October 12, 2017

Mr. Peter Hays
Environmental Protection Specialist II
State of Colorado
Division of Reclamation, Mining, & Safety
1313 Sherman Street – Room 215
Denver, CO 80203

RE: Northern Colorado Constructors, Inc. – Bennett Pit – File No. M-2016-085
112c Permit Application, Third Adequacy Review Response

Dear Mr. Hays,

Northern Colorado Constructors, Inc. has received the Division's adequacy review comments letter dated September 19, 2017. Below are the comments and the corresponding responses that have been provided to address the comments.

Floodplain Study Comments

1. Page 1, 3rd & 4th paragraph – The text states the topography was obtained using LIDAR and that no existing model was available for this section of the South Platte River. Please provide some discussion on if the LIDAR was able to obtain topography under the water surface in the river at the time it was flown and if not, how was the model adjusted to compensate.

   Response: The LIDAR topography only extends to the top of water surface of the river. Ground survey was done to verify the river invert adjacent to the site relative to the water surface. It was found that the invert was 4 feet below the top of water found in the LIDAR topography. The river invert in the cross sections in the model was modified lower by 4 feet to accurately model the river invert.

2. Page 1, last paragraph & Page 2 – The text indicates a model was done for existing topography and for future conditions. The Division interprets the future conditions to reflect post reclamation conditions. Please explain why a model was not done for a worst case scenario during operations. This should include maximum expected footprints for topsoil, overburden and product stockpiles, as well as proposed onsite structures such as scales, scale house, offices, etc.

   Response: A mining conditions model has been added to the study. Blockouts were added to sections 5, 5.1, and 6 to simulate the stockpiles and scale house during mining conditions. Note that the scale house is located outside the floodplain. The pit areas were assumed to be partially mined, I.e. overburden/topsoil had been stripped and stockpiled and a volume of sand and gravel had been removed equal to the stockpile volumes in the processing area. Additional cross-sections HECXS4.1, HECXS5.1, HECXS6.1, and HECXS7.1

were added in all three models in the portion of the reach that includes the pit to more accurately model this area.

Slurry Wall Assessment Comments

3. Figure references – Beginning with the second Figure A3 reference in the first paragraph on page 5, the references to figures are off. This second Figure A3 reference should be A4 and so on as outlined below:

Reference Location	Incorrect Figure Reference	Correct Figure Reference
1st para., p. 5, 2nd reference	A3	A4
4th para., p. 6	A4	A5
5th para., p. 6, 1st & 2nd reference	A5	A6

Please correct the text.

Response: The text has been corrected.

Thank you for your consideration of our responses to the comments. Please feel free to contact me with any questions or if you need additional information.

Sincerely,

J.C. York, P.E.
J&T Consulting, Inc.

Attachments:

1. Revised Floodplain Study
2. Updated Slurry Wall Assessment

McGrane Water Engineering, LLC

4475 Driftwood Place • Boulder, CO 80301 • Phone: (303) 917-1247
E-Mail: dennis@mcgranewater.com

May 10, 2017

Mr. JC York
J&T Consulting, Inc.
305 Denver Avenue, Suite D
Ft. Lupton, CO 80621

Via email at: jcyork@j-tconsulting.com

RE: Bennett Pit - Slurry Wall Assessment

Dear Mr. York:

The proposed Bennett gravel pit mine is located approximately 3 miles south of Platteville, Colorado in Sections 1 and 12, Township 2 North, Range 67 West (6th PM). The South Platte River (SPR) is located immediately east of the proposed pit site. As part of the mine permit application process, the mine consultant, J&T Consulting, Inc. (JT) requested that McGrane Water Engineers, LLC. (MWE) determine the hydrologic impacts of installing a slurry wall around the Bennett pit prior to mining. Anticipated impacts include a rise in the water table on the up-gradient side of the slurry wall compared to predevelopment conditions, and a decline in the water table on the down gradient side. Water level increases to within 10 feet of the surface on the up-gradient side of the pit could flood existing structures such as basements or cause water logging (over saturation) and phreatophyte growth. A decline in water levels on the down gradient side could reduce the aquifer saturated thickness and well yields.

Results

Using a MODFLOW model with reasonable boundary conditions and aquifer properties, we determined that water levels on the up-gradient side (southwest) of the mine will increase up to 2 feet and water levels will likely decrease on the downgradient (northwest) side up to 2 feet. A detailed discussion of the Hydrogeologic analysis, model parameter selection and assumptions, and sensitivity analysis is included in Appendix A (Groundwater Evaluation and Modeling).

Nine up-gradient wells can be expected to have over 0.5 foot increases in water levels as a result of the slurry wall (Figure A5). Two upgradient wells (Kuipers (permit no. 15052-R) and Vincent (permit no. 829-R) already have reported pre-mining water levels less than 10 feet as highlighted in red on Table 1. The remaining wells either have reported depths to water exceeding 10 feet so as long as those measurements are accurate, we do not anticipate any water level impacts. There is one downgradiente well with a reported depth to water of four feet (Lewis, permit no. 61228-F) which should experience a slight decline (approximately 0.5 feet) in water levels. Since well yield is proportional to the saturated thickness, we would expect less than a 2% decline in the maximum theoretical pumping rate of the Lewis well which is insignificant.

Table 1 provides tabulated well data that includes: well location relative to the upgadient or downgradient side of the pit; permitted yield and water level depth below ground surface (bgs); calculated saturated thickness; and model results.

Table 1 – Wells within area of Influence of Proposed Slurry Wall

Location	Registered Well Owner	Permit No.	Town-ship	Rng	Sec	Qtr-Qtr	Well Depth (ft bgs)	Well Yield (gpm)	Static Water Level (ft bgs)	Sat. Thick. (ft)	Model Results			
											Max. Change in Water Levels (ft)	Future Depth to Water ft (bgl)	Future Sat. Thick. (ft)	% Change in Sat. Thick.
Upgradient Wells:	VINCENT ROLLIE J	68631	2 N	67 W	12	NESW	32	15	18	14	1.4	16.6	15.4	10%
	MULHAUSEN GEORGE W.	132579	2 N	67 W	11	SENE	35	20	ND	NA	0.6	Uncertain	Uncertain	Uncertain
	KUIPERS KACEY	295458	2 N	67 W	12	SWNW	45	15	20	25	0.75	19.25	25.75	3%
	KUIPERS	15051-R	2 N	67 W	12	SWNW	49	1125	12	37	1.6	10.4	38.6	4%
	KUIPERS	15052-R	2 N	67 W	12	SENW	15	1800	3	12	1.6	1.4	13.6	13%
	CARLSON MARY E	51071-A	2 N	67 W	11	NENE	70	15	25	45	0.5	24.5	45.5	1%
	VINCENT ROLLIE J	52-WCB	2 N	67 W	12	SESW	34	750	ND	NA	1.6	Uncertain	Uncertain	Uncertain
	VINCENT R J	829-R	2 N	67 W	12	SESW	30	1175	5	25	0.5	4.5	25.5	2%
	VINCENT R J	830-R	2 N	67 W	12	SWSW	50	500	22	28	0.5	21.5	28.5	2%
Downgradient Wells:	LEWIS WILLIA	61228-F	2 N	67 W	1	SESW	33	1100	4	29	-0.5	4.5	28.5	-2%

As discussed in Appendix A, the expected increase in water levels on the upgradient side of the pit and decreases in water levels on the downgradient side are likely within the expected natural seasonal fluctuations (approximately 2 feet) that occur during spring runoff.

The model results indicate that groundwater levels will likely rise into the abandoned channel located on the west side of the pit and could potential impact unidentified buried structures such as basements or cellars in that vicinity. We do not believe increased water levels in the abandoned channel will cause any additional problems because the increase is within normal expected water level fluctuations and because additional surface water will likely travel to the north where it will recharge the aquifer. **Therefore, we conclude that potential impacts are likely insignificant.**

Model Uncertainty

Whether hydrologic impacts associated with future mining are significant depends on numerous factors including: 1) actual well location relative to the pit and slurry wall (sometimes the permit location is not accurate); 2) the location and depth of vulnerable structures such as homes with basements; and 3) the location, magnitude and timing of well pumping and recharge (from precipitation, agriculture return flows, and canal seepage). Therefore, future monitoring is necessary to further evaluate hydrologic impacts.

Monitoring and Mitigation

We believe the existing five well monitoring system around the pit are adequate to monitor the seasonal water level changes and evaluate potential impacts of the proposed mine slurry wall.

If elevated upgradient water levels are significant, the mine could install a drain that intercepts groundwater on the upgradient side of the pit and transport it to the upgradient side where it could be recharge the aquifer

to mitigate downgradient impacts. This could be a passive system that operates whenever water levels rise. JT has indicated that drains such as have been successfully installed and used at other mine site. The depth, location, and size of a drain will depend on the timing and location of rising water and hydrologic properties of the aquifer and can be designed using the existing model.

Recommendations

Although we do not believe the proposed mine will have any significant impacts to adjacent well owners, we do recommend:

1. Continued monitoring of five existing monitoring wells located outside the proposed pit slurry wall area. We recommend measuring water levels on a monthly basis until seasonal fluctuations are better refined.
2. Installing a stage level recorder within the abandoned channel located on the west side of the pit to evaluate water levels; and
3. If after the slurry wall is installed and water level increases exceed 2 feet and cause negative impacts, we recommend that a drain be installed to allow rising water to be intercepted, transported to the downgradient side of the pit and allowed to recharge. It is also possible to design the drain to discharge intercepted groundwater back into the river.

If you have any questions, please give me a call.

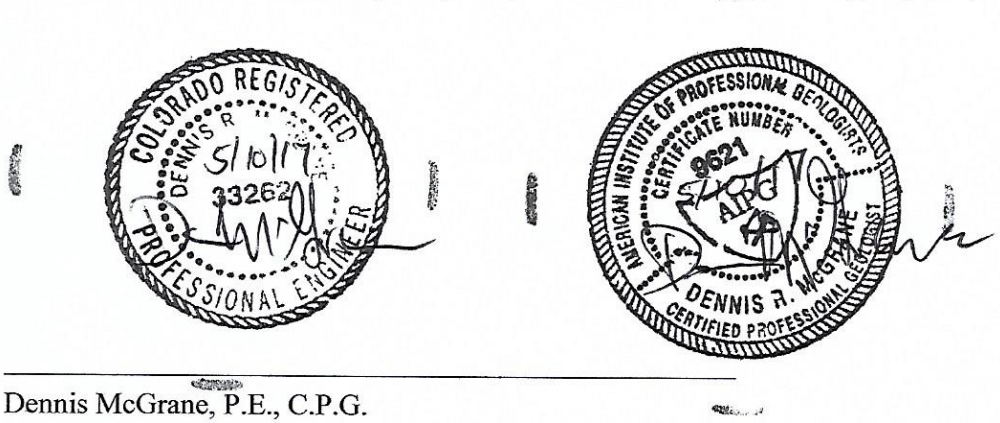
Sincerely,

McGrane Water Engineers, Inc.

Dennis McGrane, P.E., C.P.G

Professional Credentials

The technical material in this report was prepared by or under the supervision and direction of Dennis McGrane P.E, C.P.G., whose seal as a Professional Engineer in the State of Colorado and American Institute of Professional Geologists (AIPG) Certified Profession Geologist (CPG) are affixed below:



Dennis McGrane, P.E., C.P.G.

APPENDIX A – GROUNDWATER EVALATION AND MODELING

Hydrologic Setting

The proposed Bennett pit is located approximately three miles south of Platteville, Colorado on the west side of the South Platte River (SPR). The applicant would mine sand and gravel that makes up the SPR alluvial aquifer (Lindsay and others, 1998 and 2005). The mine applicant's engineer, JT Consulting supervised the drilled of fourteen boreholes around the pit to evaluate the resource. Figure A1 is a Google Earth image that shows: the planned pit, existing permitted wells with the owner and permit number, pit exploration boreholes and the model boundary. Most of the existing permitted wells are used for domestic water supply and irrigation uses.

Figure A2 shows the surficial geology (Soiser, 1965), well and SPR water level elevations and water level elevation contours at 10 foot intervals. The alluvium within the model areas consists of alluvial sand and gravel (Qal) located adjacent to the SPR river channel and older terrace alluvium (Qss) along the western model boundary. Water level elevations above mean sea level (msl) were calculated at each well by subtracting the depth to water listed in the well permit completion report from the site elevations obtained from 10-meter DEM data. The location of the water elevation contour lines were modified from Robson (2000) using the more recent well data. Water level contours within the more permeable modern alluvium (Qal) flow parallel to the SPR while groundwater in the lower permeability terrace deposits (Qss) flow more towards the river to the northeast.

Seasonal Water Level Changes

Table A1 shows weekly water level measurements taken in the five pit exploration holes that were completed as monitoring wells. Between March 21st and May 4, 2017, the depth to water has rose from between 4.1 to 6.2 feet to between 2.6 and 4.3 feet below ground level. We expect seasonal water levels next to the SPR to fluctuate in proportion to increases in river stage at the Ft. Lupton Gage gage (USGS no. 06721000) which normally increases 1 to 2 feet during the spring runoff period.

Well Data

Table A2 includes tabulated well permit data from 38 alluvial wells located within the modeled area. Well depths range from 15 to 83 feet and average 46 feet, and well yields range from less than 15 gpm for domestic wells to 1,800 for irrigation wells. The depth to water ranges from 3 to 33 feet and averages approximately 18 feet. The calculated saturated alluvial thicknesses range from 12 to 68 feet and average approximately 33 feet. We believe 68 feet is excessive because well drillers typically drill 5 to 20 feet into decomposed bedrock before completing an alluvial well.

Table A2 shows the borehole data obtained from 18 recent test holes dug around the pit. The average saturated thickness of the boreholes is approximately 34 feet which is consistent with the

average saturated thickness for all wells within the model area.. We therefore used a constant 34 foot thickness in our groundwater model. Figure A3 shows the reported well depth and yields. Figure A4 shows the well and borehole saturated thicknesses.

Aquifer Permeability

The aquifer hydraulic conductivity (K) is the measure of aquifer permeability in feet per day (ft/dy). The Colorado Division of Water Resources (DNR) complied available K data for an extensive groundwater model used for the South Platte Decision Support System (CDM-Smith, April, 2013). SPDSS Task 43.3 (CDM-Smith, December 6, 2006, Figure 5c) shows contoured K's in our model area ranging from 450 to 650 ft/day. We used an average K of 550 ft/day for the area underlain by modern alluvium (Qal) and a K of 55 ft/day for lower permeability terrace silt, sand and gravels (Qss) located west of the Meadow Island Ditch No. 1. The lower K was necessary to create the observed bend in water level contours shown in Figure A2.

The aquifer Transmissivity (T) is product of the average saturated thickness (34 feet) and average K (550 ft/day) which is approximately 140,000 gpd/ft. This is consistent with the SPDSS model T which was between 100,000 and 200,000 gpd/ft as shown in Figure 7A of SPDSS Task 43.3 (CDM-Smith, December 6, 2006).

Model Construction

We used the USGS (McDonald and Harbaugh, 1988) MODFLOW modeling program to evaluate the future effects of the Bennett pit. We used the Visual Modflow (VM) classic interface (version 4.6.0.167) to construct, run and display model results. The SPR is simulated across the entire model with the proposed Bennett Pit located in the center. The model is 10,600 feet north to south and 9,400 feet east to west, consisting of 106 rows and 94 columns using 100 foot square model cells.

Model Boundary Conditions

Model boundary conditions include the SPR; bedrock boundaries; upgradient and downgradient aquifer inflows and outflows and the eastern and western sides of the model which act as no flow boundaries.

We assigned model river cell stage elevations at 1 foot increments where 10m DEM data contours crossed the SPR, and used the VM interface to interpolate stage elevations in between. The southernmost up-gradient elevation was 4845 ft (msl) and the northern most down gradient elevation was 4822 feet (msl).

The water level gradient from south to north are tied to these "average" river elevations because the streambed conductance term (COND) is extremely high which allows water to move freely between the river and the underlying aquifer. We calculated river cell conductance (COND) as the product of the streambed unit conductance (Ksb/m) times the wetted river area (length * width). The results of a nearby (site SC-07) vertical leakance test (CDM-Smith, June 9, 2006, Figure 2) indicate that the vertical streambed hydraulic conductivity (Ksb) is approximately 331 ft/day.

However, tests conducted in 2009 by Leonard Rice Engineers just south of the model in Twn. 2N., Rng. 66W., Sec. 18, arrived at a Ksb value of 37 ft/day (Miller, 2009). We believe 37 ft/day is more accurate because it was determined through rigorous aquifer testing and not simply a short-term vertical leakance test. We measured the streambed width to be approximately 75 feet from a Google Earth image, and calculated the model cell conductance (COND) to be 270,000 ft^2/day (37 ft/day/ft * 100 ft * 75 ft) which is a very high value.

We constructed the model using a constant 34 foot depth to bedrock from the water table which was determined by the stream gradient.

Aquifer subflow in and out of the model was calculated by running the model after assigning constant heads on the southeast side of the model at 4845 feet and assigning a values of 4820 feet on the southeast side of the model. Constant heads on the west side of the model were set at 4840 feet which is below the Lupton Bottom Ditch. The 4840 foot water level contour elevation is sustained by inflow from the older alluvium (Qss) and leakage from the Lupton Bottom Ditch. No flow boundaries are assumed on the east and west sides of the model where minimal effects of the mine are expected.

Model Runs and Results

We conducted two model runs to evaluate the hydrologic effects of installing a slurry wall around the Bennett Pit. Run <SS4_noPit> simulates the pre-mine water table. Figure A5 shows the resulting water table gradient through the model area and proposed pit site. The resulting heads are very close to the water level contour targets shown on the underlying base map. Through the pit area, measured verses modeled water levels at the five pit site monitoring wells are within 0.5 feet (Root Mean Squared Residual = 0.439 feet). Table A4 shows that aquifer inflows and outflows for the pre-pit steady state run (SS4noPit) of approximately 3.5 cfs with river inflows and outflows of approximately 3 cfs.

In run <SS4_wPit>, the pit model cells are turned off to simulate the effect of the slurry wall. Figure A6 is the contoured difference in model output heads between the post-pit run <SS4wPit> minus the model cell head output from the pre-pit run <SS4noPit>. Positive values on the southwest side of the pit reflect mounding and negative values on the north side reflect lower water levels in the “shadow” of the pit. Figure A6 shows that nine up-gradient wells are within the area where the expected rise in water levels increase between 0.5 and 2.0 feet. The letter report Table 1 provides tabulated well data that includes: well location (upgradient or downgradient) relative to the pit; permitted yield and water level depth below ground surface (bgs), calculated saturated thickness, and model results. Two of those wells (Kuipers (permit no. 15052-R) and Vincent (permit no. 829-R) already have reported pre-mining water levels less than 10 feet. The rest of the wells either have reported depths to water exceeding 10 feet or no recorded levels so anticipated impacts are “uncertain.”

The model results indicate that groundwater levels will likely rise into the abandoned channel located on the west side of the pit and could potential impact unidentified buried structures such as basements or cellars in that vicinity. We do not believe increased water levels in the abandoned channel will cause any additional problems because the increase is within normal expected water

level fluctuations of approximately two to three feet (see Seasonal Water Level Changes) and because any additional groundwater that comes to the surface will likely travel northward and recharge in the "shadow" of the pit.

Model Sensitivity

The model results are insensitive to differences in hydraulic conductivities (K) since mound height is inversely proportional to K and aquifer inflow is directly proportional to K. Therefore, since the aquifer gradient and thickness are constant, an increase in K will cause a proportional increase in model inflows which would increase mound height proportionally, but this does not occur because the higher K causes a proportional decline in mound build-up.

The model results are very sensitive to the existence of the river but there is no realistic chance that the river will ever not flow in this area due to the large amount of agricultural and municipal return flows and the strict regulation of well pumping. Model results are insensitive to streambed leakance since the streambed is so permeable that large amounts of water can easily move between the river and aquifer.

We believe however that the model results in report Table 1 are sensitive to nonmodeled variables including: 1) the actual location of wells located on the up-gradient side of the pit; 2) the accuracy of reported water level depths; and 3) the timing, location, and magnitude of various types of recharge such as precipitation and canal recharge. Therefore, future monitoring is recommended as discussed in the main body of the report.

Sources

CDM-Smith, April, 2013a. South Platte Decision Support System Alluvial Groundwater Model Report.

CDM-Smith, December 6, 2006. SPDSS Phase 3, Task 34.3 South Platte Alluvium Region Aquifer Property Technical Memoradum.

CDM-Smith, June 9, 2006. SPDSS Phase 3, Task 34.3 Streambed Conductance Technical Memoradum.

Lindsay, D.A., Langer, W.H., and Knepper, D.H., 2005. Stratigraphy, Lithology, and Sedimentary Features of Quaternary Alluvial Deposits of the South Platte River and Some of its Tributaries East of the Front Range, Colorado. U.S. Geological Survey Professional Paper 1705.

Lindsey, D. A., Langer, W. H., and Shary, J. F., 1998, Gravel deposits of the South Platte River valley north of Denver, Colorado, Part B - Quality of gravel deposits for aggregate: U. S. Geological Survey Open-File Report 98-148-B, 24 p.

McDonald, M.G., and Harbaugh, A.W., 1988, A modular three-dimensional finite-difference ground-water flow model: Techniques of Water-Resources Investigations of the United States Geological Survey, Book 6, Chapter A1, 586 p.

Miller Groundwater Engineering, June 29, 2009. Groundwater model evaluations of the Broomfield Well Field. Letter report to Dennis McGrane, Leonard Rice Engineers, Inc.

Soister, Paul E., 1965. Geologic Map of the Platteville Qaudrangle, Weld County, Colorado. US Geological Survey Qaudrangle Map GQ-399.

FIGURES

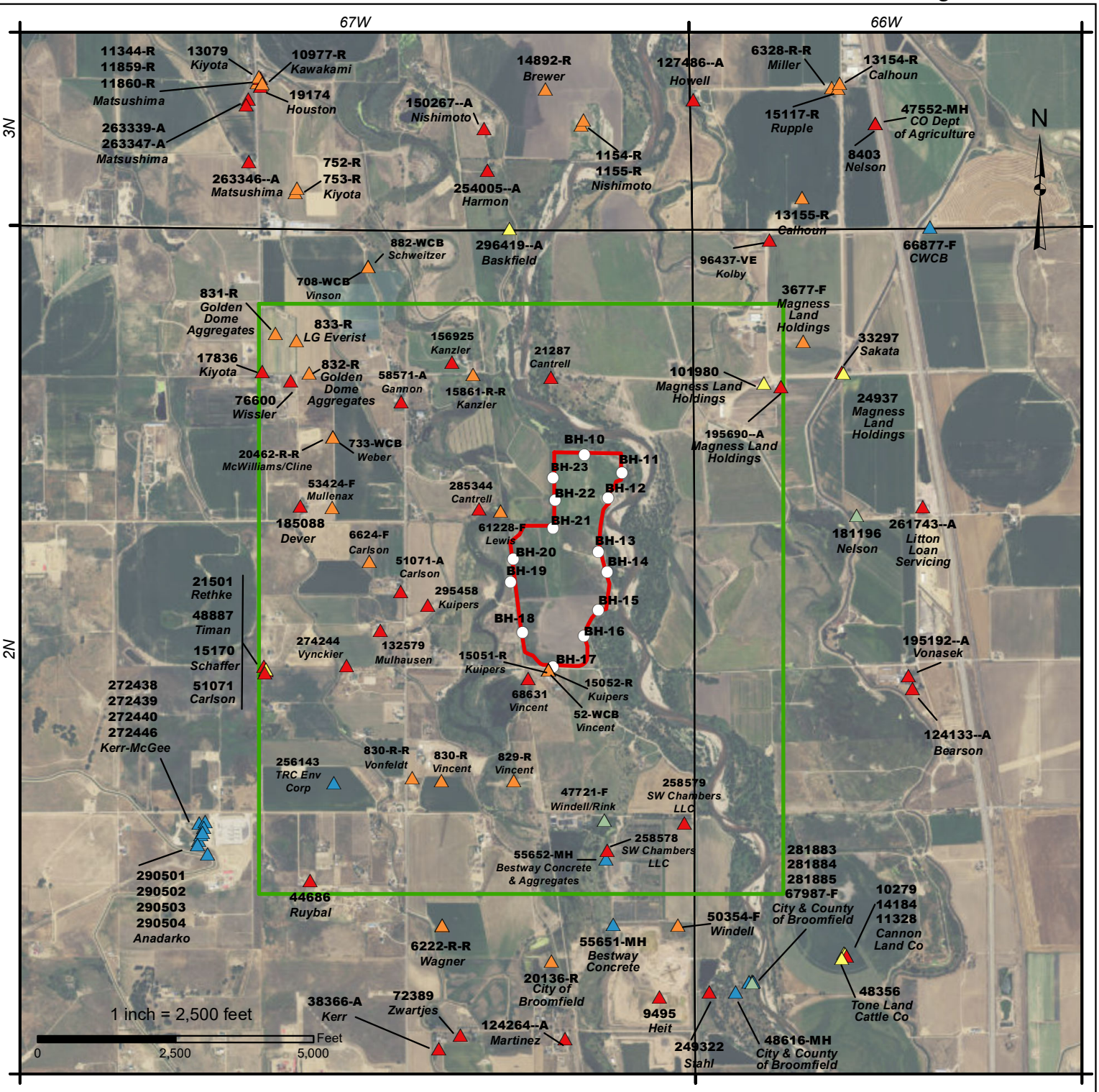


Figure A-1

Vicinity Wells
(Well Owners and Permit Numbers)

Bennett Gravel Pit
Weld County, Colorado

Map Legend

- Borehole
- Gravel Pit Slurry Wall Extent
- Model Extent
- *△ Well Permit Number / Well Owner

DWR Constructed Well*
Well Use
- DOMESTIC
- IRRIGATION
- STOCK
- COMMERCIAL
- OTHER

Sources:
DWR, Hydrobase, 033017; BLM Geocommunicator
J&T Consulting Figure dated 2.22.17
ESRI USGS Topo Basemap

Date: May 3, 2017
Projection: CO State Plane, North (2011), ft; NAD83

McGrane Water Engineering, LLC

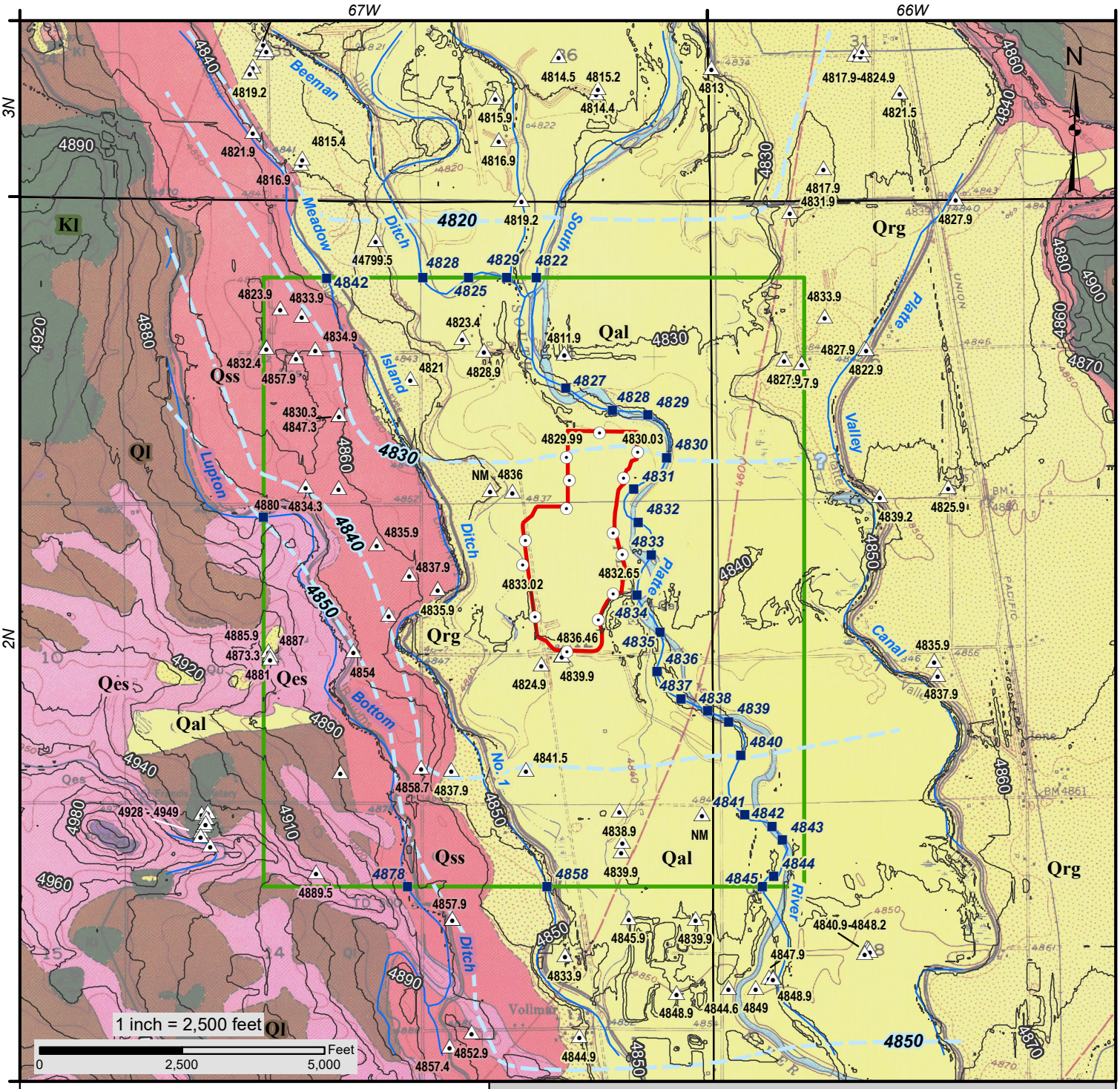


Figure A-2

Geology and Water Level Elevations

Bennett Gravel Pit
Weld County, Colorado

Map Legend

- Borehole
- DWR Water Well (SWL elevation labeled adjacent to point)
- Gravel Pit Slurry Wall Extent
- Model Extent
- Ground Surface Elevation Contour
  Contour Interval = 10 ft
- Water Level Elevation Contour
  Contour Interval = 10 ft

Geologic Units

(from Soister, 1965)

- **Qal** - Alluvium
- **Qc** - Colluvium
- **Qes** - Eolian sand
- **Qss** - Terrace sand and silt
- **Qrg** - River gravel
- **Ql** - Loess
- **Kl** - Laramie Formation

Sources:
USGS, 10m DEM
Soister, 1965 (Geologic Map)
DWR Hydrobase

Date: May 3, 2017
Projection: CO State Plane, North (2011), ft; NAD83

McGrane Water Engineering, LLC

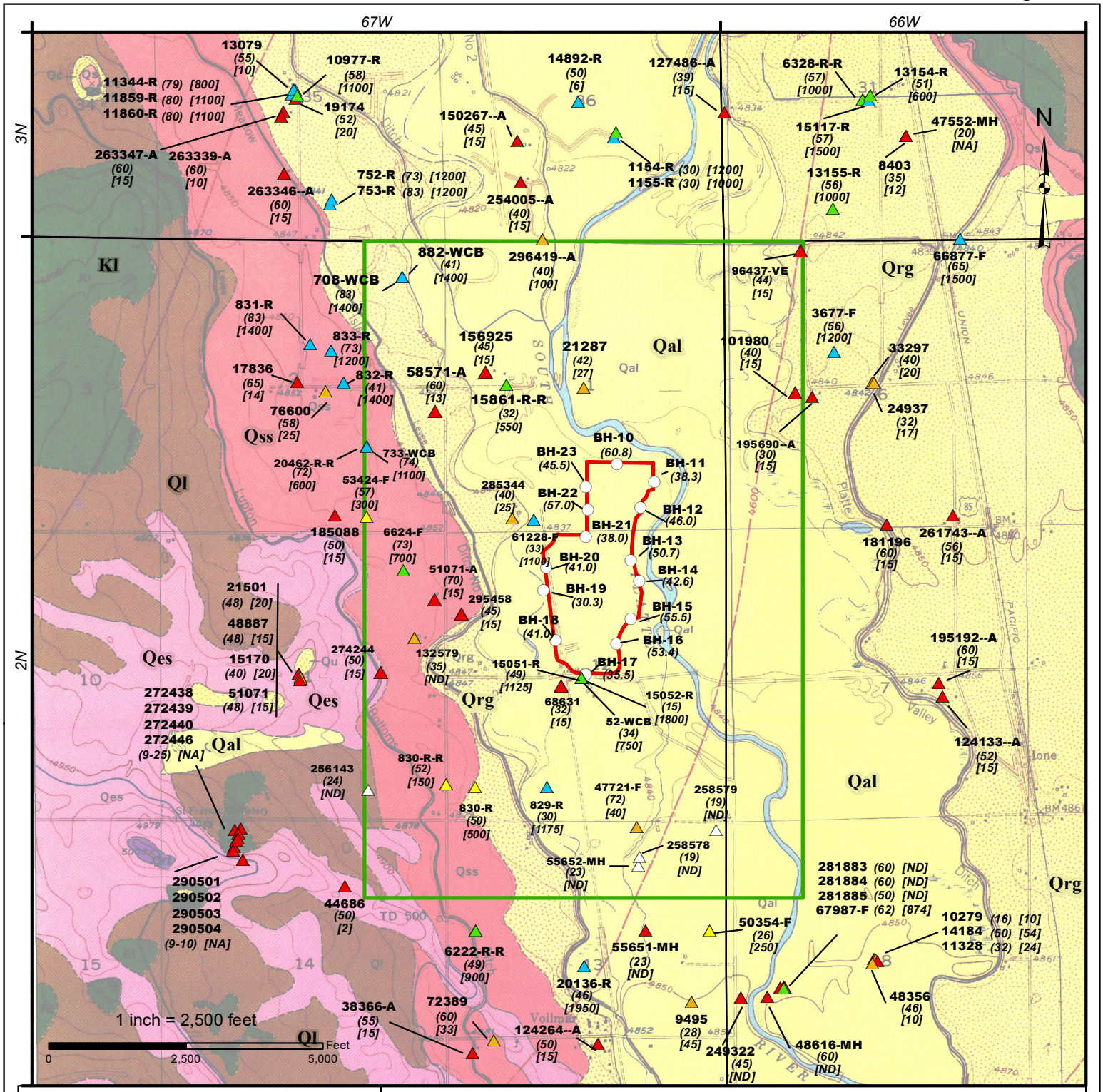


Figure A-3

Well Depth and Yield

(from well permit completion reports)

Bennett Gravel Pit
Weld County, Colorado

Map Legend

- Borehole
- Gravel Pit Slurry Wall Extent
- Model Extent
- *△ **Well Permit Number** *(well depth - ft)* *[yield - gpm]*

Well Yield* *(gpm)*

- 0 - 15
- 16 - 100
- 101 - 500
- 501 - 1000
- 1001 - 1950
- No Yield Data

Geologic Units *(from Soister, 1965)*

- **Qal** - Alluvium
- **Qc** - Colluvium
- **Qes** - Eolian sand
- **Qss** - Terrace sand and silt
- **Qrg** - River gravel
- **Ql** - Loess
- **Kl** - Laramie Formation

Sources:
DWR, Hydrobase, 033017; BLM Geocommunicator
J&T Consulting Figure dated 2.22.17
Soister, 1965 (Geologic Map)

Date: May 3, 2017
Projection: CO State Plane, North (2011), ft; NAD83

McGrane Water Engineering, LLC

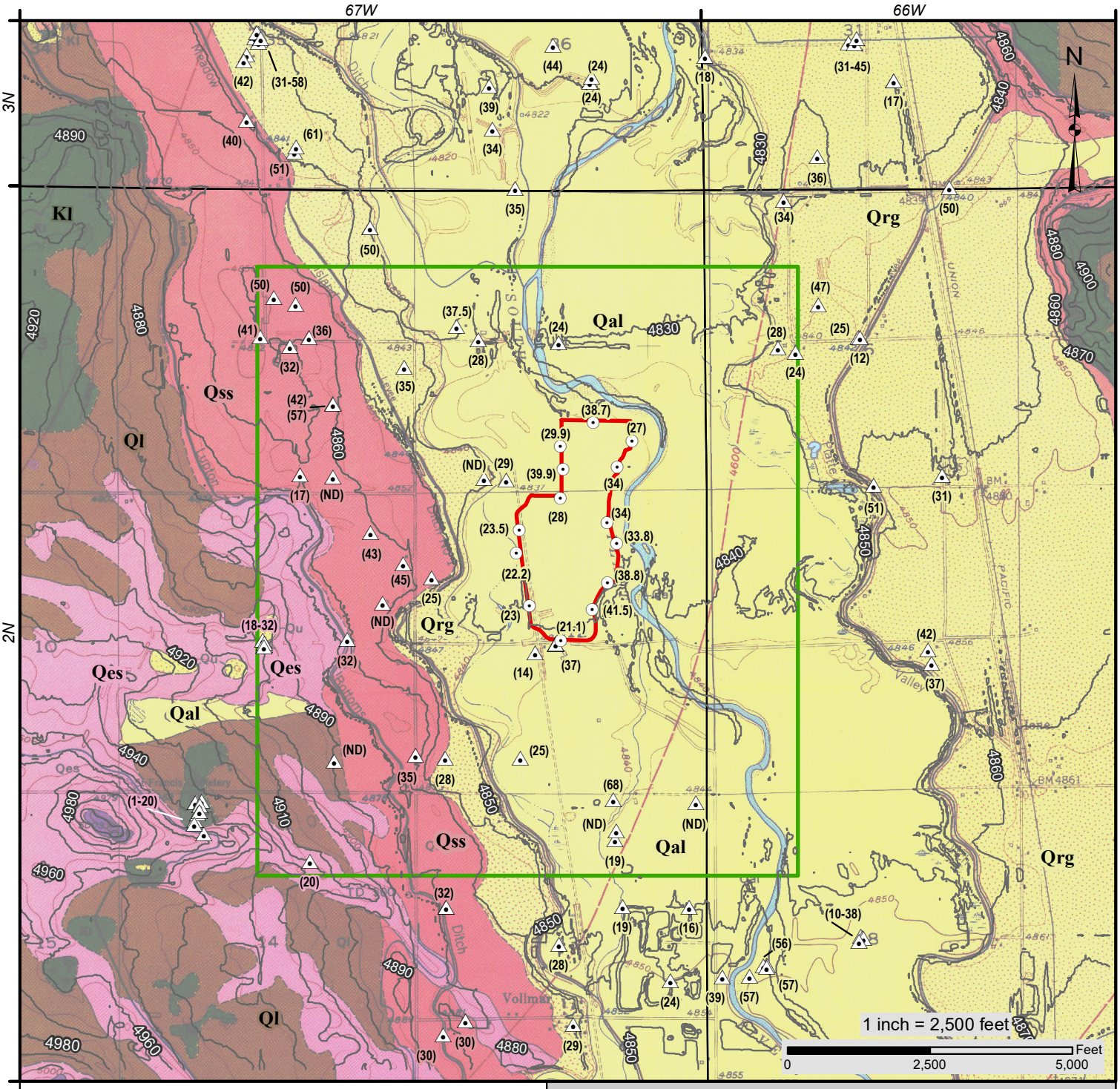


Figure A-4

Well and Borehole Saturated Thickness

Bennett Gravel Pit
Weld County, Colorado

Map Legend

- Borehole*
- DWR Water Well*
- Gravel Pit Slurry Wall Extent
- Model Extent
- Ground Surface Elevation Contour
  Contour Interval = 10 ft

*Saturated thickness in parantheses adjacent to well (ft)

Geologic Units

(from Soister, 1965)

- **Qal** - Alluvium
- **Qc** - Colluvium
- **Qes** - Eolian sand
- **Qss** - Terrace sand and silt
- **Qrg** - River gravel
- **Ql** - Loess
- **Kl** - Laramie Formation

Sources:
USGS, 10m DEM
Soister, 1965 (Geologic Map)
DWR Hydrobase

Date: May 3, 2017
Projection: CO State Plane, North (2011), ft; NAD83

McGrane Water Engineering, LLC

Figure A5 – Predevelopment Steady State Water Elevations (Run SS4noPit) and Calibration Targets

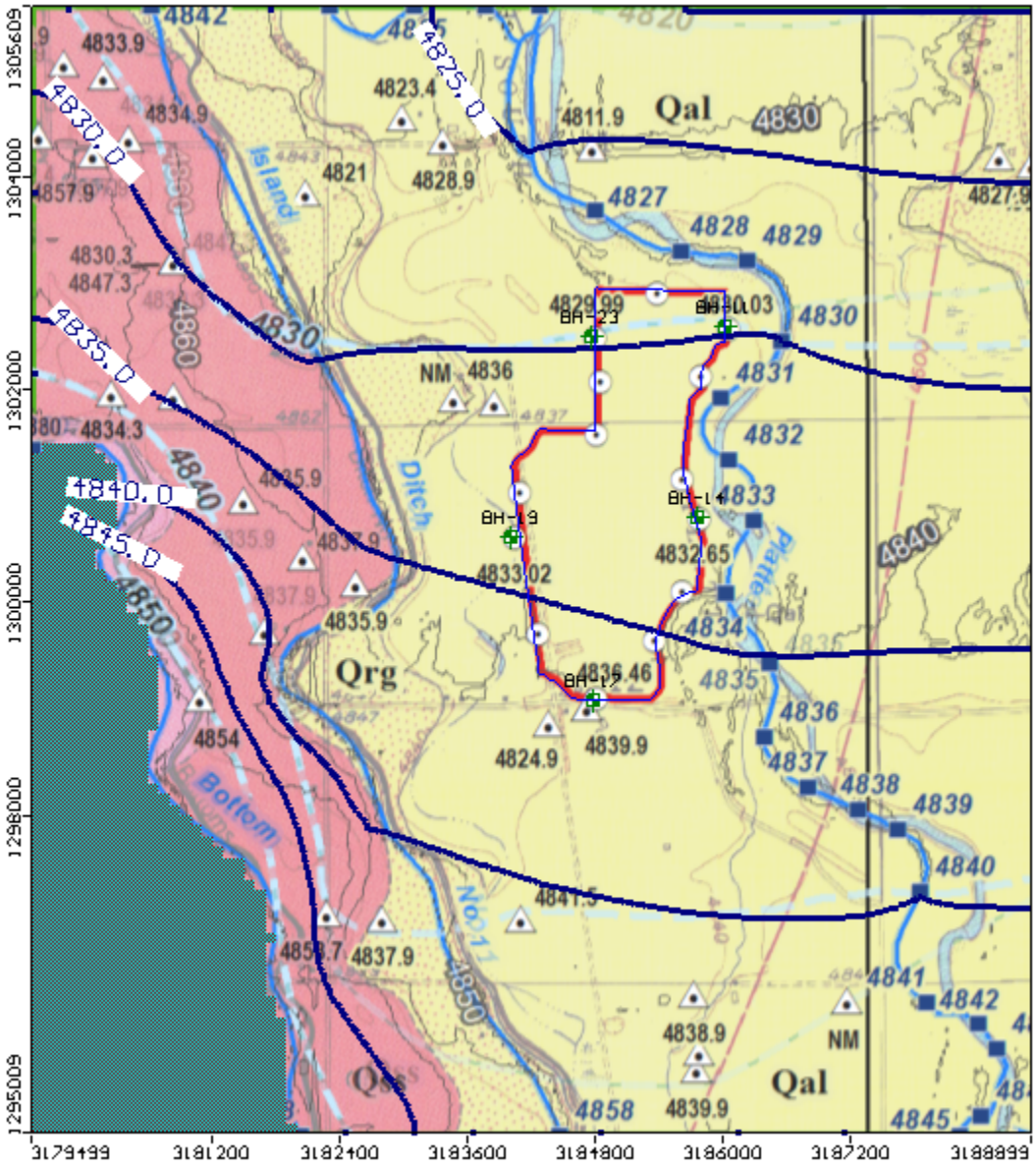
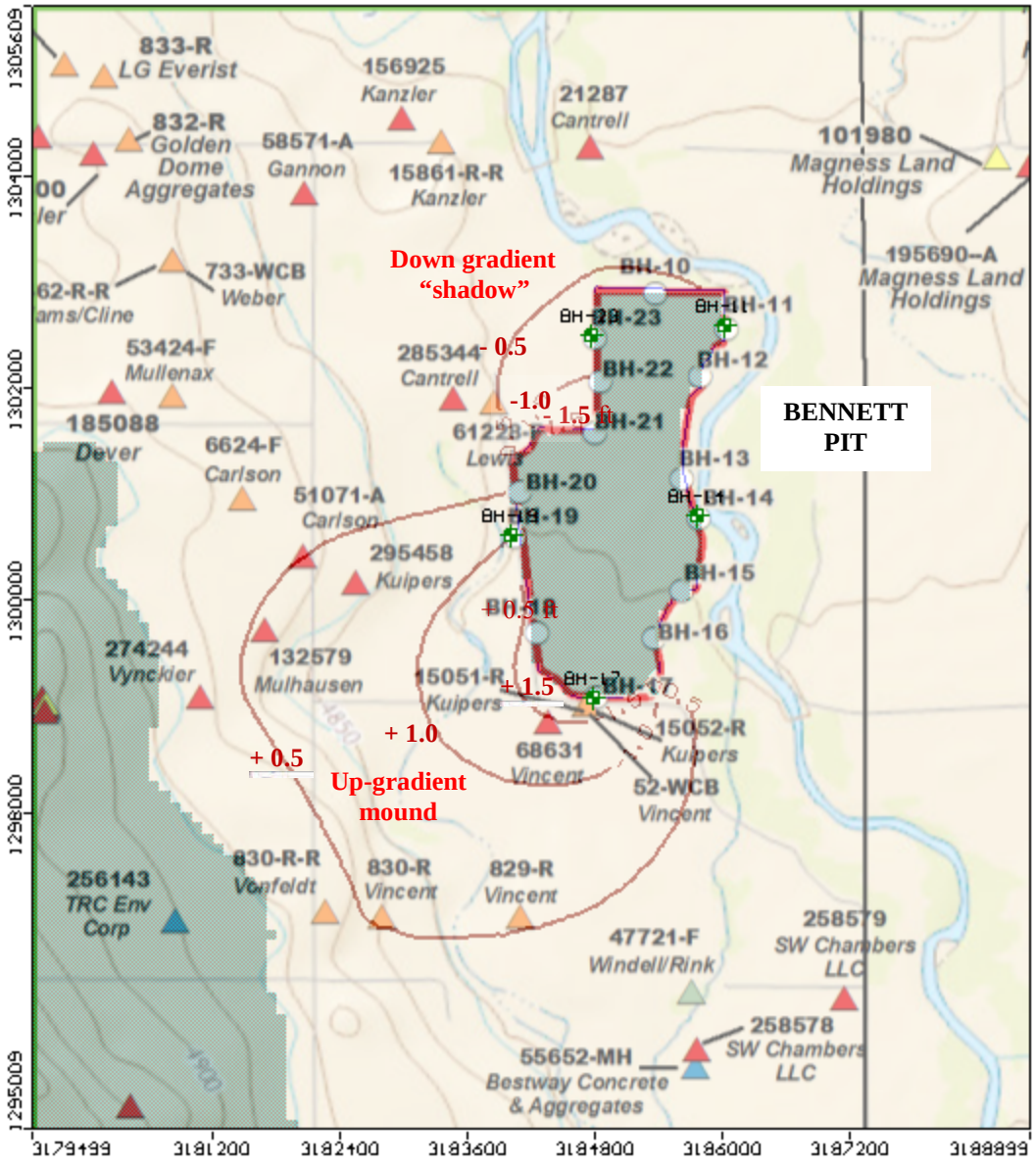


Figure A6 – Change in Water Levels with Pit (Run SS4wPit – SS4noPit)



TABLES

Table A1 – Pit Borehole Water Levels (Spring, 2017)

	JT BH-11		JT BH-14		JT BH-17		JT BH-19		JT BH-23	
Location:	Northeast Side		East Side		South Side		Southwest Side		Northwest Side	
Well Elevation (ft):	4836.78		4839.9		4843.54		4841.4		4835.99	
Ground Elevation (ft):	4834.54		4837.46		4841.21		4839.1		4833.42	
Date	**Depth (ft)**	**Elev. (ft_msl)**	**Depth (ft)**	**Elev. (ft_msl)**	**Depth (ft)**	**Elev. (ft_msl)**	**Depth (ft)**	**Elev. (ft_msl)**	**Depth (ft)**	**Elev. (ft_msl)**
21-Mar-17	5.4	4829.1	5.6	4831.9	4.9	4836.3	6.2	4832.9	4.1	4829.3
28-Mar-17	4.8	4829.8	5.0	4832.5	5.0	4836.2	6.2	4832.9	3.8	4829.7
5-Apr-17	4.5	4830.0	4.8	4832.7	4.8	4836.5	6.0	4833.0	3.4	4830.0
11-Apr-17	5.1	4829.5	5.2	4832.2	5.3	4836.0	6.2	4832.9	3.9	4829.5
20-Apr-17	5.0	4829.5	5.1	4832.3	5.3	4835.9	6.0	4833.0	3.8	4829.7
27-Apr-17	4.7	4829.9	4.5	4833.0	5.2	4836.0	5.1	4833.9	3.1	4830.3
4-May-17	4.3	4830.3	3.6	4833.8	4.1	4837.1	3.3	4835.8	2.6	4830.8
Change (ft) to Date:	1.2		1.9		0.8		2.9		1.5	

Table A2 – Well Permit Data

Perm. NO.	Applicant	Twnshp	Rng	Sec	Qtr-Qtr	Use	Well Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Well Yield (gpm)	Static Water Level (ft bgs)	Grnd Elev. (USGS 10m DEM)	Sat. Thick. (ft)
832-R	GOLDEN DOME AGGREGATES LLC	2 N	67 W	2	SWNE	iRRIG.	41	ND	ND	1400	5	4862.9	36
101980	MAGNESS LAND HOLDINGS LLC	2 N	67 W	6	NESW	DOM.	30	10	30	15	6	4843.9	24
833-R	L G EVERIST INC	2 N	67 W	2	SWNE	iRRIG.	73	ND	ND	1200	23	4856.9	50
17836	KIYOTA DAISY F	2 N	67 W	2	NWNE	DOM.	65	ND	ND	14	24	4856.4	41
76600	WISSLER CLIFTON	2 N	67 W	2	NWSE	DOM.	58	38	58	25	26	4860.9	32
185088	DEVER DARREL A	2 N	67 W	2	SWSE	HOUSE.	50	30	50	15	33	4867.3	17
831-R	GOLDEN DOME AGGREGATES LLC	2 N	67 W	2	SWNE	iRRIG.	83	ND	ND	1400	33	4856.9	50
21501	RETHKE MIKE & CANDICE	2 N	67 W	11	NESE	DOM.	48	36	48	20	16	4903.0	32
48887	TIMAN WILLIAM	2 N	67 W	11	SESW	DOM.	48	ND	ND	15	20	4905.9	28
15170	SCHAFFER RICHARD L & KATHLEEN E	2 N	67 W	11	NWSE	STOCK	40	ND	ND	20	22	4903.0	18
51071	CARLSON JAMES	2 N	67 W	11	NENE	DOM.	48	34	48	15	30	4903.3	18
44686	RUYBAL CILIMON E.	2 N	67 W	14	NWNE	DOM.	50	ND	ND	2	30	4919.5	20
47721-F	JOHN T WINDELL & LAURANNE RINK	2 N	67 W	13	NWNE	COM.	72	19	29	40	4	4842.9	68
20462-R-R	MCWILLIAMS STEVEN S &	2 N	67 W	2	NESE	iRRIG.	72	32	72	600	15	4862.3	57
51071--A	CARLSON MARY E	2 N	67 W	11	NENE	DOM.	70	15	70	15	25	4862.9	45
6624-F	CARLSON JAMES	2 N	67 W	11	NENE	iRRIG.	73	53	73	700	30	4865.9	43
733-WCB	WEBER J W	2 N	67 W	2	SESE	iRRIG.	74	44	74	1100	32	4862.3	42
156925--A	KANZLER DANDLD	2 N	67 W	1	SWNW	DOM.	45	25	45	15	7.5	4830.9	37.5
15051-R	KUIPERS JOHN	2 N	67 W	12	SWNW	iRRIG.	49	ND	ND	1125	12	4842.9	37
58571--A	GANNON	2 N	67 W	2	NESE	DOM.	60	40	60	13	25	4846.0	35
830-R-R	VONFELDT DANIEL	2 N	67 W	12	SWSW	iRRIG.	52	30	50	150	17	4875.7	35
274244	VYNCKIER DONDLD & LOIS	2 N	67 W	11	SENE	DOM.	50	18	50	15	18	4872.0	32
61228-F	LEWIS WILLIAM	2 N	67 W	1	SESW	iRRIG.	33	23	33	1100	4	4840.0	29
830-R	VINCENT R J	2 N	67 W	12	SWSW	iRRIG.	50	ND	ND	500	22	4859.9	28
195690--A	MAGNESS LAND HOLDINGS LLC	2 N	66 W	6	NWSW	STOCK	40	20	40	15	12	4839.9	28
15861-R-R	KANZLER DONDLD & SHIRLEY	2 N	67 W	1	SWNW	iRRIG.	32	20	30	550	4	4832.9	28
295458	KUIPERS KACEY	2 N	67 W	12	SWNW	DOM.	45	25	45	15	20	4855.9	25
829-R	VINCENT R J	2 N	67 W	12	SESW	iRRIG.	30	ND	ND	1175	5	4846.5	25
21287	CANTRELL HOWARD & VERONICA	2 N	67 W	1	SWSW	DOM.	42	33	42	27	18	4829.9	24
55652-MH	BESTWAY CONCRETE &	2 N	67 W	13	NWNE	OTHER	23	13	23	ND	4	4843.9	19
68631	VINCENT ROLLIE J	2 N	67 W	12	NESW	DOM.	32	24	32	15	18	4842.9	14
15052-R	KUIPERS JOHN	2 N	67 W	12	SENW	iRRIG.	15	ND	ND	1800	3	4842.9	12
53424-F	MULLENDX MARK D	2 N	67 W	2	SWSE	iRRIG.	57	ND	ND	300	ND	4863.9	ND
285344	CANTRELL HOWARD & VERONICA	2 N	67 W	1	SESW	DOM.	40	ND	ND	25	ND	4842.9	ND
132579	MULHAUSEN GEORGE W.	2 N	67 W	11	SENE	DOM.	35	ND	ND	20	ND	4864.9	ND
52-WCB	VINCENT ROLLIE J	2 N	67 W	12	SESW	iRRIG.	34	ND	ND	750	ND	4842.9	ND
256143	TRC ENVIRONMENTAL	2 N	67 W	11	SESE	OTHER	24	14	24	ND	ND	4890.9	ND
258578	SW CHAMBERS LLC	2 N	67 W	13	NWNE	DOM.	19	9	19	ND	ND	4843.9	ND
258579	SW CHAMBERS LLC	2 N	67 W	13	NENE	DOM.	19	9	19	ND	ND	4844.9	ND
					Minimum		15.0	9.0	19.0	2.0	3.0	4829.9	12.0
					Maximum		83.0	53.0	74.0	1800.0	33.0	4919.5	68.0
					Average		46.8	26.0	44.5	432.6	17.6	4860.5	32.6

Table A3 – Bennett Pit Borehole Data

Borehole ID	30 DEM Elev.	COSPN_X	COSPN_Y	Hole Depth (ft)	Depth to Weathered Bedrock (ft)	Depth to Bedrock (ft)	Depth to Water (ft)	Water Elev. (msl)	Sat. Thick (ft)
BH-10	4833.9	3185356.6	1302925.6	60.8	44.7	47.0	6.0	4827.9	41.0
BH-11	4832.9	3186033.7	1302593.7	38.3	31.5	34.5	4.5	4828.4	30.0
BH-12	4833.9	3185778.9	1302135.3	46.0	37.0	38.0	3.0	4830.9	35.0
BH-13	4834.9	3185599.7	1301164.4	50.7	38.0	39.2	4.0	4830.9	35.2
BH-14	4836.7	3185764.1	1300792.2	42.6	38.0	40.0	4.2	4832.5	35.8
BH-15	4839.9	3185603.8	1300098.6	55.5	43.3	45.3	4.5	4835.4	40.8
BH-16	4840.9	3185340.0	1299645.8	53.4	46.5	46.8	5.0	4835.9	41.8
BH-17	4842.9	3184786.6	1299086.1	35.5	25.6	26.4	4.5	4838.4	21.9
BH-18	4842.9	3184233.3	1299705.7	41.0	27.0	34.0	4.0	4838.9	30.0
BH-19	4839.4	3184011.0	1300617.3	30.3	28.0	30.0	5.8	4833.6	24.2
BH-20	4838.9	3184061.2	1301035.1	41.0	27.5	29.0	4.0	4834.9	25.0
BH-21	4836.9	3184782.2	1301596.2	38.0	32.5	37.2	4.5	4832.4	32.7
BH-22	4835.9	3184826.0	1302088.8	57.0	43.5	45.0	3.6	4832.3	41.4
BH-23	4834.9	3184778.9	1302506.4	45.5	34.0	40.0	4.1	4830.8	35.9
Average				45.4	35.5	38.0	4.4	4833.1	**33.6**

Table A4 – Model Mass Balance (Run SS4 (wPit)

MODEL OUTFLOW	(cfs)	MODEL INFLOW	(cfs)	IN-OUT
Storage	0	Storage	0	0.00
constant Head	3.50	constant Head	3.46	-0.035
River Leakage	2.96	River Leakage	2.99	0.035
Total	6.46	**Total**	6.46	0.00

FLOODPLAIN STUDY

BENNETT PIT

WELD COUNTY, COLORADO

MAY 2017
REVISED OCTOBER 2017

NORTHERN COLORADO CONSTRUCTORS, INC.
9075 WCR 10
FORT LUPTON, CO 80621

PREPARED BY:

J&T Consulting, Inc.
305 DENVER AVENUE – SUITE D
FORT LUPTON, CO 80621
PHONE: 303-857-6222
FAX: 303-857-6224

J&T Consulting, Inc.

October 12, 2017

Division of Reclamation, Mining, & Safety
Attn: Mr. Peter Hays – Environmental Protection Specialist II
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Northern Colorado Constructors, Inc. Bennett Pit
Floodplain Study

Mr. Hays:

We have prepared this letter to address the requirements of the Division of Reclamation, Mining, & Safety for the Northern Colorado Constructors, Inc. Bennett Pit.

The proposed mining operation will be conducted within the 100-yr floodplain and the 100-yr floodway. The attached floodplain map indicates the location of the 100-yr floodplain and floodway as determined by our hydraulic modeling. The affect the mining operation has on the 100-yr floodplain is the stockpiling of aggregate product generated by processing the sand and gravel deposit through the processing facility and the stockpiling of overburden and topsoil that is stripped from the site prior to mining. We assumed the largest blockouts in the floodplain by the product stockpiles and house lots in the floodplain to determine the worst case affect on the floodplain.

The topography shown on the floodplain map in ***Appendix A*** was developed from 2013 DRCOG 1 foot interval LIDAR topography. The LIDAR topography only extends to the top of water surface of the river. Ground survey was done to verify the river invert adjacent to the site relative to the water surface. It was found that the invert was 4 feet below the top of water found in the LIDAR topography. The invert in the cross sections in the model were modified lower by 4 feet to accurately model the river invert.

An existing floodplain/floodway model was not available for this area of the South Platte River. We developed our models using the aforementioned topography and HEC-RAS 5.0.3. Our models were tied into a previous studies done near the site. We tied into the Special Flood Hazard Information Report (SFHIR), South Platte River, Volume I, Weld County, Colorado, dated April 1977, completed by the Department of the Army, Omaha District, Corps of Engineers, 68102. The 100-yr flow of 29,000 cfs and 100-yr flood elevation of 4847 for section 67 from the SFHIR were used at the southern (upstream) limit of our modeling, and the 100-yr flood elevation of 4799.5 for section 66 of the SFHIR was used at the northern (downstream) limit of our modeling. The NGVD 29 elevations shown in the SFHIR were adjusted to NAVD 88 datum per the National Geodetic Survey's online Vertcon orthographic height conversion utility. The datum shift from NGVD 29 to NAVD88 in the area of the site was +2.943 feet. Pertinent portions of the SFHIR that were referenced and used in our modeling are located in ***Appendix D***.

Three models were developed for the site:

1) An existing floodplain/floodway model showing the limits and elevations of the existing 100-yr floodplain and floodway.

2) A floodplain/floodway model during the mining activities showing affect on the 100-yr floodplain and floodway resulting from the stockpiles and partially mined pit.

3) A future conditions floodplain/floodway model showing the affect on the 100-yr floodplain and floodway from the house lots after reclamation of the site is complete.

Additional cross-sections HECXS4.1, HECXS5.1, HECXS6.1, and HECXS7.1 were added in all three models in the portion of the reach that includes the pit to more accurately model this area.

Because an existing floodplain/floodway model was not available for this area we developed the existing conditions model using cross-sections taken from the aforementioned DRCOG topography. This model includes a base flood elevation model for the floodplain, and an encroachment model for the floodway. Weld County requires that the encroachment model for the floodway produces a maximum rise of 0.5 feet from the floodplain elevations. We used this criteria to model the existing floodway. We also used this criteria to model the floodway for the mining and future conditions models. Please refer to the HEC-RAS output information located in ***Appendix C*** for the existing, mining, and the future conditions models output.

In the mining conditions model, blockouts were added to sections 5, 5.1, and 6 to simulate the stockpiles during mining and the scale house. Note that the scale house is located outside the floodplain. The pit areas were assumed to be partially mined, I.e. overburden/topsoil had been stripped and stockpiled, and a volume of sand and gravel had been removed equal to the stockpile volumes in the processing area.

In the future conditions model, two (2) 4.1 feet high by 200 feet wide blockouts were added to section 4 to simulate the future house lots. The adjacent reclaimed reservoir was assumed to be full of water to a depth equaling the lowest point on the property where water would overtop the reservoirs edge.

No fill, stockpiling, or structures are located in the 100-yr floodway or cause a rise in the 100-yr floodplain elevation; therefore the operation will not increase the flood risk on neighboring properties. ***Appendix B*** summarizes the 100-yr floodplain/floodway elevations for each model and the associated rise (or fall) from the existing 100-yr floodplain elevation at each section. ***Appendix B*** also summarizes the 100-yr base flood elevation at each structure, their associated highest and lowest adjacent grades, and the minimum lowest floor elevations for each structure.

Please feel free to contact us if you need any additional information or have any questions or comments.

Sincerely,

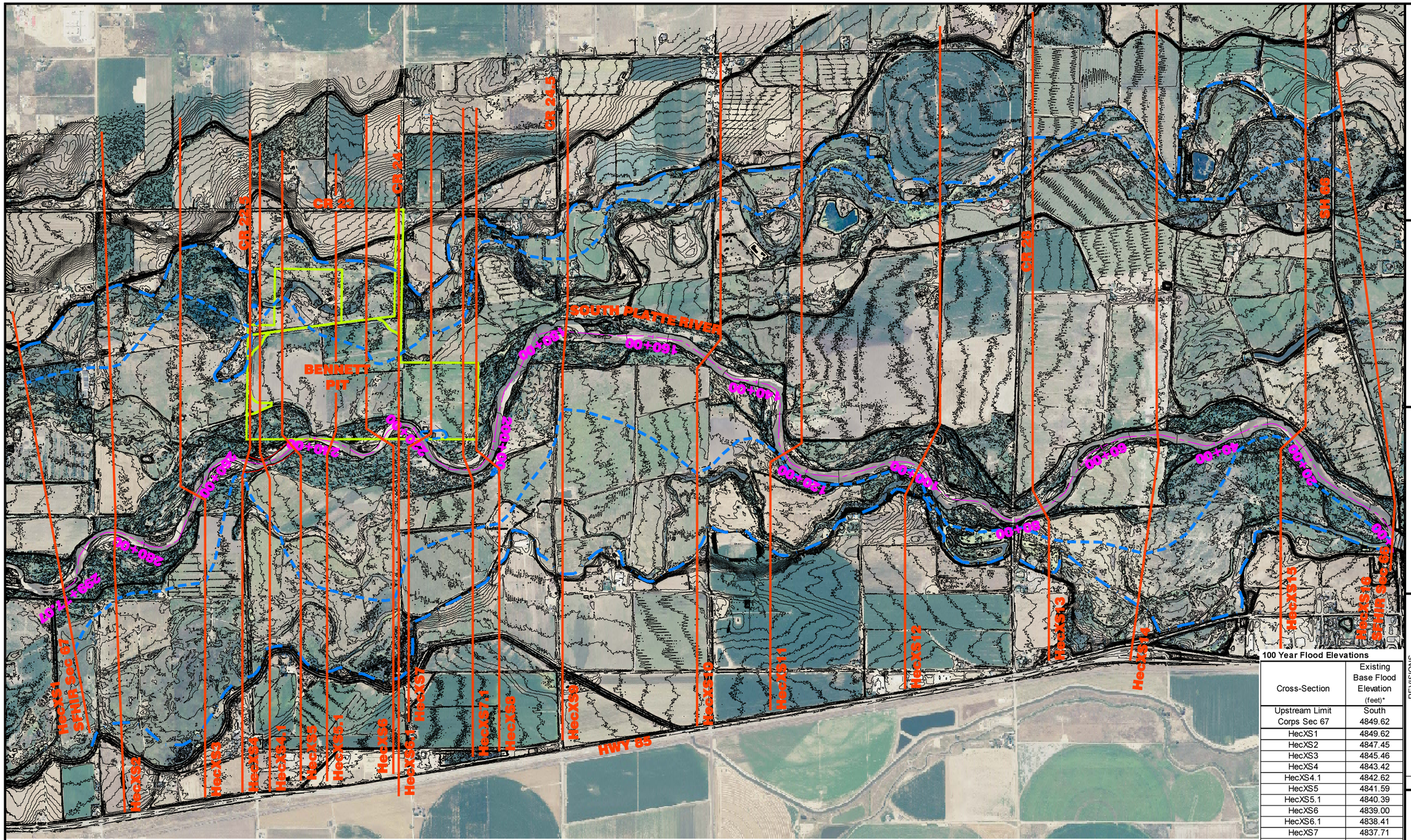
Mr. J.C. York, P.E.

Attachments:

Appendix A – Floodplain Maps
Appendix B – 100-yr Floodplain Elevation Summary
Appendix C – HECRAS Output Files
Appendix D – SFHIR information
Appendix E – Side Channel Spillway Maps and Calculations

Appendix A

Floodplain Maps



EXISTING CONTOURS

EXISTING 100-YR FLOODPLAIN

EXISTING 100-YR FLOODWAY

HecXS1
100+00
HEC-RAS CROSS-SECTION LOCATION
RIVER ALIGNMENT AND STATIONING

800 400 0 800 1600 2400
SCALE IN FEET

100 Year Flood Elevations

Cross-Section	Existing Base Flood Elevation (feet)*
Upstream Limit Corps Sec 67	South 4849.62
HecXS1	4849.62
HecXS2	4847.45
HecXS3	4845.46
HecXS4	4843.42
HecXS4.1	4842.62
HecXS5	4841.59
HecXS5.1	4840.39
HecXS6	4839.00
HecXS6.1	4838.41
HecXS7	4837.71
HecXS7.1	4835.91
HecXS8	4835.60
HecXS9	4831.11
HecXS10	4825.77
HecXS11	4822.20
HecXS12	4818.04
HecXS13	4813.67
HecXS14	4808.85
HecXS15	4803.00
HecXS16	4799.50
Downstream Limit Corps Sec 66	North 4799.50

*All elevations on NAVD88 Datum

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Bennett Pit

Floodplain Map - Existing

Northern Colorado Constructors, Inc.

REVISIONS

No	Description	Date	By	Chk

Job #	16116
Date	10.12.17
Drawn By	CMSH
Designed By	TPY
Checked By	JCY
File	JT-Bennet GIS
Scale	1" = 800'

Sheet: 1 Of: 3

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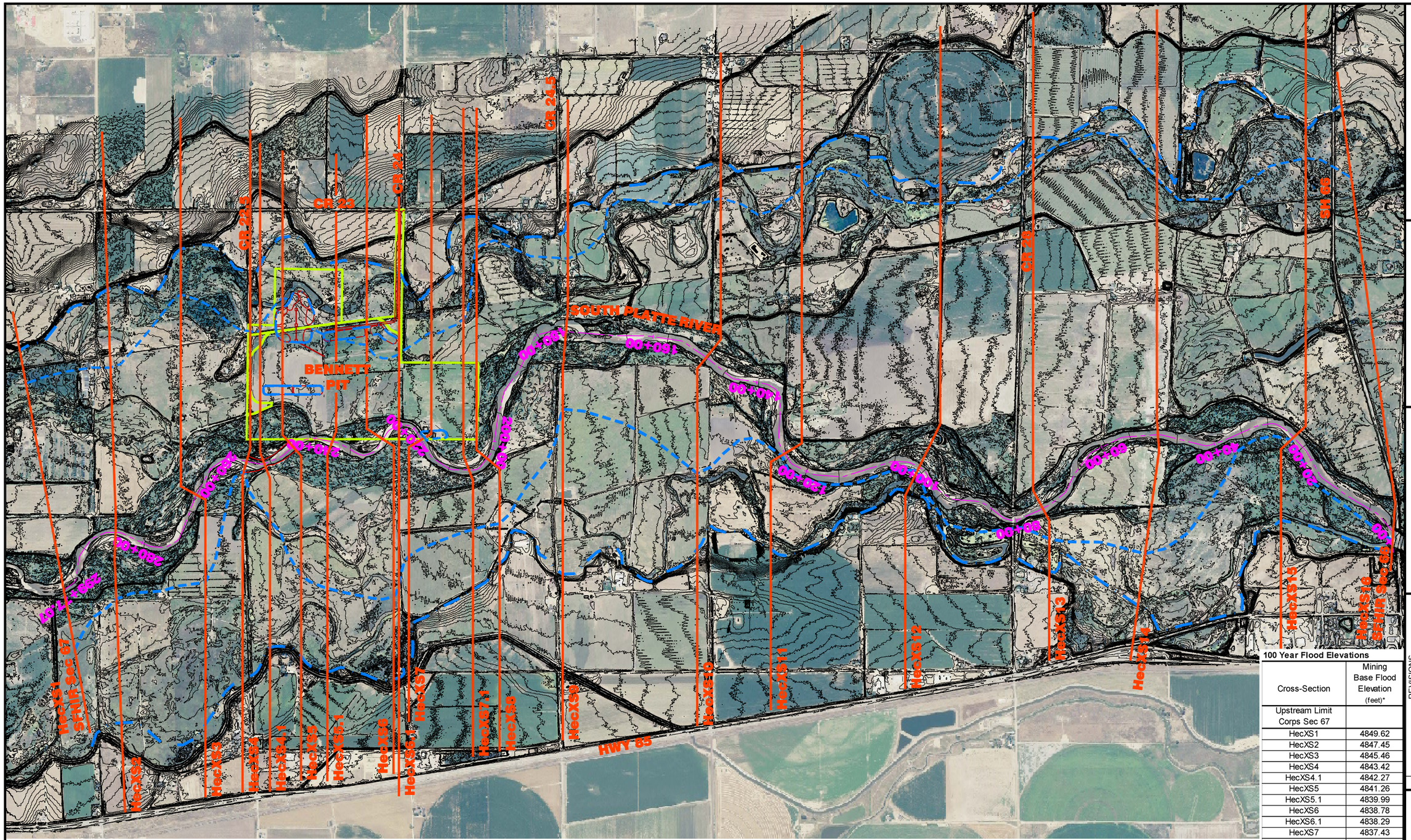

EXISTING CONTOURS

100-YR FLOODPLAIN DURING MINING

100-YR FLOODWAY DURING MINING

HecXS1
100+00
HEC-RAS CROSS-SECTION LOCATION
RIVER ALIGNMENT AND STATIONING

800 400 0 800 1600 2400

SCALE IN FEET

100 Year Flood Elevations

Cross-Section	Mining Base Flood Elevation (feet)*
Upstream Limit Corps Sec 67	
HecXS1	4849.62
HecXS2	4847.45
HecXS3	4845.46
HecXS4	4843.42
HecXS4.1	4842.27
HecXS5	4841.26
HecXS5.1	4839.99
HecXS6	4838.78
HecXS6.1	4838.29
HecXS7	4837.43
HecXS7.1	4835.88
HecXS8	4835.60
HecXS9	4831.11
HecXS10	4825.77
HecXS11	4822.20
HecXS12	4818.04
HecXS13	4813.67
HecXS14	4808.85
HecXS15	4803.00
HecXS16	4799.50
Downstream Limit Corps Sec 66	North 4799.50

*All elevations on NAVD88 Datum

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Bennett Pit

Floodplain Map - Mining

Northern Colorado Constructors, Inc.

REVISIONS

No	Date	By	Chk	Description

Job #	16116
Date	10.12.17
Drawn By	CMSH
Designed By	TPY
Checked By	JCY
File	JT-Bennet GIS
Scale	1" = 800'

Sheet: 2 Of: 3

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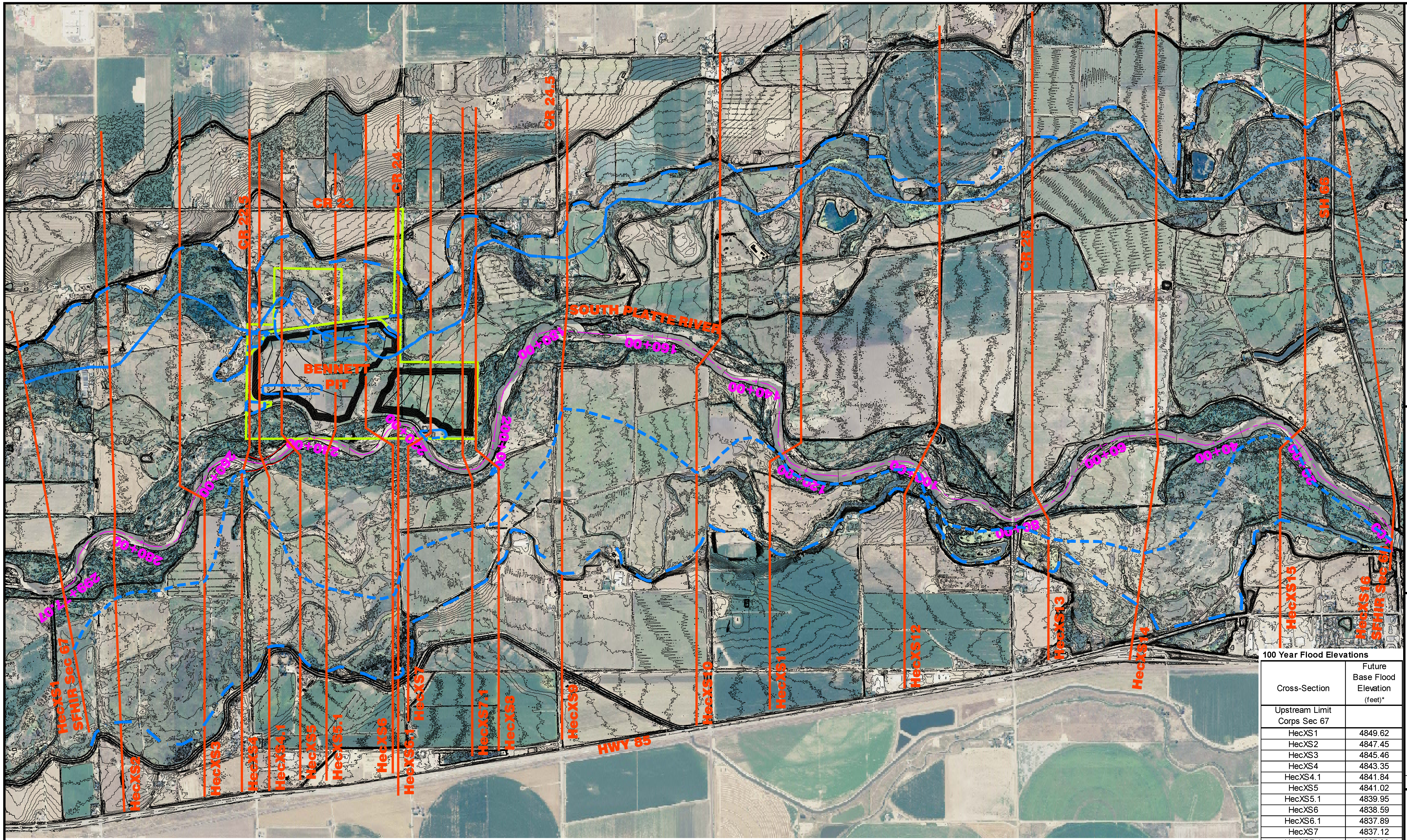

LEGEND

EXISTING CONTOURS
PROPOSED 100–YR FLOODPLAIN
PROPOSED 100–YR FLOODWAY
HecXS1 HEC–RAS CROSS–SECTION LOCATION
100+00 RIVER ALIGNMENT AND STATIONING

800 400 0 800 1600 2400
SCALE IN FEET

100 Year Flood Elevations

Cross-Section	Future Base Flood Elevation (feet)*
Upstream Limit Corps Sec 67	
HecXS1	4849.62
HecXS2	4847.45
HecXS3	4845.46
HecXS4	4843.35
HecXS4.1	4841.84
HecXS5	4841.02
HecXS5.1	4839.95
HecXS6	4838.59
HecXS6.1	4837.89
HecXS7	4837.12
HecXS7.1	4835.88
HecXS8	4835.60
HecXS9	4831.11
HecXS10	4825.77
HecXS11	4822.20
HecXS12	4818.04
HecXS13	4813.67
HecXS14	4808.85
HecXS15	4803.00
HecXS16	4799.50
Downstream Limit Corps Sec 66	

*All elevations on NAVD88 Datum

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Bennett Pit

Floodplain Map - Proposed

Northern Colorado Constructors, Inc.

REVISIONS

No	Date	By	Chk	Description

Job #	16116
Date	10.12.17
Drawn By	CMSH
Designed By	TPY
Checked By	JCY
File	JT-Bennet GIS
Scale	1" = 800'

Sheet: 3 Of: 3

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Appendix B

Floodplain Elevations Summary

J&T Consulting, Inc.

Northern Colorado Constructors, Inc.

Bennett Pit
10/12/2017
cmsh
16116 Bennett Pit Floodplain Elevation Summary

100-yr Floodplain Elevation Summary

100 Year Flood Elevations

Cross-Section	River Station (feet)	Existing Base Flood Elevation (feet)*	Existing Floodway Elevation (feet)*	Base Flood to Floodway Change (feet)*	Mining Base Flood Elevation (feet)*	Existing to Mining Change (feet)*	Mining Floodway Elevation (feet)*	Existing to Mining Change (feet)*	Future Base Flood Elevation (feet)*	Existing to Future Change (feet)*	Future Floodway Elevation (feet)*	Existing to Future Change (feet)*
Upstream Limit Corps Sec 67	29977.07	South 4849.62										
HecXS1	29977.07	4849.62	4850.10	0.48	4849.62	0.00	4850.10	0.00	4849.62	0.00	4850.10	0.00
HecXS2	28500	4847.45	4847.90	0.45	4847.45	0.00	4847.90	0.00	4847.45	0.00	4847.90	0.00
HecXS3	26500	4845.46	4845.95	0.49	4845.46	0.00	4845.92	-0.03	4845.46	0.00	4845.90	-0.05
HecXS4	25313.88	4843.42	4843.90	0.48	4843.42	0.00	4843.90	0.00	4843.35	-0.07	4843.81	-0.09
HecXS4.1	25000	4842.62	4843.08	0.46	4842.27	-0.35	4842.72	-0.36	4841.84	-0.78	4842.33	-0.75
HecXS5	24421.62	4841.59	4842.06	0.47	4841.26	-0.33	4841.72	-0.34	4841.02	-0.57	4841.47	-0.59
HecXS5.1	23701.35	4840.39	4840.85	0.46	4839.99	-0.40	4840.46	-0.39	4839.95	-0.44	4840.00	-0.85
HecXS6	22651.94	4839.00	4839.46	0.46	4838.78	-0.22	4839.24	-0.22	4838.59	-0.41	4839.08	-0.38
HecXS6.1	22273.76	4838.41	4838.87	0.46	4838.29	-0.12	4838.75	-0.12	4837.89	-0.52	4838.30	-0.57
HecXS7	21768.17	4837.71	4838.19	0.48	4837.43	-0.28	4837.89	-0.30	4837.12	-0.59	4837.55	-0.64
HecXS7.1	20720.93	4835.91	4836.36	0.45	4835.88	-0.03	4836.34	-0.02	4835.88	-0.03	4836.34	-0.02
HecXS8	20325.92	4835.60	4836.08	0.48	4835.60	0.00	4836.08	0.00	4835.60	0.00	4836.08	0.00
HecXS9	17500	4831.11	4831.56	0.45	4831.11	0.00	4831.56	0.00	4831.11	0.00	4831.56	0.00
HecXS10	15000	4825.77	4826.22	0.45	4825.77	0.00	4826.22	0.00	4825.77	0.00	4826.22	0.00
HecXS11	12500	4822.20	4822.66	0.46	4822.20	0.00	4822.66	0.00	4822.20	0.00	4822.66	0.00
HecXS12	10000	4818.04	4818.52	0.48	4818.04	0.00	4818.52	0.00	4818.04	0.00	4818.52	0.00
HecXS13	7500	4813.67	4814.14	0.47	4813.67	0.00	4814.14	0.00	4813.67	0.00	4814.14	0.00
HecXS14	5000	4808.85	4809.33	0.48	4808.85	0.00	4809.33	0.00	4808.85	0.00	4809.33	0.00
HecXS15	2500	4803.00	4803.47	0.47	4803.00	0.00	4803.47	0.00	4803.00	0.00	4803.47	0.00
HecXS16	100	4799.50	4799.50	0.00	4799.50	0.00	4799.50	0.00	4799.50	0.00	4799.50	0.00
Downstream Limit Corps Sec 66	100	North 4799.50										

*All elevations on NAVD88 Datum

Structures - 100 Year Base Flood Elevations

Structure	River Station (feet)	Existing Base Flood Elevation (feet)*	Highest Adjacent Grade (feet)*	Lowest Adjacent Grade (feet)*	Lowest First Floor Elevation (feet)*
Asphalt/ Concrete Batch Plant	24422	4841.59	4842.60	4842.60	4842.59
Scale House	22274	4838.41	4844.25	4843.95	4839.41
Lot 1	22274	4838.41	4839.50	4839.50	4839.41
Lot 2	25314	4843.42	4844.50	4844.50	4844.42
Lot 3	25314	4843.42	4844.50	4844.50	4844.42
House	21768	4837.71	4839.20	4838.80	4838.71

*All elevations on NAVD88 Datum

Appendix C

HEC-RAS Output

HEC-RAS Plan: Existing River: S Platte Reach: Alignment - Sout

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)	
Alignment - Sout	29977.07	PF 1	29000.00	4839.00	4849.62	4848.25	4849.69	0.000837	5.05	16893.09	6577.21	0.27
Alignment - Sout	29977.07	PF 2	29000.00	4839.00	4850.10	4848.37	4850.18	0.000816	5.13	14928.03	4605.13	0.27
Alignment - Sout	28500	PF 1	29000.00	4837.00	4847.45		4847.62	0.001044	6.23	14488.28	7201.73	0.34
Alignment - Sout	28500	PF 2	29000.00	4837.00	4847.90		4848.11	0.001045	6.41	11778.51	3879.60	0.34
Alignment - Sout	26500	PF 1	29000.00	4834.00	4845.46		4845.59	0.000788	5.73	17543.23	8247.83	0.30
Alignment - Sout	26500	PF 2	29000.00	4834.00	4845.95		4846.09	0.000761	5.79	15056.69	5182.78	0.30
Alignment - Sout	25313.88	PF 1	29000.00	4832.00	4843.42	4843.42	4844.16	0.002507	10.27	9198.46	6382.06	0.54
Alignment - Sout	25313.88	PF 2	29000.00	4832.00	4843.90		4844.71	0.002403	10.33	6876.29	2287.95	0.53
Alignment - Sout	25000	PF 1	29000.00	4832.00	4842.62	4842.26	4842.90	0.001736	8.03	12703.74	6513.91	0.43
Alignment - Sout	25000	PF 2	29000.00	4832.00	4843.08	4842.43	4843.40	0.001708	8.20	10715.63	4151.30	0.43
Alignment - Sout	24421.62	PF 1	29000.00	4831.00	4841.59		4841.79	0.001188	6.71	14737.67	7262.99	0.36
Alignment - Sout	24421.62	PF 2	29000.00	4831.00	4842.06		4842.29	0.001159	6.83	12837.71	5005.07	0.36
Alignment - Sout	23701.35	PF 1	29000.00	4830.00	4840.39		4840.76	0.001547	7.65	12430.82	6876.97	0.42
Alignment - Sout	23701.35	PF 2	29000.00	4830.00	4840.85		4841.27	0.001533	7.84	10686.39	4722.99	0.42
Alignment - Sout	22651.94	PF 1	29000.00	4829.00	4839.00		4839.18	0.001106	6.28	15043.46	7269.60	0.35
Alignment - Sout	22651.94	PF 2	29000.00	4829.00	4839.46		4839.67	0.001096	6.44	12599.55	4518.96	0.35
Alignment - Sout	22273.76	PF 1	29000.00	4828.00	4838.41		4838.67	0.001580	7.61	12808.74	6620.55	0.42
Alignment - Sout	22273.76	PF 2	29000.00	4828.00	4838.87		4839.17	0.001563	7.79	10676.05	3994.61	0.42
Alignment - Sout	21768.17	PF 1	29000.00	4827.00	4837.71		4837.93	0.001178	6.74	13249.54	5594.77	0.36
Alignment - Sout	21768.17	PF 2	29000.00	4827.00	4838.19		4838.44	0.001144	6.84	11665.74	3927.79	0.36
Alignment - Sout	20720.93	PF 1	29000.00	4826.00	4835.91		4836.10	0.001168	6.39	13796.55	6334.74	0.36
Alignment - Sout	20720.93	PF 2	29000.00	4826.00	4836.36		4836.58	0.001164	6.57	12335.02	4785.90	0.36
Alignment - Sout	20325.92	PF 1	29000.00	4826.50	4835.60		4835.70	0.000847	5.12	15986.41	6070.54	0.30
Alignment - Sout	20325.92	PF 2	29000.00	4826.50	4836.08		4836.19	0.000825	5.22	14828.76	4911.70	0.30
Alignment - Sout	17500	PF 1	29000.00	4821.00	4831.11		4831.64	0.002250	7.59	9047.41	6059.00	0.48
Alignment - Sout	17500	PF 2	29000.00	4821.00	4831.56		4832.19	0.002263	7.90	6828.64	2510.21	0.49
Alignment - Sout	15000	PF 1	29000.00	4817.00	4825.77		4825.96	0.001174	5.99	13998.32	6647.48	0.36
Alignment - Sout	15000	PF 2	29000.00	4817.00	4826.22		4826.45	0.001169	6.19	12355.53	4817.37	0.36

HEC-RAS Plan: Existing River: S Platte Reach: Alignment - Sout (Continued)

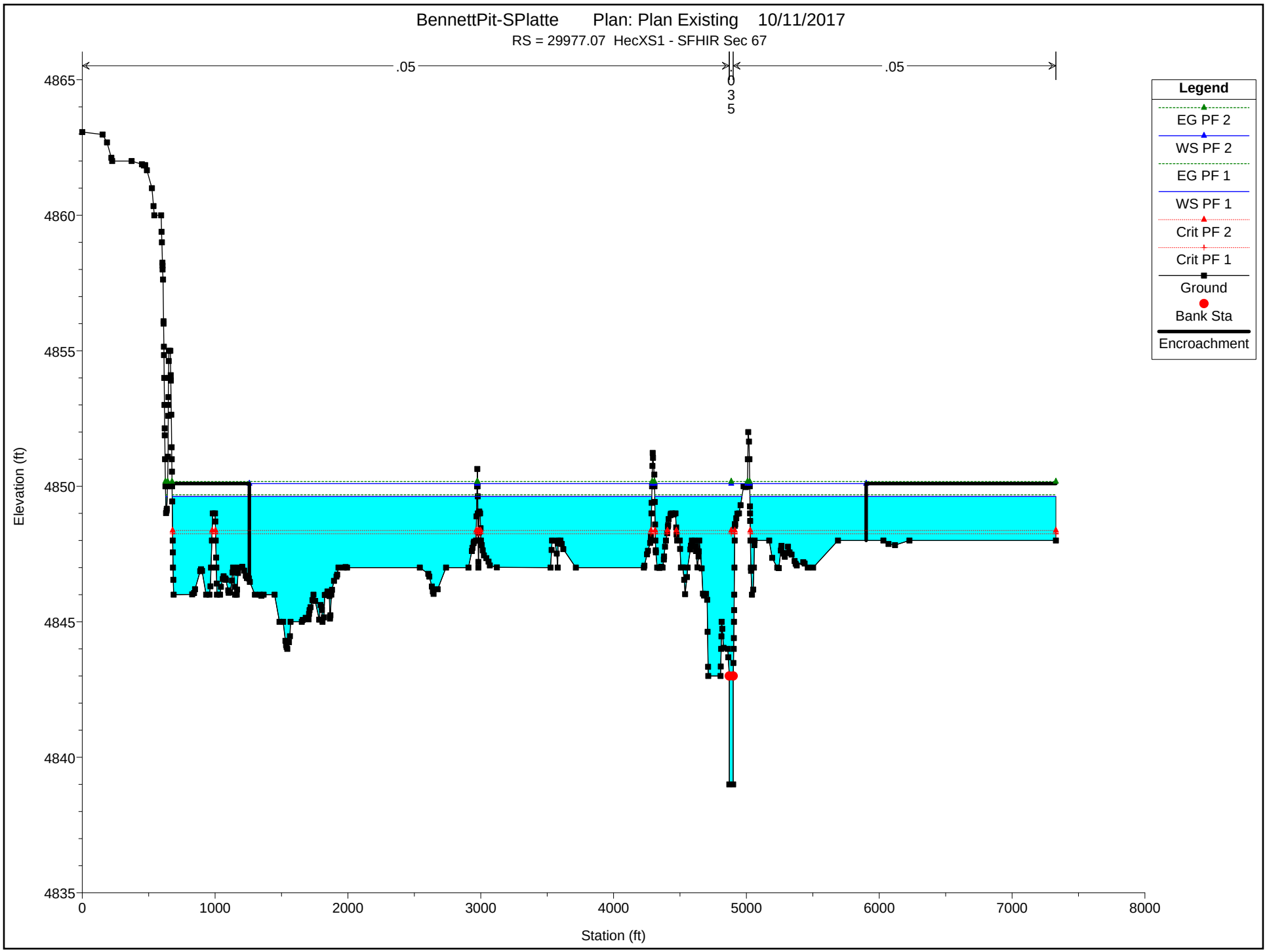
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment - Sout	12500	PF 1	29000.00	4813.00	4822.20		4822.33	0.001173	6.01	14183.09	6780.52	0.35
Alignment - Sout	12500	PF 2	29000.00	4813.00	4822.66		4822.81	0.001172	5.96	12785.45	4739.95	0.34
Alignment - Sout	10000	PF 1	29000.00	4809.00	4818.04		4818.20	0.001471	6.21	12567.77	6355.34	0.39
Alignment - Sout	10000	PF 2	29000.00	4809.00	4818.52		4818.69	0.001452	6.21	11749.52	4322.64	0.38
Alignment - Sout	7500	PF 1	29000.00	4805.00	4813.67		4813.82	0.001273	4.98	13167.78	5993.47	0.35
Alignment - Sout	7500	PF 2	29000.00	4805.00	4814.14		4814.31	0.001241	5.17	13387.70	6140.22	0.35
Alignment - Sout	5000	PF 1	29000.00	4801.00	4808.85		4809.07	0.001682	6.64	12398.39	6746.85	0.42
Alignment - Sout	5000	PF 2	29000.00	4801.00	4809.33		4809.58	0.001617	6.78	11361.93	5067.14	0.41
Alignment - Sout	2500	PF 1	29000.00	4799.00	4803.00		4803.06	0.000717	2.77	15783.07	5362.87	0.24
Alignment - Sout	2500	PF 2	29000.00	4799.00	4803.47		4803.53	0.000706	2.94	15309.62	4685.95	0.25
Alignment - Sout	100	PF 1	29000.00	4794.55	4799.50	4798.57	4799.68	0.002320	5.79	11051.52	5707.91	0.46
Alignment - Sout	100	PF 2	29000.00	4794.55	4799.50	4798.88	4799.87	0.004148	7.72	8048.47	4344.74	0.61

HEC-RAS Plan: Existing River: S Platte Reach: Alignment - Sout

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	29977.07	PF 1	4849.62		4849.69	6577.21	22136.66	1556.83	5306.52		4871.24	4900.28	
Alignment - Sout	29977.07	PF 2	4850.10	0.48	4850.18	4605.13	23774.86	1654.12	3571.02	1258.03	4871.24	4900.28	5901.58
Alignment - Sout	28500	PF 1	4847.45		4847.62	7201.73	18588.30	6473.98	3937.72		6813.27	6912.74	
Alignment - Sout	28500	PF 2	4847.90	0.45	4848.11	3879.60	19466.88	6947.56	2585.56	4048.41	6813.27	6912.74	8022.92
Alignment - Sout	26500	PF 1	4845.46		4845.59	8247.83	17398.72	6029.69	5571.59		6636.20	6728.02	
Alignment - Sout	26500	PF 2	4845.95	0.49	4846.09	5182.78	18344.14	6350.09	4305.77	3033.43	6636.20	6728.02	8216.20
Alignment - Sout	25313.88	PF 1	4843.42		4844.16	6382.06	13567.23	12170.71	3262.06		5653.96	5757.75	
Alignment - Sout	25313.88	PF 2	4843.90	0.48	4844.71	2287.95	13883.79	12756.98	2359.24	3262.08	5653.96	5757.75	5863.50
Alignment - Sout	25000	PF 1	4842.62		4842.90	6513.91	11992.60	6836.37	10171.03		5481.43	5561.65	
Alignment - Sout	25000	PF 2	4843.08	0.46	4843.40	4151.30	12134.24	7281.66	9584.10	3386.44	5481.43	5561.65	7537.74
Alignment - Sout	24421.62	PF 1	4841.59		4841.79	7262.99	12917.94	7331.05	8751.02		5111.35	5214.51	
Alignment - Sout	24421.62	PF 2	4842.06	0.47	4842.29	5005.07	12963.29	7788.44	8248.27	2493.94	5111.35	5214.51	7499.01
Alignment - Sout	23701.35	PF 1	4840.39		4840.76	6876.97	11013.97	10748.01	7238.02		4890.80	5025.92	
Alignment - Sout	23701.35	PF 2	4840.85	0.46	4841.27	4722.99	10682.65	11497.33	6820.03	2724.71	4890.80	5025.92	7503.32
Alignment - Sout	22651.94	PF 1	4839.00		4839.18	7269.60	7473.52	7260.08	14266.40		5698.23	5813.94	
Alignment - Sout	22651.94	PF 2	4839.46	0.46	4839.67	4518.96	6382.73	7788.33	14828.94	4018.89	5698.23	5813.94	8561.03
Alignment - Sout	22273.76	PF 1	4838.41		4838.67	6620.55	10831.35	7256.01	10912.63		5252.02	5343.67	
Alignment - Sout	22273.76	PF 2	4838.87	0.46	4839.17	3994.61	9974.28	7756.12	11269.60	3741.38	5252.02	5343.67	7765.13
Alignment - Sout	21768.17	PF 1	4837.71		4837.93	5594.77	12611.71	7517.33	8870.97		5616.58	5720.81	
Alignment - Sout	21768.17	PF 2	4838.19	0.48	4838.44	3927.79	12744.00	7971.54	8284.46	3715.58	5616.58	5720.81	7813.81
Alignment - Sout	20720.93	PF 1	4835.91		4836.10	6334.74	12899.69	7100.42	8999.89		6193.90	6306.01	
Alignment - Sout	20720.93	PF 2	4836.36	0.45	4836.58	4785.90	13912.78	7636.76	7450.46	2559.78	6193.90	6306.01	7389.06
Alignment - Sout	20325.92	PF 1	4835.60		4835.70	6070.54	16893.62	4599.71	7506.67		6088.13	6186.94	
Alignment - Sout	20325.92	PF 2	4836.08	0.48	4836.19	4911.70	18240.33	4944.16	5815.50	2396.05	6088.13	6186.94	7316.98
Alignment - Sout	17500	PF 1	4831.11		4831.64	6059.00	6424.32	16224.30	6351.38		3779.50	4055.29	
Alignment - Sout	17500	PF 2	4831.56	0.44	4832.19	2510.21	4699.07	17851.17	6449.76	2728.62	3779.50	4055.29	5288.39
Alignment - Sout	15000	PF 1	4825.77		4825.96	6647.48	11383.17	8710.03	8906.80		5223.39	5389.19	
Alignment - Sout	15000	PF 2	4826.22	0.45	4826.45	4817.37	11116.67	9455.66	8427.67	2496.10	5223.39	5389.19	7360.21
Alignment - Sout	12500	PF 1	4822.20		4822.33	6780.52	22036.83	4620.31	2342.87		7144.12	7227.75	

HEC-RAS Plan: Existing River: S Platte Reach: Alignment - Sout (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	12500	PF 2	4822.66	0.46	4822.81	4739.95	24182.02	4817.98		2434.65	7144.12	7227.75	7227.75
Alignment - Sout	10000	PF 1	4818.04		4818.20	6355.34	22247.18	5060.46	1692.36		7602.21	7703.56	
Alignment - Sout	10000	PF 2	4818.52	0.47	4818.69	4322.64	23647.41	5352.60		3051.84	7602.21	7703.56	7703.56
Alignment - Sout	7500	PF 1	4813.67		4813.82	5993.47	16205.33	8930.76	3863.91		8369.07	8661.51	
Alignment - Sout	7500	PF 2	4814.14	0.47	4814.31	6140.22	16711.75	9973.61	2314.64	2542.34	8369.07	8661.51	9095.49
Alignment - Sout	5000	PF 1	4808.85		4809.07	6746.85	15014.16	7572.53	6413.31		7213.66	7359.05	
Alignment - Sout	5000	PF 2	4809.33	0.48	4809.58	5067.14	15496.66	8204.72	5298.62	2904.84	7213.66	7359.05	9350.06
Alignment - Sout	2500	PF 1	4803.00		4803.06	5362.87	27178.84	1671.33	149.82		7520.75	7672.12	
Alignment - Sout	2500	PF 2	4803.47	0.47	4803.53	4685.95	27016.68	1983.32		2737.07	7520.75	7672.12	7672.12
Alignment - Sout	100	PF 1	4799.50		4799.68	5707.91	22349.71	6553.38	96.91		7883.19	8111.83	
Alignment - Sout	100	PF 2	4799.50	0.00	4799.87	4344.74	20261.61	8738.39		1832.97	7883.19	8111.83	8111.83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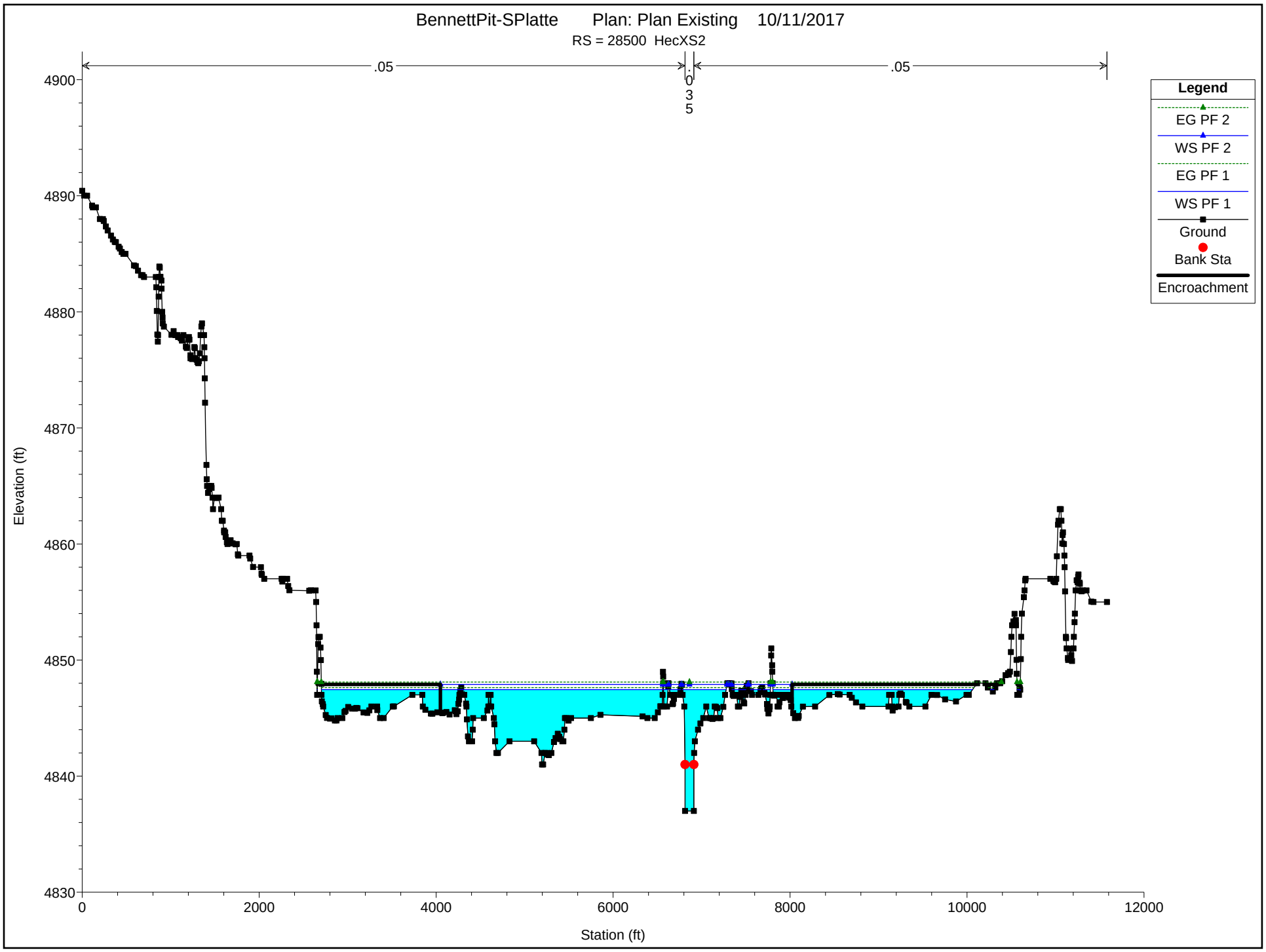
.05
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4865
4860
4855
4850
4845
4840
4835
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)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WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
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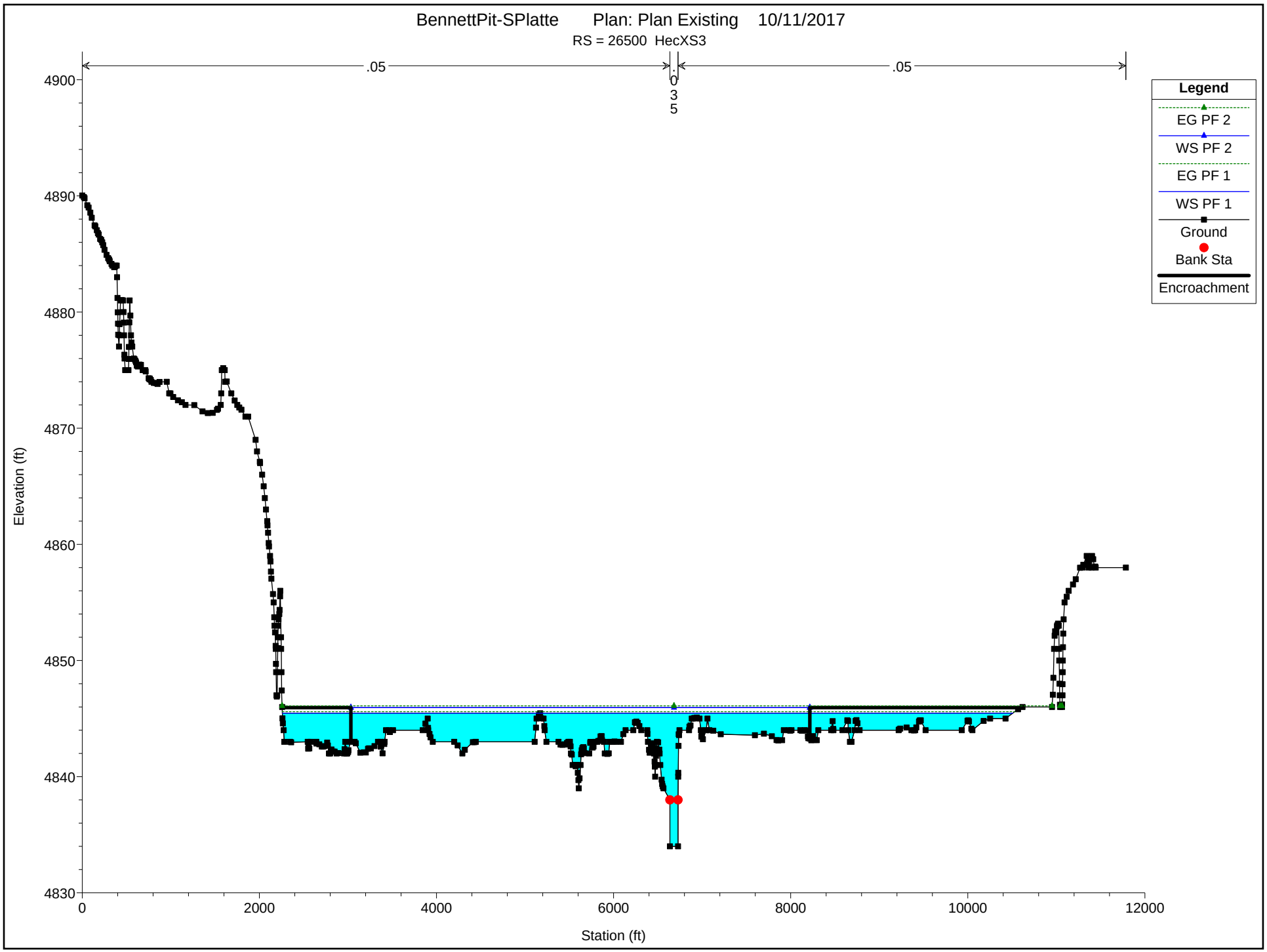
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000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.03
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
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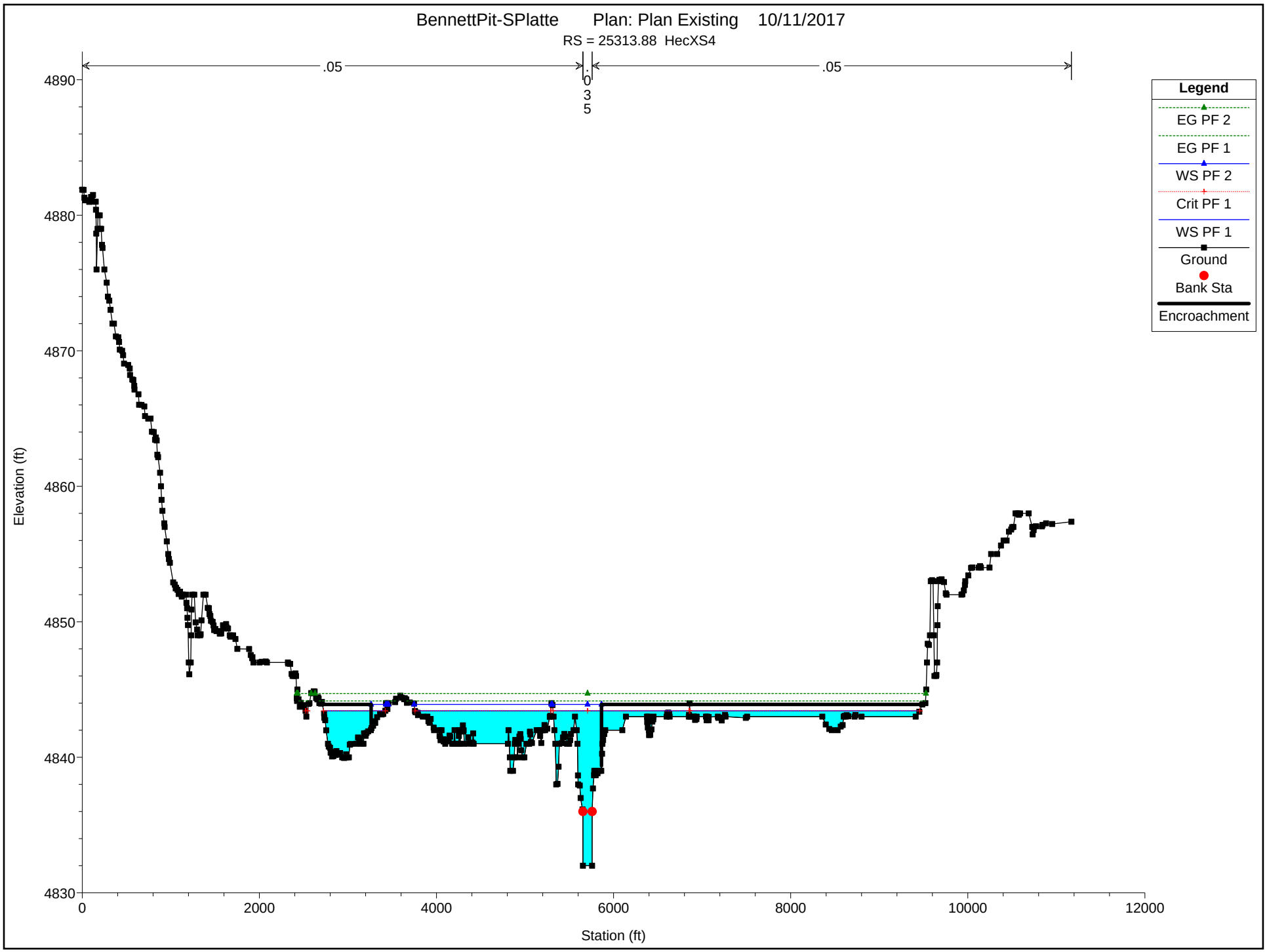
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000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.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
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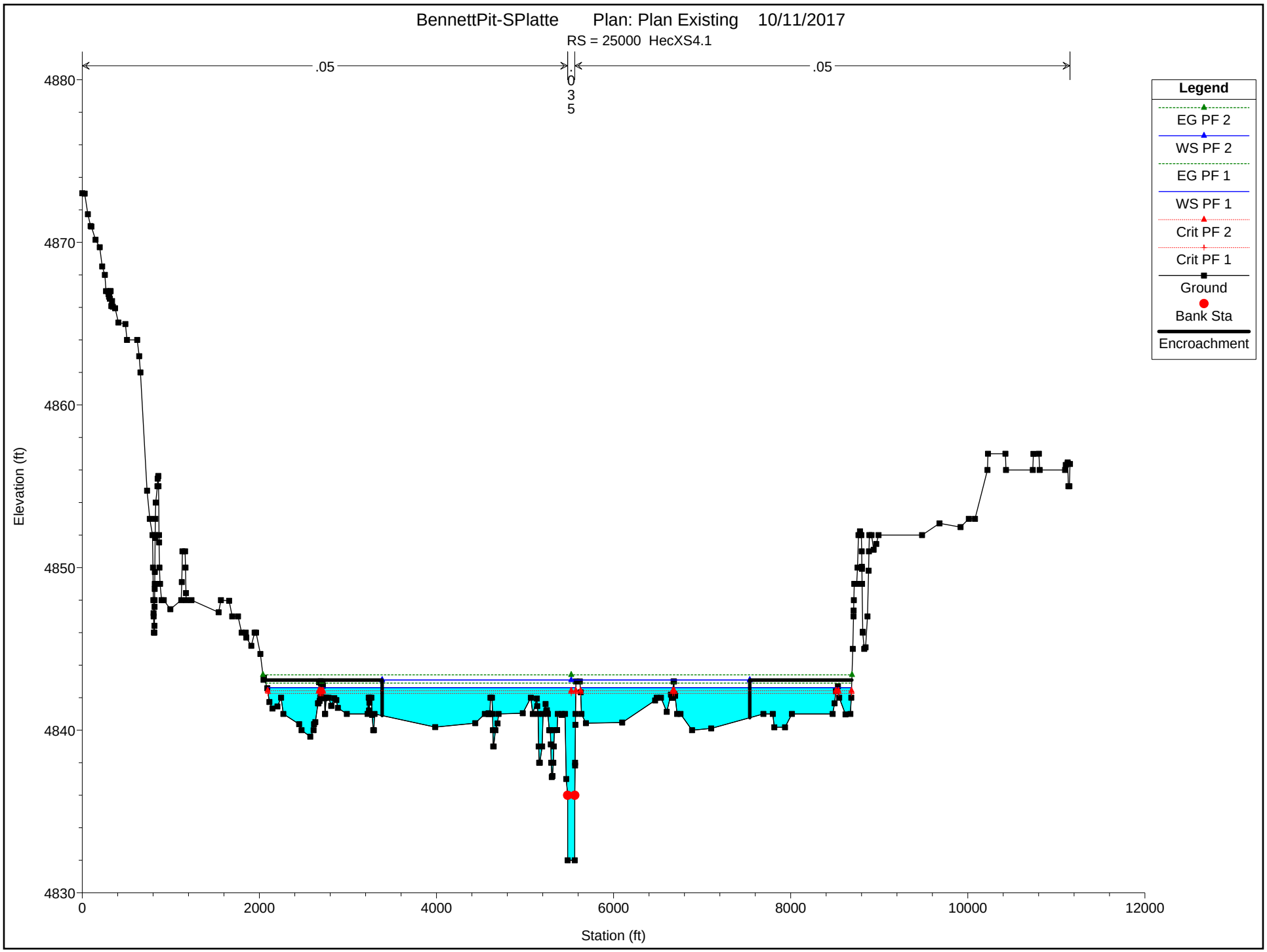
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)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Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
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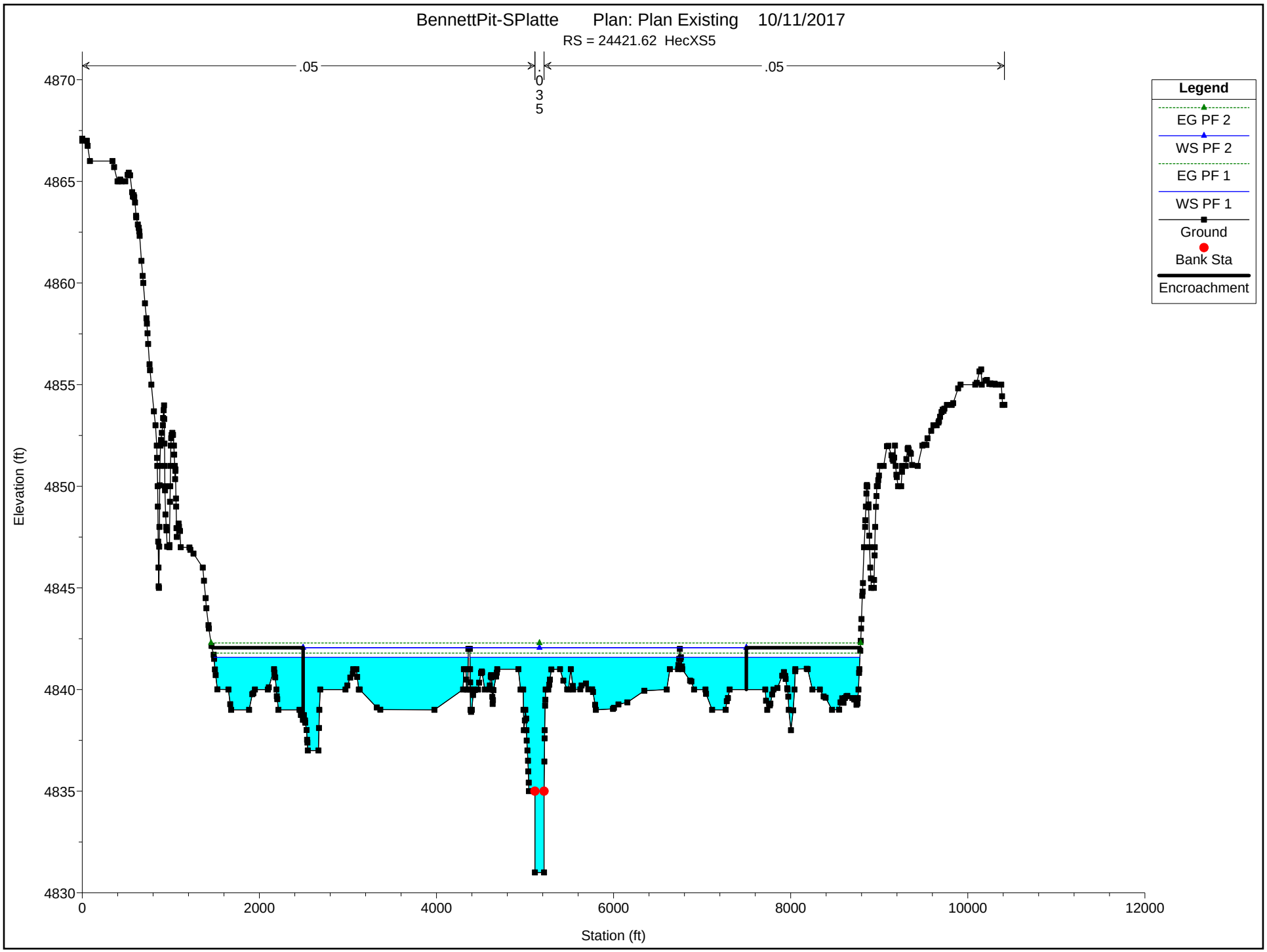
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)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Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
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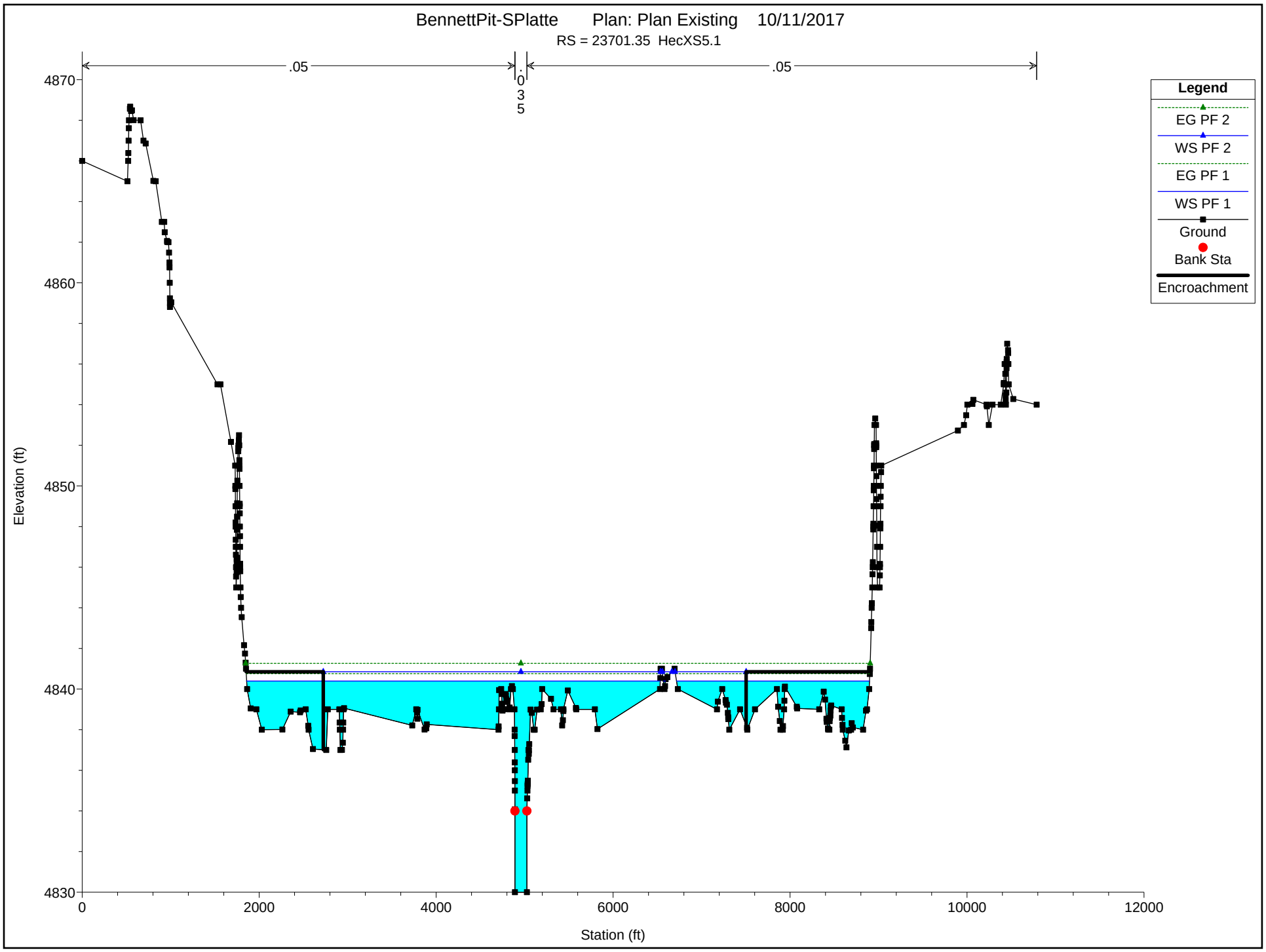
4860
4855
4850
4845
4840
4835
4830
0
2000
4000
6000
8000
10000
12000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.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
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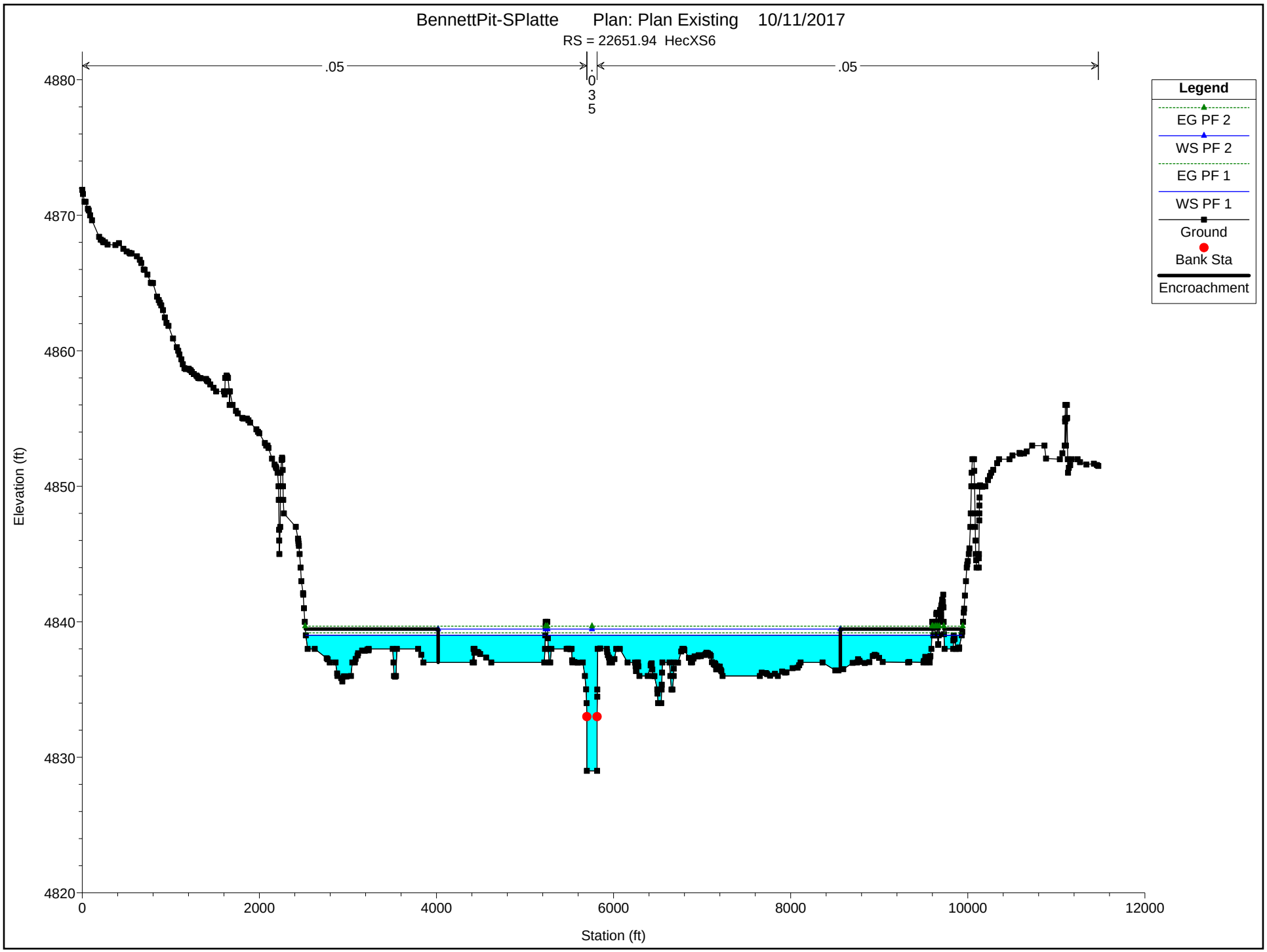
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)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.05
0.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
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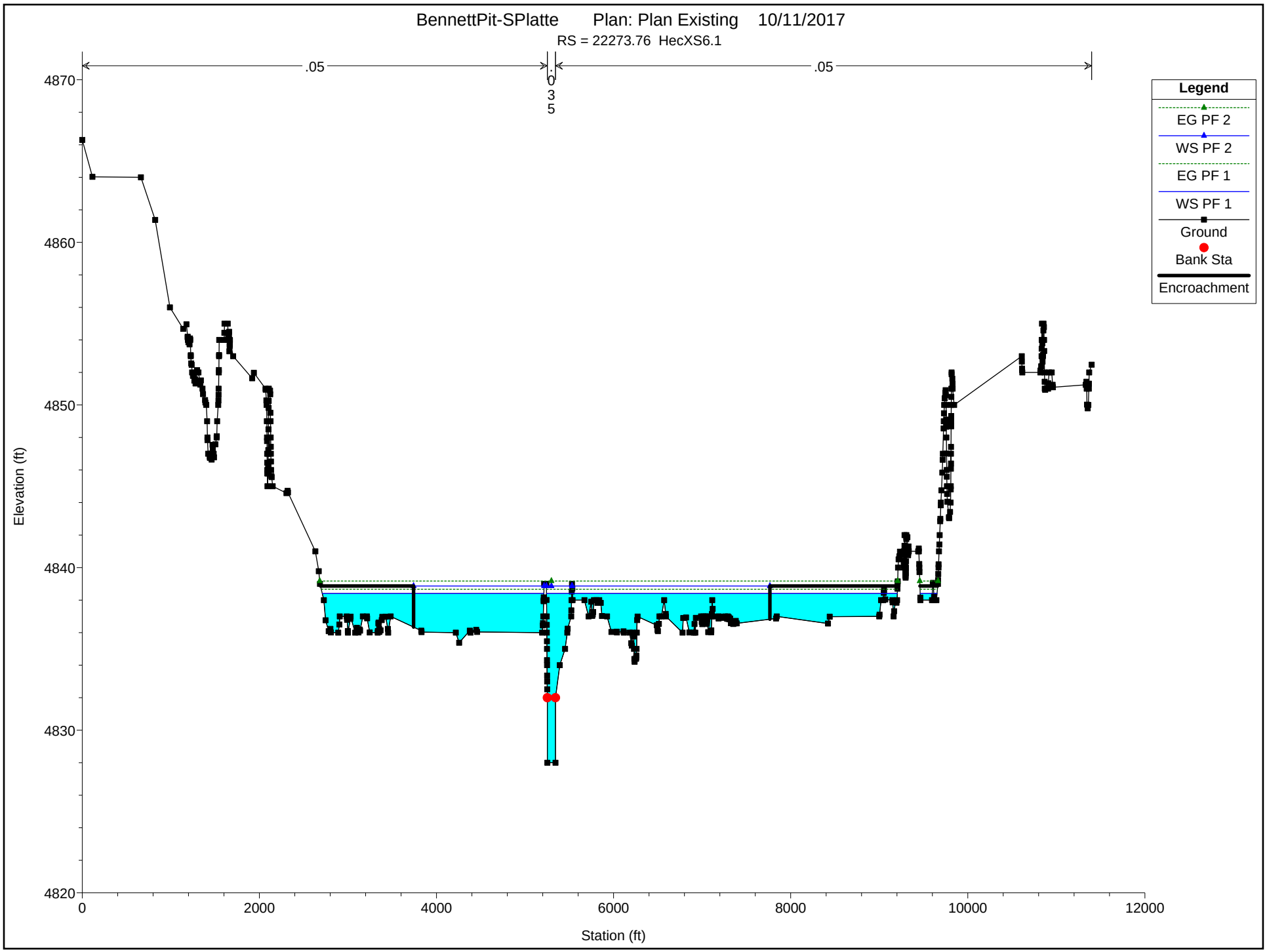
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000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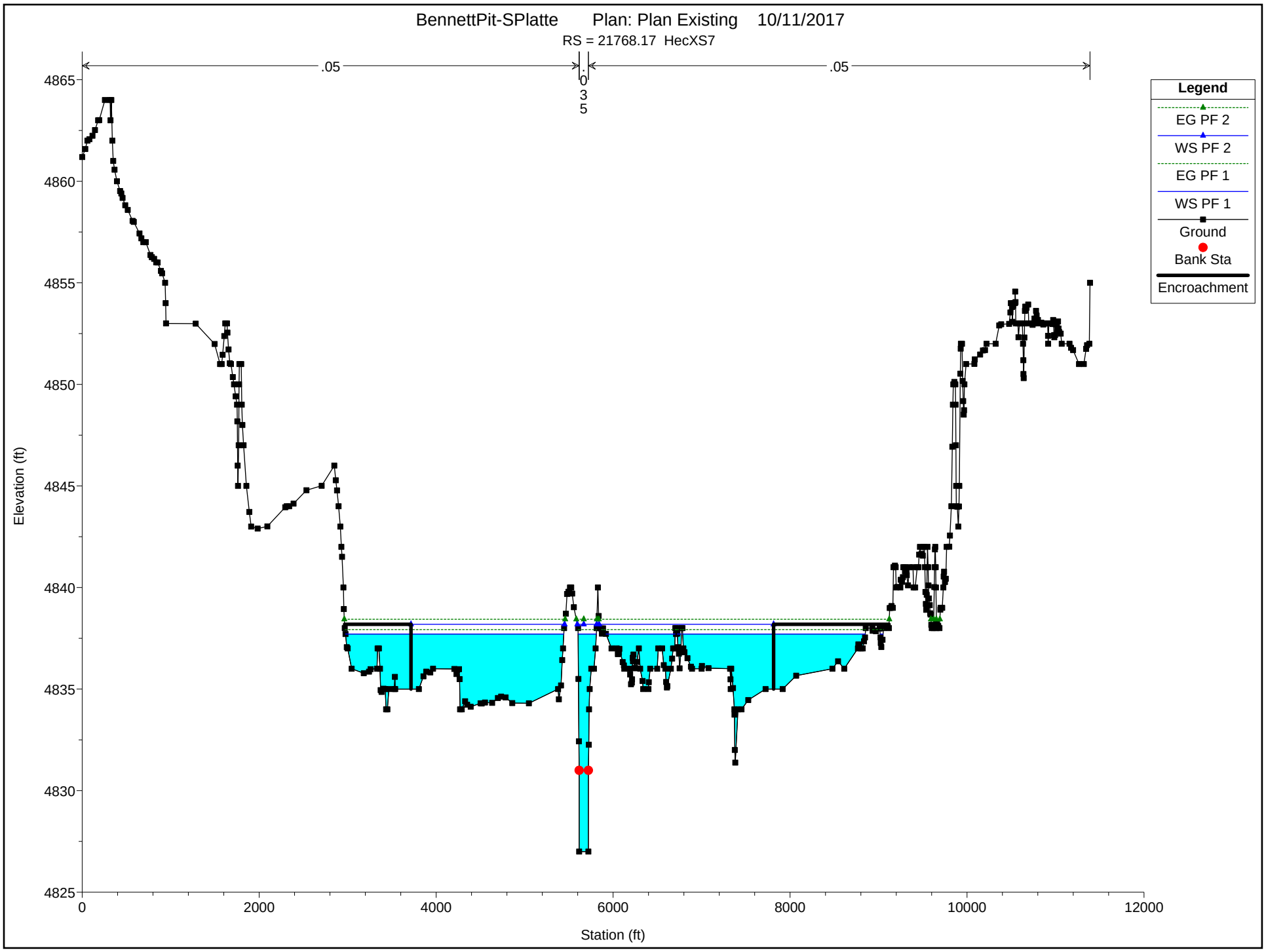
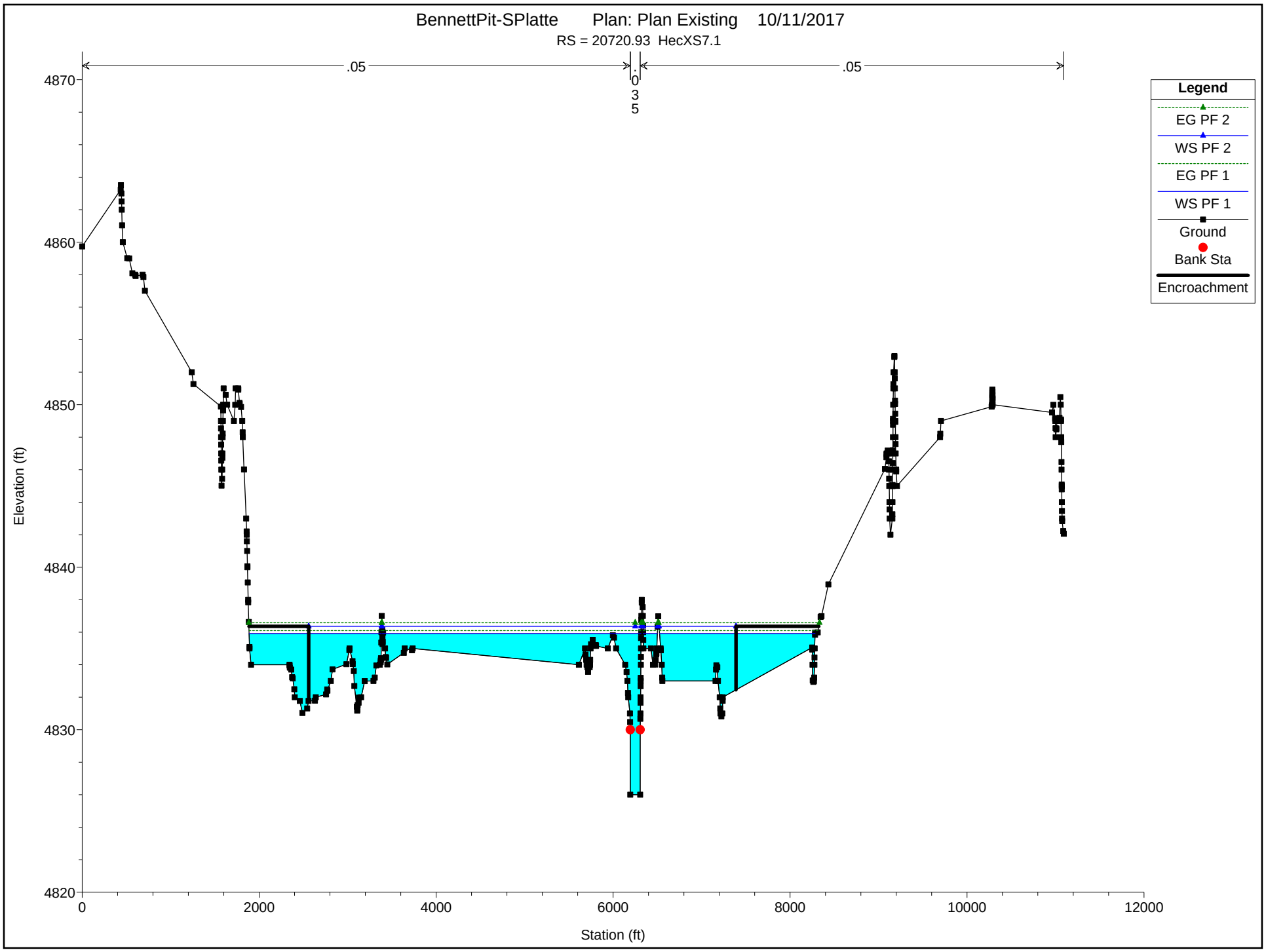
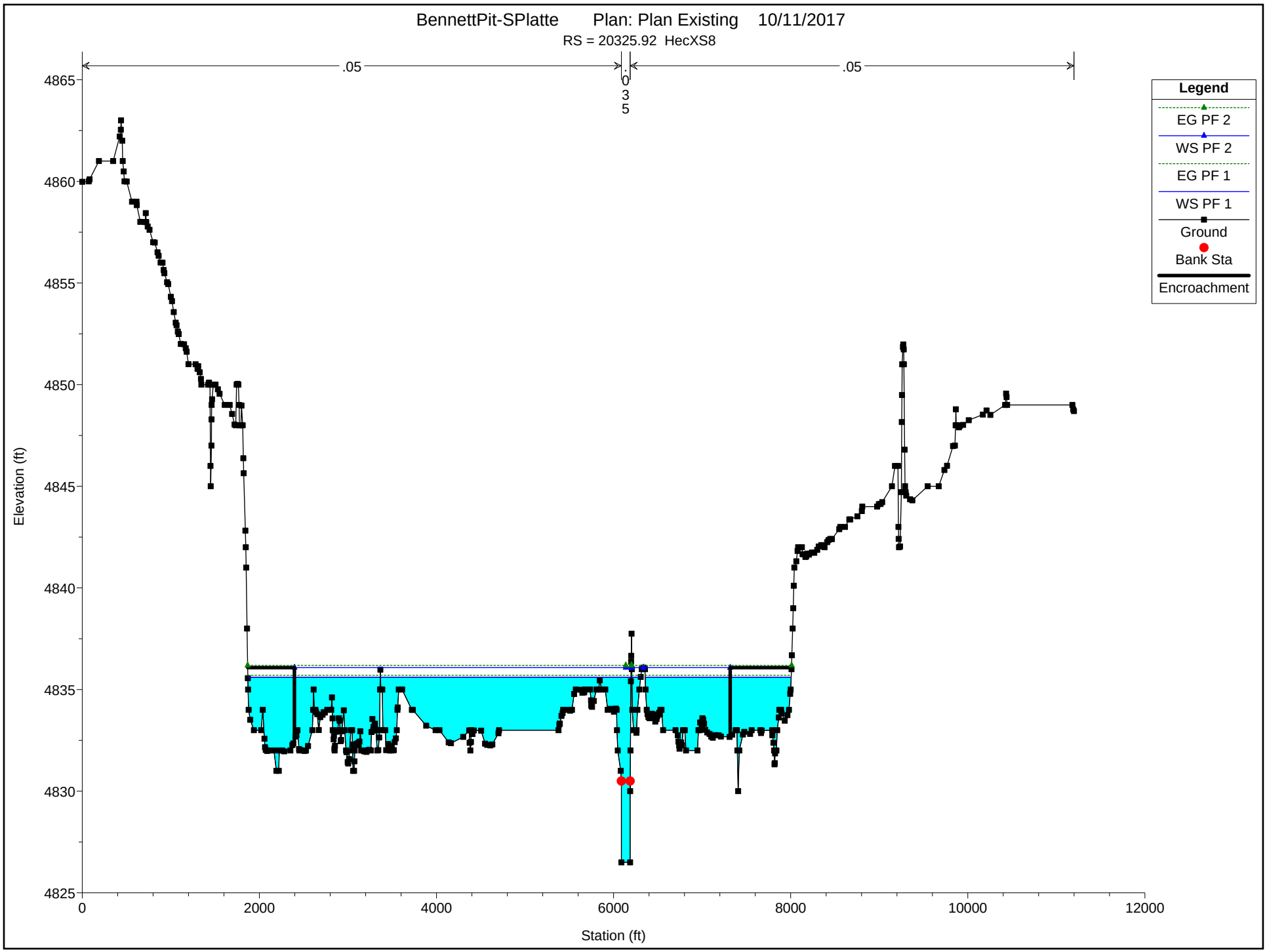
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 21768.17 HecXS7
.05
.05
0.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 20720.93 HecXS7.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 20325.92 HecXS8
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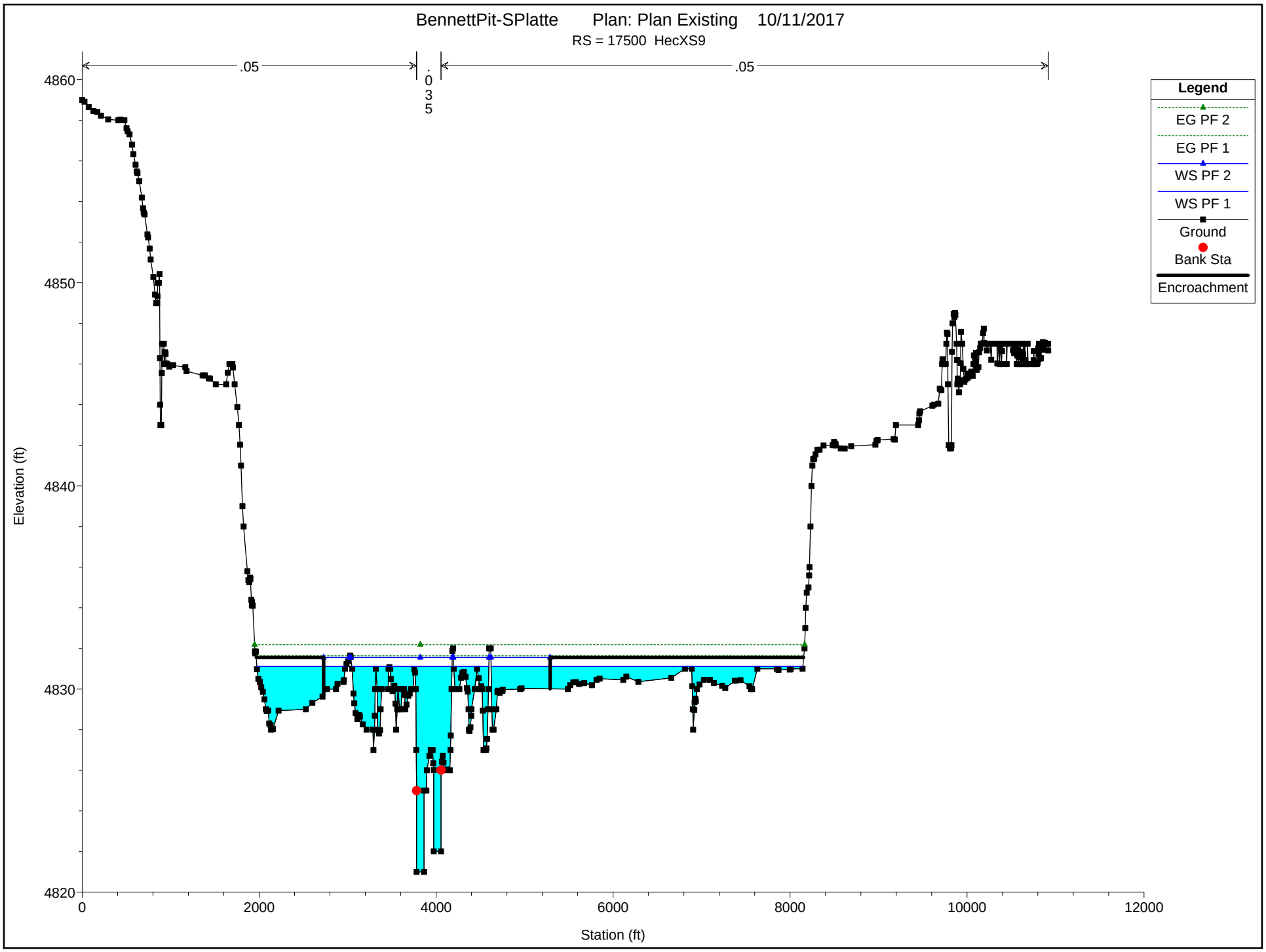
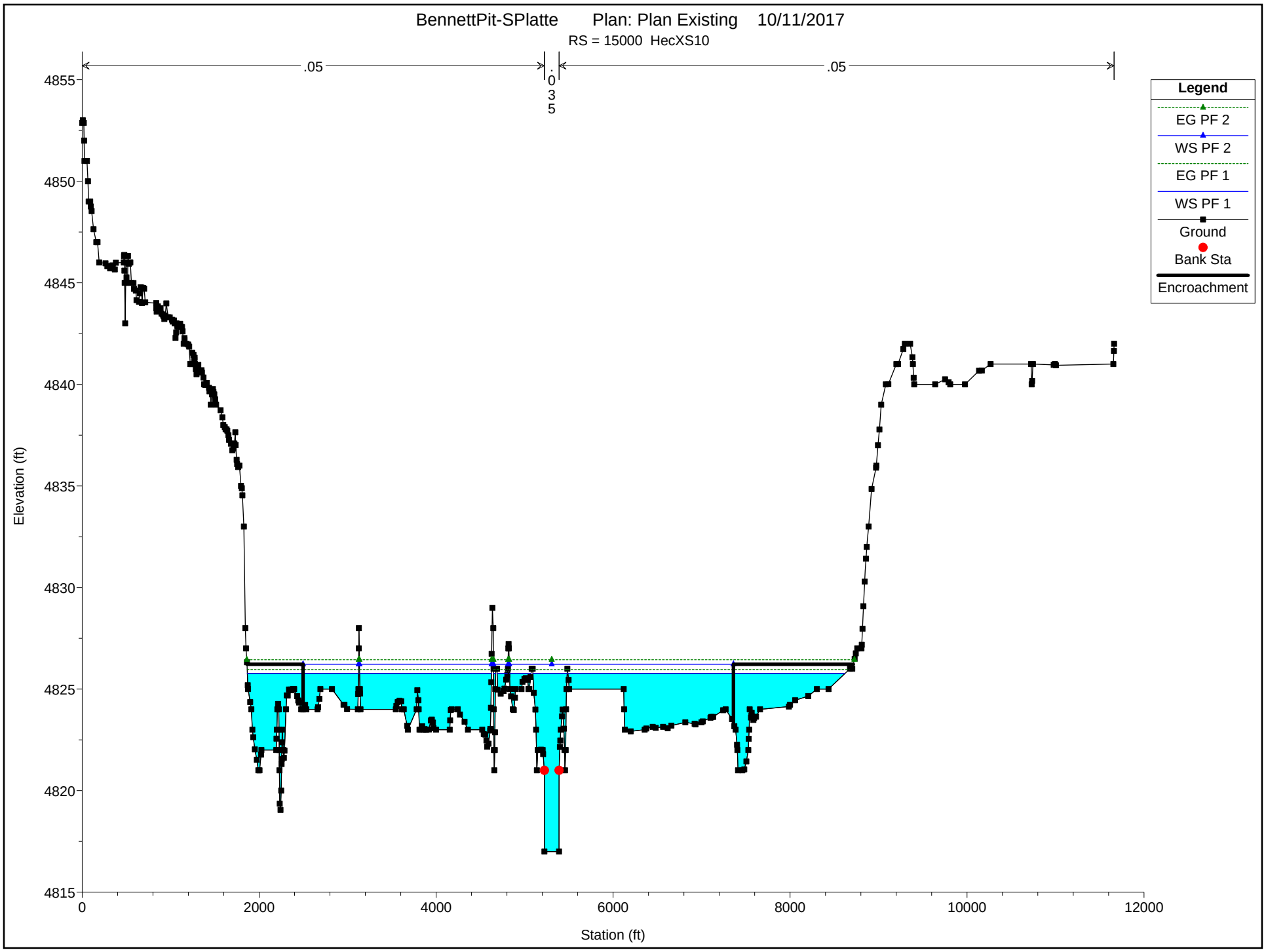
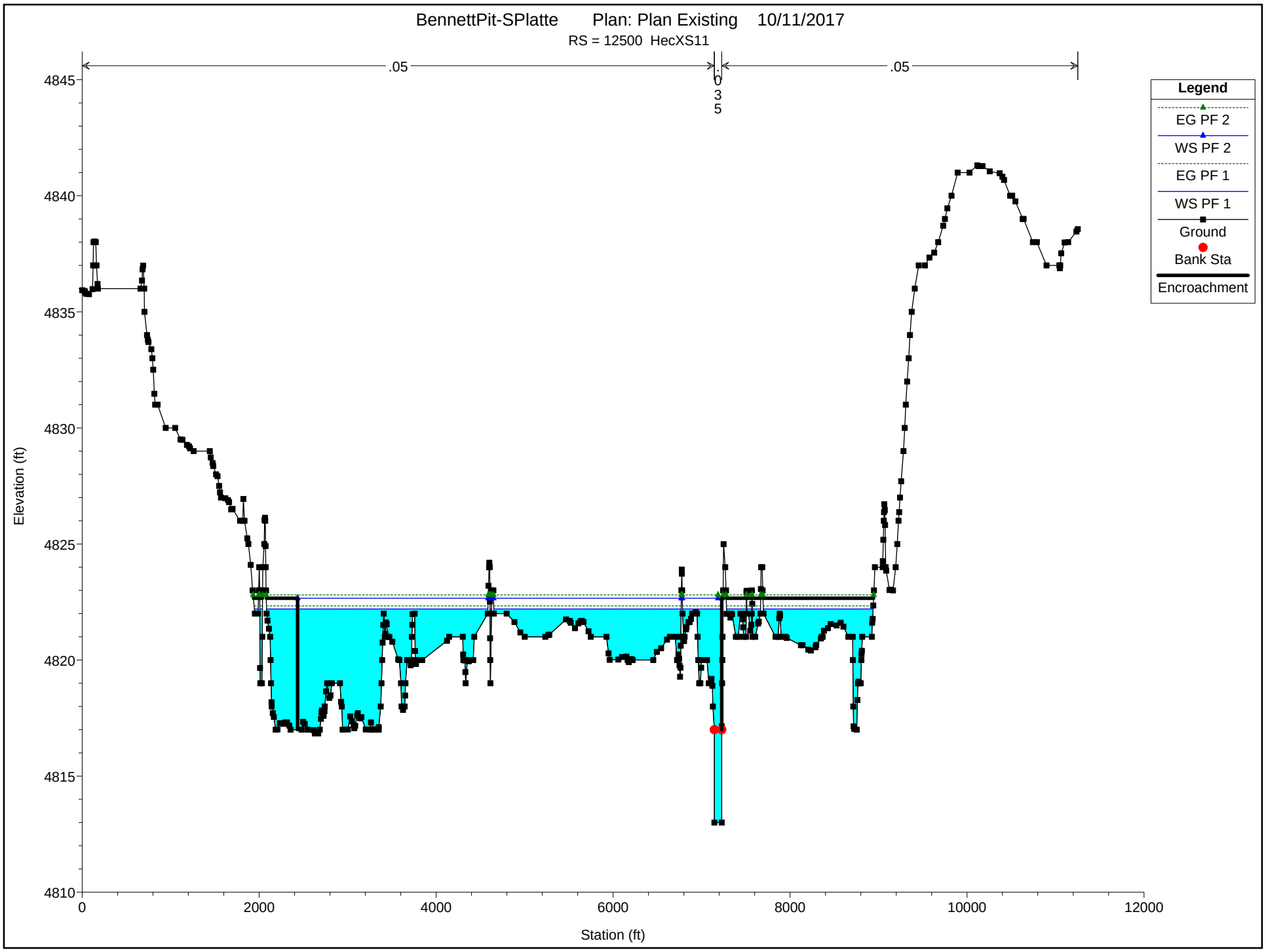
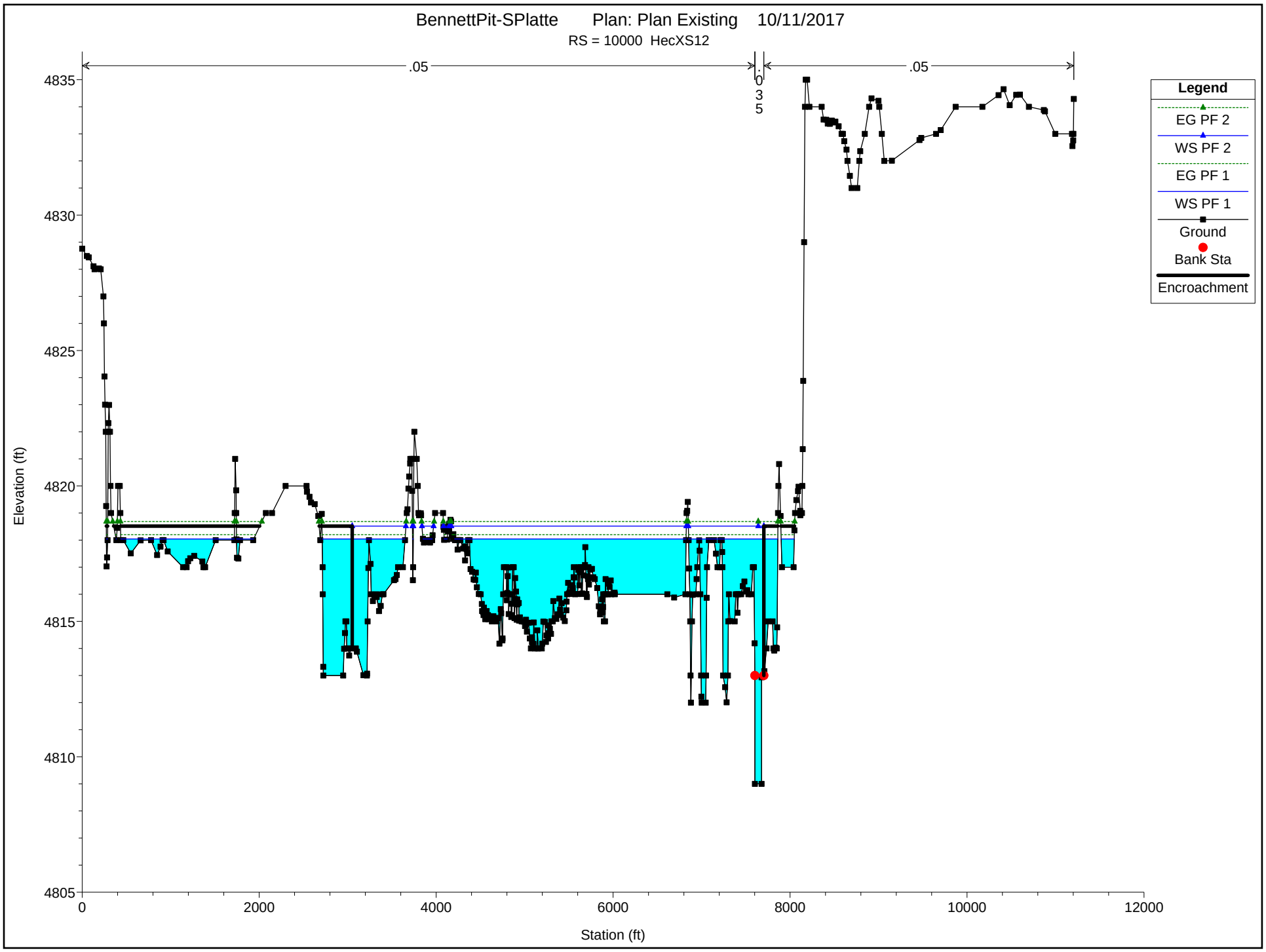
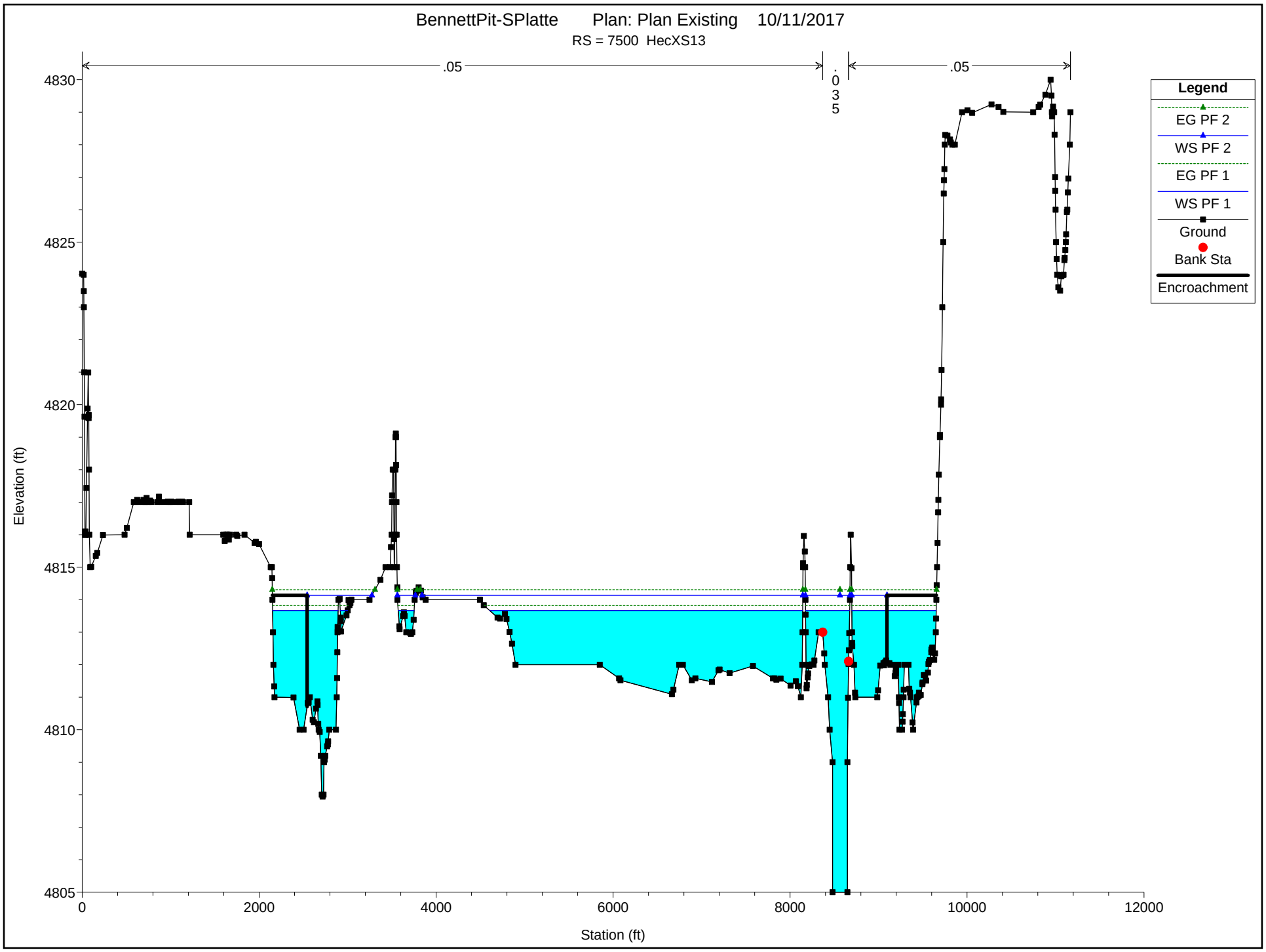
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000

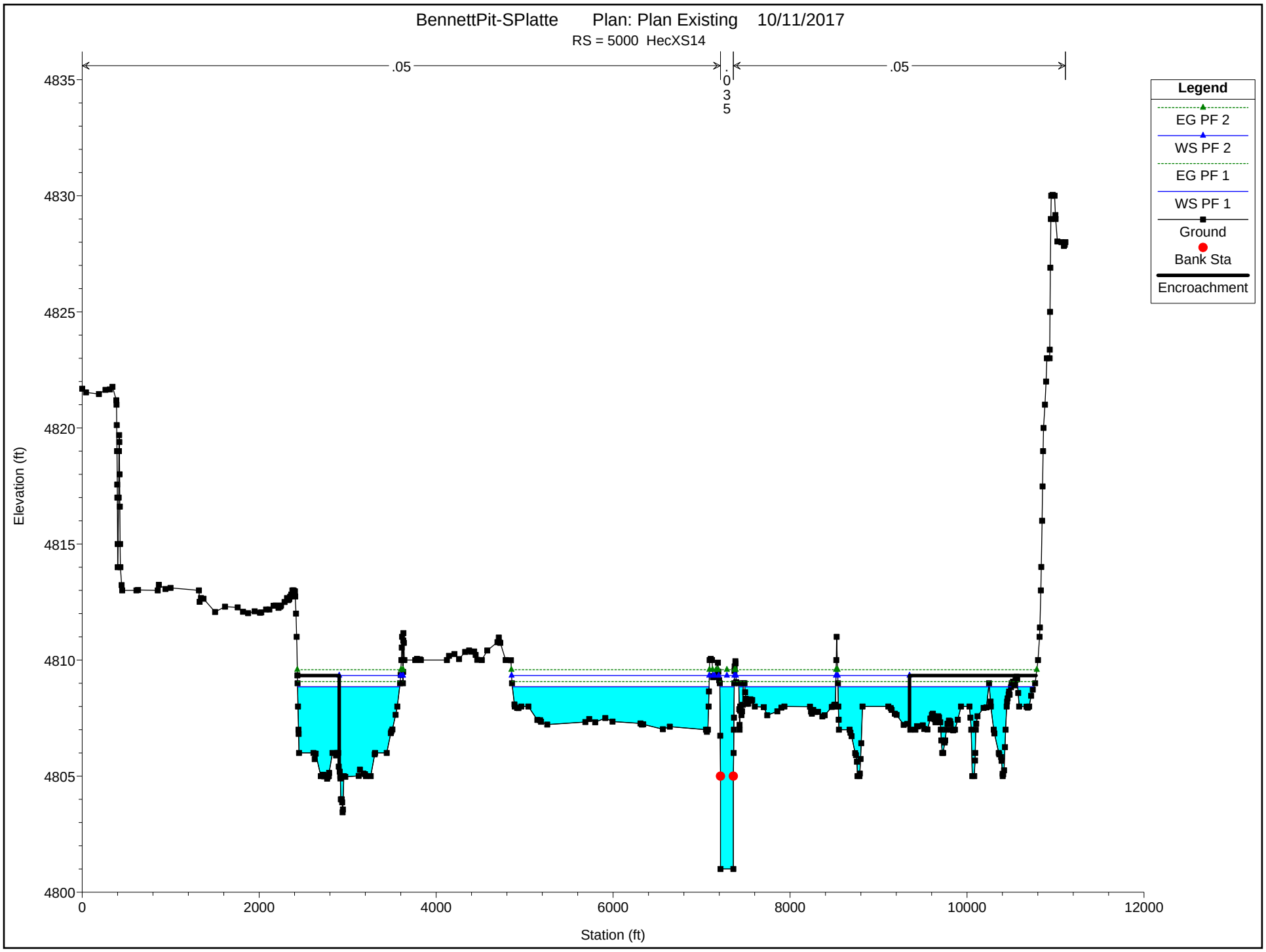

BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 17500 HecXS9
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000

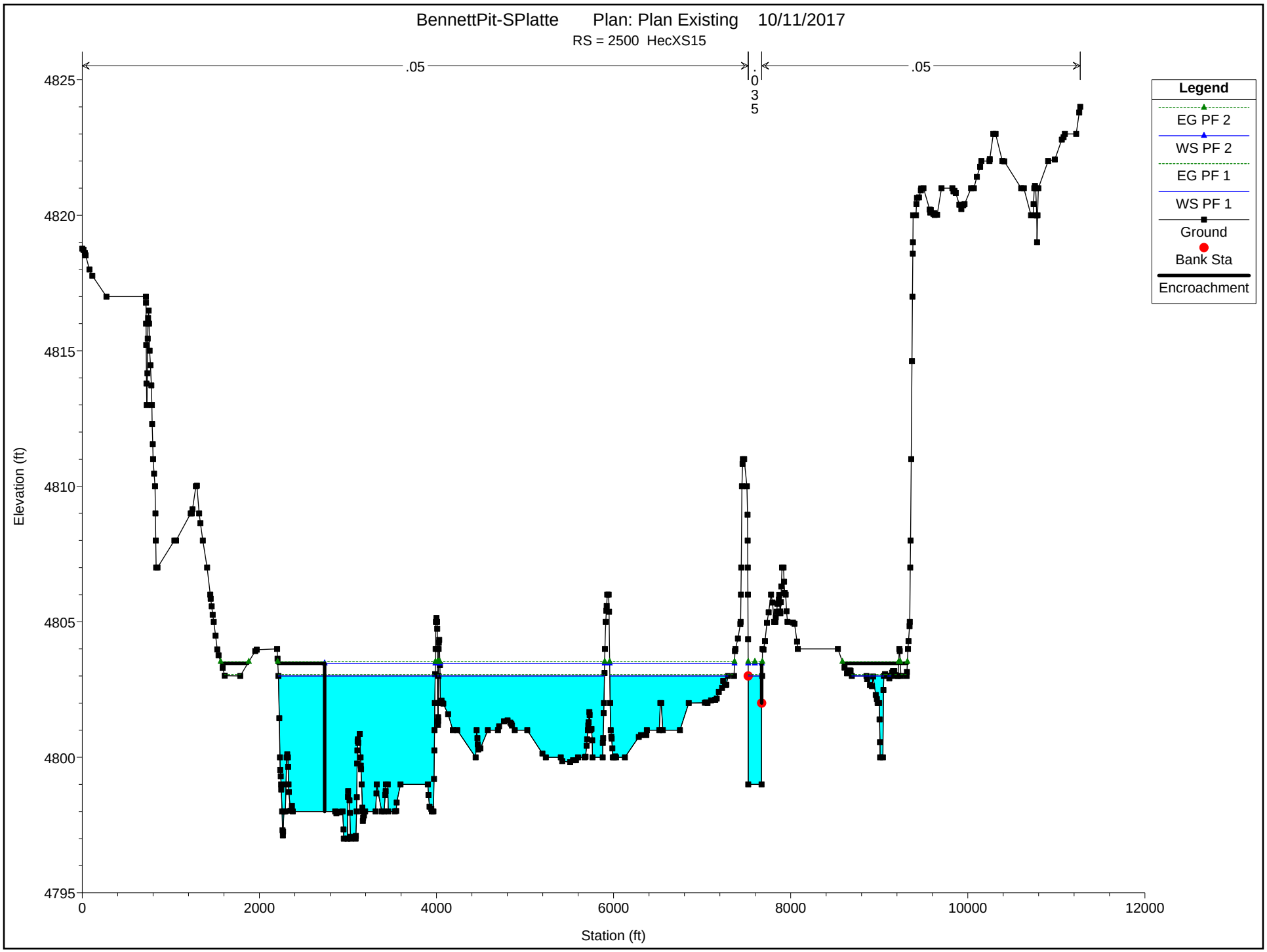

BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 15000 HecXS10
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4855
4850
4845
4840
4835
4830
4825
4820
4815
0
2000
4000
6000
8000
10000
12000

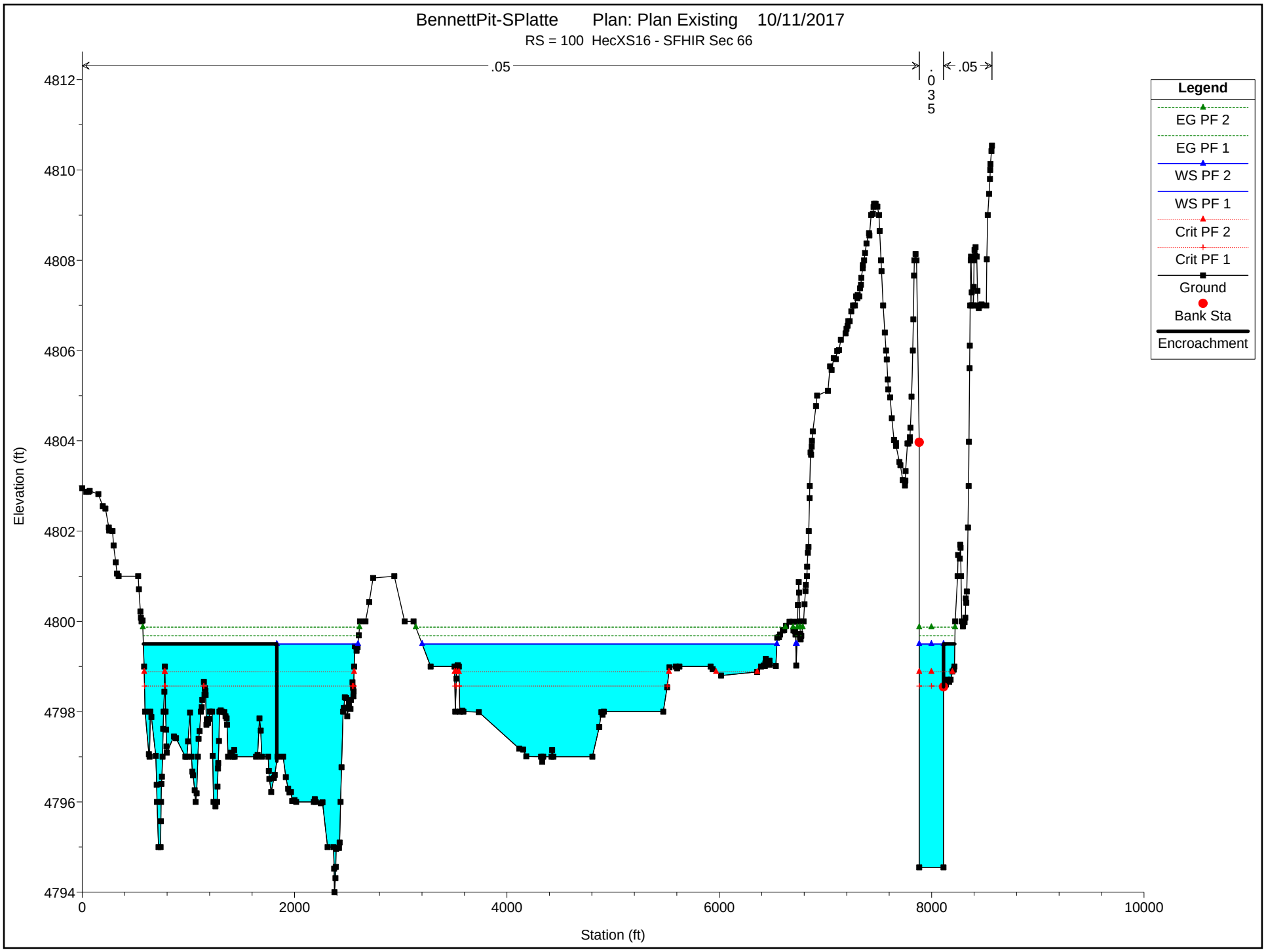

BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 12500 HecXS11
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4845
4840
4835
4830
4825
4820
4815
4810
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 10000 HecXS12
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4835
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 7500 HecXS13
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 5000 HecXS14
.05
.03
5
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4835
4830
4825
4820
4815
4810
4805
4800
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 2500 HecXS15
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4825
4820
4815
4810
4805
4800
4795
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Existing 10/11/2017
RS = 100 HecXS16 - SFHIR Sec 66
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4812
4810
4808
4806
4804
4802
4800
4798
4796
4794
0
2000
4000
6000
8000
10000
Station (ft)

HEC-RAS Plan: Mining River: S Platte Reach: Alignment - Sout

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)	
Alignment - Sout	29977.07	PF 1	29000.00	4839.00	4849.62	4848.25	4849.69	0.000837	5.05	16893.09	6577.21	0.27
Alignment - Sout	29977.07	PF 2	29000.00	4839.00	4850.10	4848.37	4850.18	0.000816	5.13	14928.03	4605.13	0.27
Alignment - Sout	28500	PF 1	29000.00	4837.00	4847.45		4847.62	0.001044	6.23	14488.28	7201.73	0.34
Alignment - Sout	28500	PF 2	29000.00	4837.00	4847.90		4848.10	0.001047	6.41	11769.04	3878.42	0.34
Alignment - Sout	26500	PF 1	29000.00	4834.00	4845.46		4845.59	0.000788	5.73	17543.23	8247.83	0.30
Alignment - Sout	26500	PF 2	29000.00	4834.00	4845.92		4846.07	0.000780	5.85	14925.10	5182.78	0.30
Alignment - Sout	25313.88	PF 1	29000.00	4832.00	4843.42	4843.42	4844.16	0.002507	10.27	9198.46	6382.06	0.54
Alignment - Sout	25313.88	PF 2	29000.00	4832.00	4843.90	4843.51	4844.61	0.002207	9.90	7462.47	2533.45	0.51
Alignment - Sout	25000	PF 1	29000.00	4832.00	4842.27	4841.24	4842.46	0.001358	6.94	13551.62	6448.63	0.38
Alignment - Sout	25000	PF 2	29000.00	4832.00	4842.72	4840.69	4842.96	0.001347	7.12	10743.65	3519.10	0.38
Alignment - Sout	24421.62	PF 1	29000.00	4831.00	4841.26		4841.53	0.001474	7.32	12013.29	6216.32	0.40
Alignment - Sout	24421.62	PF 2	29000.00	4831.00	4841.72		4842.04	0.001451	7.48	10119.87	3885.55	0.40
Alignment - Sout	23701.35	PF 1	29000.00	4830.00	4839.99		4840.19	0.001019	6.05	13003.89	6618.14	0.34
Alignment - Sout	23701.35	PF 2	29000.00	4830.00	4840.46		4840.70	0.001007	6.20	10941.67	3720.75	0.34
Alignment - Sout	22651.94	PF 1	29000.00	4829.00	4838.78		4838.97	0.001204	6.45	14280.72	6935.60	0.36
Alignment - Sout	22651.94	PF 2	29000.00	4829.00	4839.24		4839.47	0.001192	6.62	12069.38	4337.78	0.36
Alignment - Sout	22273.76	PF 1	29000.00	4828.00	4838.29		4838.47	0.001152	6.45	14058.01	6603.38	0.35
Alignment - Sout	22273.76	PF 2	29000.00	4828.00	4838.75		4838.97	0.001143	6.61	11005.60	3485.76	0.36
Alignment - Sout	21768.17	PF 1	29000.00	4827.00	4837.43		4837.76	0.001663	7.87	11605.25	5498.01	0.43
Alignment - Sout	21768.17	PF 2	29000.00	4827.00	4837.89		4838.27	0.001648	8.06	9791.01	3590.17	0.43
Alignment - Sout	20720.93	PF 1	29000.00	4826.00	4835.88		4835.99	0.000786	5.24	16329.69	6332.80	0.29
Alignment - Sout	20720.93	PF 2	29000.00	4826.00	4836.34		4836.47	0.000777	5.36	14513.86	4681.16	0.29
Alignment - Sout	20325.92	PF 1	29000.00	4826.50	4835.60		4835.70	0.000847	5.12	15986.41	6070.54	0.30
Alignment - Sout	20325.92	PF 2	29000.00	4826.50	4836.08		4836.19	0.000825	5.22	14828.76	4911.70	0.30
Alignment - Sout	17500	PF 1	29000.00	4821.00	4831.11		4831.64	0.002250	7.59	9047.41	6059.00	0.48
Alignment - Sout	17500	PF 2	29000.00	4821.00	4831.56		4832.19	0.002263	7.90	6828.64	2510.21	0.49
Alignment - Sout	15000	PF 1	29000.00	4817.00	4825.77		4825.96	0.001174	5.99	13998.32	6647.48	0.36
Alignment - Sout	15000	PF 2	29000.00	4817.00	4826.22		4826.45	0.001170	6.19	12353.18	4817.36	0.36

HEC-RAS Plan: Mining River: S Platte Reach: Alignment - Sout (Continued)

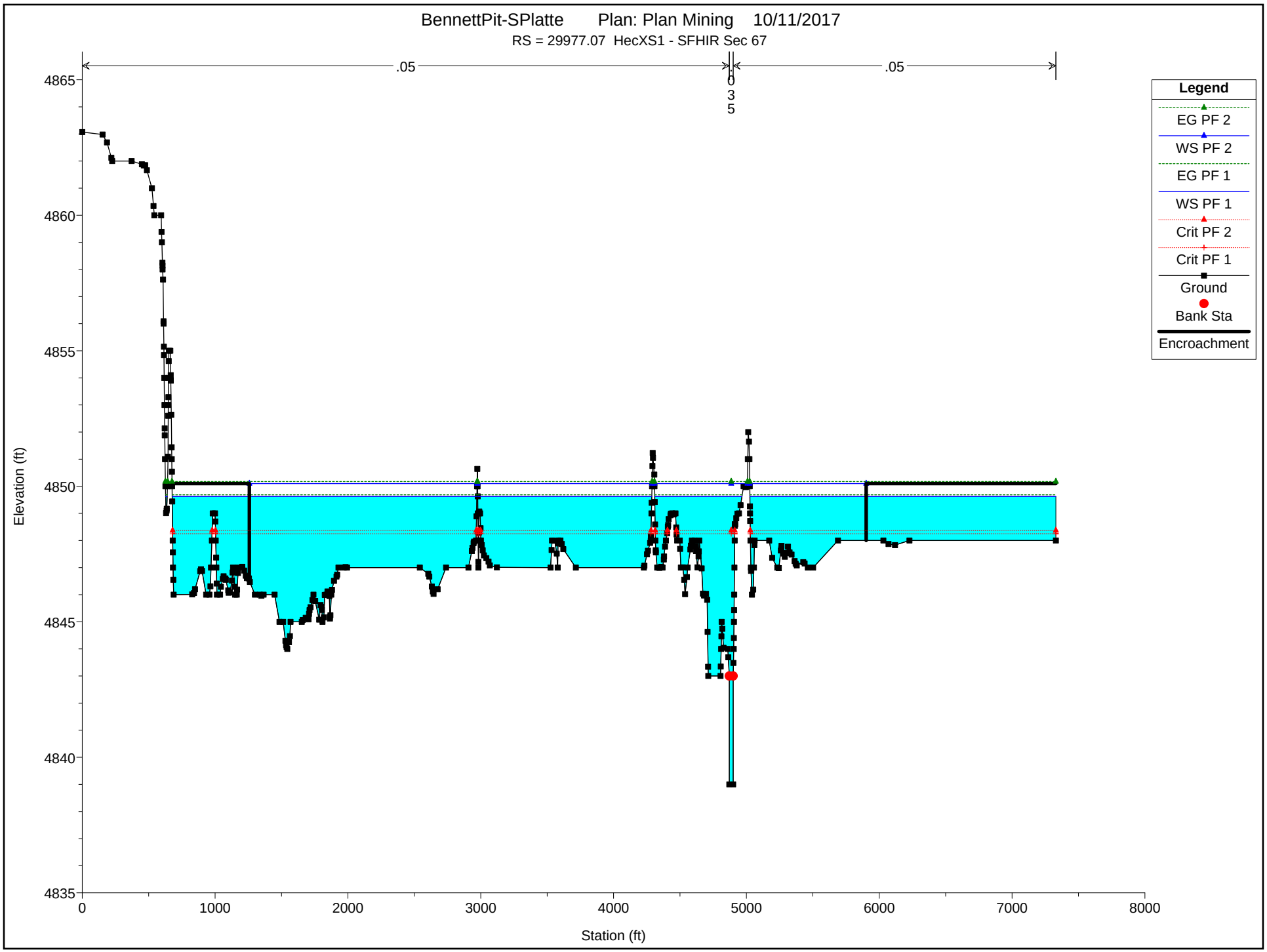
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment - Sout	12500	PF 1	29000.00	4813.00	4822.20		4822.33	0.001173	6.01	14183.09	6780.52	0.35
Alignment - Sout	12500	PF 2	29000.00	4813.00	4822.66		4822.81	0.001172	5.96	12785.45	4739.95	0.34
Alignment - Sout	10000	PF 1	29000.00	4809.00	4818.04		4818.20	0.001471	6.21	12567.77	6355.34	0.39
Alignment - Sout	10000	PF 2	29000.00	4809.00	4818.52		4818.69	0.001452	6.21	11749.52	4322.64	0.38
Alignment - Sout	7500	PF 1	29000.00	4805.00	4813.67		4813.82	0.001273	4.98	13167.78	5993.47	0.35
Alignment - Sout	7500	PF 2	29000.00	4805.00	4814.14		4814.31	0.001241	5.17	13387.70	6140.22	0.35
Alignment - Sout	5000	PF 1	29000.00	4801.00	4808.85		4809.07	0.001682	6.64	12398.39	6746.85	0.42
Alignment - Sout	5000	PF 2	29000.00	4801.00	4809.33		4809.58	0.001618	6.78	11359.45	5067.05	0.41
Alignment - Sout	2500	PF 1	29000.00	4799.00	4803.00		4803.06	0.000717	2.77	15783.07	5362.87	0.24
Alignment - Sout	2500	PF 2	29000.00	4799.00	4803.47		4803.53	0.000706	2.94	15309.62	4685.95	0.25
Alignment - Sout	100	PF 1	29000.00	4794.55	4799.50	4798.57	4799.68	0.002320	5.79	11051.52	5707.91	0.46
Alignment - Sout	100	PF 2	29000.00	4794.55	4799.50	4798.88	4799.87	0.004148	7.72	8048.47	4344.74	0.61

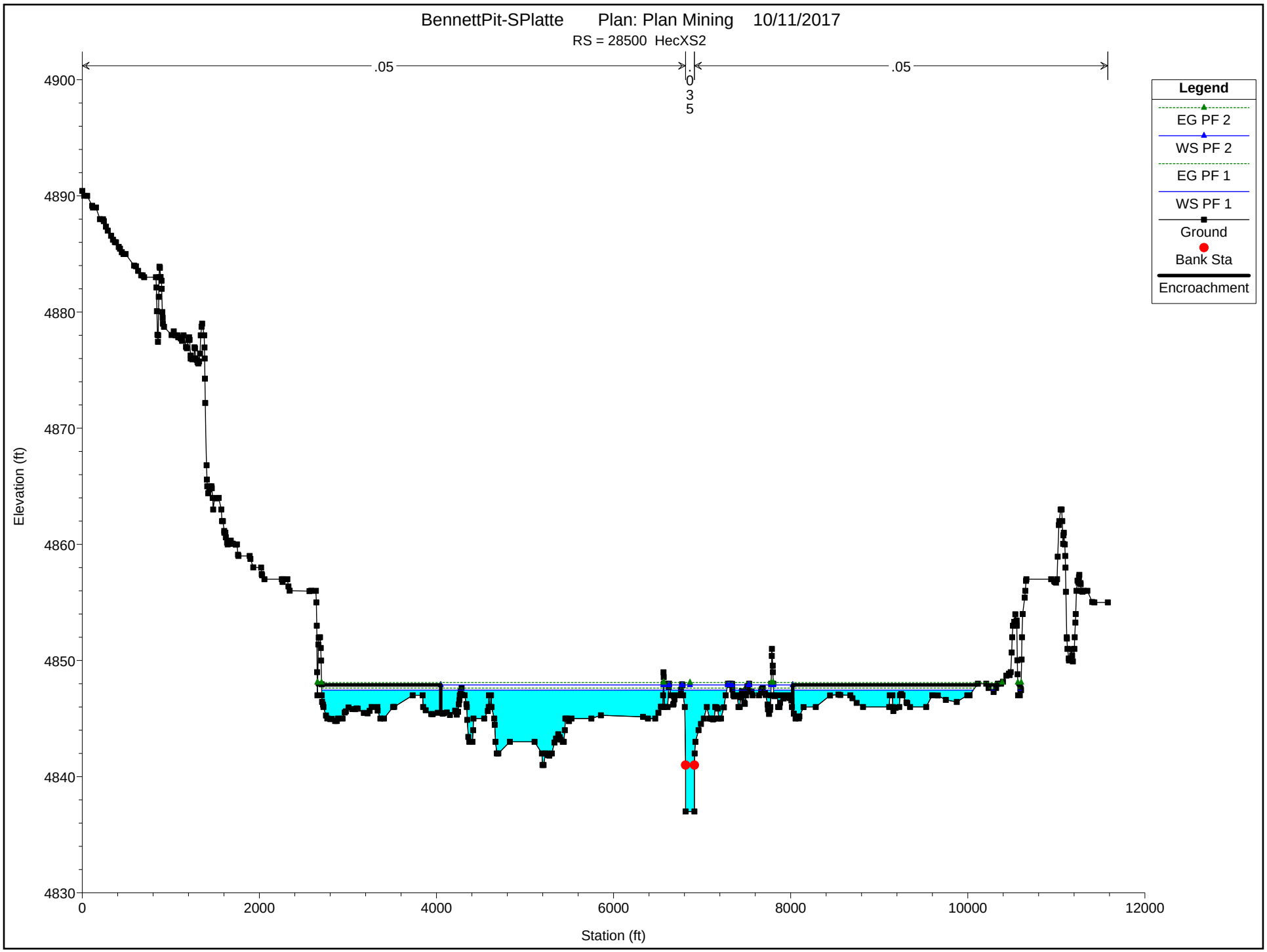
HEC-RAS Plan: Mining River: S Platte Reach: Alignment - Sout

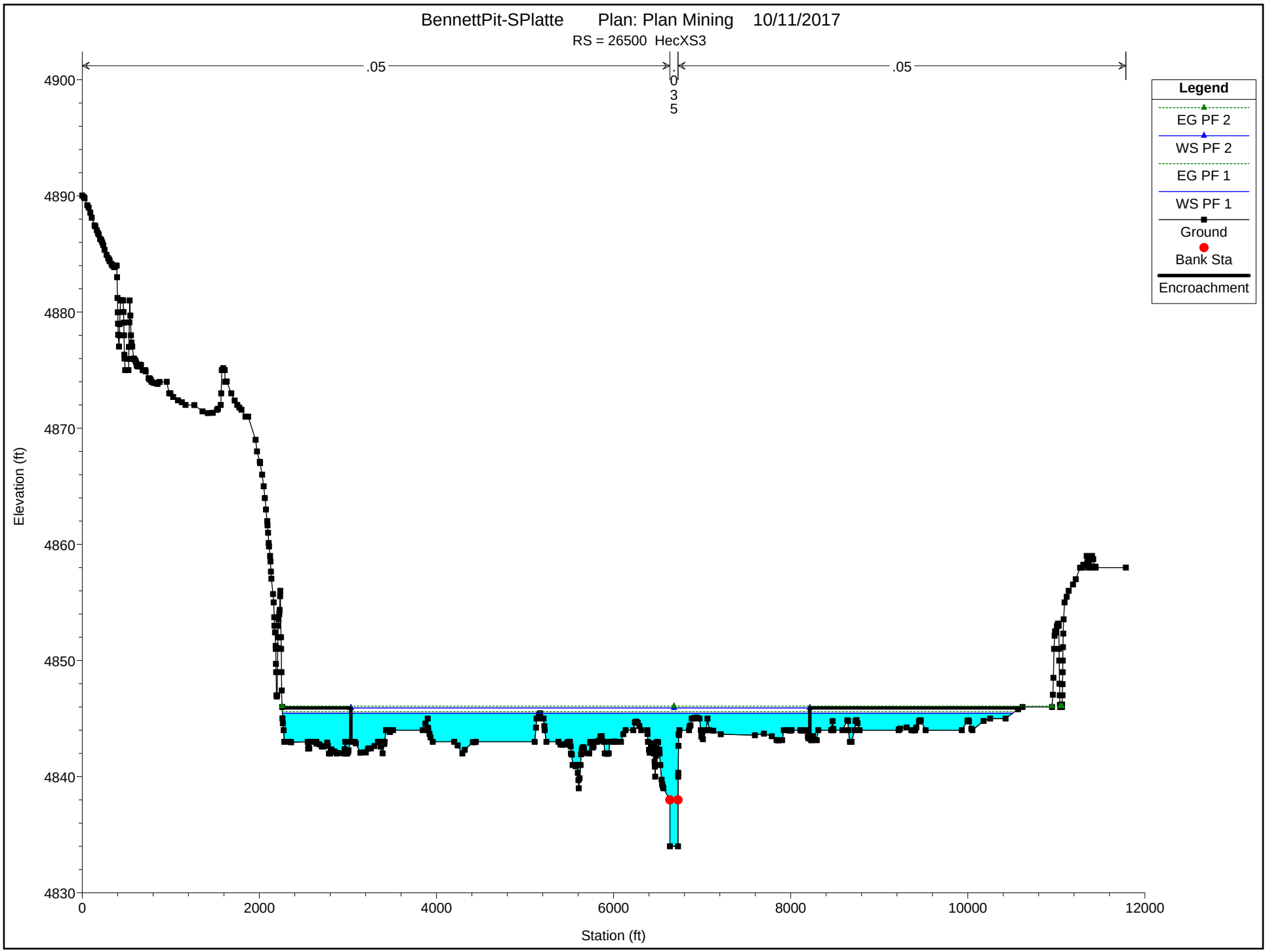
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	29977.07	PF 1	4849.62		4849.69	6577.21	22136.66	1556.83	5306.52		4871.24	4900.28	
Alignment - Sout	29977.07	PF 2	4850.10	0.48	4850.18	4605.13	23774.86	1654.12	3571.02	1258.03	4871.24	4900.28	5901.58
Alignment - Sout	28500	PF 1	4847.45		4847.62	7201.73	18588.30	6473.98	3937.72		6813.27	6912.74	
Alignment - Sout	28500	PF 2	4847.90	0.45	4848.10	3878.42	19464.43	6952.34	2583.23	4048.41	6813.27	6912.74	8022.92
Alignment - Sout	26500	PF 1	4845.46		4845.59	8247.83	17398.72	6029.69	5571.59		6636.20	6728.02	
Alignment - Sout	26500	PF 2	4845.92	0.46	4846.07	5182.78	18316.78	6408.49	4274.73	3033.43	6636.20	6728.02	8216.20
Alignment - Sout	25313.88	PF 1	4843.42		4844.16	6382.06	13567.23	12170.71	3262.06		5653.96	5757.75	
Alignment - Sout	25313.88	PF 2	4843.90	0.47	4844.61	2533.45	14224.05	12220.59	2555.36	3087.91	5653.96	5757.75	5935.27
Alignment - Sout	25000	PF 1	4842.27		4842.46	6448.63	16922.07	5714.75	6363.19		5481.43	5561.65	
Alignment - Sout	25000	PF 2	4842.72	0.46	4842.96	3519.10	17643.32	6122.80	5233.88	3614.20	5481.43	5561.65	7191.89
Alignment - Sout	24421.62	PF 1	4841.26		4841.53	6216.32	14564.56	7746.07	6689.37		5111.35	5214.51	
Alignment - Sout	24421.62	PF 2	4841.72	0.47	4842.04	3885.55	14268.73	8277.40	6453.87	3365.16	5111.35	5214.51	7423.06
Alignment - Sout	23701.35	PF 1	4839.99		4840.19	6618.14	17232.73	8166.61	3600.67		4890.80	5025.92	
Alignment - Sout	23701.35	PF 2	4840.46	0.47	4840.70	3720.75	17264.97	8759.86	2975.17	3270.69	4890.80	5025.92	7147.82
Alignment - Sout	22651.94	PF 1	4838.78		4838.97	6935.60	9592.79	7294.76	12112.46		5698.23	5813.94	
Alignment - Sout	22651.94	PF 2	4839.24	0.46	4839.47	4337.78	8623.46	7835.98	12540.57	4065.01	5698.23	5813.94	8428.50
Alignment - Sout	22273.76	PF 1	4838.29		4838.47	6603.38	14617.15	6080.03	8302.82		5252.02	5343.67	
Alignment - Sout	22273.76	PF 2	4838.75	0.46	4838.97	3485.76	14266.52	6513.46	8220.02	4048.56	5252.02	5343.67	7566.58
Alignment - Sout	21768.17	PF 1	4837.43		4837.76	5498.01	12613.46	8551.71	7834.84		5616.58	5720.81	
Alignment - Sout	21768.17	PF 2	4837.89	0.46	4838.27	3590.17	12488.24	9147.15	7364.62	3844.11	5616.58	5720.81	7692.93
Alignment - Sout	20720.93	PF 1	4835.88		4835.99	6332.80	15951.04	5799.13	7249.83		6193.90	6306.01	
Alignment - Sout	20720.93	PF 2	4836.34	0.46	4836.47	4681.16	17227.77	6219.72	5552.52	2605.55	6193.90	6306.01	7330.90
Alignment - Sout	20325.92	PF 1	4835.60		4835.70	6070.54	16893.62	4599.71	7506.67		6088.13	6186.94	
Alignment - Sout	20325.92	PF 2	4836.08	0.48	4836.19	4911.70	18240.33	4944.16	5815.50	2396.05	6088.13	6186.94	7316.98
Alignment - Sout	17500	PF 1	4831.11		4831.64	6059.00	6424.32	16224.30	6351.38		3779.50	4055.29	
Alignment - Sout	17500	PF 2	4831.56	0.44	4832.19	2510.21	4699.07	17851.17	6449.76	2728.62	3779.50	4055.29	5288.39
Alignment - Sout	15000	PF 1	4825.77		4825.96	6647.48	11383.17	8710.03	8906.80		5223.39	5389.19	
Alignment - Sout	15000	PF 2	4826.22	0.45	4826.45	4817.36	11115.75	9457.28	8426.97	2496.10	5223.39	5389.19	7360.21
Alignment - Sout	12500	PF 1	4822.20		4822.33	6780.52	22036.83	4620.31	2342.87		7144.12	7227.75	

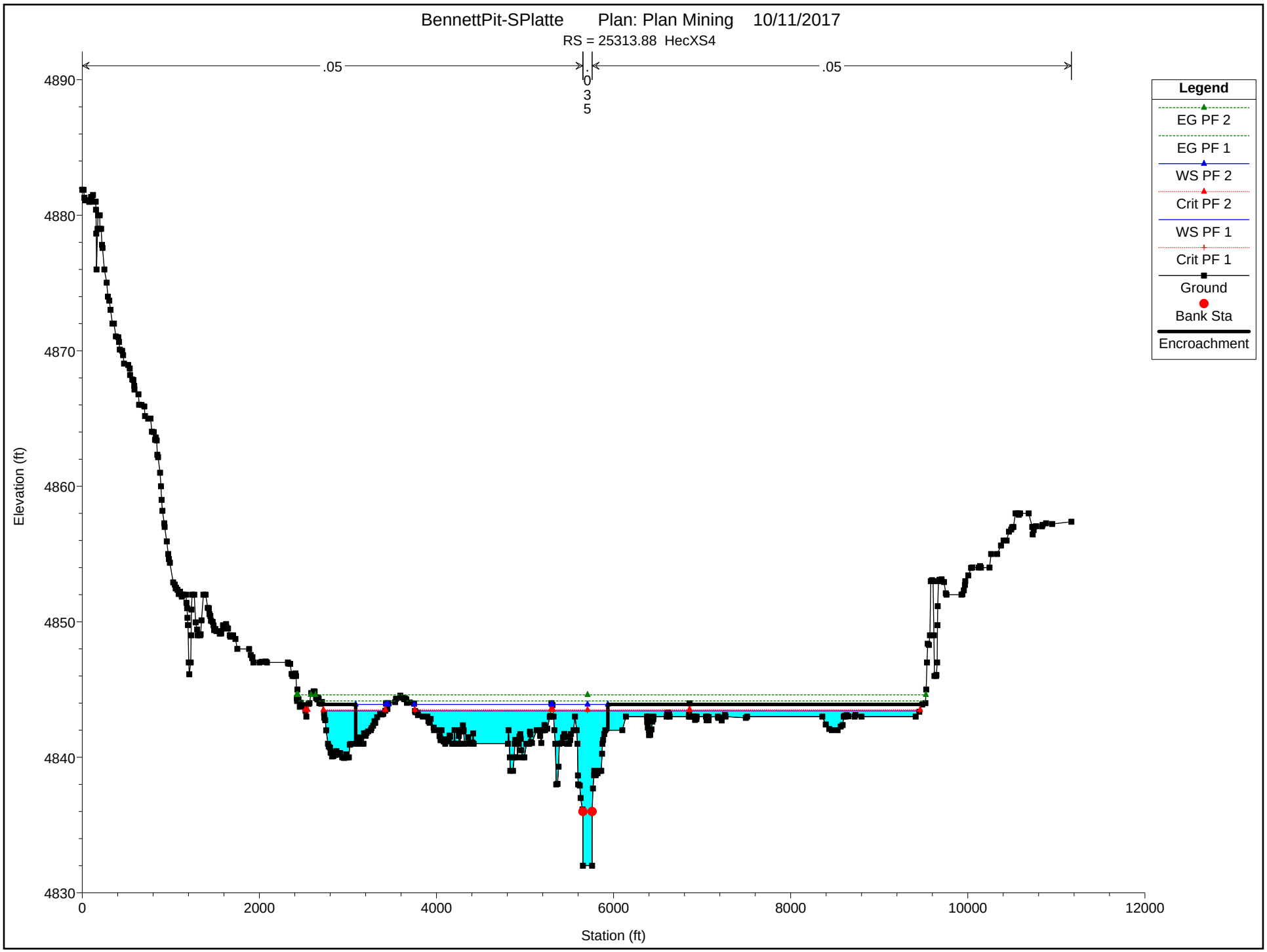
HEC-RAS Plan: Mining River: S Platte Reach: Alignment - Sout (Continued)

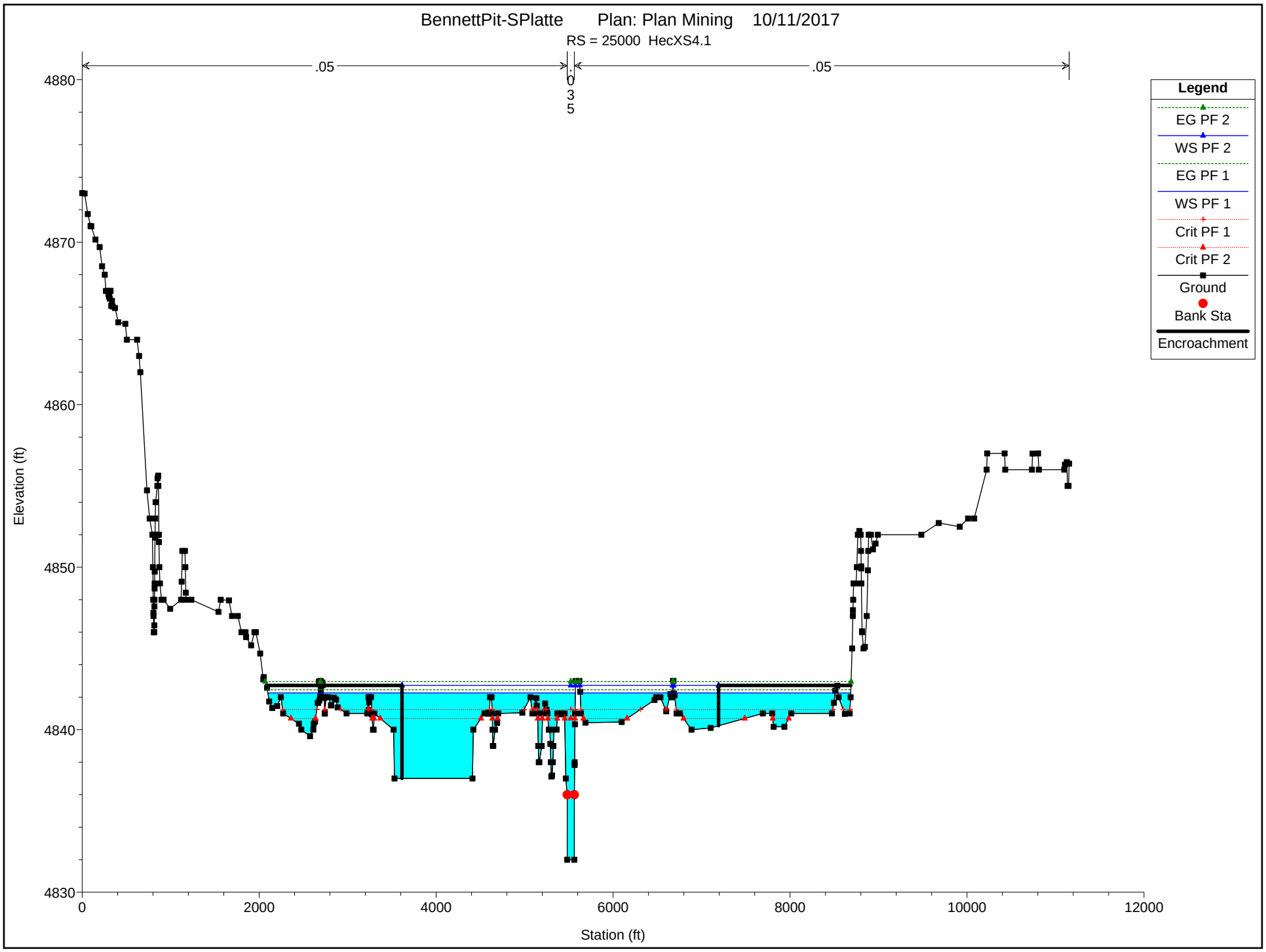
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	12500	PF 2	4822.66	0.46	4822.81	4739.95	24182.02	4817.98		2434.65	7144.12	7227.75	7227.75
Alignment - Sout	10000	PF 1	4818.04		4818.20	6355.34	22247.18	5060.46	1692.36		7602.21	7703.56	
Alignment - Sout	10000	PF 2	4818.52	0.47	4818.69	4322.64	23647.41	5352.60		3051.84	7602.21	7703.56	7703.56
Alignment - Sout	7500	PF 1	4813.67		4813.82	5993.47	16205.33	8930.76	3863.91		8369.07	8661.51	
Alignment - Sout	7500	PF 2	4814.14	0.47	4814.31	6140.22	16711.75	9973.61	2314.64	2542.34	8369.07	8661.51	9095.49
Alignment - Sout	5000	PF 1	4808.85		4809.07	6746.85	15014.16	7572.53	6413.31		7213.66	7359.05	
Alignment - Sout	5000	PF 2	4809.33	0.48	4809.58	5067.05	15496.16	8206.28	5297.56	2904.84	7213.66	7359.05	9350.06
Alignment - Sout	2500	PF 1	4803.00		4803.06	5362.87	27178.84	1671.33	149.82		7520.75	7672.12	
Alignment - Sout	2500	PF 2	4803.47	0.47	4803.53	4685.95	27016.68	1983.32		2737.07	7520.75	7672.12	7672.12
Alignment - Sout	100	PF 1	4799.50		4799.68	5707.91	22349.71	6553.38	96.91		7883.19	8111.83	
Alignment - Sout	100	PF 2	4799.50	0.00	4799.87	4344.74	20261.61	8738.39		1832.97	7883.19	8111.83	8111.83

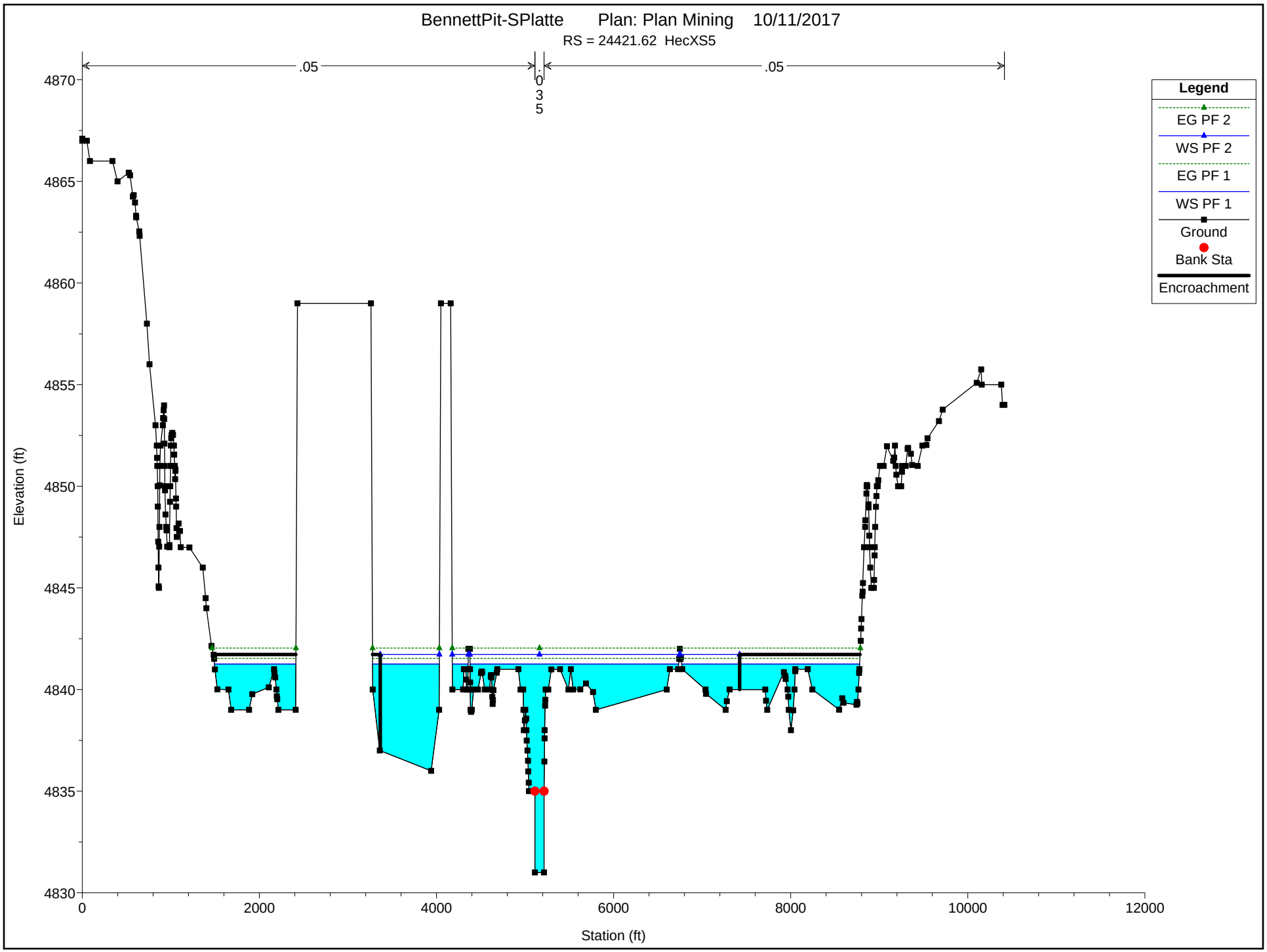

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 29977.07 HecXS1 - SFHIR Sec 67
.05
.05
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4865
4860
4855
4850
4845
4840
4835
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)

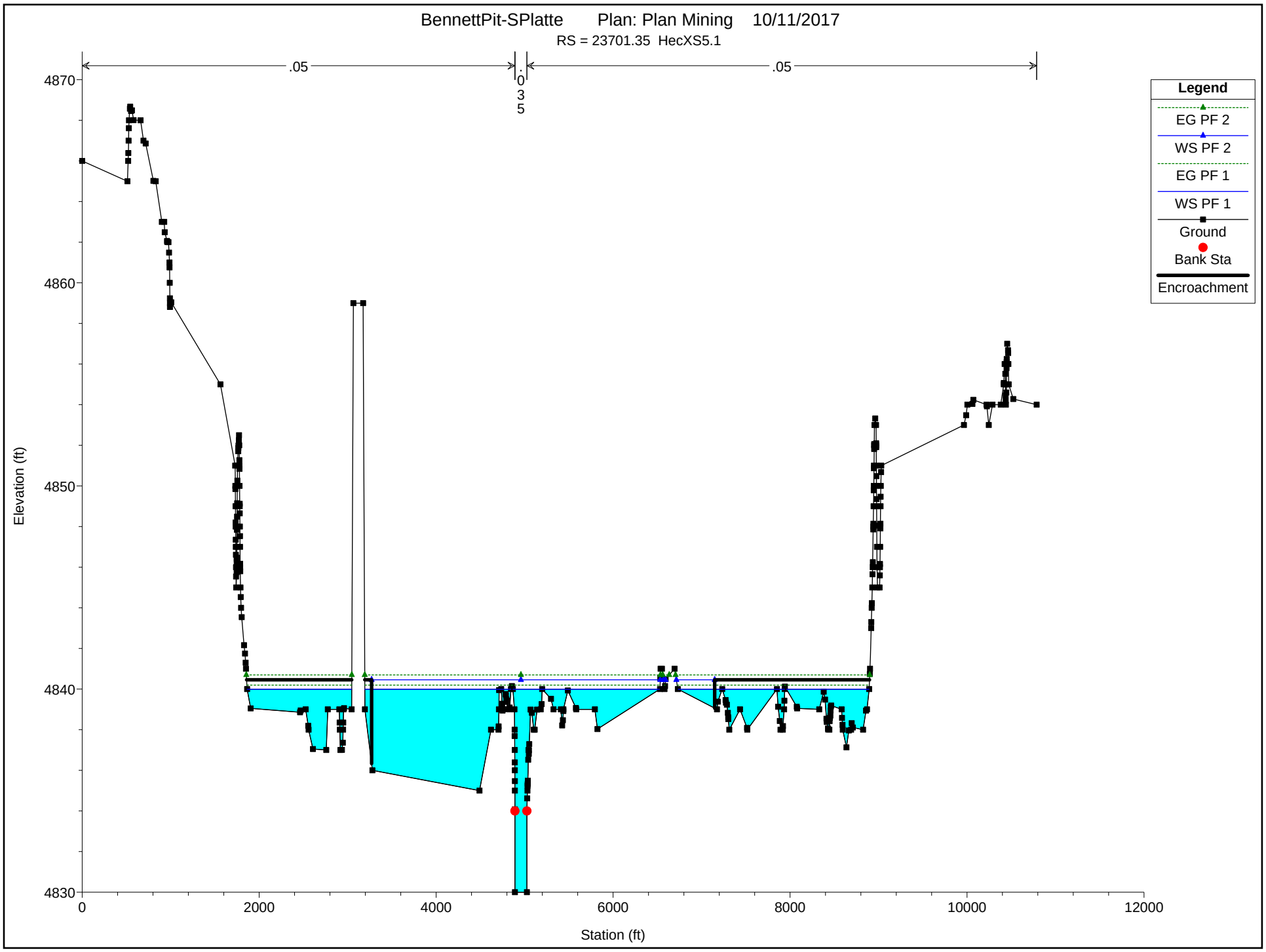

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 28500 HecXS2
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4900
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

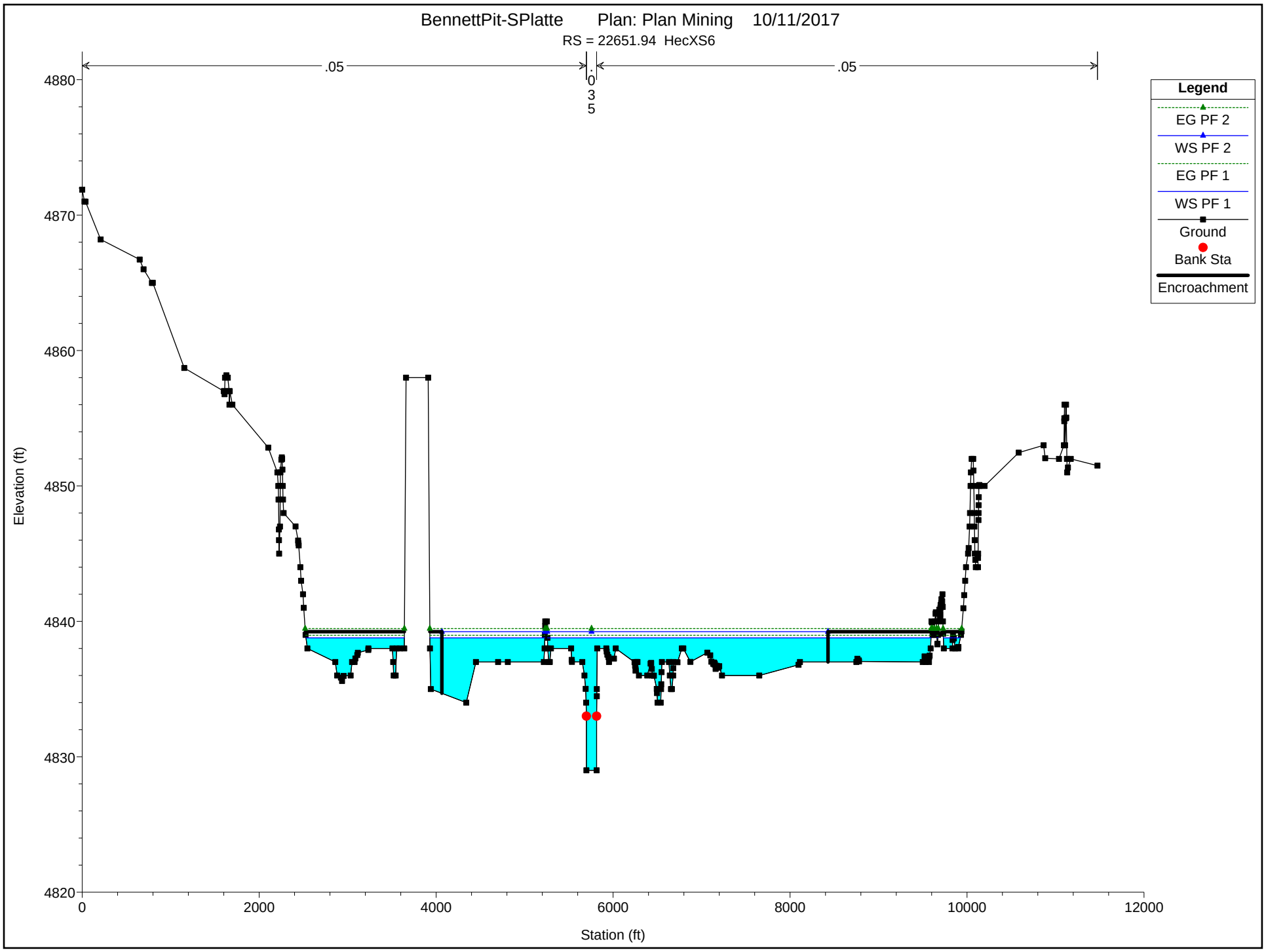

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 26500 HecXS3
.05
.03
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4900
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000

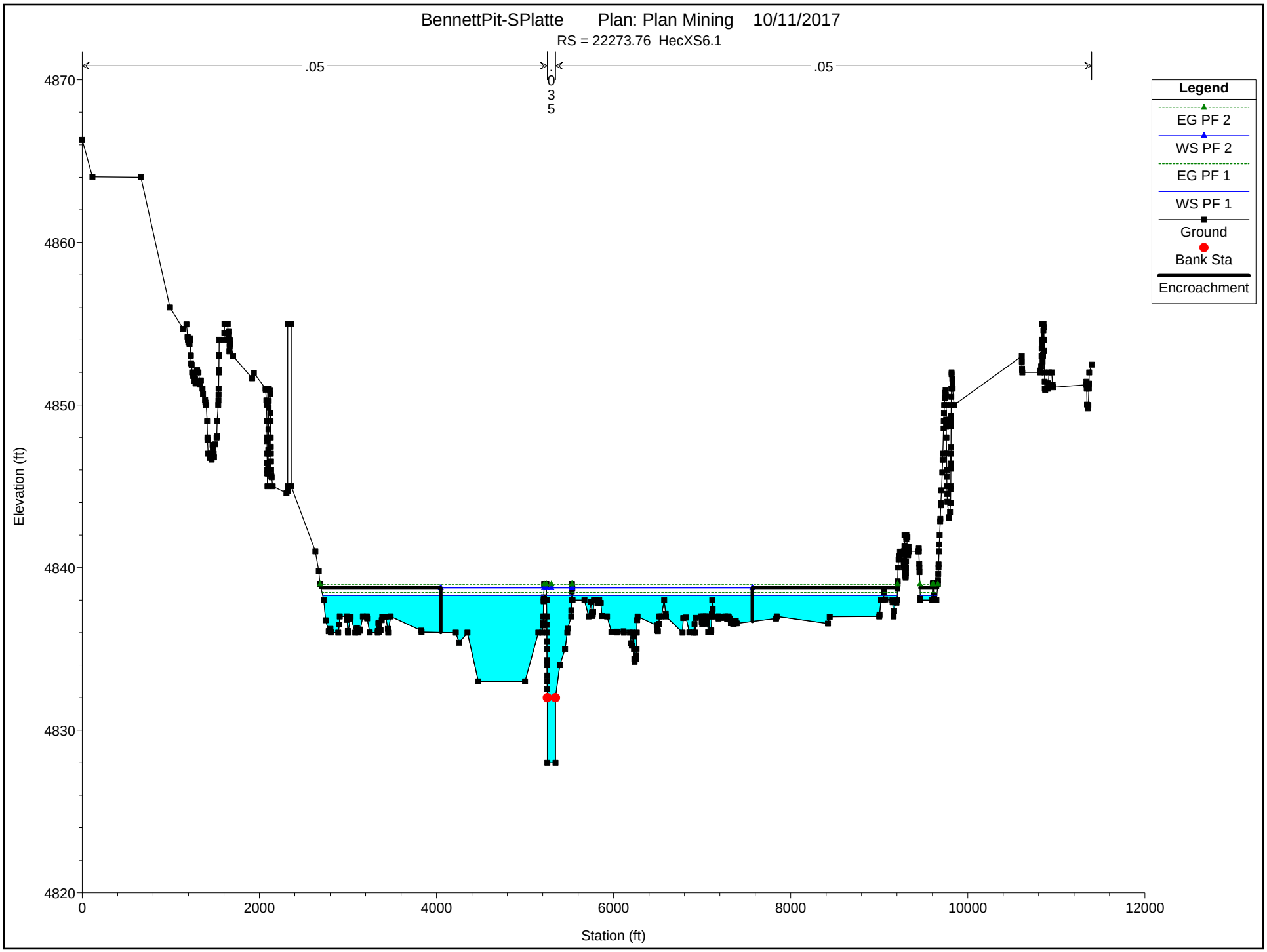

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 25313.88 HecXS4
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

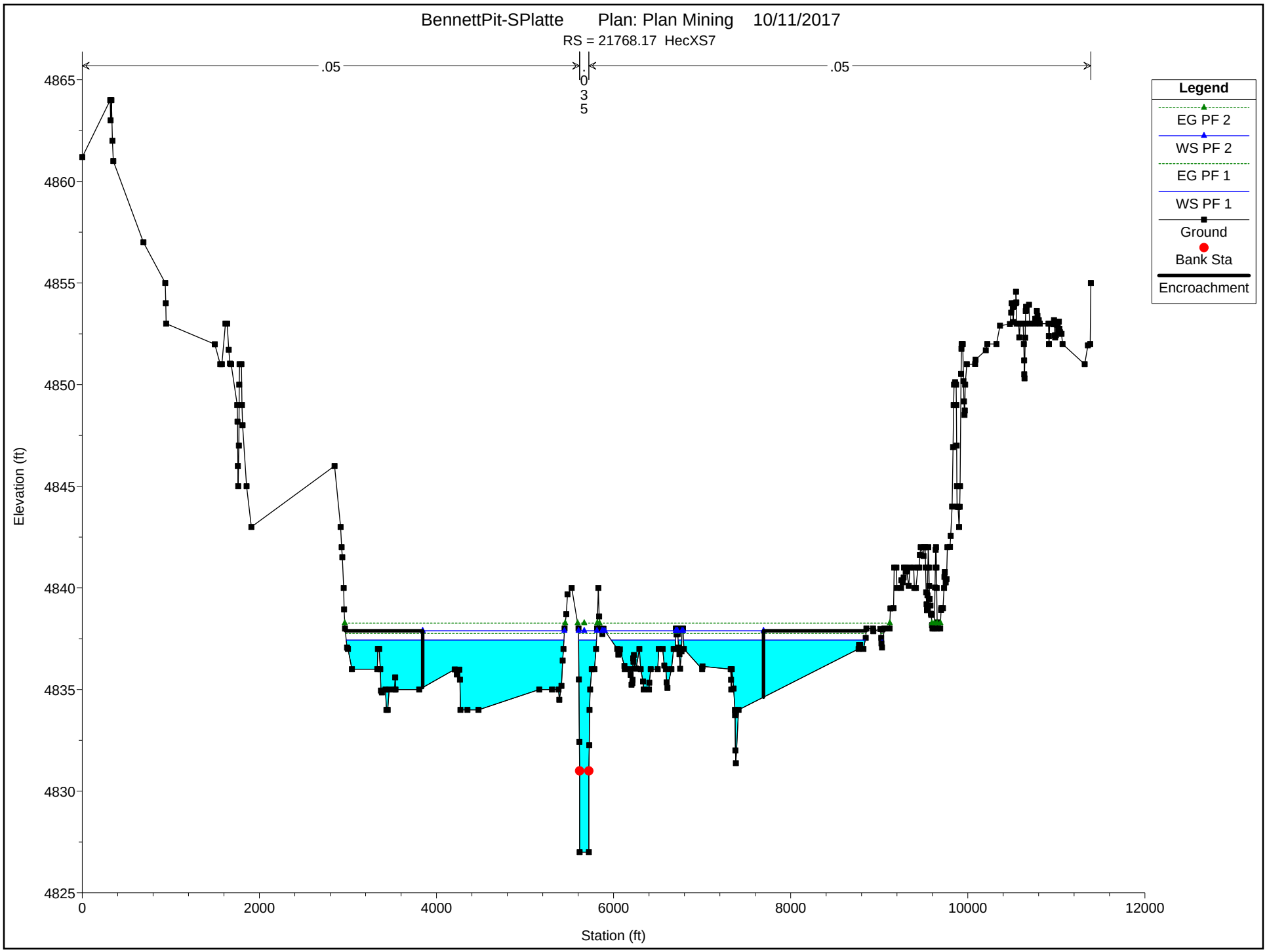

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 25000 HecXS4.1
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

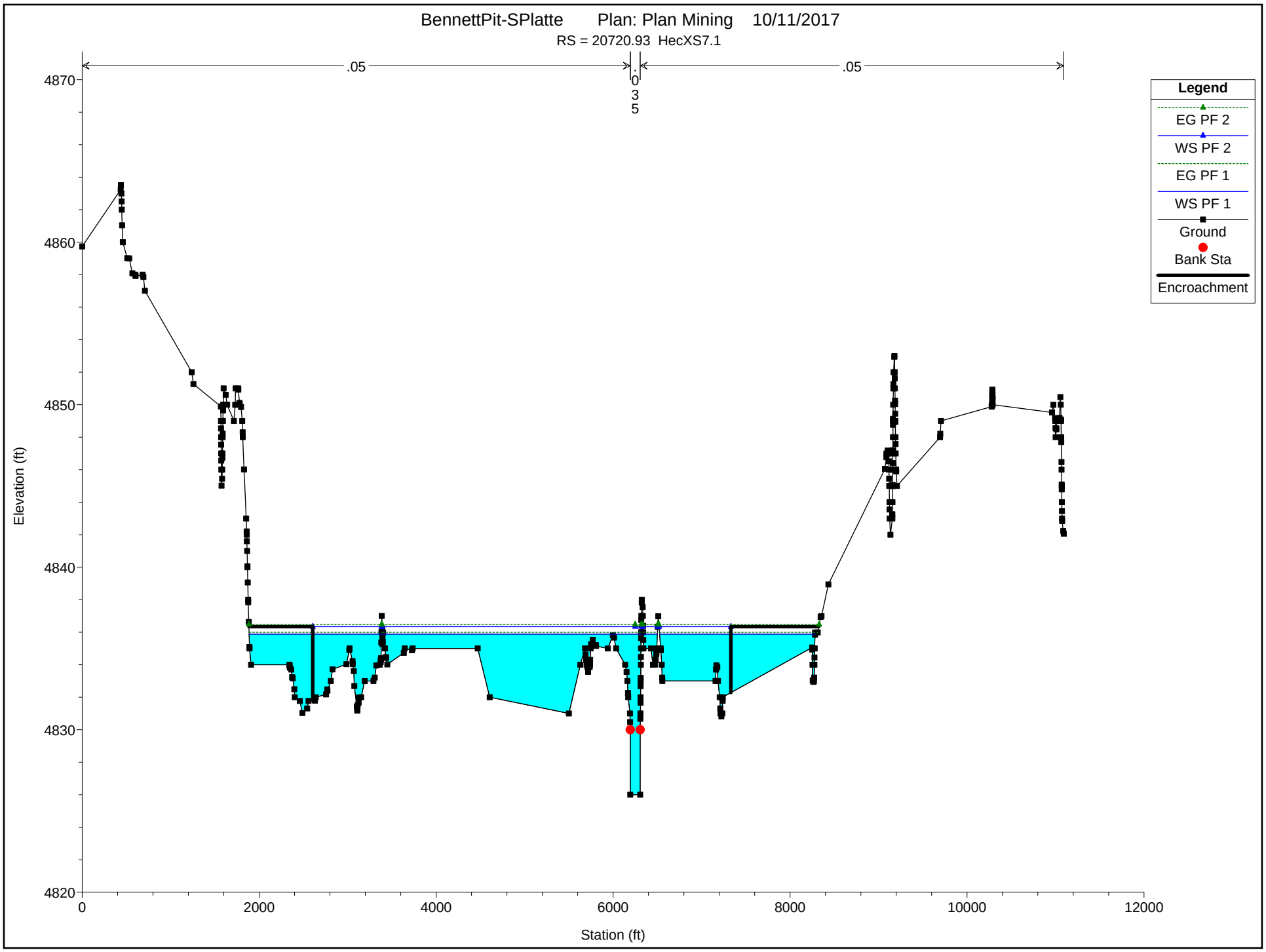

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 24421.62 HecXS5
.05
0.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4870
4865
4860
4855
4850
4845
4840
4835
4830
0
2000
4000
6000
8000
10000
12000

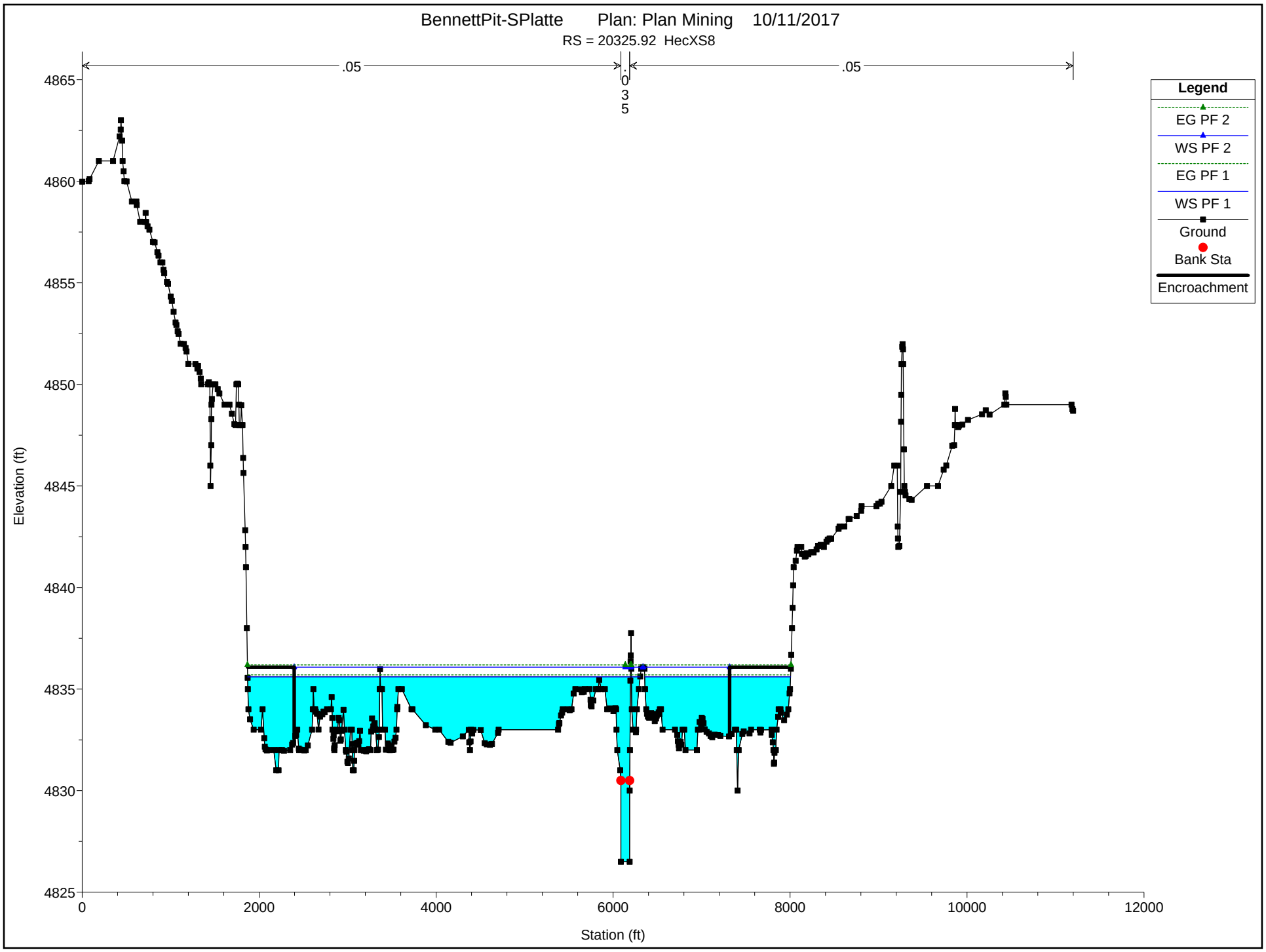

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 23701.35 HecXS5.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

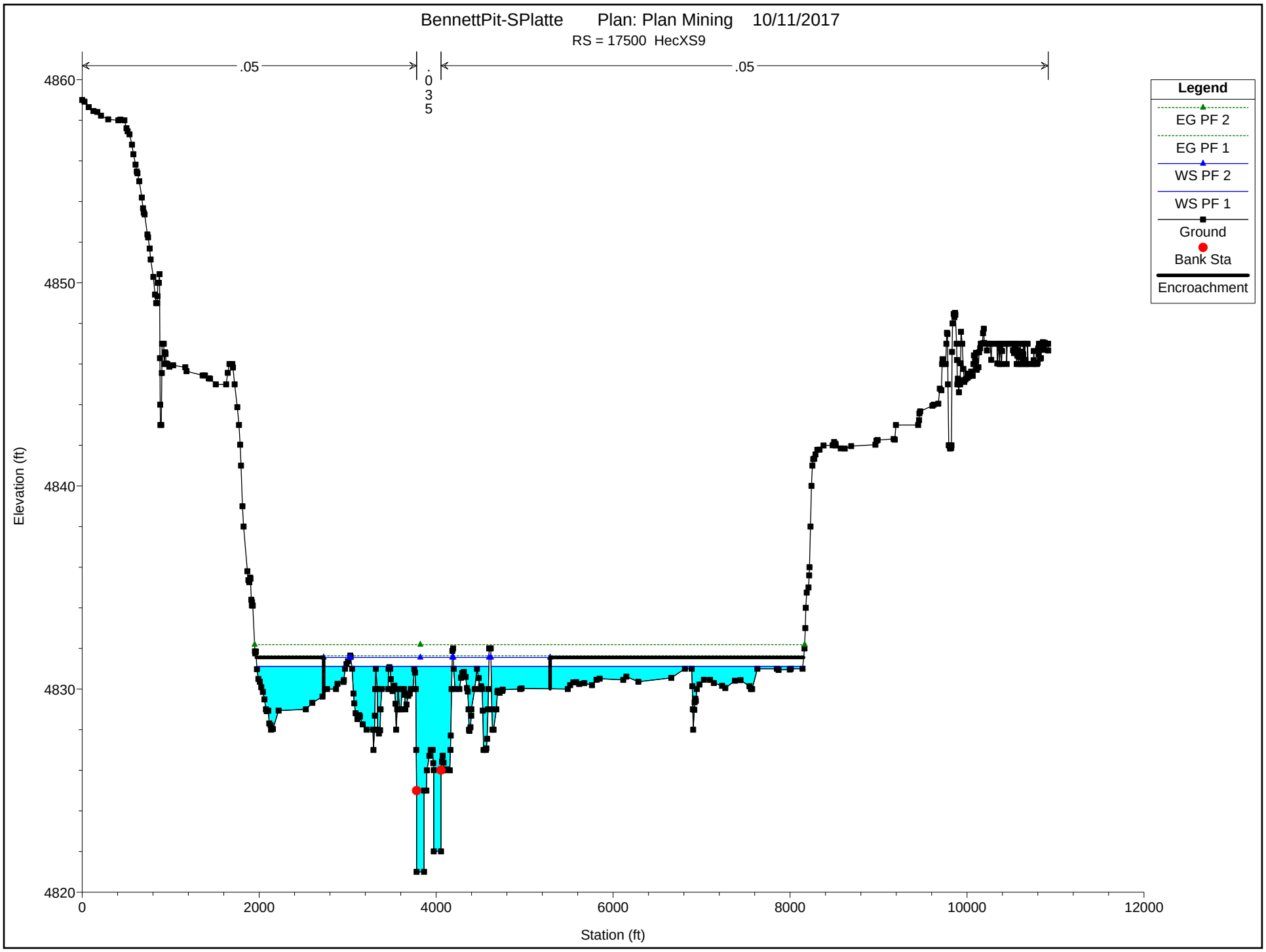

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 22651.94 HecXS6
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4880
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000

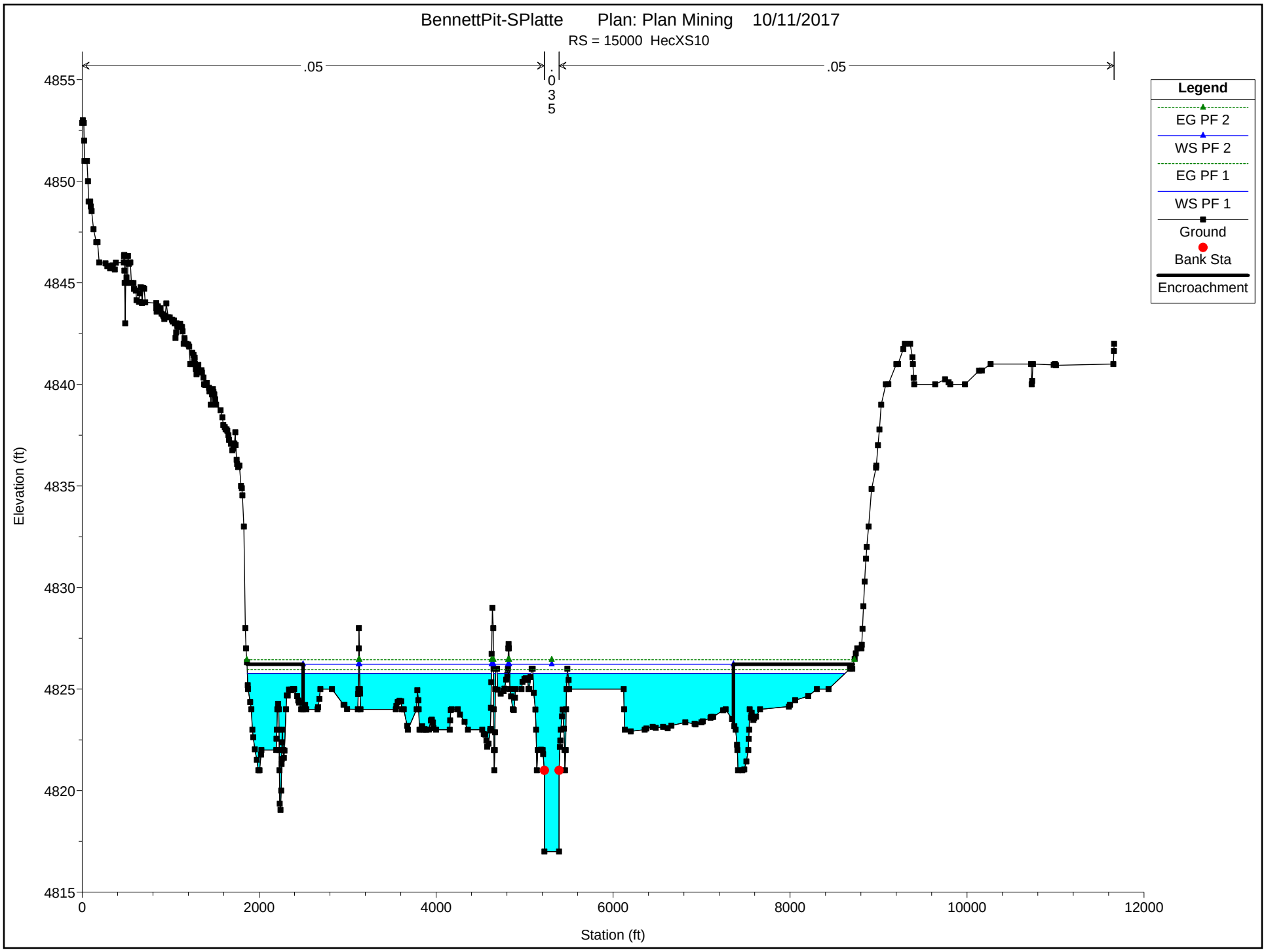

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 22273.76 HecXS6.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

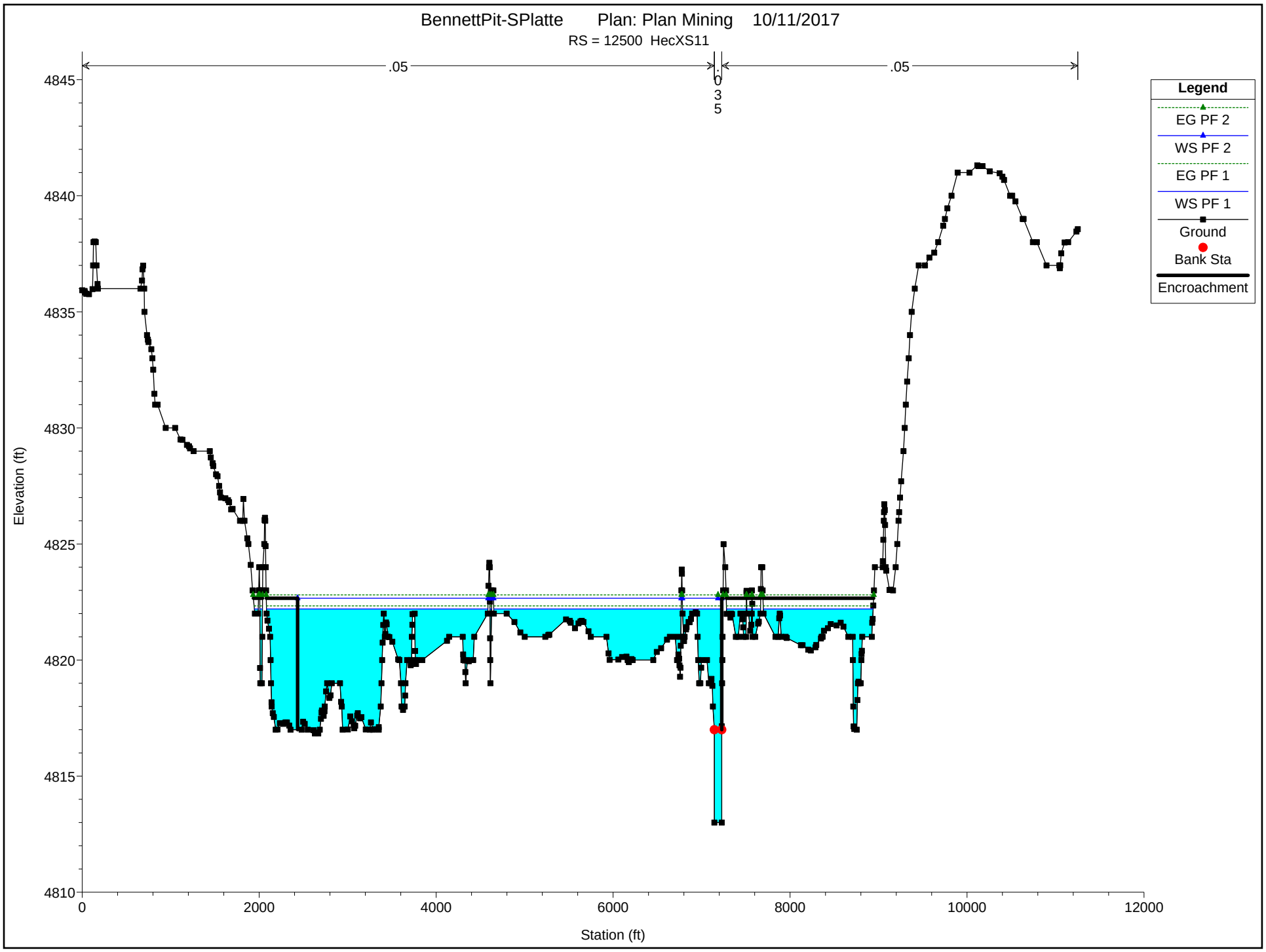

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 21768.17 HecXS7
.05
.05
0.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000

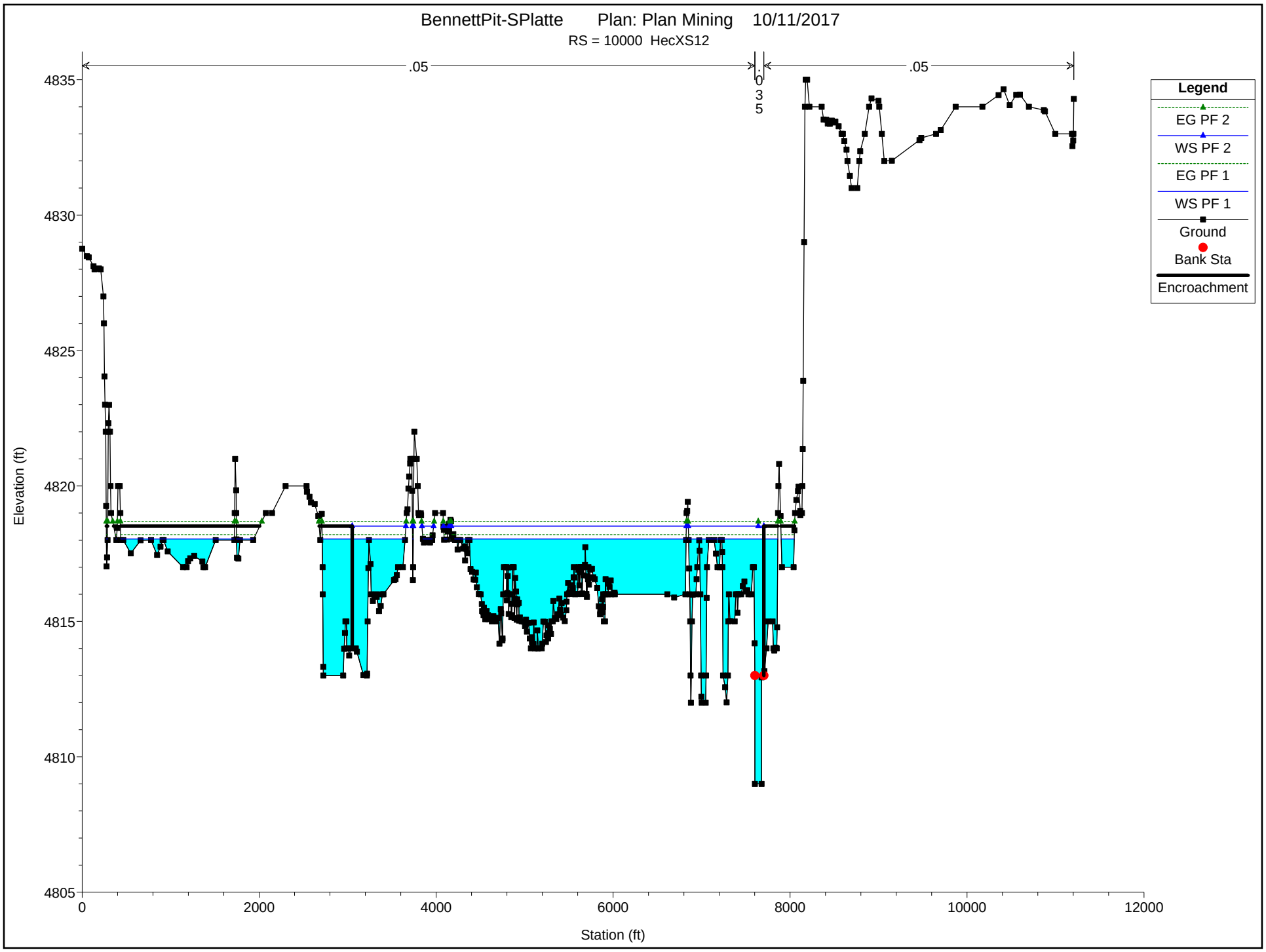

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 20720.93 HecXS7.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

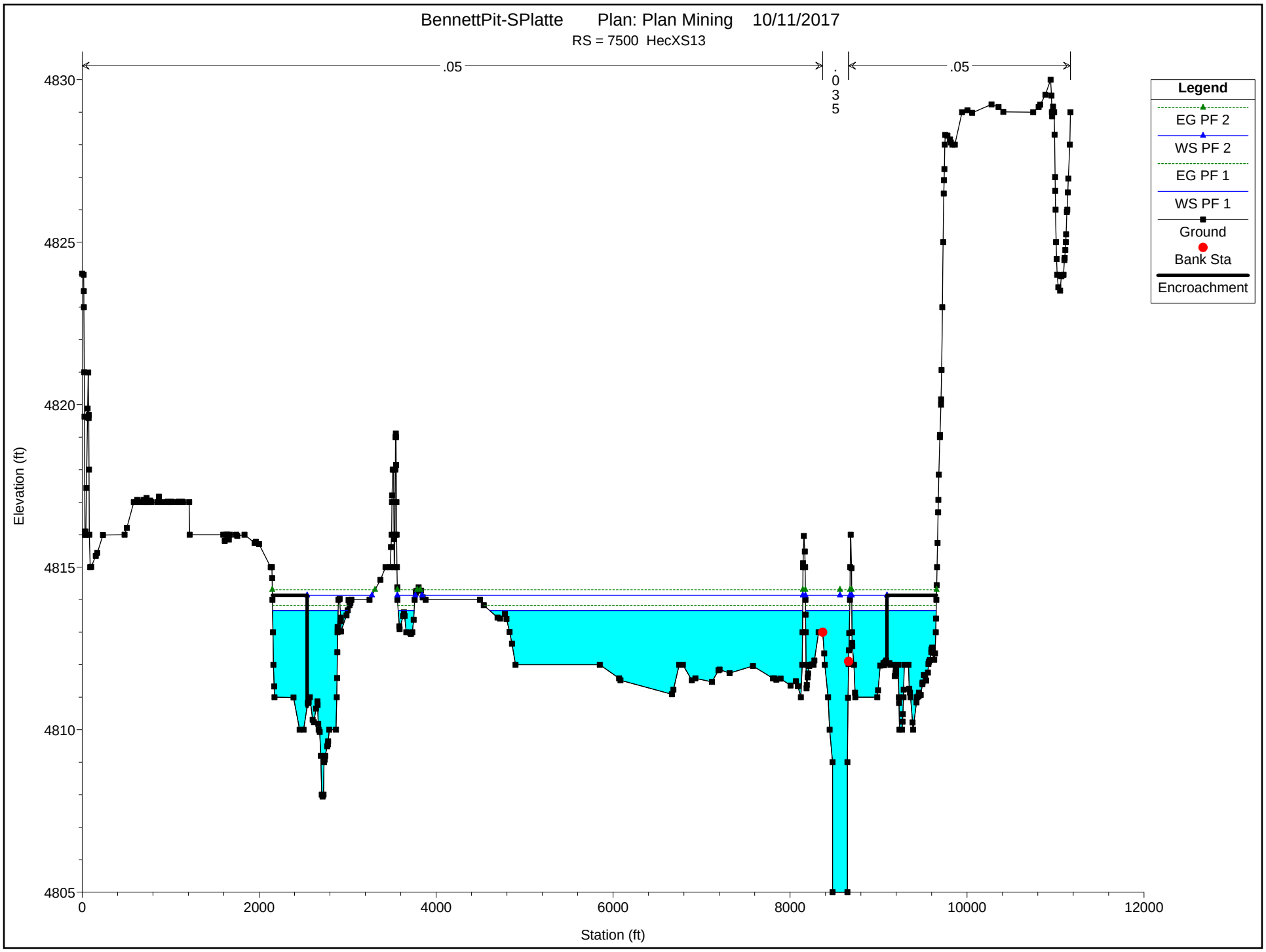

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 20325.92 HecXS8
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000

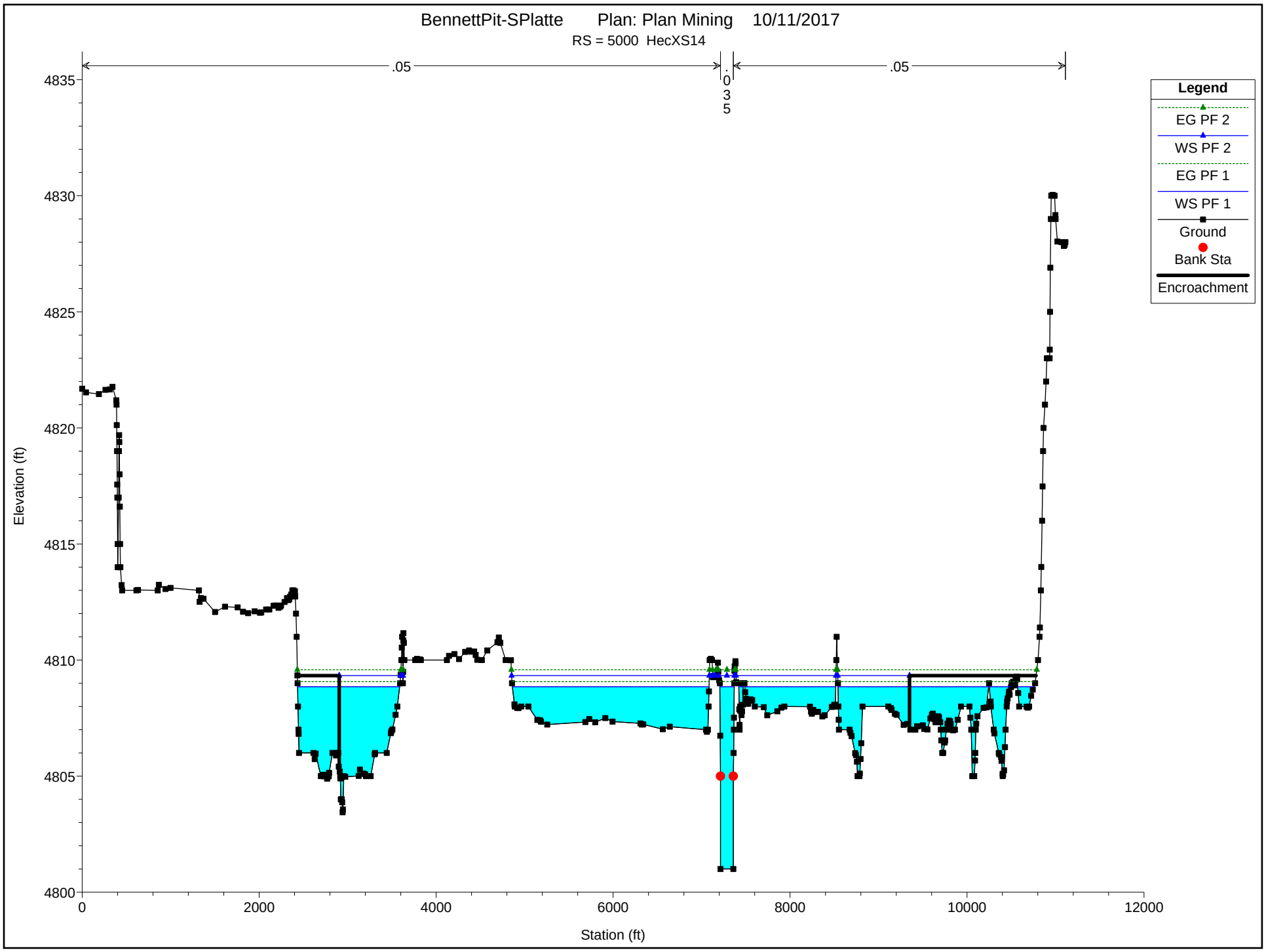

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 17500 HecXS9
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

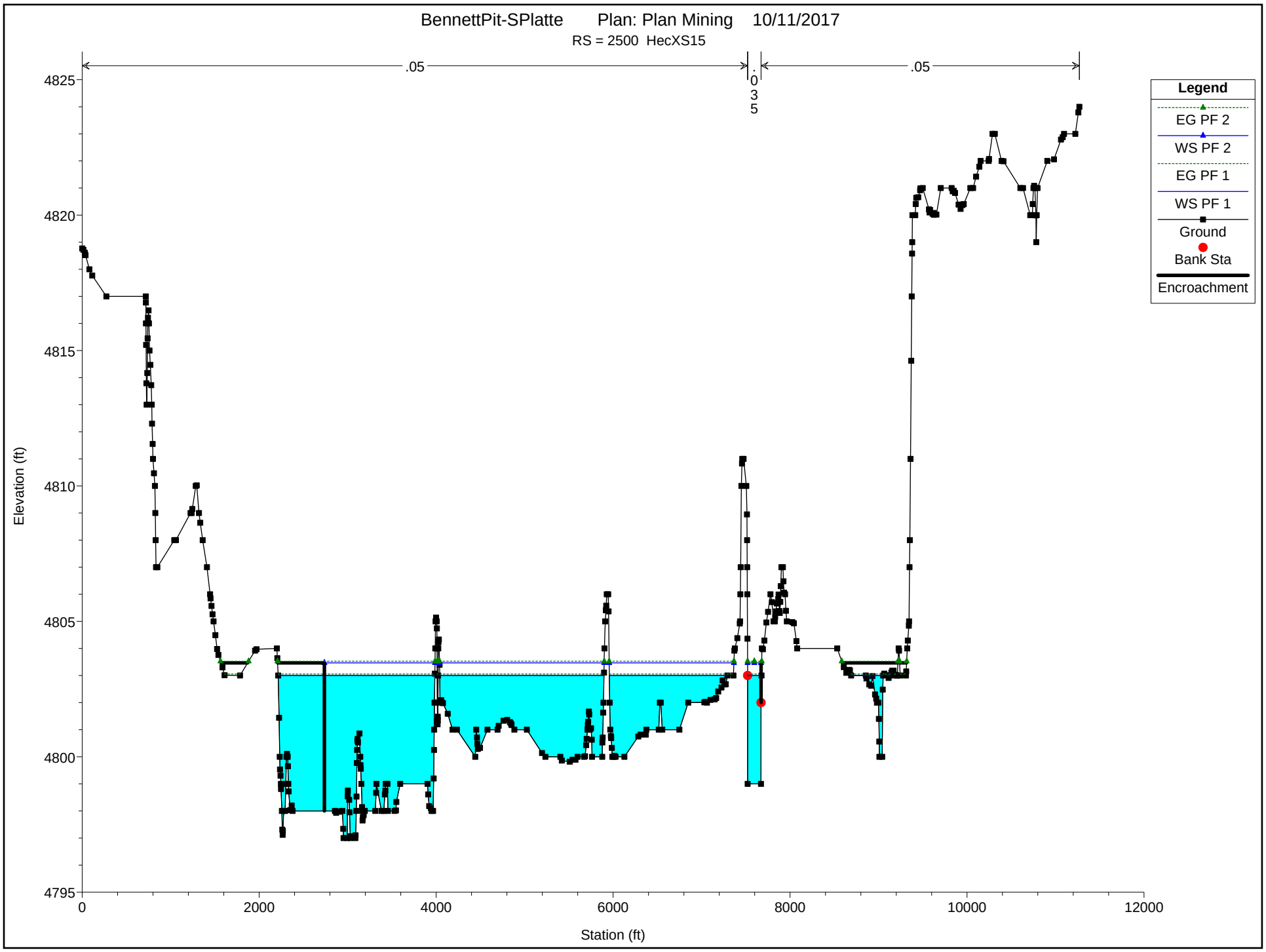

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 15000 HecXS10
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4855
4850
4845
4840
4835
4830
4825
4820
4815
0
2000
4000
6000
8000
10000
12000

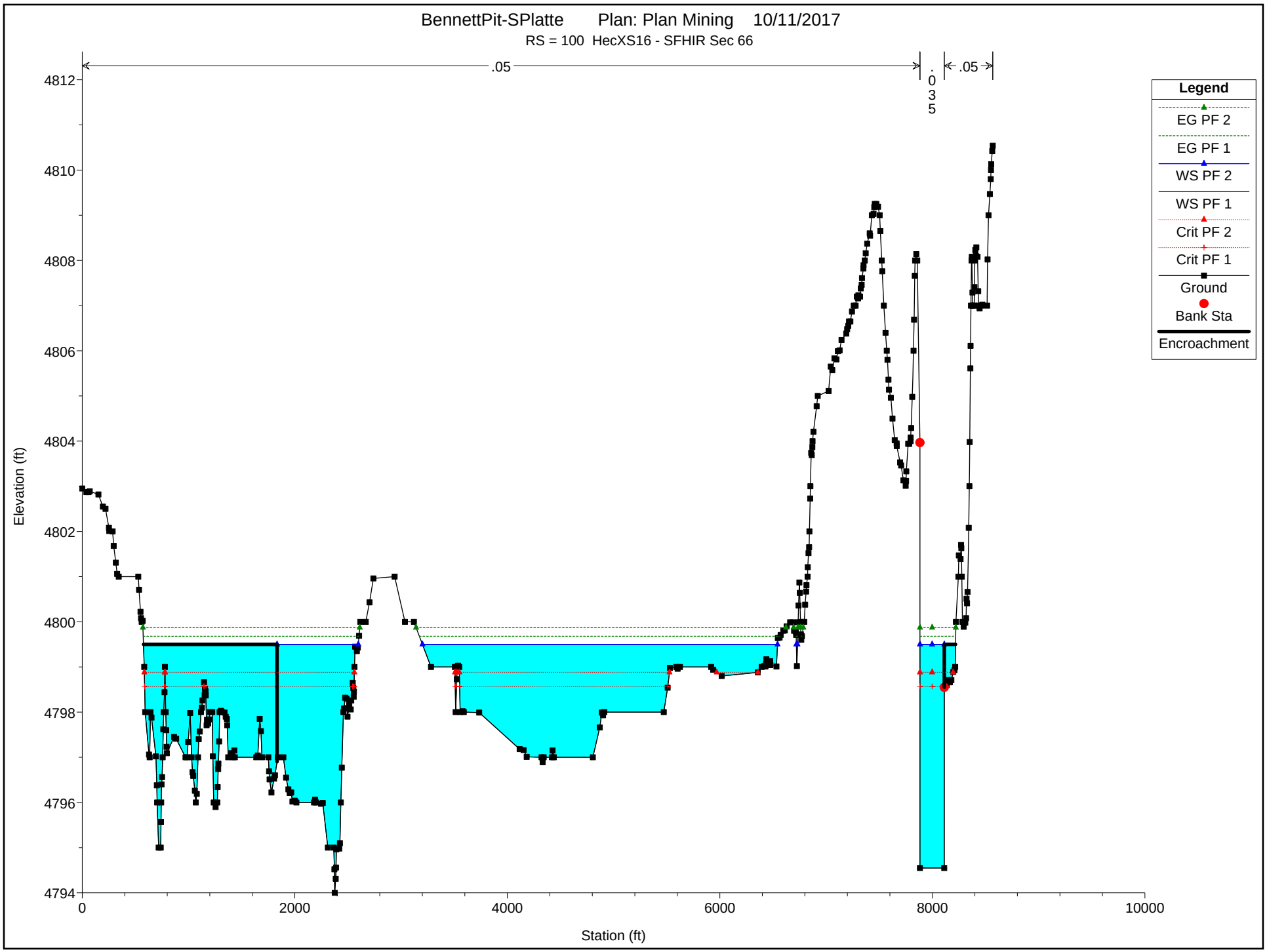

BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 12500 HecXS11
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4845
4840
4835
4830
4825
4820
4815
4810
0
2000
4000
6000
8000
10000
12000
Station (ft)


BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 10000 HecXS12
.05
.03
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4835
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000
Station (ft)


BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 7500 HecXS13
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000
Station (ft)


BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 5000 HecXS14
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4835
4830
4825
4820
4815
4810
4805
4800
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 2500 HecXS15
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4825
4820
4815
4810
4805
4800
4795
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Mining 10/11/2017
RS = 100 HecXS16 - SFHIR Sec 66
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4812
4810
4808
4806
4804
4802
4800
4798
4796
4794
0
2000
4000
6000
8000
10000
Station (ft)

HEC-RAS Plan: Proposed River: S Platte Reach: Alignment - Sout

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)	
Alignment - Sout	29977.07	PF 1	29000.00	4839.00	4849.62	4848.25	4849.69	0.000837	5.05	16893.09	6577.21	0.27
Alignment - Sout	29977.07	PF 2	29000.00	4839.00	4850.10	4848.37	4850.18	0.000816	5.13	14928.03	4605.13	0.27
Alignment - Sout	28500	PF 1	29000.00	4837.00	4847.45		4847.62	0.001045	6.23	14481.25	7201.04	0.34
Alignment - Sout	28500	PF 2	29000.00	4837.00	4847.90		4848.10	0.001048	6.42	11761.25	3876.72	0.34
Alignment - Sout	26500	PF 1	29000.00	4834.00	4845.46		4845.59	0.000788	5.73	17515.04	8246.83	0.30
Alignment - Sout	26500	PF 2	29000.00	4834.00	4845.90		4846.05	0.000794	5.90	14849.52	5193.80	0.30
Alignment - Sout	25313.88	PF 1	29000.00	4832.00	4843.35	4843.35	4844.05	0.002444	10.09	8986.90	6194.75	0.53
Alignment - Sout	25313.88	PF 2	29000.00	4832.00	4843.81	4843.28	4844.25	0.001607	8.41	10275.18	4743.90	0.43
Alignment - Sout	25000	PF 1	29000.00	4832.00	4841.84	4839.46	4842.05	0.001413	6.89	11730.35	6078.24	0.39
Alignment - Sout	25000	PF 2	29000.00	4832.00	4842.33	4839.54	4842.55	0.001363	6.99	10905.70	3843.17	0.38
Alignment - Sout	24421.62	PF 1	29000.00	4831.00	4841.02		4841.21	0.001199	6.50	14064.33	7209.11	0.36
Alignment - Sout	24421.62	PF 2	29000.00	4831.00	4841.47		4841.72	0.001196	6.69	10258.76	3493.15	0.36
Alignment - Sout	23701.35	PF 1	29000.00	4830.00	4839.95		4840.15	0.001400	6.31	12736.99	6681.06	0.39
Alignment - Sout	23701.35	PF 2	29000.00	4830.00	4840.40		4840.65	0.001404	6.55	9738.92	2971.45	0.40
Alignment - Sout	22651.94	PF 1	29000.00	4829.00	4838.59		4838.81	0.001346	6.73	14095.17	7201.12	0.38
Alignment - Sout	22651.94	PF 2	29000.00	4829.00	4839.08		4839.32	0.001295	6.83	11638.82	4271.74	0.38
Alignment - Sout	22273.76	PF 1	29000.00	4828.00	4837.89		4838.13	0.001560	7.31	12148.46	6073.93	0.41
Alignment - Sout	22273.76	PF 2	29000.00	4828.00	4838.30		4838.66	0.001601	7.61	8231.42	2558.10	0.42
Alignment - Sout	21768.17	PF 1	29000.00	4827.00	4837.12		4837.33	0.001210	6.58	12636.47	5422.75	0.36
Alignment - Sout	21768.17	PF 2	29000.00	4827.00	4837.55		4837.83	0.001230	6.82	9399.89	2822.16	0.37
Alignment - Sout	20720.93	PF 1	29000.00	4826.00	4835.88		4835.99	0.000783	5.23	16353.80	6332.80	0.29
Alignment - Sout	20720.93	PF 2	29000.00	4826.00	4836.34		4836.47	0.000774	5.36	14533.43	4680.60	0.29
Alignment - Sout	20325.92	PF 1	29000.00	4826.50	4835.60		4835.70	0.000847	5.12	15986.41	6070.54	0.30
Alignment - Sout	20325.92	PF 2	29000.00	4826.50	4836.08		4836.19	0.000825	5.22	14828.76	4911.70	0.30
Alignment - Sout	17500	PF 1	29000.00	4821.00	4831.11		4831.64	0.002250	7.59	9047.41	6059.00	0.48
Alignment - Sout	17500	PF 2	29000.00	4821.00	4831.56		4832.19	0.002263	7.90	6828.64	2510.21	0.49
Alignment - Sout	15000	PF 1	29000.00	4817.00	4825.77		4825.96	0.001174	5.99	13998.32	6647.48	0.36
Alignment - Sout	15000	PF 2	29000.00	4817.00	4826.22		4826.45	0.001169	6.19	12355.53	4817.37	0.36

HEC-RAS Plan: Proposed River: S Platte Reach: Alignment - Sout (Continued)

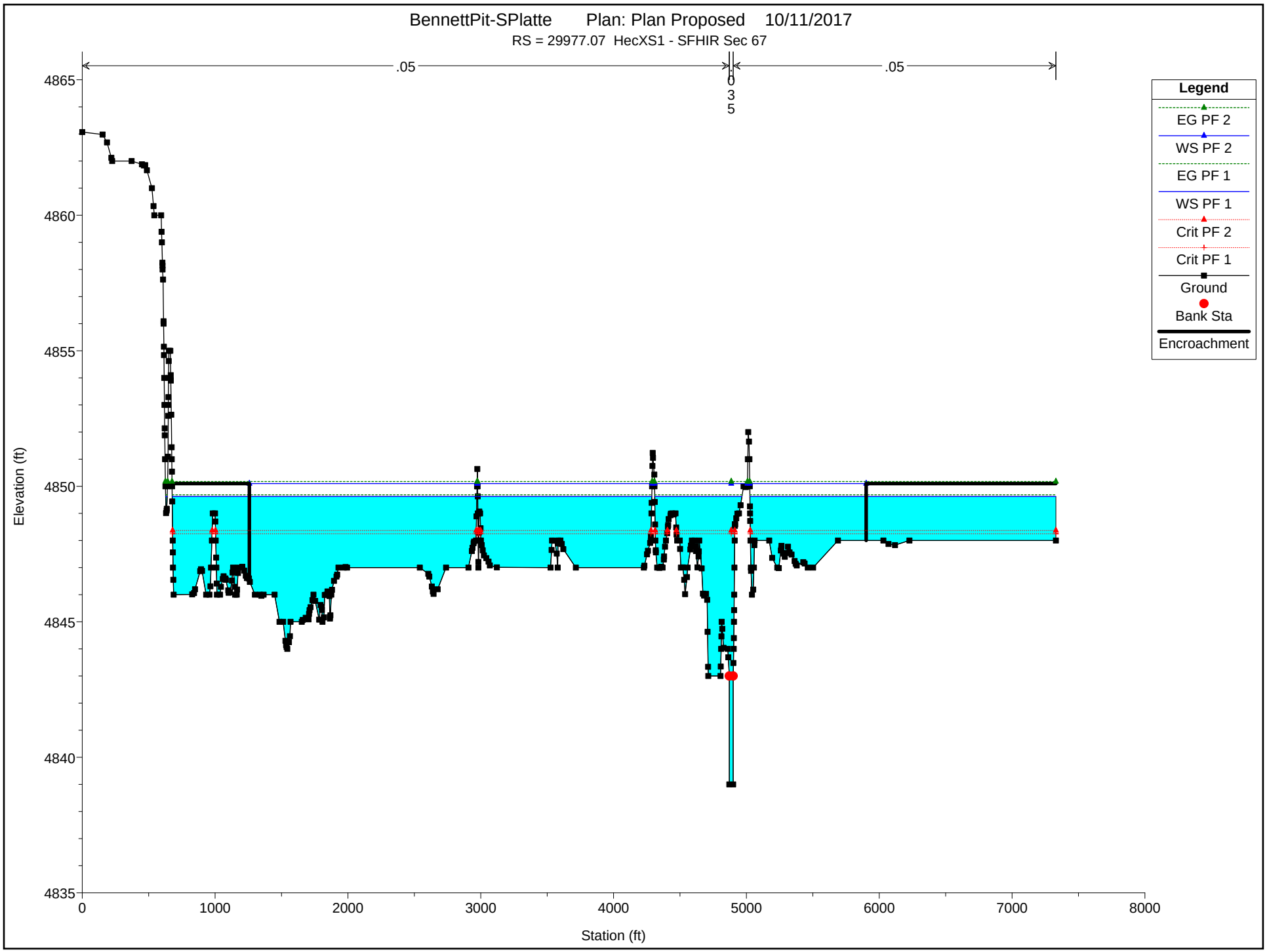
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment - Sout	12500	PF 1	29000.00	4813.00	4822.20		4822.33	0.001173	6.01	14183.09	6780.52	0.35
Alignment - Sout	12500	PF 2	29000.00	4813.00	4822.66		4822.81	0.001172	5.96	12785.45	4739.95	0.34
Alignment - Sout	10000	PF 1	29000.00	4809.00	4818.04		4818.20	0.001471	6.21	12567.77	6355.34	0.39
Alignment - Sout	10000	PF 2	29000.00	4809.00	4818.52		4818.69	0.001452	6.21	11749.52	4322.64	0.38
Alignment - Sout	7500	PF 1	29000.00	4805.00	4813.67		4813.82	0.001273	4.98	13167.78	5993.47	0.35
Alignment - Sout	7500	PF 2	29000.00	4805.00	4814.14		4814.31	0.001241	5.17	13387.70	6140.22	0.35
Alignment - Sout	5000	PF 1	29000.00	4801.00	4808.85		4809.07	0.001682	6.64	12398.39	6746.85	0.42
Alignment - Sout	5000	PF 2	29000.00	4801.00	4809.33		4809.58	0.001617	6.78	11361.93	5067.14	0.41
Alignment - Sout	2500	PF 1	29000.00	4799.00	4803.00		4803.06	0.000717	2.77	15783.07	5362.87	0.24
Alignment - Sout	2500	PF 2	29000.00	4799.00	4803.47		4803.53	0.000706	2.94	15309.62	4685.95	0.25
Alignment - Sout	100	PF 1	29000.00	4794.55	4799.50	4798.57	4799.68	0.002320	5.79	11051.52	5707.91	0.46
Alignment - Sout	100	PF 2	29000.00	4794.55	4799.50	4798.88	4799.87	0.004148	7.72	8048.47	4344.74	0.61

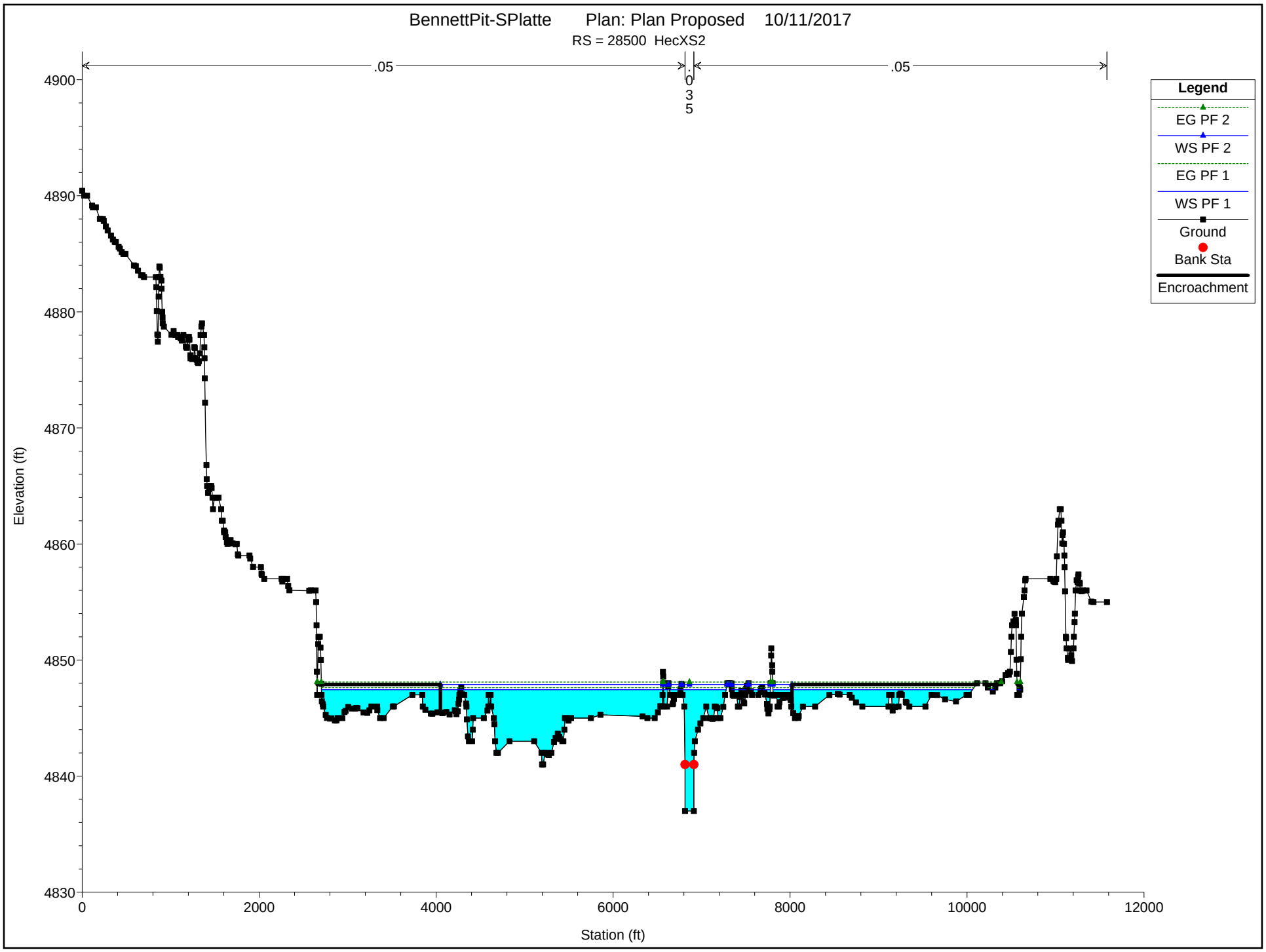
HEC-RAS Plan: Proposed River: S Platte Reach: Alignment - Sout

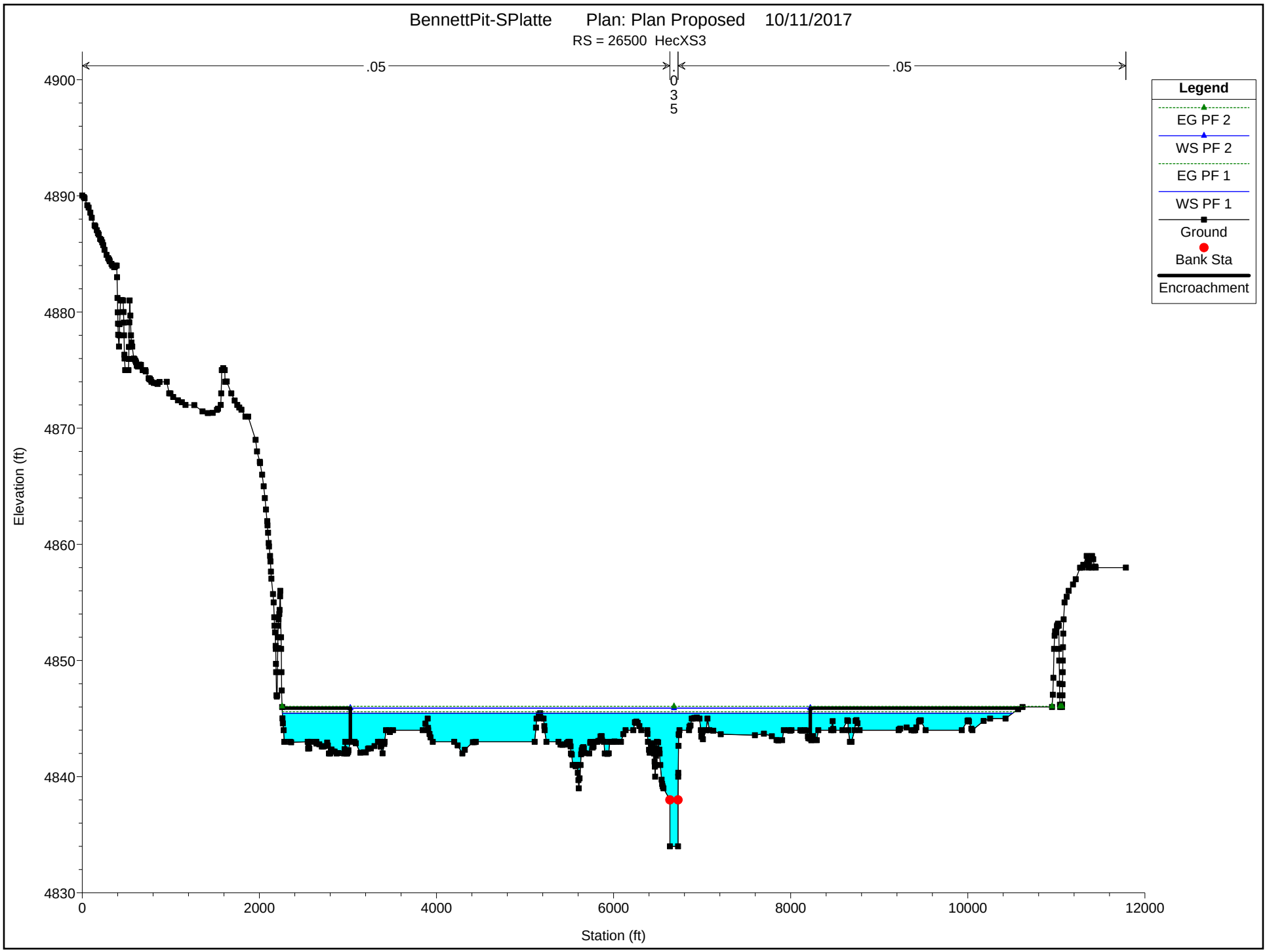
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	29977.07	PF 1	4849.62		4849.69	6577.21	22136.66	1556.83	5306.52		4871.24	4900.28	
Alignment - Sout	29977.07	PF 2	4850.10	0.48	4850.18	4605.13	23774.86	1654.12	3571.02	1258.03	4871.24	4900.28	5901.58
Alignment - Sout	28500	PF 1	4847.45		4847.62	7201.04	18588.02	6476.79	3935.19		6813.27	6912.74	
Alignment - Sout	28500	PF 2	4847.90	0.45	4848.10	3876.72	19464.89	6955.91	2579.20	4048.41	6813.27	6912.74	8021.93
Alignment - Sout	26500	PF 1	4845.46		4845.59	8246.83	17420.88	6028.14	5550.98		6636.20	6728.02	
Alignment - Sout	26500	PF 2	4845.90	0.44	4846.05	5193.80	18292.37	6445.22	4262.41	3027.38	6636.20	6728.02	8221.18
Alignment - Sout	25313.88	PF 1	4843.35		4844.05	6194.75	14410.82	11882.51	2706.67		5653.96	5757.75	
Alignment - Sout	25313.88	PF 2	4843.81	0.47	4844.25	4743.90	14943.46	10303.84	3752.71	2848.61	5653.96	5757.75	8091.01
Alignment - Sout	25000	PF 1	4841.84		4842.05	6078.24	19677.45	5431.32	3891.23		5481.43	5561.65	
Alignment - Sout	25000	PF 2	4842.33	0.49	4842.55	3843.17	18631.28	5783.02	4585.70	3582.89	5481.43	5561.65	7499.10
Alignment - Sout	24421.62	PF 1	4841.02		4841.21	7209.11	17750.40	6720.67	4528.93		5111.35	5214.51	
Alignment - Sout	24421.62	PF 2	4841.47	0.45	4841.72	3493.15	18518.89	7225.12	3255.99	3260.49	5111.35	5214.51	6797.27
Alignment - Sout	23701.35	PF 1	4839.95		4840.15	6681.06	18359.83	6774.52	3865.66		4890.80	5025.92	
Alignment - Sout	23701.35	PF 2	4840.40	0.45	4840.65	2971.45	18823.85	7430.43	2745.72	3158.88	4890.80	5025.92	6130.32
Alignment - Sout	22651.94	PF 1	4838.59		4838.81	7201.12	10370.23	7467.64	11162.13		5698.23	5813.94	
Alignment - Sout	22651.94	PF 2	4839.08	0.49	4839.32	4271.74	9685.78	7957.62	11356.60	3980.76	5698.23	5813.94	8280.05
Alignment - Sout	22273.76	PF 1	4837.89		4838.13	6073.93	16011.92	6621.67	6366.40		5252.02	5343.67	
Alignment - Sout	22273.76	PF 2	4838.30	0.42	4838.66	2558.10	16209.29	7183.40	5607.31	4500.27	5252.02	5343.67	7098.13
Alignment - Sout	21768.17	PF 1	4837.12		4837.33	5422.75	16944.17	6936.97	5118.86		5616.58	5720.81	
Alignment - Sout	21768.17	PF 2	4837.55	0.43	4837.83	2822.16	17362.44	7494.02	4143.55	4395.98	5616.58	5720.81	7553.29
Alignment - Sout	20720.93	PF 1	4835.88		4835.99	6332.80	15978.19	5788.11	7233.71		6193.90	6306.01	
Alignment - Sout	20720.93	PF 2	4836.34	0.46	4836.47	4680.60	17255.74	6208.55	5535.71	2605.71	6193.90	6306.01	7330.53
Alignment - Sout	20325.92	PF 1	4835.60		4835.70	6070.54	16893.62	4599.71	7506.67		6088.13	6186.94	
Alignment - Sout	20325.92	PF 2	4836.08	0.48	4836.19	4911.70	18240.33	4944.16	5815.50	2396.05	6088.13	6186.94	7316.98
Alignment - Sout	17500	PF 1	4831.11		4831.64	6059.00	6424.32	16224.30	6351.38		3779.50	4055.29	
Alignment - Sout	17500	PF 2	4831.56	0.44	4832.19	2510.21	4699.07	17851.17	6449.76	2728.62	3779.50	4055.29	5288.39
Alignment - Sout	15000	PF 1	4825.77		4825.96	6647.48	11383.17	8710.03	8906.80		5223.39	5389.19	
Alignment - Sout	15000	PF 2	4826.22	0.45	4826.45	4817.37	11116.67	9455.66	8427.67	2496.10	5223.39	5389.19	7360.21
Alignment - Sout	12500	PF 1	4822.20		4822.33	6780.52	22036.83	4620.31	2342.87		7144.12	7227.75	

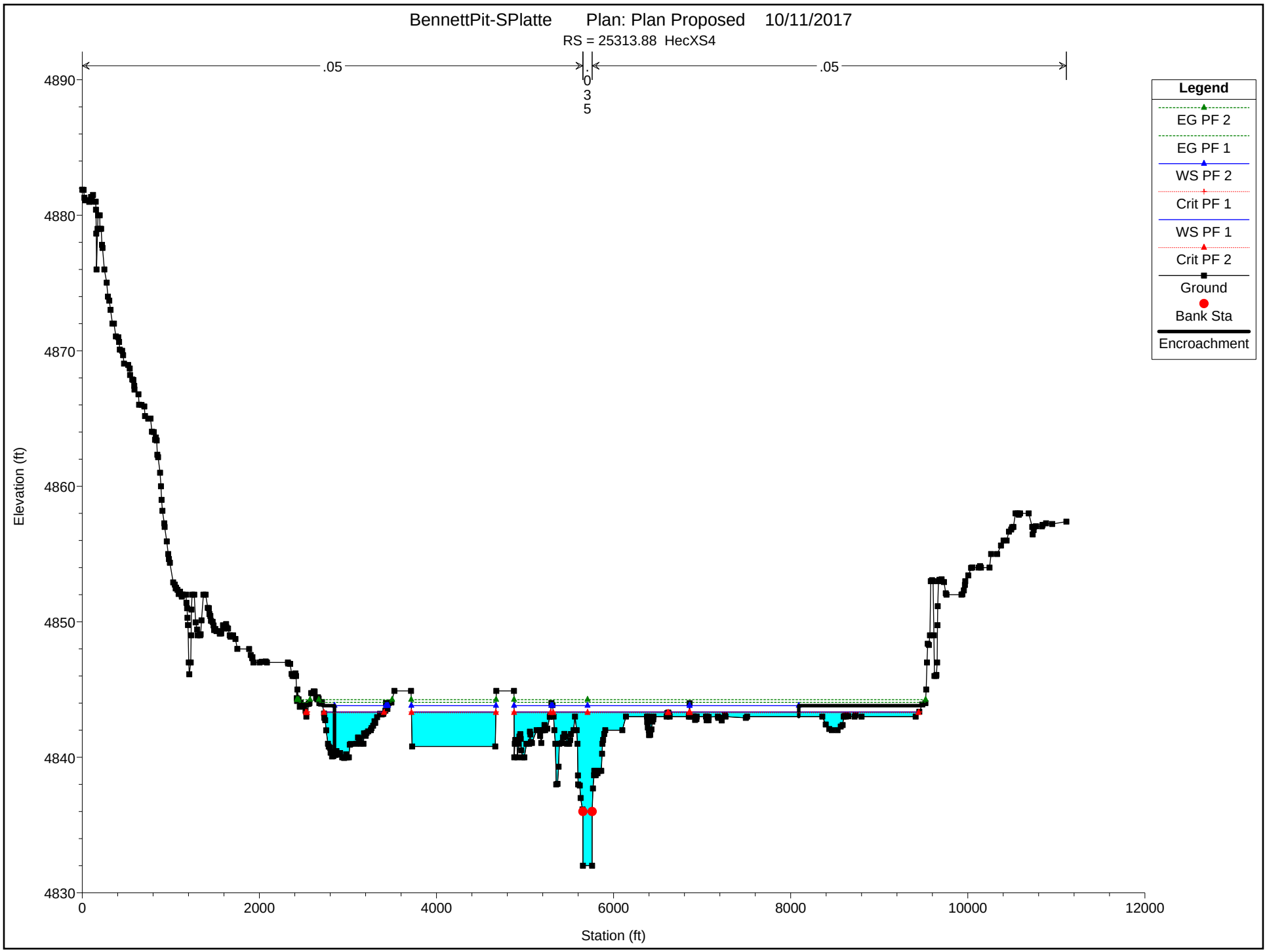
HEC-RAS Plan: Proposed River: S Platte Reach: Alignment - Sout (Continued)

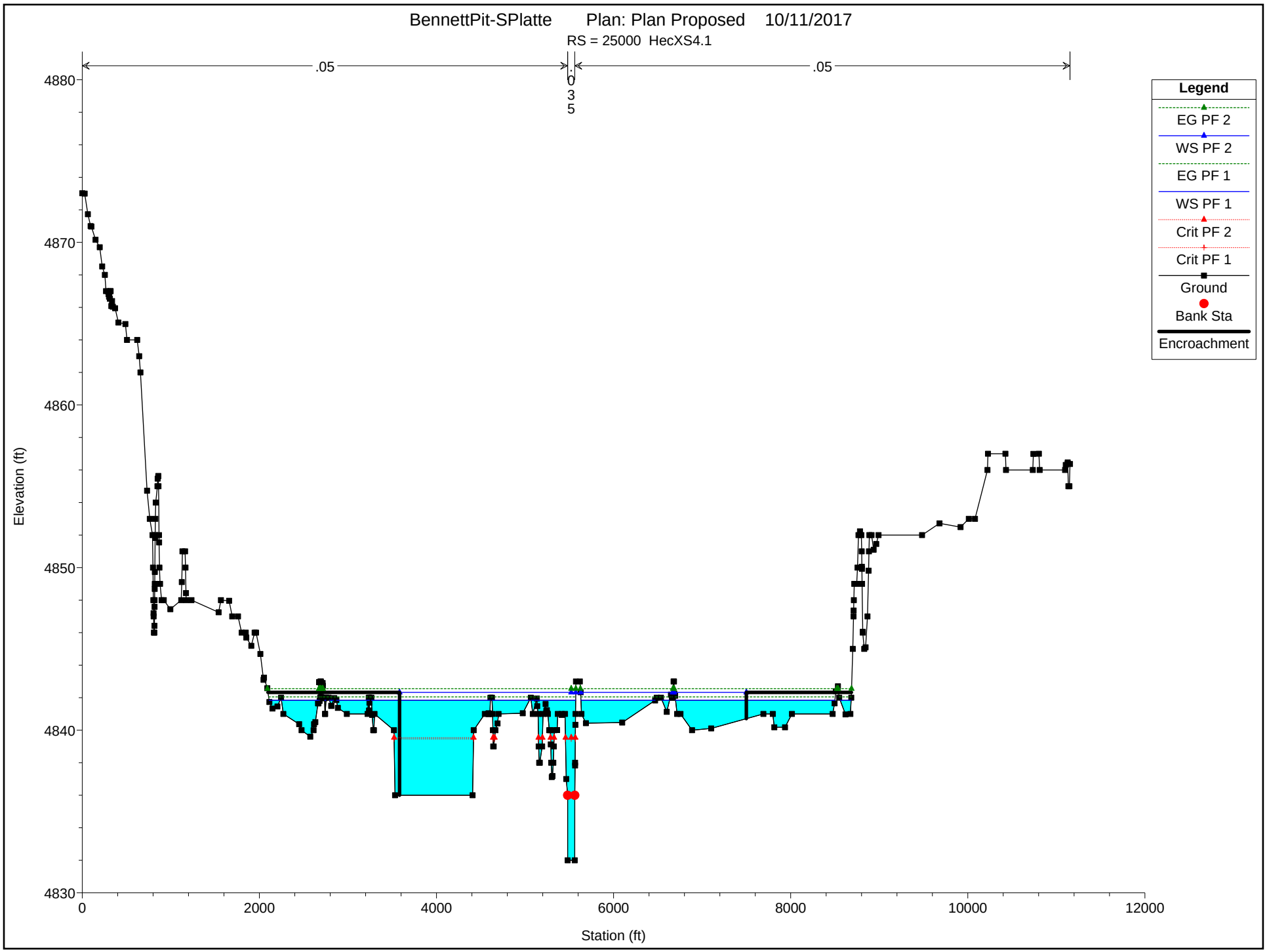
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Alignment - Sout	12500	PF 2	4822.66	0.46	4822.81	4739.95	24182.02	4817.98		2434.65	7144.12	7227.75	7227.75
Alignment - Sout	10000	PF 1	4818.04		4818.20	6355.34	22247.18	5060.46	1692.36		7602.21	7703.56	
Alignment - Sout	10000	PF 2	4818.52	0.47	4818.69	4322.64	23647.41	5352.60		3051.84	7602.21	7703.56	7703.56
Alignment - Sout	7500	PF 1	4813.67		4813.82	5993.47	16205.33	8930.76	3863.91		8369.07	8661.51	
Alignment - Sout	7500	PF 2	4814.14	0.47	4814.31	6140.22	16711.75	9973.61	2314.64	2542.34	8369.07	8661.51	9095.49
Alignment - Sout	5000	PF 1	4808.85		4809.07	6746.85	15014.16	7572.53	6413.31		7213.66	7359.05	
Alignment - Sout	5000	PF 2	4809.33	0.48	4809.58	5067.14	15496.66	8204.72	5298.62	2904.84	7213.66	7359.05	9350.06
Alignment - Sout	2500	PF 1	4803.00		4803.06	5362.87	27178.84	1671.33	149.82		7520.75	7672.12	
Alignment - Sout	2500	PF 2	4803.47	0.47	4803.53	4685.95	27016.68	1983.32		2737.07	7520.75	7672.12	7672.12
Alignment - Sout	100	PF 1	4799.50		4799.68	5707.91	22349.71	6553.38	96.91		7883.19	8111.83	
Alignment - Sout	100	PF 2	4799.50	0.00	4799.87	4344.74	20261.61	8738.39		1832.97	7883.19	8111.83	8111.83

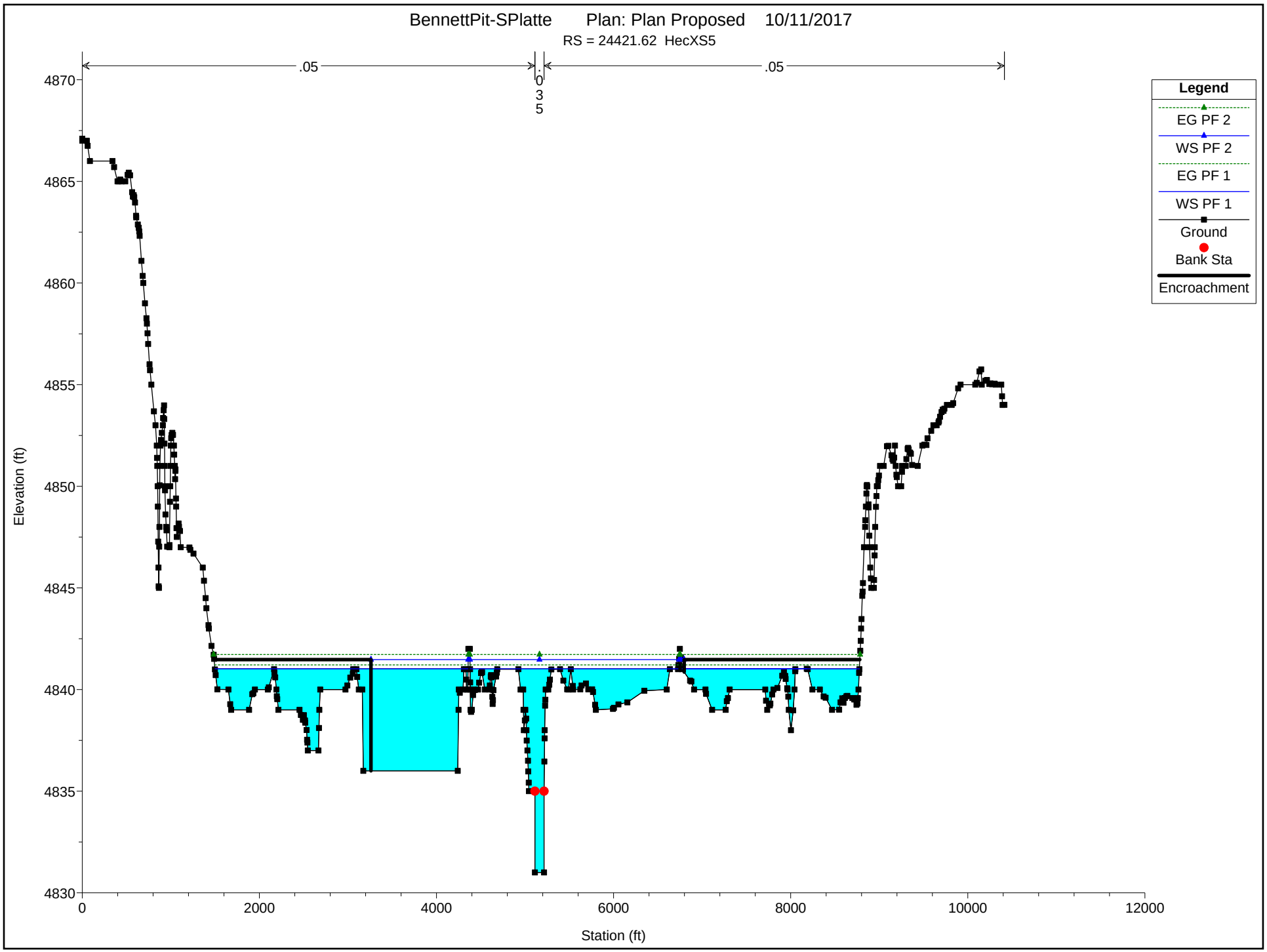

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 29977.07 HecXS1 - SFHIR Sec 67
.05
.05
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4865
4860
4855
4850
4845
4840
4835
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)

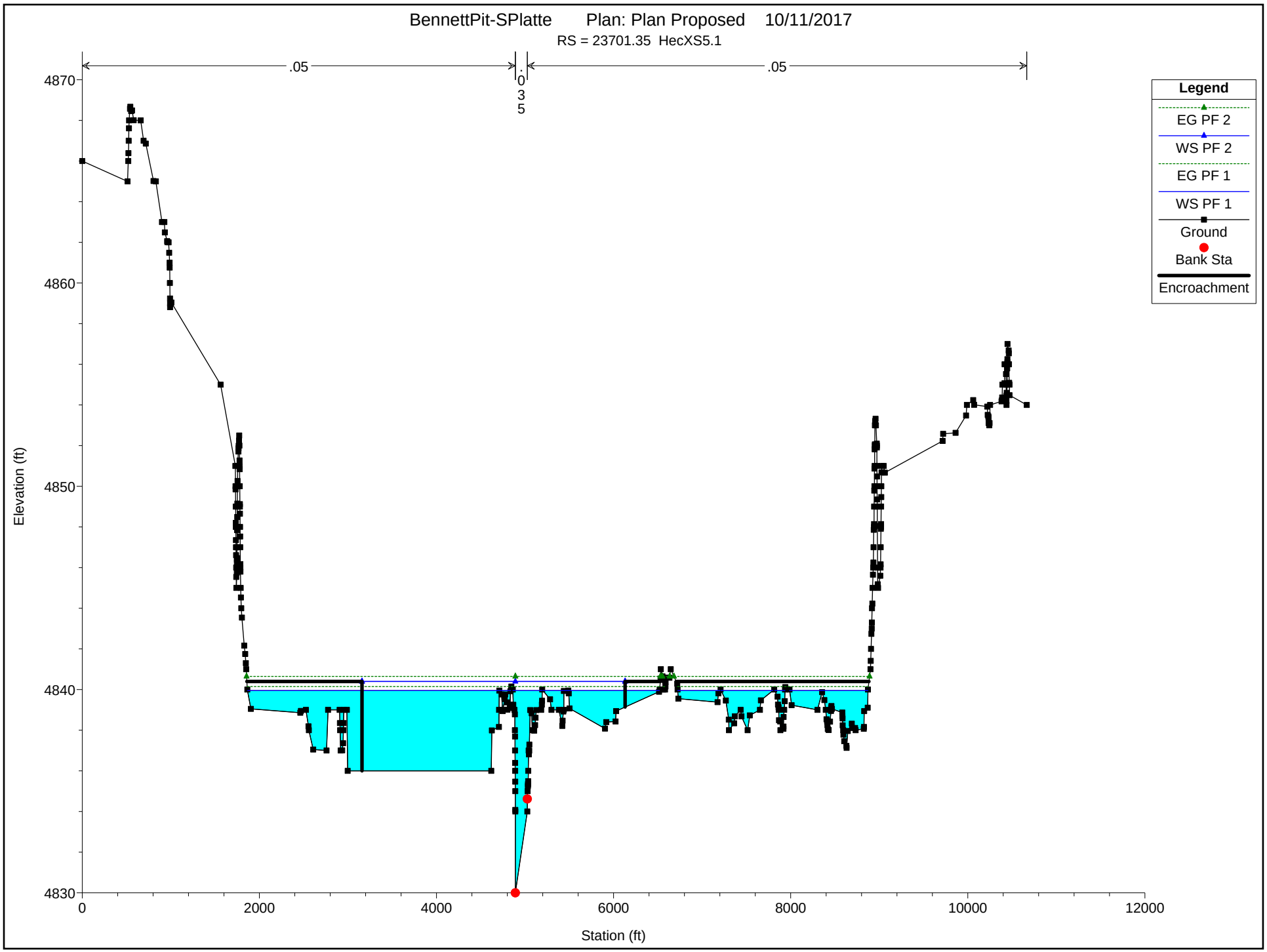

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 28500 HecXS2
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4900
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000

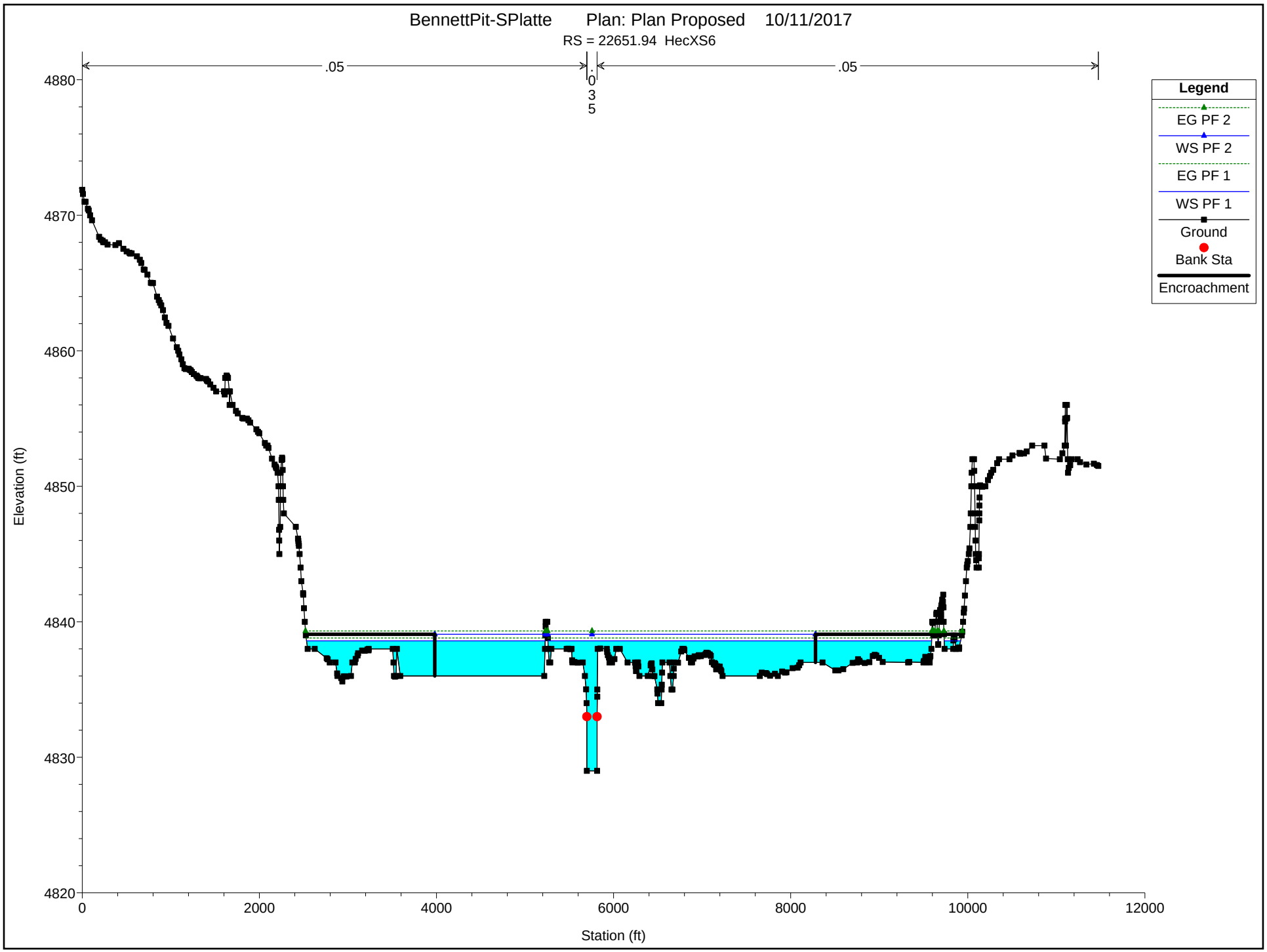

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 26500 HecXS3
.05
.03
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4900
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000

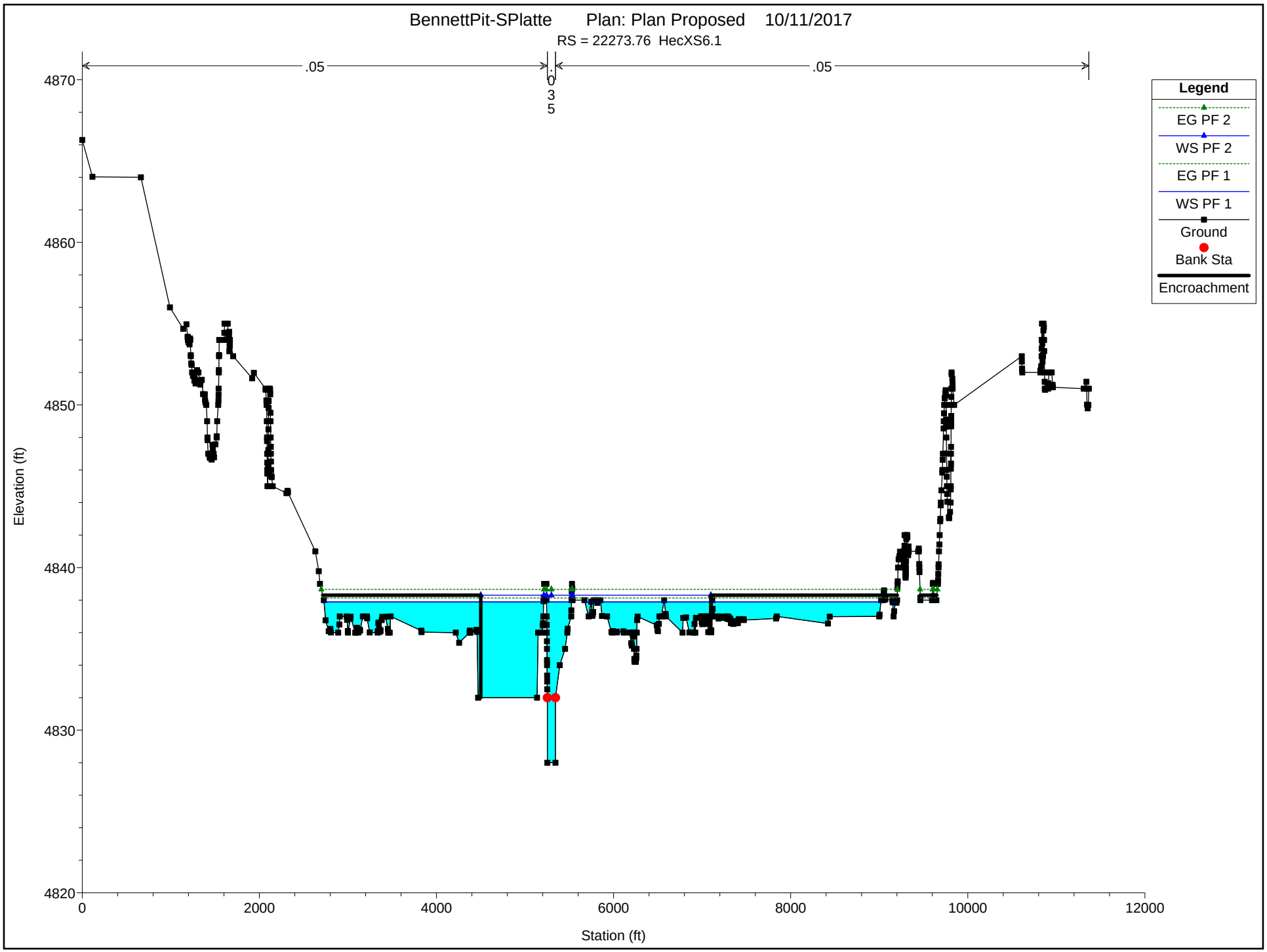

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 25313.88 HecXS4
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 1
WS PF 1
Crit PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
4890
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

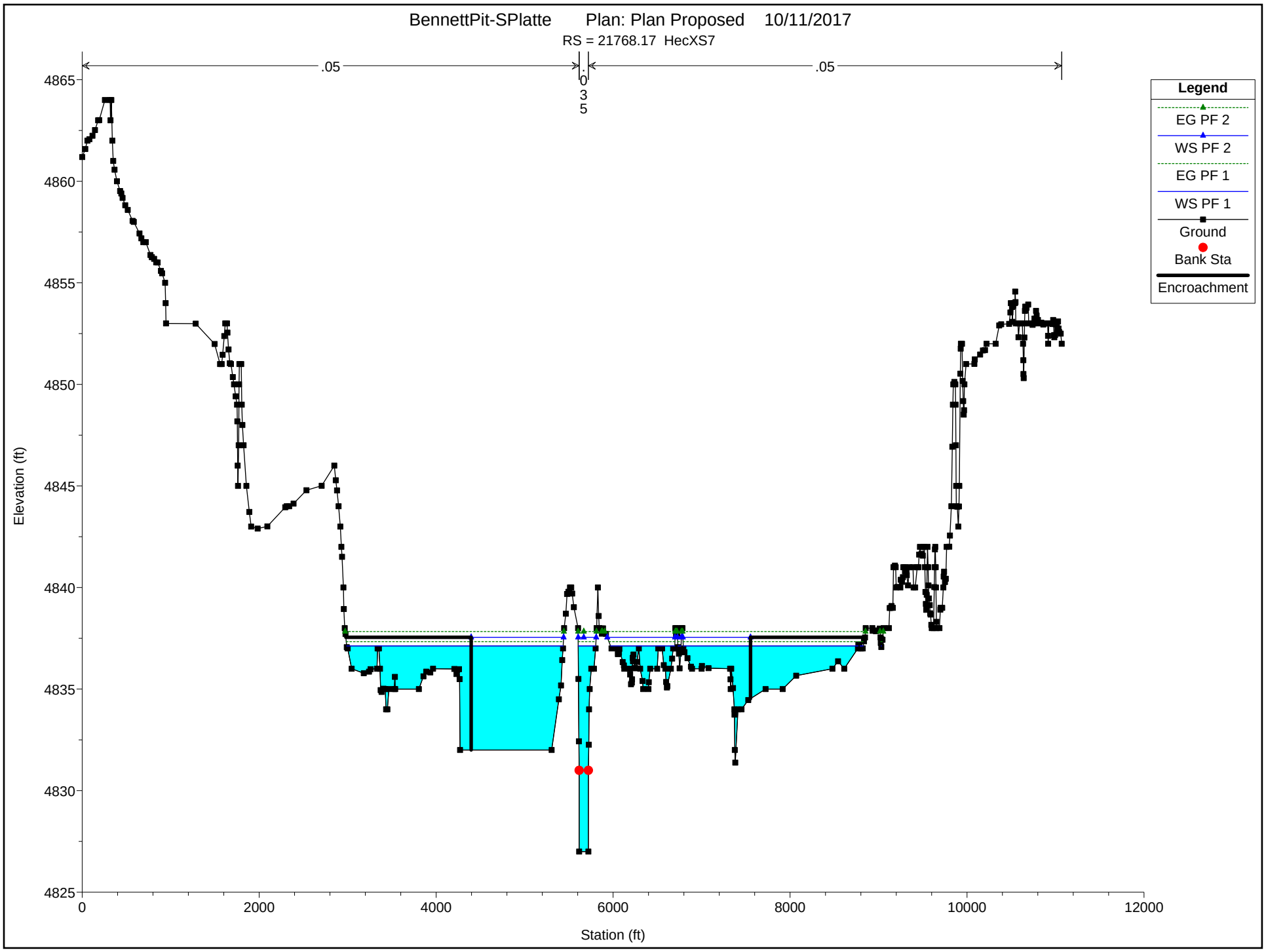

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 25000 HecXS4.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4880
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

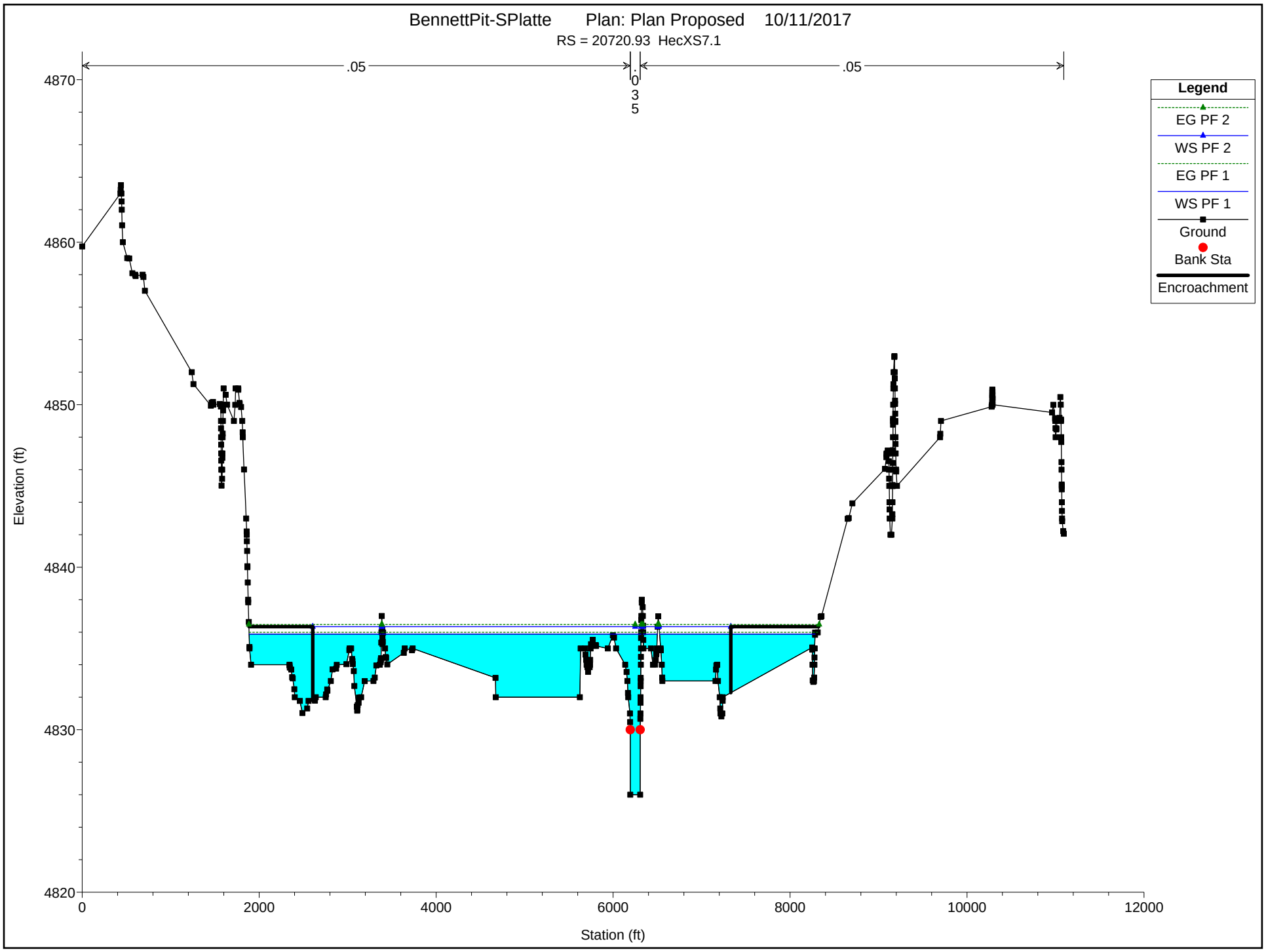

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 24421.62 HecXS5
.05
.05
0.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4870
4865
4860
4855
4850
4845
4840
4835
4830
0
2000
4000
6000
8000
10000
12000

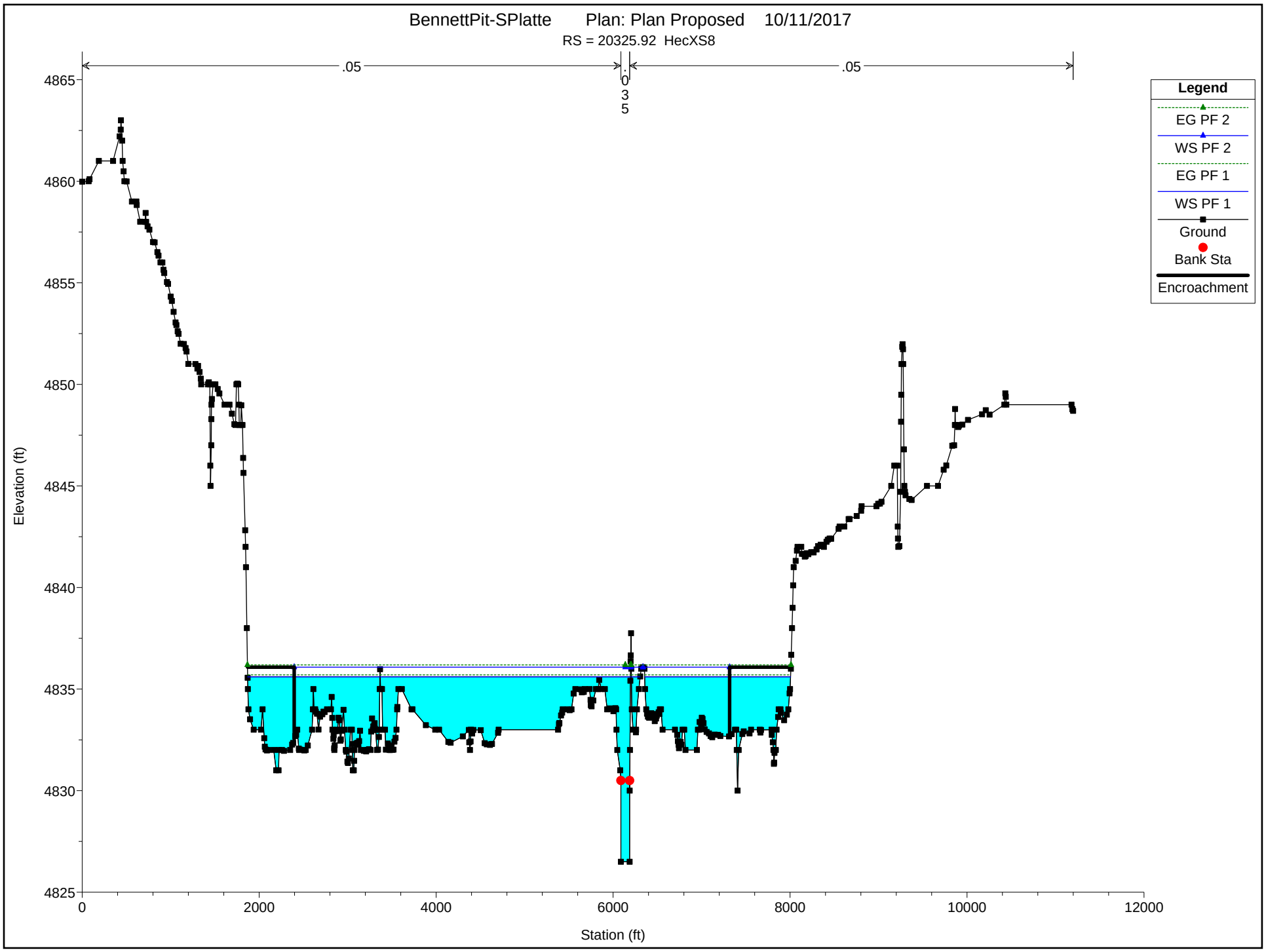

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 23701.35 HecXS5.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
0
2000
4000
6000
8000
10000
12000
Station (ft)

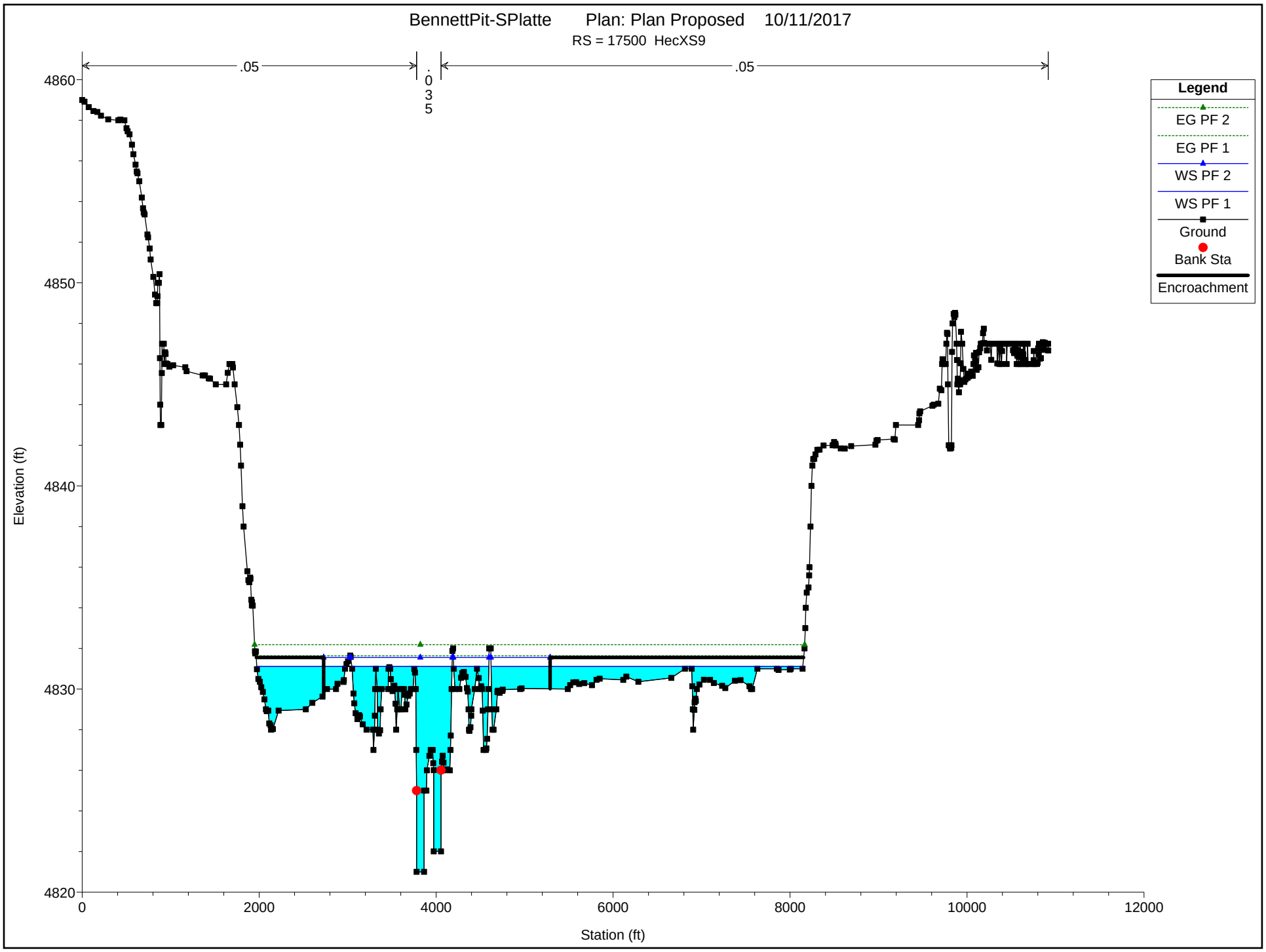

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 22651.94 HecXS6
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4880
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000

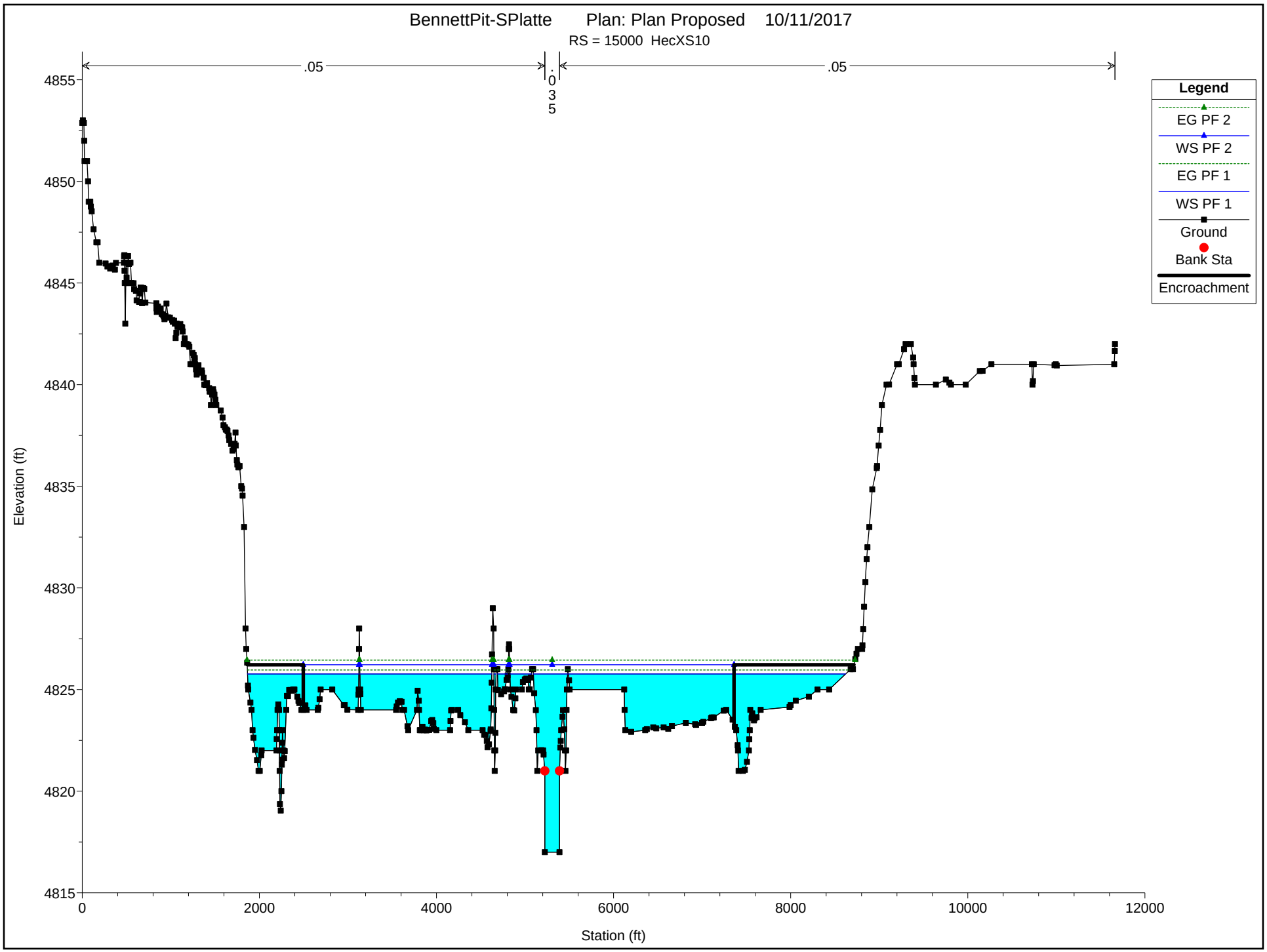

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 22273.76 HecXS6.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

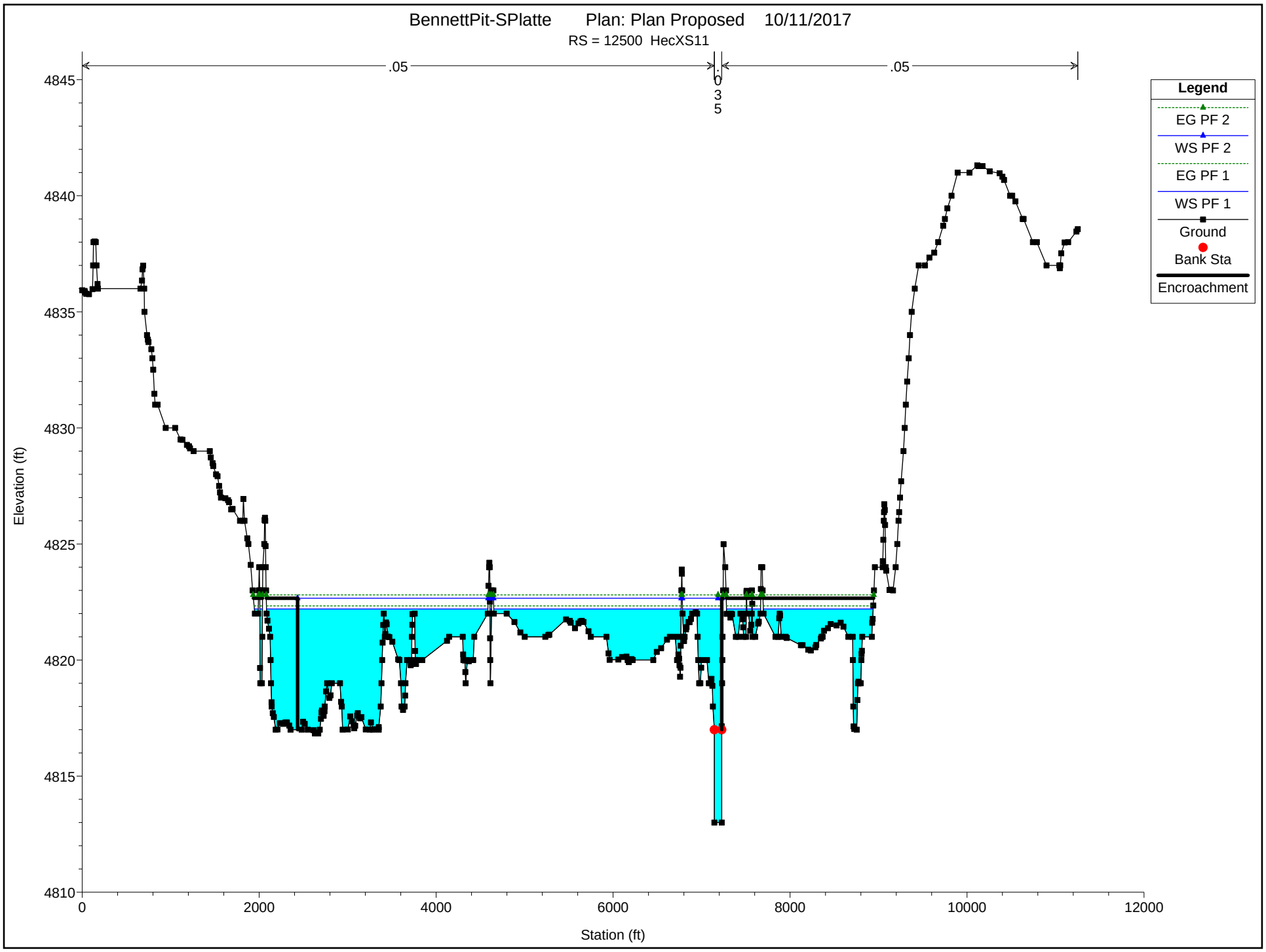

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 21768.17 HecXS7
.05
.05
0.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000

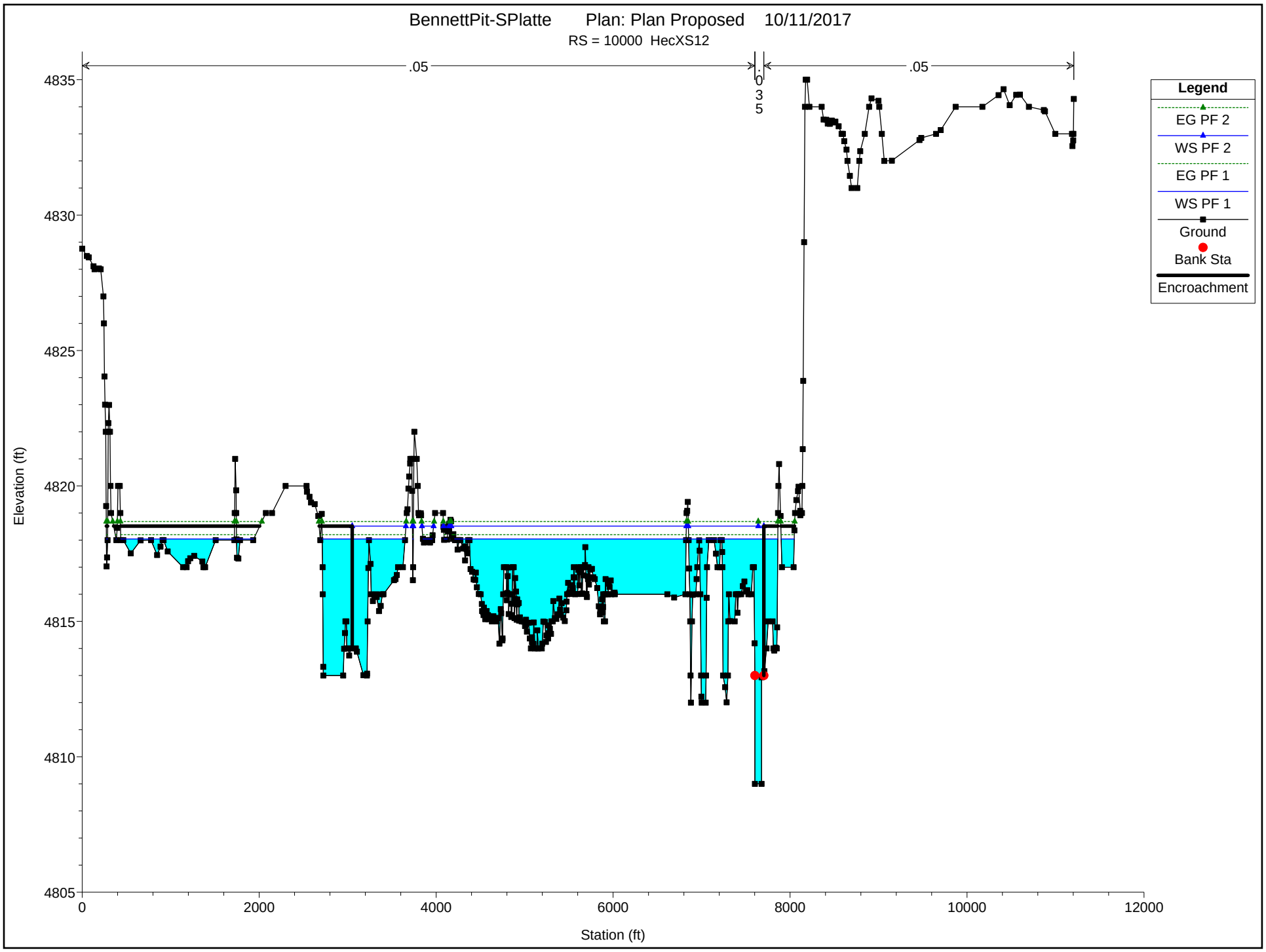

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 20720.93 HecXS7.1
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4870
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

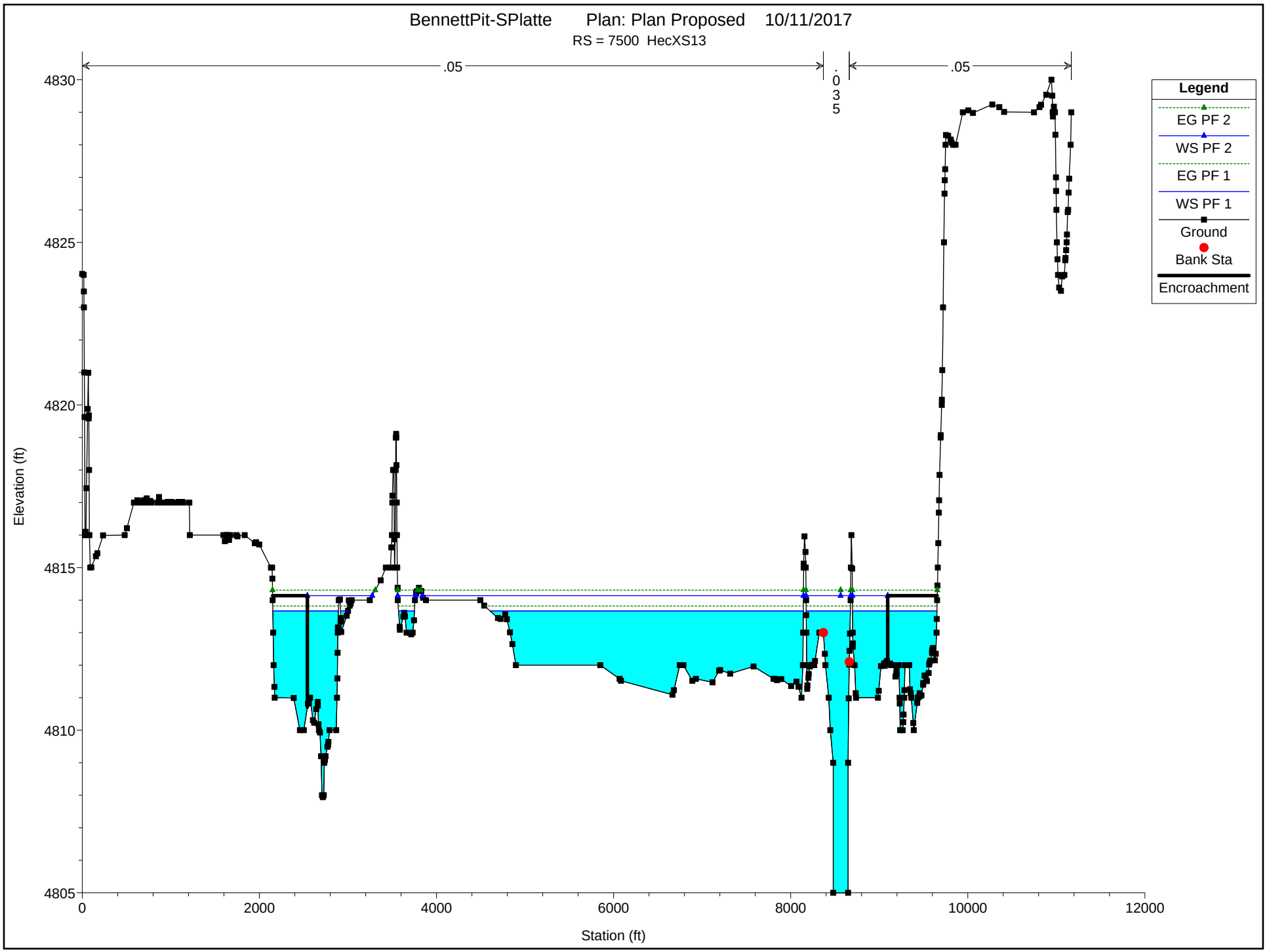

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 20325.92 HecXS8
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4865
4860
4855
4850
4845
4840
4835
4830
4825
0
2000
4000
6000
8000
10000
12000

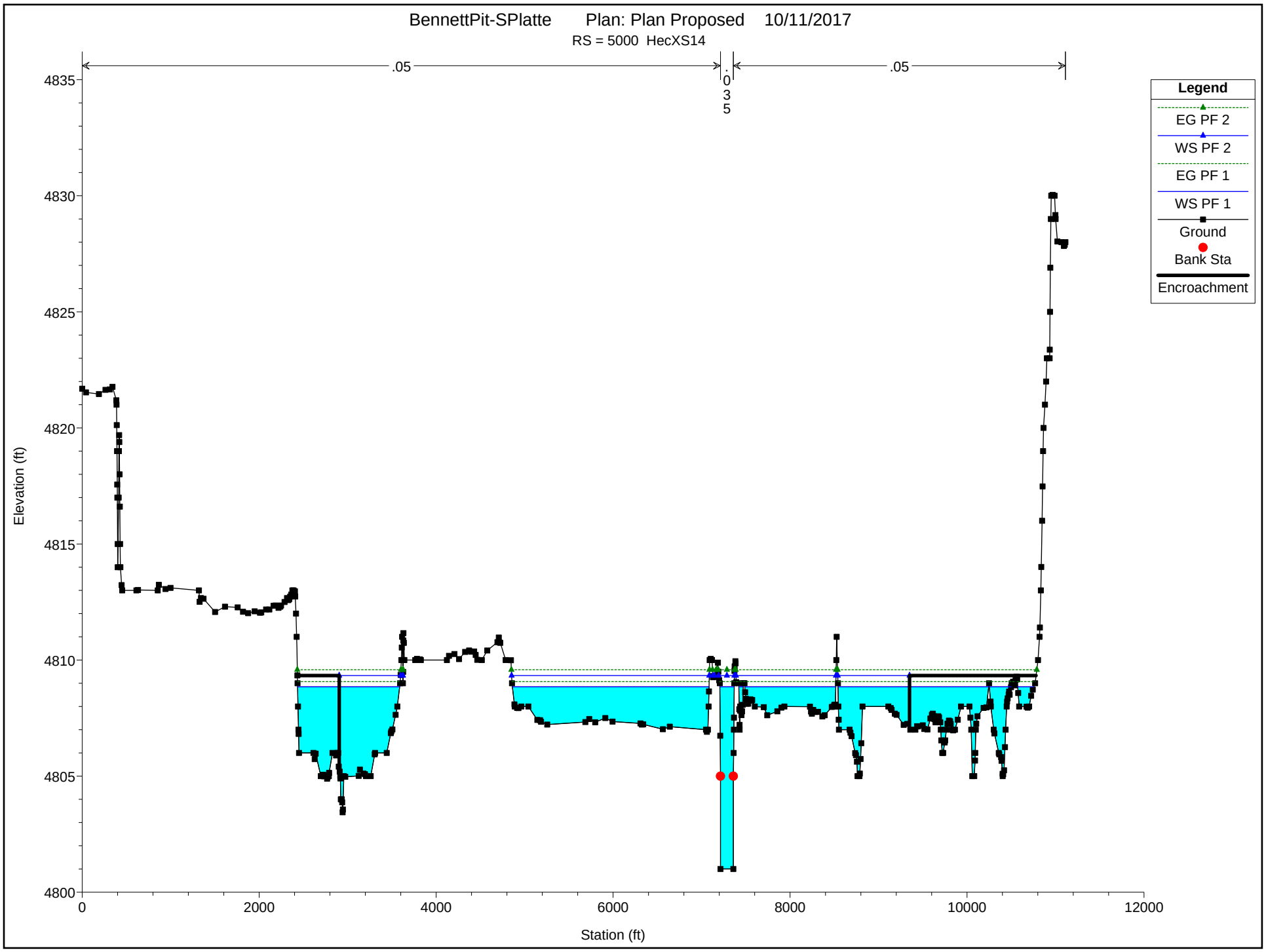

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 17500 HecXS9
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4860
4850
4840
4830
4820
0
2000
4000
6000
8000
10000
12000
Station (ft)

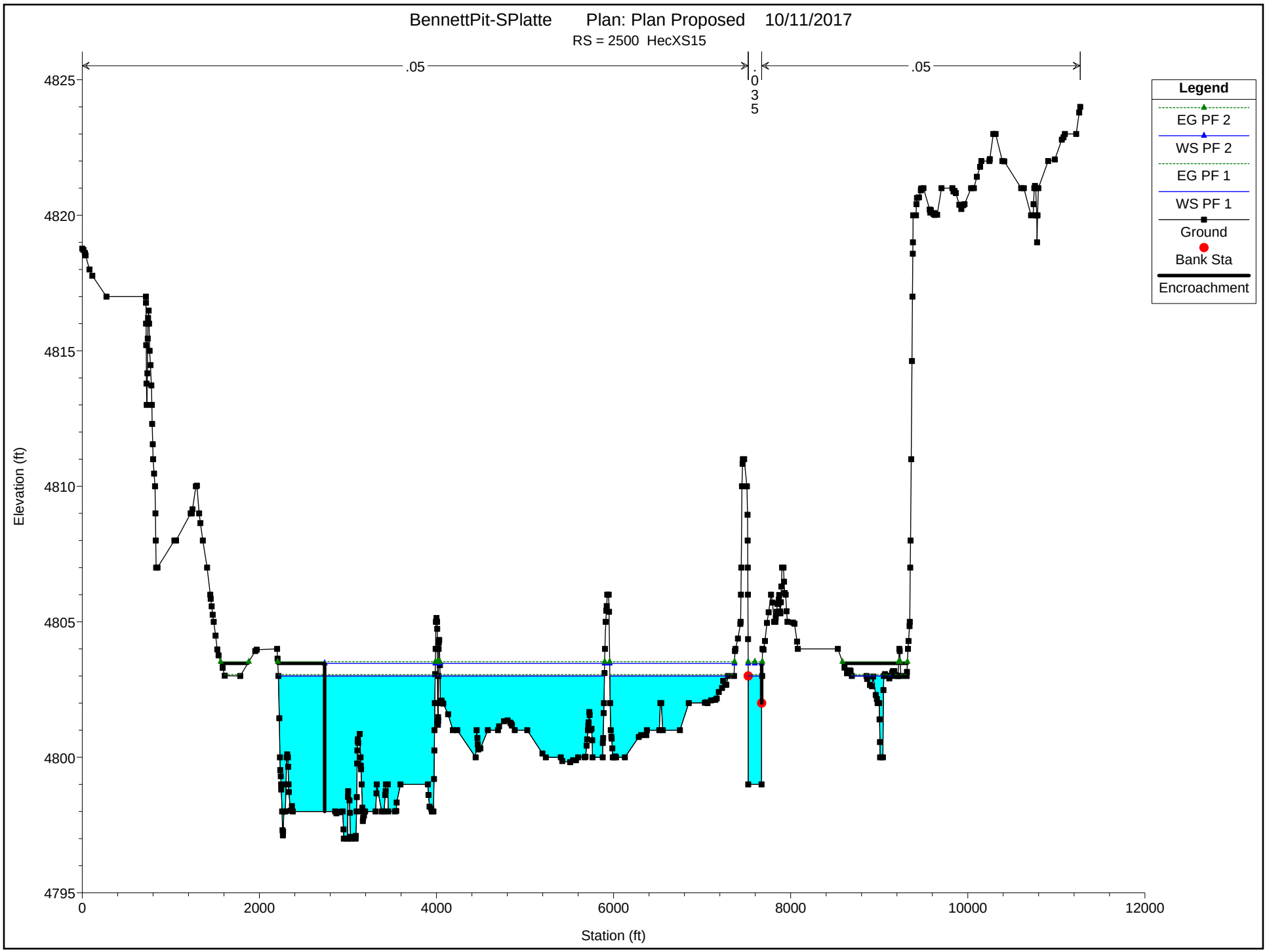

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 15000 HecXS10
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4855
4850
4845
4840
4835
4830
4825
4820
4815
0
2000
4000
6000
8000
10000
12000

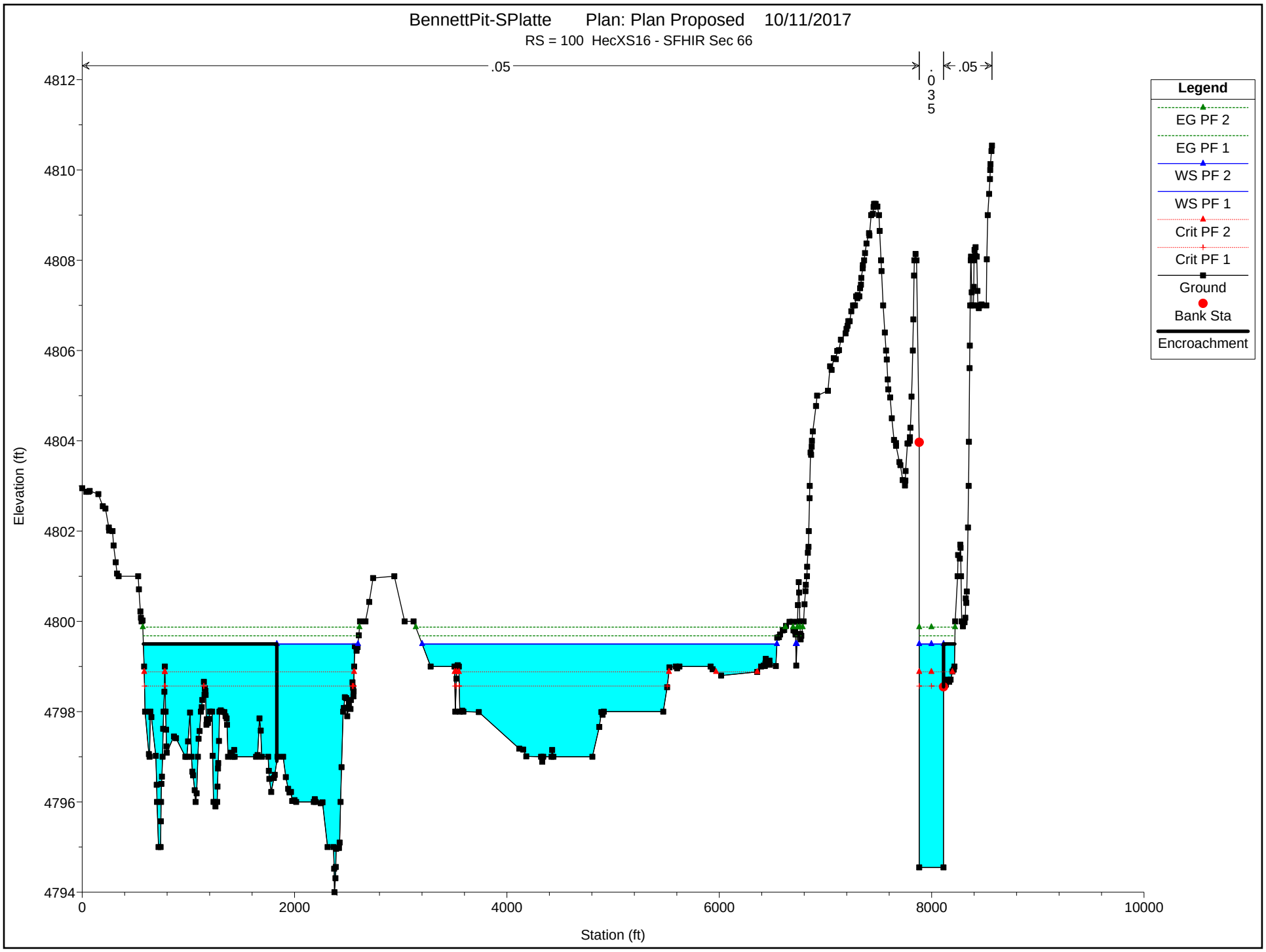

BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 12500 HecXS11
.05
.05
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4845
4840
4835
4830
4825
4820
4815
4810
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 10000 HecXS12
.05
.03
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4835
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000
Station (ft)


BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 7500 HecXS13
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4830
4825
4820
4815
4810
4805
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 5000 HecXS14
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4835
4830
4825
4820
4815
4810
4805
4800
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 2500 HecXS15
.05
.035
.05
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
4825
4820
4815
4810
4805
4800
4795
0
2000
4000
6000
8000
10000
12000


BennettPit-SPlatte Plan: Plan Proposed 10/11/2017
RS = 100 HecXS16 - SFHIR Sec 66
.05
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 2
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
4812
4810
4808
4806
4804
4802
4800
4798
4796
4794
0
2000
4000
6000
8000
10000
Station (ft)

Appendix D

Special Flood Hazard Information Report Information

LEGEND:

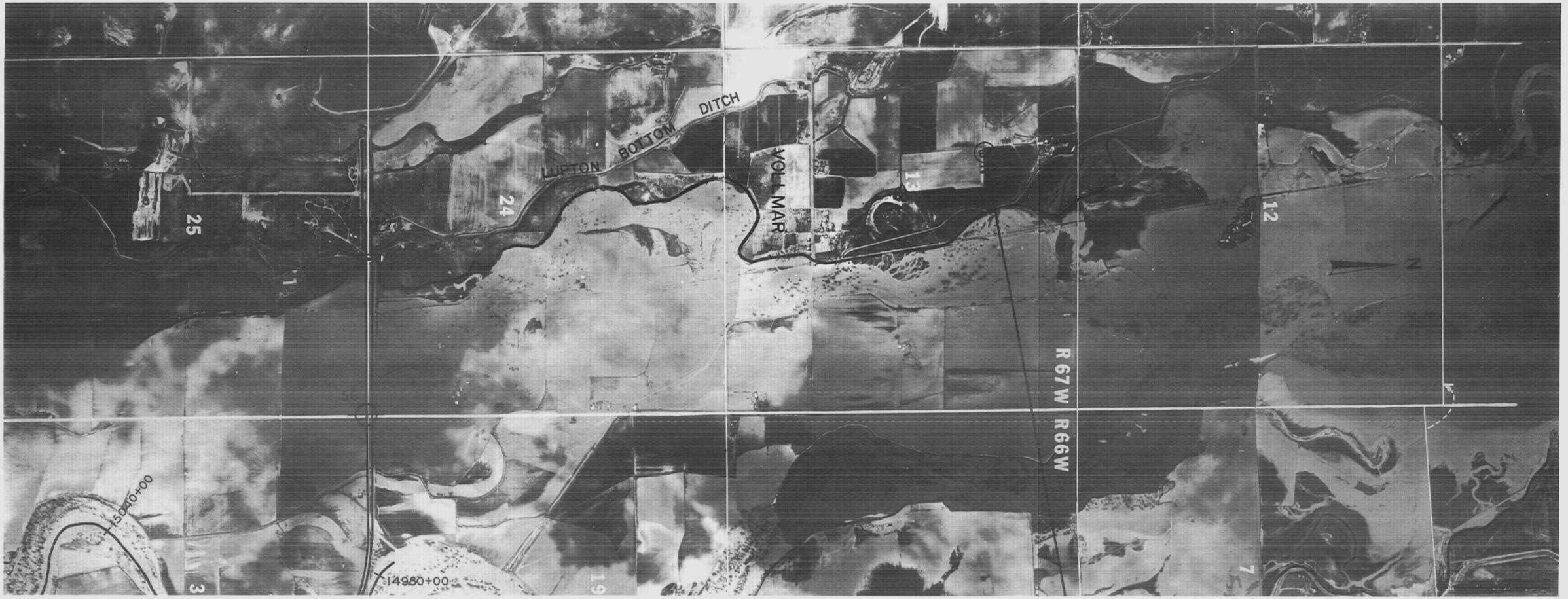
- 100 YEAR FLOOD
- 500 YEAR FLOOD
- FLOOD OUTLINE OF MAY 1973
- HIGH WATER MARK

APPROX. SCALE
1" = 1000'

NOTES:
1. FOR LOCATION OF THIS PLATE SEE PLATE INDEX MAP (PLATE 2)
2. FOR PROFILE, SEE PLATE 25
3. FOR STAGE DISCHARGE CURVE, SEE PLATE 35

SOUTH PLATTE RIVER BASIN
WELD COUNTY, COLORADO
SOUTH PLATTE RIVER
FLOODED AREA
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
APRIL 1977

PLATE 6E



LEGEND:

- 100 YEAR FLOOD
- 500 YEAR FLOOD
- FLOOD OUTLINE OF MAY 1973
- HIGH WATER MARK

APPROX. SCALE
1" = 1000'

NOTES:

1. FOR LOCATION OF THIS PLATE SEE PLATE INDEX MAP (PLATE 2)
2. FOR PROFILE SEE PLATE 25
3. FOR STAGE DISCHARGE CURVE, SEE PLATE 35

SOUTH PLATTE RIVER BASIN
WELD COUNTY, COLORADO

SOUTH PLATTE RIVER
FLOODED AREA

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
APRIL 1977

PLATE 6W

LEGEND:

- 100 YEAR FLOOD
- 500 YEAR FLOOD
- FLOOD OUTLINE OF MAY 1973
- HIGH WATER MARK

APPROX. SCALE
1" = 1000'

NOTES:

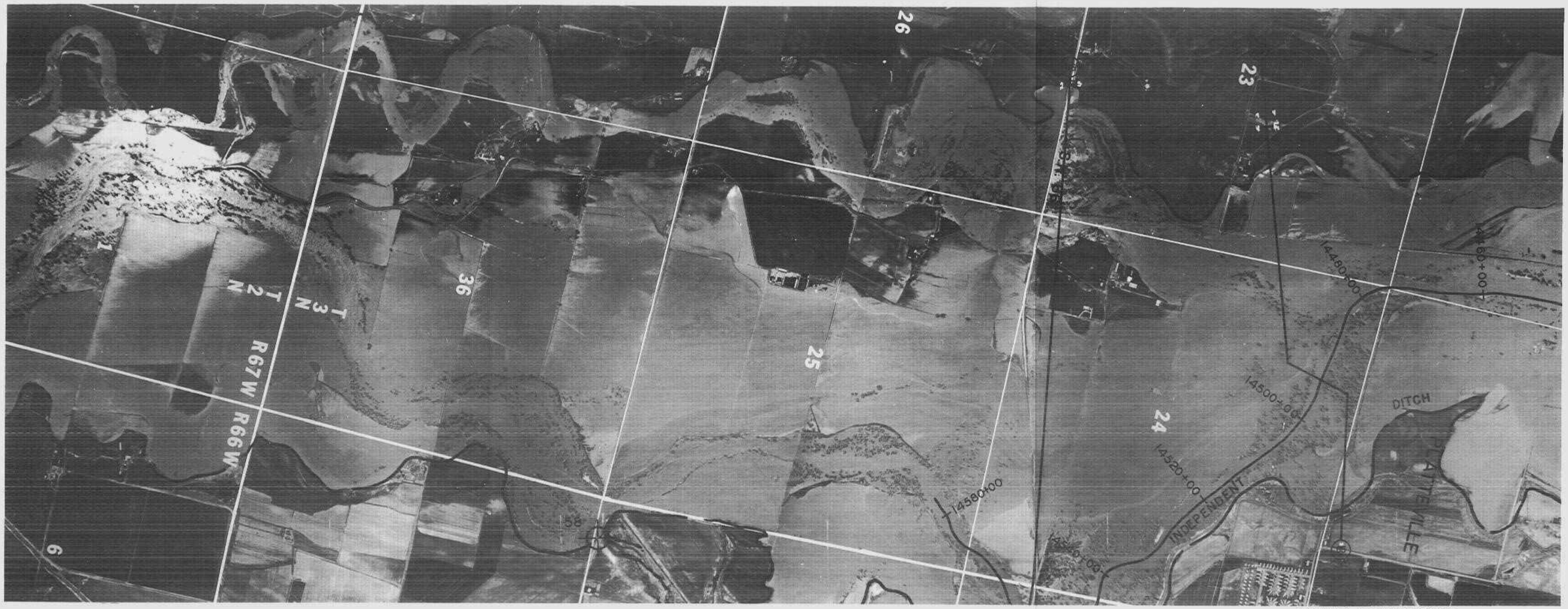
1. FOR LOCATION OF THIS PLATE SEE PLATE INDEX MAP (PLATE 2)
2. FOR PROFILE, SEE PLATE 26

SOUTH PLATTE RIVER BASIN
WELD COUNTY, COLORADO

SOUTH PLATTE RIVER
FLOODED AREA

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
APRIL 1977

PLATE 7E



LEGEND:

- 100 YEAR FLOOD
- 500 YEAR FLOOD
- FLOOD OUTLINE OF MAY 1973
- HIGH WATER MARK

APPROX. SCALE
1" = 1000'

NOTES:
1. FOR LOCATION OF THIS PLATE SEE PLATE INDEX MAP (PLATE 2)
2. FOR PROFILE, SEE PLATE 26

SOUTH PLATTE RIVER BASIN
WELD COUNTY, COLORADO

SOUTH PLATTE RIVER
FLOODED AREA

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
APRIL 1977

PLATE 7W

Appendix E

Side Channel Spillway Maps and Calculations

The length of the riverside berm is greater than 1,300 feet. According to *Technical Review Guidelines for Gravel Mining & Water Storage Activities* from Urban Drainage and Flood Control District, the equation for the side channel spillway length is:

$$L_s = \frac{0.6 \times A_p}{12{,}000}$$

$L_S = length\ of\ the\ side\ channel\ spillway$

$A_p = area\ of\ pit\ measured\ in\ square\ feet\ at\ the\ high\ water\ line$

The calculated surface area for the North and South cell combined at the high water line is 4,271,494 square feet. The calculated length of the spillway is 213.6 feet which was rounded to 215 feet.

The riverside berm protection was designed based on Figure 2.8: Riprap Spillway Stabilization from the *Technical Review Guidelines for Gravel Mining & Water Storage Activities* shown below. The pitside protection was designed using the Rock Chute Design Program based on "Design of Rock Chutes" by Robinson, Rice, and Kadavy, ASAE Vol. 41(3). The results sheet is included.

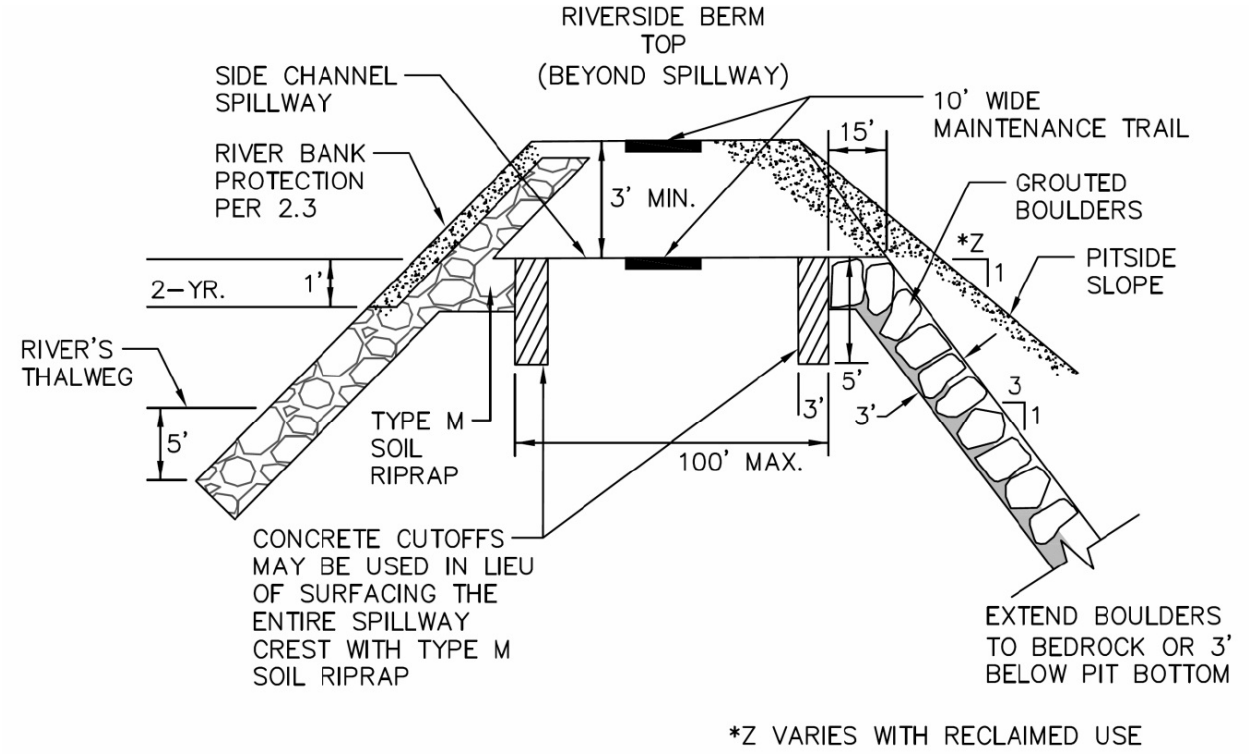


Figure 2.8
Riprap Spillway Stabilization

Rock Chute Design Data

(Version WI-July-2010, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Bennett Pit **County:** Weld
Designer: TPY **Checked by:**
Date: May 12 2017 **Date:**

Input Geometry:

Upstream Channel	Chute		Downstream Channel
Bw = 215.0 ft.	Bw = 215.0 ft.		Bw = 400.0 ft.
Side slopes = 10.0 (m:1)	Factor of safety = 1.20 (F_s)	1.2 Min	Side slopes = 0.1 (m:1)
Velocity n-value = 0.060	Side slopes = 10.0 (m:1)	→ 2.0:1 max.	Velocity n-value = 0.020
Bed slope = 0.0100 ft./ft.	Bed slope (3:1) = 0.330 ft./ft	→ 3.0:1 max.	Bed slope = 0.0050 ft./ft.
Note: n value = a) velocity n from waterway program	Freeboard = 0.0 ft.	→ Increase Freeboard	
or b) computed mannings n for channel	Outlet apron depth, d = 0.0 ft.		Base flow = 0.0 cfs

Design Storm Data (Table 2, FOTG, WI-NRCS Grade Stabilization Structure No. 410):

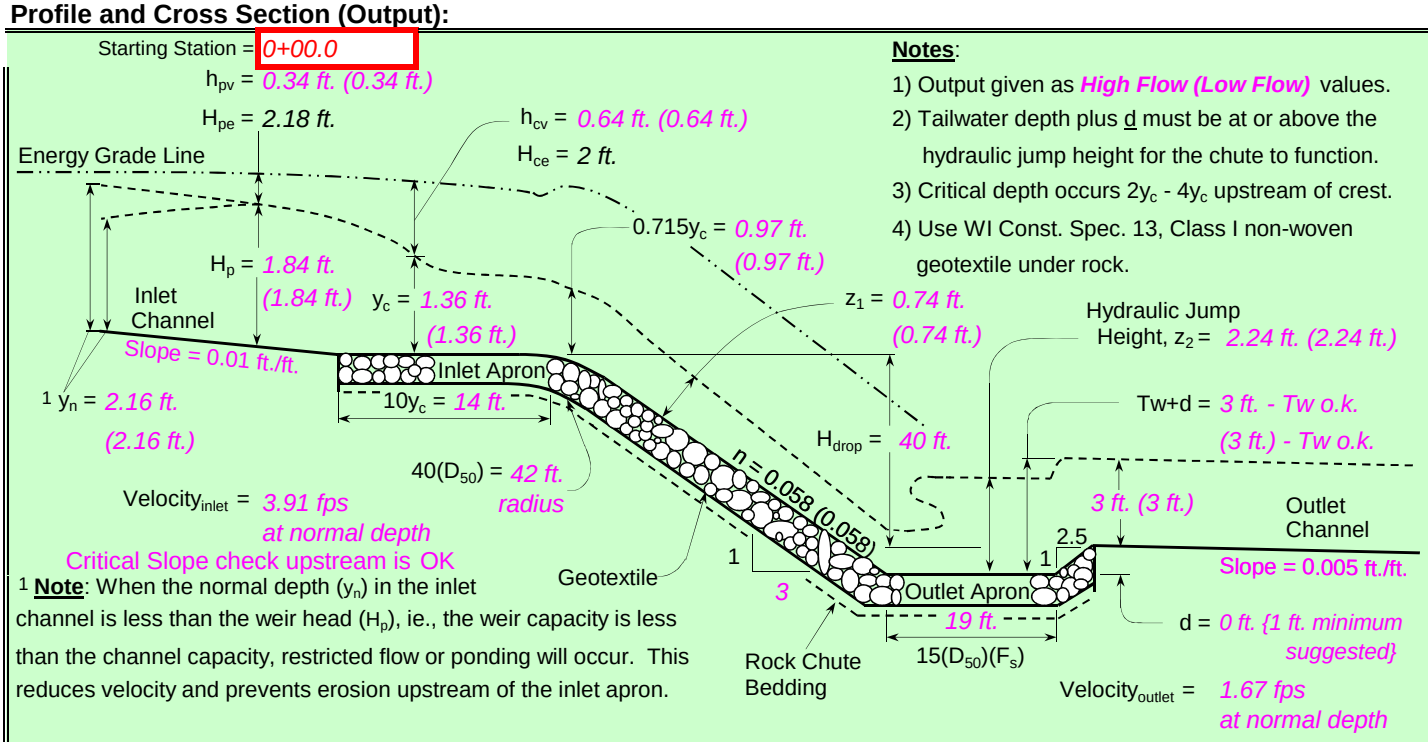
Apron elev. --- Inlet = 100.0 ft. ------- Outlet 60.0 ft. --- (H_{drop} = 40 ft.)

Q_{high} = Runoff from design storm capacity from Table 2, FOTG Standard 410
Q_5 = Runofff from a 5-year,24-hour storm.

Q_{high} = 2000.0 cfs High flow storm through chute → Tw (ft.) = 3.00
Q_5 = 2000.0 cfs Low flow storm through chute → Tw (ft.) = 3.00

Note: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.
Input tailwater (Tw): 0.33 1.20

Profile and Cross Section (Output):

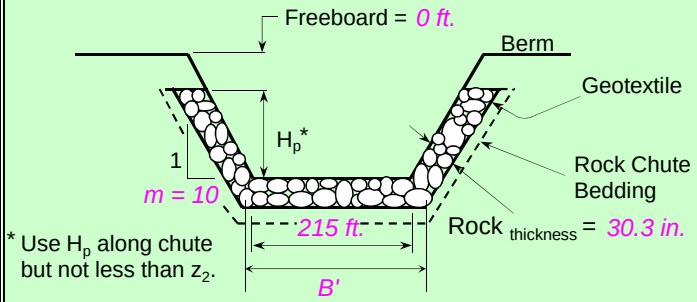


Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.
4) Use WI Const. Spec. 13, Class I non-woven geotextile under rock.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute

Typical Cross Section



* Use H_p along chute but not less than z_2.

	9.01 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.74 ft.	Normal depth in chute
n-value =	0.058	Manning's roughness coefficient
$D_{50}(F_s)$ =	15.1 in.	Minimum Design D50*
$2(D_{50})(F_s)$ =	30.3 in.	Rock chute thickness
Tw + d =	3 ft.	Tailwater above outlet apron
z_2 =	2.24 ft.	Hydraulic jump height
*** The outlet	will	function adequately

High Flow Storm Information

Rock Chute Design - Cut/Paste Plan

(Version WI-July-2010, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

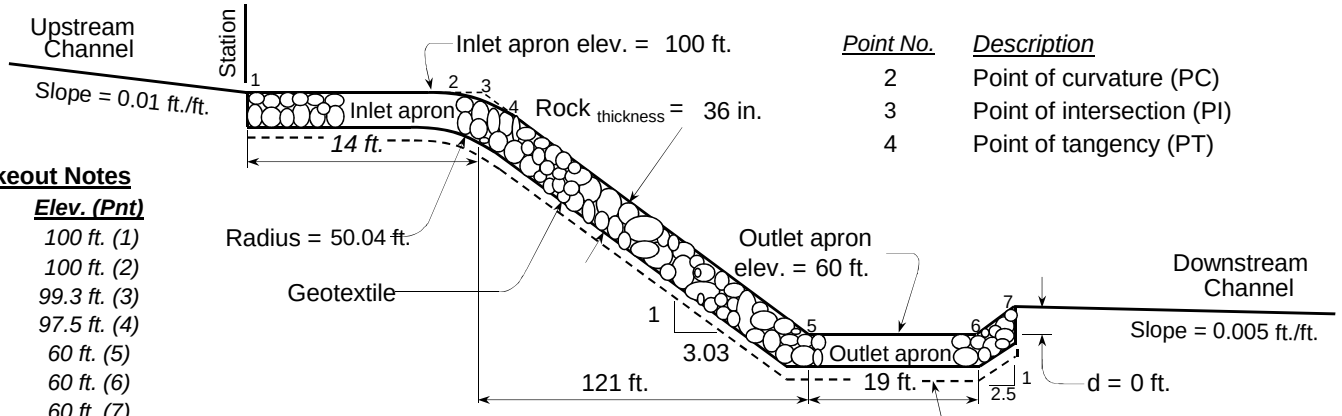
Project: Bennett Pit
Designer: TPY
Date: May 12 2017

County: Weld
Checked by:
Date:

Design Values		Rock Gradation Envelope		Quantities [a]	
D_{50} dia. =	18.0 in.	% Passing	Diameter, in. (weight, lbs.)	Rock =	5200 yd^3
$Rock_{chute}$ thickness =	36.0 in.	D_{100} ---------	27 - 36 (1393 - 3302)	Geotextile (WCS-13)[b] =	5740 yd^2
Inlet apron length =	14 ft.	D_{85} ---------	23 - 32 (907 - 2407)	Bedding 12 in. =	1974 yd^3
Outlet apron length =	19 ft.	D_{50} ---------	18 - 27 (413 - 1393)	Excavation =	0 yd^3
Radius =	50 ft.	D_{10} ---------	14 - 23 (211 - 907)	Earthfill =	0 yd^3
Will bedding be used?	Yes	*Coefficient of Uniformity, $(D_{60})/(D_{10}) < 1.7$*		Seeding =	0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*

[b] *Geotextile Class I (Non-woven) shall be overlapped and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

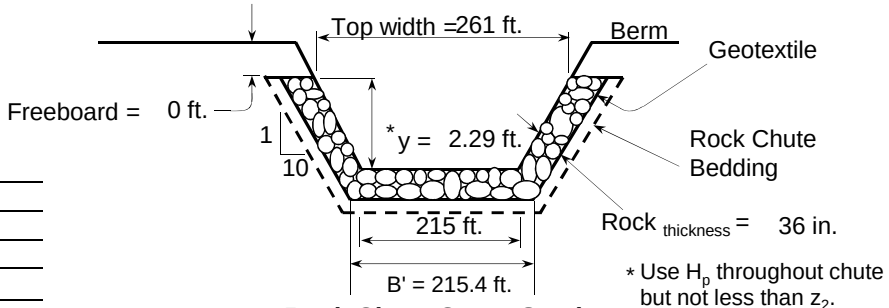


Point No.	Description
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

Stakeout Notes

Sta.	Elev. (Pnt)
0+00.0	100 ft. (1)
0+06.0	100 ft. (2)
0+14.0	99.3 ft. (3)
0+21.6	97.5 ft. (4)
1+35.2	60 ft. (5)
1+54.2	60 ft. (6)
1+54.2	60 ft. (7)

Profile Along Centerline of Rock Chute

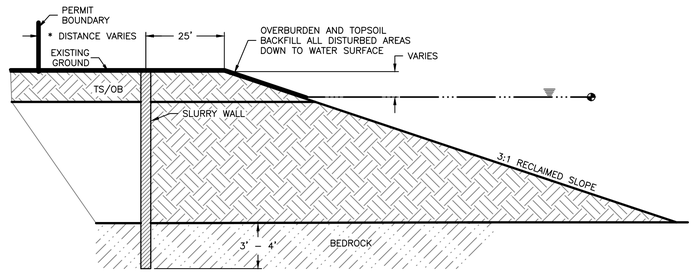


Rock Chute Cross Section

Notes:
Rock gradation envelope can be met with Gradation printed

Profile, Cross Sections, and Quantities

NRCS Natural Resources Conservation Service, United States Department of Agriculture	Bennett Pit Weld County	Date Designed TPY Drawn Checked Approved File Name Drawing Name Sheet 1 of 1



TYPICAL RECLAIMED SECTION
N.T.S.

LEGEND:

- EXISTING CONTOURS
- EXISTING WETLAND
- EXISTING PROPERTY BOUNDARY
- EXISTING GAS
- EXISTING ELECTRIC
- EXISTING TELEPHONE
- EXISTING OVERHEAD ELECTRIC
- EXISTING EASEMENT
- SLURRY WALL
- PERMIT BOUNDARY
- 100 YR FLOODPLAIN
- PROPOSED CONTOURS
- SEEDED AREAS

NORTH RESERVOIR
WATER SURFACE AREA = 32.83 AC

SOUTH RESERVOIR
WATER SURFACE AREA = 62.88 AC

100 YEAR FLOODWAY (TYP)

INLET/OUTLET FACILITY

215 FT WIDE X 2 FT DEEP SIDE CHANNEL SPILLWAY

200'R TANK BATTERY SETBACK

150'R OIL/GAS SETBACK

50' PIPELINE EASEMENT (REC. NO. 1571317)

20' IRRIGATION LATERAL EASEMENT (REC. NO. 2809905)

30' INGRESS, EGRESS & UTILITY EASEMENT ALONG EXISTING ROAD (REC. NO. 3139162)

SOUTH PLATTE RIVER

MEADOW ISLAND LEVEE DITCH NO. 1

COUNTY ROAD NO. 23
(60' RIGHT-OF-WAY / APRIL 28, 1888, BK 48, PG 71)

COUNTY ROAD NO. 22 1/2
(60' RIGHT-OF-WAY / JULY 26, 1887, BK 48, PG 55)

200 100 0 200 400 600
SCALE IN FEET

J&T Consulting, Inc.
305 N Denver Avenue - Suite D
Fort Lupton, CO 80621
Ph: 303-857-6222 Fax: 303-857-6224
www.jtconsulting.com

Bennett Gravel Pit

Exhibit F
Reclamation Plan Map

Northern Colorado Constructors, Inc.

M-2016-085

REVISIONS				
No	Date	By	Chk	Description

J&T CONSULTING, INC.

Job #	16116
Date	5.15.17
Drawn By	WSS
Designed By	TPY
Checked By	JCY
File	JT-Reclamation
Scale	1" = 200'

Sheet: 1 Of: 2

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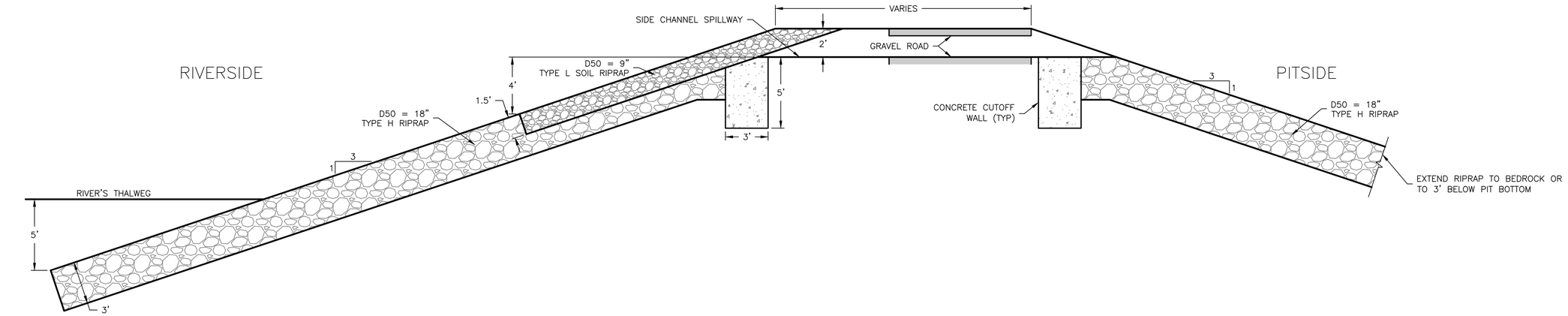
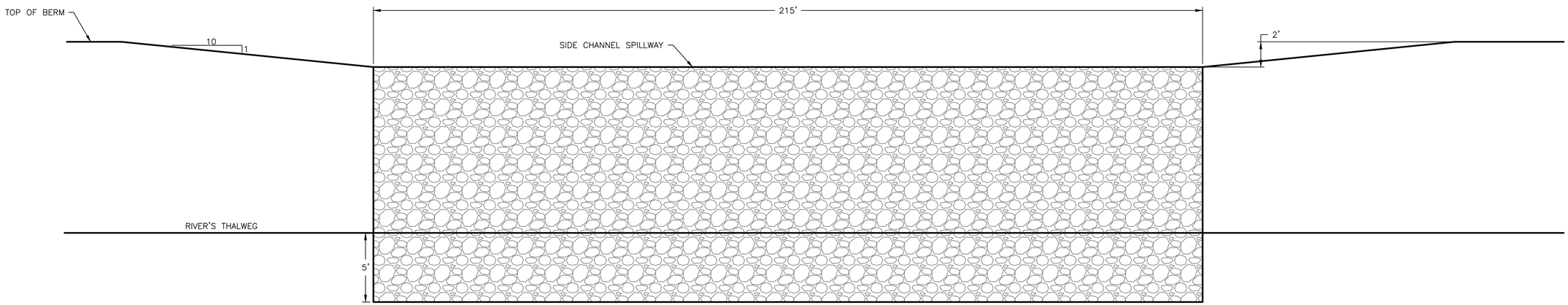
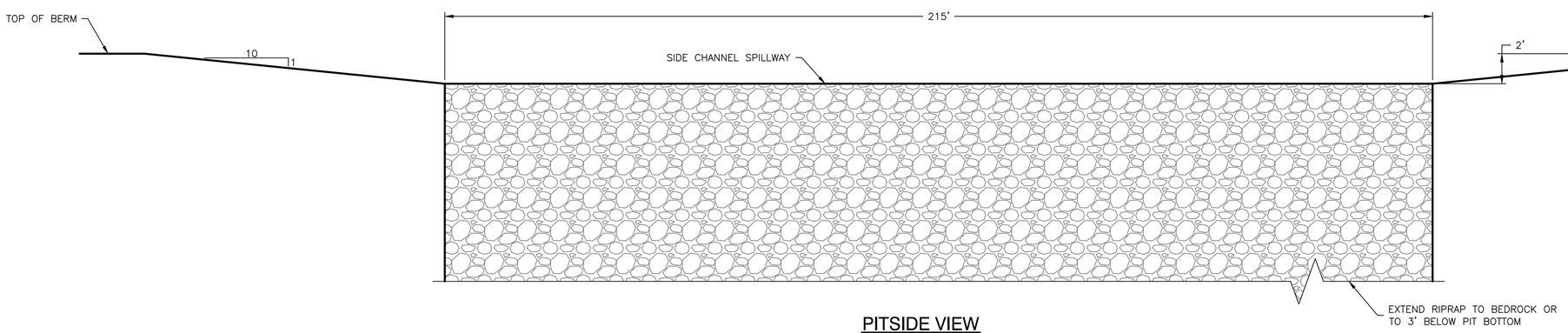


SECTION VIEW



RIVERSIDE VIEW



PITSIDE VIEW

RIPRAP LINED SIDE CHANNEL SPILLWAY

N.T.S.

J&T Consulting, Inc.
305 N Denver Avenue - Suite D
Fort Lupton, CO 80621
Ph: 303-857-6222 Fax: 303-857-6224
www.jtconsulting.com

Bennett Gravel Pit

Exhibit F

Side Channel Spillway

Northern Colorado Constructors, Inc.

M-2016-085

REVISIONS

No	Description	Date	By	Chk

J&T CONSULTING, INC.

Job #	16116
Date	5.15.17
Drawn By	WSS
Designed By	TPY
Checked By	JCY
File	JT-Reclamation
Scale	1" = 200'

Sheet: 2 Of: 2