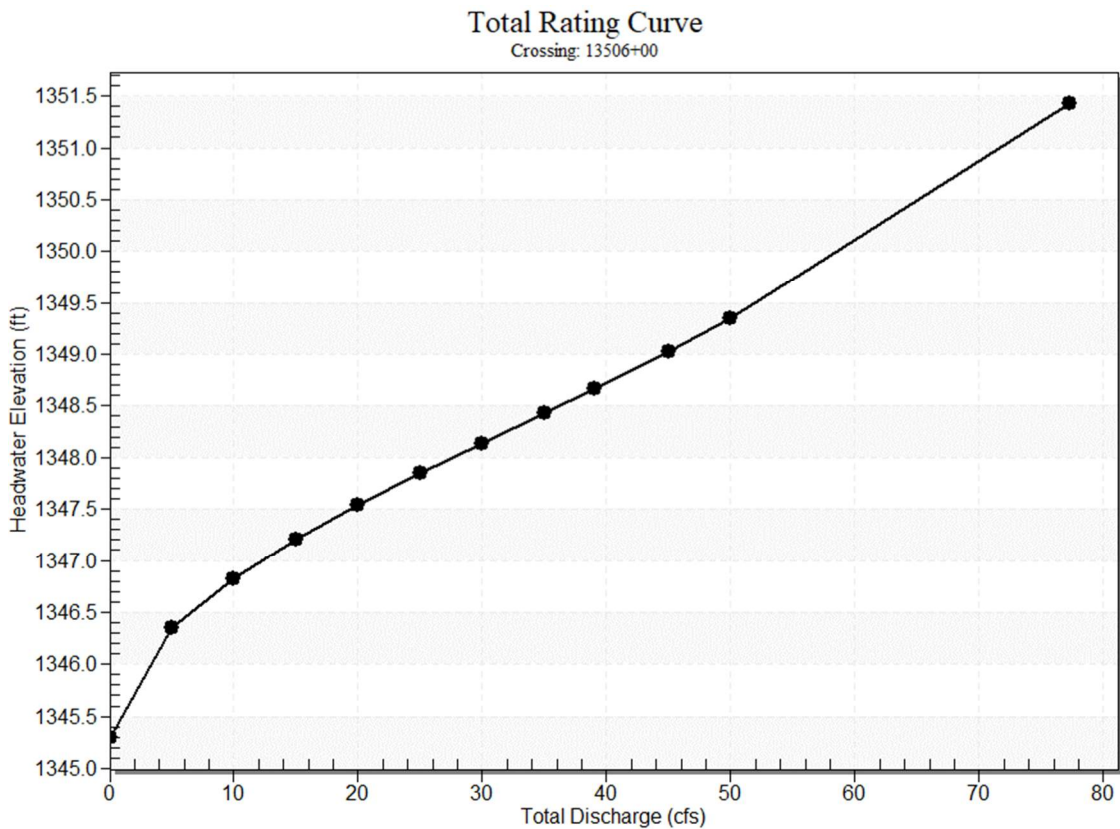
Minimum Flow: 0.00 cfs

Design Flow: 39.00 cfs

Maximum Flow: 50.00 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1345.30	0.00	0.00	0.00	1
1346.35	5.00	5.00	0.00	1
1346.82	10.00	10.00	0.00	1
1347.20	15.00	15.00	0.00	1
1347.53	20.00	20.00	0.00	1
1347.84	25.00	25.00	0.00	1
1348.14	30.00	30.00	0.00	1
1348.43	35.00	35.00	0.00	1
1348.66	39.00	39.00	0.00	1
1349.02	45.00	45.00	0.00	1
1349.34	50.00	50.00	0.00	1
1351.40	71.99	71.99	0.00	Overtopping

Rating Curve Plot for Crossing: 13506+00



Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	1345.30	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
5.00 cfs	5.00 cfs	1346.35	0.96	1.05	2-M2	0.76	0.70	0.70	0.71	3.99	0.62
10.00 cfs	10.00 cfs	1346.82	1.38	1.52	2-M2	1.09	1.00	1.00	1.06	4.85	0.78
15.00 cfs	15.00 cfs	1347.20	1.76	1.90	2-M2	1.36	1.23	1.23	1.33	5.47	0.89
20.00 cfs	20.00 cfs	1347.50	2.10	2.23	3-M2	1.62	1.43	1.43	1.56	5.83	0.97

cfs	cfs	3		4	M2			6			
25.00	25.00	1347.8	2.41	2.54	3-	1.86	1.61	1.6	1.77	6.18	1.04
cfs	cfs	4		3	M2			7			
					t						
30.00	30.00	1348.1	2.70	2.83	3-	2.12	1.77	1.8	1.96	6.52	1.10
cfs	cfs	4		9	M2			6			
					t						
35.00	35.00	1348.4	2.99	3.12	3-	2.43	1.92	2.0	2.13	6.87	1.15
cfs	cfs	3		9	M2			3			
					t						
39.00	39.00	1348.6	3.24	3.36	3-	3.00	2.03	2.1	2.26	7.16	1.19
cfs	cfs	6		2	M2			6			
					t						
45.00	45.00	1349.0	3.63	3.72	3-	3.00	2.19	2.3	2.44	7.61	1.24
cfs	cfs	2		2	M2			4			
					t						
50.00	50.00	1349.3	4.00	4.04	3-	3.00	2.30	2.4	2.58	8.00	1.28
cfs	cfs	4		4	M2			8			
					t						

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

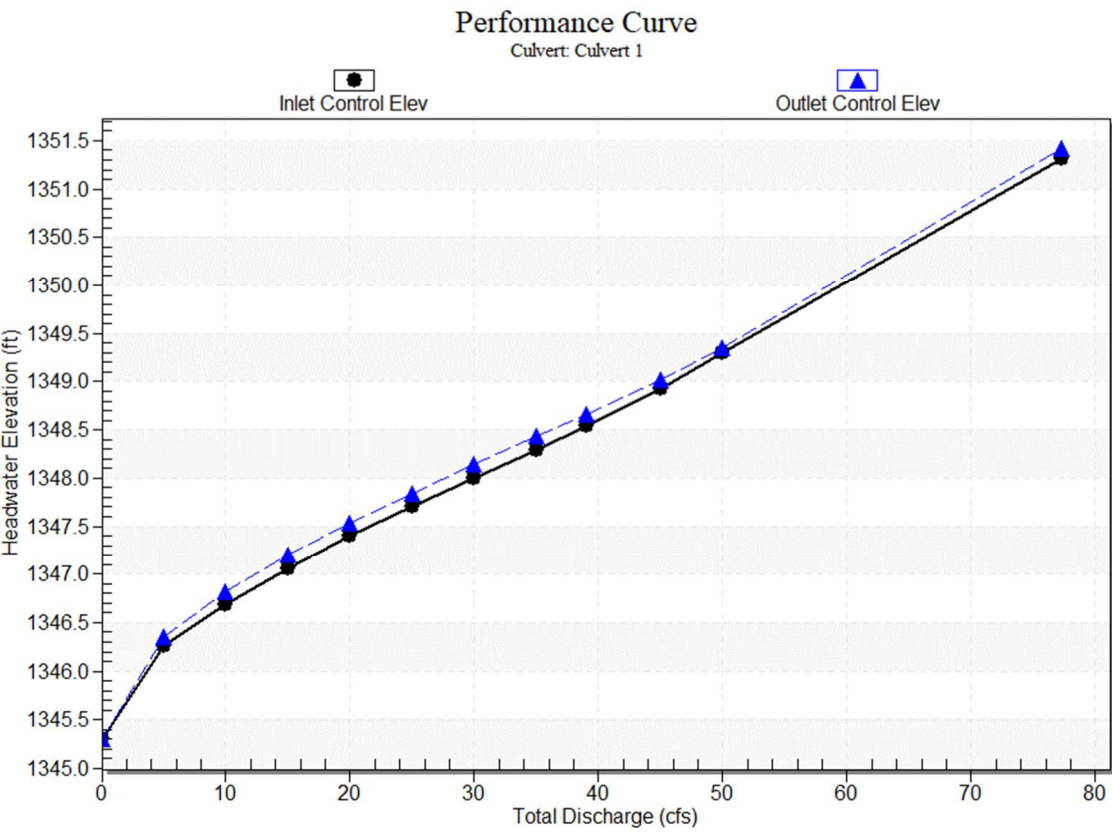
Inlet Elevation (invert): 1345.30 ft,

Outlet Elevation (invert): 1345.10 ft

Culvert Length: 84.00 ft,

Culvert Slope: 0.0024

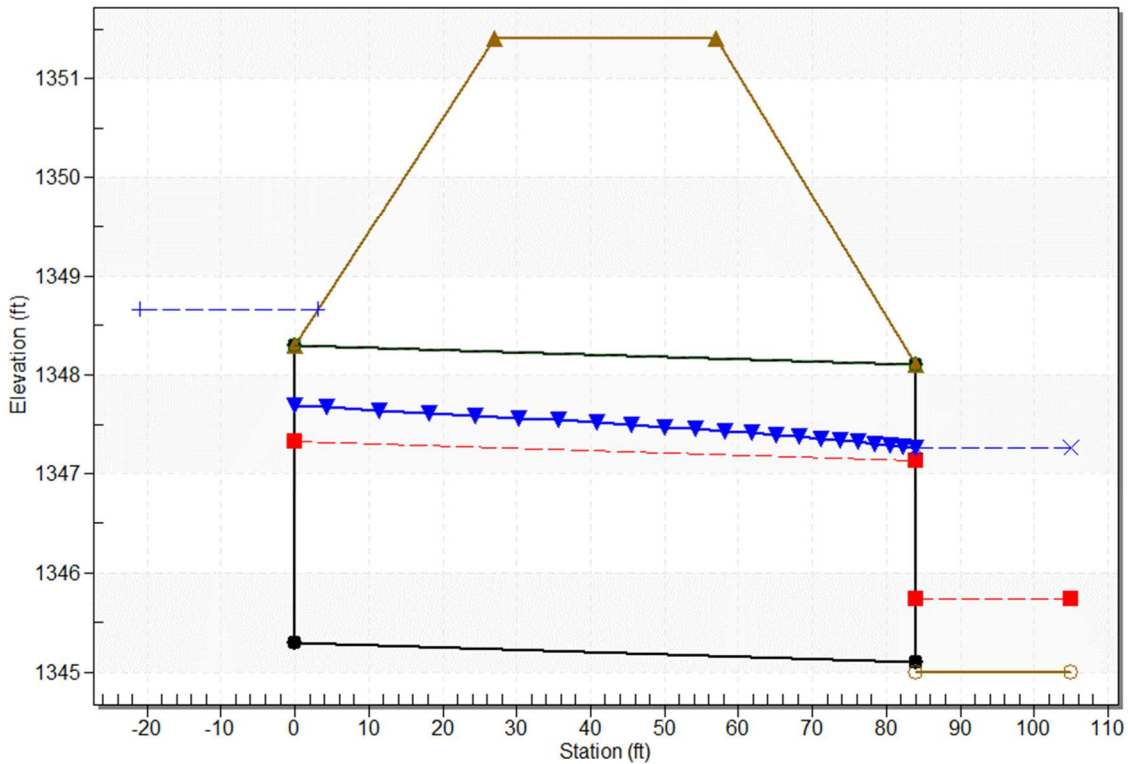
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - 13506+00, Design Discharge - 39.0 cfs

Culvert - Culvert 1, Culvert Discharge - 39.0 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1345.30 ft

Outlet Station: 84.00 ft

Outlet Elevation: 1345.10 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Tailwater Data for Crossing: 13506+00

Table 3 - Downstream Channel Rating Curve (Crossing: 13506+00)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	1345.00	0.00	0.00	0.00	0.00
5.00	1345.71	0.71	0.62	0.01	0.14
10.00	1346.06	1.06	0.78	0.02	0.15
15.00	1346.33	1.33	0.89	0.02	0.15
20.00	1346.56	1.56	0.97	0.03	0.15
25.00	1346.77	1.77	1.04	0.03	0.15
30.00	1346.96	1.96	1.10	0.04	0.16
35.00	1347.13	2.13	1.15	0.04	0.16
39.00	1347.26	2.26	1.19	0.04	0.16
45.00	1347.44	2.44	1.24	0.05	0.16
50.00	1347.58	2.58	1.28	0.05	0.16

Tailwater Channel Data - 13506+00

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 2.00 (:1)

Channel Slope: 0.0003

Channel Manning's n: 0.0300

Channel Invert Elevation: 1345.00 ft

Roadway Data for Crossing: 13506+00

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 500.00 ft

Crest Elevation: 1351.40 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Culvert at Sosseman Road South Trackside Ditch – Phoenix Main HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

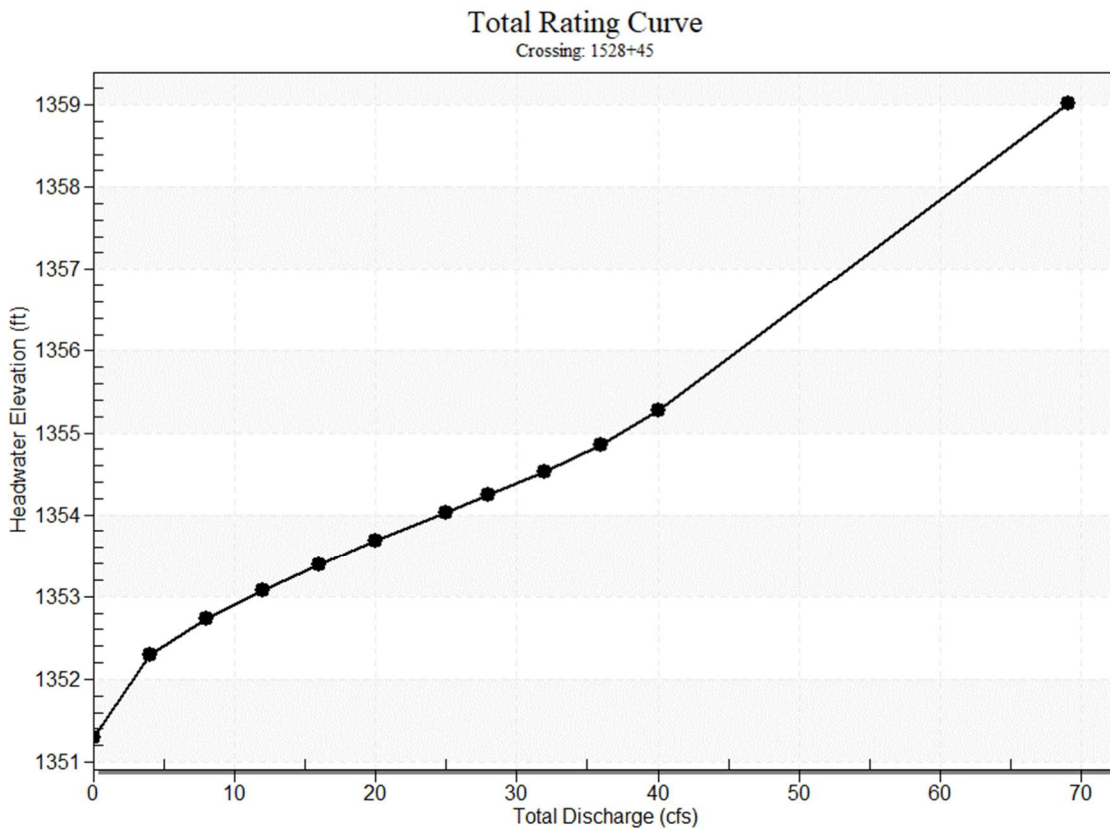
Design Flow: 25.00 cfs

Maximum Flow: 40.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1528+45

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1351.30	0.00	0.00	0.00	1
1352.30	4.00	4.00	0.00	1
1352.73	8.00	8.00	0.00	1
1353.08	12.00	12.00	0.00	1
1353.39	16.00	16.00	0.00	1
1353.68	20.00	20.00	0.00	1
1354.03	25.00	25.00	0.00	1
1354.24	28.00	28.00	0.00	1
1354.53	32.00	32.00	0.00	1
1354.85	36.00	36.00	0.00	1
1355.27	40.00	40.00	0.00	1
1359.00	67.42	67.42	0.00	Overtopping

Rating Curve Plot for Crossing: 1528+45



Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	1351.30	0.00	0.000	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
4.00 cfs	4.00 cfs	1352.30	0.85	0.998	2-M2c	0.88	0.62	0.62	0.27	3.75	1.40
8.00 cfs	8.00 cfs	1352.73	1.22	1.430	2-M2c	1.28	0.89	0.89	0.41	4.55	1.81
12.00 cfs	12.00 cfs	1353.08	1.52	1.778	2-M2c	1.62	1.10	1.10	0.52	5.11	2.10
16.00 cfs	16.00 cfs	1353.3	1.83	2.09	2-	1.95	1.28	1.2	0.61	5.58	2.32

cfs	cfs	9		0	M2			8			
20.00	20.00	1353.6	2.10	2.37	2-	2.33	1.43	1.4	0.70	5.99	2.51
cfs	cfs	8		8	M2			3			
25.00	25.00	1354.0	2.40	2.72	2-	3.00	1.61	1.6	0.80	6.46	2.71
cfs	cfs	3		7	M2			1			
28.00	28.00	1354.2	2.58	2.93	2-	3.00	1.71	1.7	0.85	6.72	2.82
cfs	cfs	4		7	M2			1			
32.00	32.00	1354.5	2.81	3.22	7-	3.00	1.83	1.8	0.92	7.06	2.94
cfs	cfs	3		6	M2			3			
36.00	36.00	1354.8	3.05	3.54	7-	3.00	1.95	1.9	0.98	7.40	3.06
cfs	cfs	5		8	M2			5			
40.00	40.00	1355.2	3.30	3.96	7-	3.00	2.06	2.0	1.04	7.73	3.17
cfs	cfs	7		9	M2			6			
					c						

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

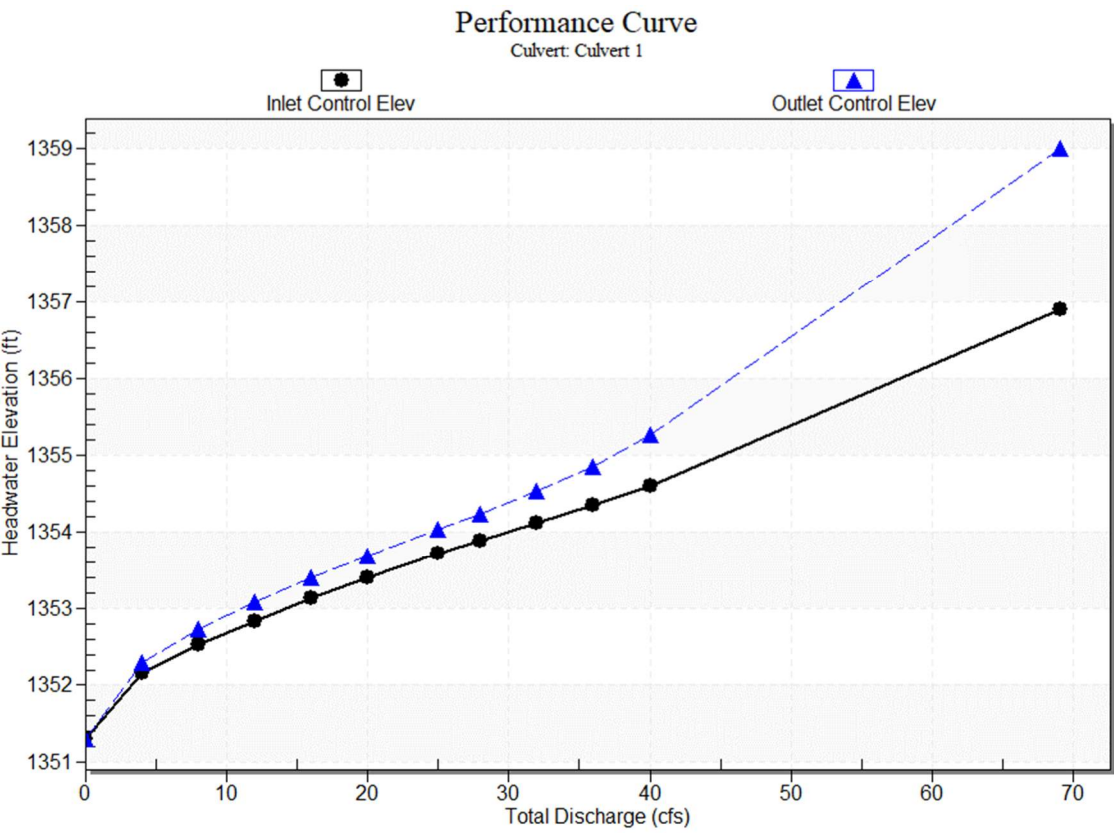
Inlet Elevation (invert): 1351.30 ft,

Outlet Elevation (invert): 1351.00 ft

Culvert Length: 88.00 ft,

Culvert Slope: 0.0034

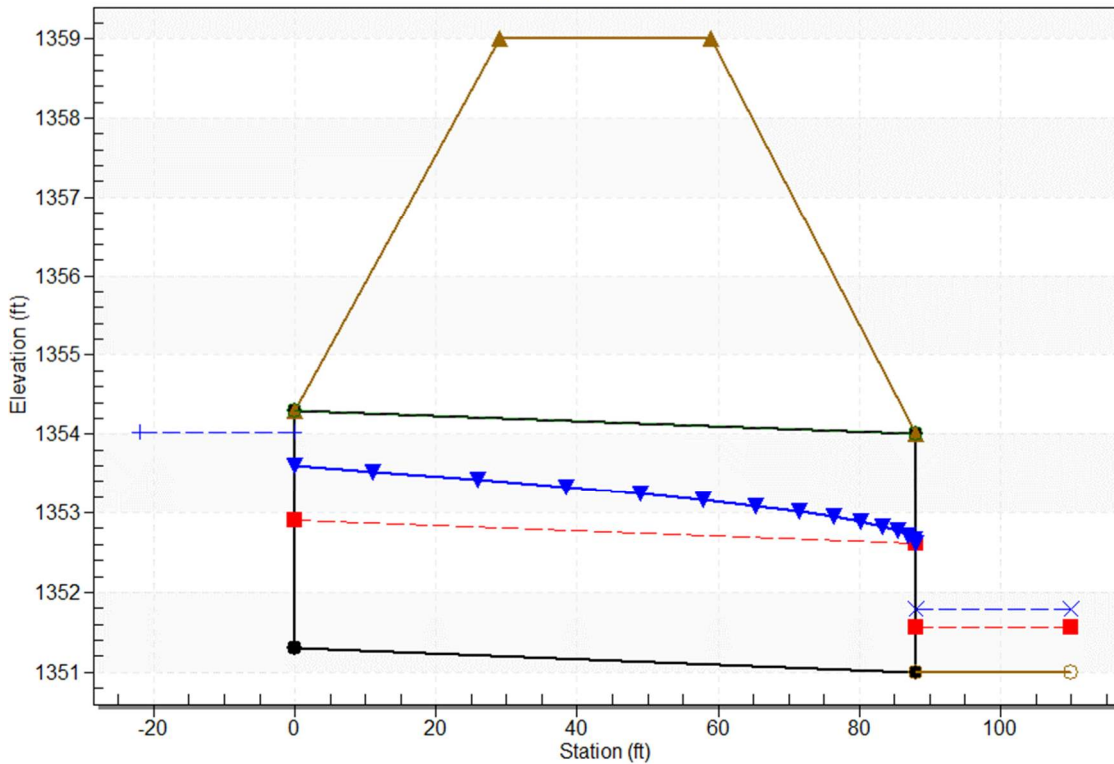
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - 1528+45, Design Discharge - 25.0 cfs

Culvert - Culvert 1, Culvert Discharge - 25.0 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1351.30 ft

Outlet Station: 88.00 ft

Outlet Elevation: 1351.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Tailwater Data for Crossing: 1528+45

Table 3 - Downstream Channel Rating Curve (Crossing: 1528+45)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	1351.00	0.00	0.00	0.00	0.00
4.00	1351.27	0.27	1.40	0.08	0.49
8.00	1351.41	0.41	1.81	0.13	0.52
12.00	1351.52	0.52	2.10	0.16	0.54
16.00	1351.61	0.61	2.32	0.19	0.55
20.00	1351.70	0.70	2.51	0.22	0.56
25.00	1351.80	0.80	2.71	0.25	0.57
28.00	1351.85	0.85	2.82	0.27	0.58
32.00	1351.92	0.92	2.94	0.29	0.58
36.00	1351.98	0.98	3.06	0.31	0.59
40.00	1352.04	1.04	3.17	0.33	0.59

Tailwater Channel Data - 1528+45

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 2.00 (.:1)

Channel Slope: 0.0050

Channel Manning's n: 0.0300

Channel Invert Elevation: 1351.00 ft

Roadway Data for Crossing: 1528+45

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 300.00 ft

Crest Elevation: 1359.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Culvert at 1586+55 South Trackside Ditch Phoenix Main HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

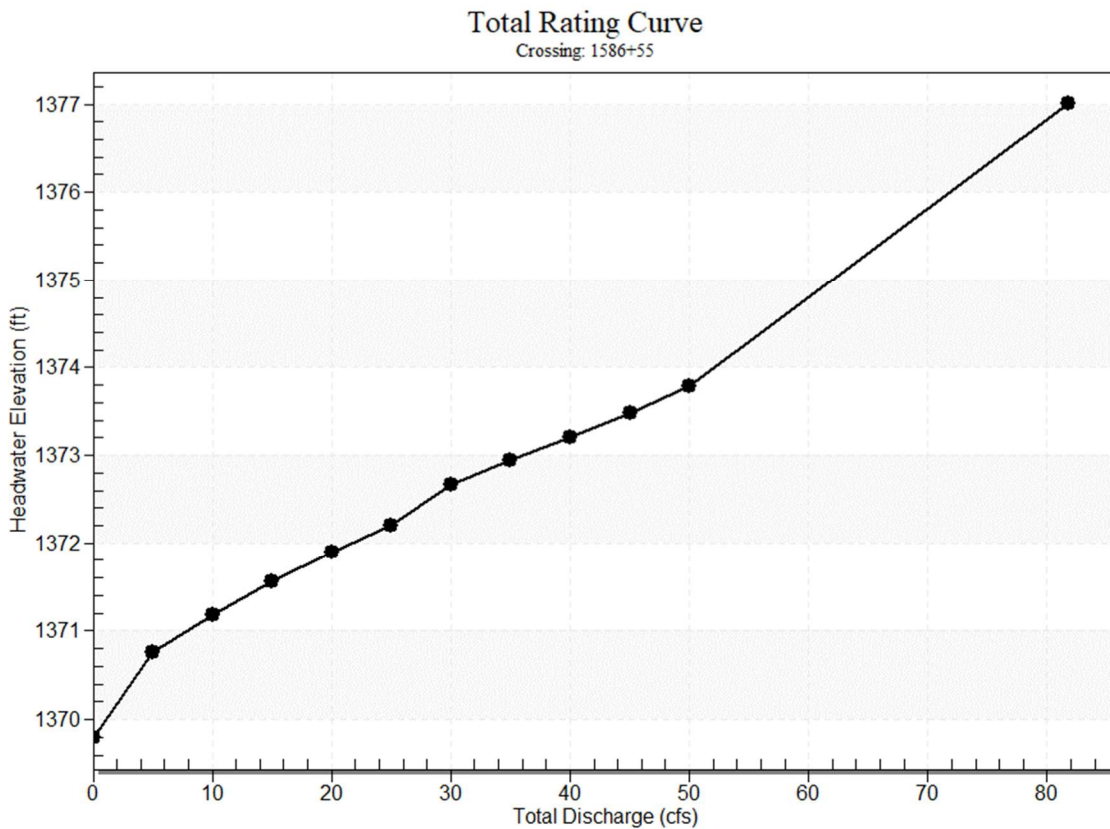
Design Flow: 30.00 cfs

Maximum Flow: 50.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1586+55

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1369.80	0.00	0.00	0.00	1
1370.76	5.00	5.00	0.00	1
1371.18	10.00	10.00	0.00	1
1371.55	15.00	15.00	0.00	1
1371.90	20.00	20.00	0.00	1
1372.20	25.00	25.00	0.00	1
1372.67	30.00	30.00	0.00	1
1372.94	35.00	35.00	0.00	1
1373.21	40.00	40.00	0.00	1
1373.48	45.00	45.00	0.00	1
1373.80	50.00	50.00	0.00	1
1377.00	80.96	80.96	0.00	Overtopping

Rating Curve Plot for Crossing: 1586+55



Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00 cfs	0.00 cfs	1369.80	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
5.00 cfs	5.00 cfs	1370.76	0.96	0.41	1-S2	0.68	0.70	0.68	0.36	4.16	1.30
10.00 cfs	10.00 cfs	1371.18	1.38	0.76	1-S2	0.97	1.00	0.97	0.54	5.07	1.67
15.00 cfs	15.00 cfs	1371.50	1.75	1.07	1-S2	1.20	1.23	1.20	0.69	5.67	1.92
20.00 cfs	20.00 cfs	1371.90	2.10	1.38	1-S2	1.41	1.43	1.40	0.81	6.11	2.12

cfs	cfs	0		2	S2			1			
25.00	25.00	1372.2	2.40	1.69	1-	1.61	1.61	1.6	0.92	6.46	2.29
cfs	cfs	0		9	S2			1			
30.00	30.00	1372.6	2.70	2.86	2-	1.81	1.77	1.7	1.03	6.89	2.43
cfs	cfs	7		6	M2			7			
35.00	35.00	1372.9	2.99	3.13	7-	2.01	1.92	1.9	1.12	7.32	2.55
cfs	cfs	4		7	M2			2			
40.00	40.00	1373.2	3.30	3.40	7-	2.23	2.06	2.0	1.21	7.73	2.67
cfs	cfs	1		7	M2			6			
45.00	45.00	1373.4	3.63	3.68	7-	2.50	2.19	2.1	1.29	8.16	2.77
cfs	cfs	8		4	M2			9			
50.00	50.00	1373.8	4.00	3.97	7-	3.00	2.30	2.3	1.37	8.59	2.86
cfs	cfs	0		6	M2			0			
					c						

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

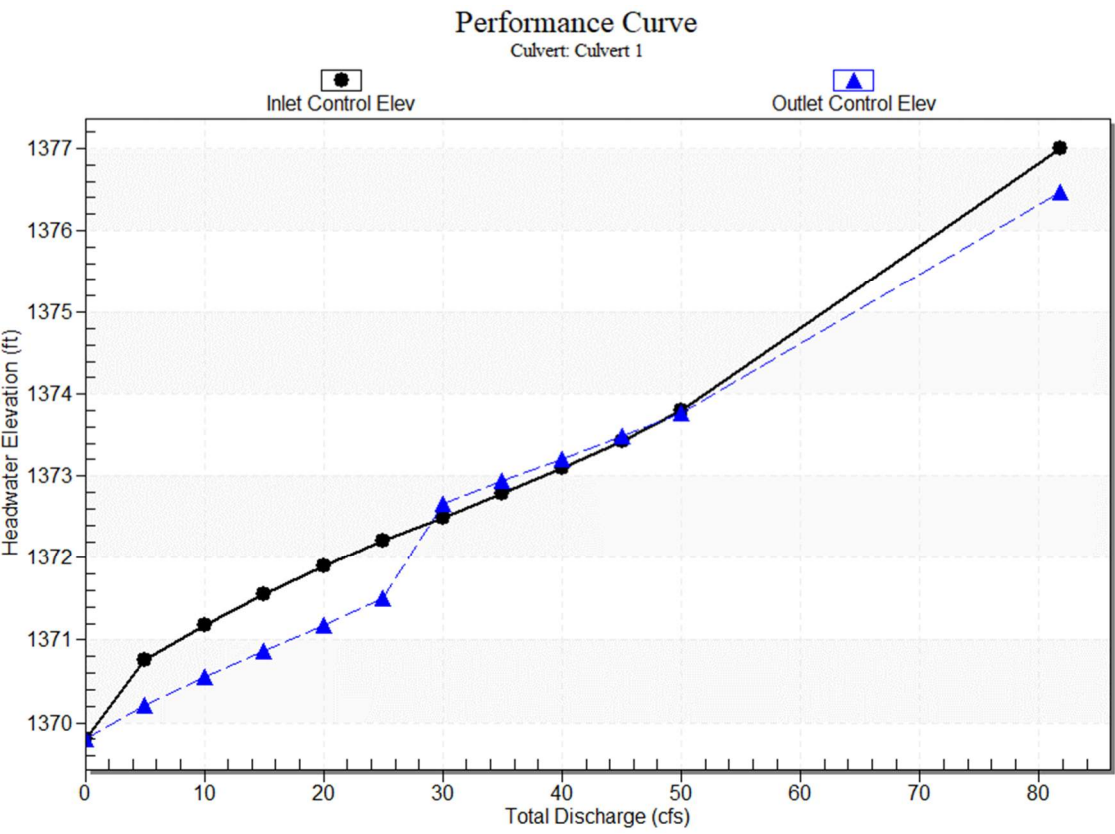
Inlet Elevation (invert): 1369.80 ft,

Outlet Elevation (invert): 1369.50 ft

Culvert Length: 80.00 ft,

Culvert Slope: 0.0037

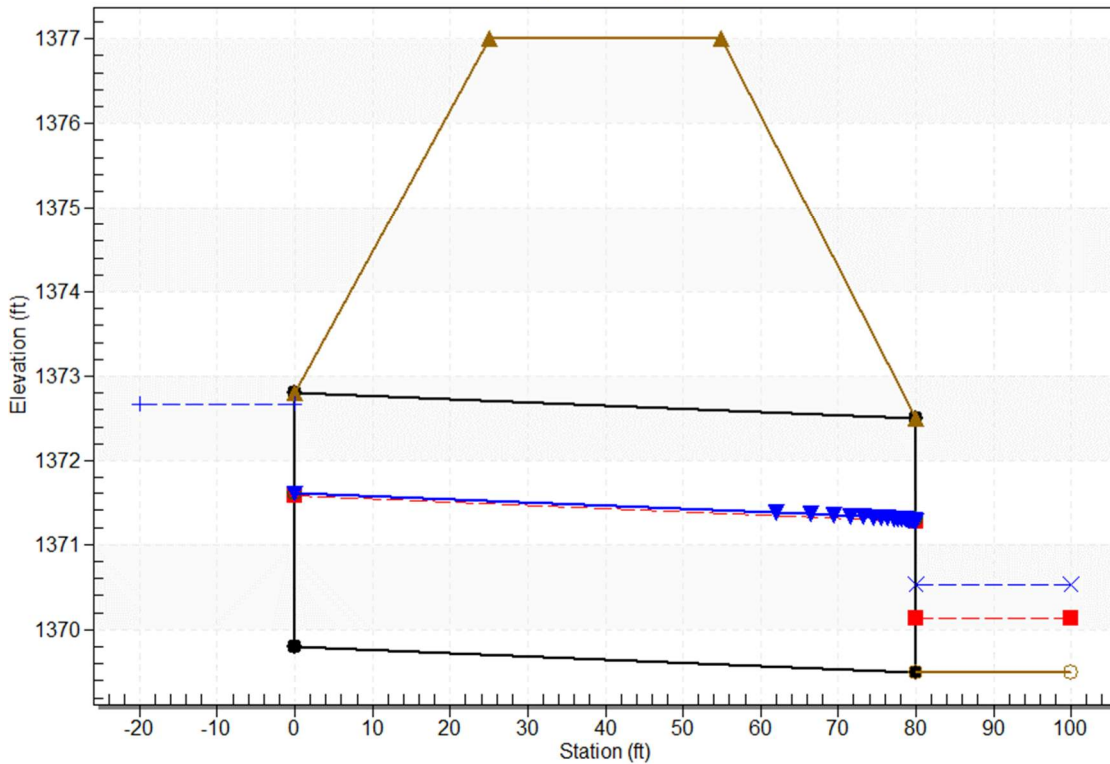
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - 1586+55, Design Discharge - 30.0 cfs

Culvert - Culvert 1, Culvert Discharge - 30.0 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1369.80 ft

Outlet Station: 80.00 ft

Outlet Elevation: 1369.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Tailwater Data for Crossing: 1586+55

Table 3 - Downstream Channel Rating Curve (Crossing: 1586+55)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
0.00	1369.50	0.00	0.00	0.00	0.00
5.00	1369.86	0.36	1.30	0.07	0.39
10.00	1370.04	0.54	1.67	0.10	0.42
15.00	1370.19	0.69	1.92	0.13	0.43
20.00	1370.31	0.81	2.12	0.15	0.44
25.00	1370.42	0.92	2.29	0.17	0.45
30.00	1370.53	1.03	2.43	0.19	0.46
35.00	1370.62	1.12	2.55	0.21	0.46
40.00	1370.71	1.21	2.67	0.23	0.47
45.00	1370.79	1.29	2.77	0.24	0.47
50.00	1370.87	1.37	2.86	0.26	0.47

Tailwater Channel Data - 1586+55

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 2.00 (:1)

Channel Slope: 0.0030

Channel Manning's n: 0.0300

Channel Invert Elevation: 1369.50 ft

Roadway Data for Crossing: 1586+55

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 500.00 ft

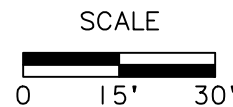
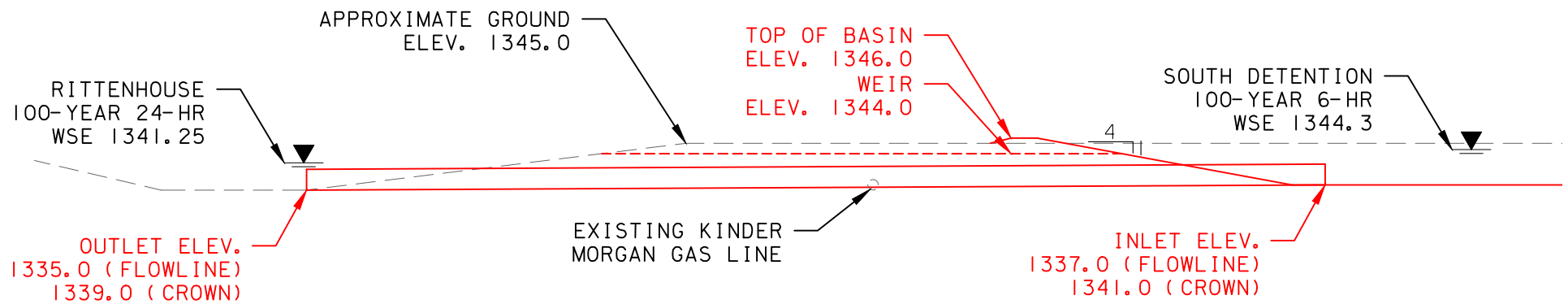
Crest Elevation: 1377.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

CULVERT AT SOUTH DETENTION OUTLET - PIRATE IND. LEAD TRACK

PROPOSED: 2-178' LONG, 48" CORRUGATED METAL PIPE CULVERTS



NAVD 1988 DATUM
SOUTH DETENTION OUTLET

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

PROPOSED CULVERT - LOOKING NORTHWEST

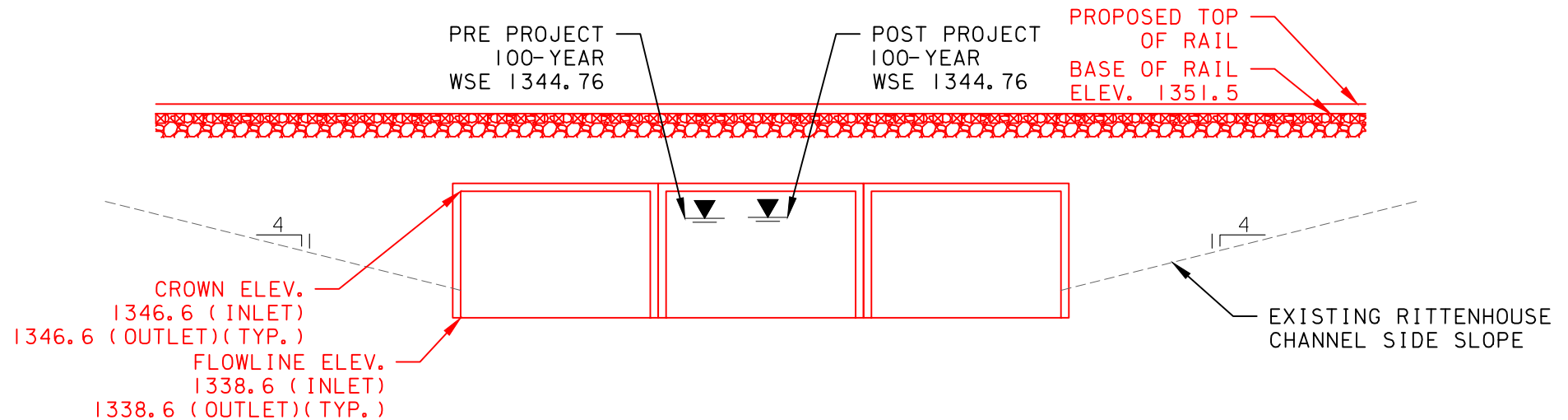
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FIGURE

1

CULVERT AT STA. 7+88 - PIRATE IND. LEAD TRACK
 PROPOSED: 3-142' LONG, 12.0' X 8.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
 RITTENHOUSE CHANNEL

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

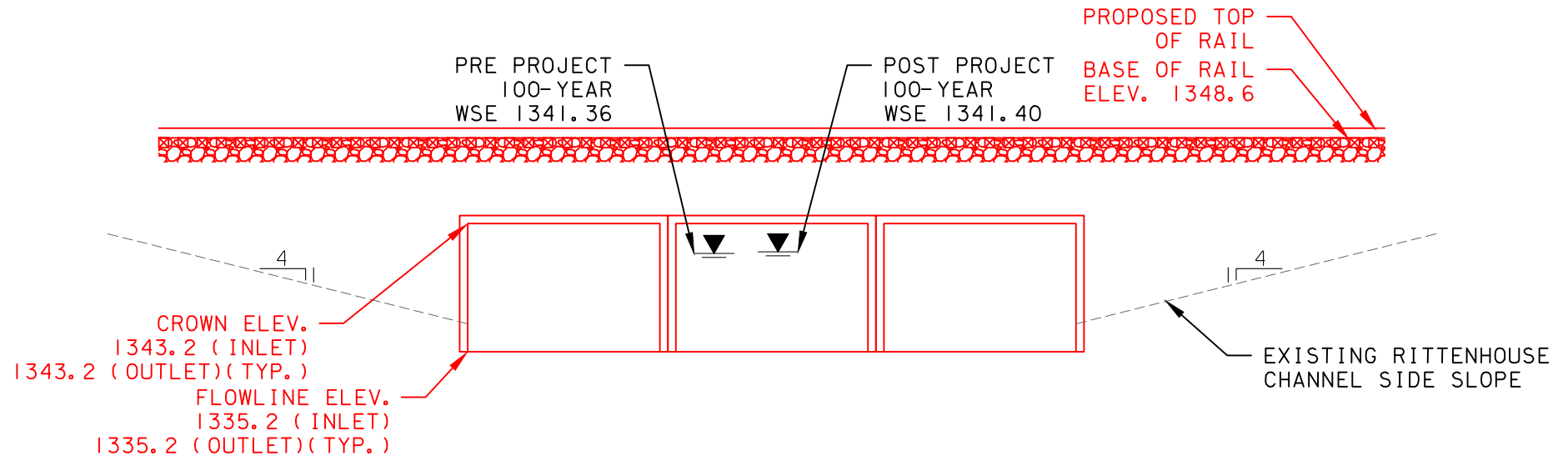
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 2

CULVERT AT STA. 7+92 - PIRATE IND. LEAD TRACK
 PROPOSED: 3-142' LONG, 12.0' X 8.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
 RITTENHOUSE CHANNEL

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

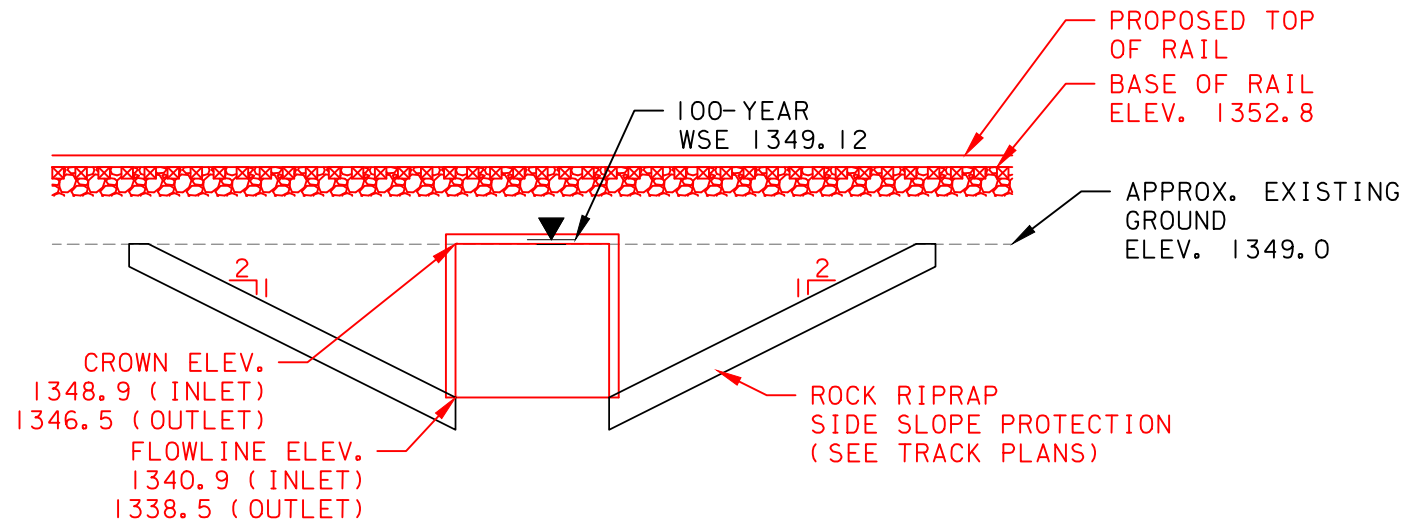
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 3

CULVERT AT STA. 19+35 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-188' LONG, 10.0' X 8.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
 TRACKSIDE DITCH

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

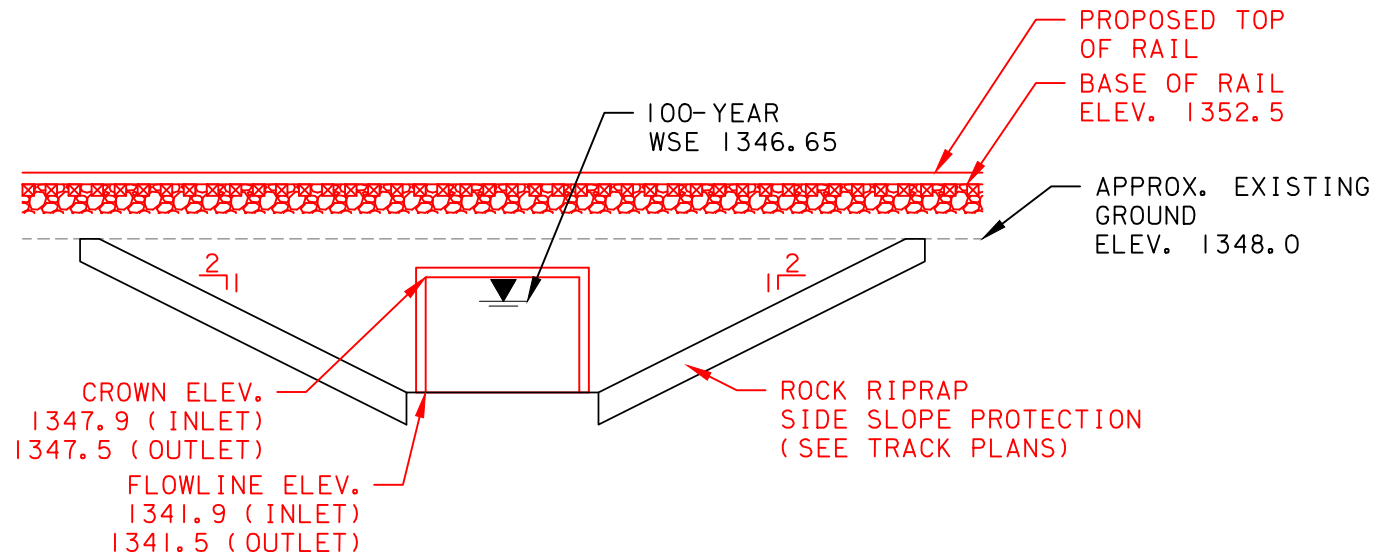
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 4

CULVERT AT STA. 26+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-230' LONG, 8.0' X 6.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
 PECOS ROAD

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

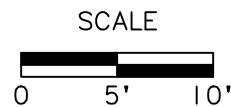
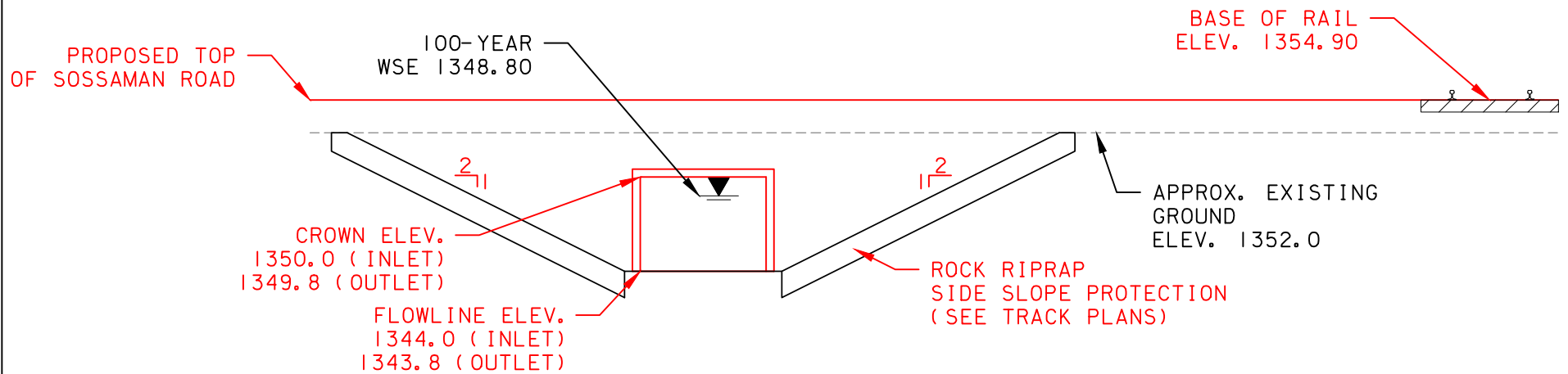
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 5

CULVERT AT STA. 38+47 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-136' LONG, 8.0' X 6.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
 SOSSAMAN ROAD

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

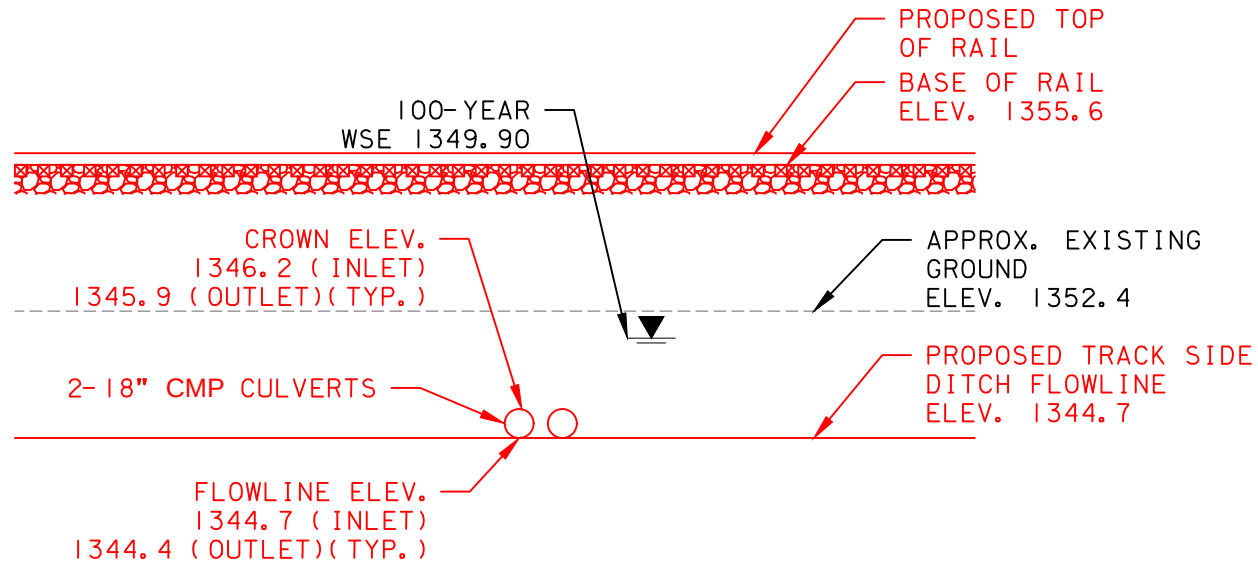
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FIGURE
 6

CULVERT AT STA. 41+40 - PIRATE IND. LEAD TRACK
 PROPOSED: 2-100' LONG, 18" CORRUGATED METAL PIPE CULVERTS



NAVD 1988 DATUM
 NORTH DETENTION OUTLET

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

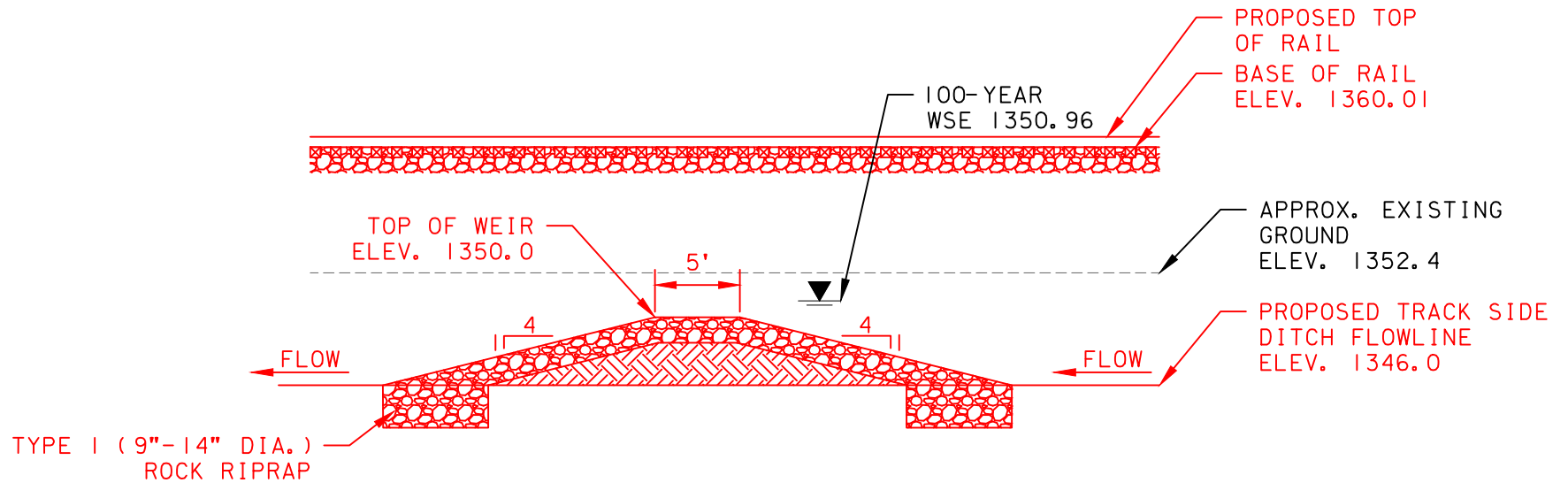
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FIGURE
 7

WEIR AT STA. 55+80 - PIRATE IND. LEAD TRACK

PROPOSED: WEIR



SCALE



NAVD 1988 DATUM
TRACKSIDE DITCH

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

PROPOSED WEIR - PROFILE ALONG FLOWLINE

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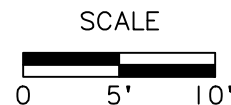
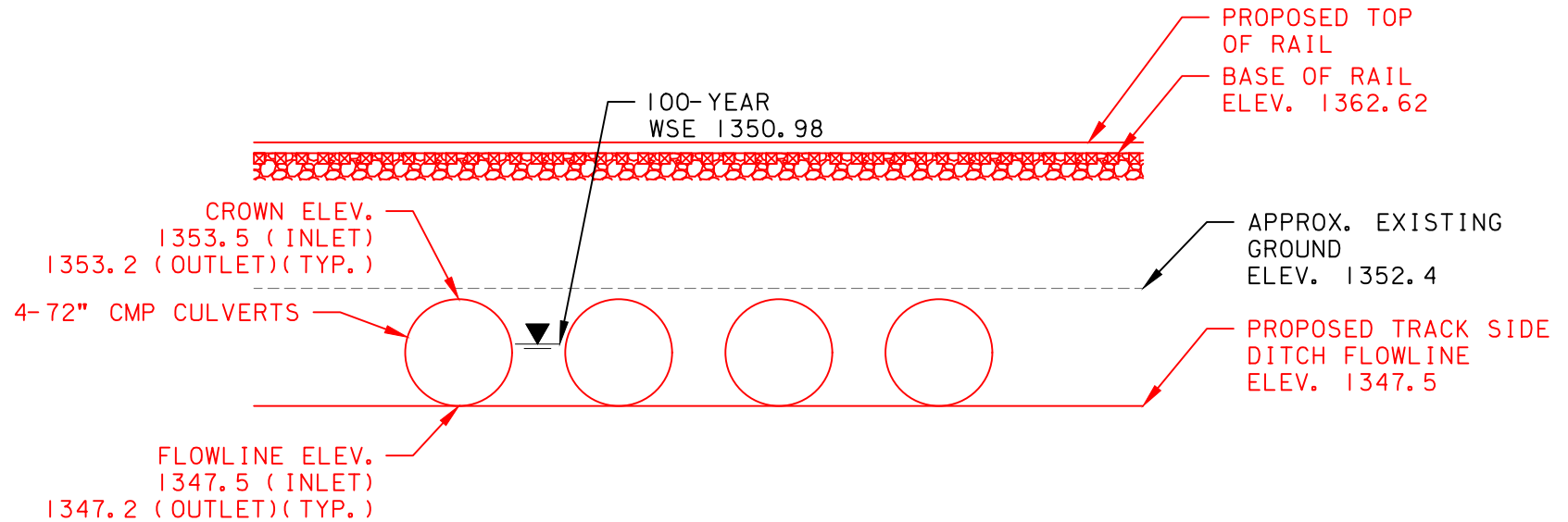
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FIGURE

8

CULVERT AT STA. 56+10 - PIRATE IND. LEAD TRACK
 PROPOSED: 4-150' LONG, 72" CORRUGATED METAL PIPE CULVERTS



NAVD 1988 DATUM
 NORTH DETENTION INLET

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

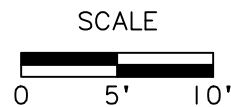
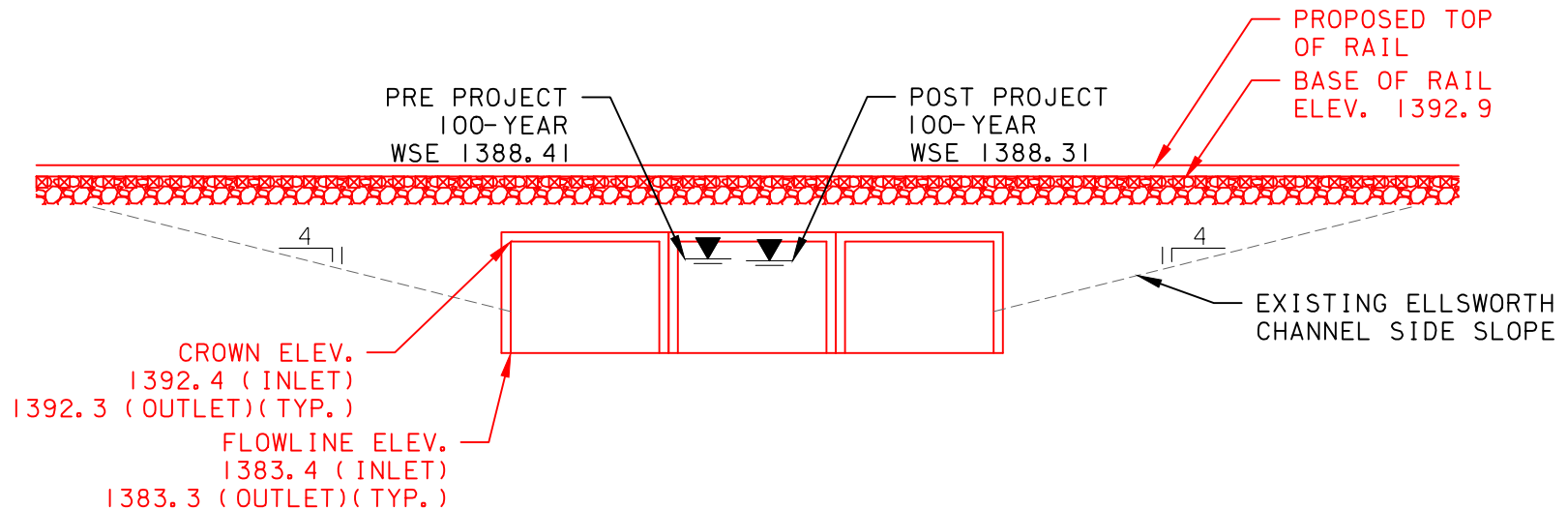
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FIGURE
 9

CULVERT AT STA. 157+22 - PIRATE IND. LEAD TRACK

PROPOSED: 3-44' LONG, 9.0' X 6.0' CONCRETE BOX CULVERT



NAVD 1988 DATUM
ELLSWORTH CHANNEL

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

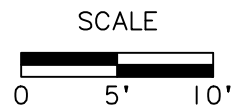
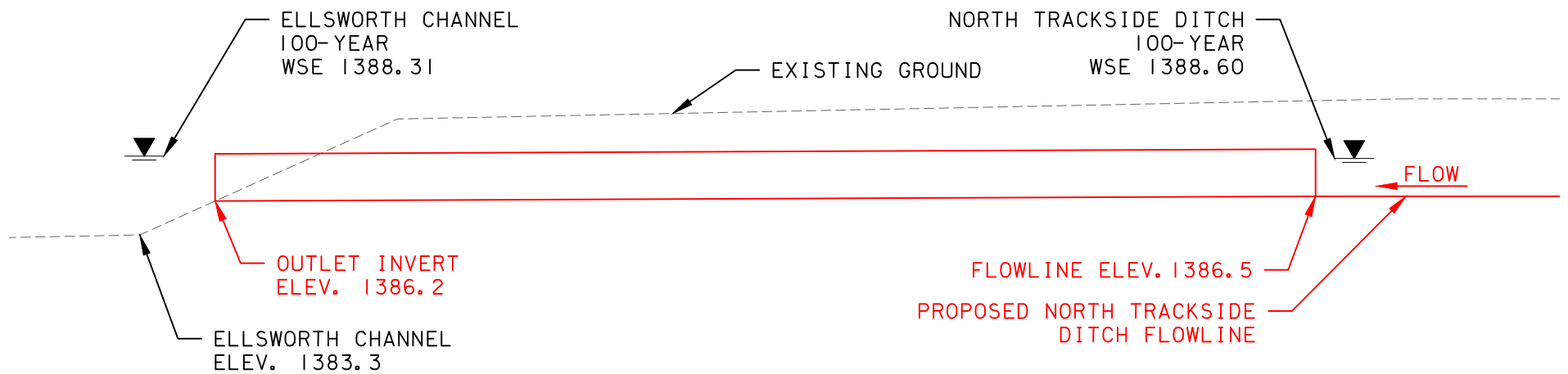
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
10

CULVERT AT STA. 158+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 2-70' LONG, 36" CORRUGATED METAL PIPE CULVERT



NAVD 1988 DATUM
 NORTH TRACKSIDE DITCH

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

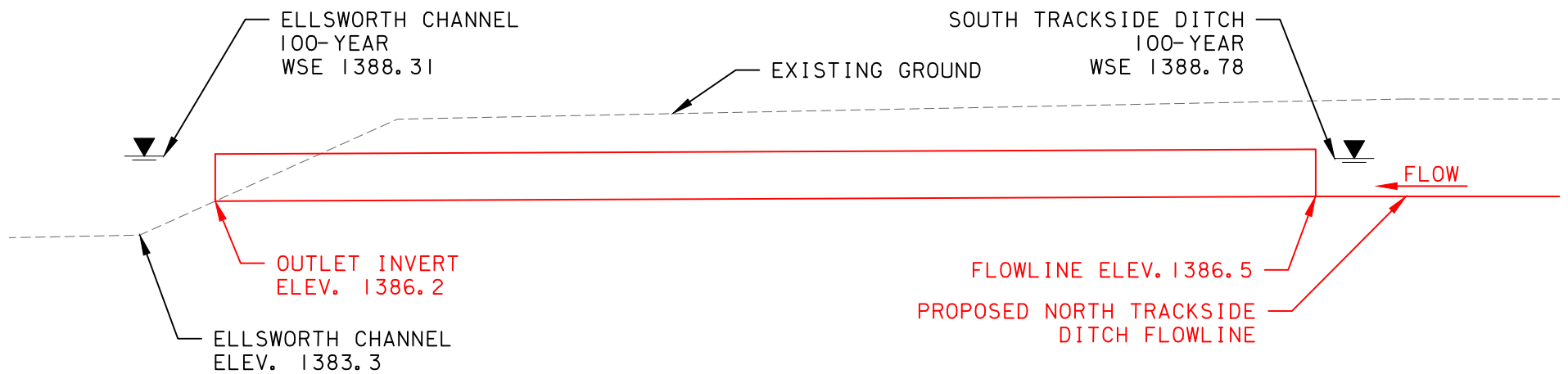
PROPOSED CULVERT - LOOKING NORTH

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FIGURE
 12

CULVERT AT STA. 158+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-90' LONG, 36" CORRUGATED METAL PIPE CULVERT



NAVD 1988 DATUM
 SOUTH TRACKSIDE DITCH

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - LOOKING NORTH

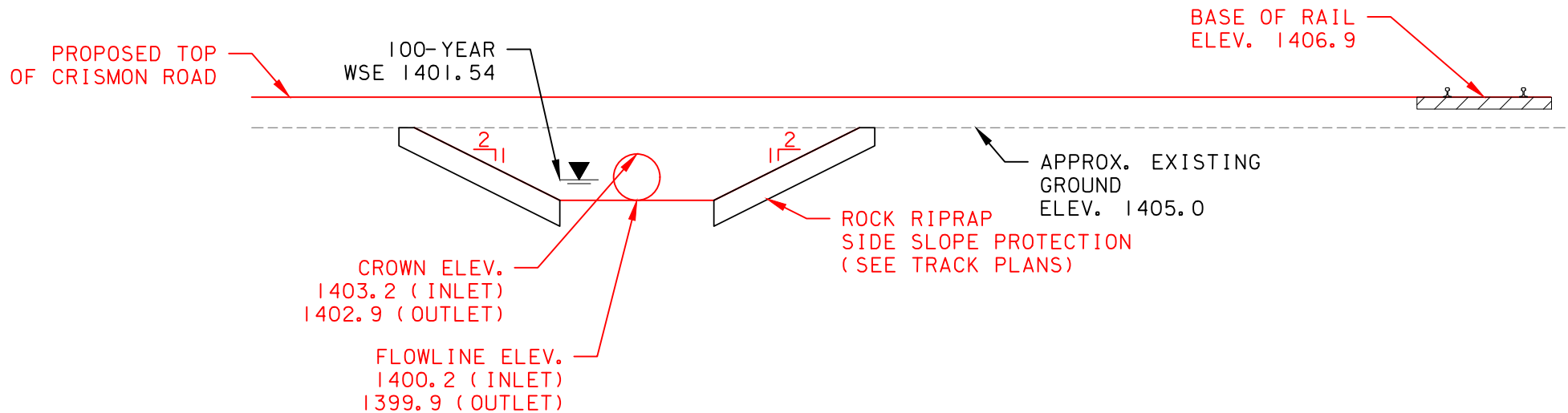
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FIGURE
 11

CULVERT AT STA. 209+12 - PIRATE IND. LEAD TRACK

PROPOSED: 1-92' LONG, 36" SMOOTH STEEL PIPE CULVERT



NAVD 1988 DATUM
SOUTH TRACKSIDE DITCH
CRISMON ROAD

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

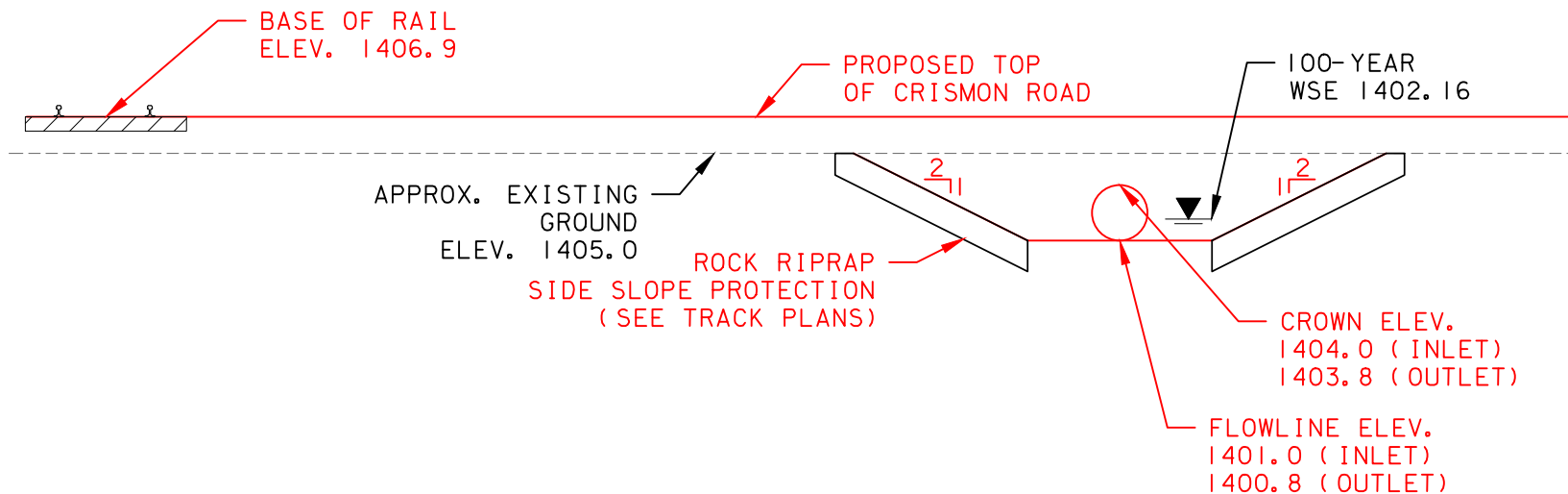
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
13

CULVERT AT STA. 209+12 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-84' LONG, 36" SMOOTH STEEL PIPE CULVERT



NAVD 1988 DATUM
 NORTH TRACKSIDE DITCH
 CRISMON ROAD

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

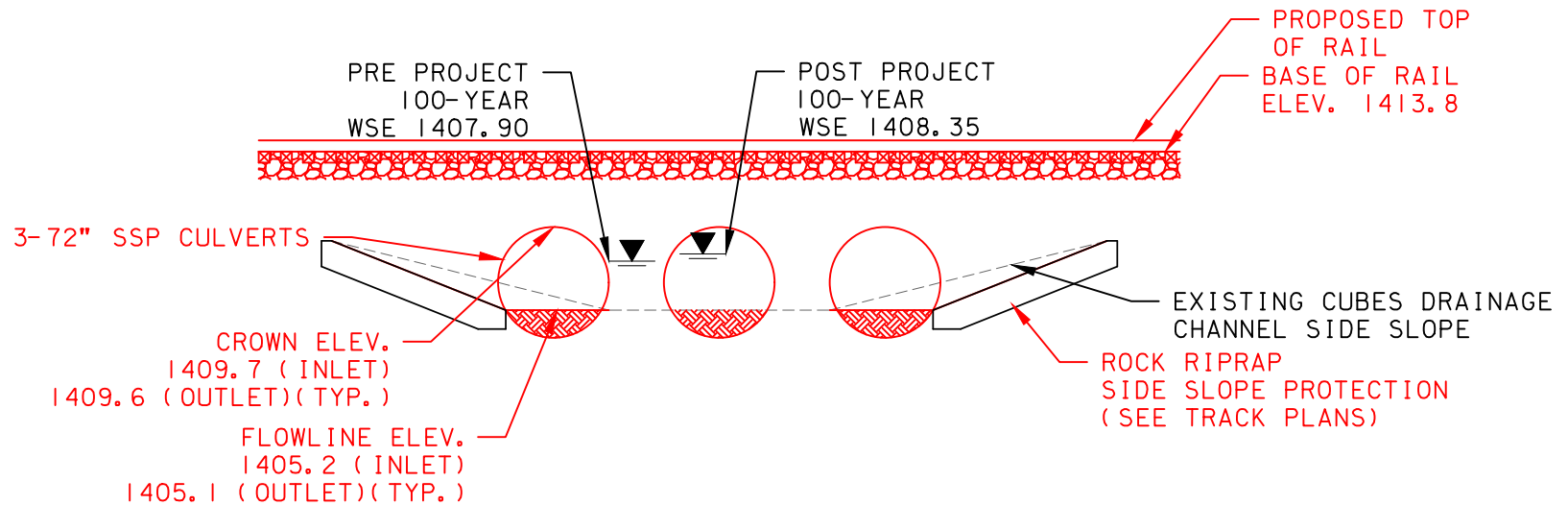
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 14

CULVERT AT STA. 222+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 3-70' LONG, 72" SMOOTH STEEL PIPE CULVERT DEPRESSED 1.5'



NAVD 1988 DATUM
 THE CUBES

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

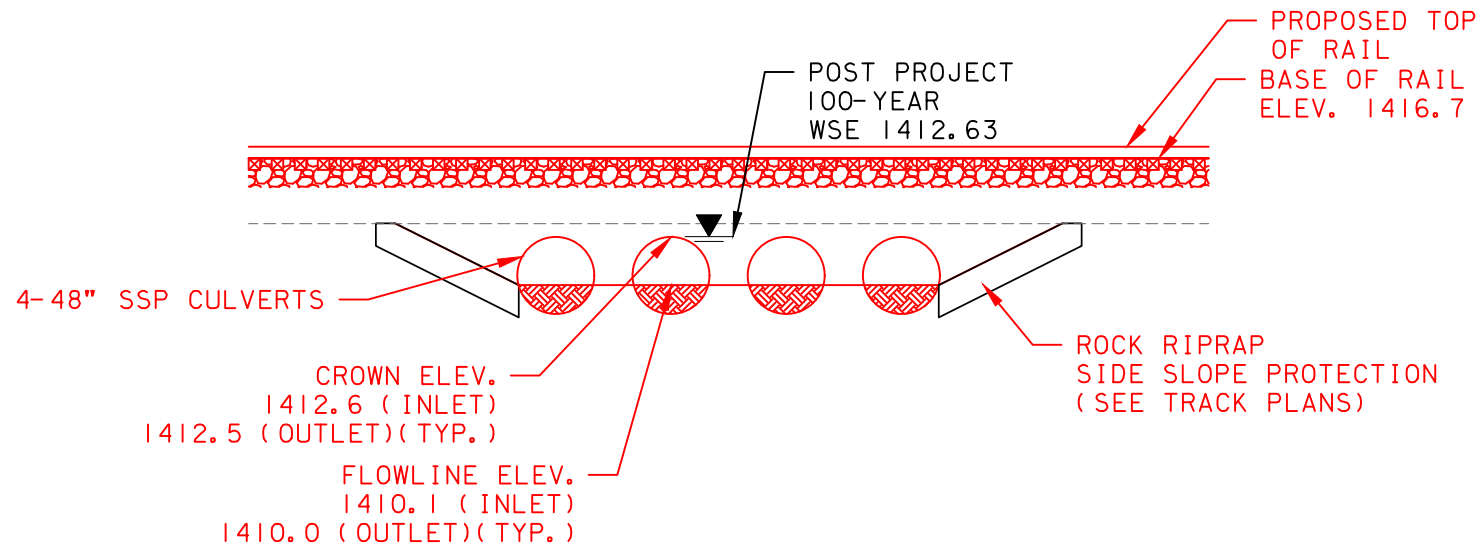
PROPOSED CULVERT - UPSTREAM FACE PROFILE

olsson

601 P Street, Suite 200
 P.O. Box 64008
 Lincoln, NE 68501-4008
 TEL 402-474-0311
 FAX 402-474-0160
 www.olssonassociates.com

FIGURE
 15

CULVERT AT STA. 236+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 4-70' LONG, 48" SMOOTH STEEL PIPE CULVERT DEPRESSED 1.5'



NAVD 1988 DATUM
 EAST OF MERRILL ROAD

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

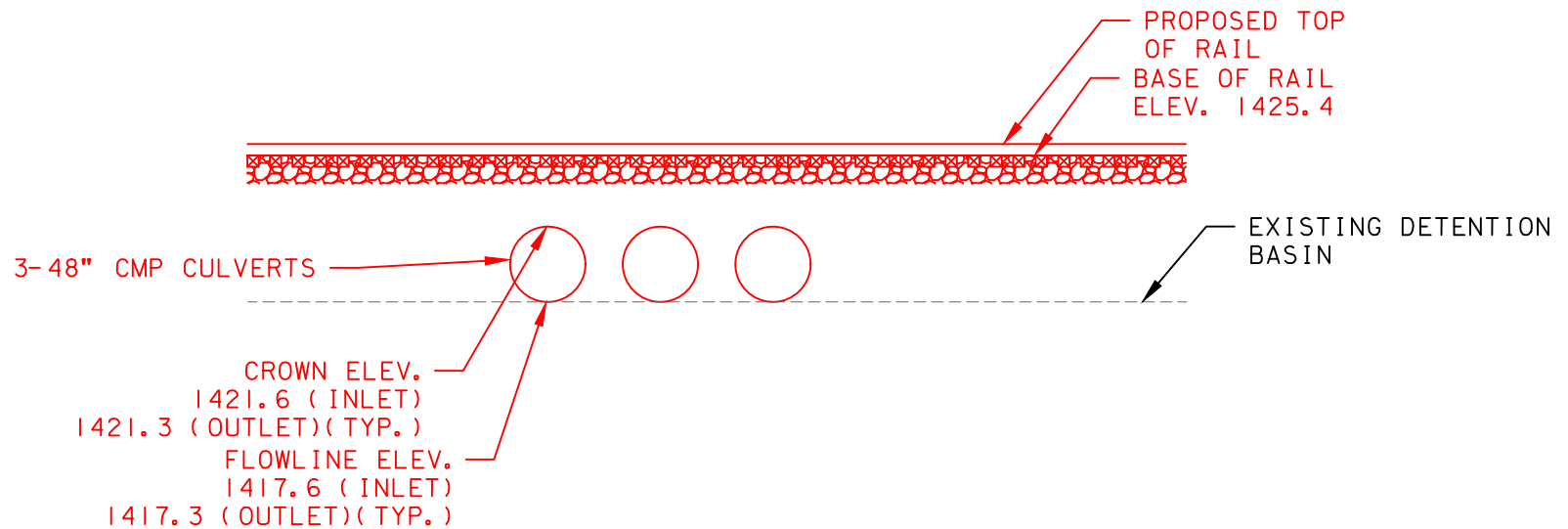
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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 FAX 402-474-6160
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FIGURE
 16

CULVERT AT STA. 268+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 3-56' LONG, 48" CORRUGATED METAL PIPE CULVERT



NAVD 1988 DATUM
 EAST OF SIGNAL BUTTE ROAD
 HYDRAULIC EQUILIZER

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

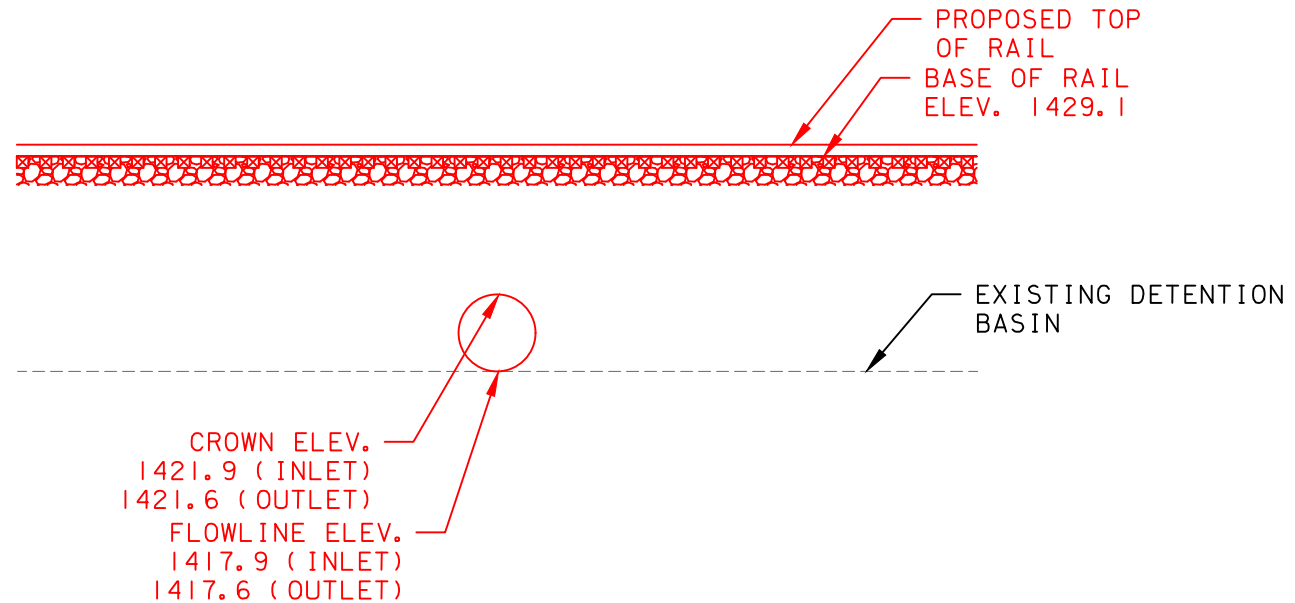
PROPOSED CULVERT - UPSTREAM FACE PROFILE

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FIGURE
 17

CULVERT AT STA. 278+00 - PIRATE IND. LEAD TRACK
 PROPOSED: 1-66' LONG, 48" CORRUGATED METAL PIPE CULVERT



NAVD 1988 DATUM
 WEST OF PRIVATE ROAD
 HYDRAULIC EQUILIZER

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

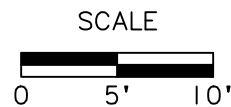
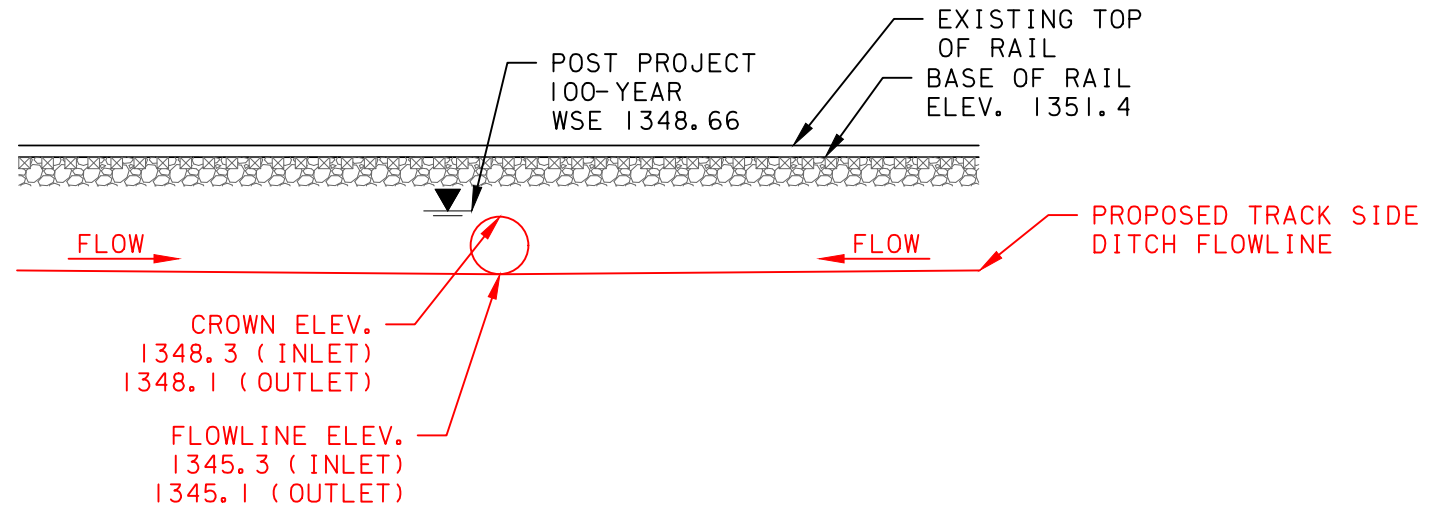
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FIGURE
 18

CULVERT AT STA. 1506+00 - PHOENIX SUBDIVISION

PROPOSED: 1-84' LONG, 36" SMOOTH STEEL PIPE CULVERT



NAVD 1988 DATUM
MP 935.22

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

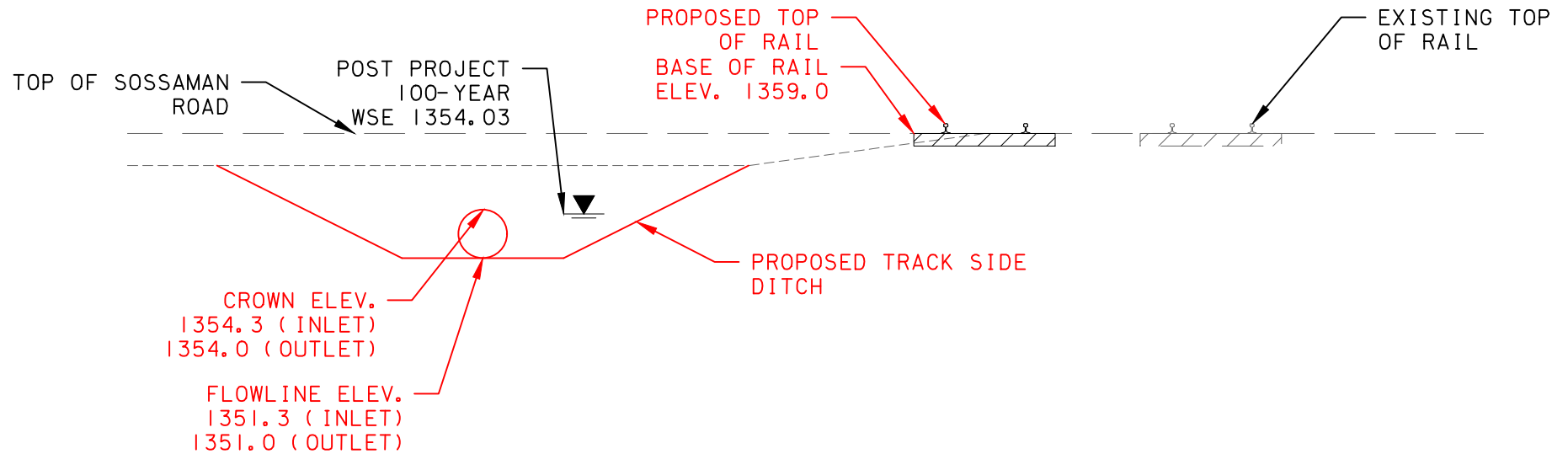
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FIGURE
19

CULVERT AT STA. 1528+45 - PHOENIX SUBDIVISION
 PROPOSED: 1-88' LONG, 36" CORRUGATED METAL PIPE CULVERT



NAVD 1988 DATUM
 SOSSAMAN ROAD

PROJECT: C20-0927
 DRAWN BY: GVP
 DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

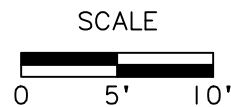
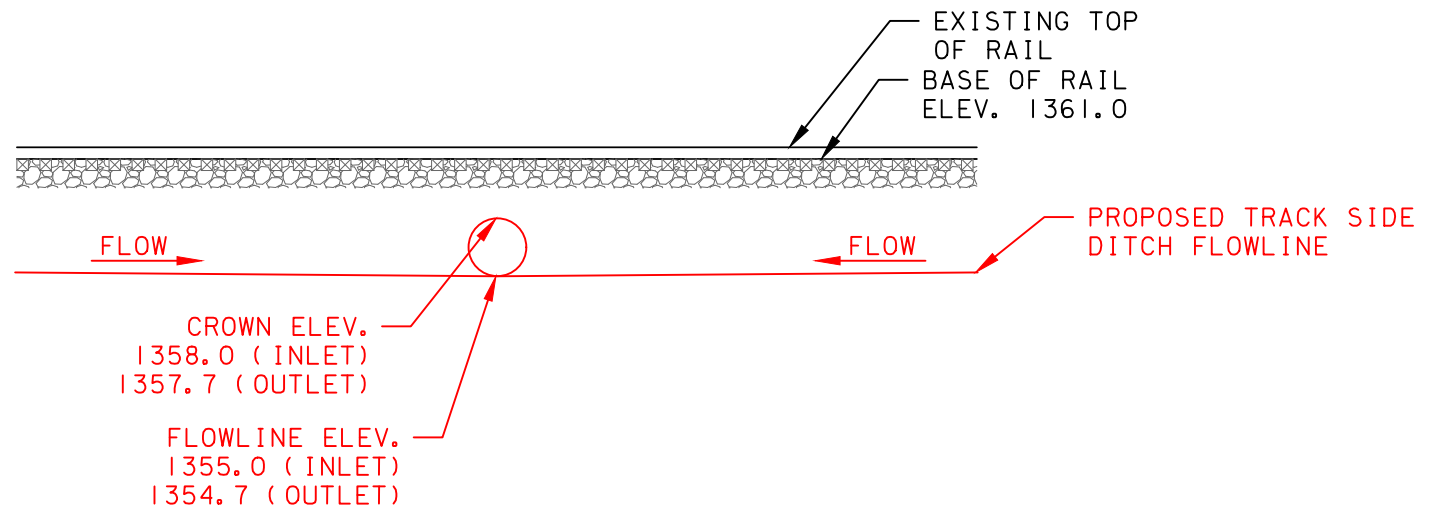
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FIGURE
 20

CULVERT AT STA. 1535+00 - PHOENIX SUBDIVISION

PROPOSED: 1-72' LONG, 36" SMOOTH STEEL PIPE CULVERT



NAVD 1988 DATUM
MP 935.77

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

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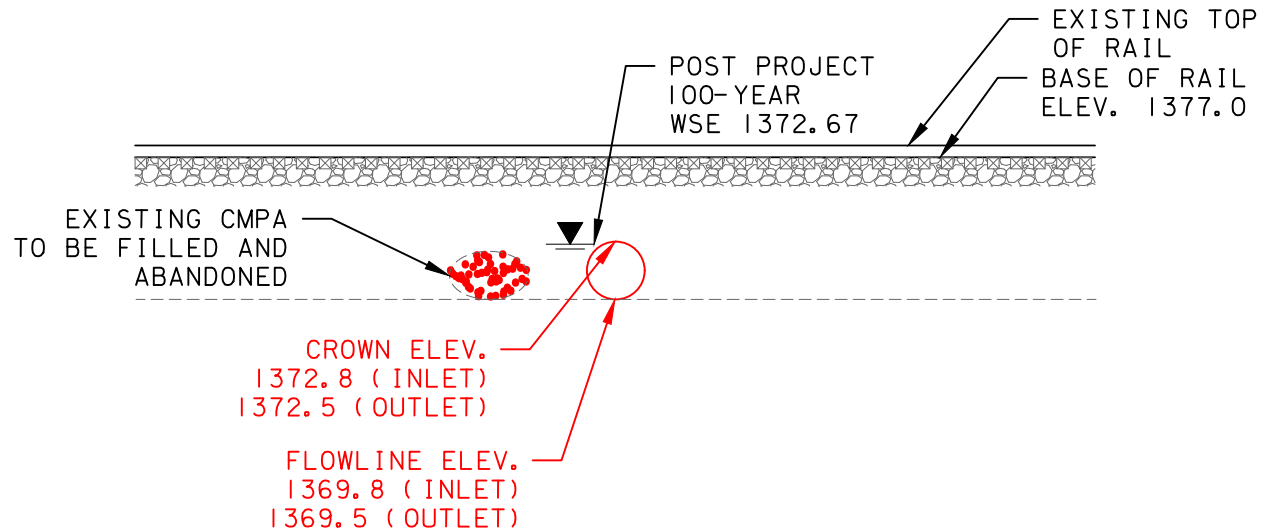
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Lincoln, NE 68501-4608

TEL 402-474-0311
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FIGURE
21

CULVERT AT STA. 1586+55 - PHOENIX SUBDIVISION

PROPOSED: 1-80' LONG, 36" SMOOTH STEEL PIPE CULVERT



NAVD 1988 DATUM
MP 936.75

PROJECT: C20-0927
DRAWN BY: GVP
DATE: MAY 2022

PROPOSED CULVERT - UPSTREAM FACE PROFILE

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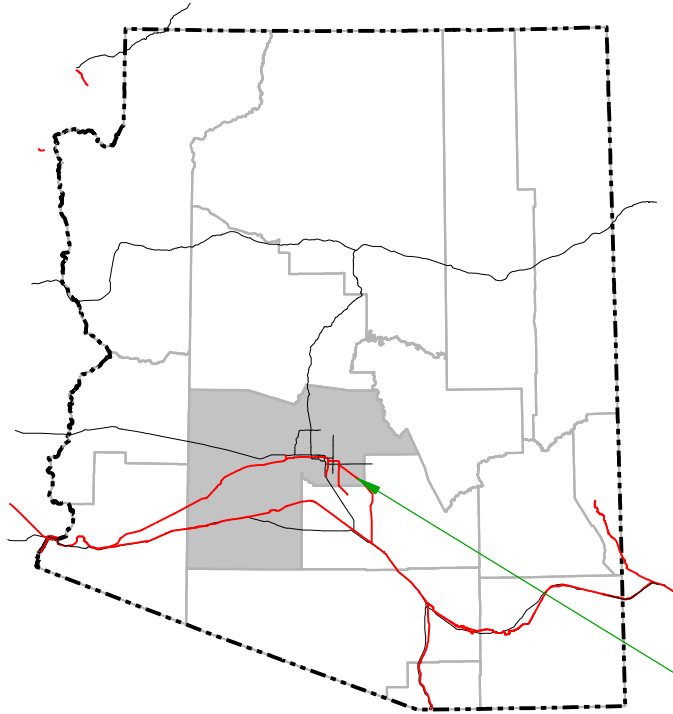
TEL 402.474.6311
FAX 402.474.6160
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FIGURE
22

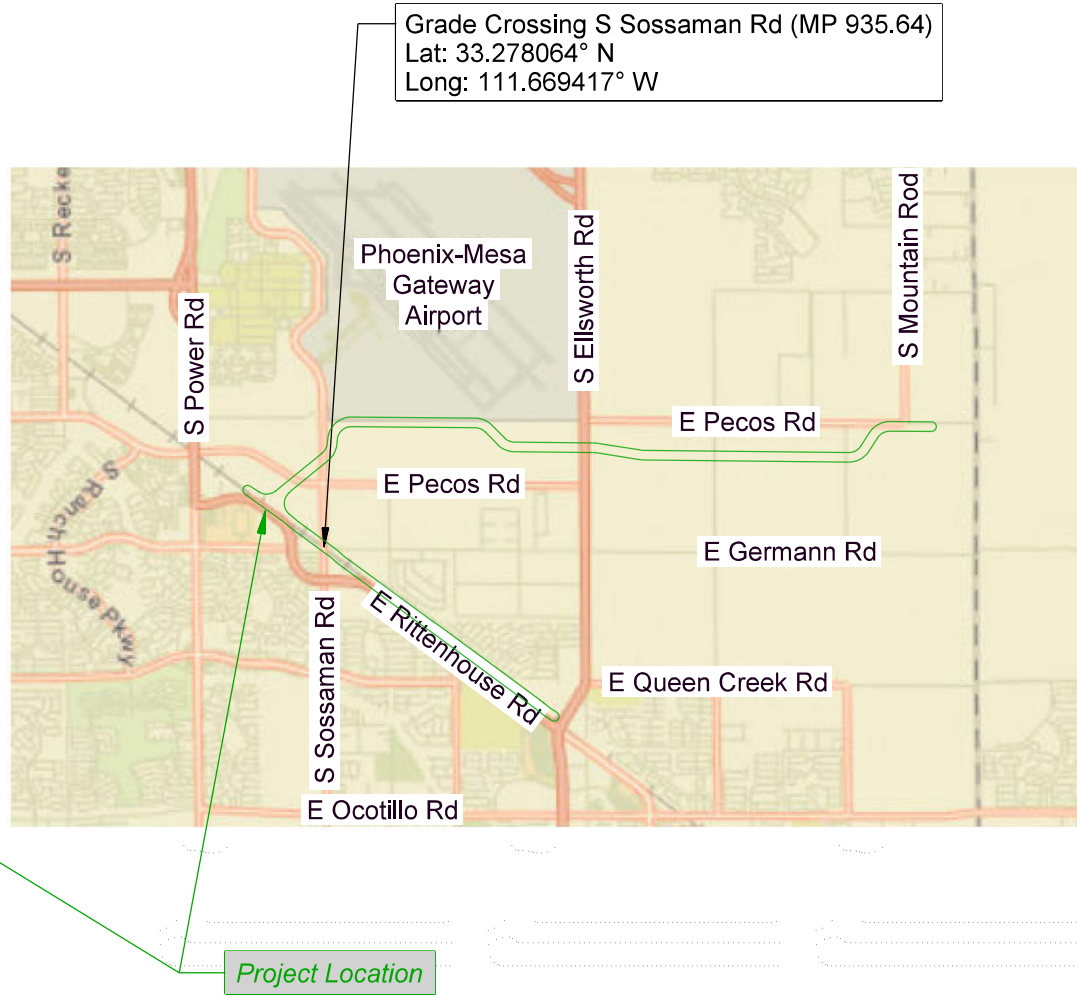
Appendix F - Select Pages from UPRR 60% Design Plans



ENGINEERING DESIGN



State of Arizona



Project Location Map

MESA, ARIZONA PHOENIX SUBDIVISION MP 934.79 TO MP 937.83 CONSTRUCT INDUSTRIAL LEAD TRACK

**60% PLANS
REVIEW**

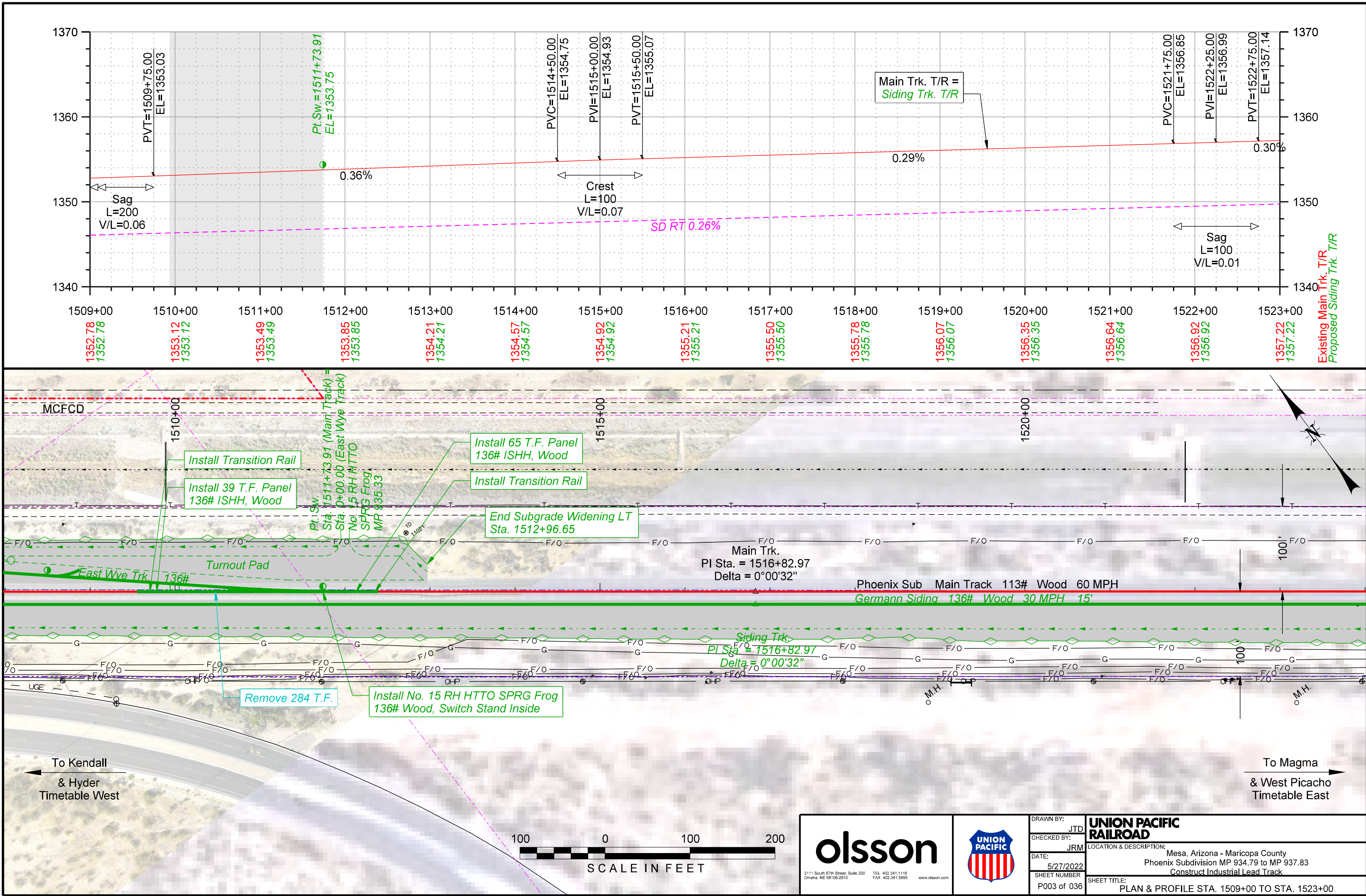
LAST REVISED
2/19/2022

WORK ORDER:
PROJECT NUMBER:
BUDGET REFERENCE:

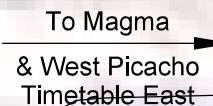
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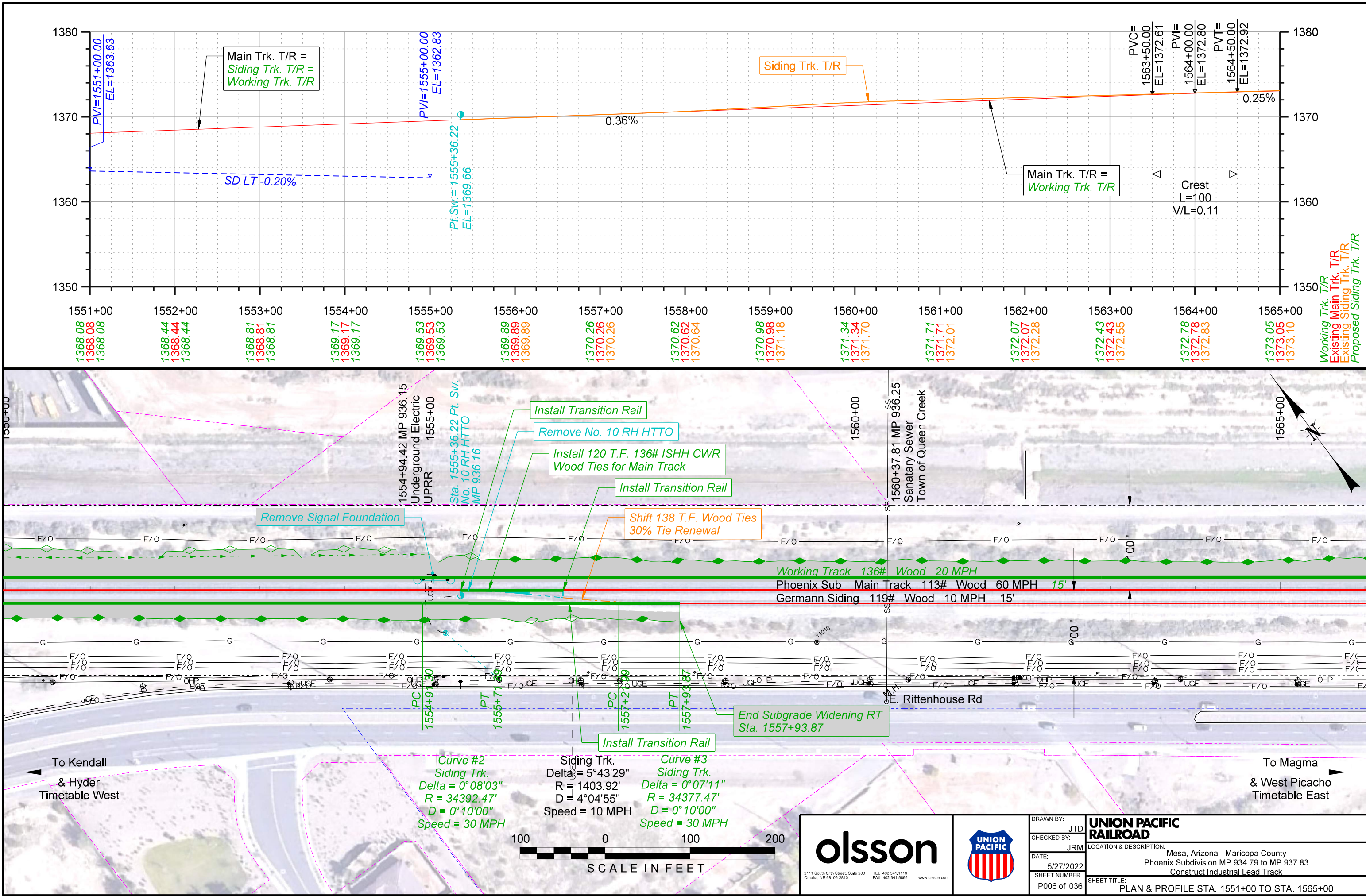
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5/27/2022



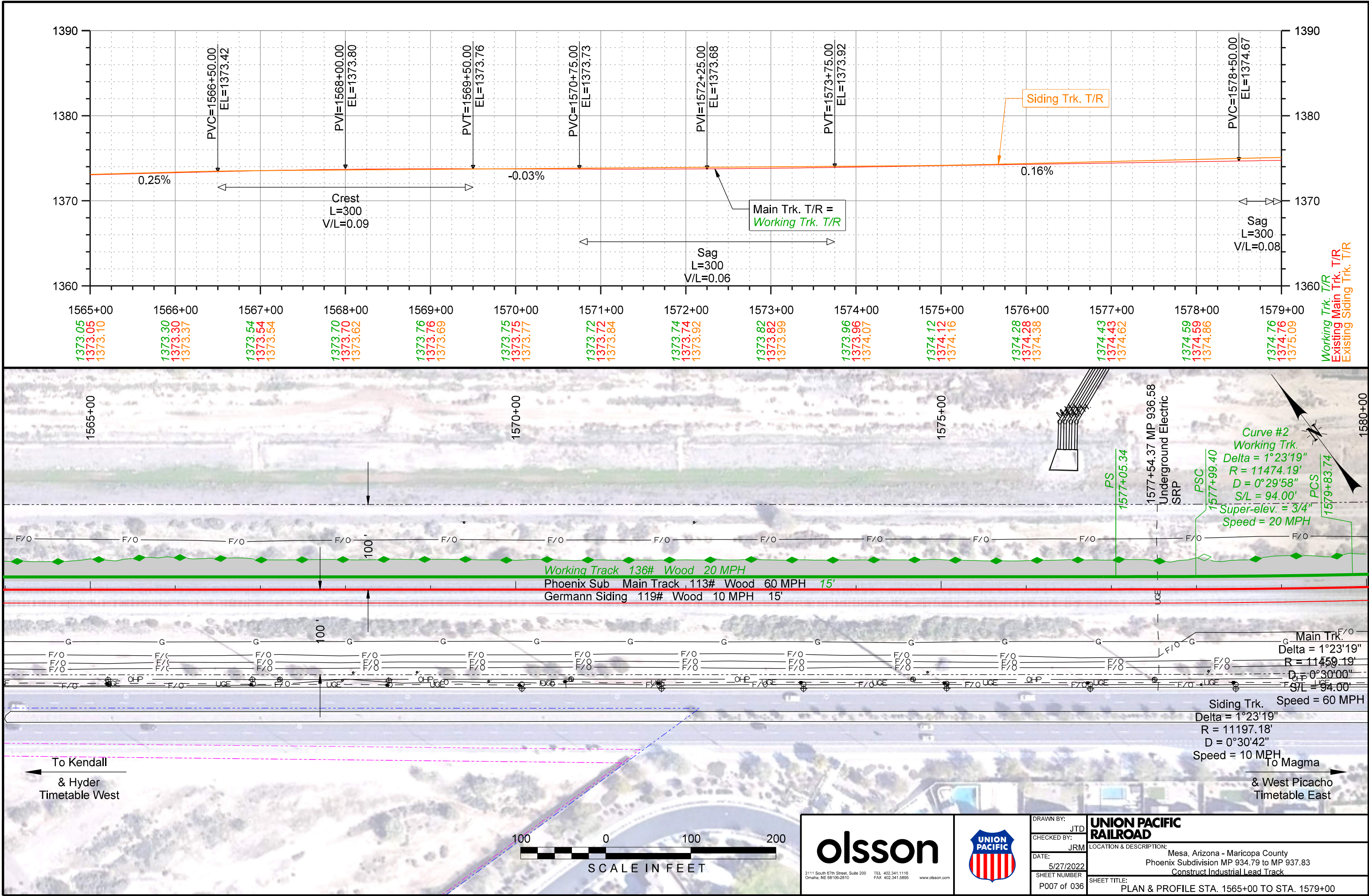
 2111 South 67th Street, Suite 200 Omaha, NE 68106-2910 TEL: 402.341.1118 FAX: 402.341.5895 www.olson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 1509+00 TO STA. 1523+00
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		DATE: 5/27/2022	
		SHEET NUMBER: P003 of 036	



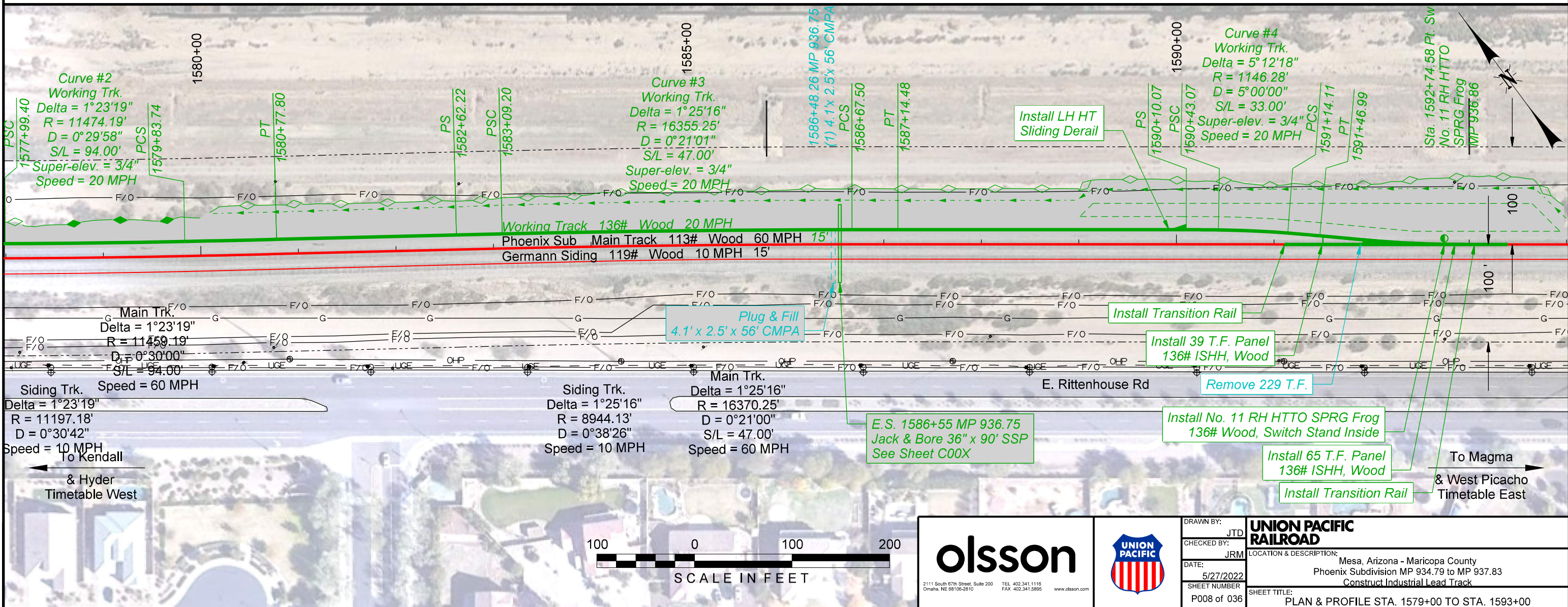
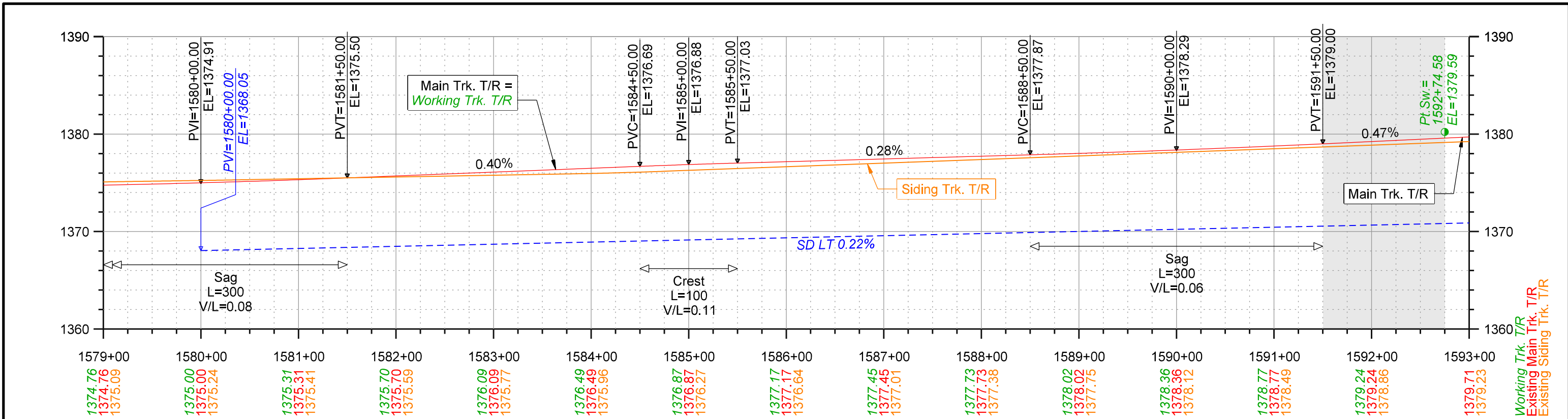
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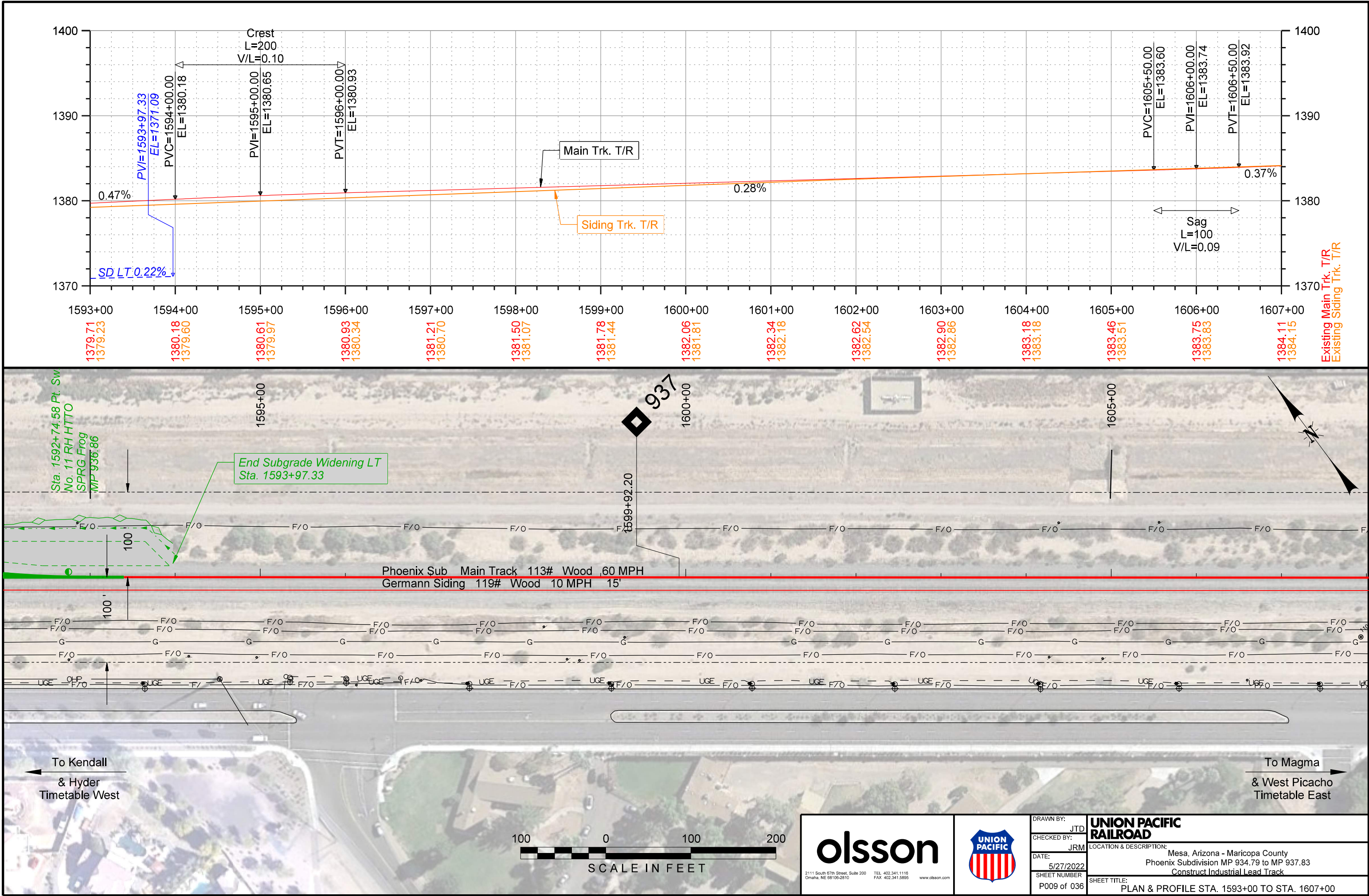
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DRAWN BY: JTD
CHECKED BY: JRM
DATE: 5/27/2022
SHEET NUMBER: P008 of 036

LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County
Phoenix Subdivision MP 934.79 to MP 937.83
Construct Industrial Lead Track

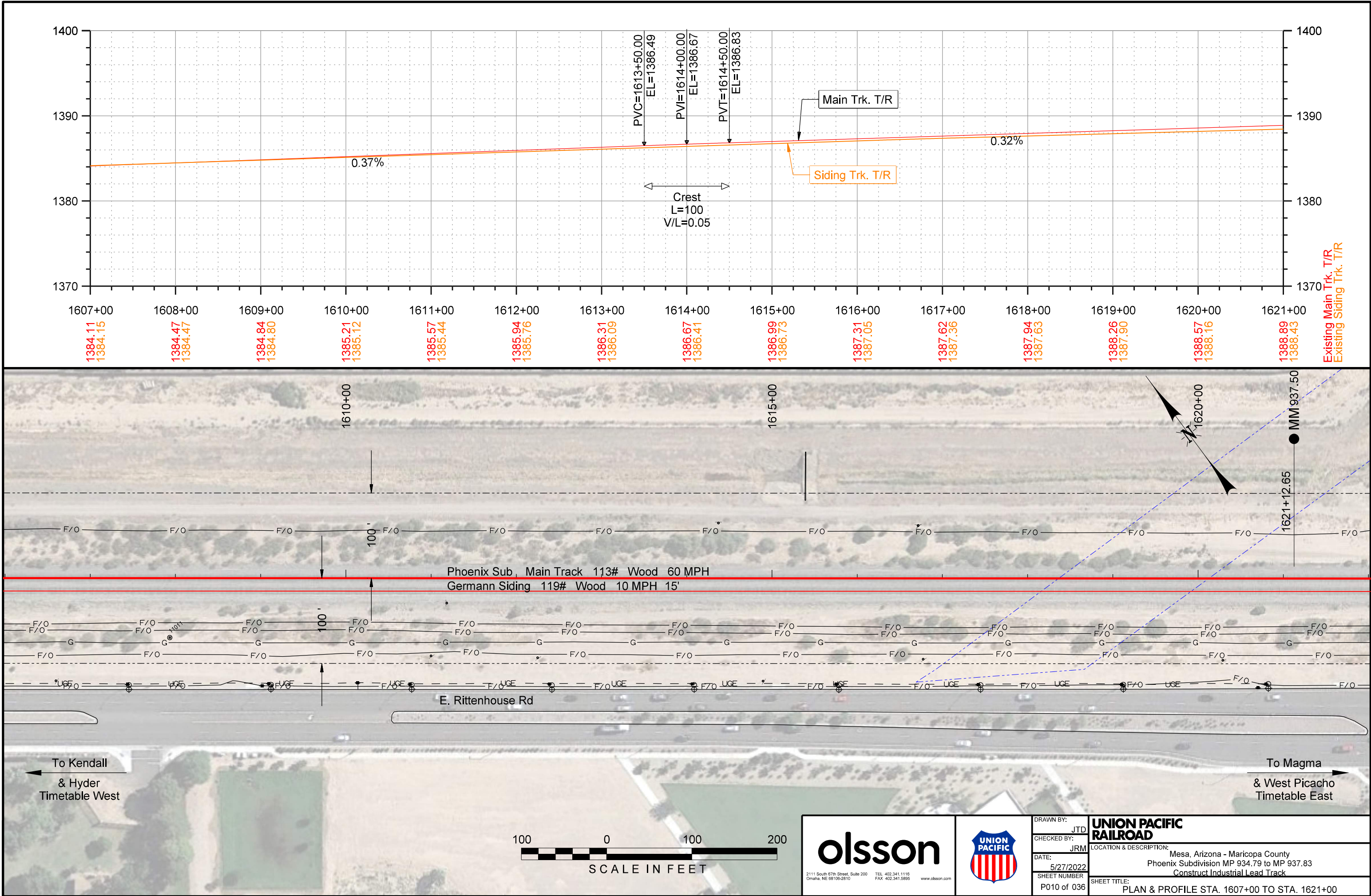
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		DATE: 5/27/2022	
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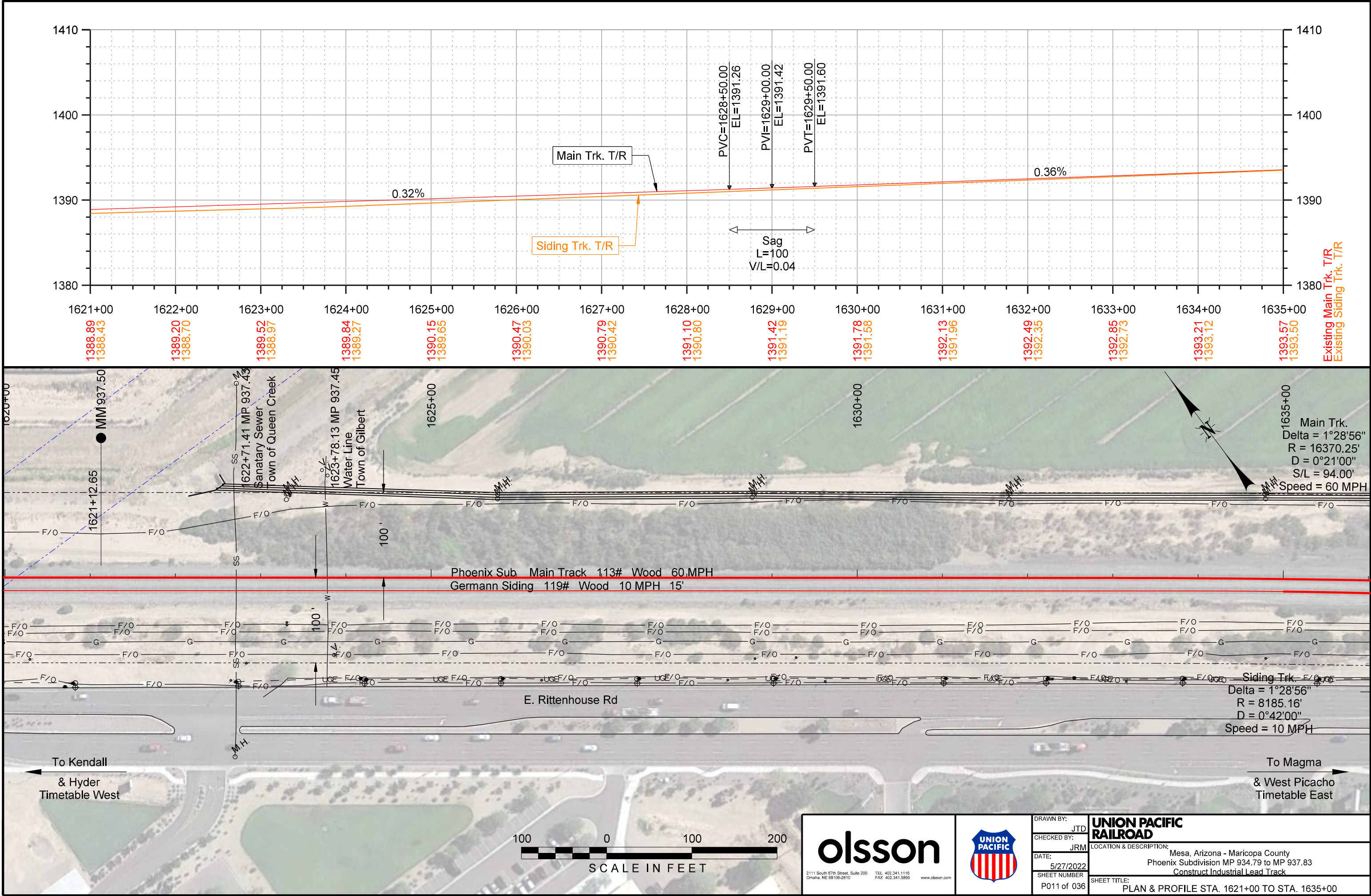
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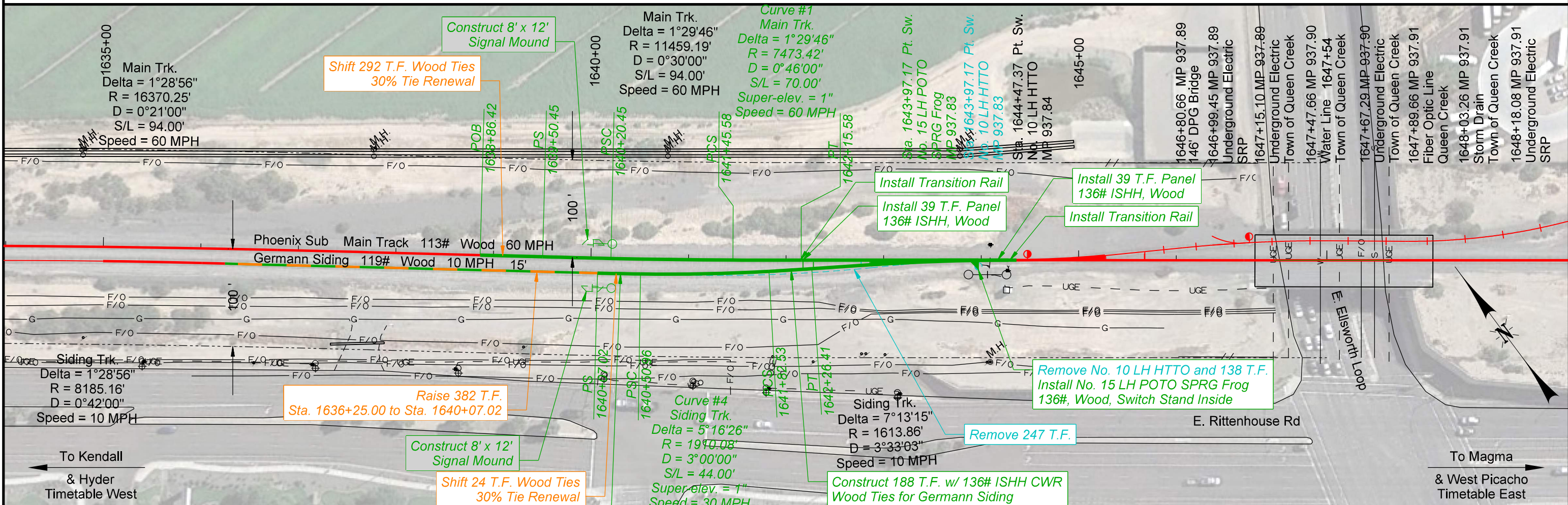
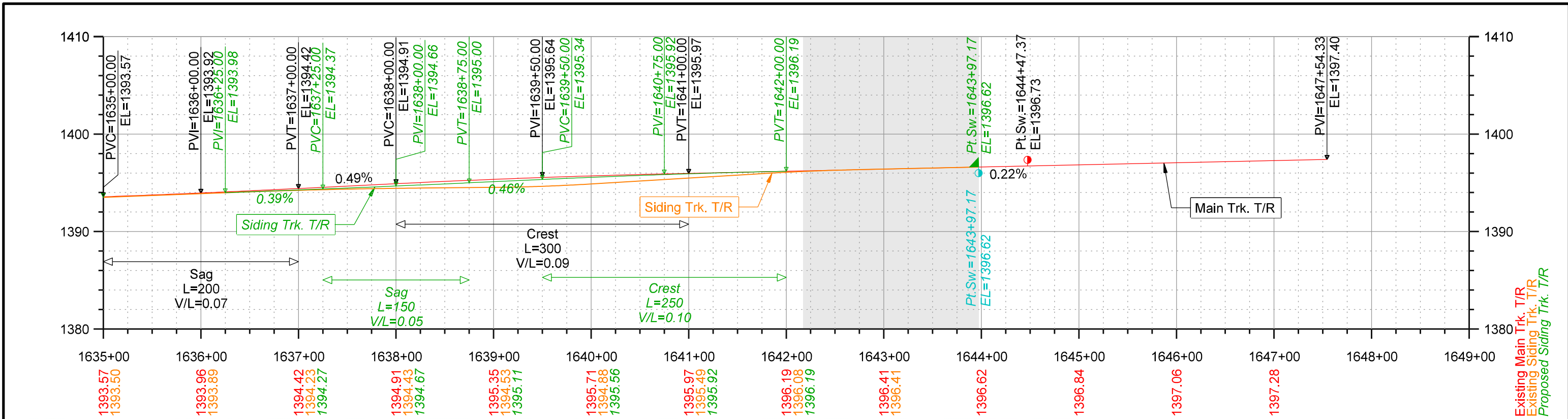


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UNION PACIFIC RAILROAD

LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County
Phoenix Subdivision MP 934.79 to MP 937.83
Construct Industrial Lead Track

SHEET TITLE: PLAN & PROFILE STA. 1635+00 TO STA. 1649+00

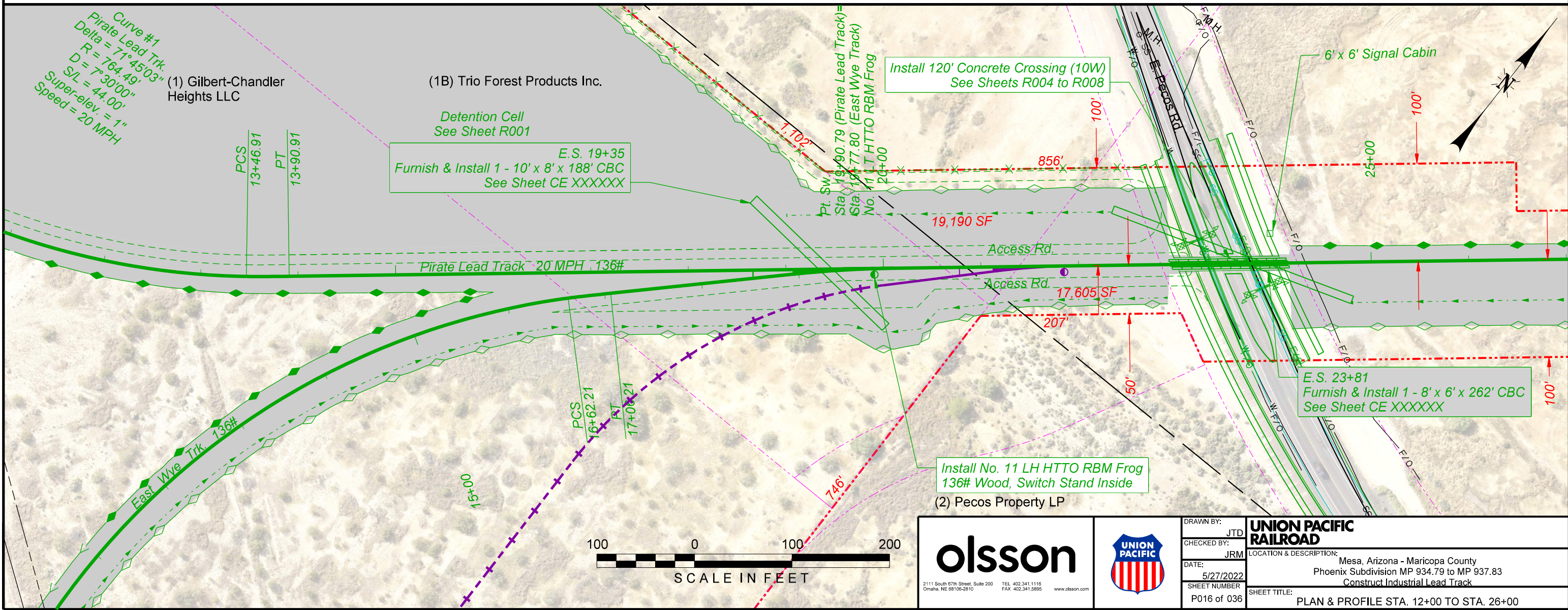
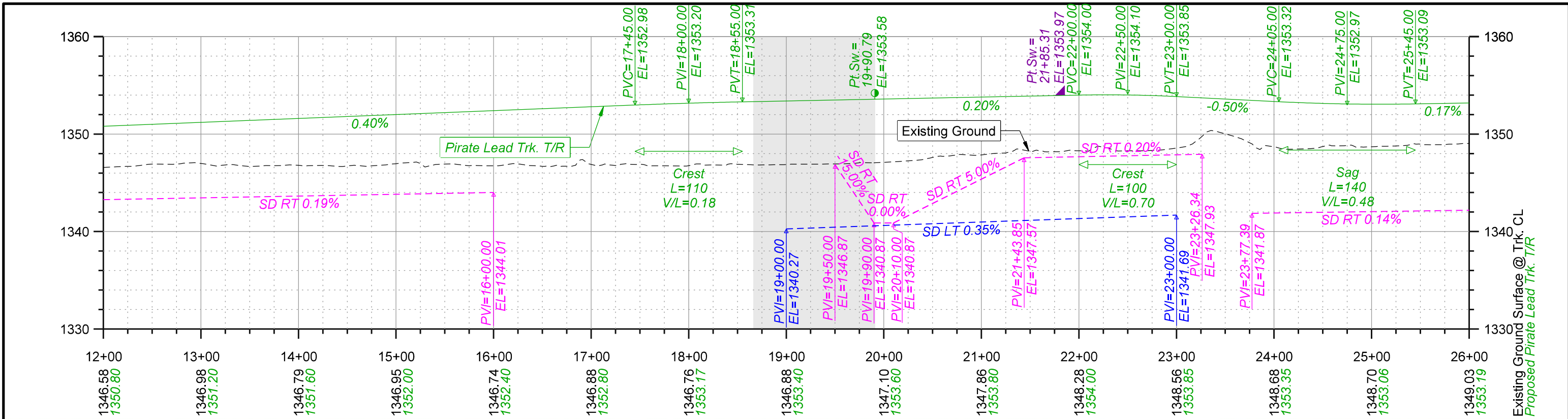
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DATE: 5/27/2022

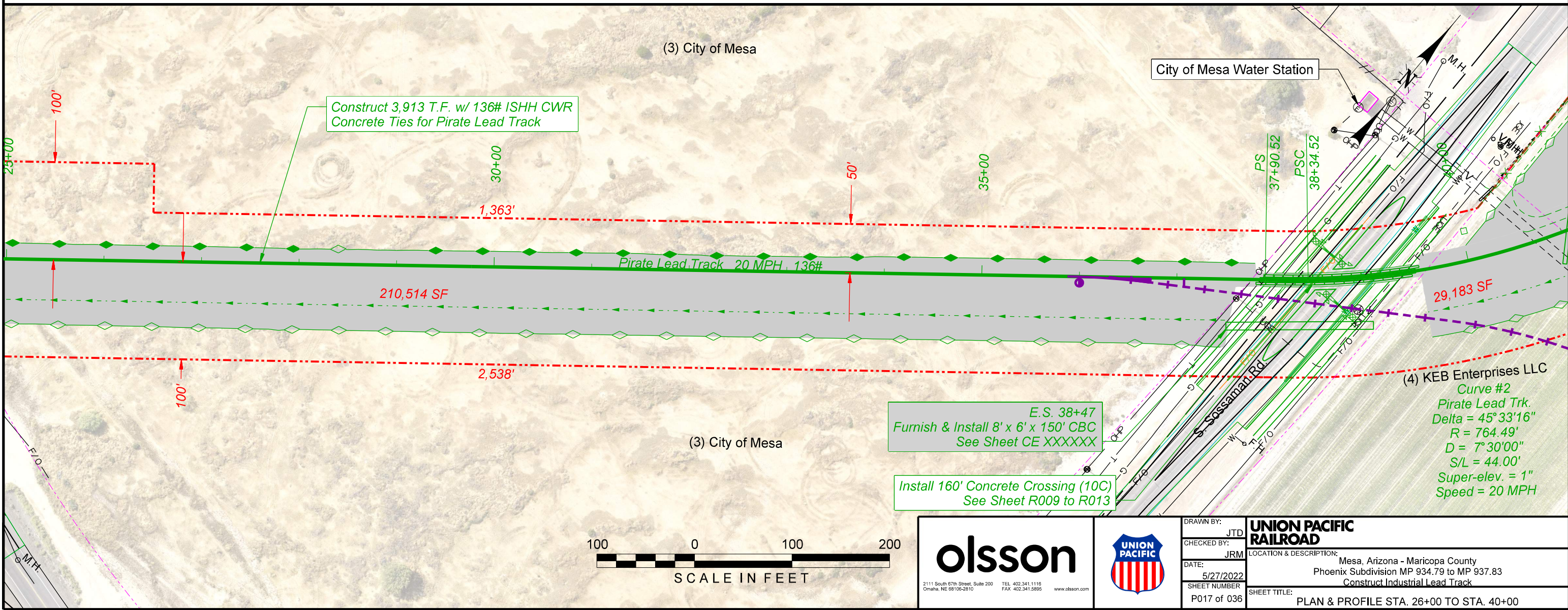
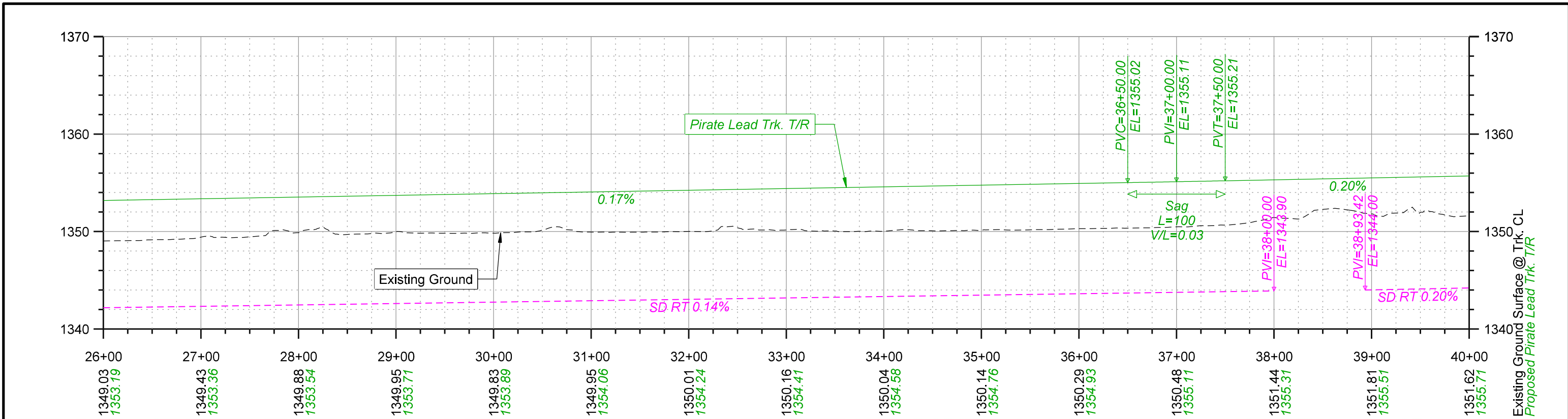
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5/27/2022



E.S. 38+47
Furnish & Install 8' x 6' x 150' CBC
See Sheet CE XXXXXX

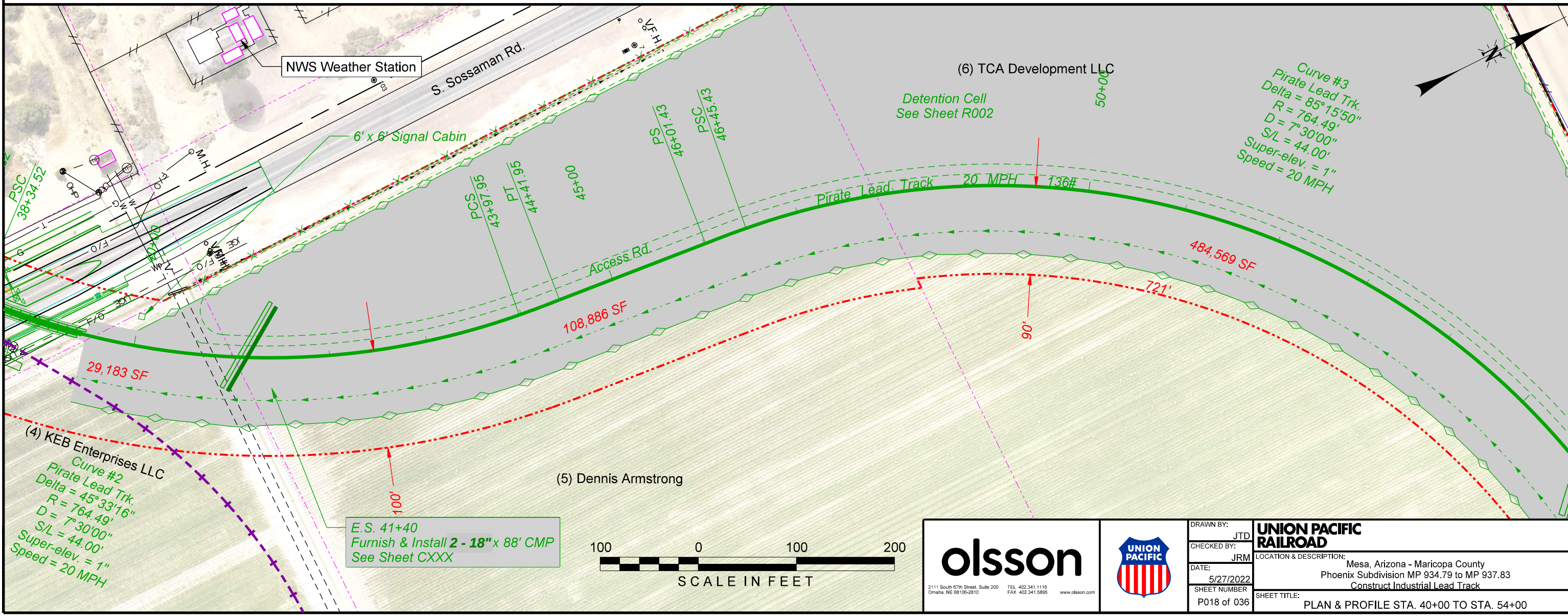
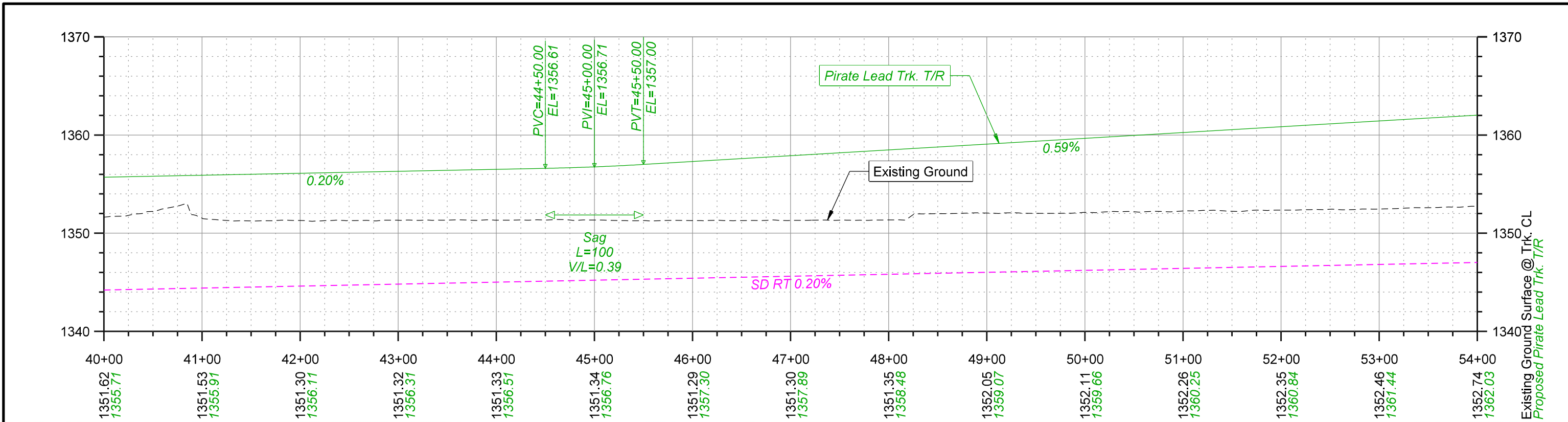
Install 160' Concrete Crossing (10C)
See Sheet R009 to R013

(4) KEB Enterprises LLC
Curve #2
Pirate Lead Trk.
Delta = 45°33'16"
R = 764.49'
D = 7°30'00"
S/L = 44.00'
Super-elev. = 1"
Speed = 20 MPH

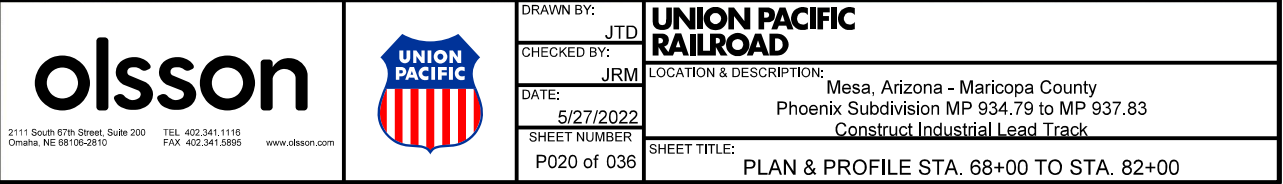


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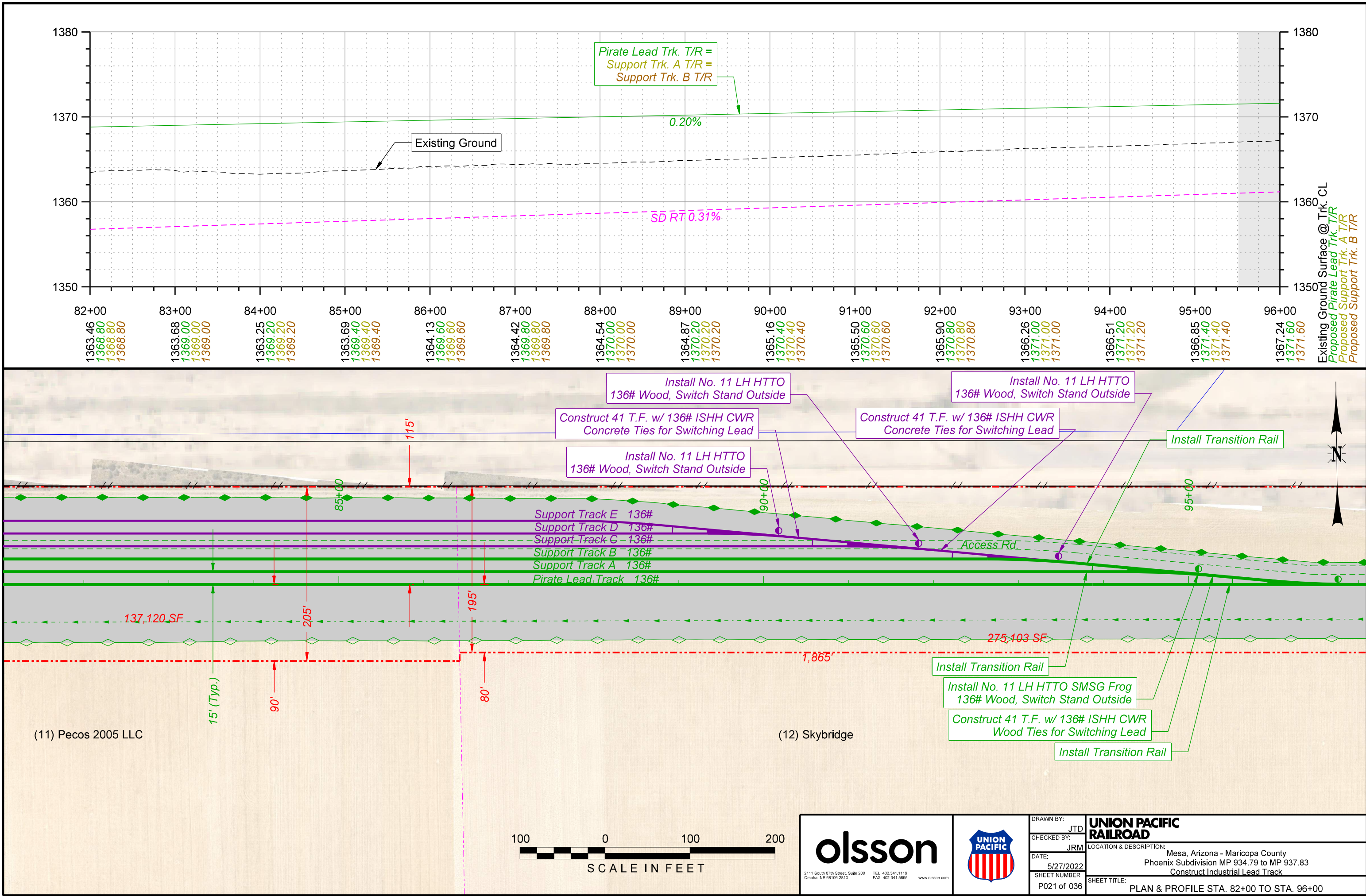
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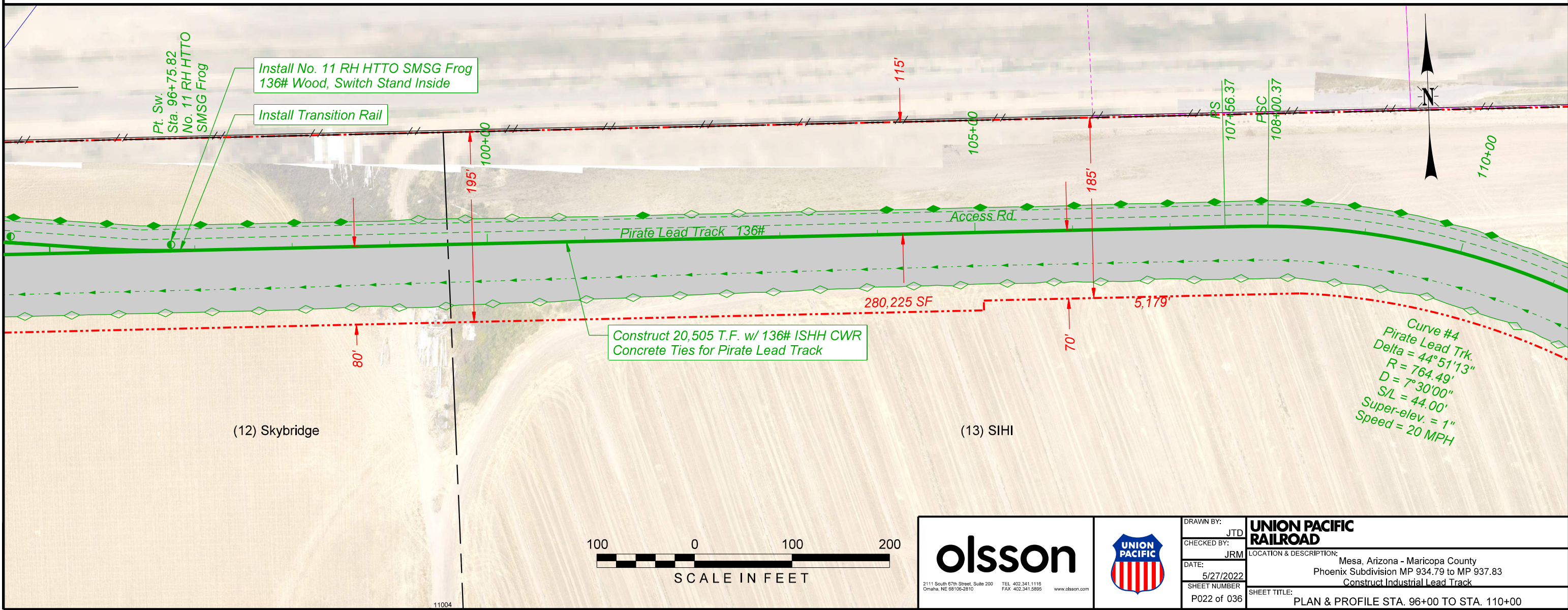
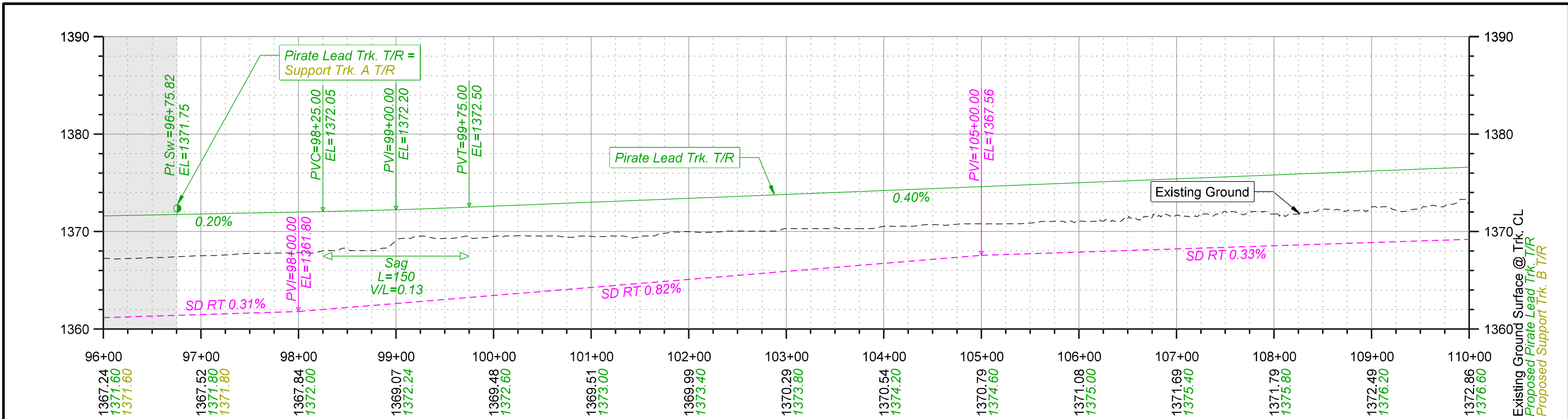
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5/27/2022

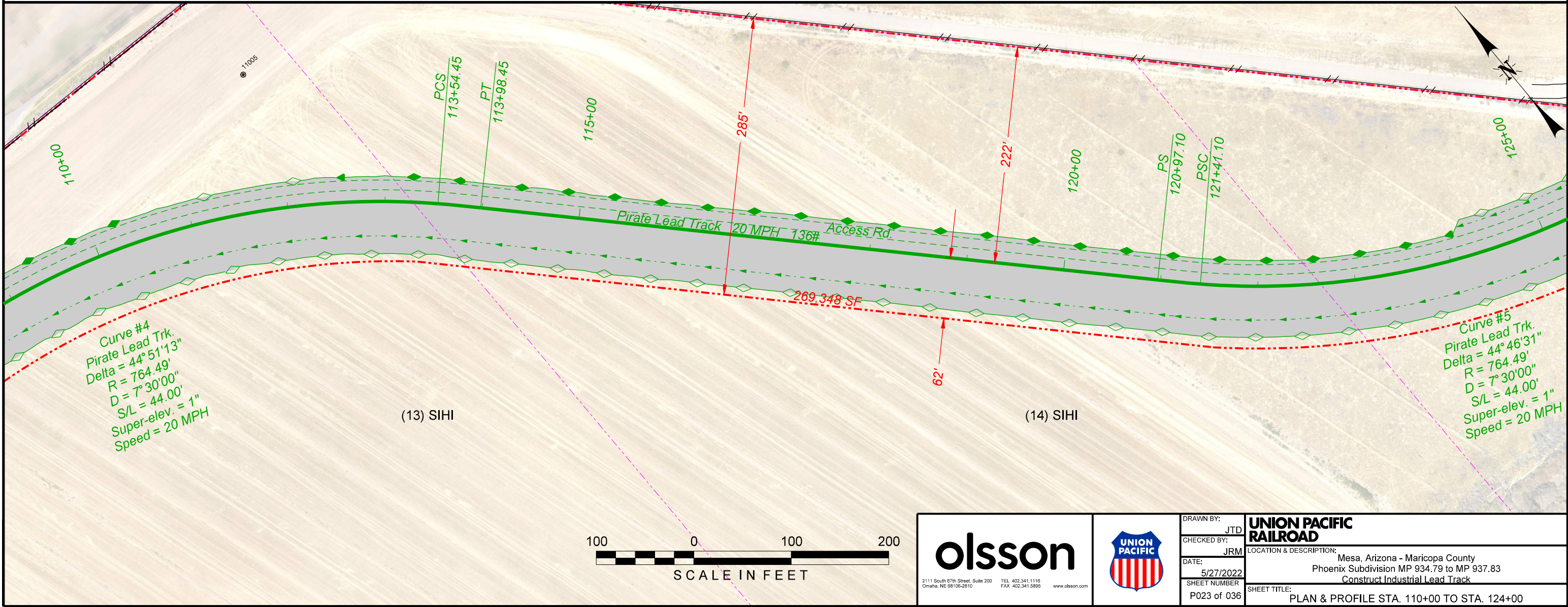
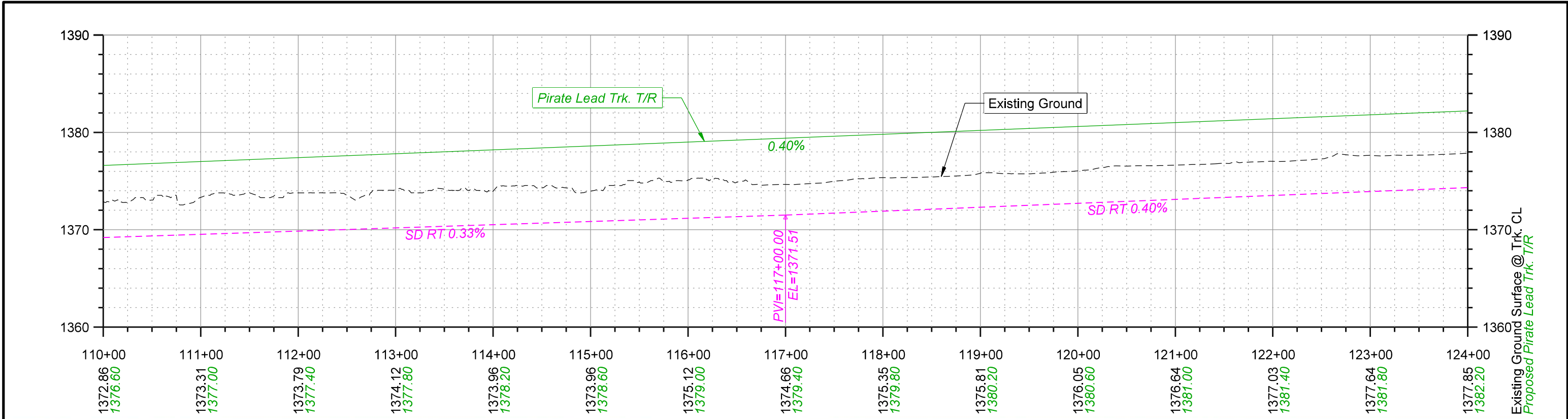


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5/27/2022



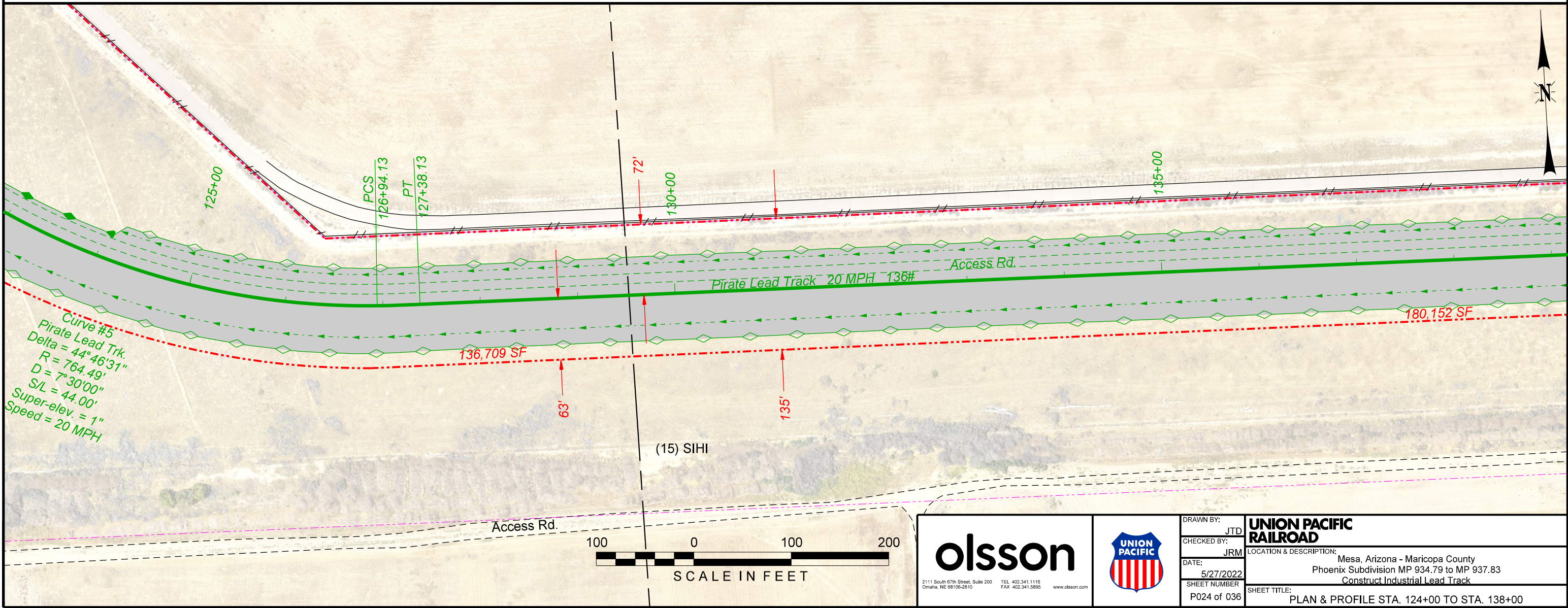
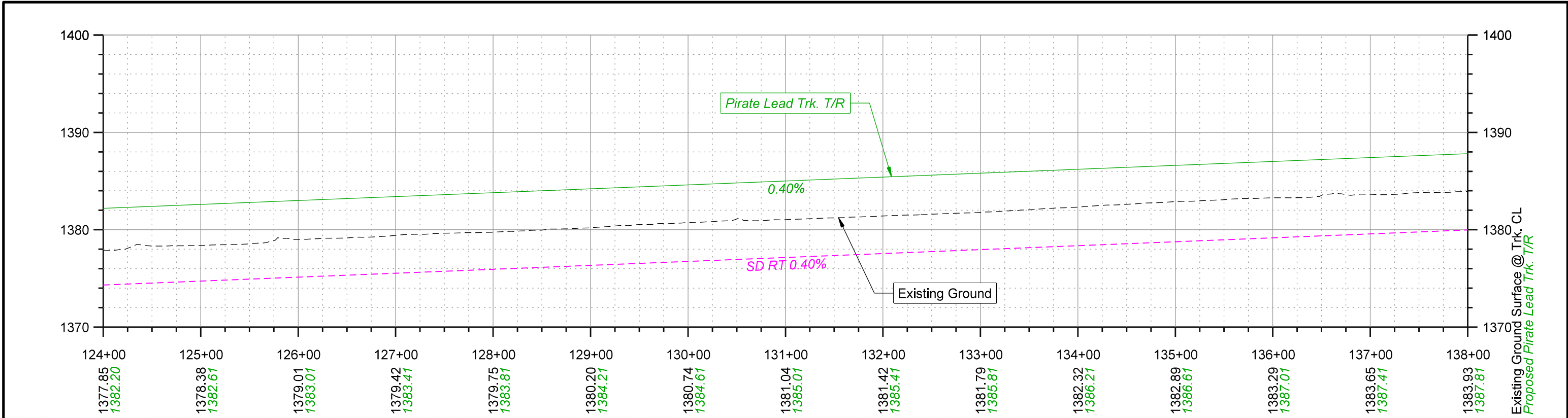
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5/27/2022



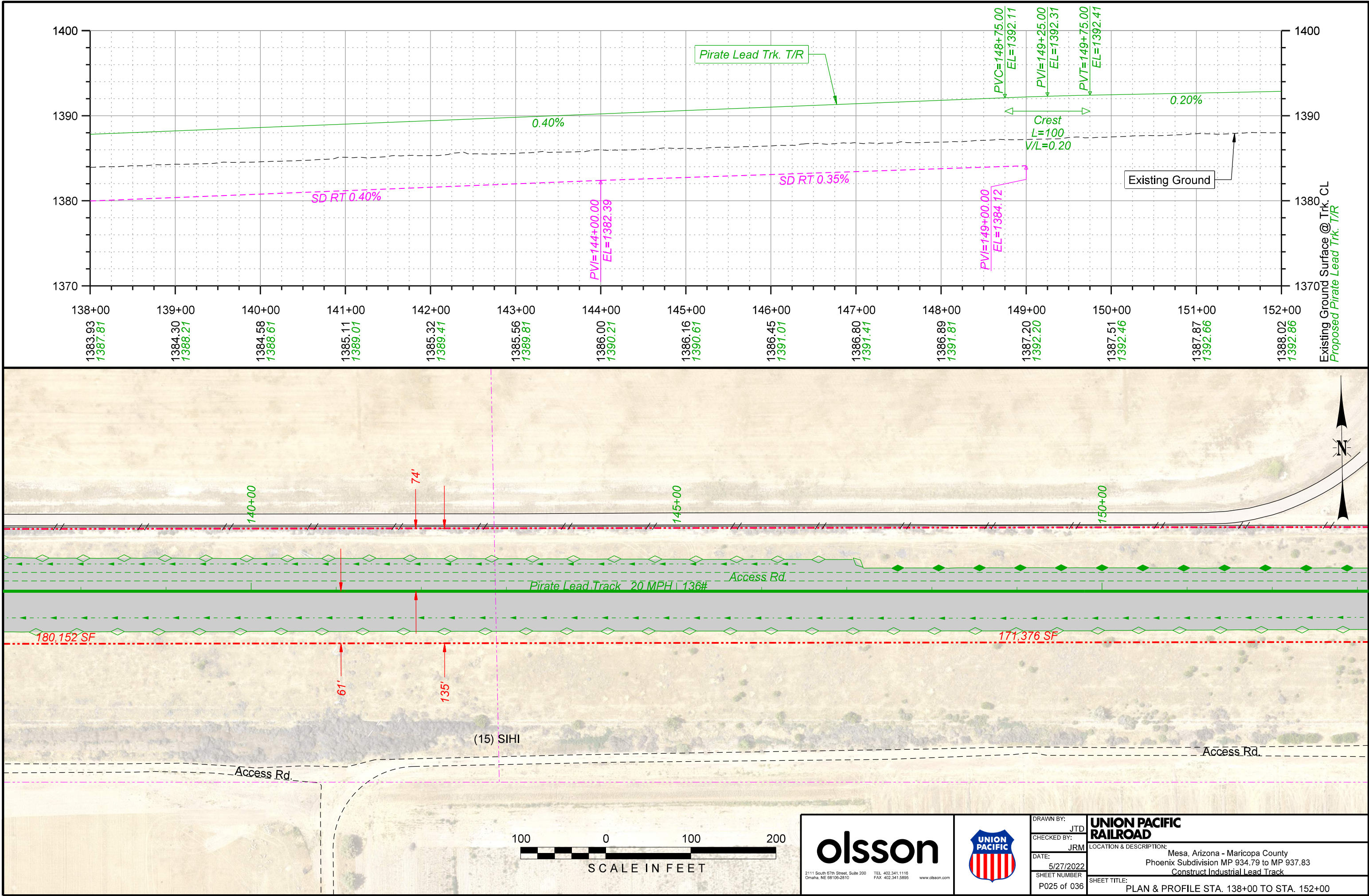
 2111 South 67th Street, Suite 200 Omaha, NE 68106-2910 TEL: 402.341.1119 FAX: 402.341.5895 www.olson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 110+00 TO STA. 124+00
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		DATE: 5/27/2022	
		SHEET NUMBER: P024 of 036	

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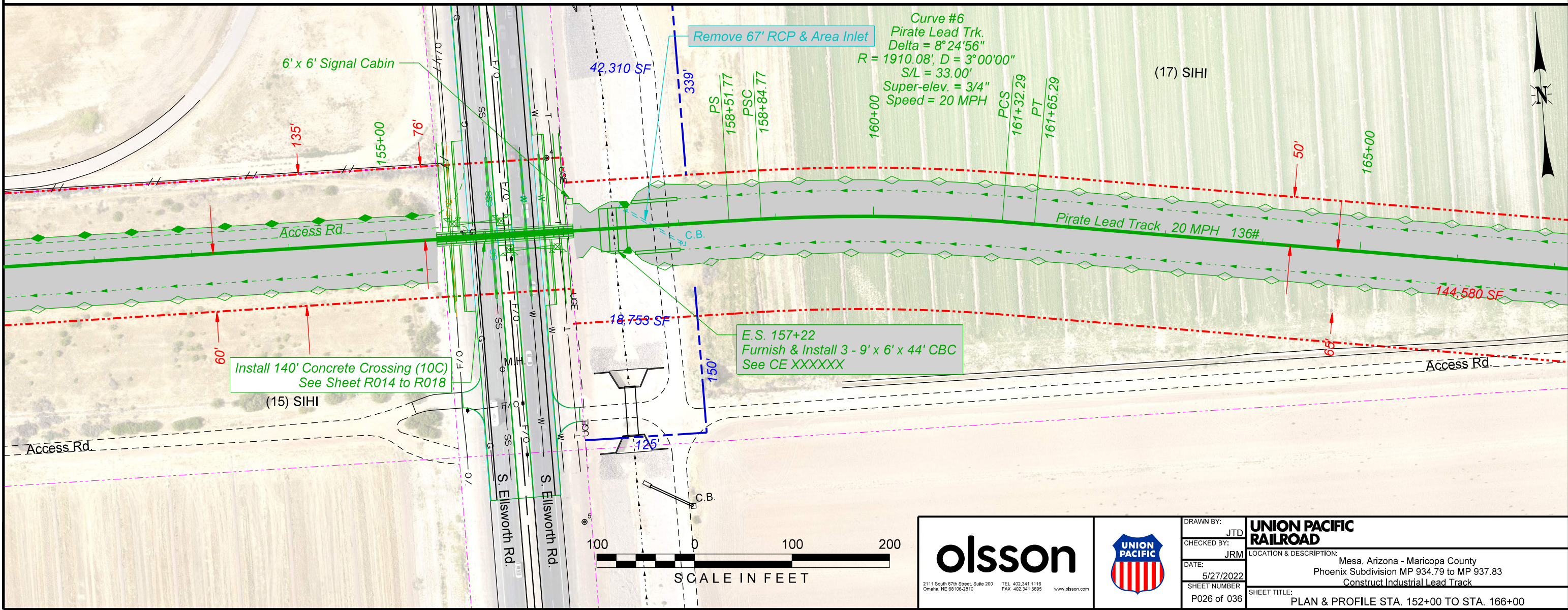
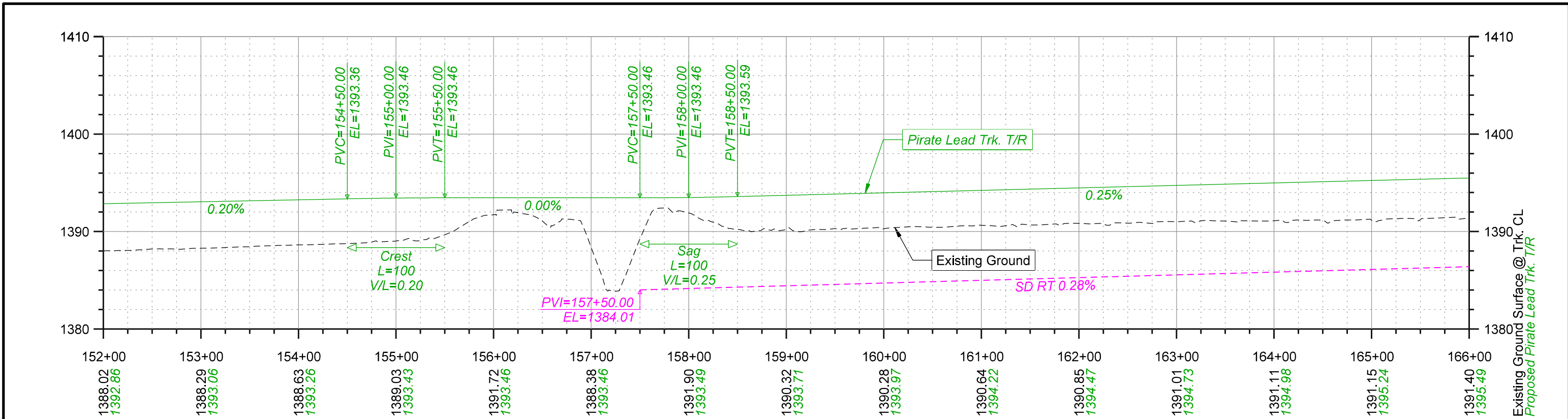
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DATE: 5/27/2022
SHEET NUMBER: P025 of 036

UNION PACIFIC RAILROAD

LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County
Phoenix Subdivision MP 934.79 to MP 937.83
Construct Industrial Lead Track

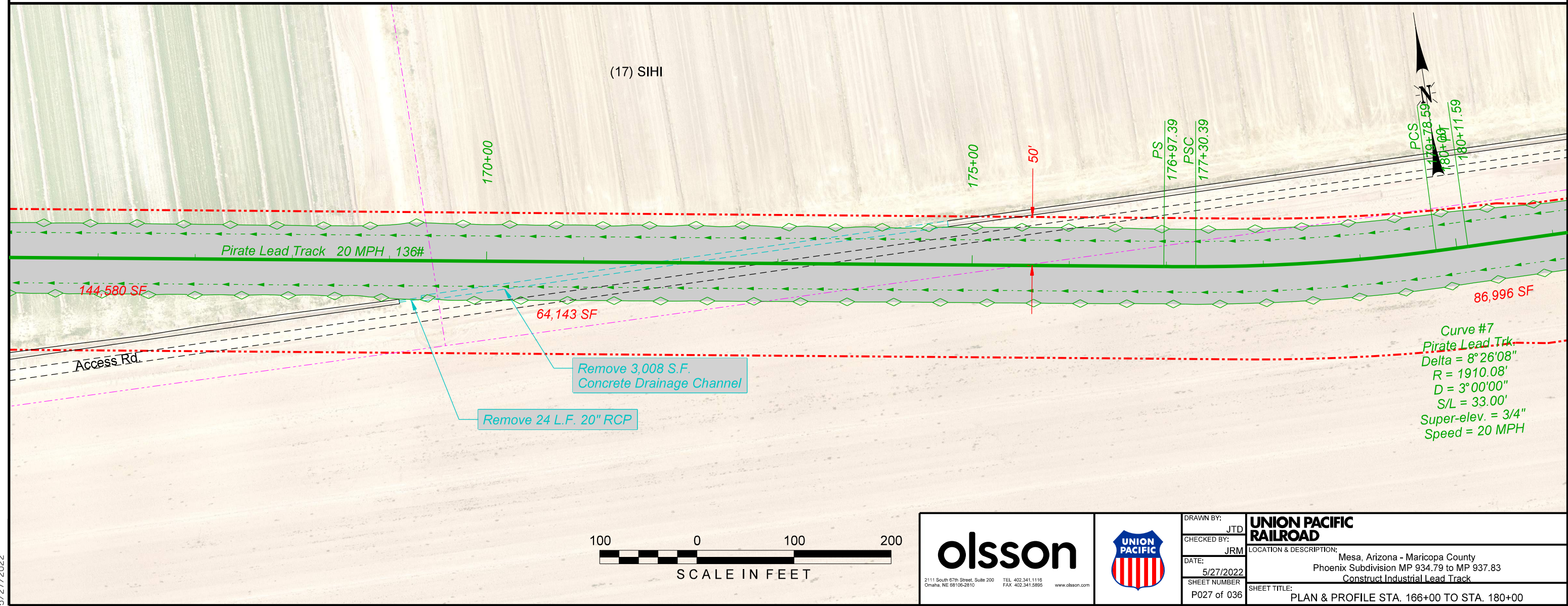
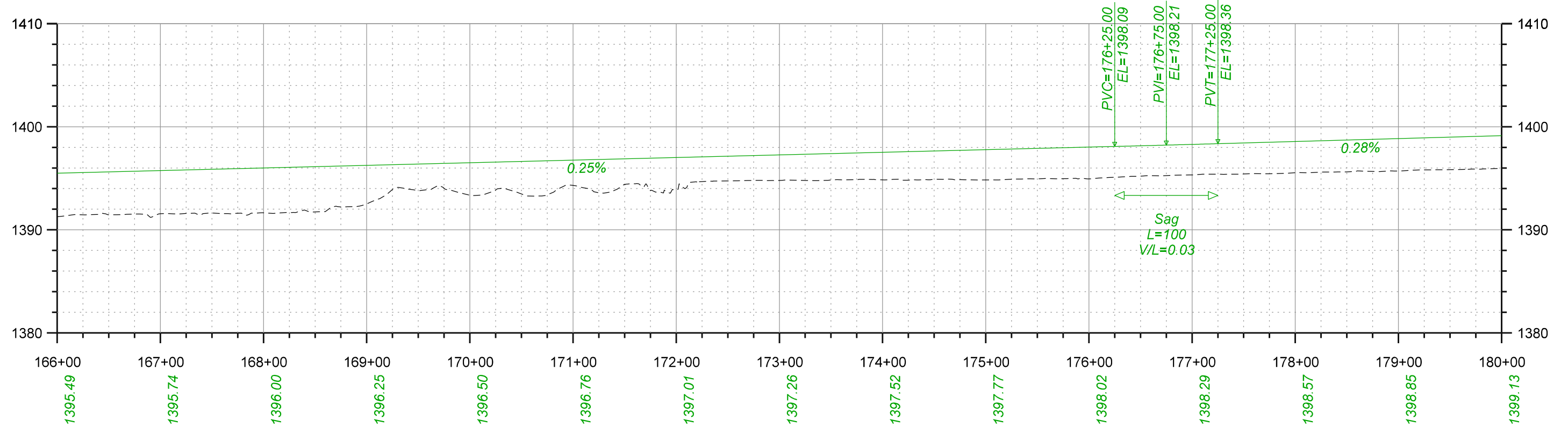
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		DATE: 5/27/2022	
		SHEET NUMBER: P026 of 036	

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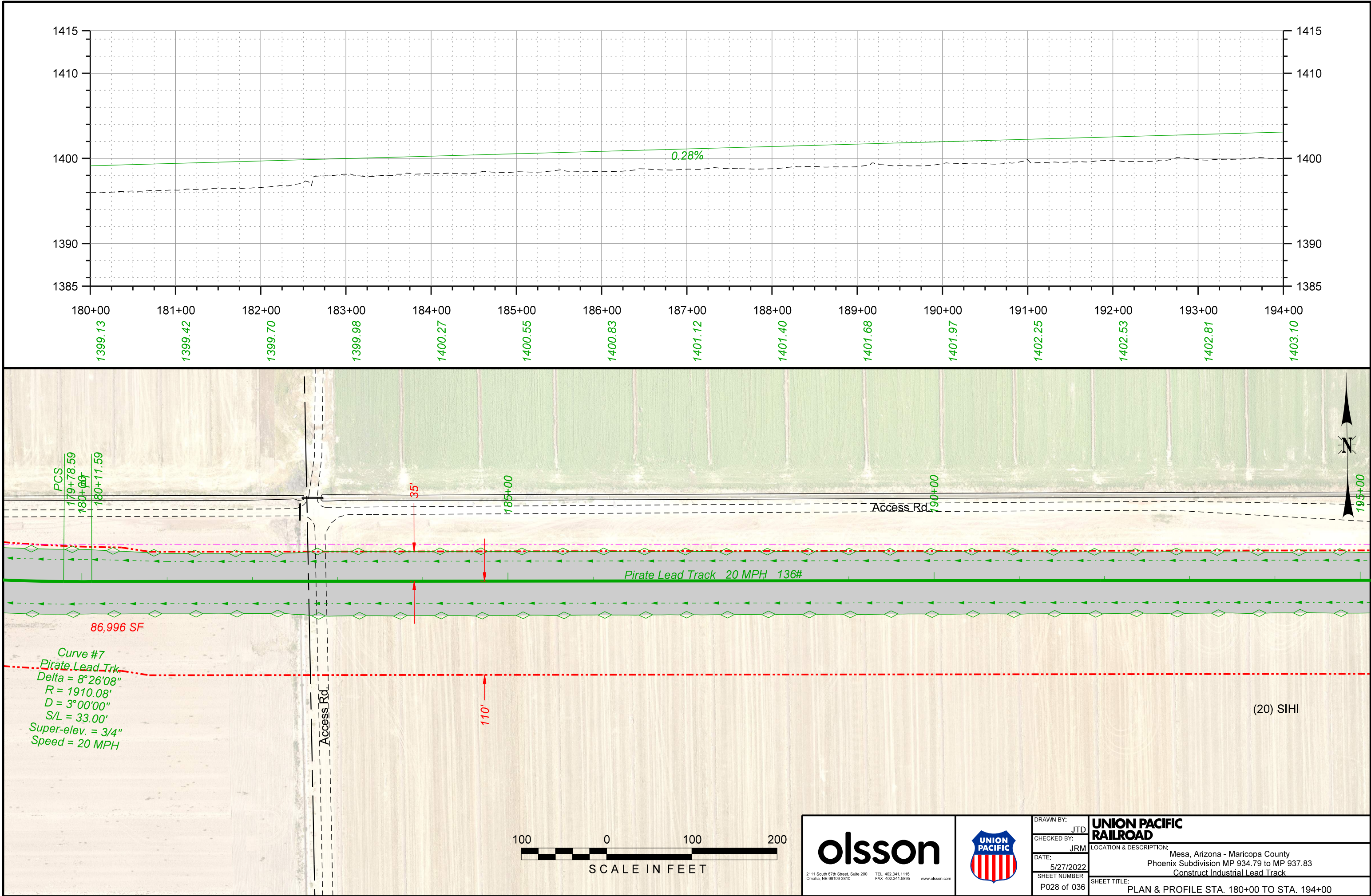


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CHECKED BY: JRM
DATE: 5/27/2022
SHEET NUMBER: P027 of 036

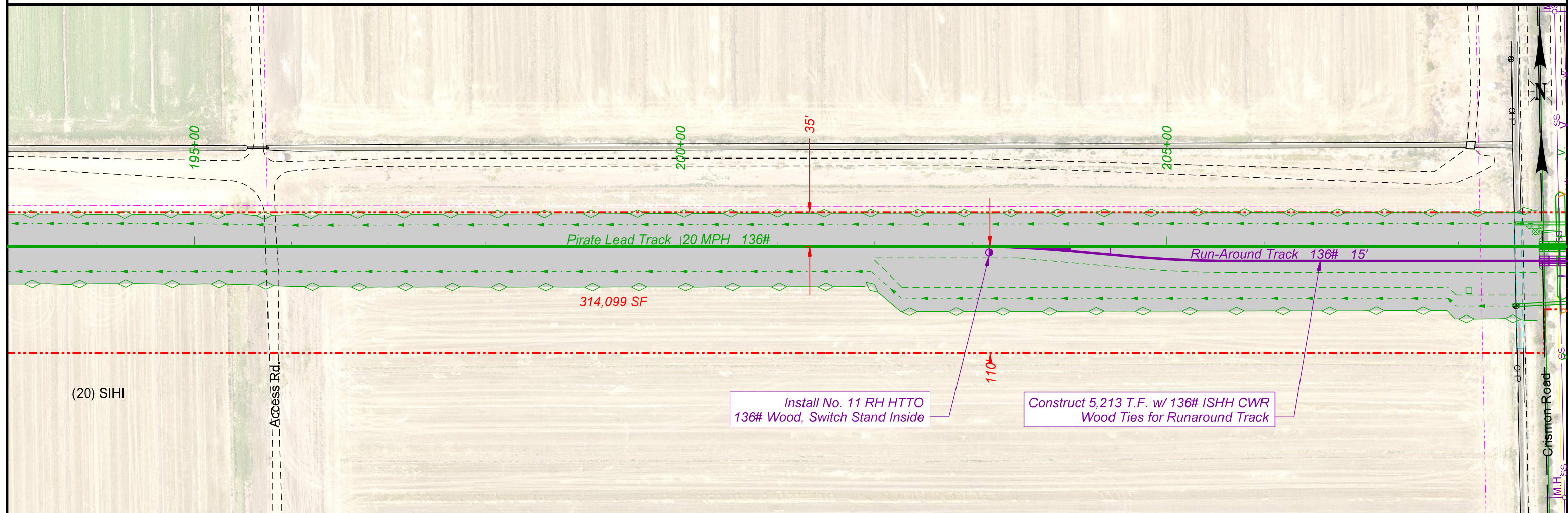
UNION PACIFIC RAILROAD
LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County
Phoenix Subdivision MP 934.79 to MP 937.83
Construct Industrial Lead Track
SHEET TITLE: PLAN & PROFILE STA. 166+00 TO STA. 180+00

Curve #7
Pirate Lead Trk
Delta = 8° 26' 08"
R = 1910.08'
D = 3° 00' 00"
S/L = 33.00'
Super-elev. = 3/4"
Speed = 20 MPH

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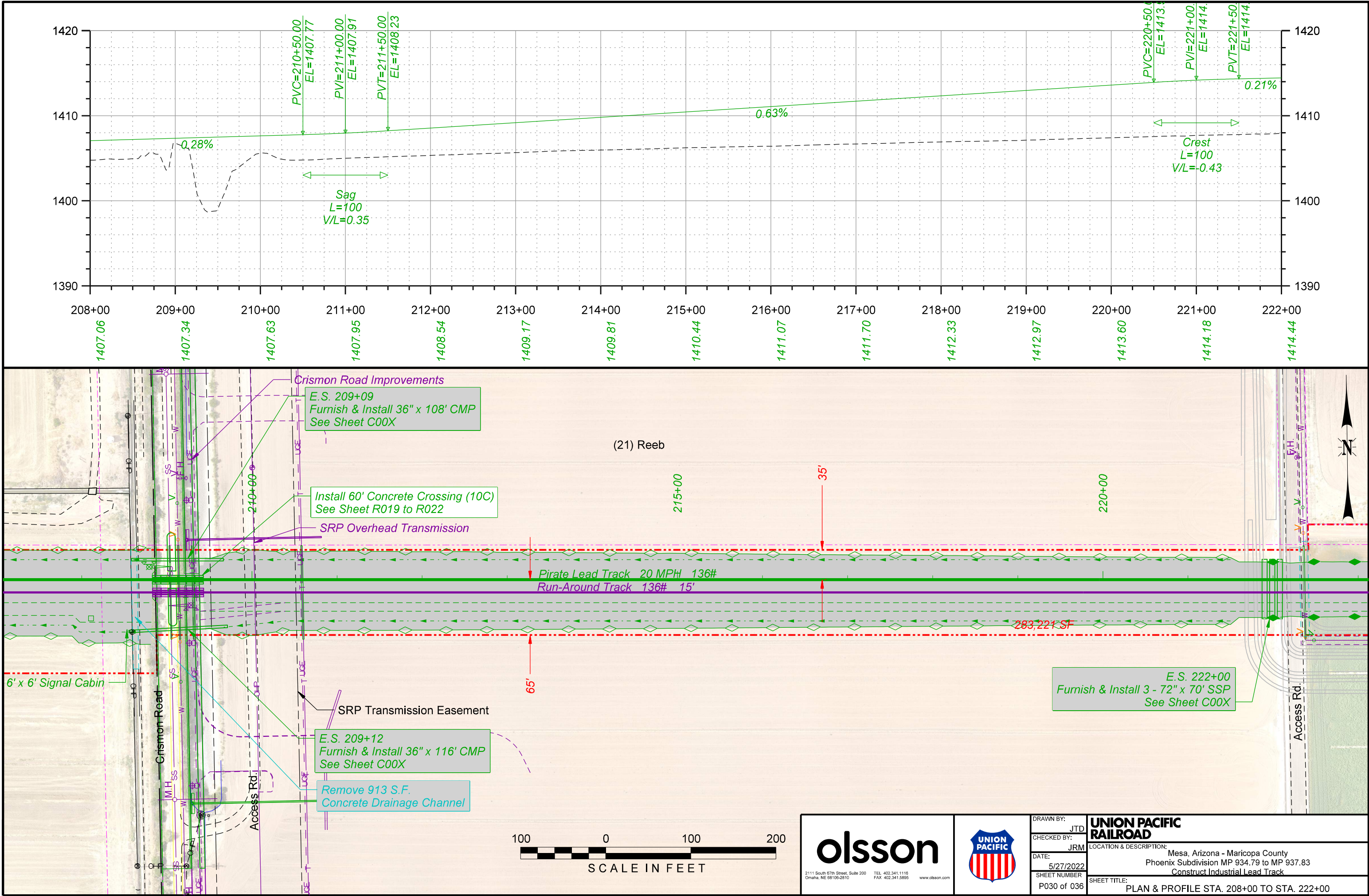


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		CHECKED BY: JRM	
		DATE: 5/27/2022	
		SHEET NUMBER: P028 of 036	

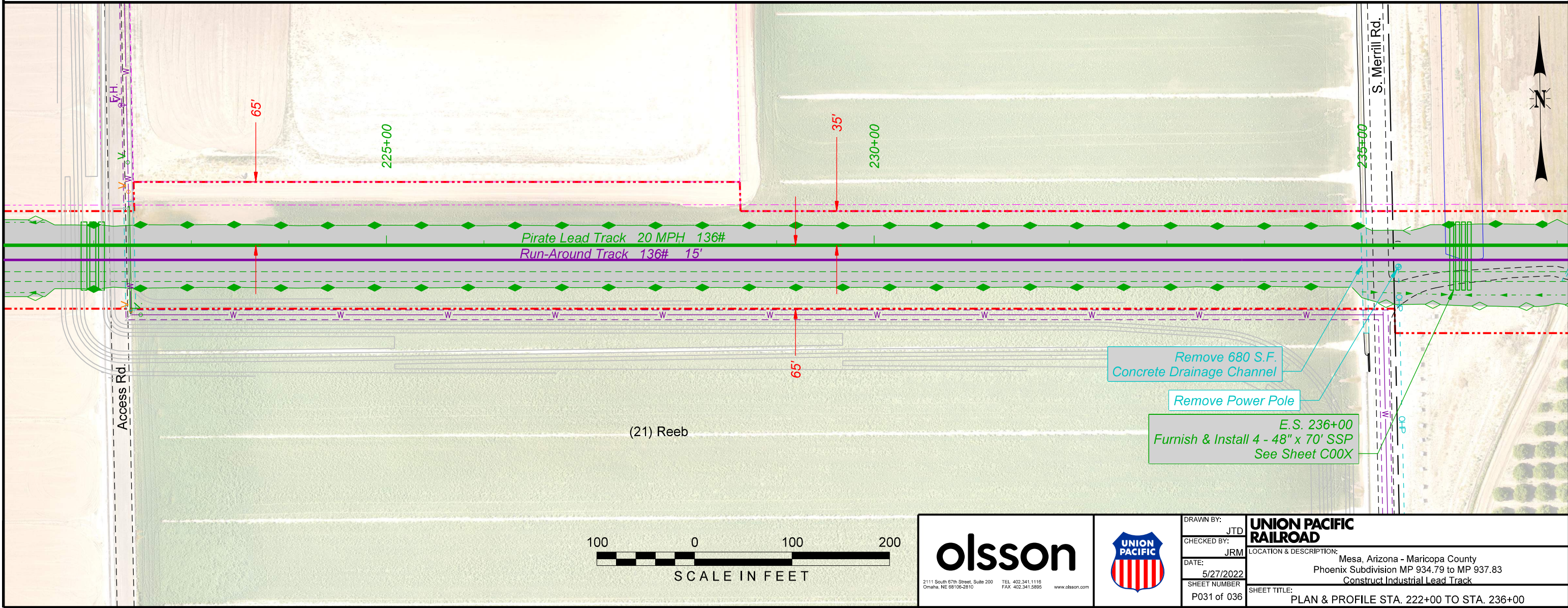
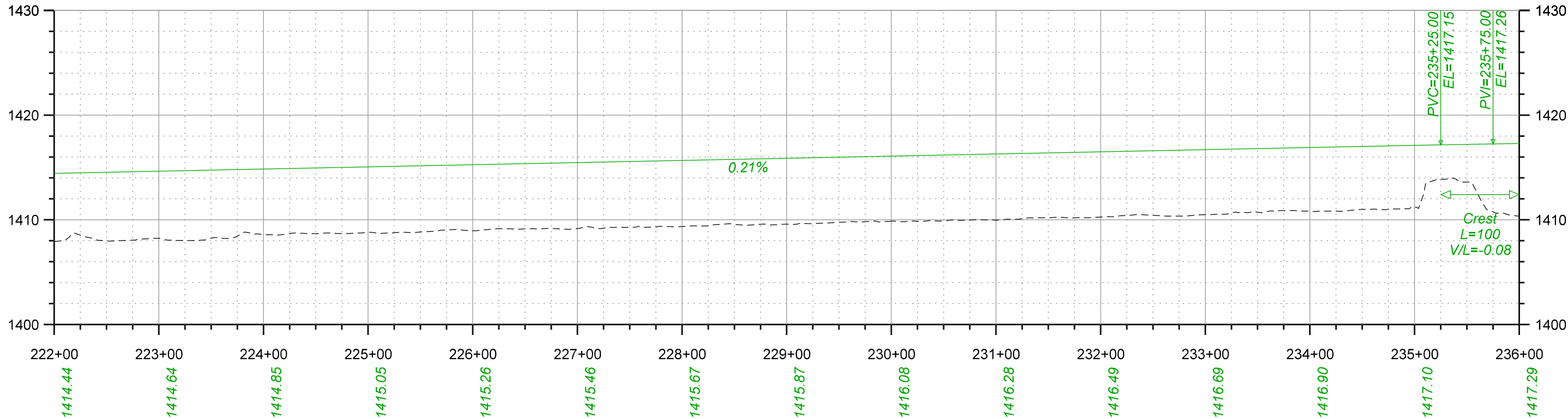


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DATE: 5/27/2022	
SHEET NUMBER P029 of 036	
LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track	
SHEET TITLE: PLAN & PROFILE STA. 194+00 TO STA. 208+00	

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5/27/2022

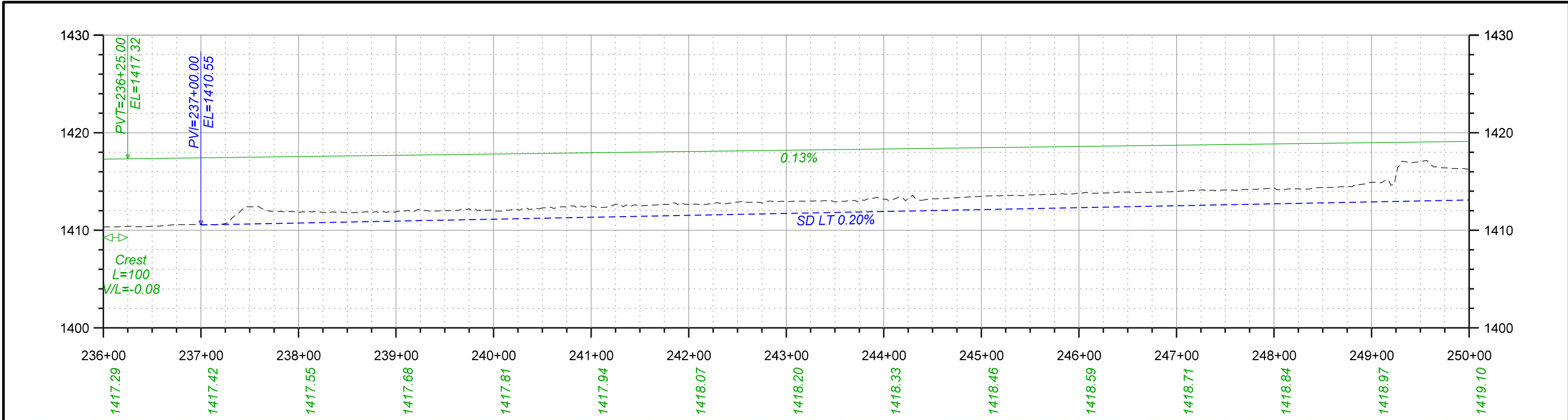
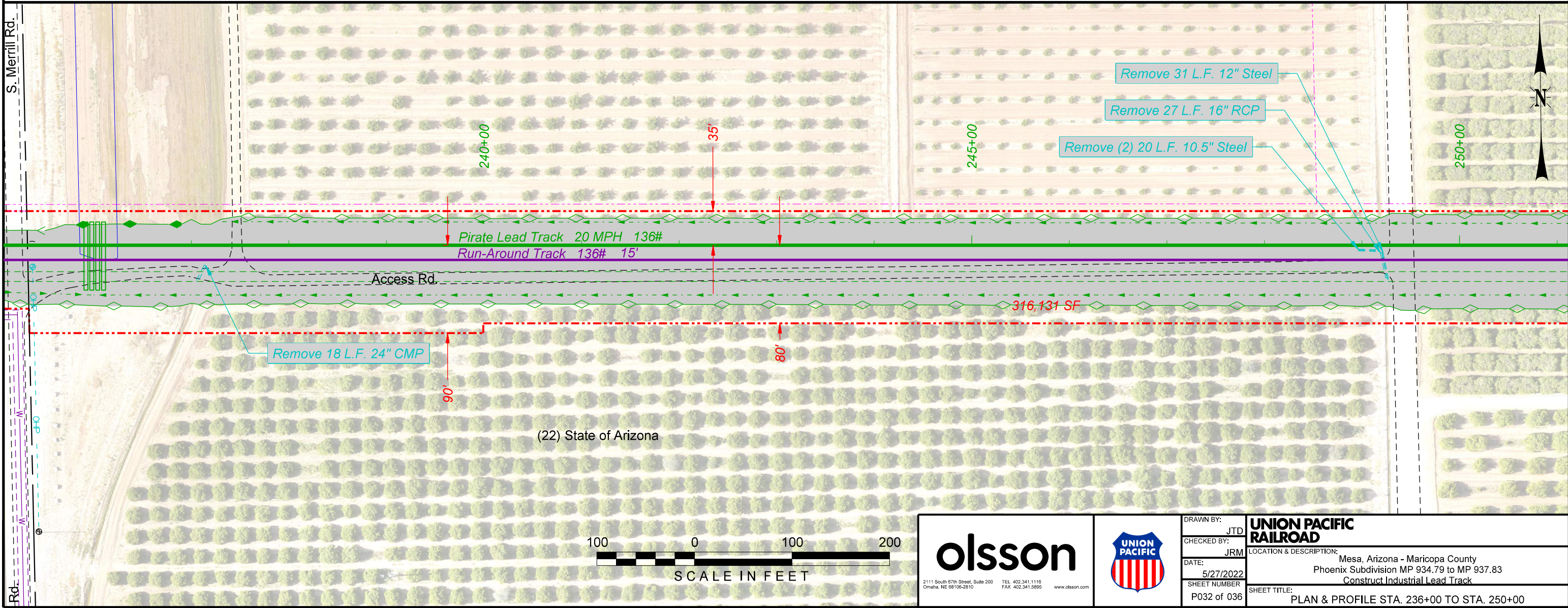


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5/27/2022



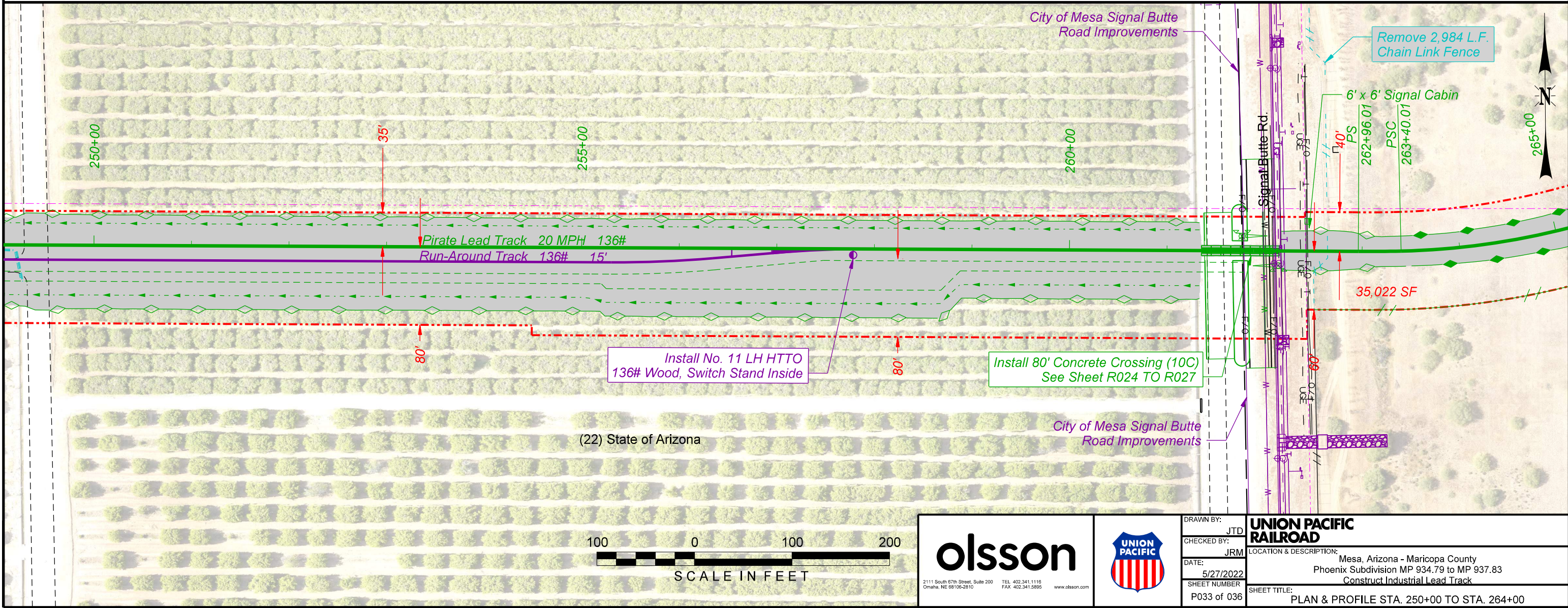
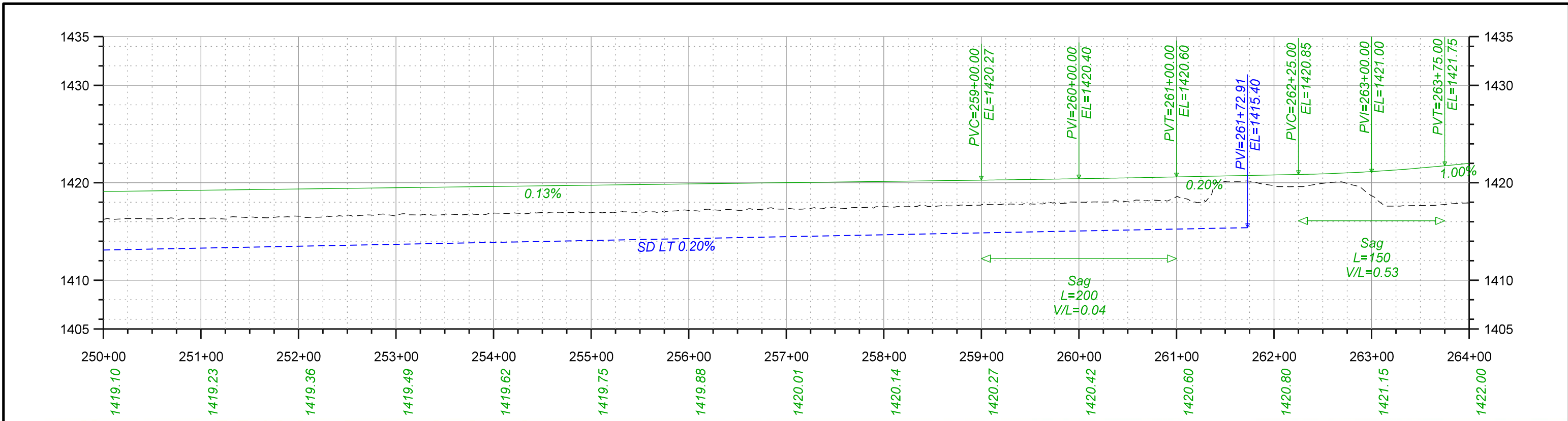
 2111 South 67th Street, Suite 200 Omaha, NE 68106-2910 TEL: 402.341.1118 FAX: 402.341.5895 www.olson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 222+00 TO STA. 236+00
		CHECKED BY: JRM	
		DATE: 5/27/2022	
		SHEET NUMBER P031 of 036	

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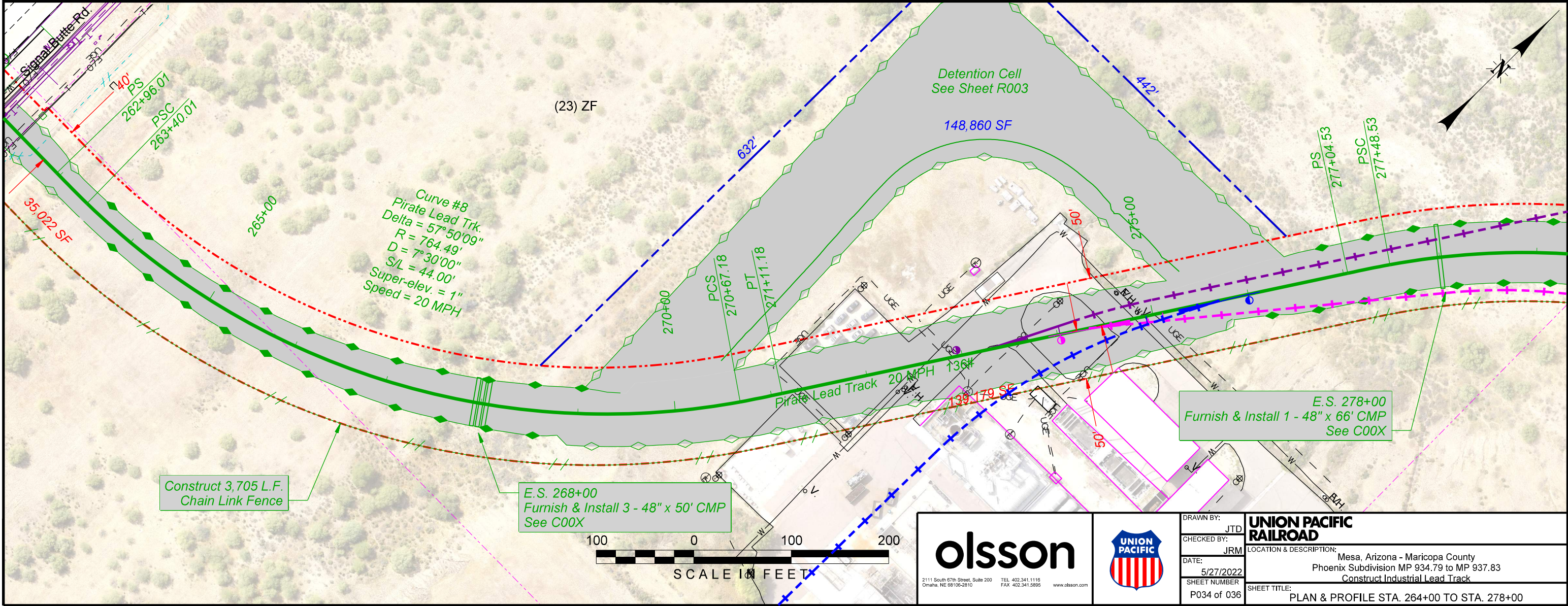
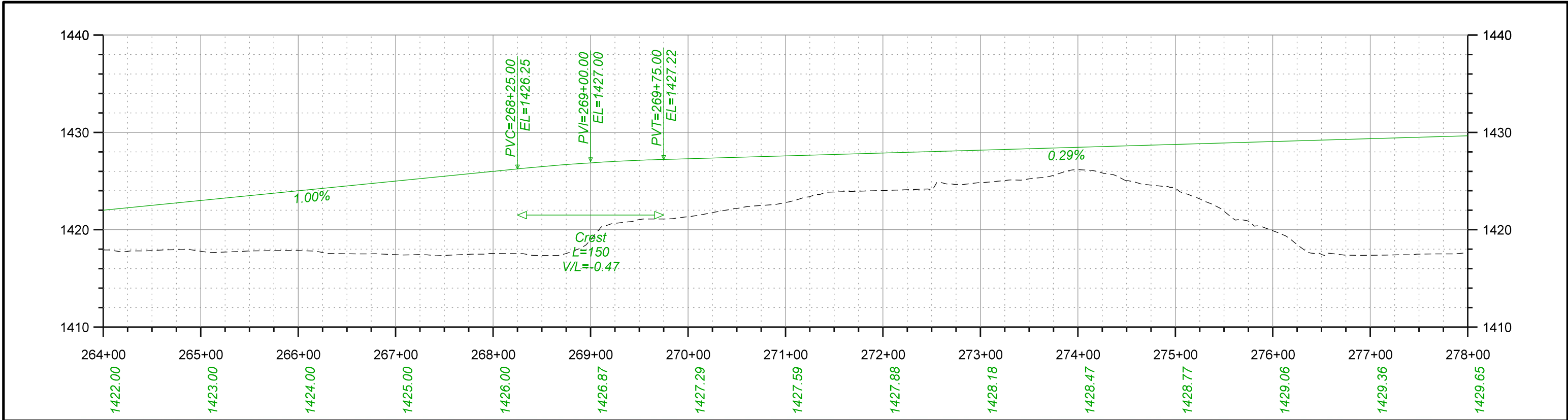
 2111 South 67th Street, Suite 200 Omaha, NE 68106-2910 TEL 402.341.1118 FAX 402.341.5895 www.olsson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 236+00 TO STA. 250+00
		CHECKED BY: JRM	
		DATE: 5/27/2022	
		SHEET NUMBER P032 of 036	

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5/27/2022



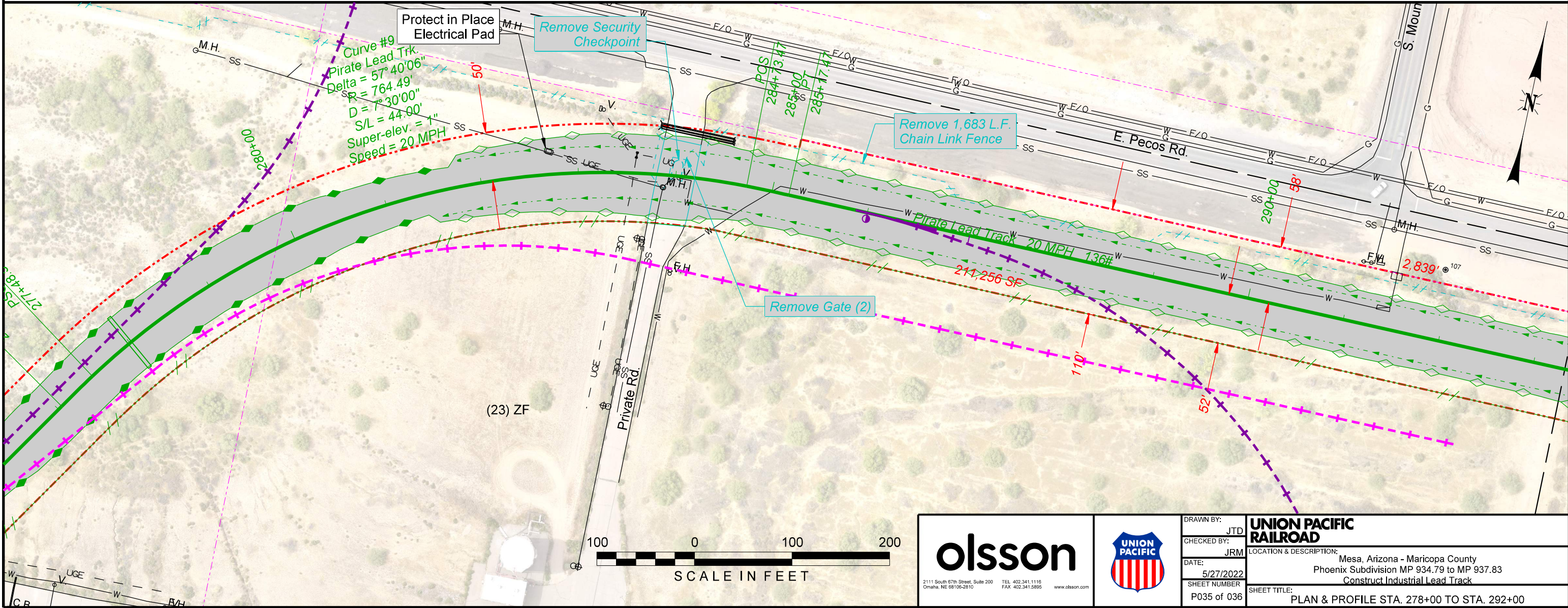
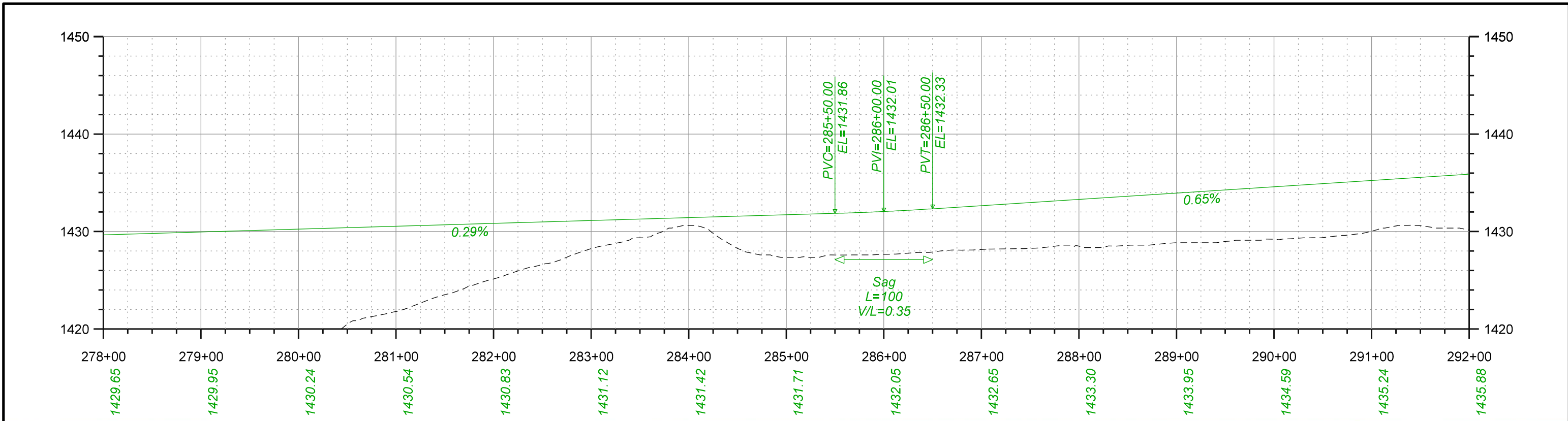
 2111 South 67th Street, Suite 200 Olmsted, NE 68105-2910 TEL 402.341.1119 FAX 402.341.5895 www.olson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 250+00 TO STA. 264+00
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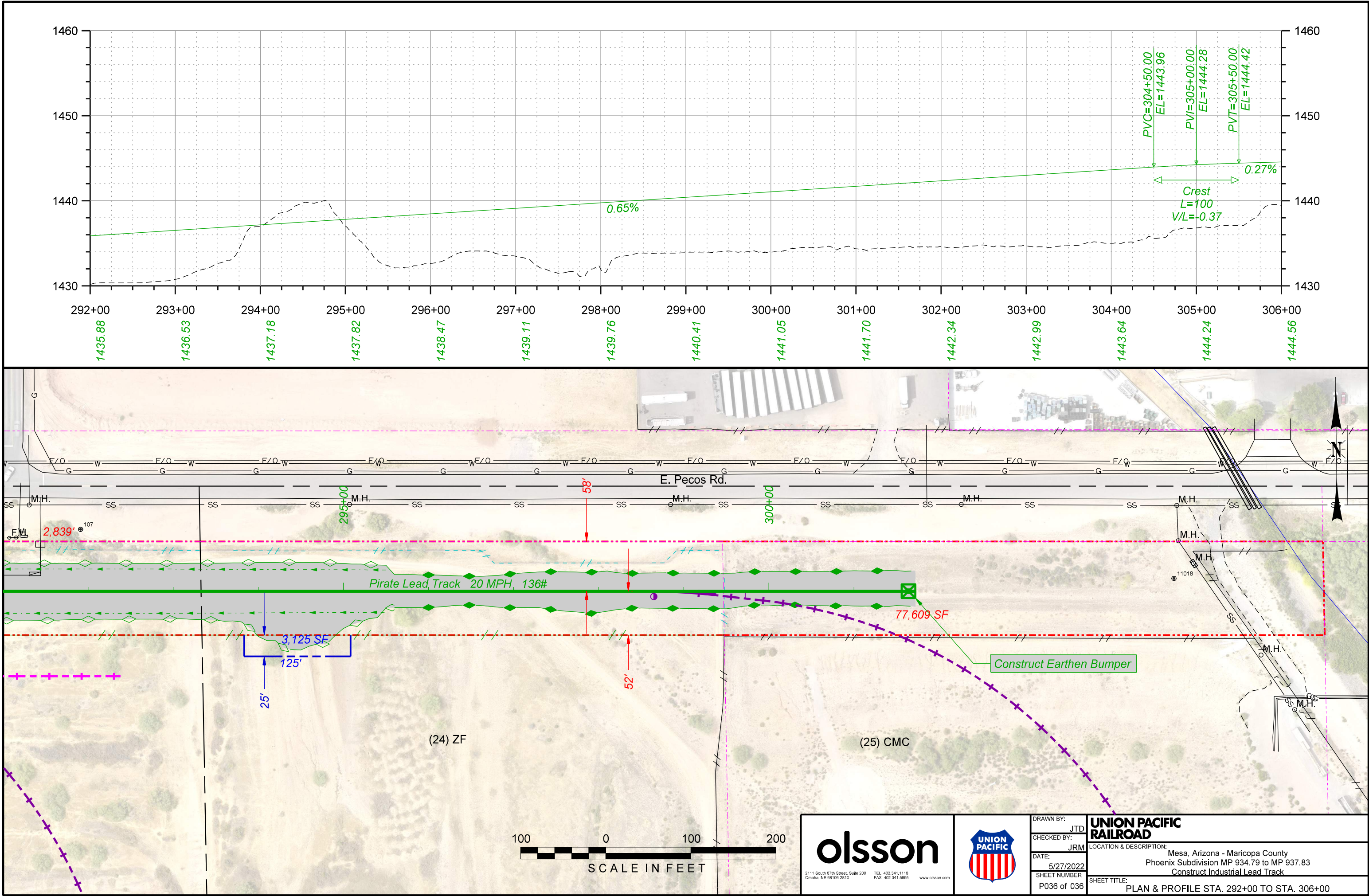
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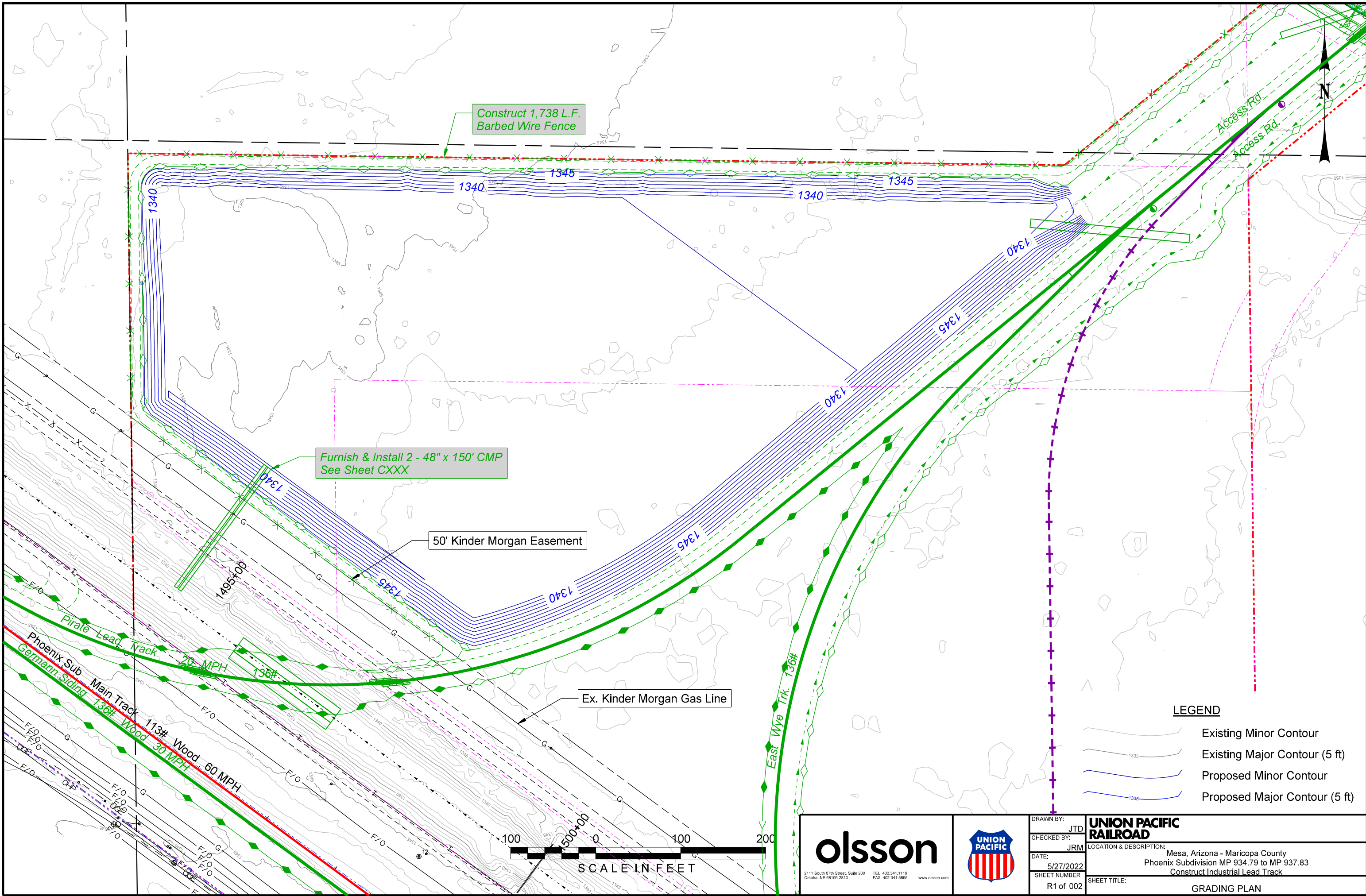
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CHECKED BY: JRM	
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SHEET NUMBER P035 of 036	

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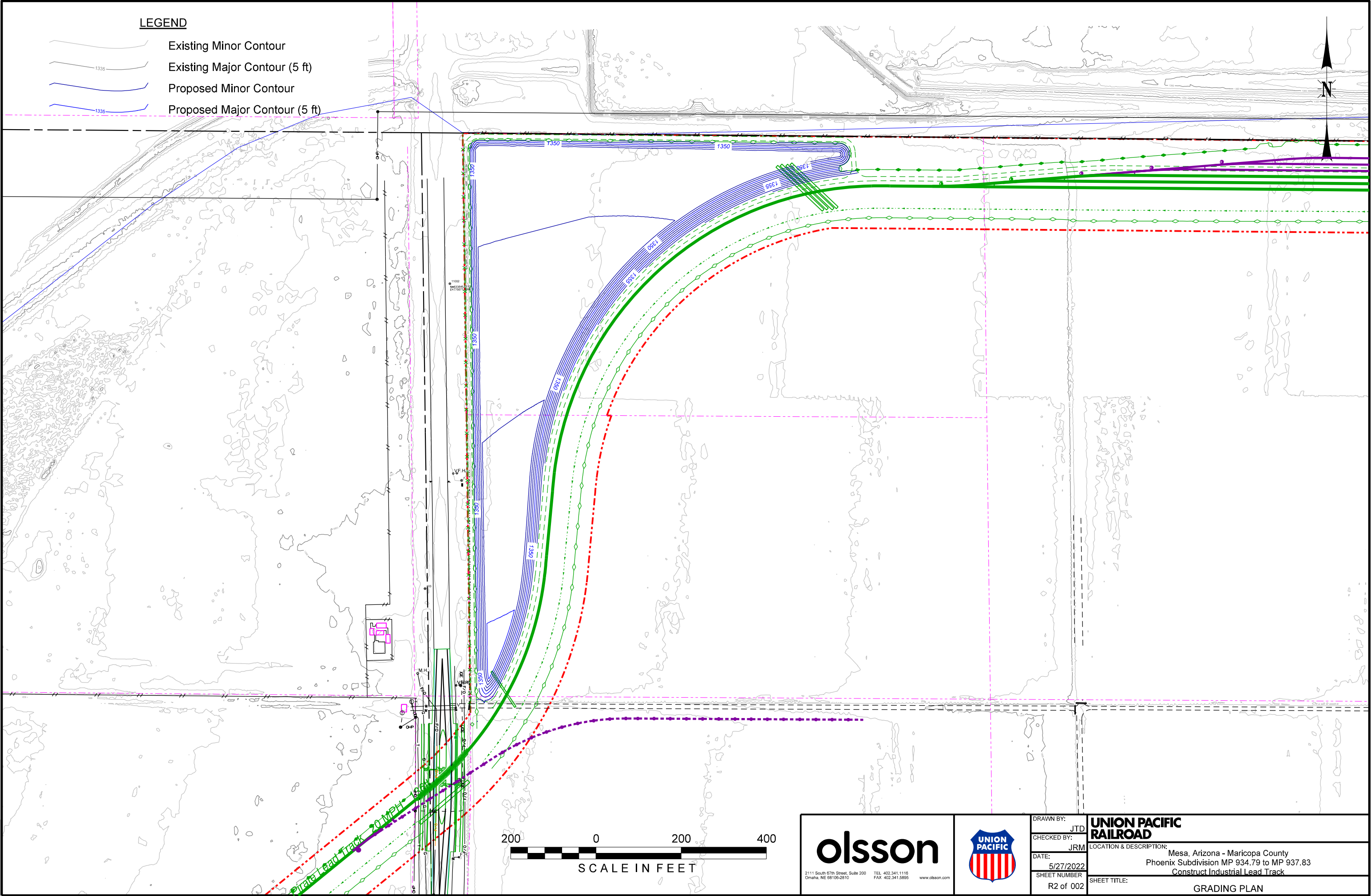
 2111 South 67th Street, Suite 200 Omaha, NE 68106-2910 TEL: 402.341.1118 FAX: 402.341.5895 www.olsson.com		DRAWN BY: JTD	UNION PACIFIC RAILROAD LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track SHEET TITLE: PLAN & PROFILE STA. 292+00 TO STA. 306+00
		CHECKED BY: JRM	
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		CHECKED BY: JRM	
		DATE: 5/27/2022	
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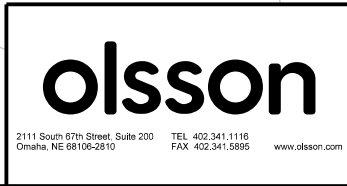
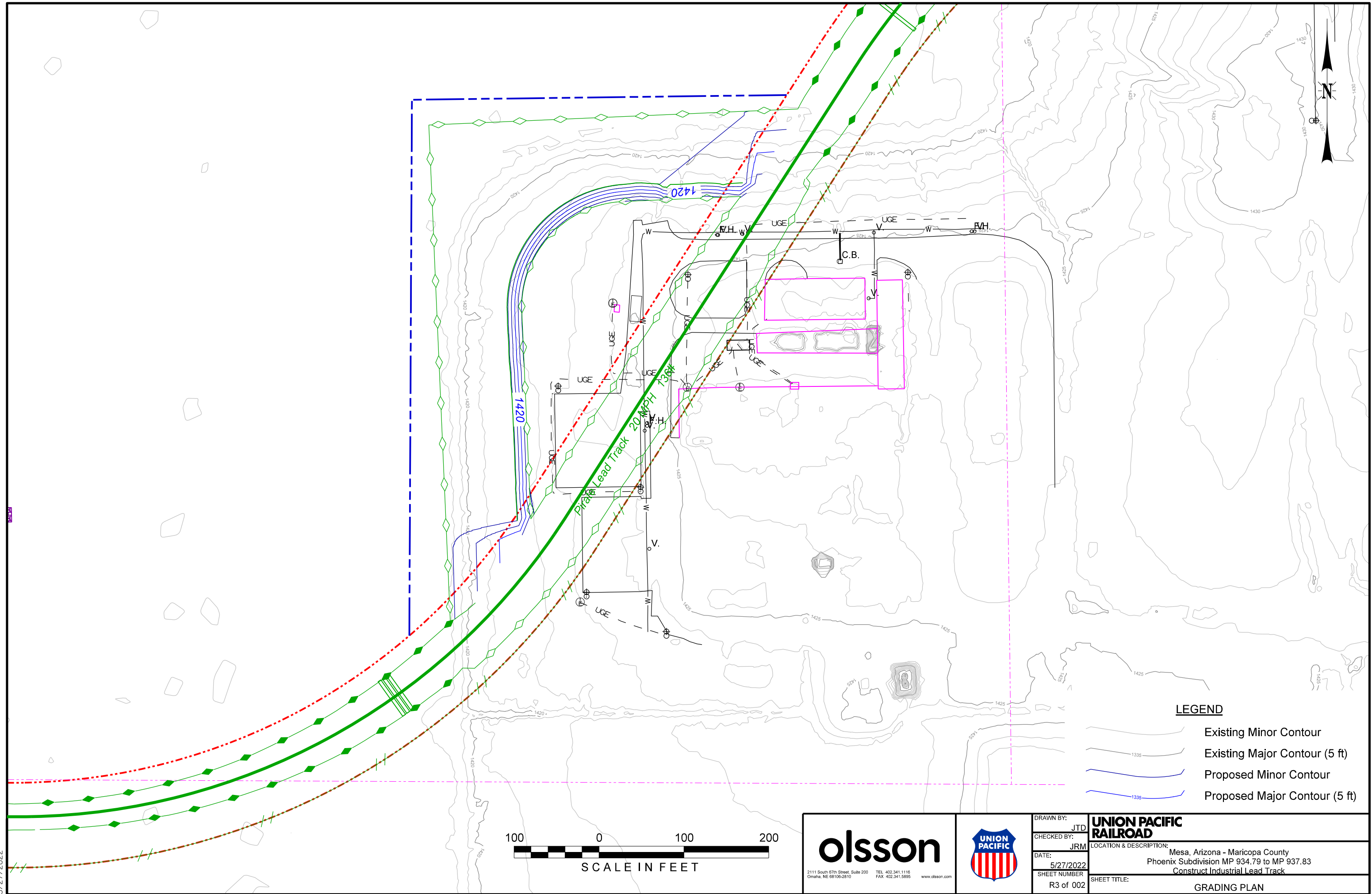
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DATE:	5/27/2022
SHEET NUMBER	R2 of 002

UNION PACIFIC RAILROAD
LOCATION & DESCRIPTION:
Mesa, Arizona - Maricopa County Phoenix Subdivision MP 934.79 to MP 937.83 Construct Industrial Lead Track
SHEET TITLE:
GRADING PLAN



DRAWN BY:	JTD
CHECKED BY:	JRM
DATE:	5/27/2022
SHEET NUMBER	R3 of 002

0	UNION PACIFIC RAILROAD
1	LOCATION & DESCRIPTION: Mesa, Arizona - Maricopa County
2	Phoenix Subdivision MP 934.79 to MP 937.83
	Construct Industrial Lead Track
2	SHEET TITLE: GRADING PLAN

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