Case #: 21-DR-2002#2

Review Cycle: 3

Reviewed By: GA

Date: 05/15/2024

Status: Accepted

Prepared for:

Vargo Quarter Horses LLC
29607 N. Hayden Rd.
Scottsdale, AZ 85266

Parcel owner at:

APN: 216-70-005L

CASE #: 21-DR-2002#2

PRELIMINARY DRAINAGE REPORT

Project #23WHC802

Preliminary Drainage Report Submittal: August 22, 2023
Revised: March 11, 2024
Revised: April 26, 2024

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4/26/2024

expires 6/30/2026

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SECTION 1 - INTRODUCTION

1.1 LOCATION AND ZONING

The Vargo Quarter Horses LLC (VQHS) project is located at 29607 N. Hayden Rd Scottsdale, Arizona 85266 with parcel number 216-70-005L. The site is 383,691 square feet (8.825 acres) and located off N Hayden Road to the east, south of East Dixileta Drive The parcel is in the Northwest Quarter of the Northwest Quarter of Sec. 25 Township 5 North and Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The parcels are currently zoned as Single Family Residential (RI-190) ESL FO with an approved conditional use for a Ranch.

The scope of the project is to amend the previously approved Case #21-DR-2002 site plan to construct an 80' by 100' shop with labor quarters and abandoning the Phase 2, 80'x100' Arena and turn-outs. In addition, the proposed construction will include the following site improvements: a concrete pad for a manure storage dumpster, a flagpole, and relocating the entry gate further into the property boundary. The proposed shop will be located in the northwestern portion of the parcel that is currently occupied by an equestrian arena.

1.2 VICINITY MAP

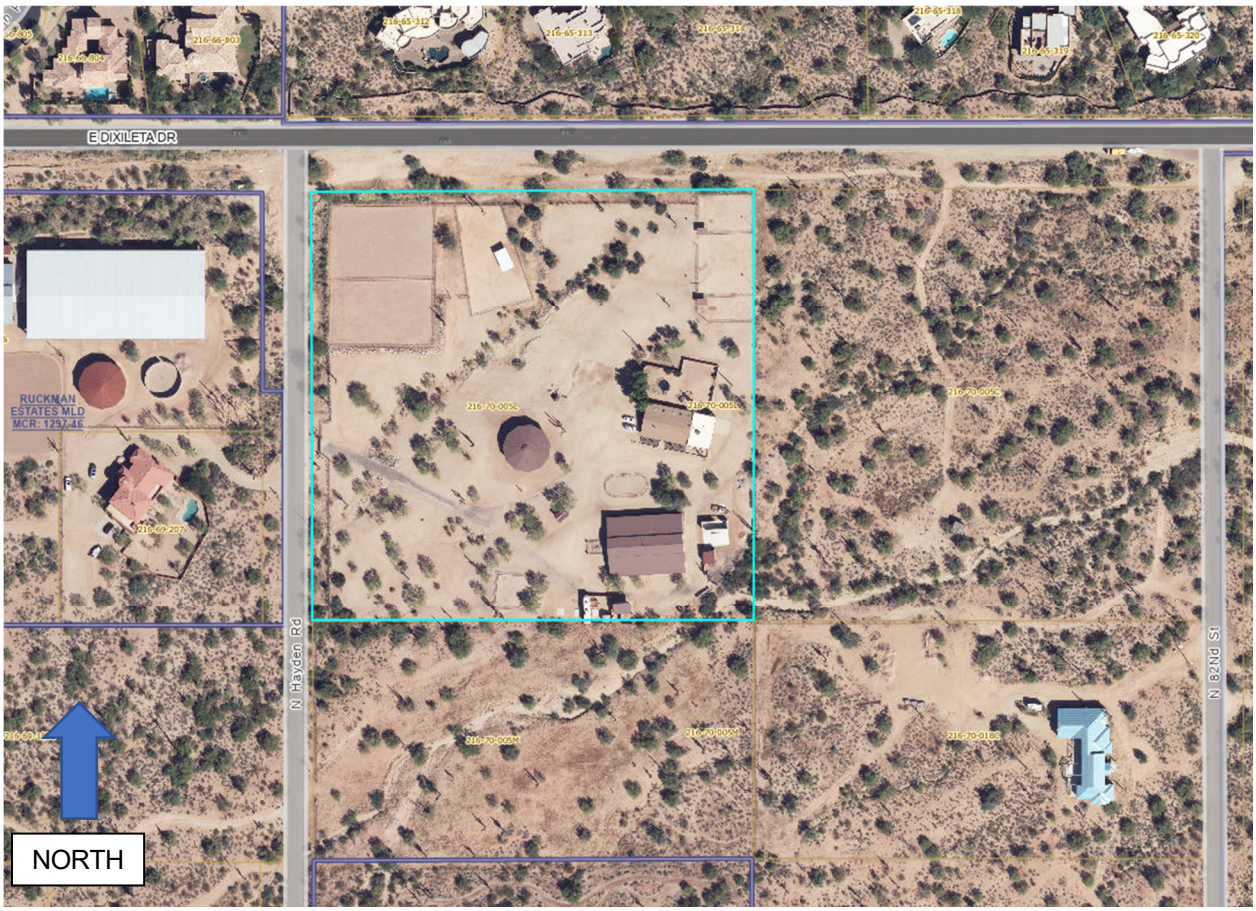


Figure 1.1.1 Vicinity Map (NTS) Image

1.2 PURPOSE

This drainage Report is an evaluation of the existing and proposed conditions for the property outlined above. The report is to satisfy jurisdictional requirements according to the Design Standards and Policies of The City of Scottsdale (City). Also, Report is satisfying jurisdictional requirements according to the Maricopa County (County) Drainage Policies and Standards, Drainage Design Manuals for Maricopa County, Volume 1 – Hydrology and Volume 2 – Hydraulics and Section 1205 of the Maricopa County Zoning.

1.4 FLOOD HAZARD CLASSIFICATION (4-1.102)

According to the Federal Emergency Management Agency's (FEMA) National Flood Hazard Layer (NFHL) Viewer, the property is located within a 100-Year Flood Zone X, described as an "Area of Minimal Flood Hazard".

FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Community Number	Community Map Number	Panel Number	Panel Date	Suffix	FIRM Index Date	FIRM Zone	Base Flood Elevation (AO Zone, use depth)
045012	04013C	0893	7/20/2021	M	2/8/2024	X	N/A

The applicable Flood Zone "X" is defined as: "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile."

Reference Exhibit A to view full FEMA FIRMette Flood Panel for this location.

SECTION 2 - EXISTING CONDITIONS

A survey of the existing conditions of the site was performed in March of 2023 by Everett Allen Group to capture the pre-development conditions. Refer to Exhibit B of the appendix for the survey. From the survey, there are several structures currently located on site, including a residence, barn, shed, covered pen, and multiple wall enclosures and shade structures. The existing residence is 4,833 square feet under roof and has a Finished Grade Elevation (FGE) of 2259.80'. The existing barn is 8,899 square feet, the shed is 115 square feet, and the covered pen has an area of 3,386 square feet. There are currently seven (7) shade structures with a total area of 4,846 square feet, the wall enclosures cover an area of 8,066 square feet. Driveway access to the parcel and the house, enters property from Hayden Road on the west end of the parcel.

Adjacent parcels to the south (APN 216-70-005M) and east (APN 216-70-005C) are both vacant.

There are several protected Natural Area Open Space (NAOS) easements located across the property (INSTR. 02-0976053 M.C.R., 04-0396387 M.C.R) covering an area of approximately 79,073 square feet (1.82 acres).

The site topography shows that the parcel generally slopes from the northeast to the southwest at an approximate average grade of 2% with sparce vegetation. There are two (2) washes that cross the property. The North Wash enters the northeast corner of parcel APN 216-70-005L and goes southwest (north of the house). Along its path, as reflected on the provided survey sheet and Grading & Drainage plan, the wash flows through two 48" culverts, in series, (Culvert A and Culvert B) approximately 300' downstream of the property line and an 18" culvert (Culvert C) under the main driveway (with rip rap lined inlet and outlet) before exiting the property in the southwest corner. The North Wash passes primarily within the existing documented NAOS easement. The South Wash has a small path across the southeast corner of the parcel APN 216-70-005L, flowing southwest. There is an existing drainage easement encompassing the South Wash as the wash exceeds 50 CFS. There are no detention basins existing on the site.

SECTION 3 – HYDROLOGY

3.1 PEAK DISCHARGE METHODOLOGY

The site hydrology was reviewed with the existing drainage report, "Drainage Report for Ganley Residence", prepared by Argus Consulting, dated March 2002, filed with Case #21-DR-2002. The drainage report along with the topography of the site was reviewed for the current existing conditions. In addition, Maricopa County's Flo-2D User Interface, and more specifically the "122_ScottsdaleFans5-6 – F56- Whisper Rock" Study, was used to derive the 100-yr, 24-hr, peak flow and water surface elevation (WSEL) of each wash as well as to derive the 100-yr, 24-hr, peak flow and WSEL at areas of interest for design purposes.

The peak flows for the washes and storm calculations were reviewed both with the existing drainage report as well as the hydrologic conditions as modeled in FLO-2D for the site and are described in the subsequent sections for each wash.

The Flo-2D study was reviewed by Western Heritage Consulting and Engineering (WHCE) and consider it the best available data.

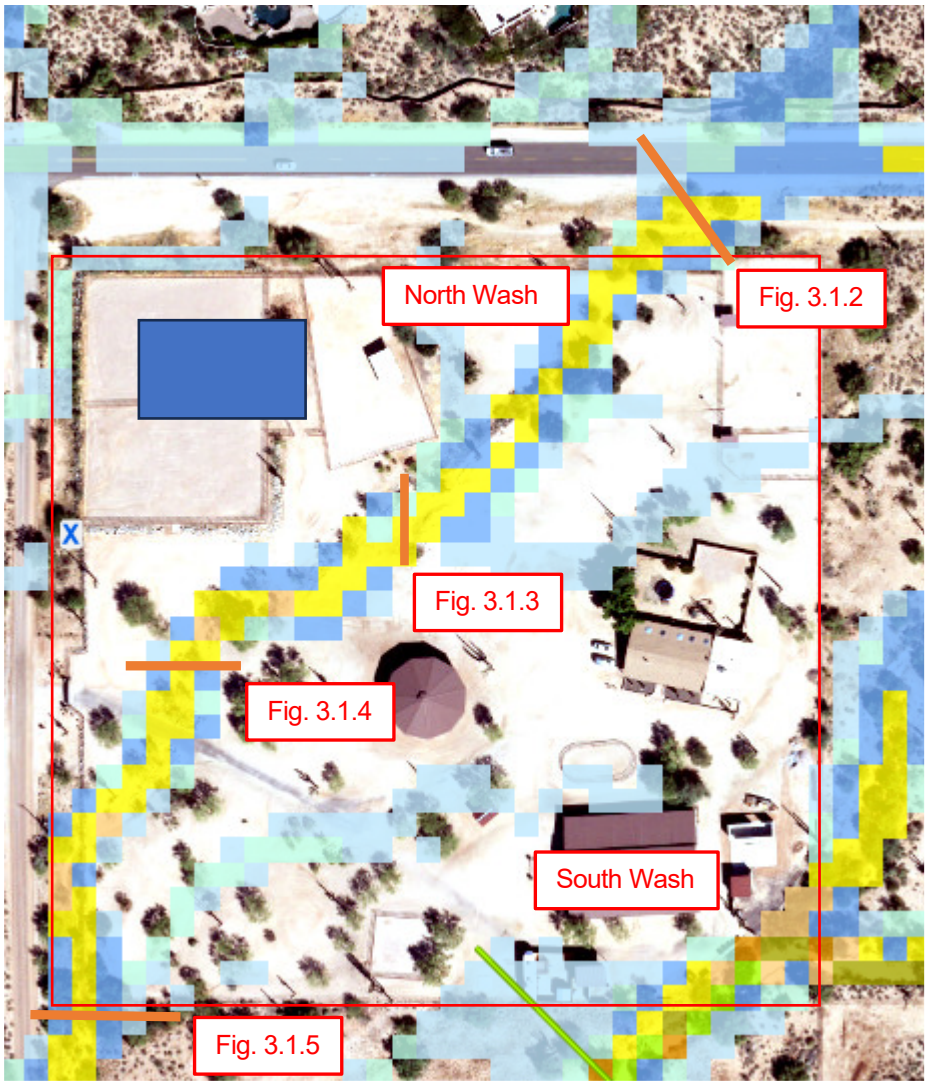


Figure 3.1.1 Flo-2D Project Area Image

The red outline in Figure 3.1.1 borders the project area, the blue rectangle indicates the approximate location of the proposed 80' x 100' shop building, and the orange lines located across the North Wash indicate cross-sections at the north wash and the Figures with detailed Flo-2d information for the cross-sections.

3.2 NORTH WASH

The 2002 drainage report calculates the drainage contributing to the North Wash using the Grading and Drainage Plans for Sinquidados Unit III, the residential subdivision to the north, with small drainage areas between the subdivision and the project site. An off-site 100-Yr peak flow of 11 CFS was calculated for the North Wash. We have reviewed the existing drainage report with the existing conditions as well as the flows provided in the FLO-2D Study, and there is a significant increase in 100-Yr peak flows using the FLO-2D study. After further review of the site, it is our opinion that the 100-Yr peak flows as defined in the FLO-2D study provide the more accurate design flows entering the North Wash of the property. From a site visit performed by WHCE, there is a perimeter wall that borders the south limits of the Sinquidados subdivision. The wall allows for the drainage to pass through several locations that correlate with the flow patterns described in the FLO-2D Study. These flows are directed toward the project site through culverts under E. Dixileta Drive. It appears the discrepancy between the previous drainage report and the FLO-2D Study, is the previous drainage report did not account for the inundation of storm surge that exits at the residential subdivision east of the project site and flows west along E. Dixileta Drive and enters the project site in the North Wash. Based on our site visit, it does appear this is an accurate representation of the site conditions. For this project, we have revised the values based on the FLO-2D Study in lieu of the existing drainage report. Refer to the following calculations for the North Wash design flows. The individual cells across the wash were totaled to derive the 100-Yr Peak design flows for the washes.

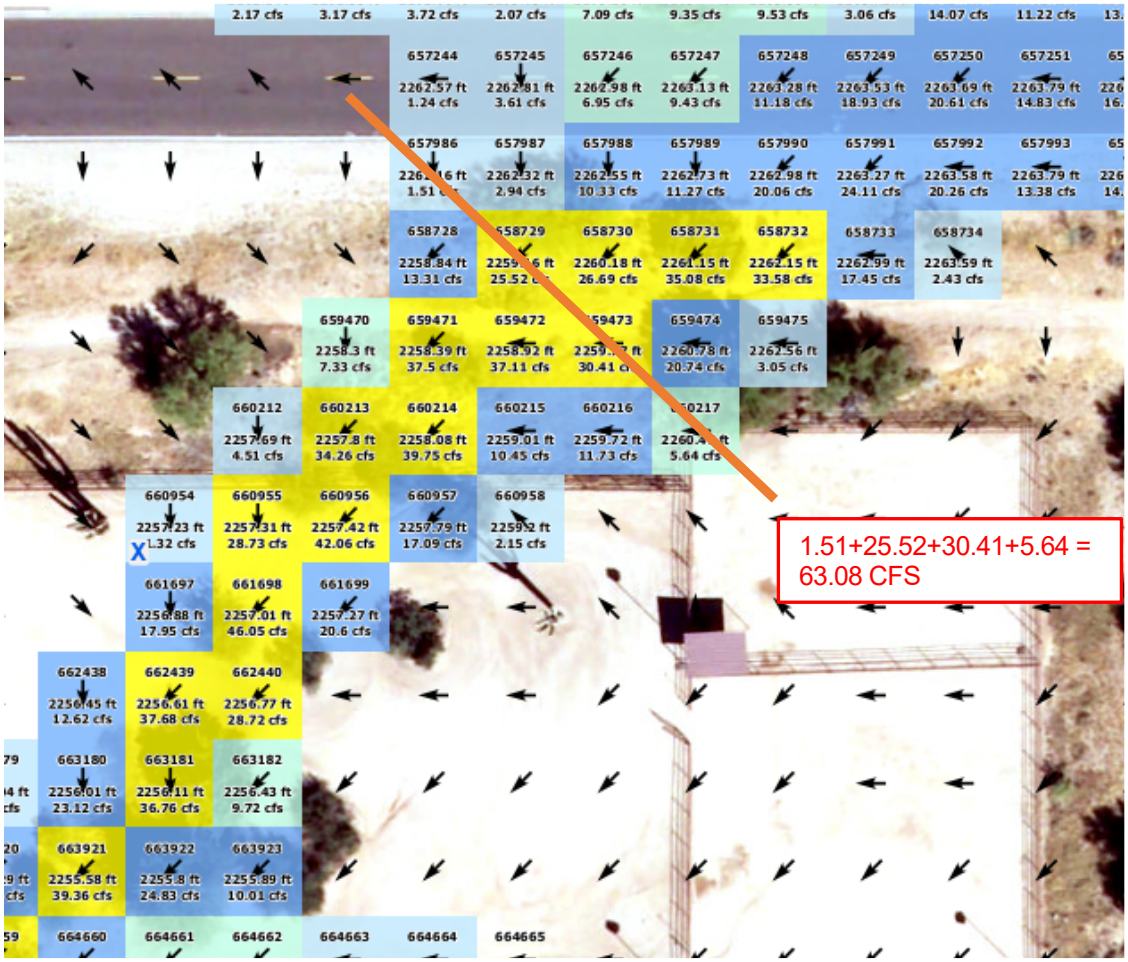


Figure 3.1.2 Flo-2D North Wash Upstream Cross-Section Image

The upstream cross-section was analyzed to derive the flow entering the property from the north. The flow grids along the cross-section line in Figure 3.1.2 were added to derive a peak flow of 63.1 cubic feet per second (CFS).

Figure 3.1.3 Flo-2D North Wash Culverts A & B Cross-Section Image

As portrayed in Figure 3.1.1 there is a minor drainage that enters the property approximately halfway across the north property line, the flow is conveyed through an offsite 18" RCP culvert under the road from a subdivision to the north of the property. The orange line in Figure 3.1.3 above indicates a flow cross-section that includes the flow through the North Wash with the additional flow from the minor drainage in a 100-yr flow event; determining the flow to pass through Culverts A and B and mid-wash. The sum of the grids resulted in a flow of 76.4 CFS.

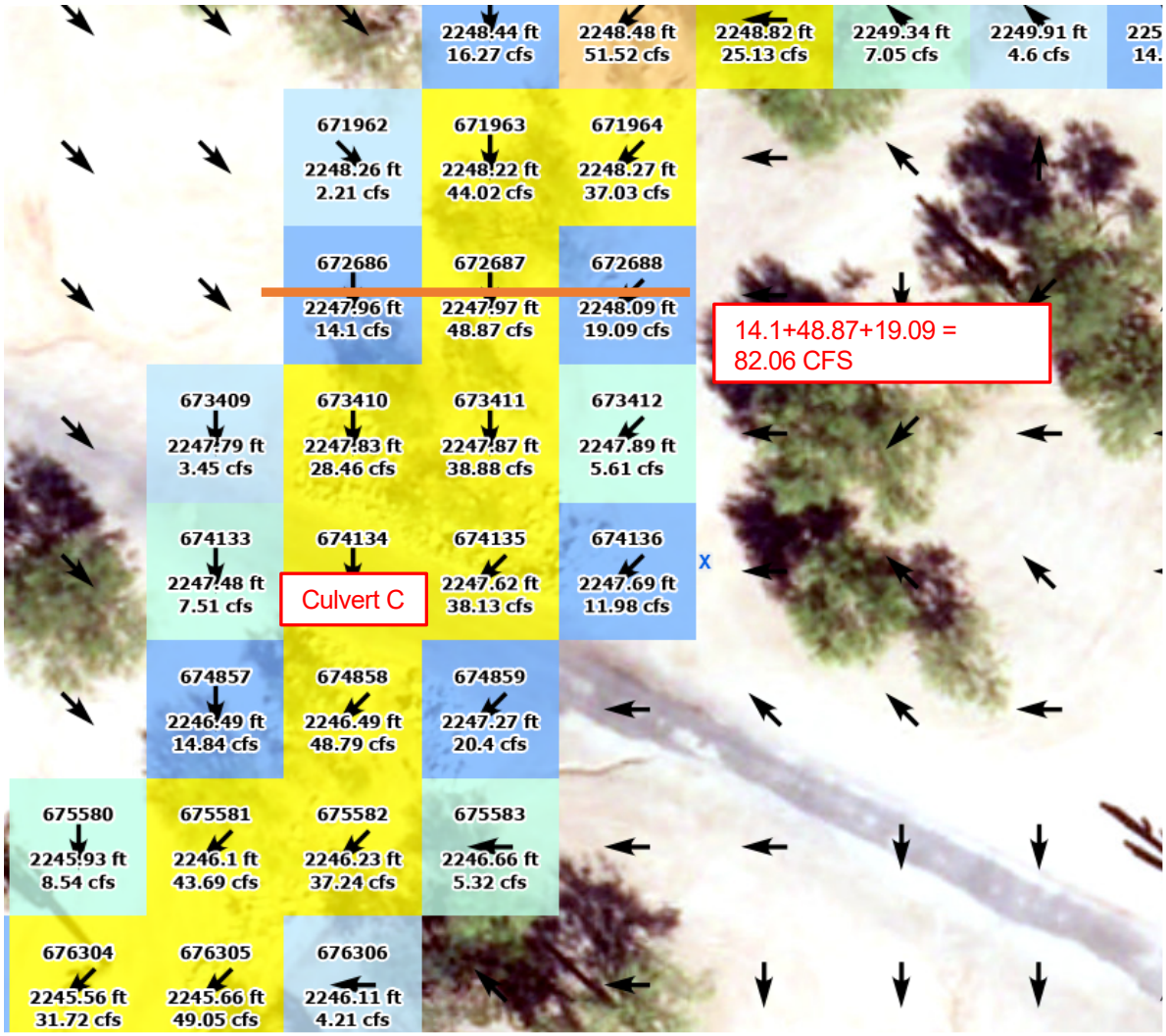


Figure 3.1.4 Flo-2D North Wash Culvert C Cross-Section Image

The grids intersected by the orange line in Figure 3.1.4 were added to derive the flow across the driveway and through Culvert C, they added to a peak flow of 82.1 CFS.

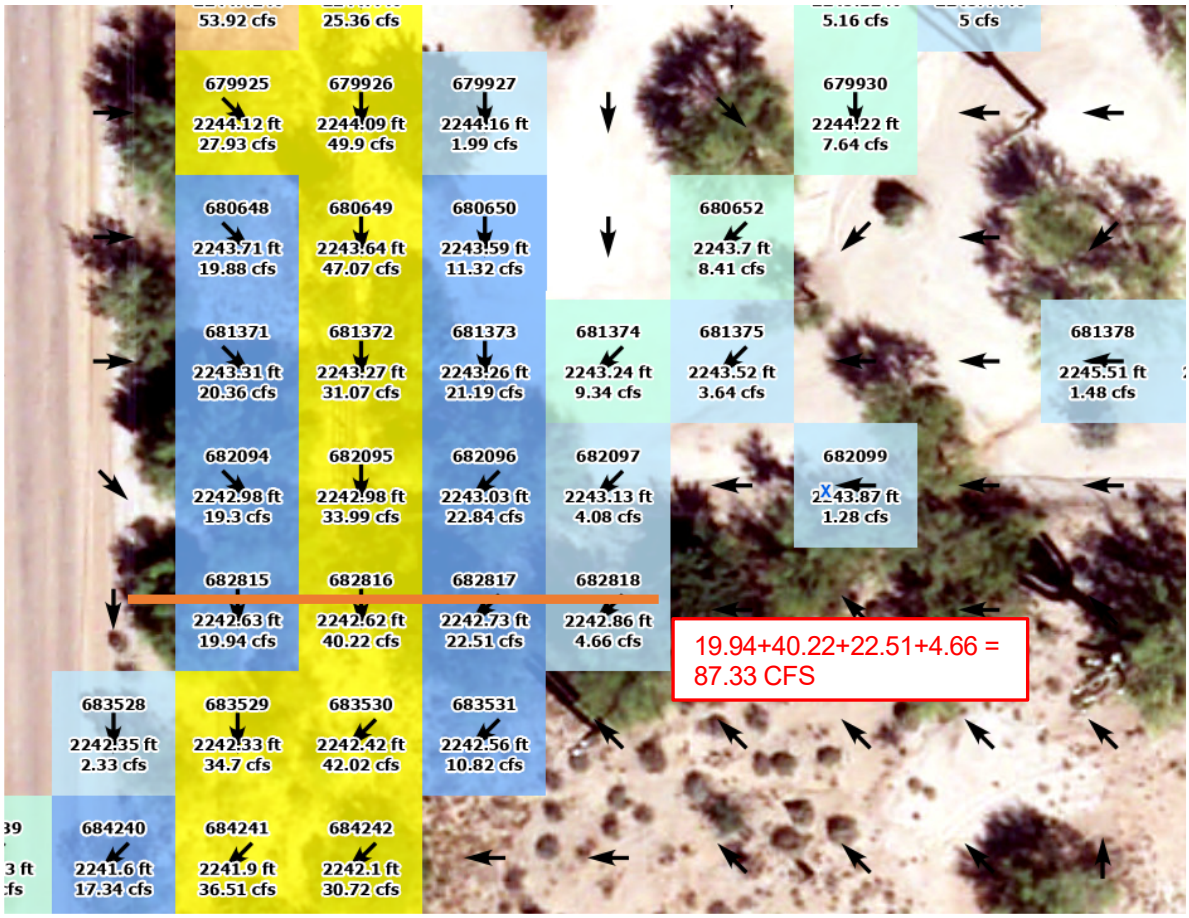


Figure 3.1.5 Flo-2D North Wash Downstream Cross-Section Image

The flow grids indicated by the downstream cross-section line in Figure 3.1.5 added to a peak flow of 87.4 CFS exiting the property.

These derived flows were used as inputs in HEC-RAS analysis of the existing and proposed conditions, see Section 5 for HEC-RAS information and analysis.

3.3 SOUTH WASH

In addition to the North Wash, the South Wash design flows were reviewed with the existing drainage report and the FLO-2D Study. The 2002 drainage report calculated a 100-Yr Peak design flow of 366 CFS, compared to the design peak flow of 251.9 CFS CFS entering the region of the South Wash and 258.3 CFS exiting the South Wash study area, as shown in Figure 3.1.6. It is our opinion that the reduction in flow compared to the study is a result of a portion of the flow routing along E. Dixileta to the North Wash. The design flows for the South Wash were concluded to be the Flo-2D derived values of 251.9 CFS at the properties point of entry and 258.3 CFS at the properties point of exit.

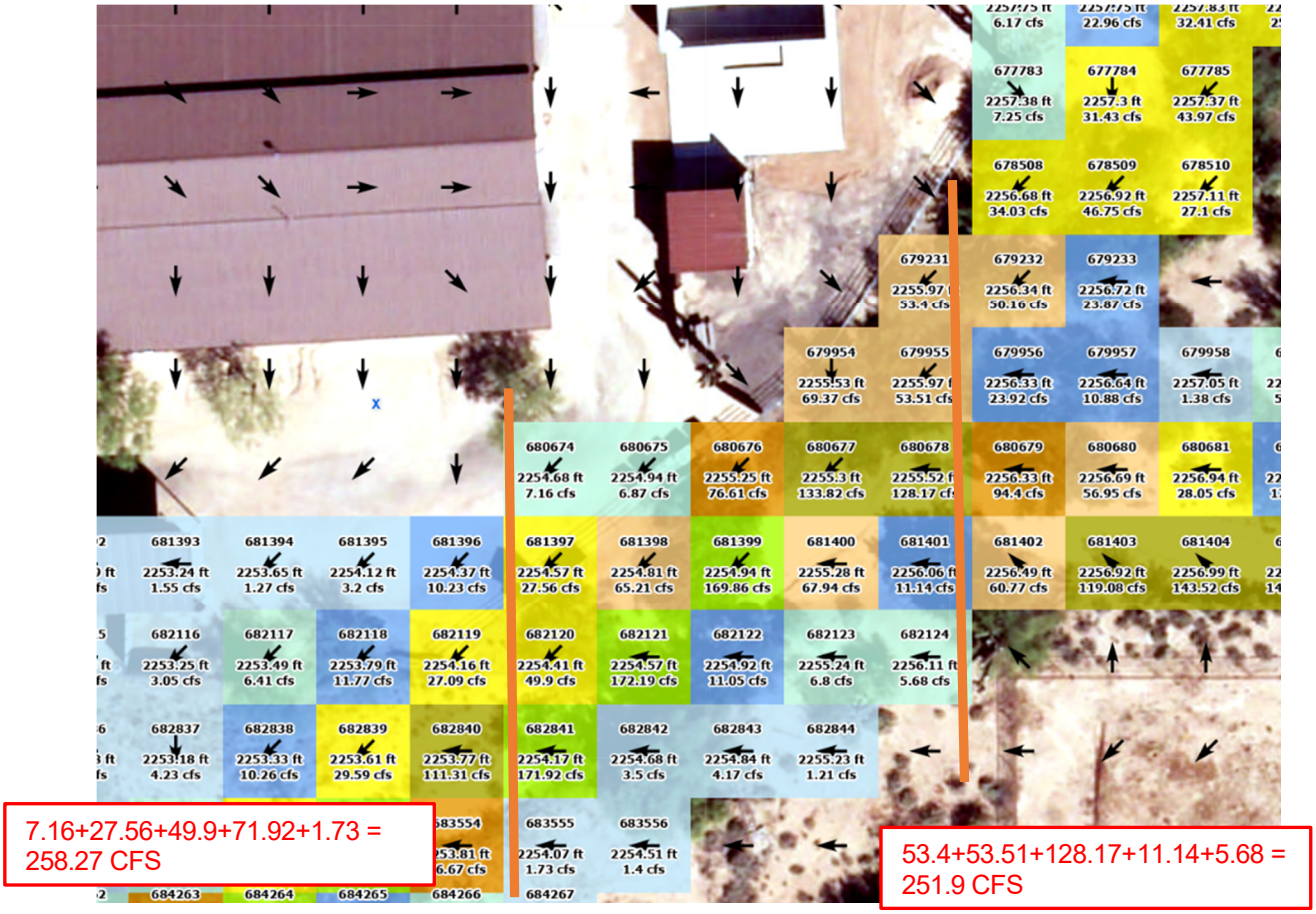


Figure 3.1.6 Flo-2D South Wash Cross-Section Image

3.4 DRAINAGE EASEMENTS (4-1.600)

Per the Design Standards & Policies Manual, a drainage easement is required for watercourse regulated by the ESL zoning district with a 100-year, peak discharge rate of 50 CFS or greater.

There is an existing 60' drainage easement for the South Wash as recorded per Instr. 02-0976260 M.C.R. which was based on the 2002 drainage report. From our review, the existing drainage easement based on the higher design peak flows from the 2002 drainage report is acceptable and encapsulates the water surface elevation as derived from the Flo-2D values described above in section 3.3. No new construction is proposed in the vicinity of the South Wash, however, per the surveyed conditions, a section of a wall and perimeter screen is encroaching into the existing drainage easement. The existing wall and perimeter screen will be removed as well as any mobile units that encroach into the drainage easement at the time of final design.

Based on the revised design flows derived from FLO-2D for the North Wash of a minimum flow of 63.1 CFS and a maximum flow of 87.4 CFS, a drainage easement is required since the flow exceeds 50 CFS per City requirements. During the final plan submittal, a drainage easement will be dedicated encompassing the 100-year flood limits. This flood limits will be defined utilizing HEC-RAS modelling as described below. Adequate printouts from the HEC-RAS results are included with this report. Digital models will be provided as necessary separately from this report. There will be no structures (existing or proposed) within the drainage easement. The drainage easement concluded per this report is shown on the grading and drainage plans. Reference Section 5.1 for further information and documentation of the HEC-RAS water surface elevation extents.

3.5 EROSION HAZARD SETBACK (4-1.300)

Recommended setback distances for the proposed development for the North and South Wash are calculated using the ADWR State Standard 5-96, Guideline 1, Level 1. A minimum of 20' is required for straight reaches, and 50' for curved reaches. Both the North and South Wash are considered straight reaches to determine minimum setback distances.

North Wash: Setback = $1.0(Q/100)^{0.5}$ (SSA 5-96)
= $1.0\ (87.4/100)^{0.5}$ = 0.97 feet
= 20' minimum is used

South Wash: Setback = $1.0(Q/100)^{0.5}$ (SSA 5-96)
= $1.0\ (251.9/100)^{0.5}$ = 15.9 feet
= 20' minimum is used

floodplain !
No floodway was established

The proposed Shop and manure storage pad will be located a minimum of 20' from the 100-year ~~floodway~~ as defined in Section 5.1. The erosion hazard setback limits are shown on the grading and drainage plans as 20' offsets from the water surface elevation of the 100-year, 24-hour, peak flows.

As discussed in Section 4 below, some culverts are proposed to be replaced. Scour protection will be applied at the inlet and outlet of the proposed culverts to replace the existing Culvert A and B. Additionally, scour protection will be verified and replaced as necessary at the existing 18" diameter culvert under the main driveway where the existing riprap is located. The South Wash was not evaluated for scour protection as no proposed construction is adjacent to the wash. Note that the existing structures that encroach into the easement will be removed as described in Section 3.4.

The minimum scour depth from the ADWR State Standard 5-96, Guideline 2, Level 1 is as follows:

North Wash: Scour Depth = General Degradation + Long term Degradation (minimum of 3')
= $0.157(Q100)^{0.4} + 0.02(Q100)^{0.6}$
= $0.157(87.4)^{0.4} + 0.02(87.4)^{0.6}$ = 1.23 ft
= 3' minimum is used

3.6 STORMWATER STORAGE AND FIRST FLUSH REQUIREMENTS (4-1.201)

Stormwater storage ~~and first flush~~ requirements are not required for the project site as it is designated as a R1-190, single-family residential (SFR). Although there is a conditional use permit for a Ranch, the site is primarily a residence and equine boarding and not a commercial development. The proposed Shop is for equipment storage and labor quarters only. No commercial events take place at the project site.

We have also reviewed the first flush requirements based on the disturbance area for the proposed site development. The proposed graded surface area has a total disturbance area of 50,846 square feet. Refer to the Grading and Drainage Plan for graded area. The Shop roof gutter downspouts are drained into an underground 4" diameter drainpipe which discharges into the existing wash. The roof projected area is 8,000 square feet and the adjusted total disturbed area is 42,846 square feet (0.98 acres). Since the disturbance area is less than 1 acre, first flush mitigation is not required for this site.

SECTION 4 - PROPOSED CONDITIONS

4.1 PROPOSED SITE IMPROVEMENTS

The previously approved design review, 21-DR-2002, shows an 8,000 square foot Phase 2 Arena located east of the North Wash at the northeasterly corner of the site. It was originally intended to amend the previous site plan and replace the Arena with the new 8,000 sq. ft. Shop. Due to the revised design flows of the North Wash described above with the required drainage easements and minimum setbacks, the new Shop has been located in the northeast corner of the project site and the Phase II Arena has been eliminated from the site. The

northwest corner of the proposed Shop is located approximately 75.0' south and 90.0' east of the north and west property boundaries, respectively.

Due to the location of the proposed Shop, access improvements are required to be made where the existing Culvert A and B are located in the North Wash. It is proposed that the existing 48" culverts be removed and replaced with one culvert crossing composed of two 24" culverts installed parallel to each other to pass the design flow of the North Wash. As described above, scour protection to a minimum of 3' below the channel floor will be provided. Culvert locations are identified in Exhibits B and C.

Per the City of Scottsdale, due to the limited scope of change to the existing improvements, a Wash Modification Application is not required for this site.

4.2 SITE GRADING AND LOWEST FLOOR ELEVATIONS

The lowest floor elevation (F.F.) for the proposed Shop is 2255.9'. The adjacent water surface elevation for the 100-yr peak design flows of the North Wash at the upstream end of the proposed Shop is approximately 2254.2' at Section 651 of the HEC-RAS model, 1.7 feet below the lowest floor elevation. The shop site grading will direct flows similar to historic sheet flows of on-site drainage. There is a minimal effect from the site grading on flows into the North Wash.

To allow for vehicle access to the proposed Shop, grading extents encroach into the North Wash (southeast of the building) to create an in-line embankment (30' wide) with two new 24" culverts designed to convey the design flow of the North Wash. All proposed grading improvements are outside of the NAOS Easements. Refer to the Hydraulics section for culvert design.

For visual reference of the proposed conditions please reference Exhibit D included in the Appendix.

SECTION 5 – HYDRAULICS

5.1 HEC-RAS MODEL (4-1.504)

To model and analyze the effects of the existing and proposed conditions, WHCE utilized Hydraulic Engineering Center's River Analysis System (HEC-RAS) software program Version 6.3.1. Flow values derived from the cross-sections indicated in Figures 3.1.2, 3.1.3, 3.1.4, and 3.1.5 were input into HEC-RAS to simulate 100-year peak flow events. This 24 hour, 100 year flow data was used for both the existing and proposed models.

Flow Change Location				
	River	Reach	RS	PF 1
1	Vargo Wash	Reach 1	879	63.1
2	Vargo Wash	Reach 1	858	63.1
3	Vargo Wash	Reach 1	771	63.1
4	Vargo Wash	Reach 1	705	63.1
5	Vargo Wash	Reach 1	651	63.1
6	Vargo Wash	Reach 1	597	76.4
7	Vargo Wash	Reach 1	534	76.4
8	Vargo Wash	Reach 1	469	76.4
9	Vargo Wash	Reach 1	401	76.4
10	Vargo Wash	Reach 1	319	82.1
11	Vargo Wash	Reach 1	243	82.1
12	Vargo Wash	Reach 1	169	82.1
13	Vargo Wash	Reach 1	105	82.1
14	Vargo Wash	Reach 1	5	87.3

Figure 5.1.1 HEC-RAS Flow Inputs Image from: HEC-RAS 6.3.1 Software

To fully evaluate and understand the results of the proposed conditions, WHCE separately modeled the existing conditions and the proposed conditions for results comparisons. For the existing conditions model, topography as surveyed by Everett Alan was imported as the existing terrain. The proposed grading extents created in AutoDesk Civil3D was merged with the existing topographic information from Everett Alan's site survey to create one surface and was then exported from Civil3D into HEC-RAS to create the terrain for the proposed conditions model. The two separate terrains were used in defining the reach and cross-sections for the North Wash.

The existing conditions model was developed solely using information from the site survey. The two existing 48" culverts (Culverts A and B) were modeled as one 48" culvert spanning from the beginning of Culvert A to the ending of Culvert B. Only one long culvert was modeled due to the inability to have a cross-section intersecting an inline structure: therefore, creating a limitation by the proposed model. As noted from the site survey, the 48" culverts were almost half full of sediment, creating a natural grade about two feet above the culvert inverts. To model the sediment, two feet of depth was blocked in the HEC-RAS culvert inputs. See Figure 5.1.2 for HEC-RAS reach and cross-sections setup with existing terrain. The existing conditions were input and ran in HEC-RAS as Plan 06 – Existing Conditions, to model the flow conditions created by the current conditions. The results of this plan are explained in Section 5.2 below.

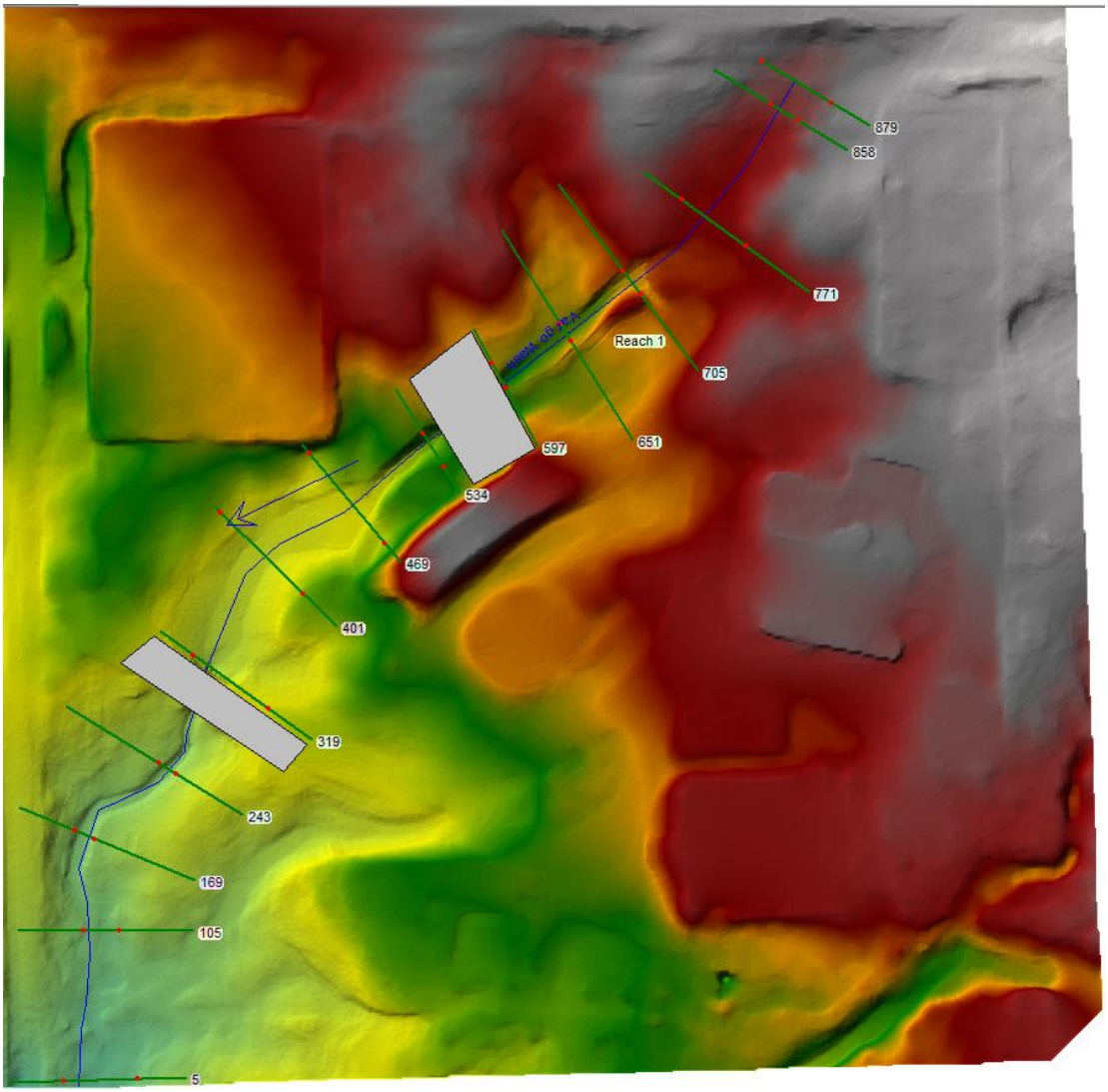


Figure 5.1.2 HEC-RAS Existing Conditions Terrain and Geometry Image

A separate HEC-RAS model was further developed by incorporating proposed project improvements, including the proposed grading and the culvert crossings. The two parallel proposed 24” culverts and access driveway grading were set-up within the proposed conditions model. There are no proposed changes to the downstream 18” culvert or its surrounding grade. See Figures 5.1.3 for HEC-RAS reach and cross-sections set up with the proposed terrain. These inputs were run in HEC-RAS as Plan 05 – Proposed Conditions to derive and depict the resulting flow extents. The results of these models are shown and explained in Section 5.2 below.

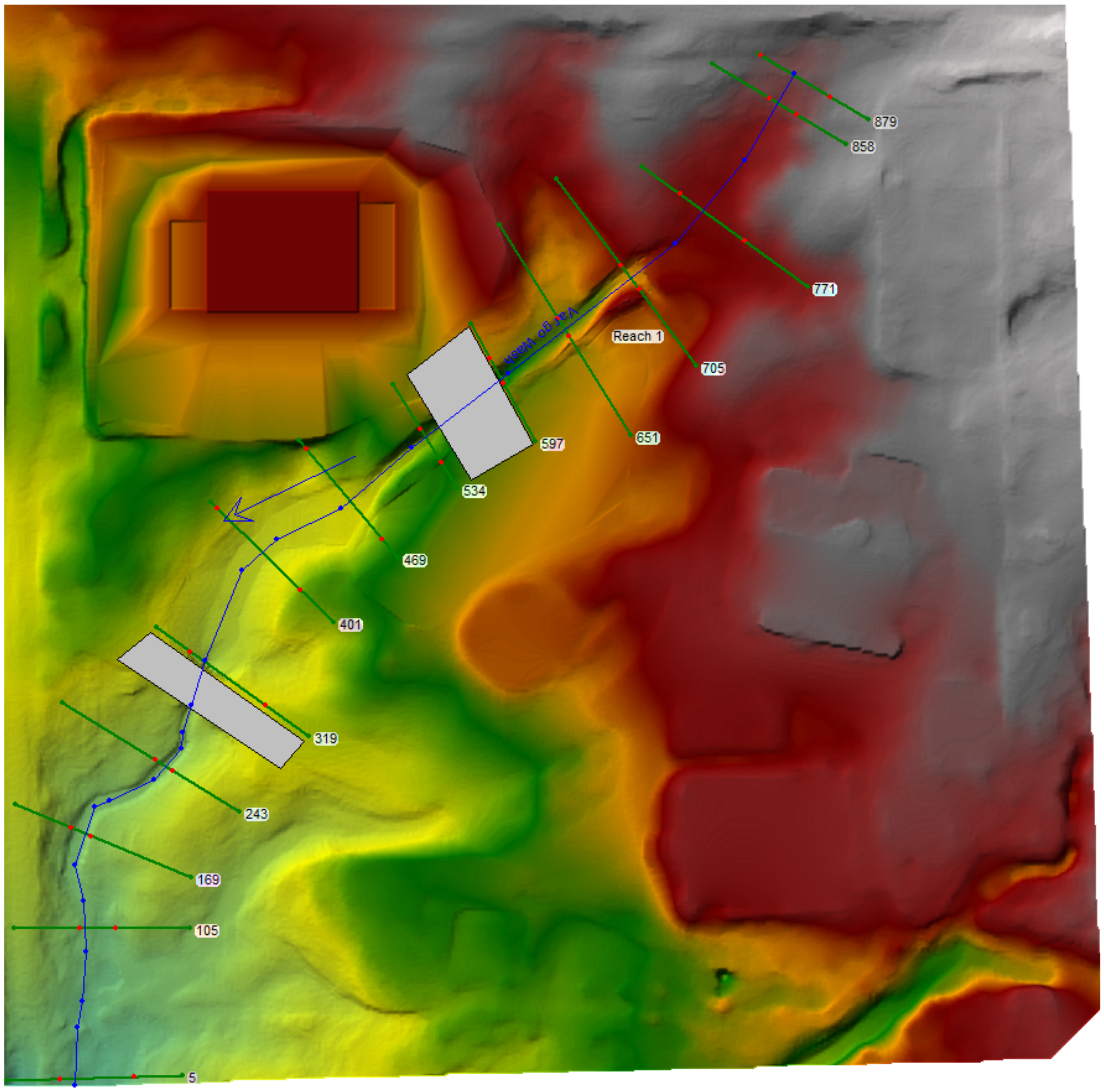


Figure 5.1.3 HEC-RAS Proposed Conditions Terrain and Geometry Image

5.2 HEC-RAS RESULTS (4-1.504)

From the HEC-RAS calculated water surface elevations based on the existing and proposed conditions, the 100-year floodplain limits were defined and exported into AutoCad Civil 3D. The floodplain limits are shown on the Grading and Drainage Plans and a drainage easement was outlined to encompass the floodplain limits.

The HEC-RAS model did result in both the main driveway and the access to the Shop having water flowing over them. Less than 0.25 ft in depth flowing over them was observed: therefore, meeting emergency requirements of a maximum of 1.0 ft of 100-year-flow depth. According to the HEC-RAS existing and proposed model result comparisons, there were no major impacts to flow conditions or conveyance areas, most of the site runoff is directed into and through the North Wash.

Table 5.2.1 below lists and compares the water surface elevations (WSEL) at each cross-section along the wash. As shown in the table, there is minimal change in the water surface elevations caused by the proposed conditions. The only difference is a WSEL drop of 0.02 feet (.24 inches) from existing to proposed elevations at cross-section 597, two feet upstream of the proposed culvert replacement.

Table 5.2.1 HEC-RAS Water Surface Elevation Results and Comparison

Cross Section	Plan 06 - Existing Conditions WSEL (ft)	Plan 05 - Proposed Conditions WSEL (ft)	WSEL Difference (ft)
879	2258.86	2258.86	0
858	2258.41	2258.41	0
771	2256.61	2256.61	0
705	2255.27	2255.27	0
651	2254.17	2254.17	0
597	2254.01	2253.99	-0.02
534	2252.11	2252.11	0
469	2250.23	2250.23	0
401	2249.55	2249.55	0
319	2249.54	2249.54	0
243	2245.61	2245.61	0
169	2244.86	2244.86	0
105	2244.06	2244.06	0
5	2242.05	2242.05	0

The summary table, with both the proposed and existing conditions, inputs, and results at each cross-section, generated by the HEC-RAS program can be found in the appendix Exhibit E.

The following figures (5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6) are HEC-RAS maps that show the flow results from the proposed and existing models for visual comparison. Further proving the minimal changes in flow caused by the proposed changes.

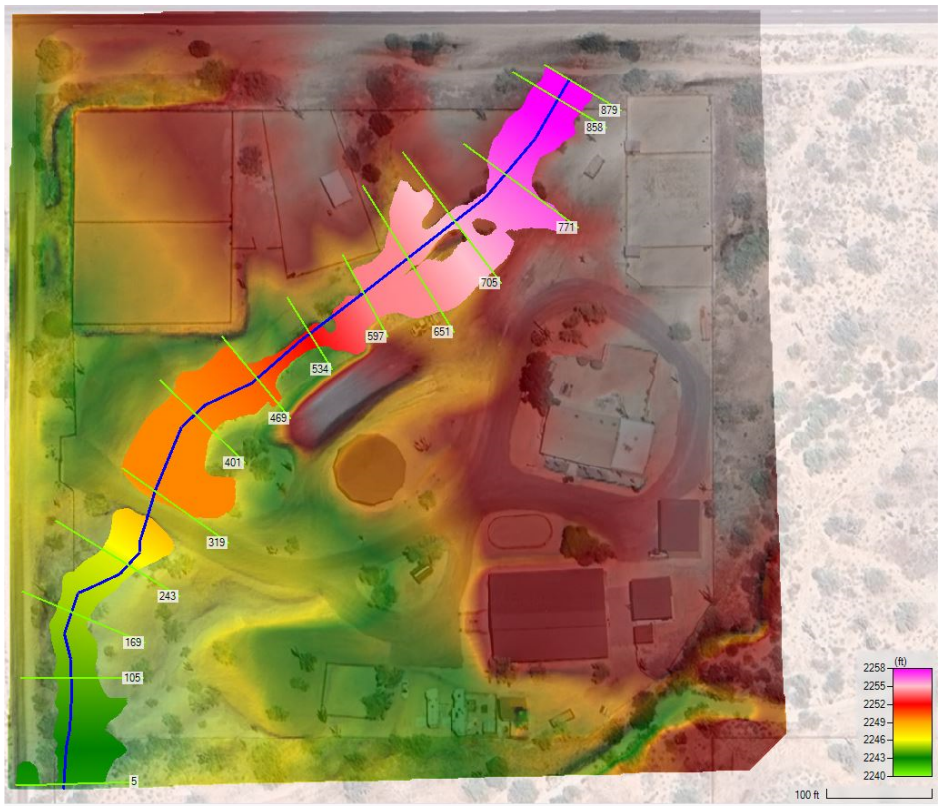


Figure 5.2.1 HEC-RAS WSEL RESULTS MAP Image - Existing Conditions

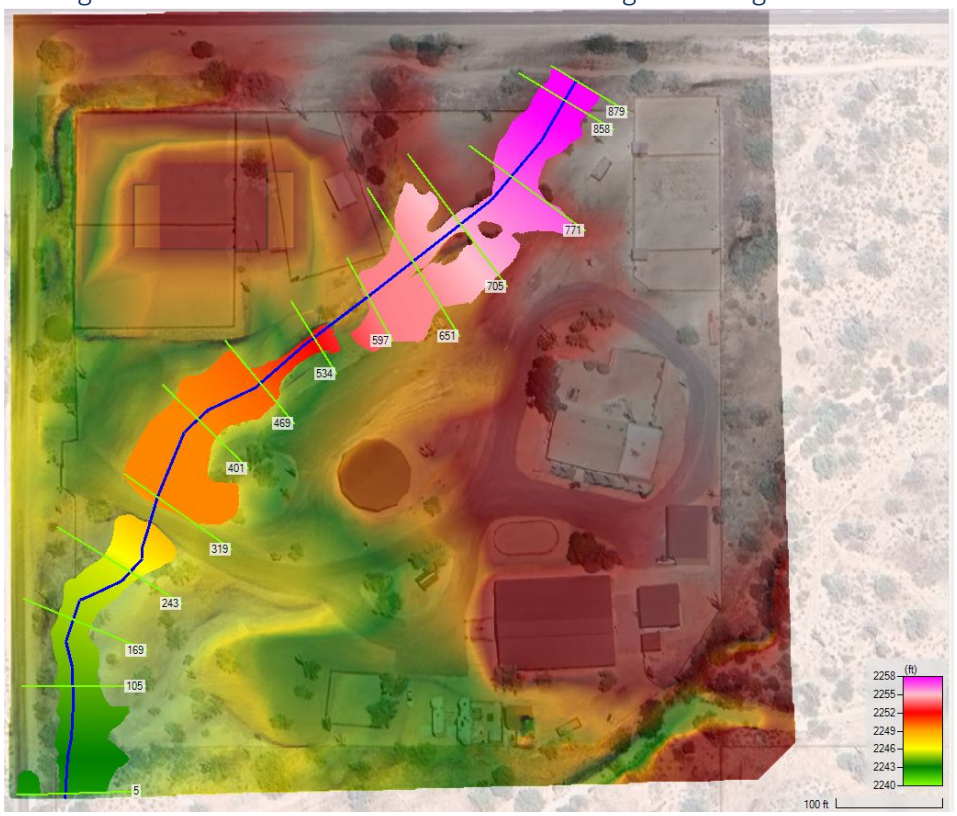


Figure 5.2.2 HEC-RAS WSEL RESULTS MAP Image - Proposed Conditions

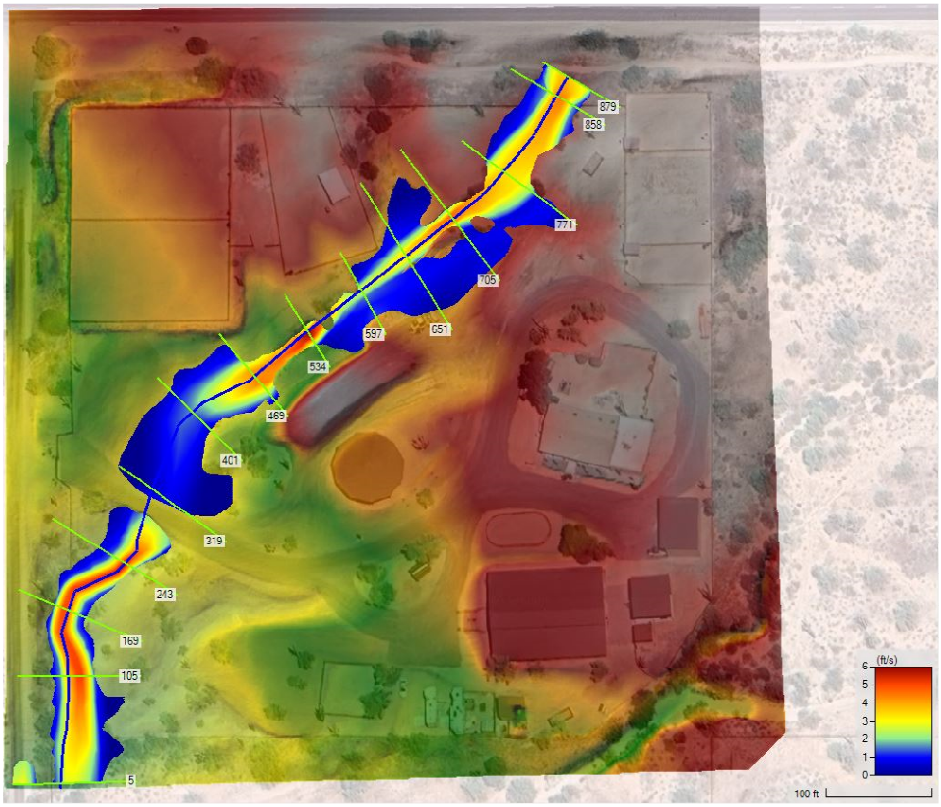


Figure 5.2.3 HEC-RAS VELOCITY RESULTS MAP Image - Existing Conditions

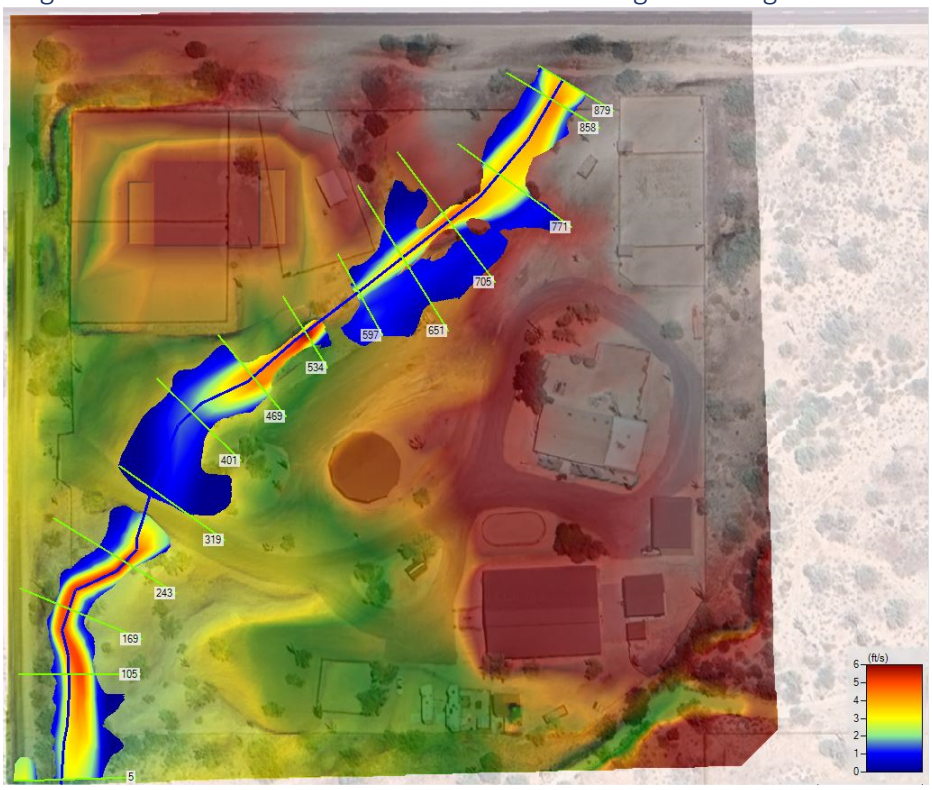


Figure 5.2.4 HEC-RAS VELOCITY MAP Image - Proposed Conditions

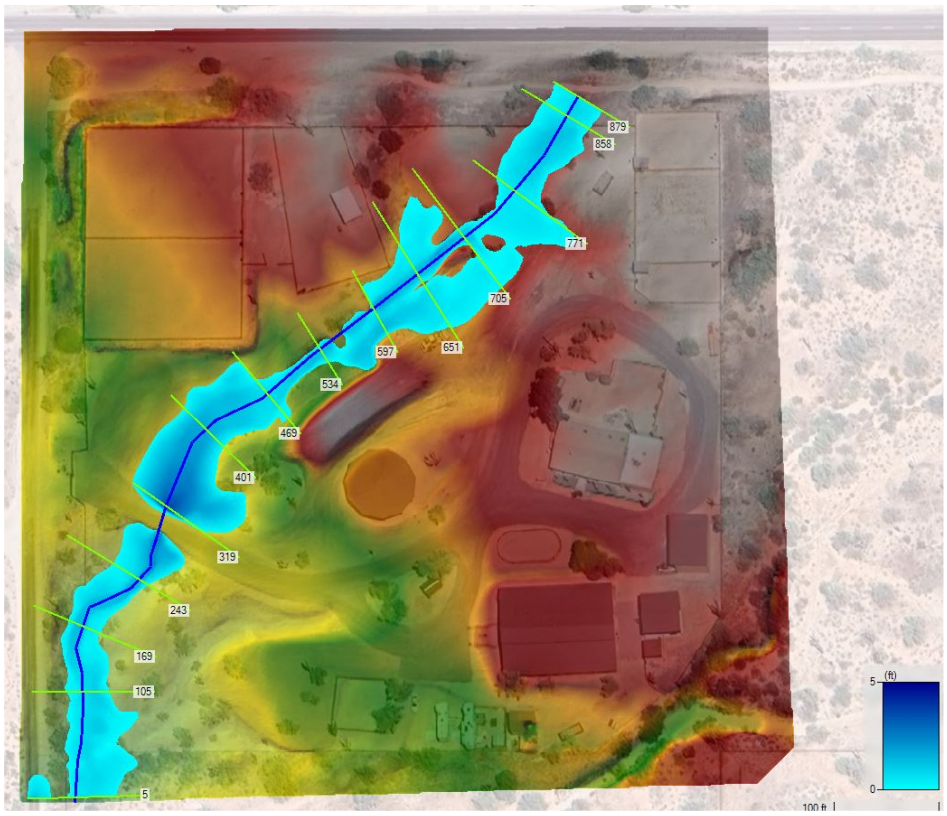


Figure 5.2.5 HEC-RAS DEPTH RESULTS MAP Image - Existing Conditions

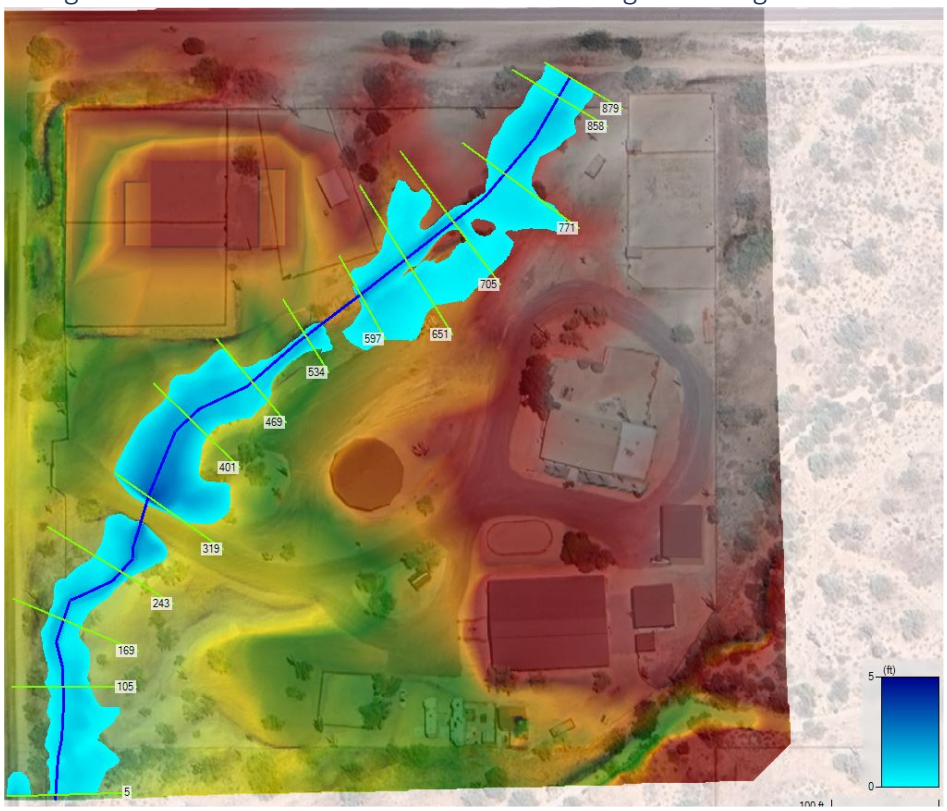


Figure 5.2.6 HEC-RAS DEPTH RESULTS MAP Image - Proposed Conditions

Figures 5.2.7 and 5.2.8 are the HEC-RAS reach profiles (PF) of energy grade line (EG), the water surface (WS), and the ground surface with the cross-section station labels. The profiles are also in the Appendix Exhibit E.

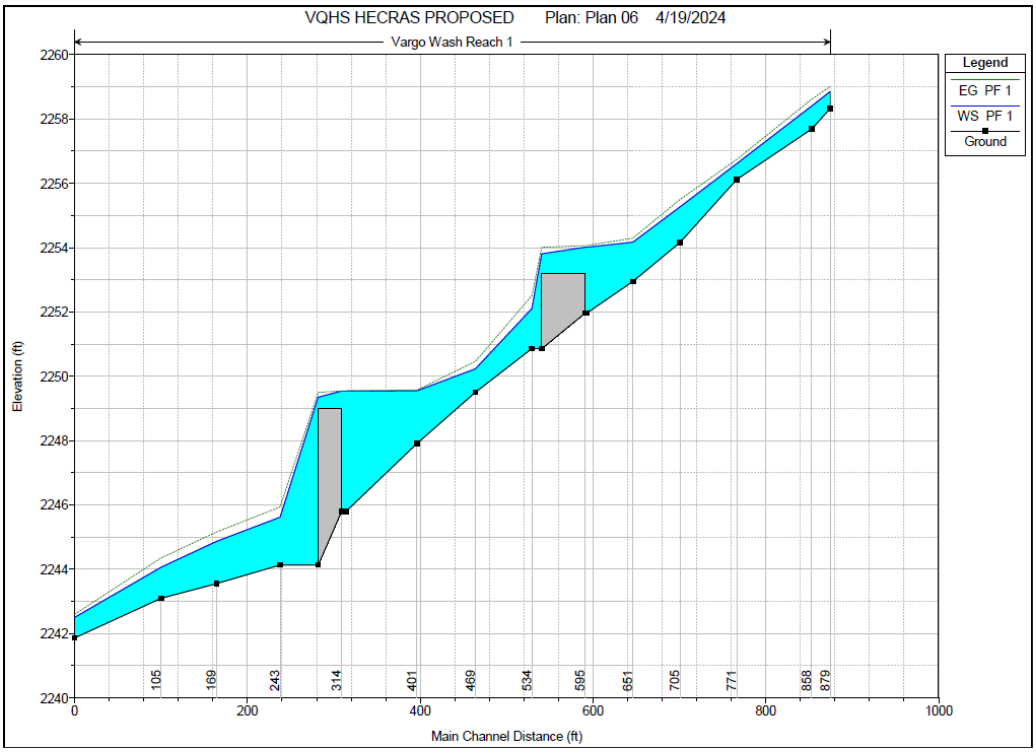


Figure 5.2.7 HEC-RAS REACH PROFILE Image – Existing Conditions

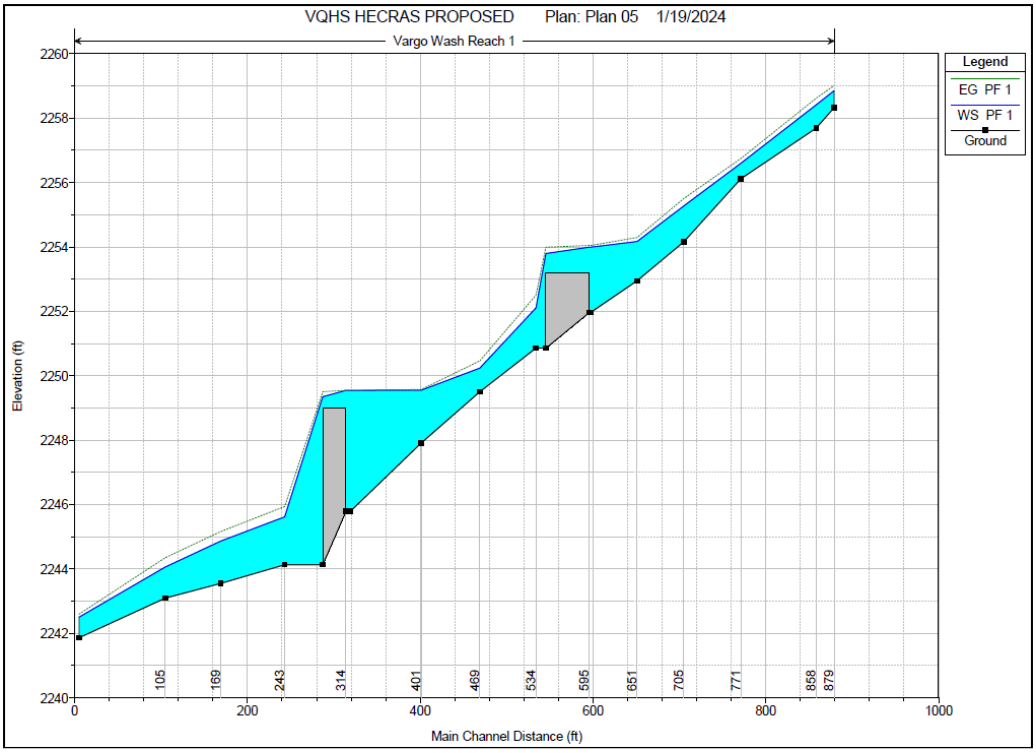


Figure 5.2.8 HEC-RAS REACH PROFILE Image – Proposed Conditions

See appendix Exhibit E for individual cross-section views with WSEL results from the HEC-RAS model.

SECTION 6 –ADDITIONAL REQUIREMENTS

6.1 STORMWATER QUALITY REQUIREMENTS (4-1.401)

The proposed project will disturb a total area of more than one acre; therefore, stormwater quality requirements of the Arizona Department of Environmental Quality (ADEQ) are applicable. Accordingly, a Notice of Intent and Stormwater Pollution Prevention Plan (SWPPP) and associated report will be submitted and processed through ADEQ to obtain approval. Approved NOI and SWPPP Forms will be submitted to the City, in addition to final plans. It is understood that no construction can take place before these documents are submitted to the City.

SECTION 7 - CONCLUSION

Existing conditions were analyzed using current topography, the existing drainage report, and the County's FLO-2D hydrology to derive peak design flows for the site. The proposed site improvements, including the site grading around the new Shop and manure storage pad, have been designed in accordance with the DS&PM and the DDMMC. The grading improvements to the site do not impact the historic wash flows, and the historic location of flow entrance and exit points remain the same for the site.

With the proposed shop finished floor elevation, surrounding driveway and site grading and the replacement of Culverts B and C; the site is designed to have no impact on existing downstream flow rates and elevations. As proven by HEC-RAS analysis, the finished floor elevation of the proposed shop will not be affected by flood events as it meets City requirements of 12" above the estimated adjacent water surface elevation. Per conversations with the Planning Department, no Wash Modification is required for the proposed site improvements.

A drainage easement will be dedicated to the North Wash due to the 100-year, peak discharge being greater than 50 CFS for the ESL zoning district. The erosion hazard setback limits are shown on the grading and drainage plans as 20' offsets from the water surface elevation of the 100-year, 24-hour, peak flows. All structures will be set outside of the erosion hazard zone.

Stormwater storage and first flush requirements are not required for the project site as it is designated as a R1-190, single-family residential (SFR). Also, the site grading disturbance area with the adjustment for routing the Shop roof gutters directly into the drain without washing over the graded/disturbed area, is less than 1 acre in total area; therefore, no first flush mitigation is required for this site.

Overall, the proposed grading and drainage improvements are effective in conveying the 100-year flood through existing drainage paths, underneath access ways, and through the property without negative impacts.

APPENDIX

EXHIBIT A: FEMA FIRMette Flood Panel

National Flood Hazard Layer FIRMette

FEMA

111°54'45"W 33°45'32"N

111°54'8"W 33°45'2"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

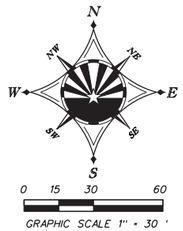
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

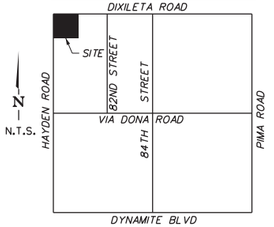
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/18/2024 at 1:18 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

EXHIBIT B: TOPOGRAPHIC SURVEY



VICINITY MAP



SITE DATA

A.P.N.----------216-70-005L
SITE ADDRESS----------29607 N. HAYDEN RD.
NET AREA----------383,691 S.F.
PARCEL ZONING----------R1-190 ESL FO

LEGAL DESCRIPTION

PER TITLE REPORT
THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 25, TOWNSHIP 5 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

OWNER

VARGO QUARTER HORSES LLC

BENCHMARK

MCDOT GDACS POINT NO. 42533-1
NORTHWEST CORNER SECTION 25
CITY OF SCOTTSDALE BRASS CAP FLUSH
EL.=2254.87 NAVD 88

NOTES

1. ALL TITLE INFORMATION IS BASED UPON A COMMITMENT FOR TITLE INSURANCE PREPARED BY SECURITY TITLE AGENCY, INC.

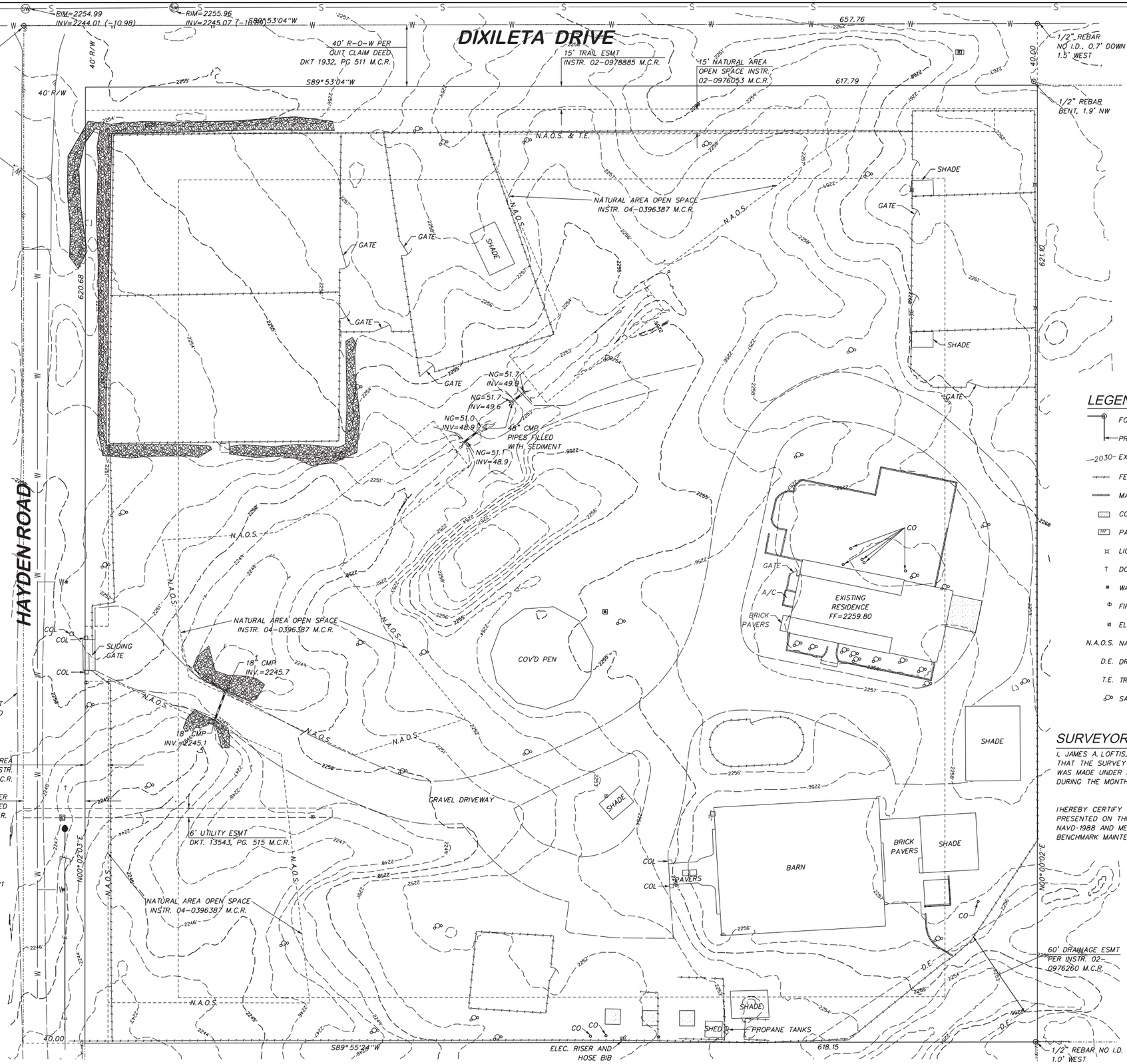
   FILE NO.: 64210762-064-MJ6-KP COMMITMENT DATE: DECEMBER 27, 2021 AMENDMENT NO. 1, AMENDMENT DATE: JANUARY 4, 2022

2. BEARINGS ARE BASED ON A LINE BETWEEN GDACS DESIGNATION NR06 AND 1LH3 WHICH BEARS NORTH 70 DEGREES 02 MINUTES 53 SECONDS EAST.

3. SURVEY IS VALID ONLY IF PRINT HAS ORIGINAL SEAL AND SIGNATURE OF SURVEYOR.

4. ANY INFORMATION, OTHER THAN SURVEY RELATED, DEPICTED ON THISMAP ARE INFORMATIONAL ONLY. NO CERTIFICATION IS GIVEN AS TO IT'S ACCURACY. THIS WOULD INCLUDE, BUT NOT BE LIMITED TO, ALLMATTERS EASILY VERIFIED VIA PUBLIC RECORDS.

5. CONTOUR INTERVAL IS 1 FOOT, ELEVATIONS ARE NAVD '88.



LEGEND

- FOUND MONUMENT (TYPE SHOWN)
- PROPERTY LINE
- 2030 EXISTING CONTOUR
- FENCE
- MASONRY WALL
- CONCRETE
- PAVEMENT
- LIGHT POLE
- DOWN GUY
- WATER METER
- FIRE HYDRANT
- ELECTRIC JUNCTION BOX
- N.A.O.S. NATURAL AREA OPEN SPACE
- D.E. DRAINAGE EASEMENT
- T.E. TRAIL EASEMENT
- SAGUARO CACTUS

SURVEYOR'S CERTIFICATION

I, JAMES A. LOFTIS, HEREBY CERTIFY:
THAT THE SURVEY PLATTED HEREON WAS MADE UNDER MY SUPERVISION DURING THE MONTH OF MARCH, 2023.

I HEREBY CERTIFY THAT ALL ELEVATIONS PRESENTED ON THIS PLAN ARE BASED ON NAVD-1988 AND MEET THE FEMA BENCHMARK MAINTENANCE (BMM) CRITERIA.

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26404
JAMES A.
LOFTIS
DATE 11/14/23
ARIZONA, U.S.A.

EVERETTALAN { GROUP }
6300 E. CAVE CREEK ROAD
SUITE # 202
CAVE CREEK, AZ 85331
PHONE:(480) 990-0545
EMAIL:Info@everettalangroup.com
WWW.EVERETTALANGROUP.COM

THIS DRAWING IS COPYRIGHTED AND PUBLISHED. IDEAS, DESIGNS AND INFORMATION CONTAINED HEREON ARE THE PROPERTY OF THE REGISTRANT & SHALL NOT BE USED IN WHOLE OR IN PART & IS NOT TO BE UTILIZED UNTIL THE RECIPIENT HAS VERIFIED THAT THIS PLAN IS THE CURRENT AND CORRECT VERSION.

SITE DATA
A.P.N.----------216-70-005L
SITE ADDRESS----------29607 N. HAYDEN RD.
NET AREA----------383,691 S.F.
PARCEL ZONING----------R1-190 ESL FO

TOPOGRAPHIC SURVEY MAP

OF

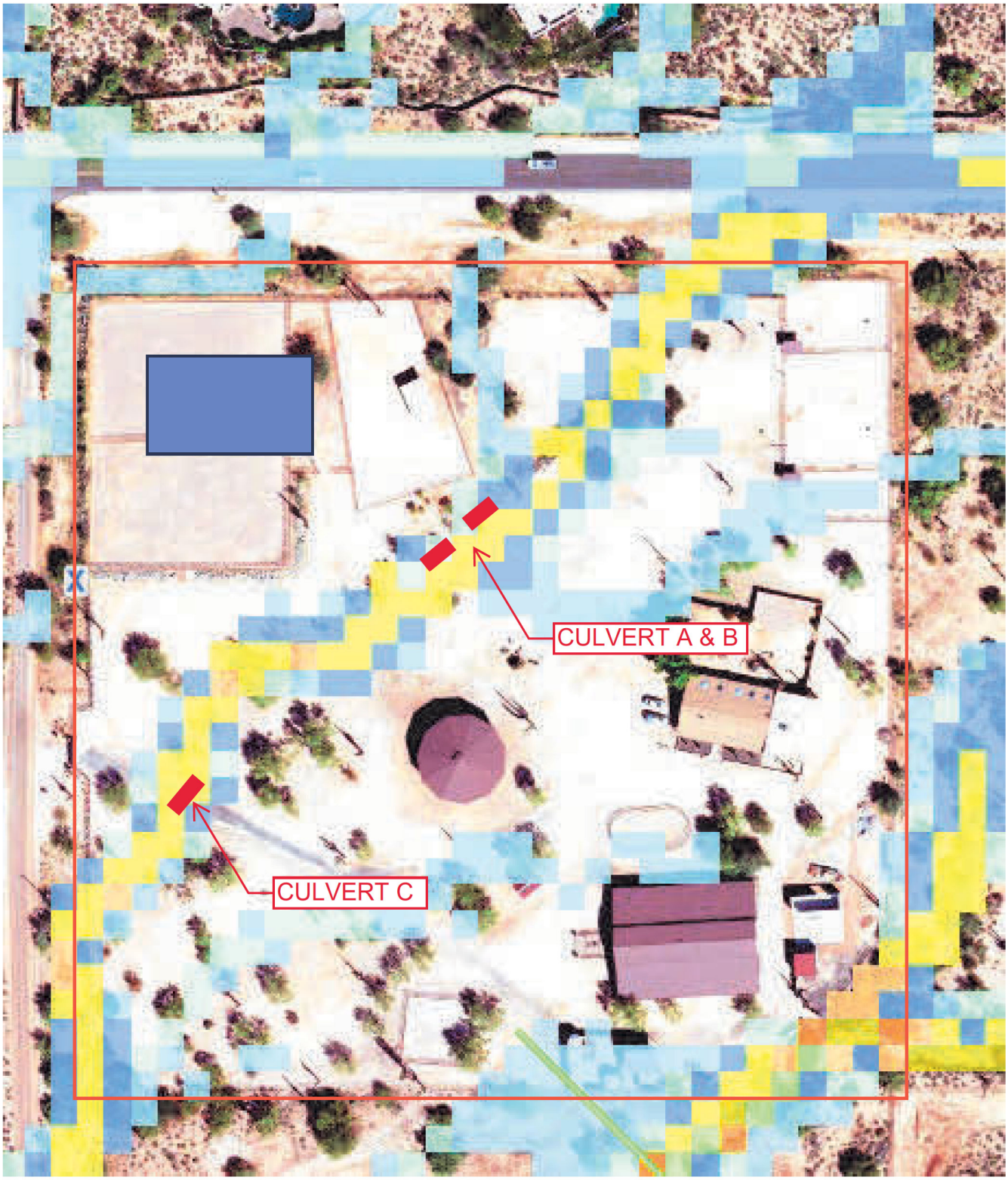
A PORTION OF THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 5 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

PROJECT NO.
230325

SURVEYOR:	J. LOFTIS
CAD TECH:	S. LOFTIS

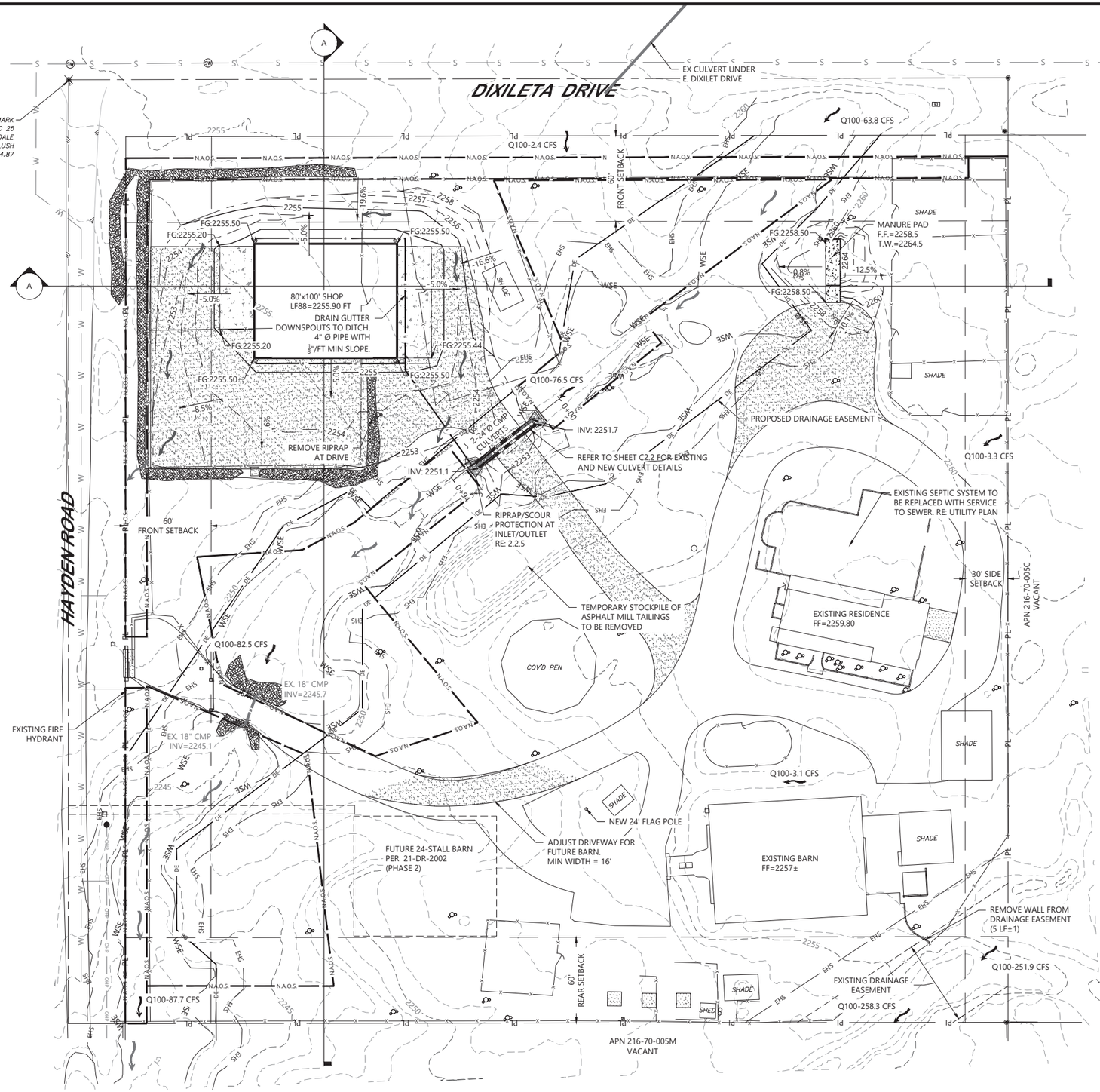
SHEET NO.
1 OF 1

EXHIBIT C: CULVERT LOCATIONS



Culvert Locations (For Reference)

EXHIBIT D: PRELIMINARY GRADING AND DRAINAGE PLANS

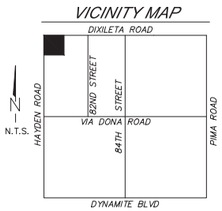


PROJECT CONTACTS

OWNER
VARGO QUARTER HORSES LLC
12255 E PARAISO DR, LOT 5
SCOTTSDALE, AZ 85255
ATTN: J. MICHAEL VARGO
PH: 614-205-8045
EMAIL: MVARGO@VARGOMAIL.COM

WESTERN HERITAGE CONSULTING & ENGINEERING
RYAN ALTENBURG
PO BOX 2117
MILLS, WY 82644
RYAN@WESTERNHCE.COM

VICINITY MAP



SITE DATA

A.P.N.	216-70-005L
SITE ADDRESS	29607 N. HAYDEN RD.
NET AREA	383,691 S.F.
PARCEL ZONING	R1-190 ESL FO
EXISTING RESIDENCE	4,833 S.F.
EXISTING BARN	8,899 S.F.
EXISTING SHADES	4,846 S.F.
EXISTING SHED	115 S.F.
EXISTING COV'D PEN	3,386 S.F.
EXISTING WALL ENCLOSURES	8,066 S.F.
NEW SHOP	8,000 S.F.
FUTURE BARN	8,320 S.F.
TOTAL	46,183 S.F. OR 12%
OPEN SPACE	337,508 S.F.

BENCHMARK

MCDOT GDACS POINT NO. 42533-1
NORTHWEST CORNER SECTION 25
CITY OF SCOTTSDALE BRASS CAP FLUSH
EL.=2254.87 NAVD 88

I HEREBY CERTIFY THAT ALL ELEVATIONS PRESENTED ON THIS PLAN ARE BASED ON NAVD-1988 AND MEET THE FEMA BENCHMARK MAINTENANCE (BMM) CRITERIA.

LEGEND

- FOUND MONUMENT (TYPE SHOWN)
- PROPERTY LINE
- 2255 EXISTING CONTOUR
- SECTION LINE
- UTILITIY EASEMENT LINE
- X FENCE
- MASONRY WALL
- CONCRETE
- PAVEMENT
- LIGHT POLE
- DOWN GUY
- WATER METER
- FIRE HYDRANT
- ELECTRIC JUNCTION BOX
- N.A.O.S. NATURAL AREA OPEN SPACE
- D.E. DRAINAGE EASEMENT
- T.E. TRAIL EASEMENT
- SAGUARO CACTUS
- BUILDING SETBACK LINE
- SW SANITARY MANHOLE
- W EXISTING WATERLINE
- S EXISTING SEWER
- OHP EXISTING OVERHEAD POWER
- EXISTING EDGE OF DRIVEWAY
- EXISTING RIPRAP
- NEW ASPHALT MILL TAILING DRIVEWAY (OR GRAVEL/ROAD BASE)
- WSE WATER SURFACE ELEVATION FOR THE 100-YR FLOOD EVENT
- EHS 20' MIN EROSION HAZARD SETBACK

0 20 40 80
1"=80' B-SIZE
1"=40' D-SIZE

NOTES

1. I HEREBY CERTIFY THAT THE TOPOGRAPHIC INFORMATION SHOWN ON THESE PLANS IS ACCURATE BASED ON A SURVEY CONDUCTED BY EVERETT ALAN GROUP DURING THE MONTH OF MARCH, 2023. REFER TO TOPOGRAPHIC SURVEY MAP FOR MORE INFORMATION.
2. GRADING CUT/FILL QUANTITIES: 1,364.9 C.Y. (CUT), 367.2 C.Y. (FILL), 997.7 (NET-CUT).
   A. ALL CUT NOT USED TO BE HAULED OFF SITE.
   B. CUT/FILL QUANTITY BASED ON 1.1 FILL FACTOR FOR COMPACTION.
   C. CUT/FILL QUANTITY BASED ON FINISHED FLOOR ELEVATION OF BUILDING FOUNDATION AND FLATWORK.
3. GRADING SURFACE AREA: 50,846 SQ. FT. (1.17 ACRES)
4. DRIVEWAY RE-SURFACING AREA: 40,192 SQ. FT. (0.92 ACRES)
5. **FINISH FLOOR CERTIFICATION**
   FINISHED FLOORS ARE SAFE FROM INUNDATION DURING A 100-YEAR PEAK RUN-OFF EVENT IF CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS.
6. THE Q-100 VALUES SHOWN ARE BASED ON FLO-2D MAP, PINNACLE PEAK WEST, WHISPER ROCK, 100 YR-24 HOUR STUDY. REFER TO DRAINAGE REPORT FOR MORE INFORMATION.

FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Community Number	Community Map Number	Panel Number	Panel Date	Suffix	FIRM Index Date	FIRM Zone	Base Flood Elevation (AO Zone, use depth)
045012	04013C	0893	7/20/2021	M	2/8/2024	X	N/A

Engineer's Certification: The lowest floor elevation(s) and/or flood-proofing elevation(s) on this plan are sufficiently high to provide protection from flooding caused by a one hundred year storm, and are in accordance with City of Scottsdale Revised Code, Chapter 37-Floodways & Floodplains Ordinance.

VARGO QUARTER HORSES, LLC

PRELIMINARY
GRADING & DRAINAGE PLAN

CITY OF SCOTTSDALE, AZ

Rev	Date	Description	By
1.0	8/30/23	DRB APP SUBMITTAL	MSP
2.0	3/11/24	COS COMMENTS - RESUBMIT	MSP
3.0	4/26/24	COS 2ND COMMENTS - RESUBMIT	MSP

Drawn By: SDG
Designed By: MSP
Reviewed By: RLA
Scale:

WESTERN HERITAGE
CONSULTING & ENGINEERING
PO BOX 2117
Mills, WY 82644
307.215.7430
info@westernhce.com

Job Number: 23WHC802
Sheet Number: C2.0

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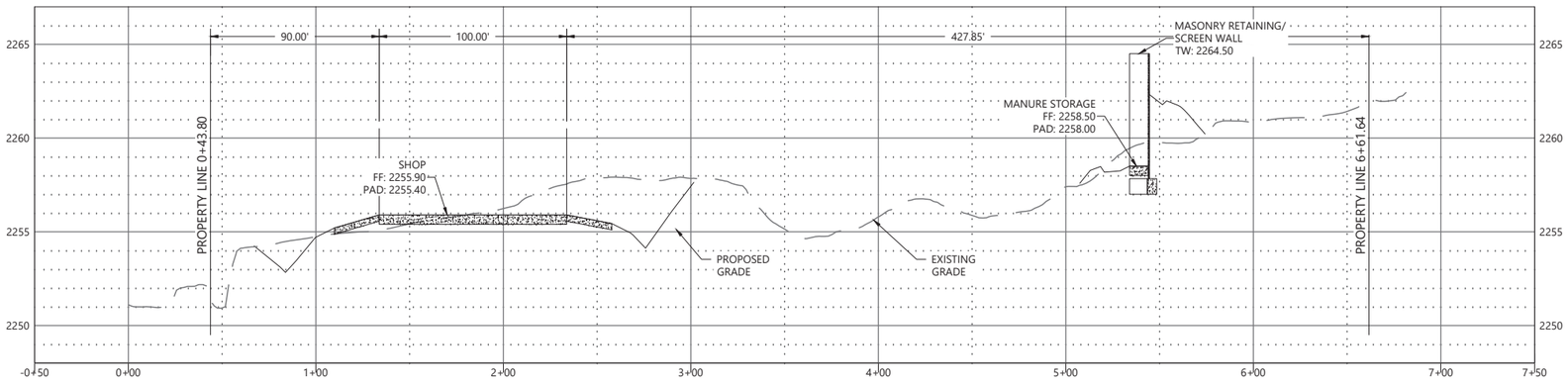
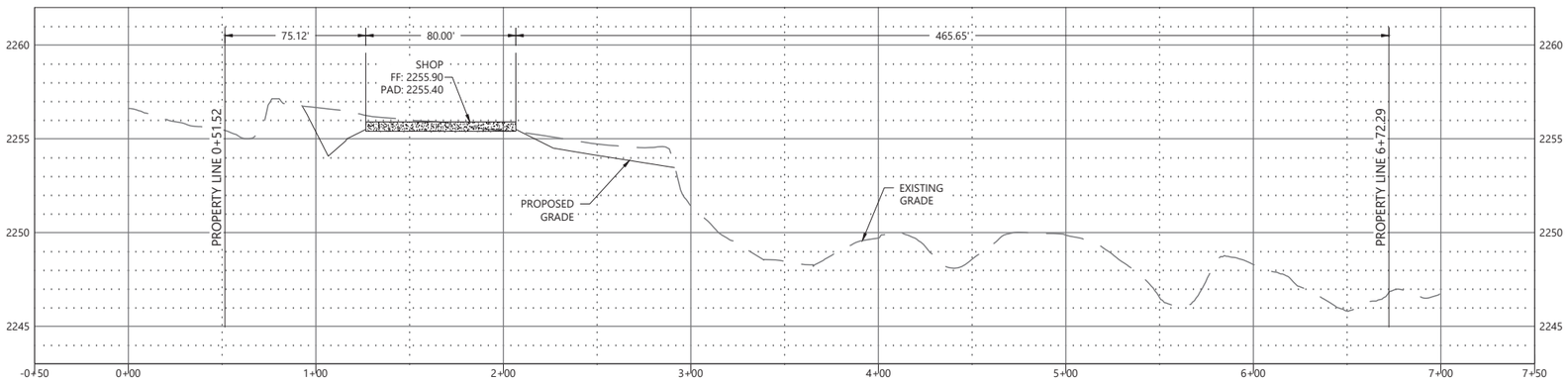


WH 2.1.1 CROSS-SECTION A

B-SIZE H:1"=80' V:1"=16' D-SIZE H:1"=40' V:1"=8'



WH 2.1.2 CROSS-SECTION B

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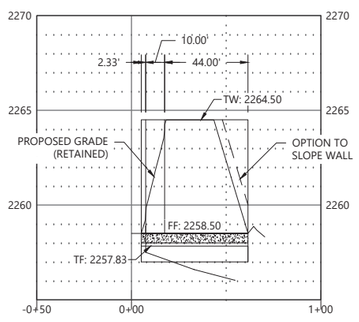

WH 2.1.3 WALL PROFILE

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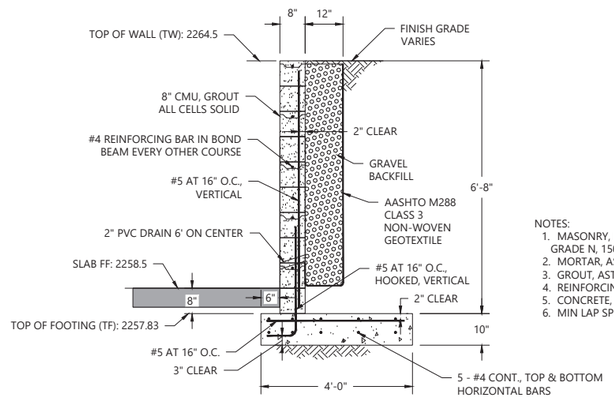


NOTES:
1. MASONRY, MEDIUM WT., ASTM C90, GRADE N, 1500 PSI.
2. MORTAR, ASTM C270, TYPE S, 1800 PSI
3. GROUT, ASTM C476, 2000 PSI
4. REINFORCING, ASTM A615, Fy=60 KSI
5. CONCRETE, 2500 PSI
6. MIN LAP SPLICE, 24"

WH 2.1.4 RETAINING WALL

1"=2'

PROJECT CONTACTS

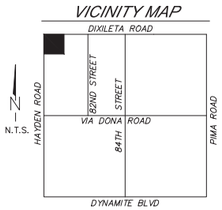
OWNER
VARGO QUARTER HORSES LLC
12255 E PARAISO DR, LOT 5
SCOTTSDALE, AZ 85255
ATTN: J. MICHAEL VARGO
PH: 614-205-8045
EMAIL: MVARGO@VARGOMAIL.COM

WESTERN HERITAGE CONSULTING & ENGINEERING
RYAN ALTENBURG
PO BOX 2117
MILLS, WY 82644
RYAN@WESTERNHCE.COM

SITE DATA

A.P.N.	216-70-005L
SITE ADDRESS	29607 N. HAYDEN RD.
NET AREA	383,691 S.F.
PARCEL ZONING	R1-190 ESL FO
EXISTING RESIDENCE	4,833 S.F.
EXISTING BARN	8,899 S.F.
EXISTING SHADES	4,846 S.F.
EXISTING SHED	115 S.F.
EXISTING COV'D PEN	3,386 S.F.
EXISTING WALL ENCLOSURES	8,066 S.F.
NEW SHOP	8,000 S.F.
FUTURE BARN	8,320 S.F.
TOTAL	46,183 S.F. OR 12%
OPEN SPACE	337,508 S.F.

VICINITY MAP



Rev	Date	Description	By
1.0	8/30/23	DRB APP SUBMITTAL	MSP
2.0	3/11/24	COS COMMENTS - RESUBMIT	MSP
3.0	4/26/24	COS 2ND COMMENTS - RESUBMIT	MSP

Drawn By: MSP
Designed By: MSP
Reviewed By: RLA
Scale:

Title:
VARGO QUARTER HORSES, LLC
PRELIMINARY
GRADING & DRAINAGE PROFILES
CITY OF SCOTTSDALE, AZ

WESTERN HERITAGE
CONSULTING & ENGINEERING
PO BOX 2117
Mills, WY 82644
307.215.7430
info@westernhce.com

Job Number: 23WHC802
Sheet Number: C2.1

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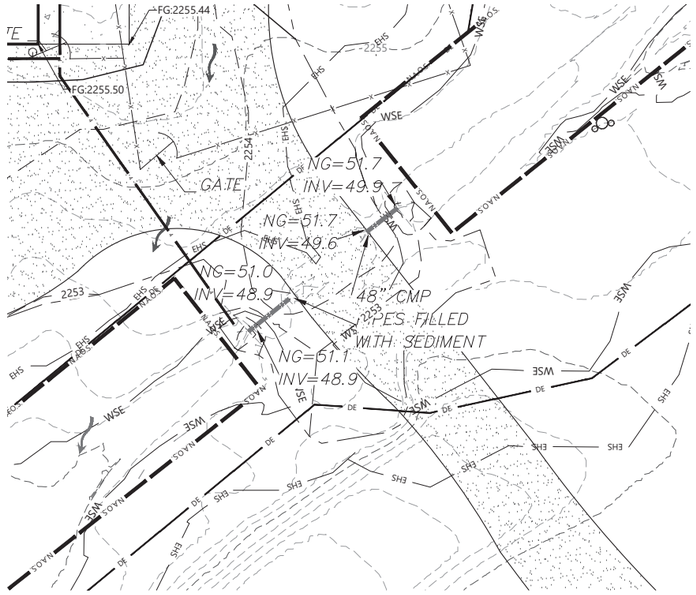
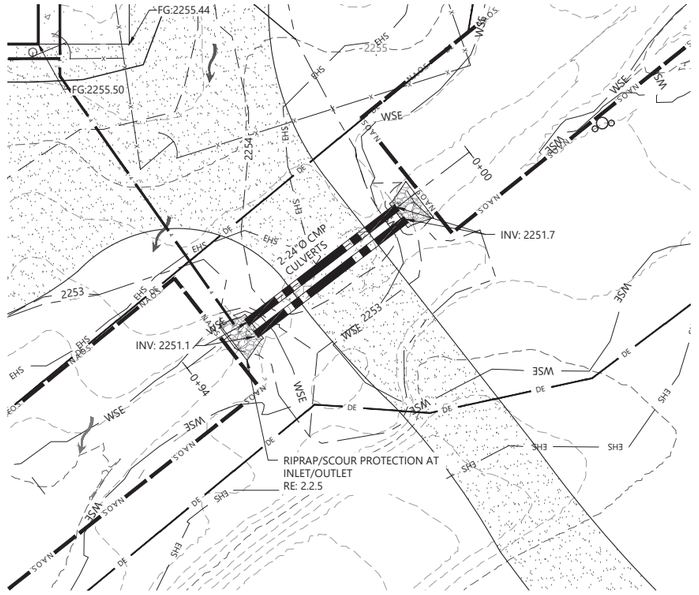


2.2.1 CULVERT PROFILE - EXISTING

B-SIZE:1"=40' D-SIZE:1"=20'



2.2.2 CULVERT PROFILE - PROPOSED

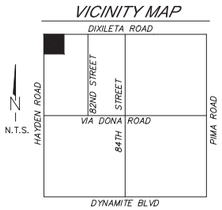
B-SIZE:1"=40' D-SIZE:1"=20'

PROJECT CONTACTS

OWNER
VARGO QUARTER HORSES LLC
12255 E PARAISO DR, LOT 5
SCOTTSDALE, AZ 85255
ATTN: J. MICHAEL VARGO
PH: 614-205-8045
EMAIL: MVARGO@VARGOMAIL.COM

WESTERN HERITAGE CONSULTING & ENGINEERING
RYAN ALTENBURG
PO BOX 2117
MILLS, WY 82644
RYAN@WESTERNHCE.COM

VICINITY MAP



SITE DATA

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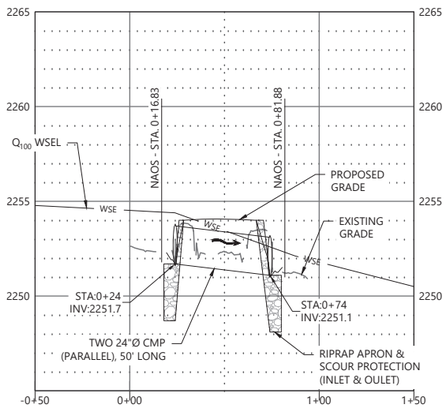
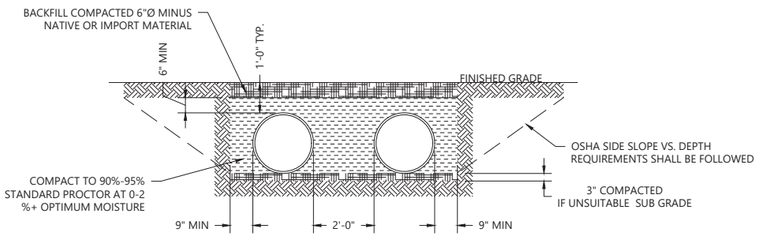


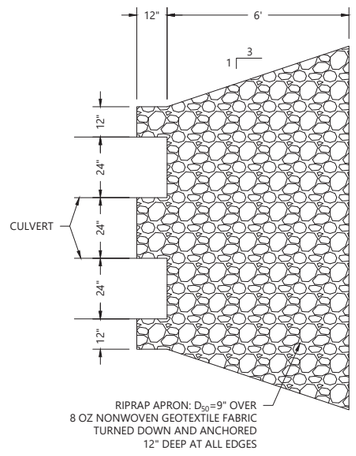
2.2.3 CULVERT PROFILE

B-SIZE H:1"=80' V:1"=16' D-SIZE H:1"=40' V:1"=8'

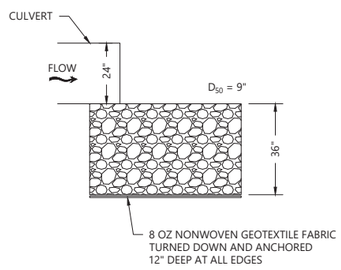


2.2.4 TRENCH

NTS



PLAN VIEW



SECTION VIEW

2.2.5 RIPRAP APRON

NTS

Title: VARGO QUARTER HORSES, LLC
PRELIMINARY
GRADING & DRAINAGE
CULVERT DETAILS
CITY OF SCOTTSDALE, AZ

Rev	Date	Description	By
1.0	8/30/23	DRB APP SUBMITTAL	MSP
2.0	3/11/24	COS COMMENTS - RESUBMIT	MSP
3.0	4/26/24	COS 2ND COMMENTS - RESUBMIT	MSP

Drawn By: MSP
Designed By: MSP
Reviewed By: RLA
Scale:

WESTERN HERITAGE
CONSULTING & ENGINEERING
PO BOX 2117
Mills, WY 82644
307.215.7430
info@westernhce.com

Job Number: 23WHC802
Sheet Number: C2.2

W:\Clients\23WHC802 VQHS\CAD&Drawings\Working\23WHC802_G&D DESIGN LAYOUTS_GRADING.dwg C2.2 G&D DETAILS 4/26/2024 1:38:44 PM

EXHIBIT E: HEC-RAS Output

- HEC-RAS – Summary Table
- HEC-RAS – North Wash Profile – Existing Topography (Plan 06)
- HEC-RAS – North Wash Cross-sections – Existing Topography (Plan 06)
- HEC-RAS – North Wash Profile – Proposed Topography (Plan 05)
- HEC-RAS – North Wash Cross-sections – Proposed Topography (Plan 05)

HEC-RAS –Summary Table

HEC-RAS River: Vargo Wash Reach: Reach 1 Profile: PF 1

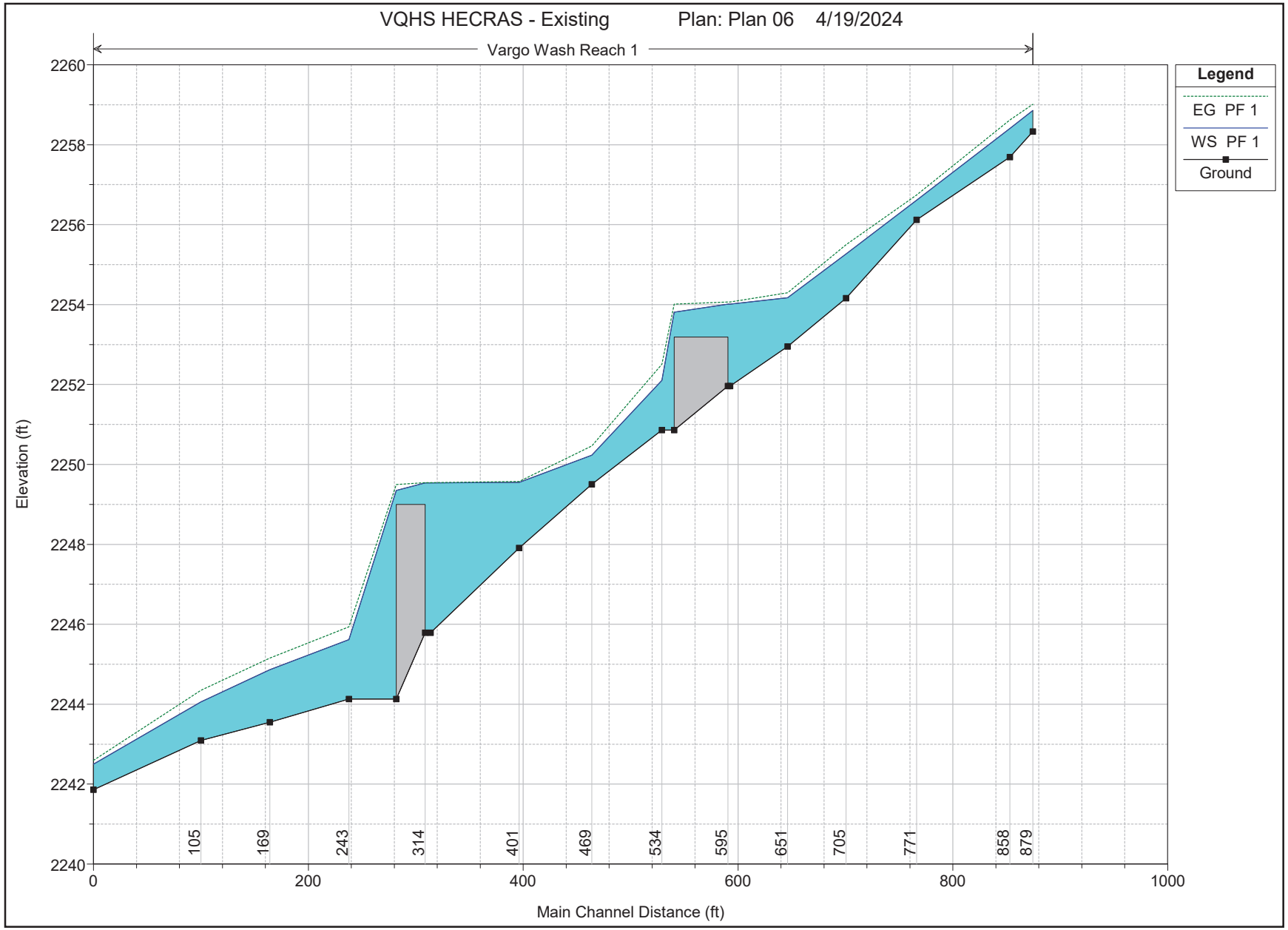
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	879	PF 1	Proposed	63.10	2258.33	2258.86		2259.01	0.019358	3.17	19.89	50.53	0.89
Reach 1	879	PF 1	existing	63.10	2258.33	2258.86		2259.01	0.019358	3.17	19.89	50.53	0.89
Reach 1	858	PF 1	Proposed	63.10	2257.69	2258.41	2258.41	2258.62	0.016857	3.99	20.29	50.11	0.90
Reach 1	858	PF 1	existing	63.10	2257.69	2258.41	2258.41	2258.62	0.016857	3.99	20.29	50.11	0.90
Reach 1	771	PF 1	Proposed	63.10	2256.12	2256.61	2256.61	2256.74	0.018357	2.99	23.35	86.07	0.86
Reach 1	771	PF 1	existing	63.10	2256.12	2256.61	2256.61	2256.74	0.018357	2.99	23.35	86.07	0.86
Reach 1	705	PF 1	Proposed	63.10	2254.16	2255.27	2255.27	2255.50	0.013227	4.00	19.29	60.27	0.82
Reach 1	705	PF 1	existing	63.10	2254.16	2255.27	2255.27	2255.50	0.013227	4.00	19.29	60.27	0.82
Reach 1	651	PF 1	Proposed	63.10	2252.95	2254.17		2254.29	0.005546	3.25	32.24	79.22	0.56
Reach 1	651	PF 1	existing	63.10	2252.95	2254.17		2254.29	0.005390	3.22	32.68	79.73	0.55
Reach 1	597	PF 1	Proposed	76.40	2251.96	2253.99	2253.51	2254.05	0.003401	2.35	45.66	68.95	0.43
Reach 1	597	PF 1	existing	76.40	2251.96	2254.01	2253.51	2254.06	0.003132	2.28	46.99	70.49	0.41
Reach 1	595			Inl Struct									
Reach 1	534	PF 1	Proposed	76.40	2250.86	2252.11	2252.11	2252.51	0.020717	5.07	15.06	19.70	1.02
Reach 1	534	PF 1	existing	76.40	2250.86	2252.11	2252.11	2252.51	0.020717	5.07	15.06	19.70	1.02
Reach 1	469	PF 1	Proposed	76.40	2249.50	2250.23	2250.23	2250.46	0.024189	3.84	19.88	44.69	1.02
Reach 1	469	PF 1	existing	76.40	2249.50	2250.23	2250.23	2250.46	0.024189	3.84	19.88	44.69	1.02
Reach 1	401	PF 1	Proposed	76.40	2247.91	2249.55		2249.57	0.000855	1.32	57.92	52.75	0.22
Reach 1	401	PF 1	existing	76.40	2247.91	2249.55		2249.57	0.000855	1.32	57.92	52.75	0.22
Reach 1	319	PF 1	Proposed	82.10	2245.79	2249.54	2247.21	2249.55	0.000127	0.65	125.72	82.11	0.09
Reach 1	319	PF 1	existing	82.10	2245.79	2249.54	2247.21	2249.55	0.000127	0.65	125.72	82.11	0.09
Reach 1	314			Inl Struct									
Reach 1	243	PF 1	Proposed	82.10	2244.13	2245.61	2245.58	2245.94	0.011282	4.78	21.82	37.78	0.80
Reach 1	243	PF 1	existing	82.10	2244.13	2245.61	2245.58	2245.94	0.011282	4.78	21.82	37.78	0.80
Reach 1	169	PF 1	Proposed	82.10	2243.55	2244.86	2244.75	2245.15	0.009870	4.52	22.02	33.24	0.75
Reach 1	169	PF 1	existing	82.10	2243.55	2244.86	2244.75	2245.15	0.009870	4.52	22.02	33.24	0.75
Reach 1	105	PF 1	Proposed	82.10	2243.09	2244.06	2244.06	2244.35	0.016653	4.46	21.17	41.02	0.92
Reach 1	105	PF 1	existing	82.10	2243.09	2244.06	2244.06	2244.35	0.016653	4.46	21.17	41.02	0.92

HEC-RAS –Summary Table

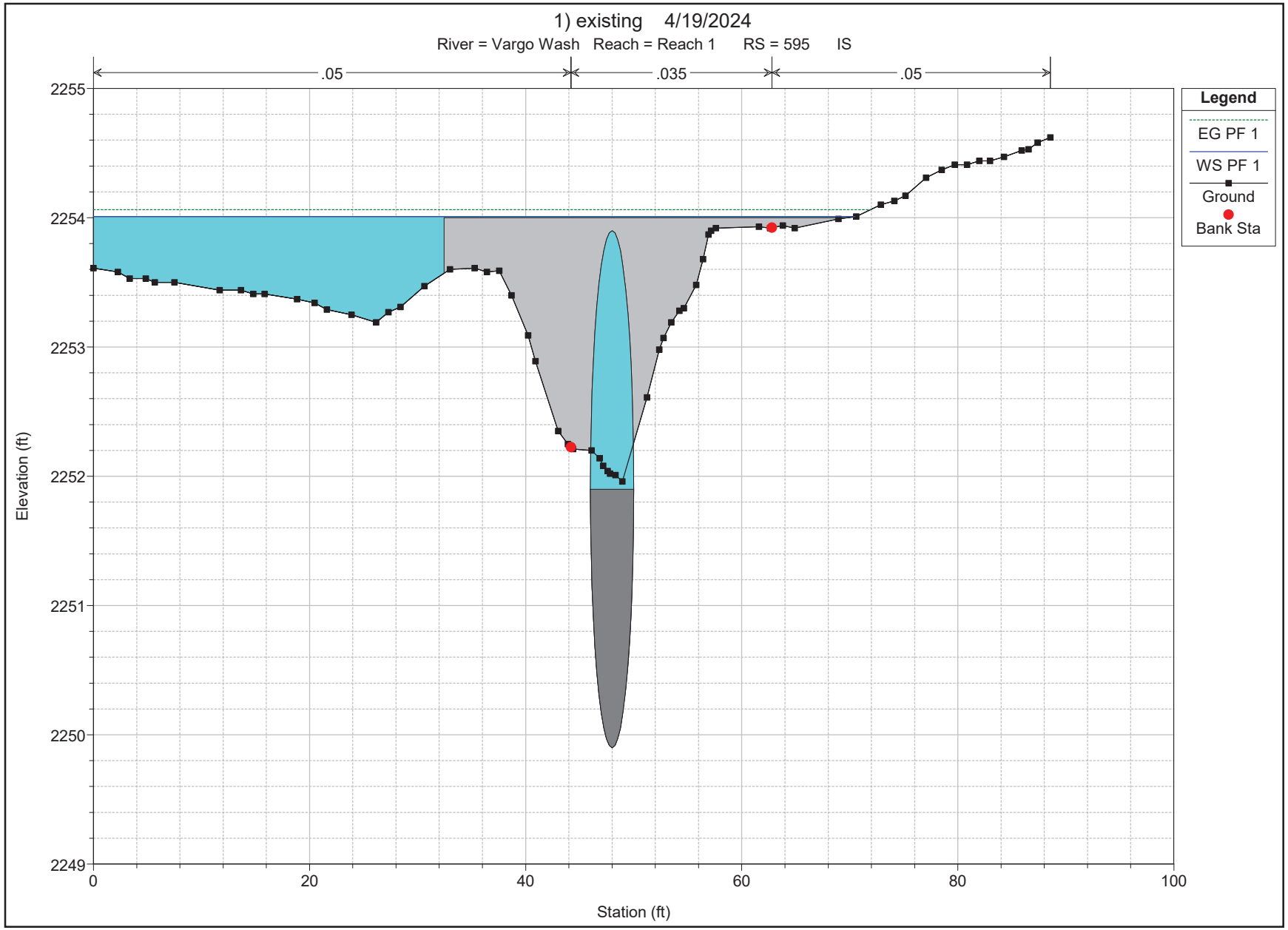
HEC-RAS River: Vargo Wash Reach: Reach 1 Profile: PF 1 (Continued)

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)	
Reach 1	5	PF 1	Proposed	87.30	2241.86	2242.50	2242.33	2242.59	0.010804	2.37	35.57	70.24	0.67
Reach 1	5	PF 1	existing	87.30	2241.86	2242.50	2242.33	2242.59	0.010804	2.37	35.57	70.24	0.67

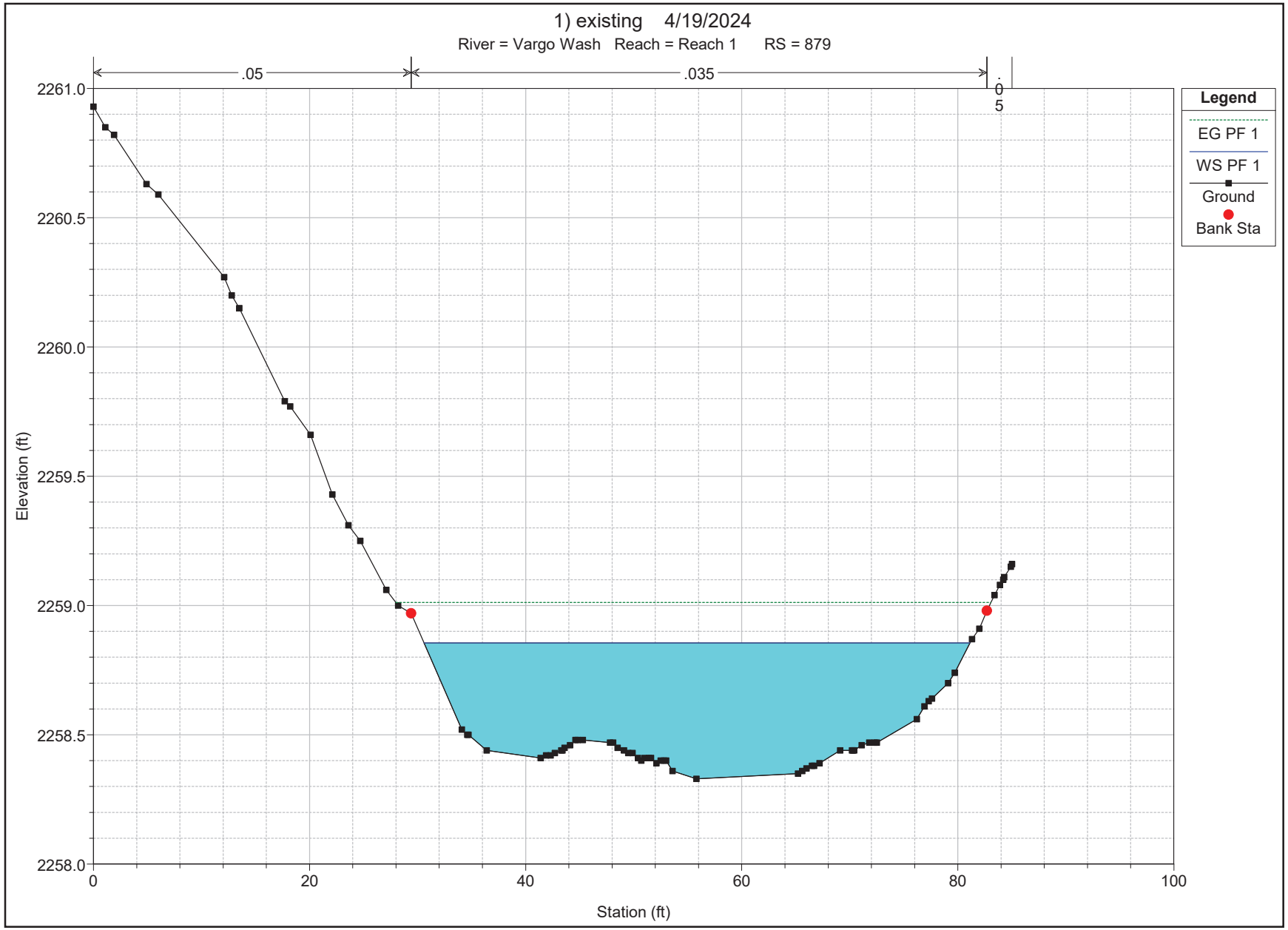
HEC-RAS Output
Existing Topography - North Wash Profile - Reach 1



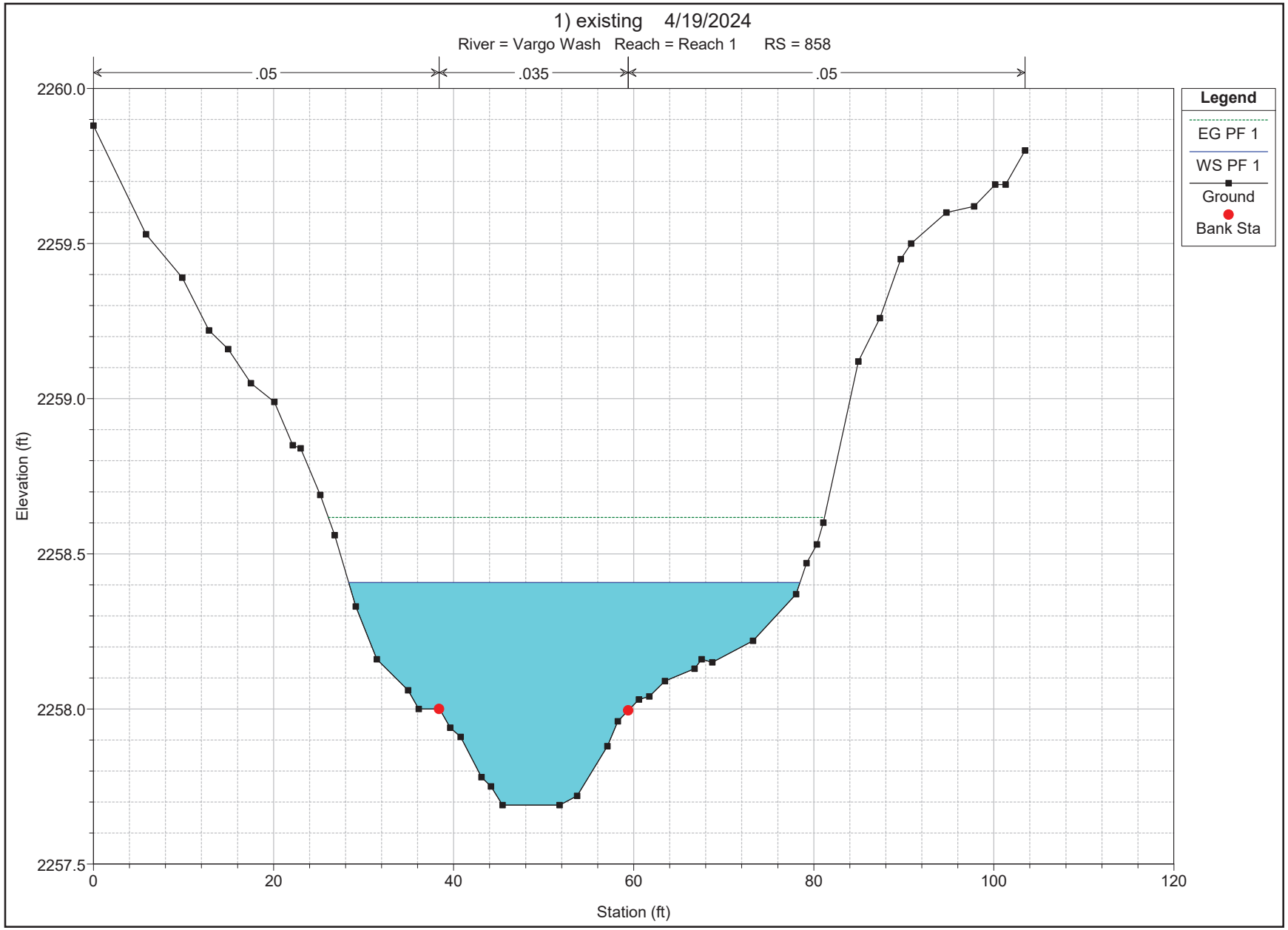
HEC-RAS Output
Existing Topography - Cross-sections



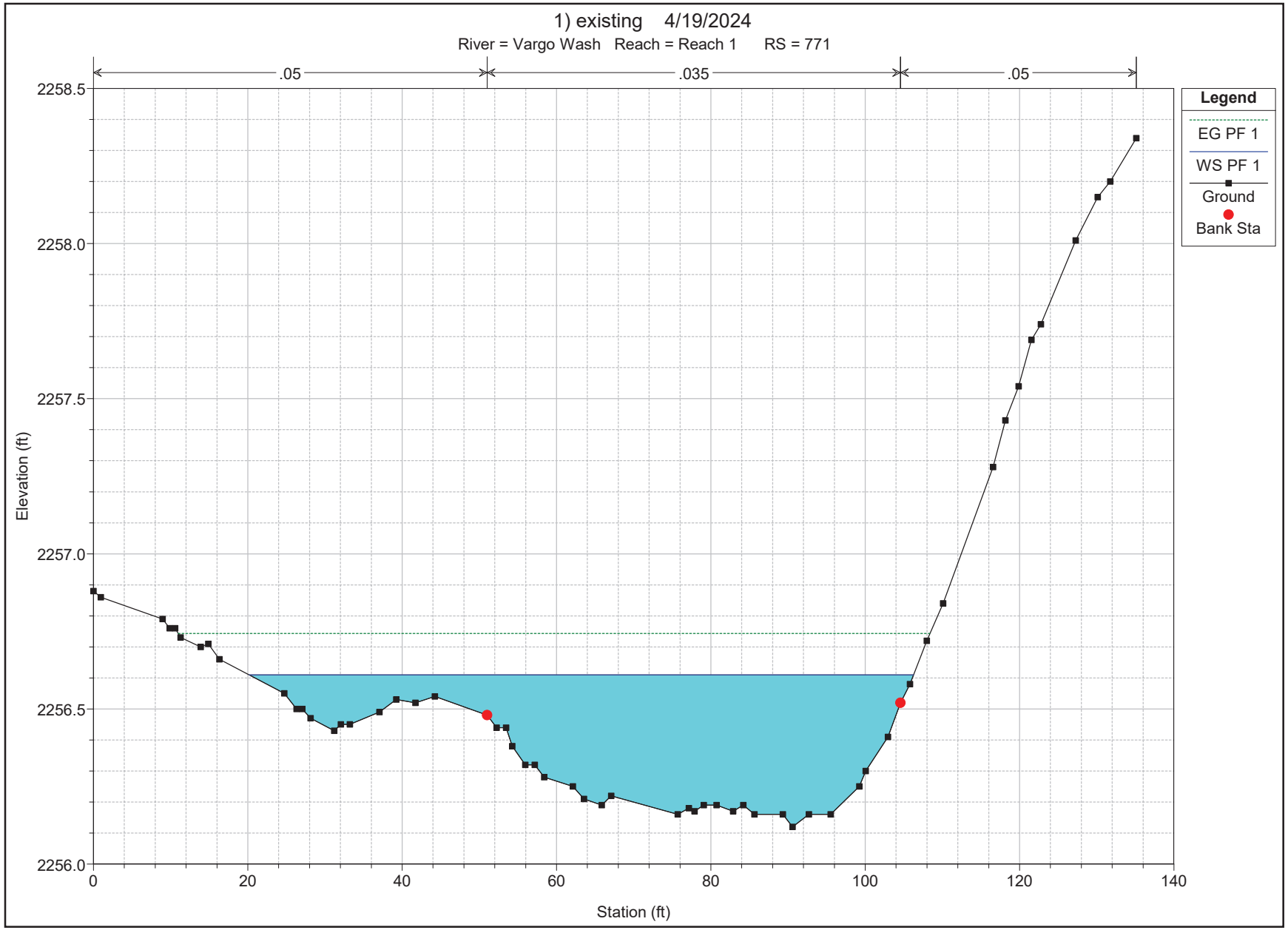
HEC-RAS Output
Existing Topography - Cross-sections



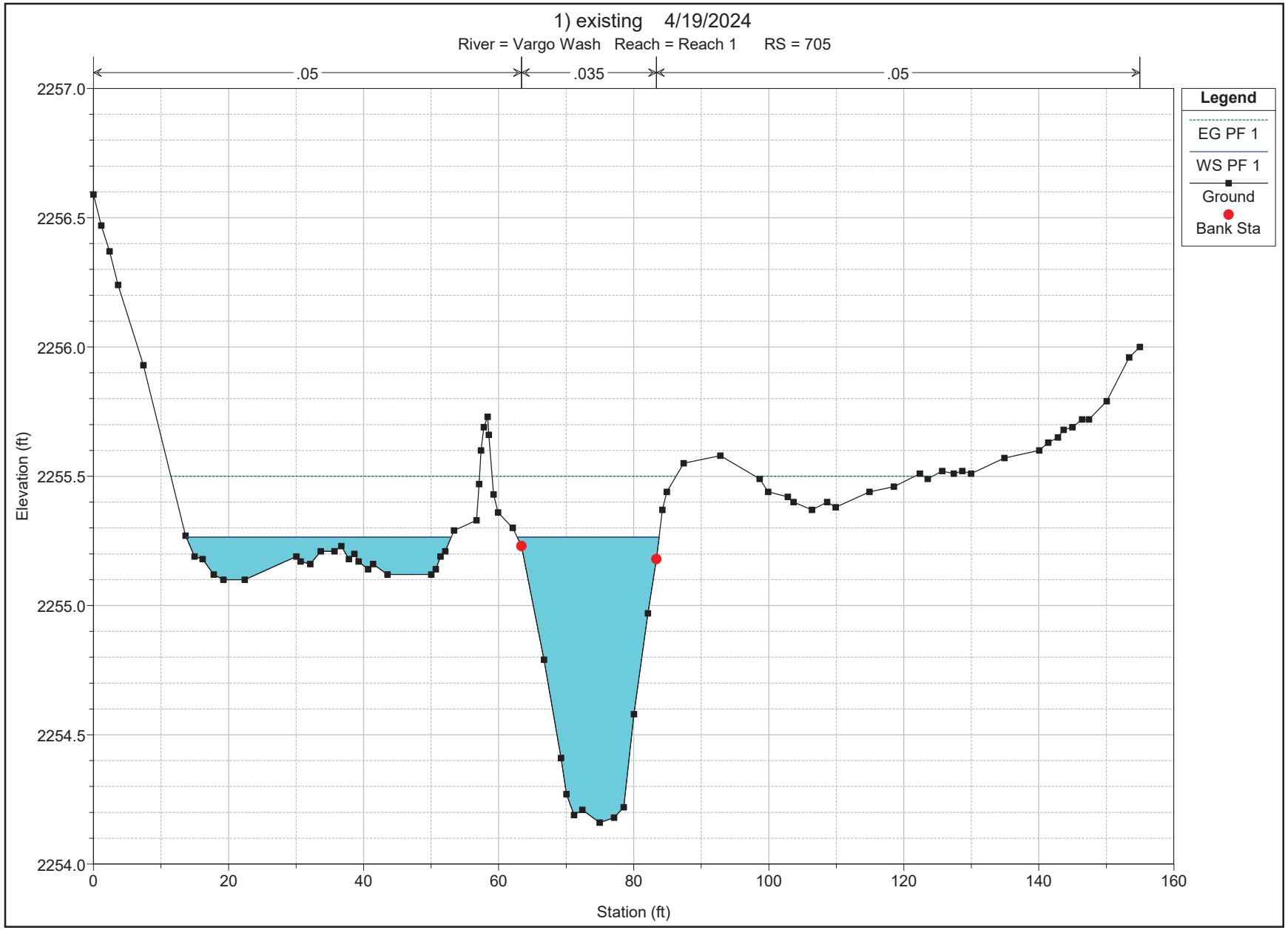
HEC-RAS Output
Existing Topography - Cross-sections



HEC-RAS Output
Existing Topography - Cross-sections



HEC-RAS Output
Existing Topography - Cross-sections



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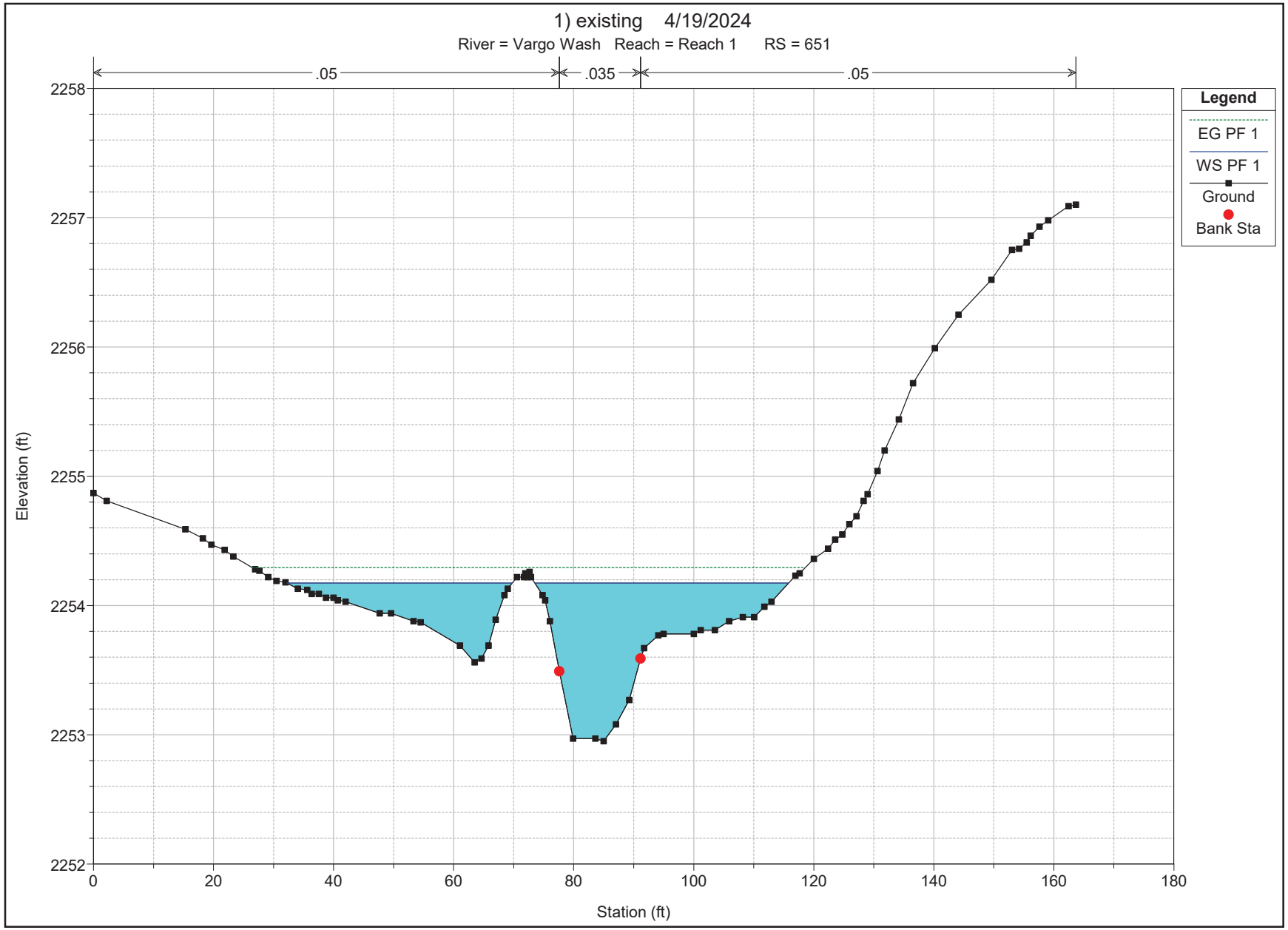
Existing Topography - Cross-sections



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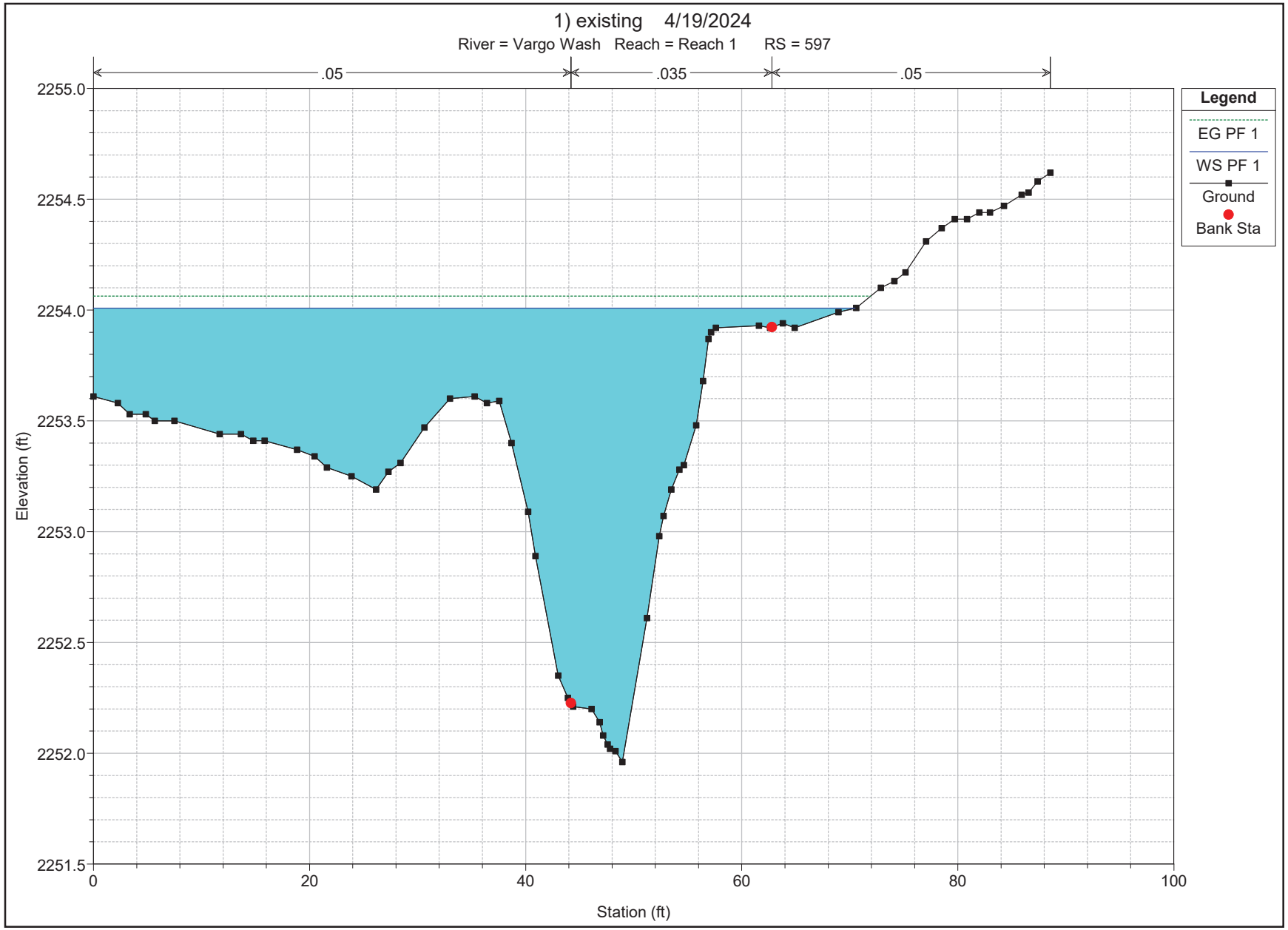
Existing Topography - Cross-sections



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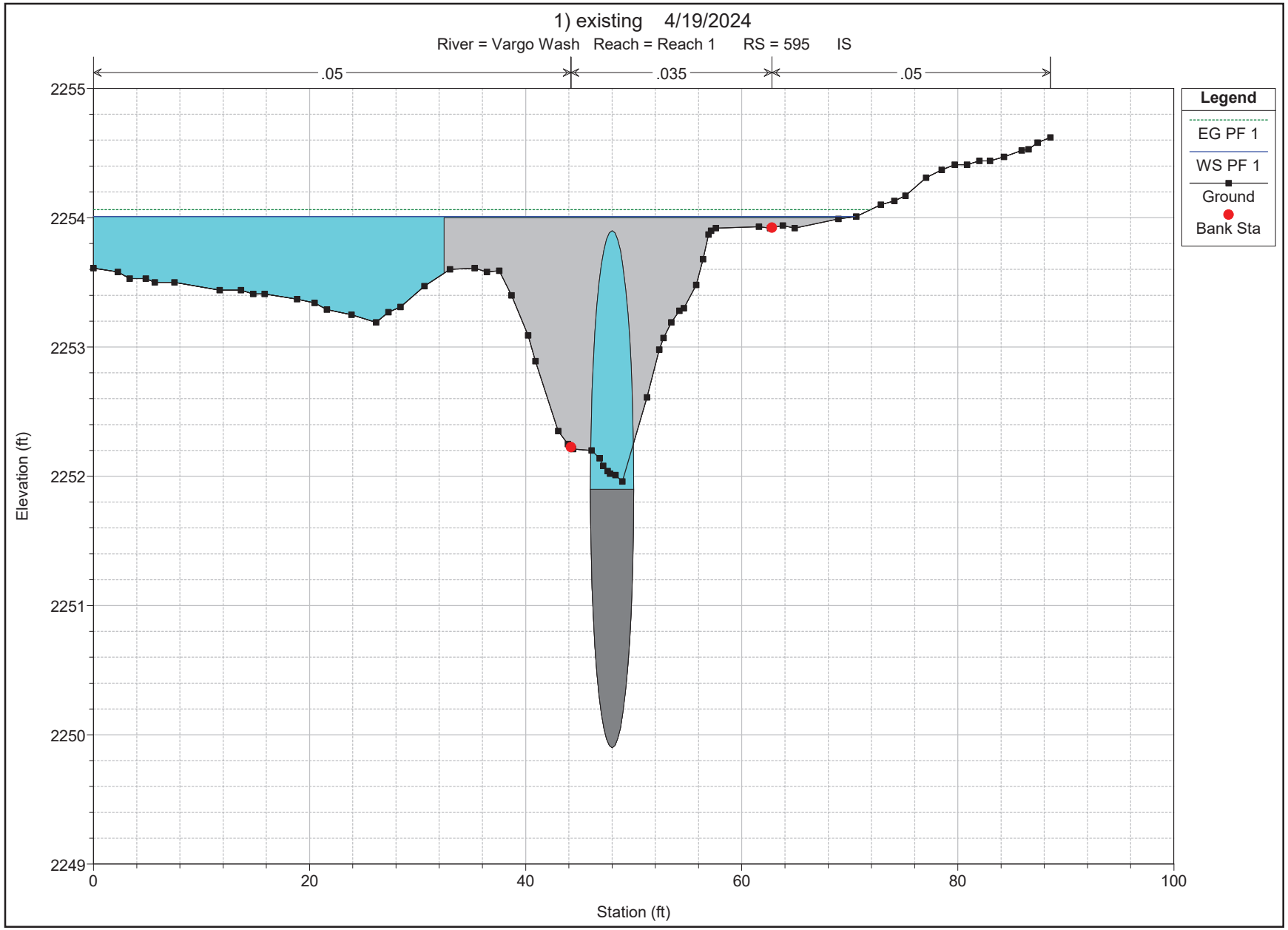
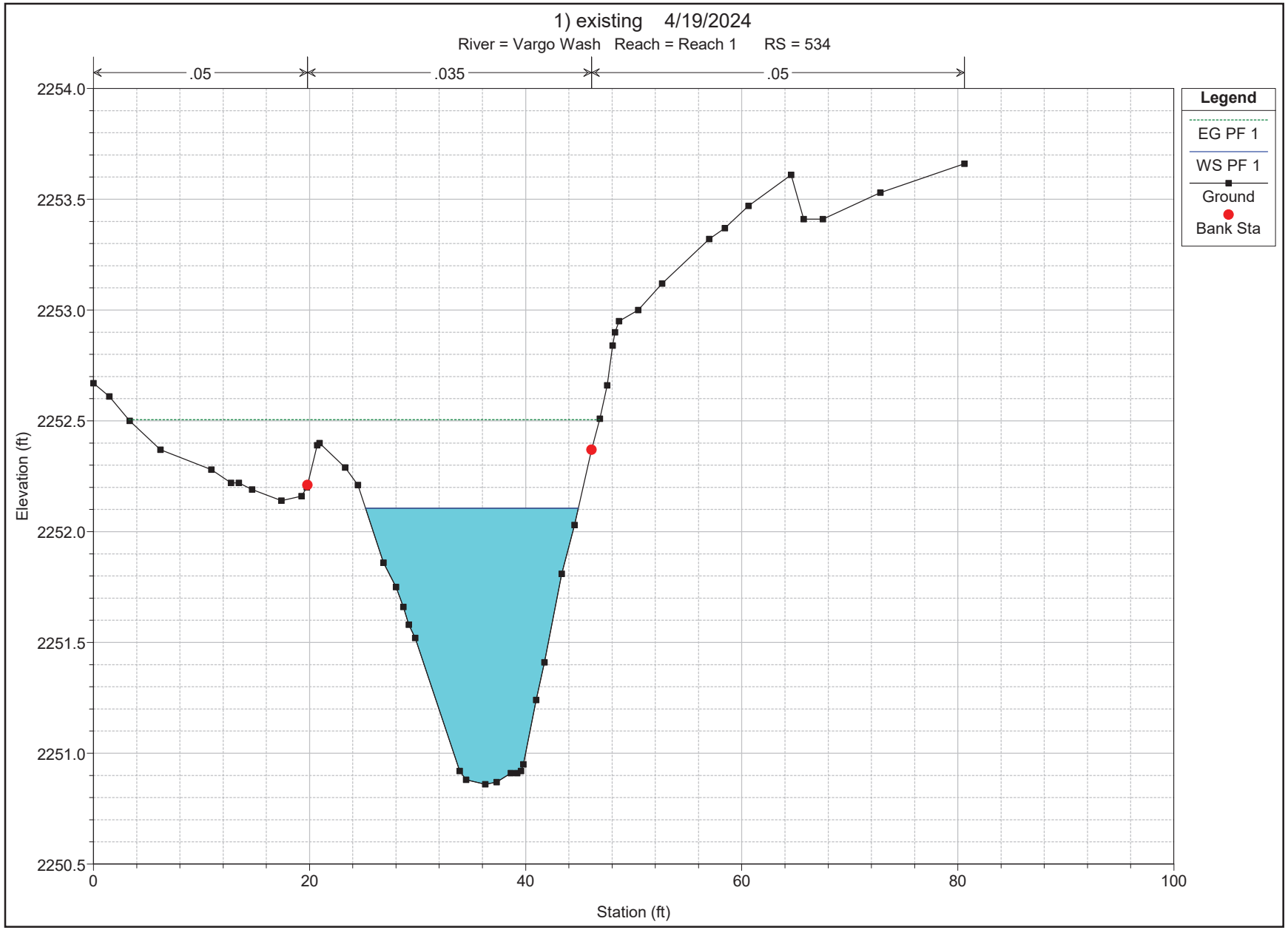
Existing Topography - Cross-sections



HEC-RAS Output
Existing Topography - Cross-sections



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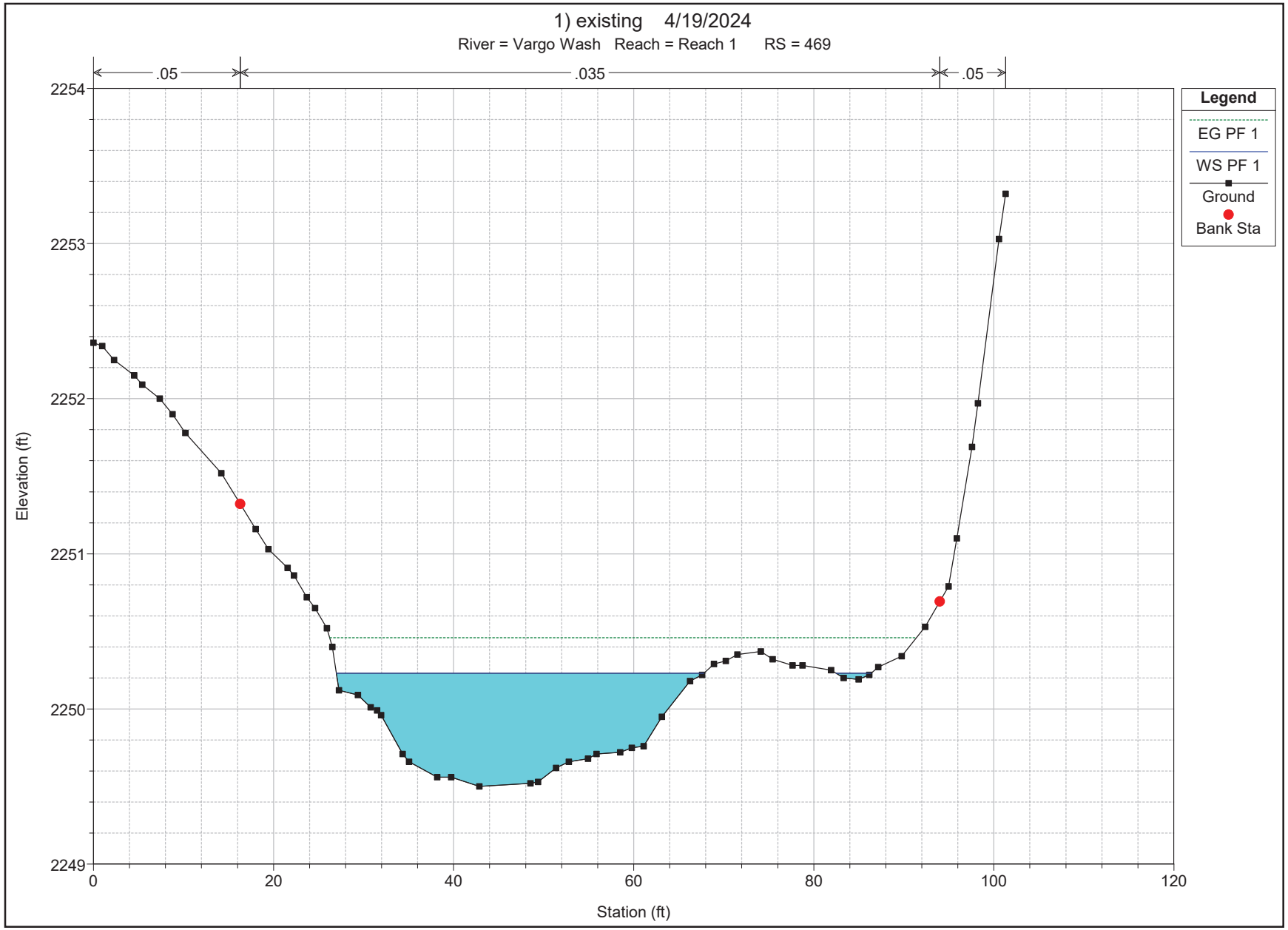
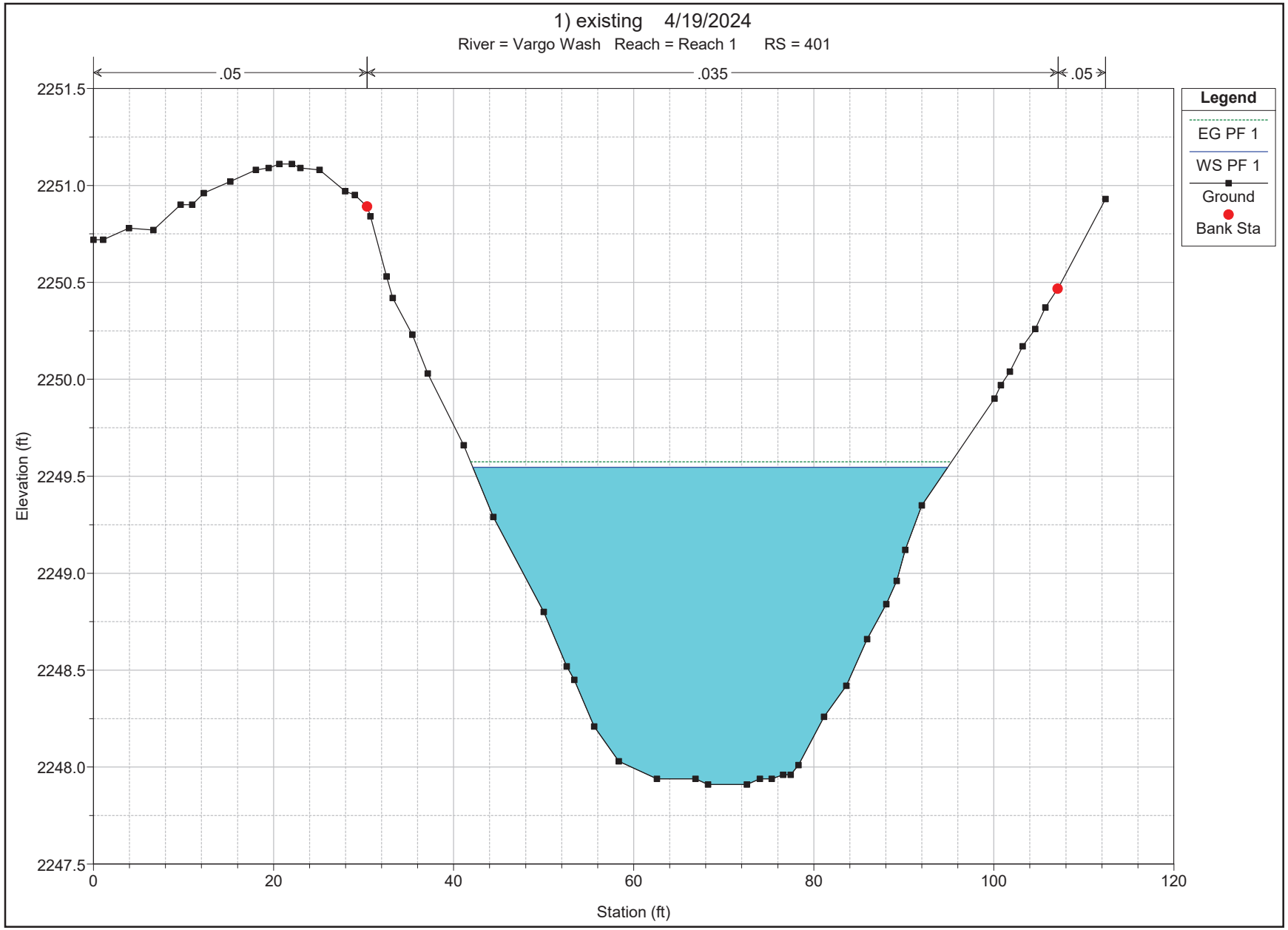
Existing Topography - Cross-sections



HEC-RAS Output
Existing Topography - Cross-sections



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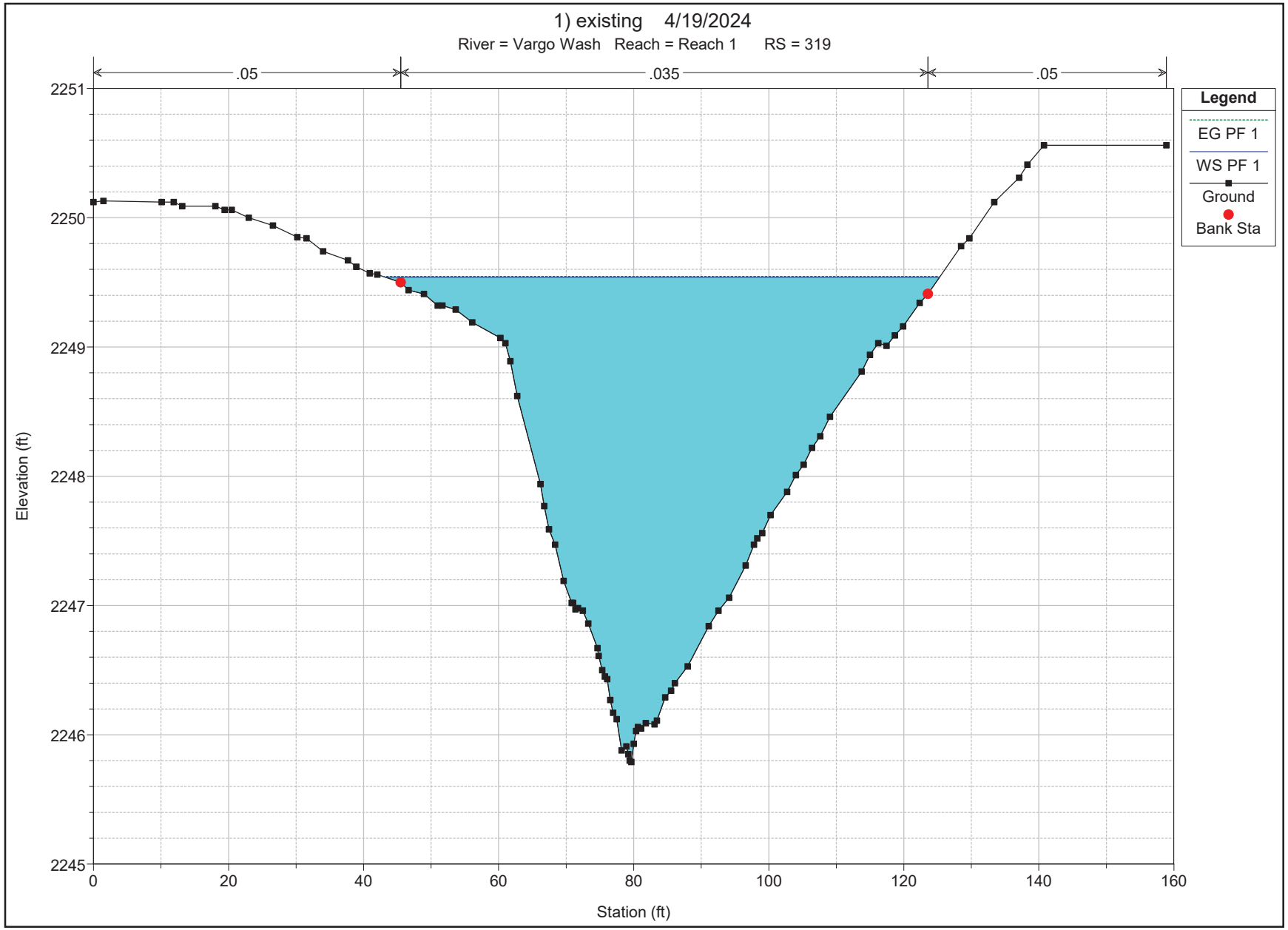
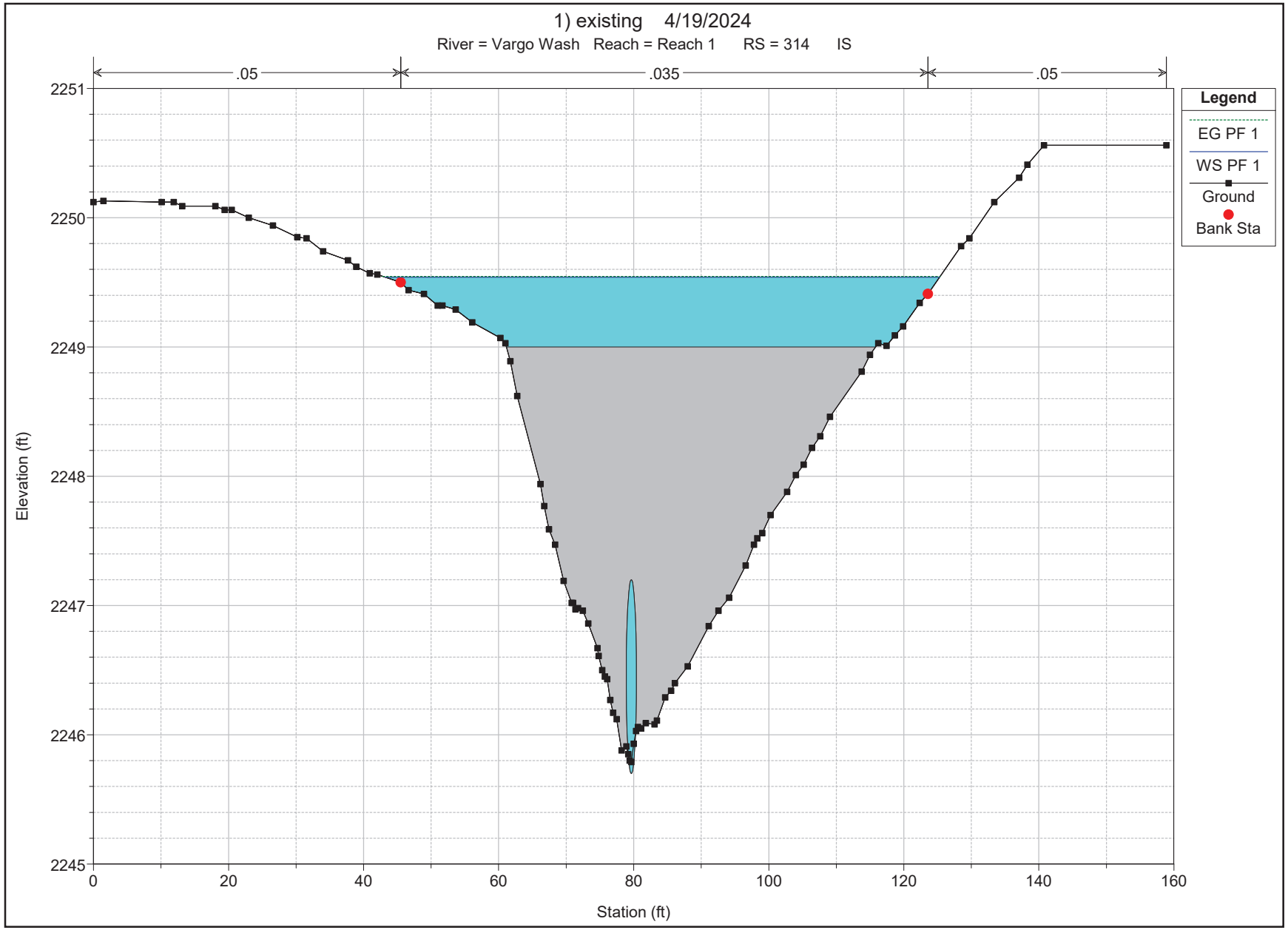
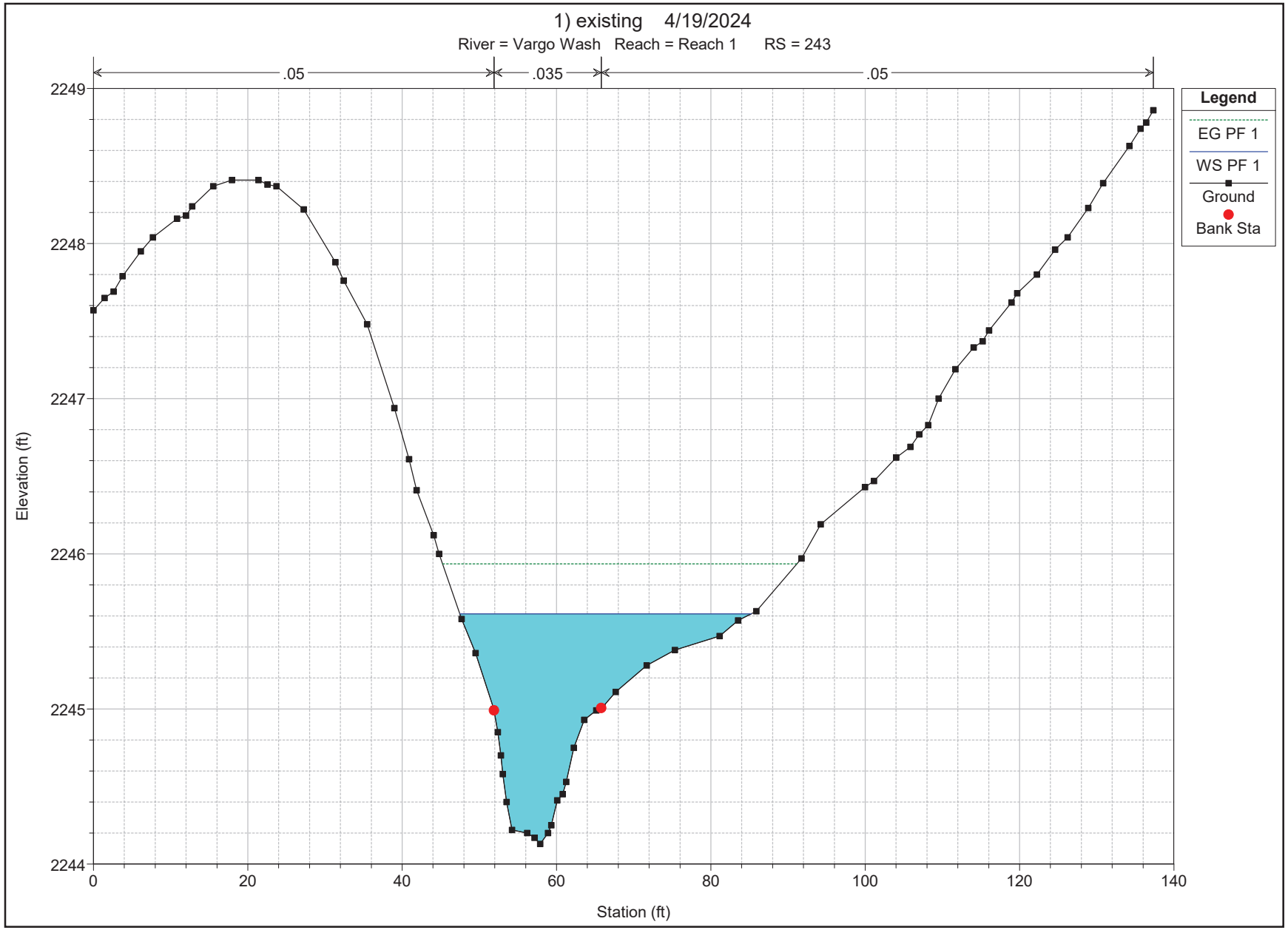
Existing Topography - Cross-sections



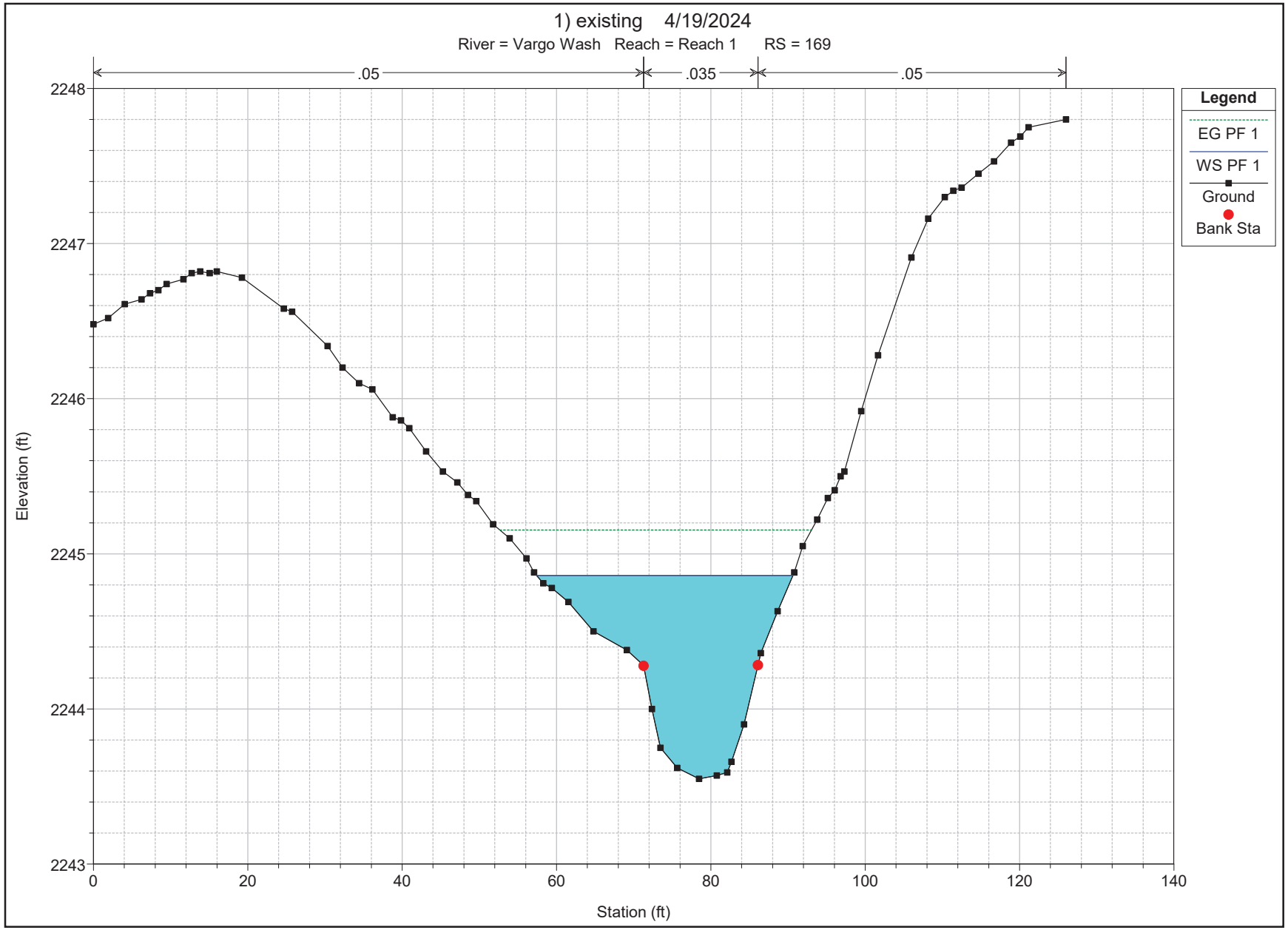
HEC-RAS Output
Existing Topography - Cross-sections



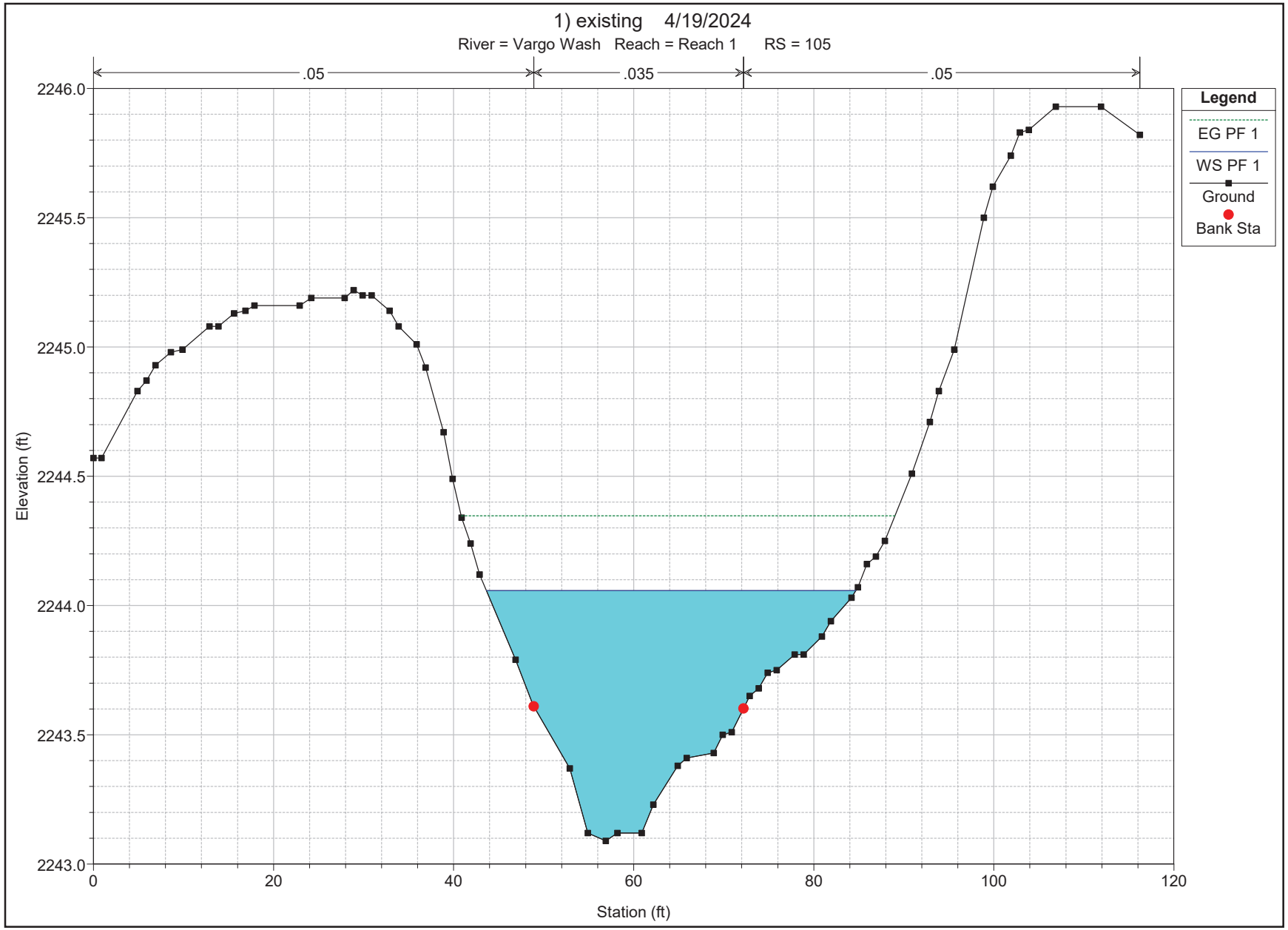
HEC-RAS Output
Existing Topography - Cross-sections



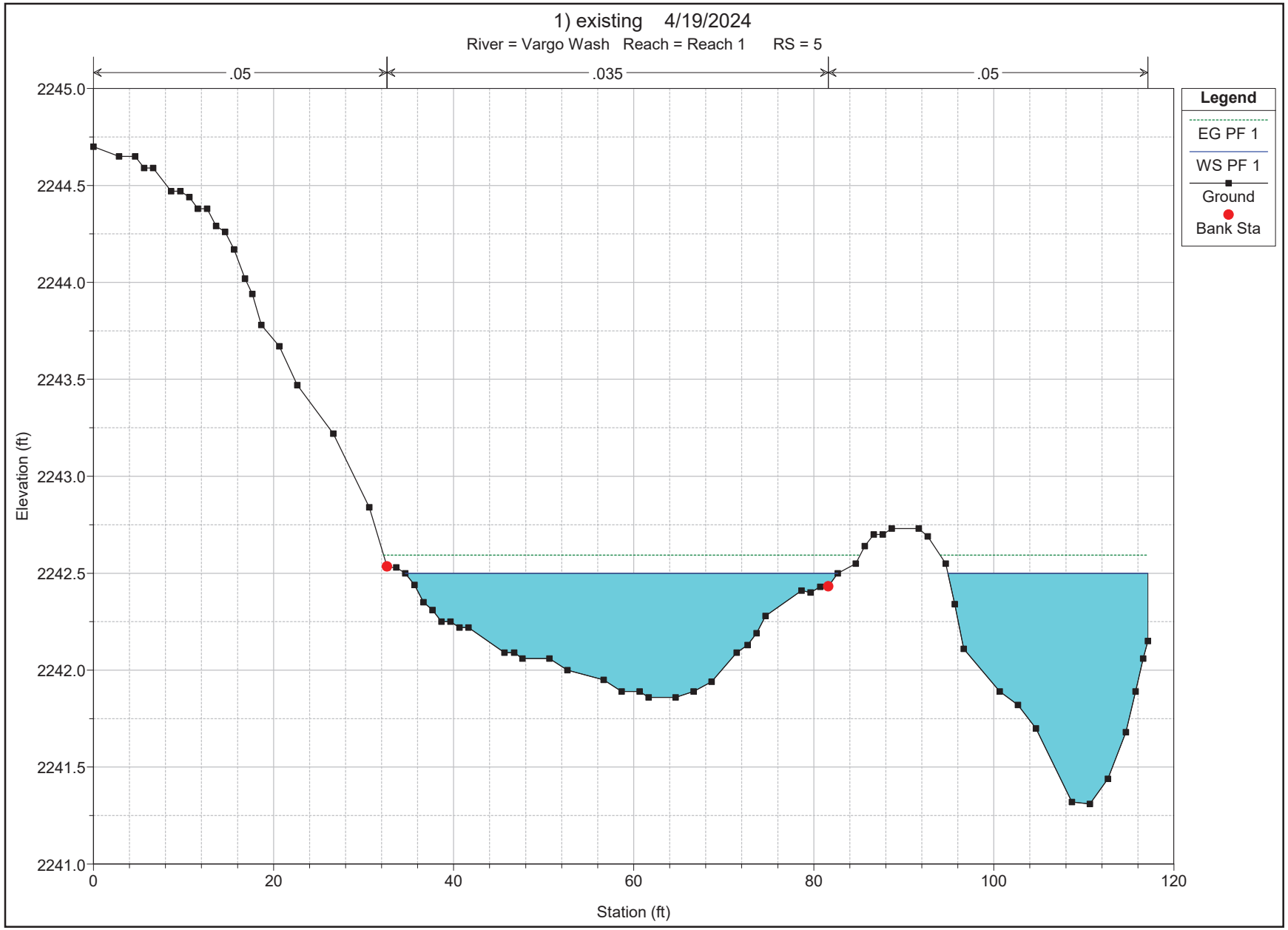
HEC-RAS Output
Existing Topography - Cross-sections



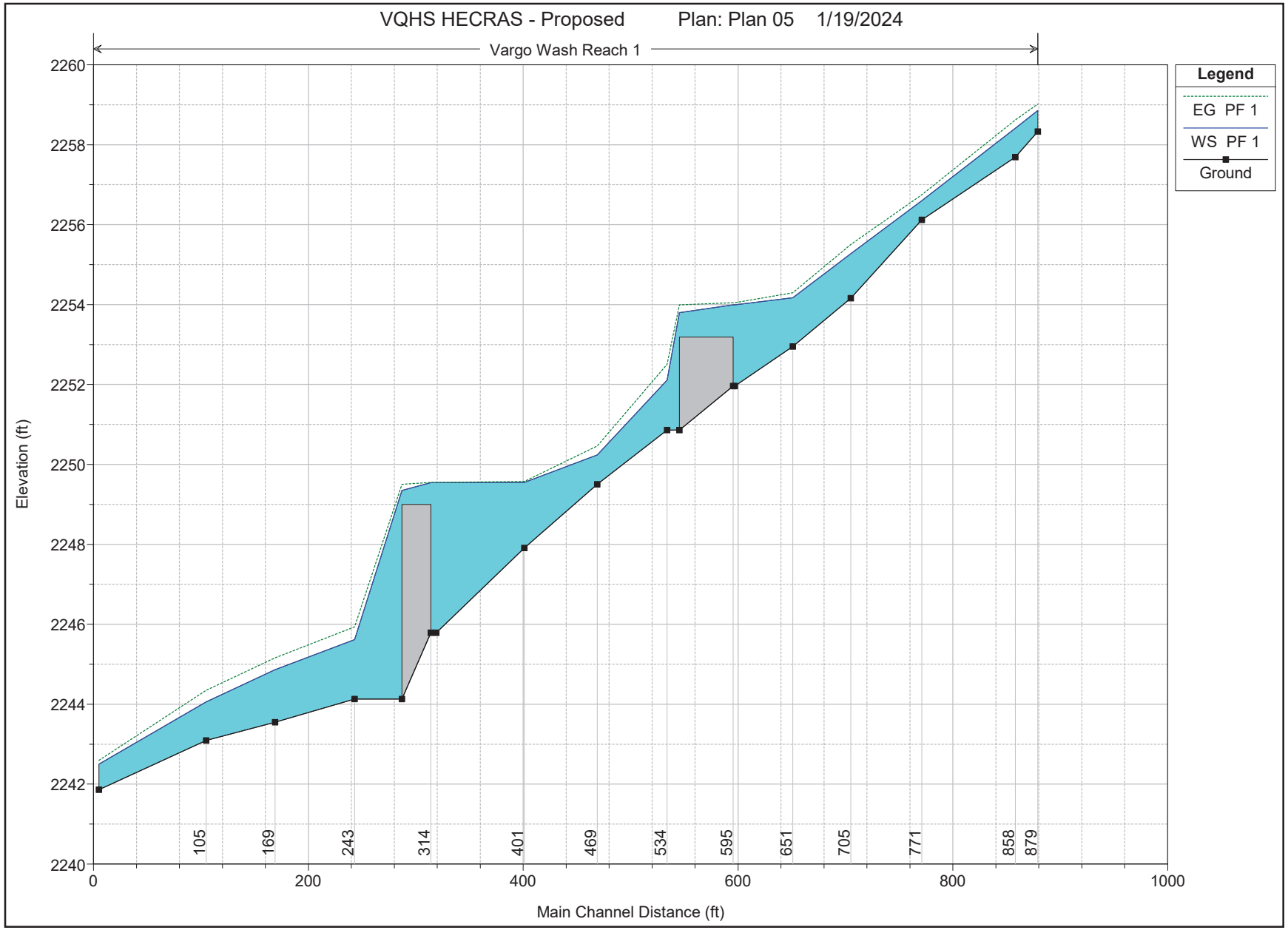
HEC-RAS Output
Existing Topography - Cross-sections



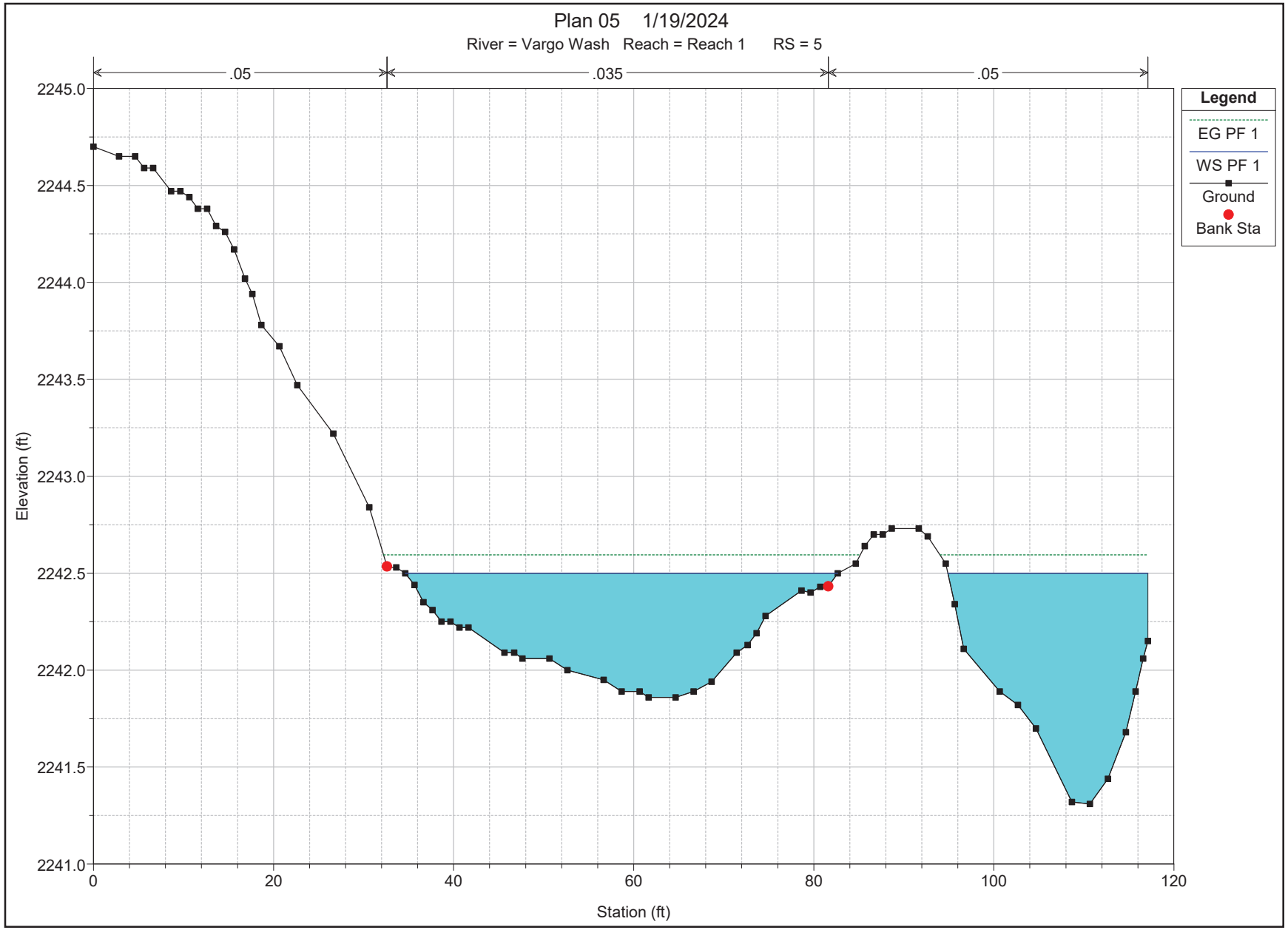
HEC-RAS Output
Existing Topography - Cross-sections



HEC-RAS Output
Proposed Topography - North Wash Profile - Reach 1



HEC-RAS Output
Proposed Topography - Cross-sections



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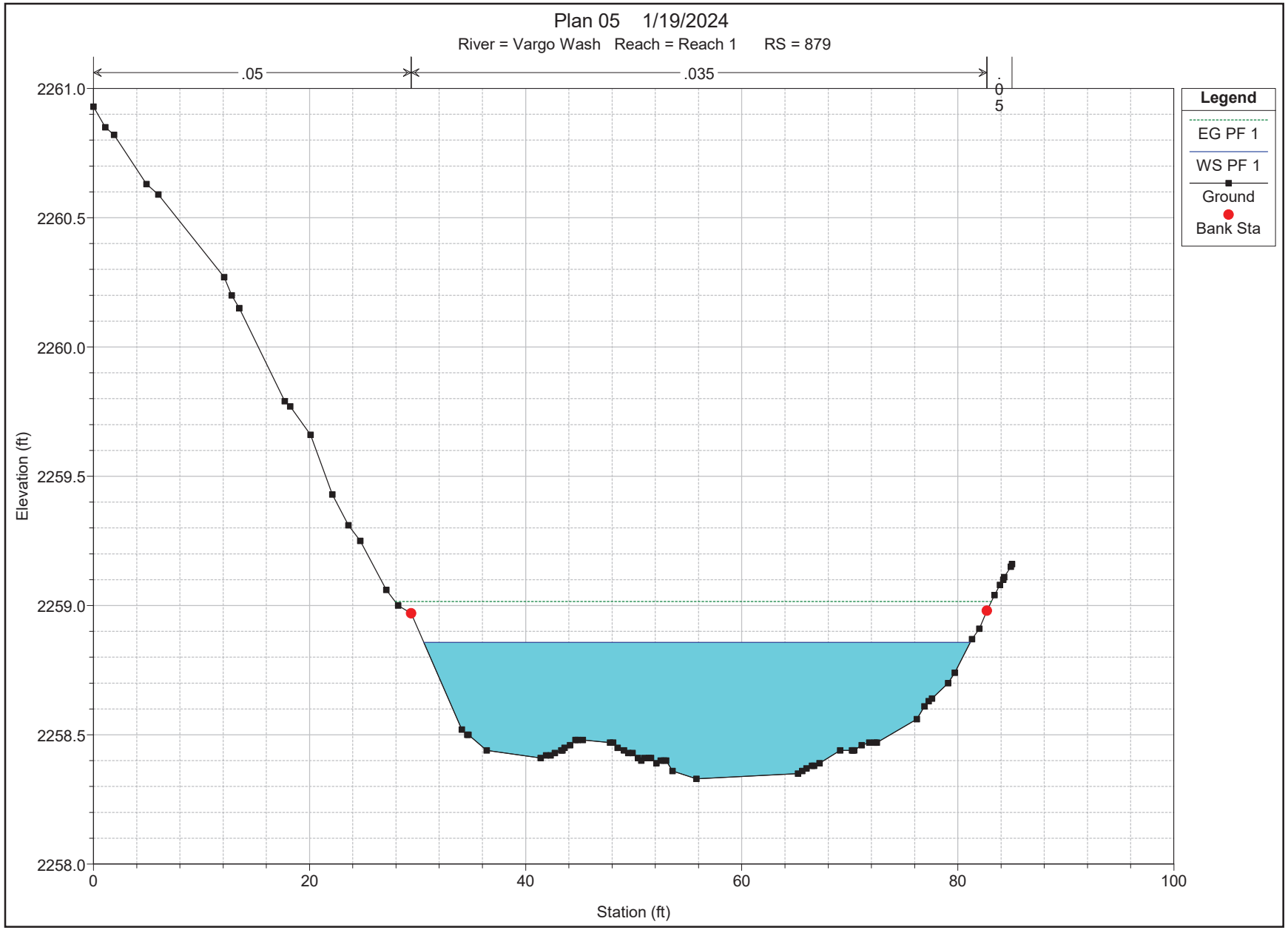
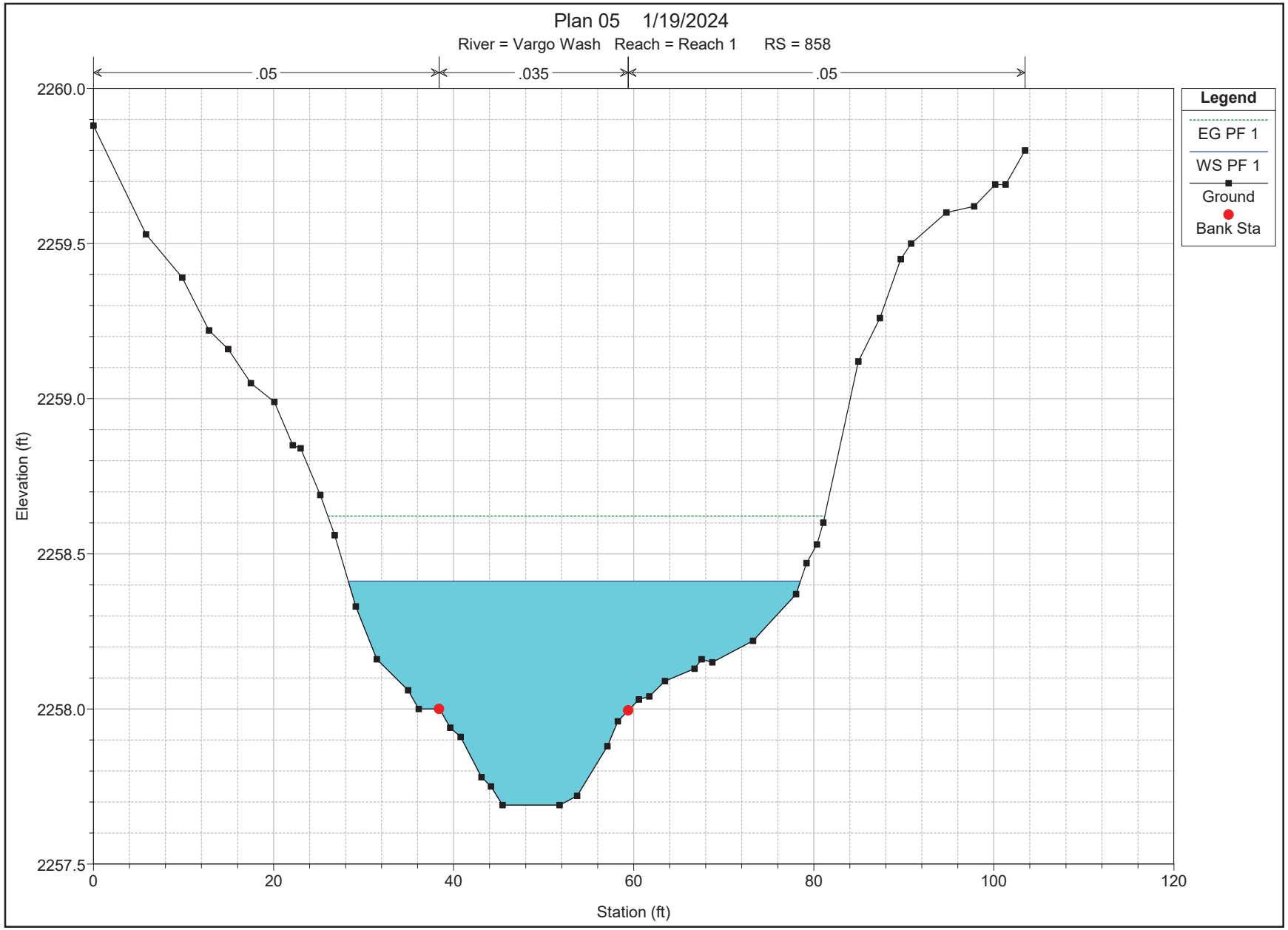
Proposed Topography - Cross-sections



HEC-RAS Output
Proposed Topography - Cross-sections



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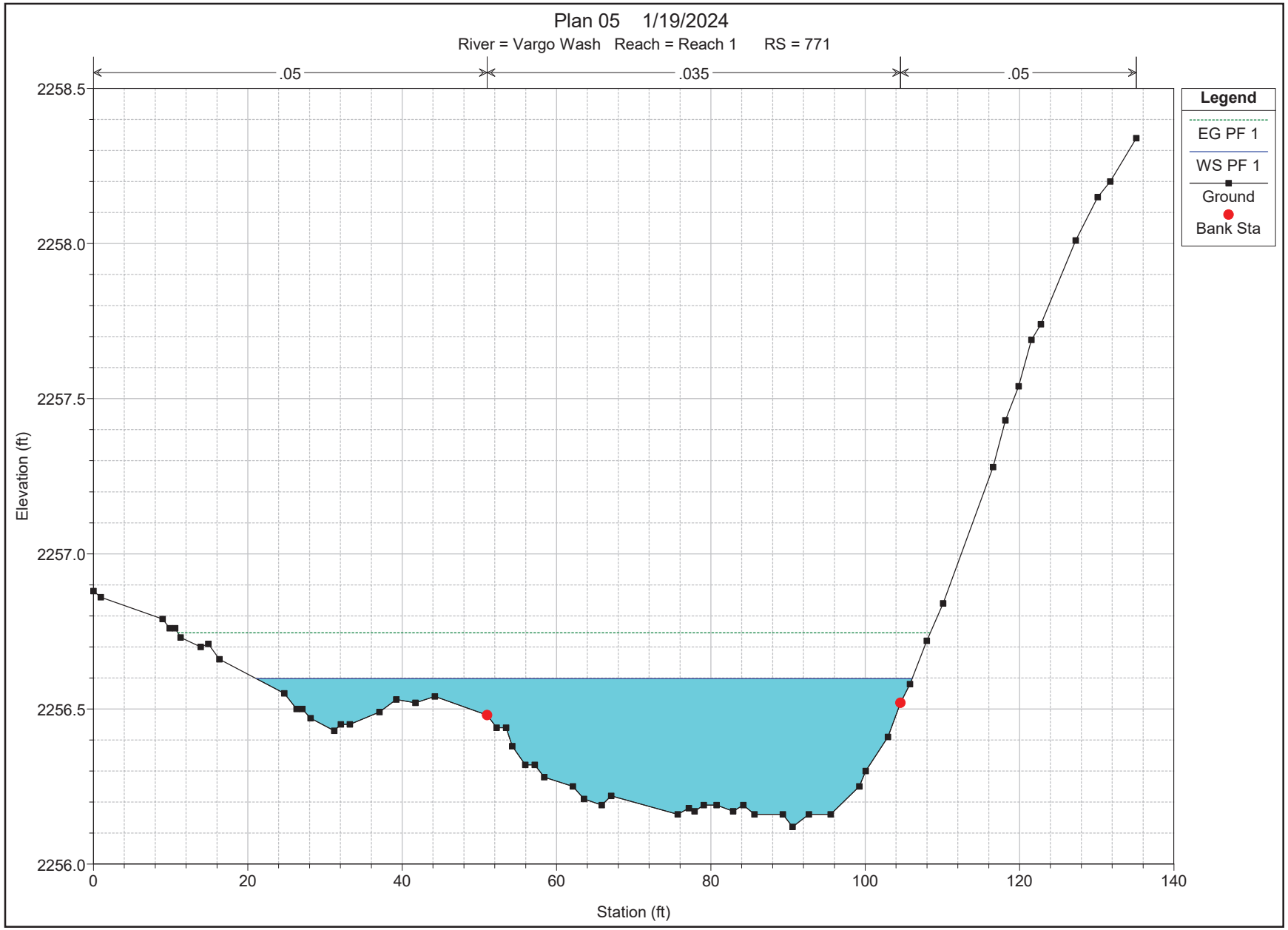
Proposed Topography - Cross-sections



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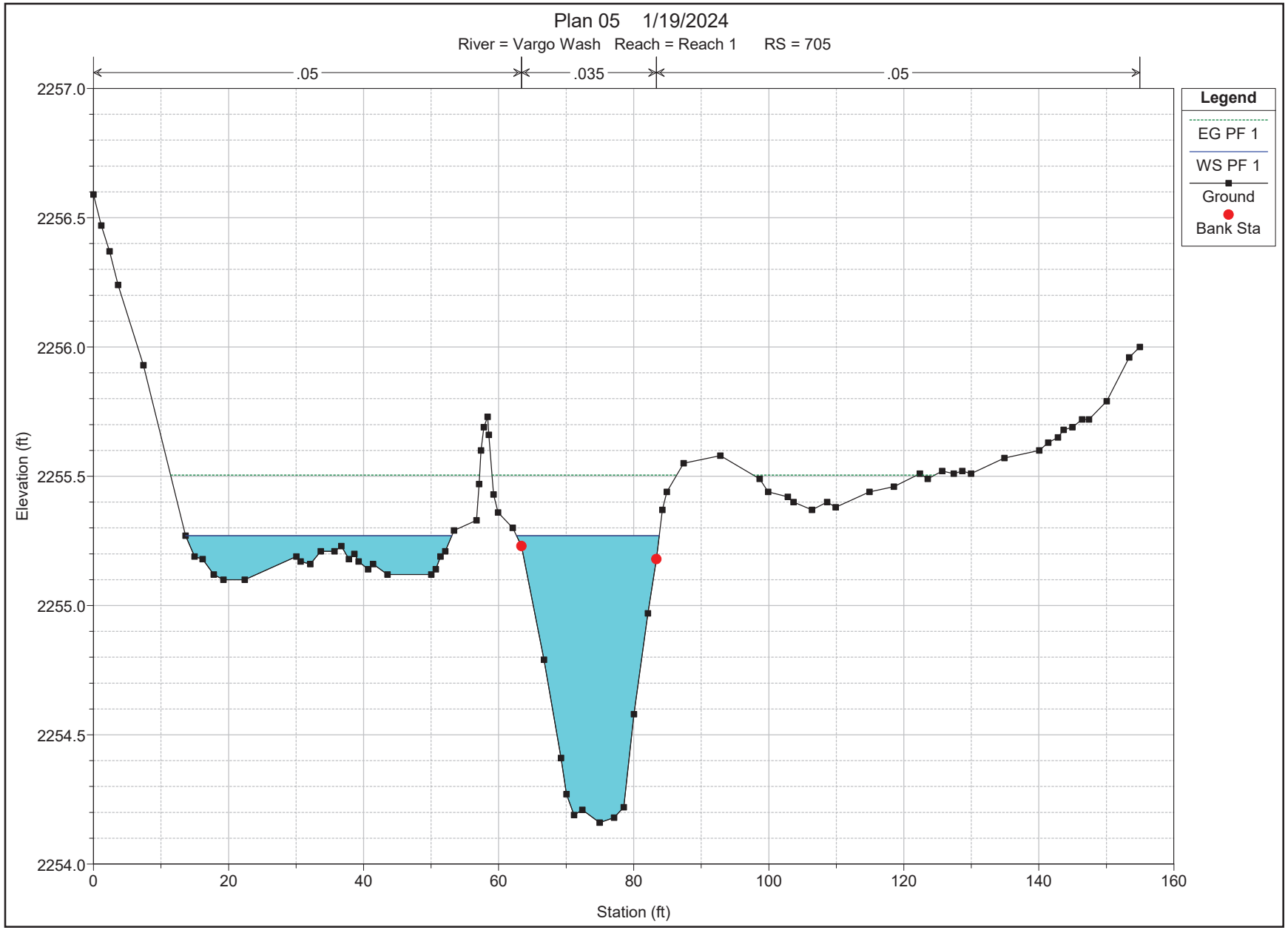

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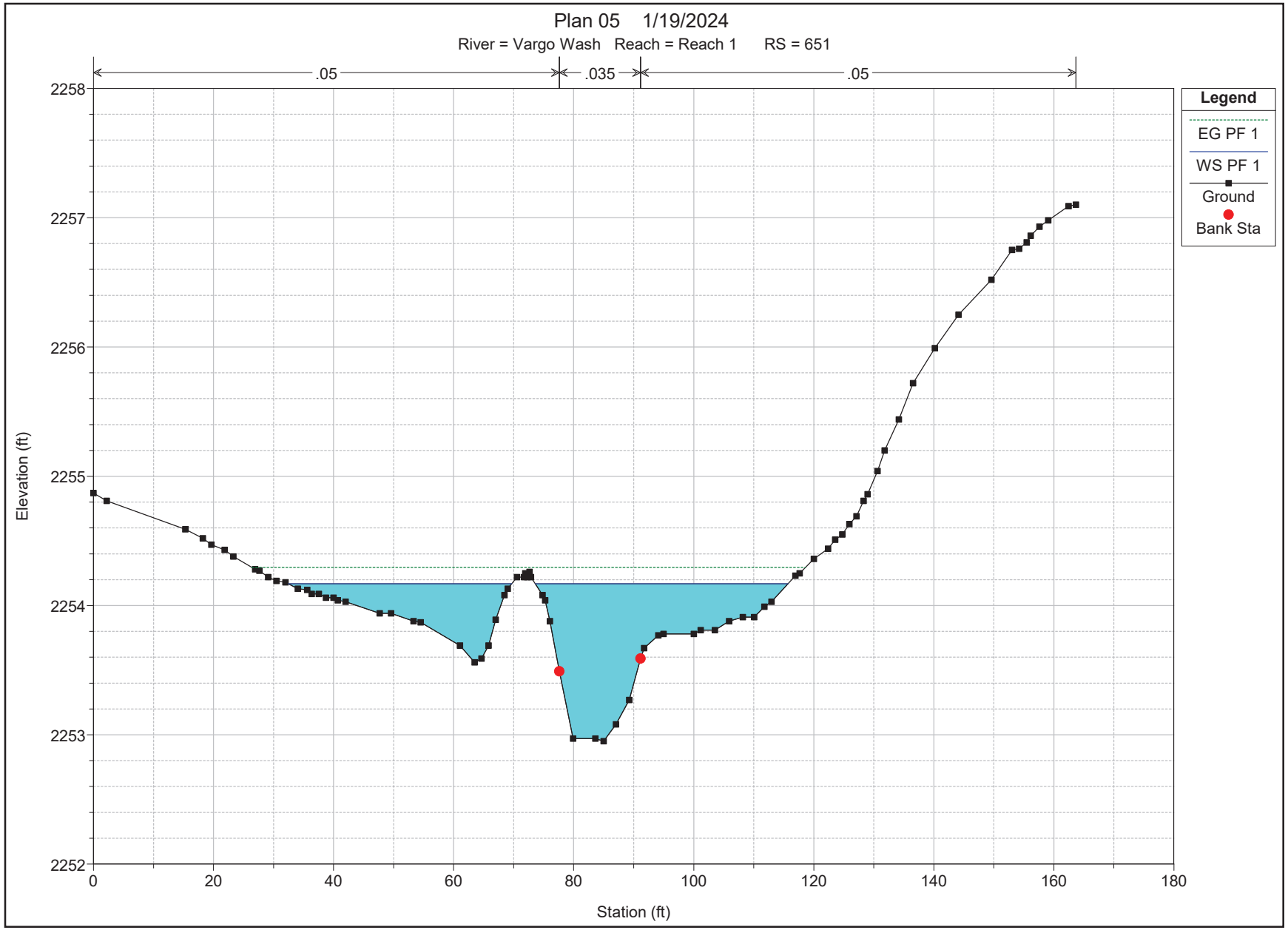
Proposed Topography - Cross-sections



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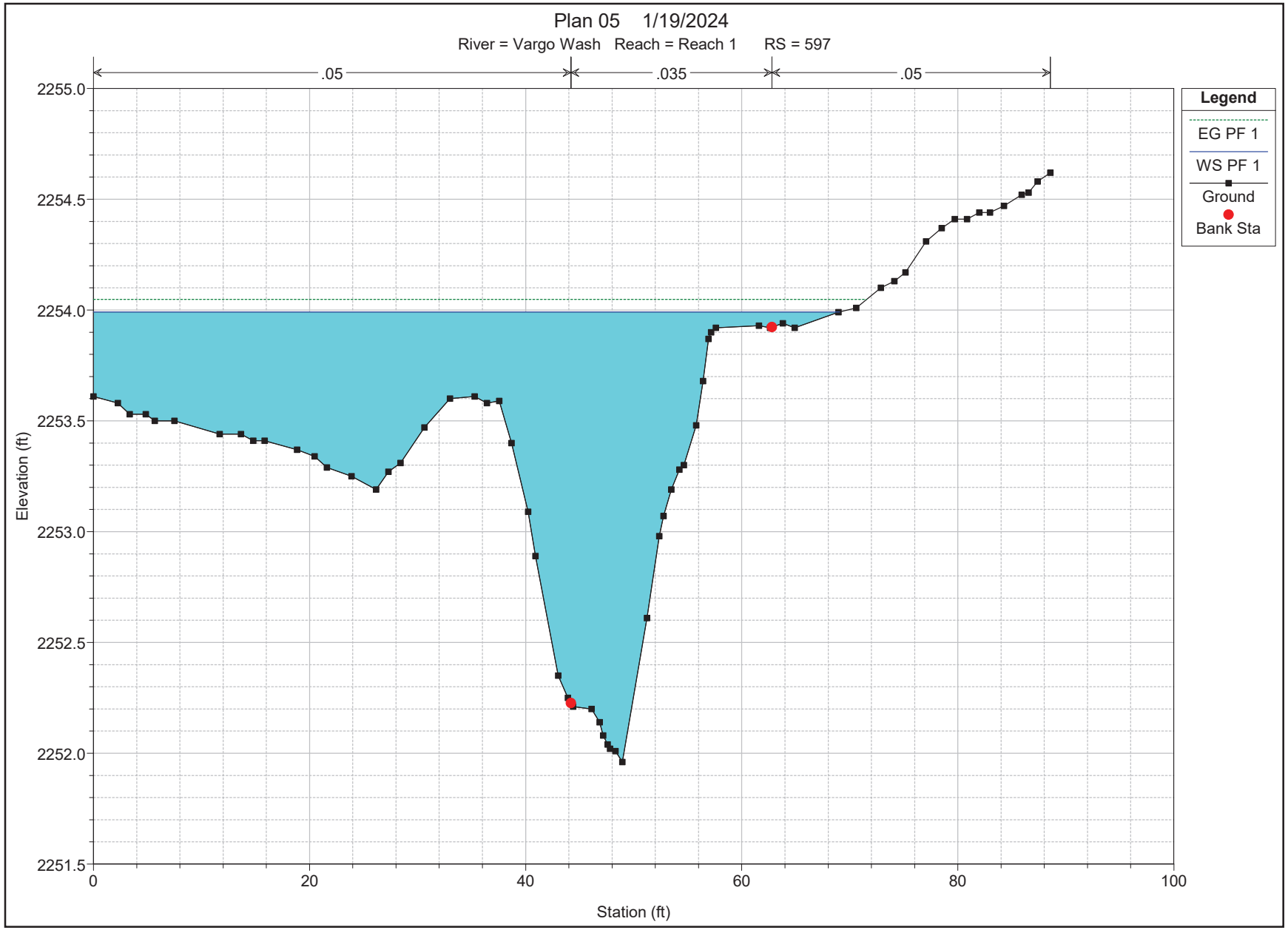

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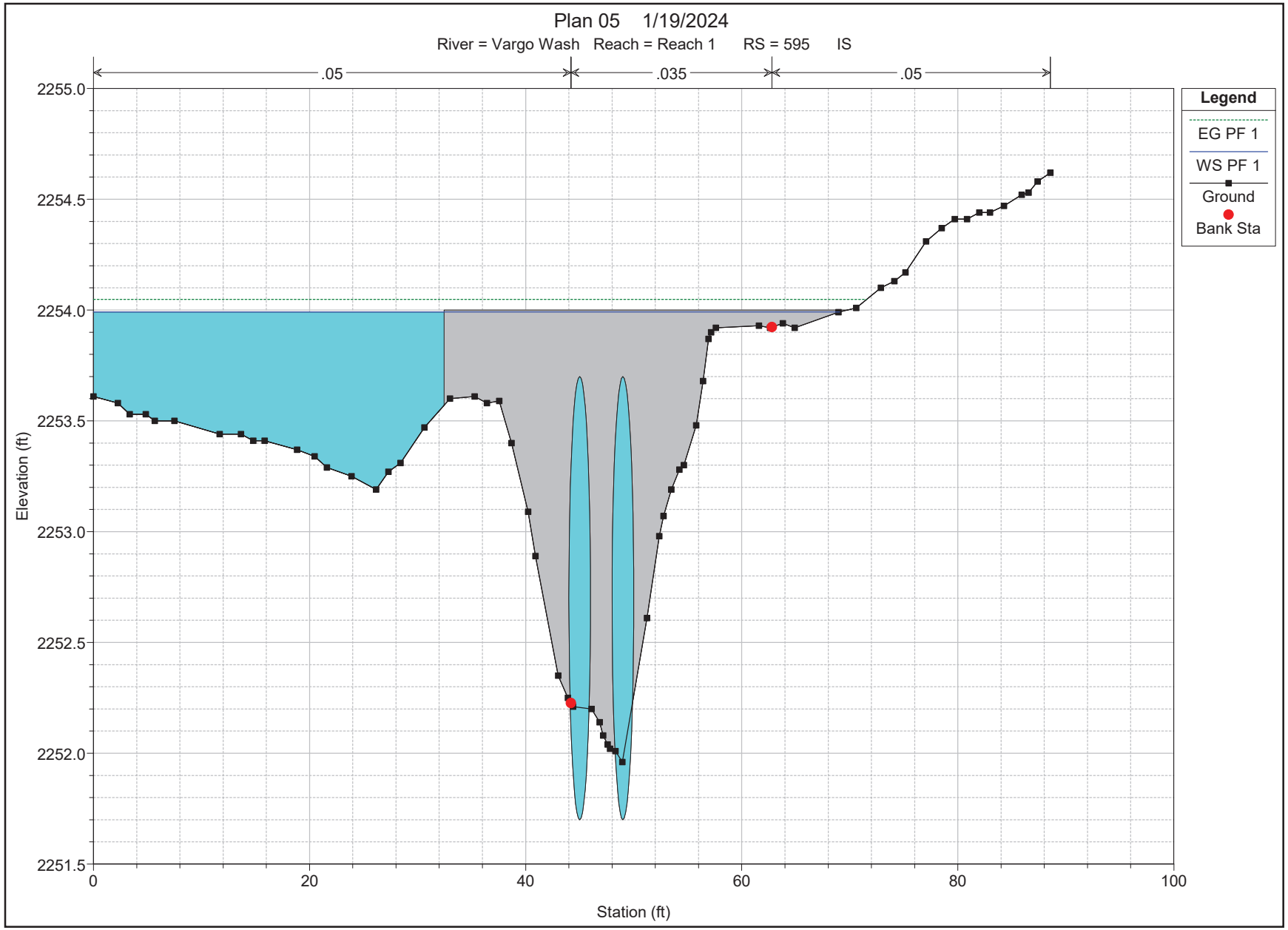

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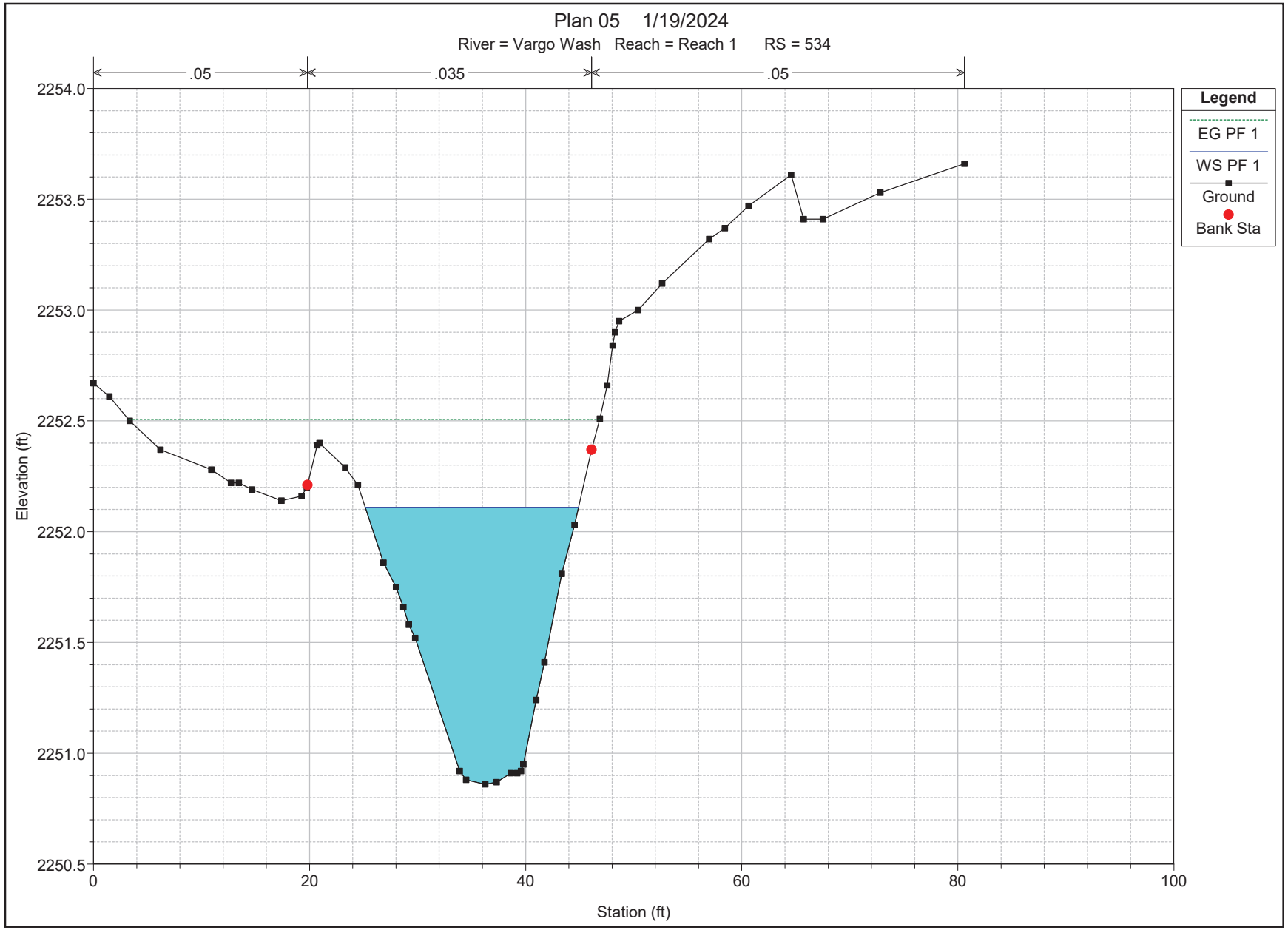
Proposed Topography - Cross-sections



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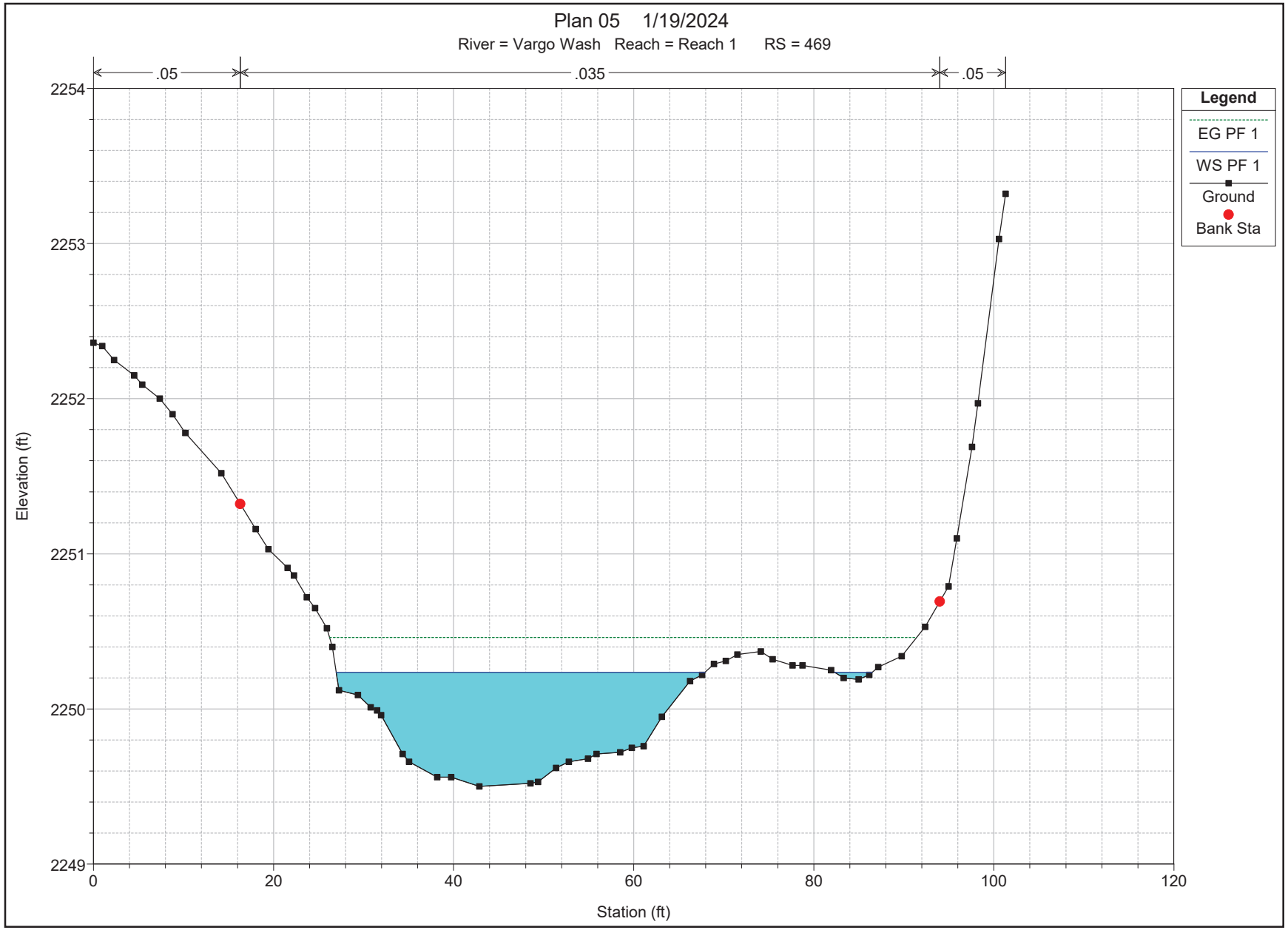
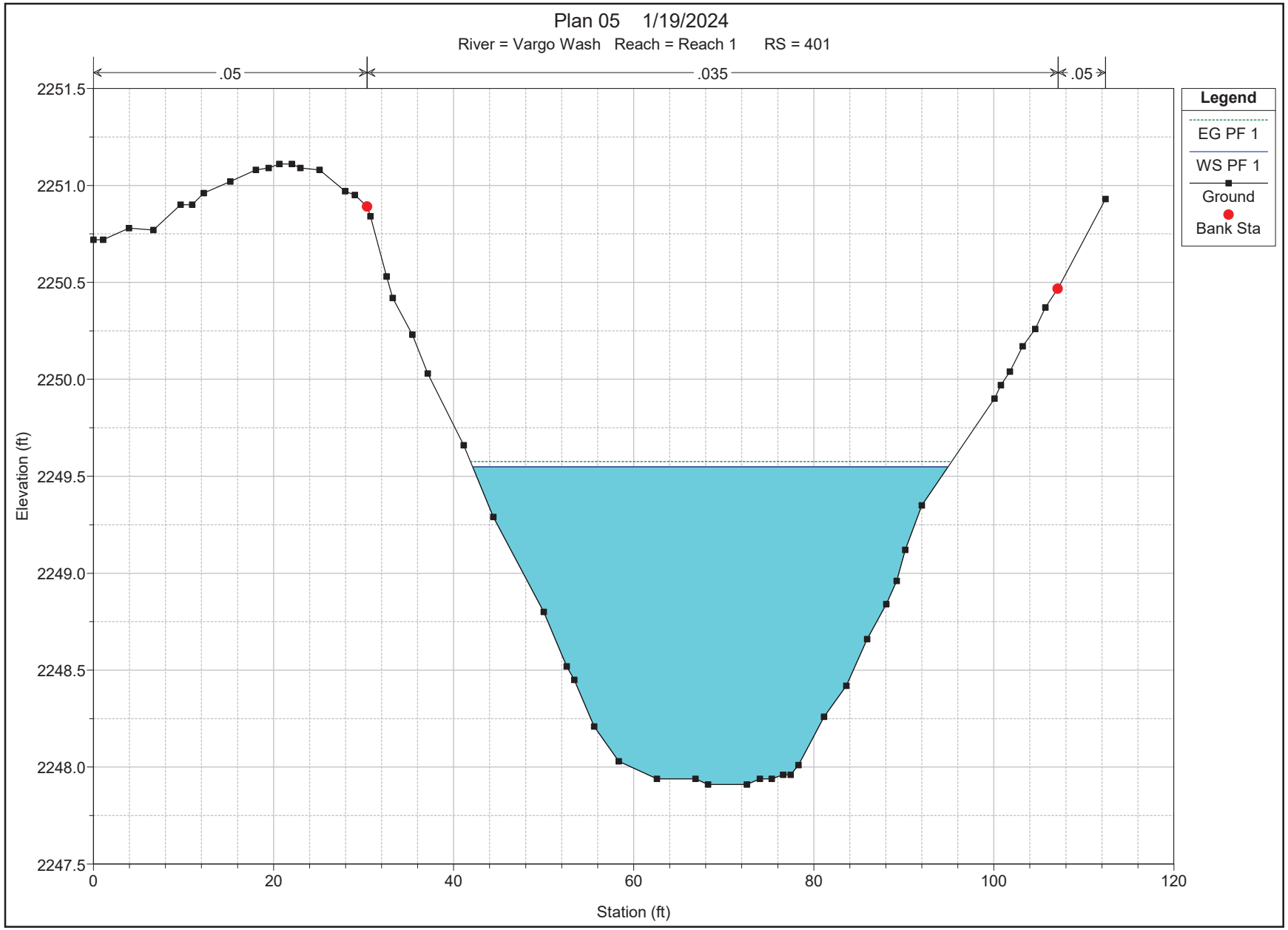
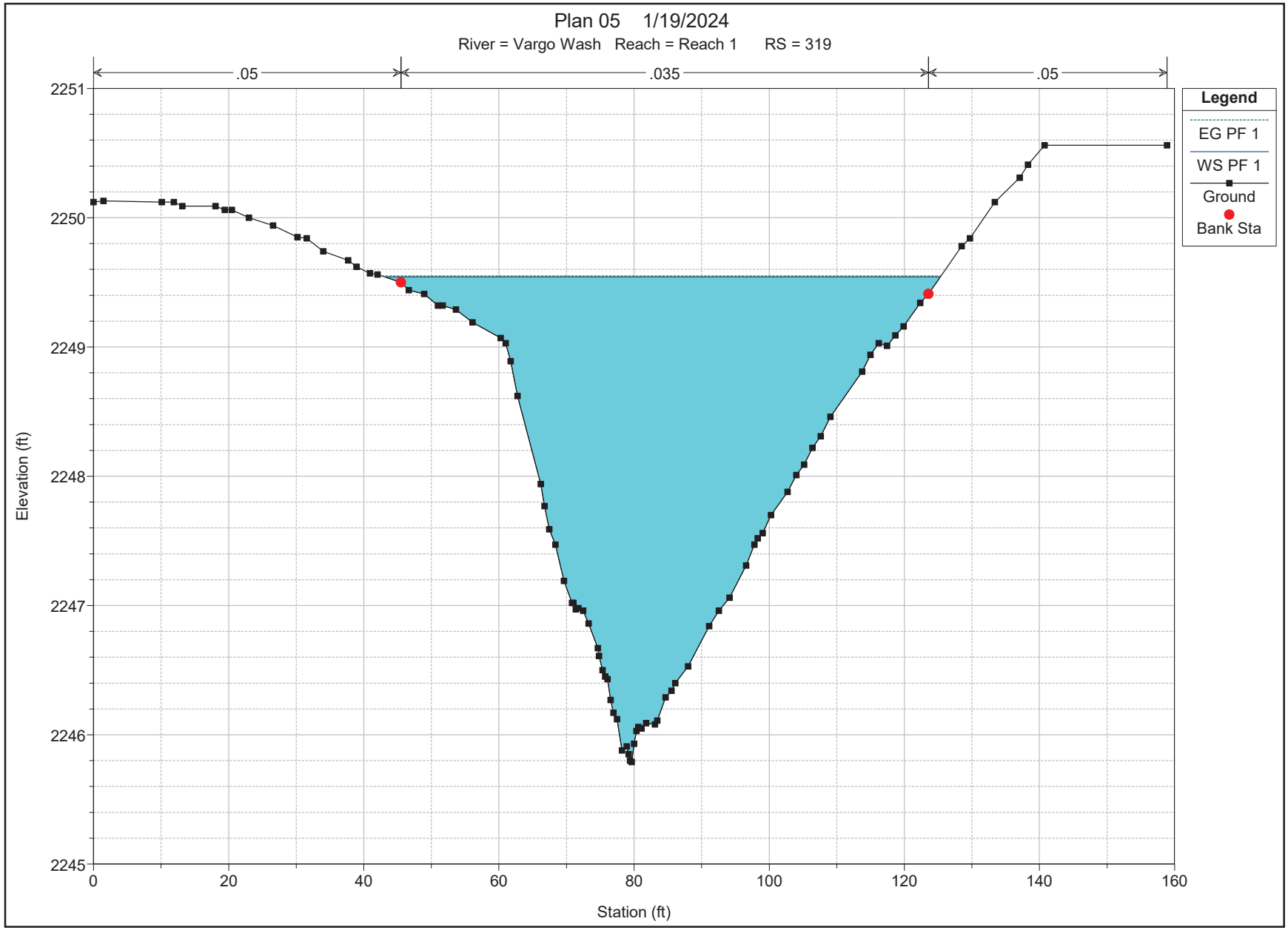
Proposed Topography - Cross-sections



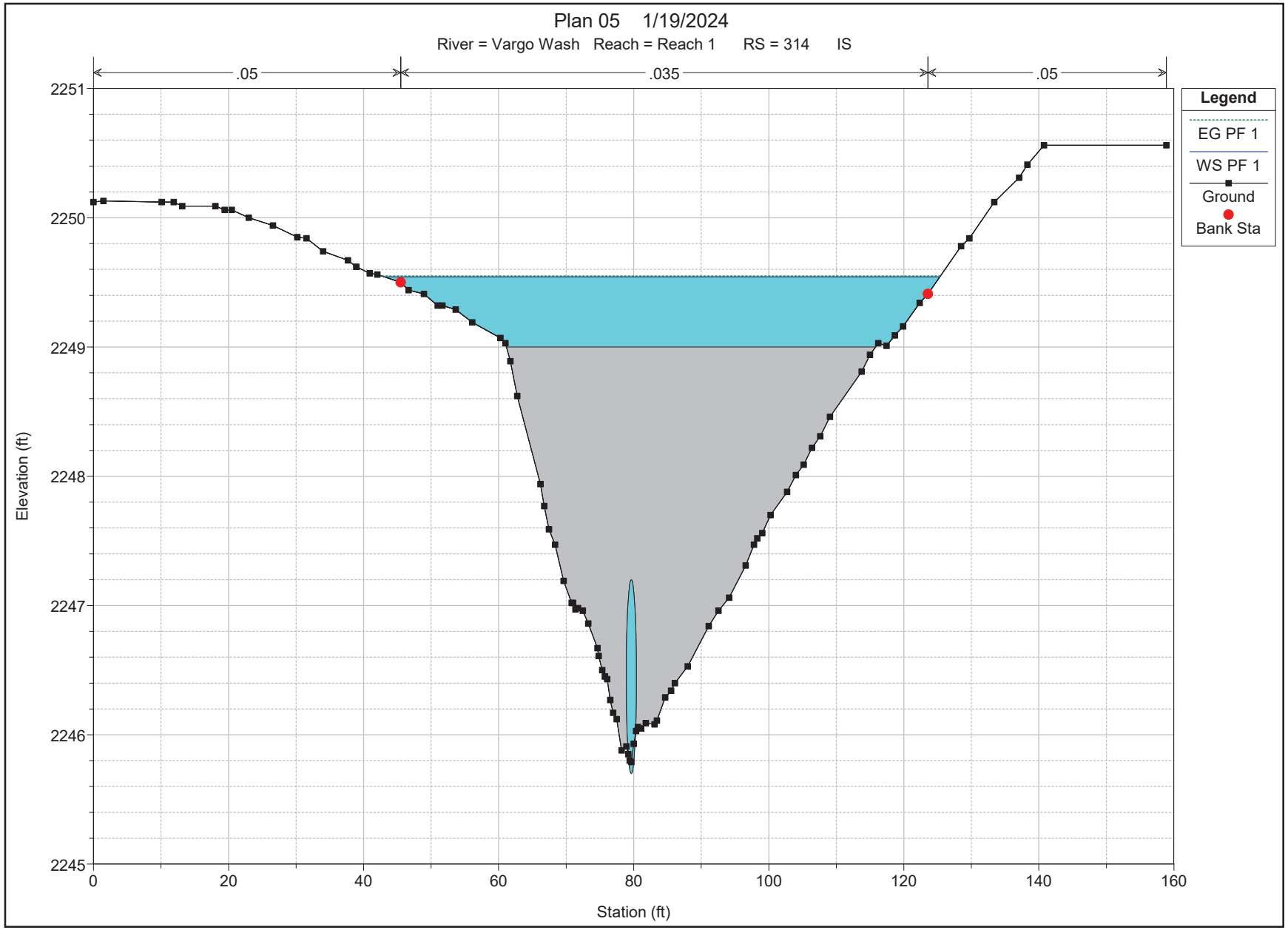
HEC-RAS Output
Proposed Topography - Cross-sections



HEC-RAS Output
Proposed Topography - Cross-sections



HEC-RAS Output
Proposed Topography - Cross-sections



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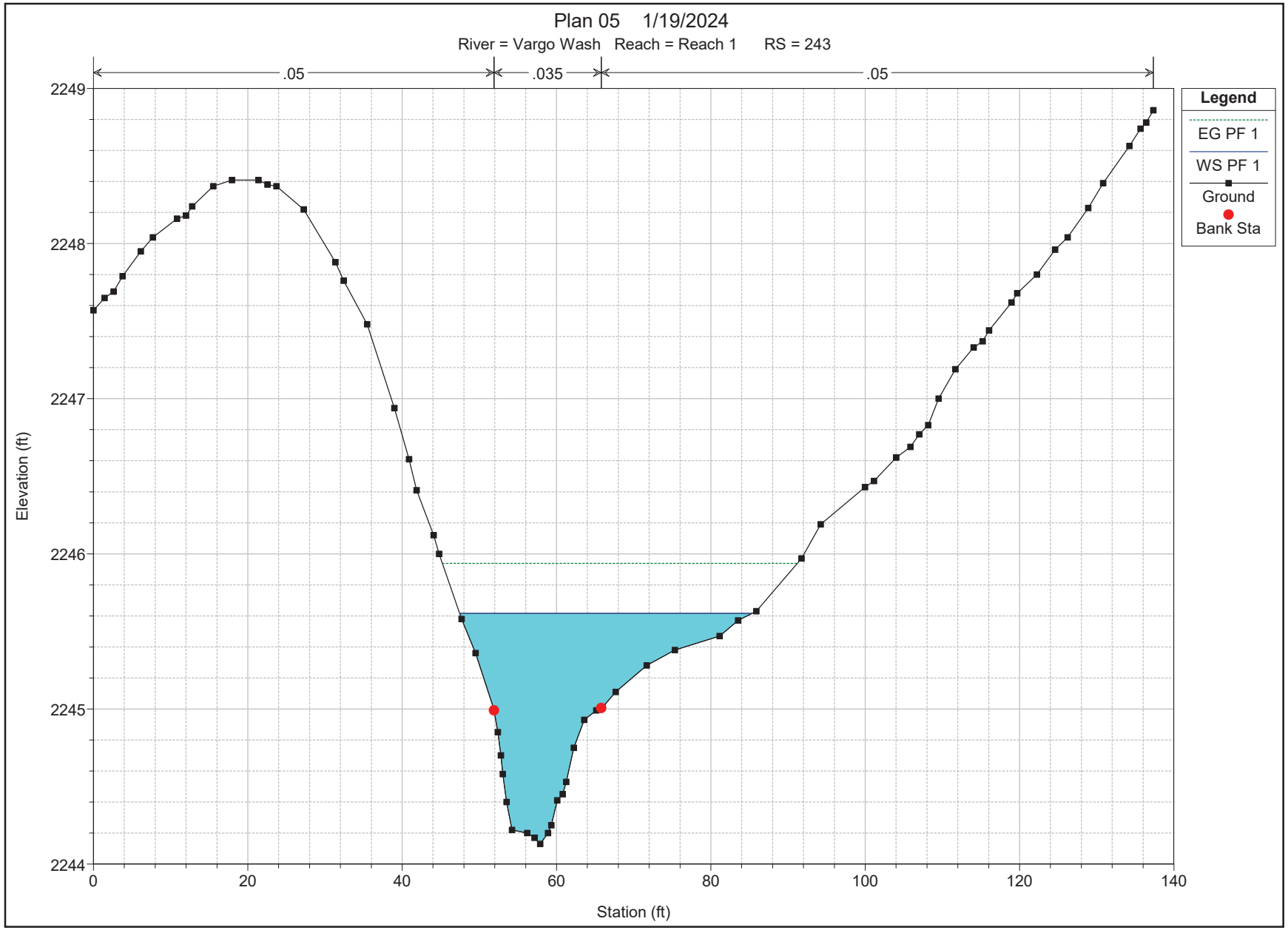
Proposed Topography - Cross-sections



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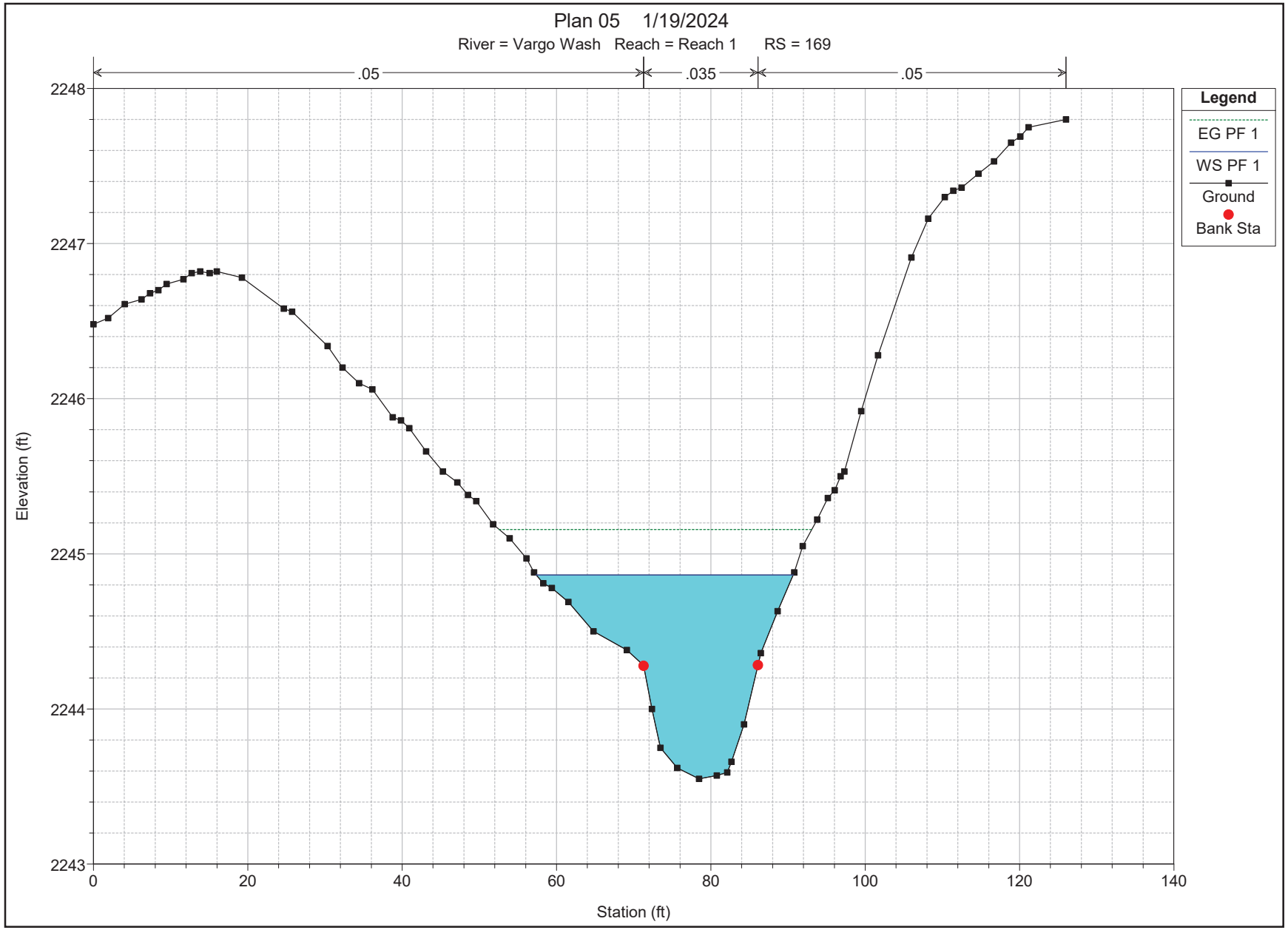
Proposed Topography - Cross-sections



HEC-RAS Output
Proposed Topography - Cross-sections