HYDRAULIC ANALYSES

FOR

SDSU MISSION VALLEY CAMPUS

100% DESIGN DEVELOPMENT

May 9, 2019

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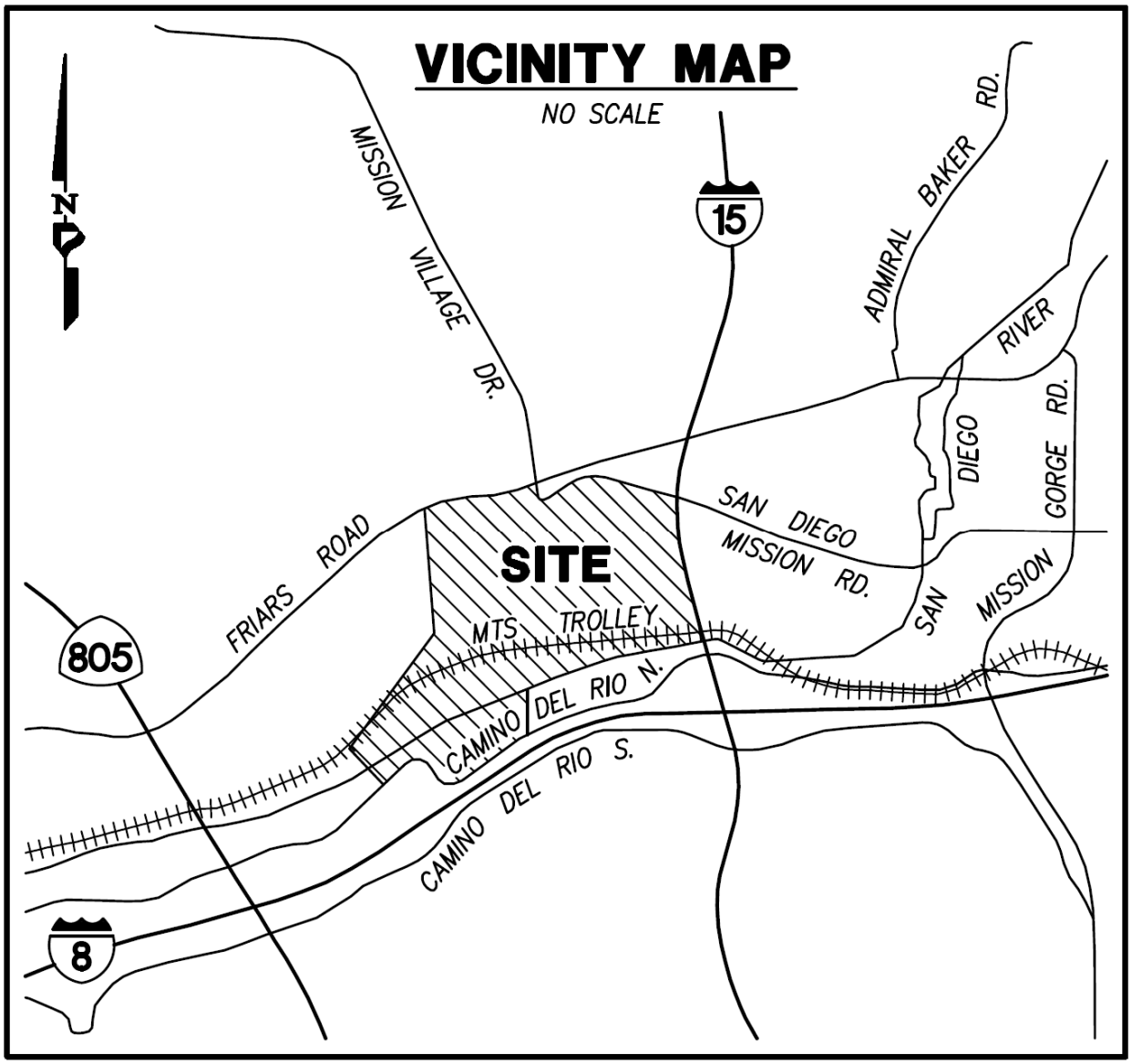
INTRODUCTION

The San Diego State University (SDSU) Mission Valley Campus Master Plan project will be located at the existing San Diego County Credit Union (SDCCU) stadium site in the city of San Diego (see the Vicinity Map). Redevelopment of the approximately 170-acre site includes new housing, a stadium, roads, and creation of a river park along the San Diego River. The river park will serve as a floodplain buffer between the San Diego River and the proposed developed areas, which will be constructed on pads elevated above the floodplain depths. Design development (DD) plans have been prepared for the project. The 100 percent DD Site Development plans were prepared by Rick Engineering and provide a grading concept for the project. This report is based on the grading from the 100 percent DD plans.



There are two primary watercourses along the site, which are defined by the Federal Emergency Management Agency's *Flood Insurance Rate Maps* (FIRM). The San Diego River flows in a

westerly direction along the southerly portion of the site and is the larger watercourse. Murphy Canyon Creek flows in a southerly direction along the easterly portion of the site (and along the west side of Interstate 15). FIRM Panels 06073C1636H and 06073C1638H dated May 16, 2012 delineate a 100-year floodplain and floodway along the San Diego River. The floodway is generally along the naturally-lined San Diego River channel just south of the SDCCU Stadium parking lot. The floodplain extends north into large portions of the parking lot, which suggests that backwater will occur within the parking lot from the river. Panel 06073C1636H also delineates a 100-year floodplain, but not a floodway, along Murphy Canyon Creek. The floodplain is generally along the existing creek channel between the parking lot and Interstate 15. The relevant portions of the FIRM Panels are included in Appendix A. The San Diego River floodplain is designated as Zone AE, which indicates that was determined by detailed engineering methods. On the other hand, the Murphy Canyon Creek floodplain is designated as Zone A, which indicates that it was determined by approximate methods and no detailed analyses were performed.

Development regulations differ for a watercourse with a Zone AE floodplain and floodway compared to a watercourse with a Zone A floodplain. For a Zone AE floodplain and floodway, development in the floodway is generally discouraged unless rises in the 100-year water surface elevations are avoided. Development in the flood fringe (area within the floodplain, but outside the floodway) is allowed subject to *San Diego Municipal Code* Section 143.0145(f), which is included in Appendix A. The project intends to avoid encroachments into the floodway that will increase water surface elevations, and will also meet the *San Diego Municipal Code's* floodplain and floodway regulations. Since the San Diego River floodplain and floodway are defined based on detailed engineering methods, the project development will adhere to the applicable floodplain and floodway regulations associated with San Diego River. Additional hydraulic analyses are not required at the current design development stage to assist in understanding development constraints guided by the regulations. A triangular portion of the San Diego River floodway encroaches into the current stadium parking lot. Development restrictions exist within the triangular area, e.g., development in the triangular area is not allowed to increase the 100-year water surface elevations. During final engineering, map revisions may be processed through FEMA in an attempt to remove the triangular floodway area and eliminate the associated restrictions.

For Zone A, the floodplain is approximate since detailed engineering was not performed. This report contains hydraulic analyses of Murphy Canyon Creek in order to provide a better understanding of the creek. The FIRM shows that the 100-year flow spills out of Murphy Canyon Creek approximately 0.5 miles north of Friars Road. The spillover becomes surface runoff that re-enters the stadium near the Kinder Morgan Mission Valley Terminal tank farm access road. The runoff then continues south across the stadium parking lot to the San Diego River. The project will convey the spillover flow within the proposed park area. This report analyzes the spillover flow as well as the hydraulics within the proposed park. The DD plans propose four phases. The park grading is part of Phase 3. Phase 1 and 2 are west and not affected by Murphy Canyon Creek. Phase 4 is within Phase 3 does not cause additional impacts to the creek beyond Phase 3. This report also analyzes the Murphy Canyon Creek capacity along the stadium site. The analyses in this report are for the 100 percent DD plans. More detailed

hydraulic analyses will be performed as the project design advances towards the final engineering design.

HYDRAULIC PARAMETERS

Existing Conditions

Existing condition hydraulic analyses have been performed for Murphy Canyon Creek along and above SDCCU Stadium. The associated FIRM suggests that the 100-year creek flow spills out of the main creek channel north of Friars Road. A portion of the spillover flow can enter SDCCU Stadium at a second location approximately 700 feet west of the main creek channel. The spillover flow will travel along an existing roadway and then under a Friars Road bridge to SDCCU Stadium. The hydraulic analyses extend to the Stadium Golf Center driveway over 4,300 feet north of Friars Road in order to assess the spillover. The analyses were performed using the Hydrologic Engineering Center River Analysis System (HEC-RAS) and Water Surface Pressure Gradient for Windows (WSPGW) programs. The following describes the hydraulic modeling.

HEC-RAS was used to model the entire Murphy Canyon Creek study reach from the San Diego River to the Stadium Golf Center driveway. The reach contains natural and concrete-lined segments, culverts, and bridge crossings. The HEC-RAS cross-sections are shown on the HEC-RAS Work Map in the map pocket. The cross-sections are based on November 11, 2016 2-foot contour interval topographic mapping prepared for the site, where available (cross-sections 1 to 30). This was supplemented with 2014 2-foot contour interval topographic mapping from SANDAG (cross-sections 50 to 63). The vertical datums are different between the two mapping sources. The 2016 mapping is on NGVD 29, while the 2014 mapping is on NAVD 88. The 2014 elevations were reduced by 2.08 feet to convert to NGVD 29.

The relevant structures within the study reach were added to the HEC-RAS model. These include existing bridges between cross-sections 0.1 and 1, 2 and 3, 23 and 24, and 54 and 55. A field survey was performed of the relevant bridges and entered into the model. There are additional bridges (Friars Road, Interstate 15 ramps, and San Diego Mission Road) that cross the study reach. A site visit and the modeling results revealed the decks, piers, and abutments from these bridges will have minimal to no impact on the floodplain, so the bridges were not included in the model. An 1,880-foot length of box culverts exist between cross-section 30 and 50. As-built plans were obtained for the culverts and show that they are double 14-foot wide by 8-foot tall reinforced concrete box culverts (see the map pocket). The culverts were entered into HEC-RAS based on the as-built information.

While HEC-RAS models culverts, it is intended for shorter lengths such as might occur under a roadway that crosses a watercourse. The results for longer culverts such as the Murphy Canyon Creek double box culverts will be approximate since HEC-RAS does not consider all potential losses such as bend losses, junction losses, etc. As a result, a WSPGW analysis, which does consider the losses, was performed for the double box culverts based on the as-built plans. The WSPGW results (see next section) show that the box culverts have capacity for approximately

2,600 cubic feet per second (cfs). The 100-year flow rate is 3,500 cfs (see next paragraph), so the spillover flow is approximately 900 cfs.

The 100-year flow rate was obtained from FEMA's May 16, 2012, *Flood Insurance Study, San Diego County, California* (FIS). The FIS (see Appendix A) indicates that the flow rate upstream of Friars Road is 3,500 cubic feet per second (cfs) and below Aero Drive is 3,000 cfs. A June 14, 2013 URS Corporation, *Individual Hydrologic and Hydraulic (IHHA) Assessment Report* uses 3,500 cfs below the double box culverts and 3,000 cfs above the double box culverts. There is a lateral channel that confluences with Murphy Canyon Creek immediately upstream of the culvert entrance, so this could be the source of the additional 500 cfs, which would be consistent with the URS assumption. The 100-year flow rates for this report assume 3,500 cfs within and below the double box culverts and 3,000 cfs upstream of the double box culverts. As mentioned above, 900 cfs of the 3,500 cfs cannot be conveyed by the culverts. The 900 cfs continues along the tank farm and enters the stadium near the tank farm access road.

The roughness coefficients were based on the conditions observed during a site visit as well as review of Google Earth. The coefficients vary from 0.015 for the concrete-lined segments to 0.075 for areas containing mature brush and trees.

The HEC-RAS downstream starting water surface elevation was based on the 100-year water surface elevation in the San Diego River from the FIRM, i.e., the backwater from the San Diego River. This was estimated to be 60.3 feet NAVD 88. The elevation was lowered by 2.08 feet to convert to NGVD 29.

Proposed Conditions

HEC-RAS analyses were performed for the Phase 3 park grading. The cross-sections were based on Rick Engineering's 100 percent DD plans, which are on NAVD 88 (see the Proposed Condition HEC-RAS Work Map). The 100-year flow rate entering the park is 900 cfs and contributed from the spillover. A dog park will be constructed between cross-sections 200 to 260, so a roughness coefficient of 0.040 was assigned along this segment. A roughness coefficient of 0.060 was assigned between cross-sections 100 to 190 to represent the landscaping and recreational features proposed along this segment. The HEC-RAS downstream starting water surface elevation was based on the 100-year water surface elevation in the San Diego River of 58 feet NAVD 88.

HYDRAULIC RESULTS

The HEC-RAS results are included in Appendix B and WSPGW results are included in Appendix C. The HEC-RAS cross-section plots are looking in the downstream direction, i.e., Interstate 15 is on the left and the SDCCU Stadium is on the right. The existing condition Murphy Canyon Creek results show that the 100-year flow is not contained within the main Murphy Canyon Creek channel and will spill into the parking lot at various locations. Lateral structures were added to the analyses to model the spill. The results indicate that the Murphy Canyon Creek 100-year flow entering the stadium (2,600 cfs) reduces to 838 cfs due to spill out of the existing channel. The spill amount can vary as the roughness (vegetative growth) in

Murphy Canyon Creek varies over time. As vegetation increases, the channel capacity lessens and the spill amount will increase.

The proposed condition HEC-RAS results model 900 cfs at the upper end of the reach from the tank farm. This flow rate increase to 2,662 cfs due to the additional contribution from the Murphy Canyon Creek spill along the stadium. The proposed condition flow depths range from 2.5 to 6.9 feet. The adjacent development pads shall provide at least 2 feet of freeboard above the 100-year water surface elevations. A proposed box culvert under a roadway within the park will be 30-feet wide by 3-feet deep. The flow velocities range from 1.1 to 9.9 feet per second. Flow velocities above 5 to 6 feet per second are generally considered erosive for naturally-lined areas. Erosion protection measures may need to be implemented for some areas during final engineering.

The WSPGW analysis shows that the double box culverts do not have capacity for the 100-year flow. Consequently, at the upstream end of the box culverts, flow will spill out of the approaching open channel. The spill occurs at flows above 2,600 cfs. Since the 100-year flow approaching the culverts is 3,500 cfs, the spillover is approximately 900 cfs.

CONCLUSION

The SDSU Mission Valley West Campus redevelopment project is encumbered by the San Diego River and Murphy Canyon Creek. Since a floodplain and floodway have been delineated along the San Diego River based on detailed engineering analyses, the associated regulations are generally well defined and understood. On the other hand, the Murphy Canyon Creek floodplain is merely based on approximate information. As a result, this report contains hydraulic analyses for Murphy Canyon Creek as well as the 100 percent Design Development Site Development plans by Rick Engineering. The analyses show that the current creek channel cannot contain the 100-year flows within or upstream of the site. As a result, the project will include a corridor to convey the excess flows around the development area.

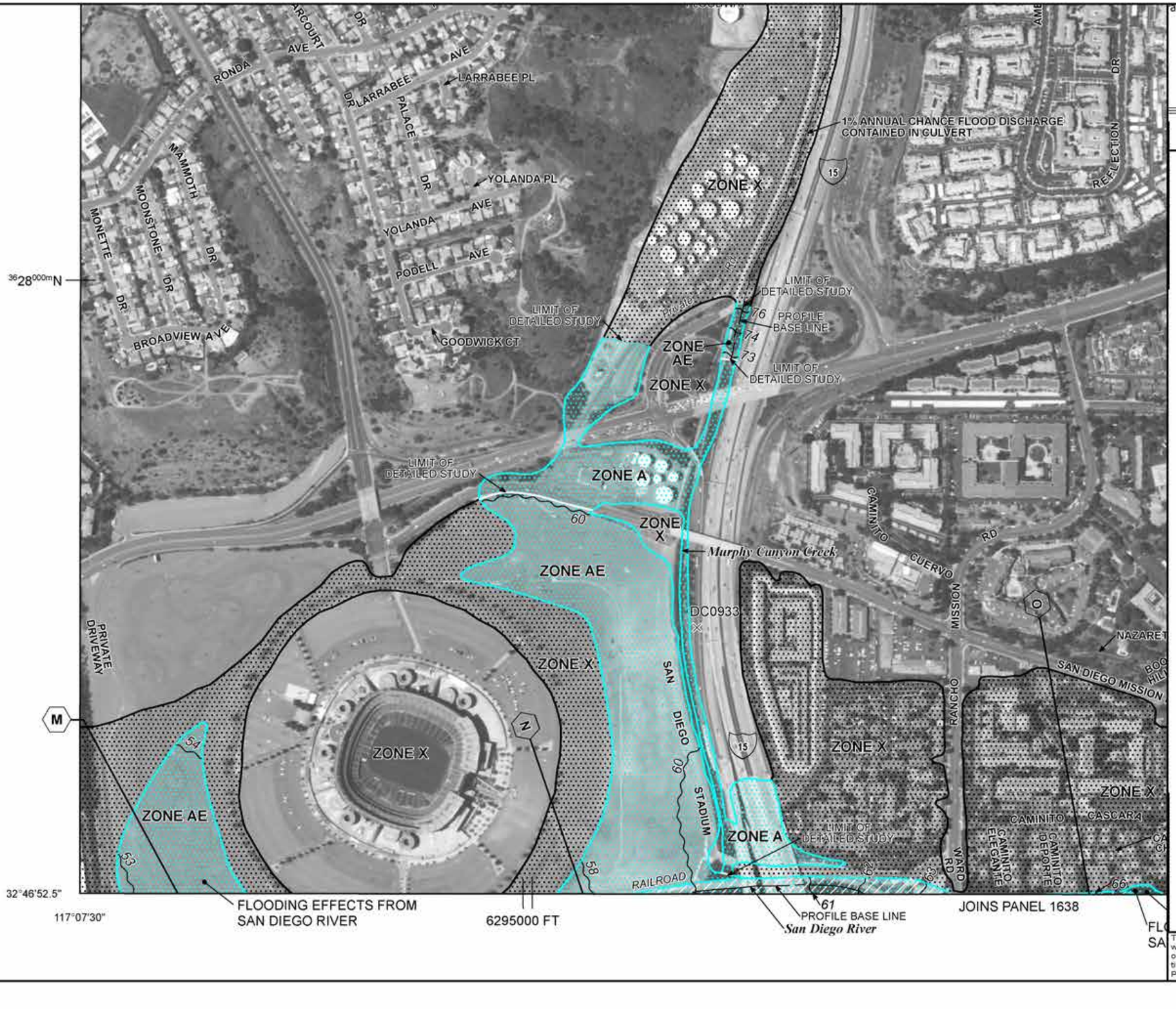
APPENDIX A

HYDRAULIC DOCUMENTATION

ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1636H

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1636 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO, CITY OF	060295	1636	H

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

MAP NUMBER
06073C1636H

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ance Program at 1-800-638-6620.

117°07'30"

32°46'52.5"

$^{36}27^{000m}$N

$^{489}000^{m}$E

$^{490}000^{m}$E

$^{36}26^{000m}$N

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1638H

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1638 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO, CITY OF	060295	1638	H

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

MAP NUMBER
06073C1638H

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

FLOOD INSURANCE STUDY

SAN DIEGO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

VOLUME 1 OF 11

Community Name	Community Number
SAN DIEGO COUNTY, UNINCORPORATED AREAS	060284
CARLSBAD, CITY OF	060285
CHULA VISTA, CITY OF	065021
CORONADO, CITY OF	060287
DEL MAR, CITY OF	060288
EL CAJON, CITY OF	060289
ENCINITAS, CITY OF	060726
ESCONDIDO, CITY OF	060290
IMPERIAL BEACH, CITY OF	060291
LA MESA, CITY OF	060292
LEMON GROVE, CITY OF	060723
NATIONAL CITY, CITY OF	060293
OCEANSIDE, CITY OF	060294
POWAY, CITY OF	060702
SAN DIEGO, CITY OF	060295
SAN MARCOS, CITY OF	060296
SANTEE, CITY OF	060703
SOLANA BEACH, CITY OF	060725
VISTA, CITY OF	060297

REVISED
May 16, 2012

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06073CV001C

TABLE 8: SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cubic feet per second) 10% Annual-Chance	2% Annual-Chance	1% Annual-Chance	0.2% Annual-Chance
At U.S. Highway 94, 9,600 Feet Upstream of Confluence	2.0	160	700	1,060	1,470
Moosa Canyon Creek					
Near Junction of Moosa Road and U.S. Highway 395	34.7	2,600[1]	9,000[1]	13,000[1]	29,000[1]
At U.S. Highway 395, Near River at Elevation 400 Feet	29.2	2,200[1]	7,500	11,550[1]	26,000[1]
Upstream of Confluence with South Fork Moosa Canyon Creek	21.4	1,400[1]	5,100[1]	7,800[1]	17,000[1]
At Old Castle Ranch	15.0	800[1]	3,300[1]	5,100[1]	11,000[1]
At Unnamed Road	3.0	--	--	3,120	--
Murphy Canyon					
Upstream of Friars Road	12.1	1,500	2,700	3,500	5,500
Downstream of Aero Drive	10.1	1,100	2,400	3,000	3,800[2]
Upstream at Aero Drive	10.1	1,100	2,400	3,000	5,000
Downstream of Confluence with Shepard Canyon	9.2	850	2,000	2,400	4,200
Upstream of Confluence with Shepard Canyon	6.2	550	1,400	1,700	3,300

-- Data Not Available

[1] Flows Partially Controlled by Turner Dam

(C) Channels that accommodate a *base flood* shall do so without increasing the water surface elevation more than one foot at any point from the level of a nonconfined *base flood* in the natural undeveloped floodplain. Channels may accommodate less than a *base flood* (low-flow channels), but shall be designed and constructed in accordance with FEMA regulations.

(D) All artificial channels shall consist of natural bottoms and sides and shall be designed and sized to accommodate existing and proposed riparian vegetation and other natural or proposed constraints. Where maintenance is proposed or required to keep vegetation at existing levels compatible with the design capacity of the channel, a responsible party shall be identified and a maintenance and monitoring process shall be established to the satisfaction of the City Engineer.

(6) *Development* shall not significantly adversely affect existing *sensitive biological resources* on-site or off-site.

(7) Within the Coastal Overlay Zone, no *structure* or portion thereof shall be erected, constructed, converted, established, altered or enlarged, or no landform alteration *grading*, placement or removal of vegetation, except that related to a historic and ongoing agricultural operation, or land division shall be permitted, provided:

(A) Parking lots, new roadways and roadway expansions shall be allowed only where indicated on an adopted *Local Coastal Program land use plan.*

(B) *Floodway* encroachments for utility and transportation crossings shall be offset by improvements or modifications to enable the passage of the *base flood*, in accordance with the FEMA standards and regulations provided in Section 143.0146.

(f) *Flood Fringe*. The applicable development regulations are those in the underlying zone, subject to the following supplemental regulations:

(1) Within the *flood fringe* of a *Special Flood Hazard Area*, permanent *structures* and *fill* for permanent *structures*, roads, and other *development* are allowed only if the following conditions are met:

(A) The *development* or *fill* will not significantly adversely affect existing *sensitive biological resources* on-site or off-site;

(B) The *development* is capable of withstanding *flooding* and does not require or cause the construction of off-site *flood* protective works including artificial *flood* channels, revetments, and levees nor will it cause adverse impacts related to *flooding* of properties located upstream or downstream, nor will it increase or expand a *(FIRM)* Zone A;

(C) *Grading* and *filling* are limited to the minimum amount necessary to accommodate the proposed *development*, harm to the environmental values of the floodplain is minimized including peak flow storage capacity, and *wetlands* hydrology is maintained;

(D) The *development* neither significantly increases nor contributes to downstream bank erosion and sedimentation nor causes an increase in *flood* flow velocities or volume; and

(E) There will be no significant adverse water quality impacts to downstream wetlands, lagoons or other *sensitive biological resources*, and the *development* is in compliance with the requirements and regulations of the National Pollution Discharge Elimination System, as implemented by the City of San Diego.

(F) The design of the *development* incorporates the findings and recommendations of both a site specific and coastal watershed hydrologic study.

(2) All *development* that involves *fill*, *channelization*, or other alteration of a *Special Flood Hazard Area* is subject to the requirements for *channelization* in Section 143.0145(e)(5) and with FEMA regulations.

(Amended 4-22-2002 by O-19051 N.S.; effective 10-8-2002.)
(Amended 11-13-08 by O-19805 N.S; effective 12-13-2008.)

§143.0146 Supplemental Regulations for Special Flood Hazard Areas

All proposed *development* within a *Special Flood Hazard Area* is subject to the following requirements and all other applicable requirements and regulations of FEMA.

(a) *Development* and Permit Review

(1) Where *base flood elevation* data has not been provided by the *Flood Insurance Study,* the City Engineer shall obtain, review, and utilize *base flood elevation* and *floodway* data available from federal or state sources, or require submittal of such data from the *applicant*. The City Engineer shall make interpretations, where needed, as to the location of the boundaries of the areas of the *Special Flood Hazard Area*, based on the best available engineering or scientific information.

(2) Proposed *development* in a *Special Flood Hazard Area* shall not adversely affect the *flood* carrying capacity of areas where *base flood elevations* have been determined but the *floodway* has not been designated. "Adversely affect" as used in this section means that the cumulative effect of the proposed *development*, when combined with all other existing and anticipated *development*, will not increase the water surface elevation of the *base flood* more than one foot at any point.

(3) In all cases where a watercourse is to be altered the City Engineer shall do the following:

(A) Notify affected, adjacent communities and the California Department of Water Resources of any proposed alteration or relocation of a watercourse and submit evidence of the notice to the Federal Insurance Administration;

(B) Require that the *flood* carrying capacity of the altered or relocated portion of the watercourse is maintained; and

(C) Secure and maintain for public inspection and availability the *certifications*, appeals, and variances required by these regulations.

(4) The *applicant* shall grant a flowage easement to the City for that portion of the property within a *floodway*.

Office

Project

9 January 2017

INPUT	OUTPUT
State Plane, NAD83	State Plane, NAD83
0406 - California 6, U.S. Feet	0406 - California 6, U.S. Feet
Vertical - NGVD29 (Vertcon94), U.S. Feet	Vertical - NAVD88, U.S. Feet

Confluence

Northing/Y:	1865213	**Northing/Y:**	1865213.000
Easting/X:	6296002	**Easting/X:**	6296002.000
Elevation/Z:	100	**Elevation/Z:**	102.083
Convergence:	-0 28 29.92914	**Convergence:**	-0 28 29.92914
Scale Factor:	1.000000312	**Scale Factor:**	1.000000312
Combined Factor:	1.000000943	**Combined Factor:**	1.000000843

Grid Shift (U.S. ft.): X/Easting = 0.0, Y/Northing = 0.0

Remark:

APPENDIX B

HEC-RAS RESULTS

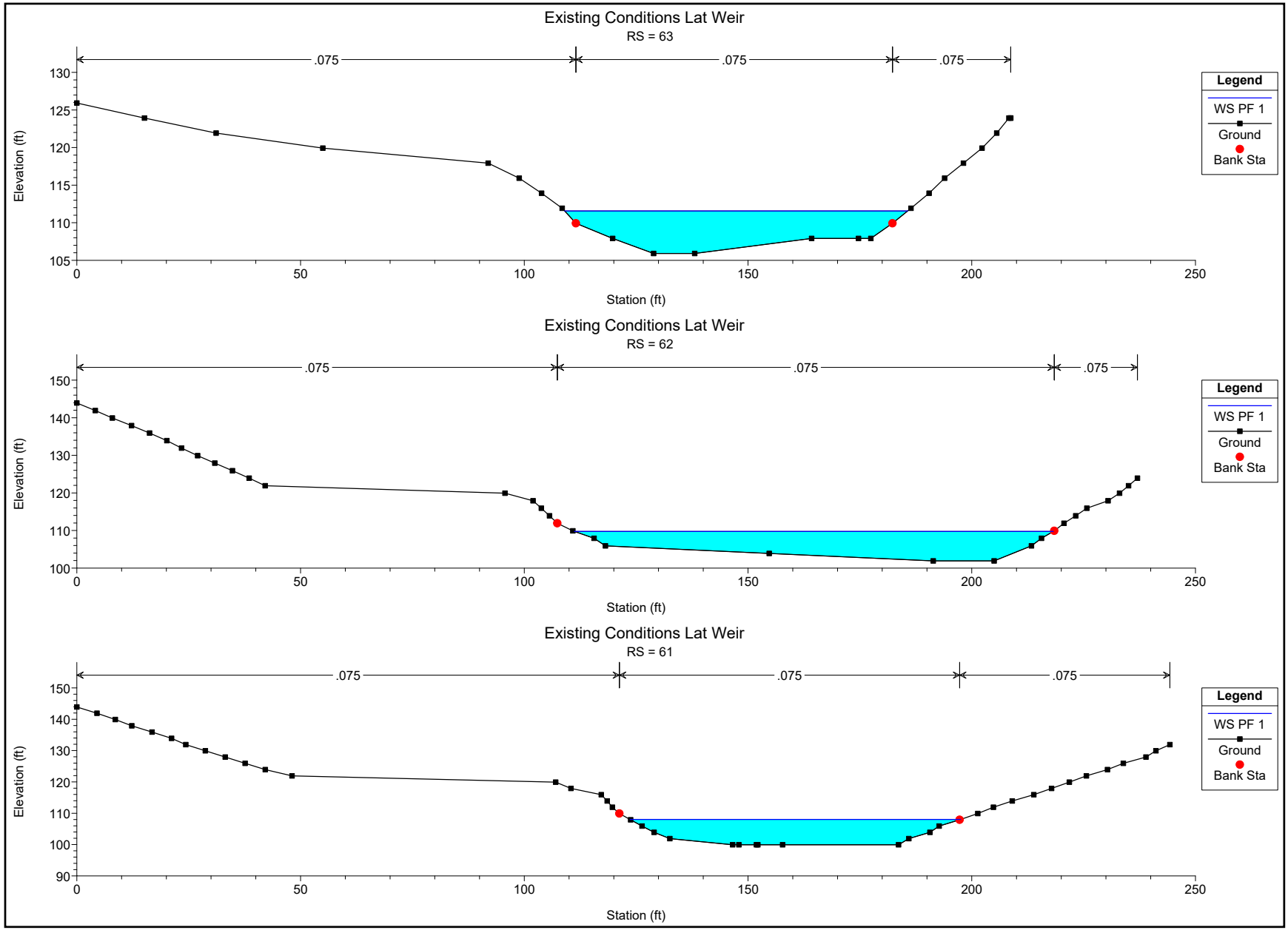
Existing Conditions Murphy Canyon Creek

HEC-RAS Plan: Existing Con River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Max Chl Dpth	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)	(ft/s)	(sq ft)	(ft)	
Reach-1	63	PF 1	3000.00	5.64	105.92	111.56	111.19	113.11	0.038139	10.01	303.08	76.66	0.86
Reach-1	62	PF 1	3000.00	7.85	101.92	109.77		110.15	0.006514	4.96	604.25	107.02	0.37
Reach-1	61	PF 1	3000.00	8.10	99.92	108.02		108.63	0.008772	6.24	481.08	73.86	0.43
Reach-1	60	PF 1	3000.00	8.35	97.92	106.27		106.88	0.008675	6.26	479.18	72.73	0.43
Reach-1	59	PF 1	3000.00	8.05	95.92	103.97		104.84	0.011874	7.47	404.52	62.52	0.51
Reach-1	58	PF 1	3000.00	7.44	93.92	101.36		102.31	0.013439	7.80	386.93	61.10	0.53
Reach-1	57	PF 1	3000.00	11.02	87.92	98.94	95.85	99.90	0.010791	7.91	389.01	54.61	0.49
Reach-1	56	PF 1	3000.00	7.43	85.92	93.35	93.35	95.77	0.047921	12.59	245.23	53.31	0.98
Reach-1	55	PF 1	3000.00	9.21	83.92	93.13	92.08	95.17	0.001228	11.48	263.23	377.45	0.78
Reach-1	54.5		Bridge										
Reach-1	54	PF 1	3000.00	8.26	83.92	92.18	92.18	95.03	0.002139	13.55	221.67	395.17	1.00
Reach-1	53	PF 1	3000.00	8.43	81.92	90.35	90.35	93.58	0.001949	14.45	214.85	409.60	0.98
Reach-1	52	PF 1	3000.00	9.55	79.92	89.47	89.47	91.95	0.001305	12.90	289.99	576.30	0.82
Reach-1	51	PF 1	3000.00	7.94	79.92	87.86	87.86	90.95	0.001971	14.13	218.05	316.69	0.98
Reach-1	50	PF 1	2600.00	9.90	75.51	85.41	81.79	86.66	0.000716	9.01	303.39	146.81	0.50
Reach-1	40		Culvert										
Reach-1	30	PF 1	2600.00	7.95	65.00	72.95		74.93	0.001462	11.28	230.59	29.00	0.70
Reach-1	29	PF 1	2600.00	9.07	64.00	73.07	71.27	74.68	0.000933	10.17	257.65	39.56	0.67
Reach-1	28	PF 1	2600.00	7.32	64.00	71.32	71.32	74.37	0.001866	14.11	202.50	41.81	0.97
Reach-1	27	PF 1	2600.00	7.06	64.00	71.06	71.06	73.87	0.001801	13.59	224.11	53.82	0.95
Reach-1	26	PF 1	2600.00	7.41	62.00	69.41	69.41	72.04	0.002195	13.00	200.03	38.09	1.00
Reach-1	25	PF 1	2600.00	7.30	62.00	69.30	69.10	71.81	0.001810	12.71	212.41	48.28	0.93
Reach-1	24	PF 1	2600.00	7.51	62.00	69.51	68.79	71.50	0.001340	11.33	243.24	57.48	0.81
Reach-1	23.5		Bridge										
Reach-1	23	PF 1	2600.00	7.41	60.00	67.41	67.41	69.71	0.001683	12.32	259.29	212.04	0.90
Reach-1	22	PF 1	2600.00	7.71	58.00	65.71	65.71	68.31	0.002004	13.02	215.52	56.61	0.97
Reach-1	21	PF 1	2600.00	7.16	58.00	65.16	65.16	67.84	0.002011	13.16	207.90	54.00	0.98
Reach-1	20	PF 1	2600.00	7.35	56.00	63.35	63.35	65.98	0.002200	13.01	199.79	38.17	1.00
Reach-1	19	PF 1	2600.00	7.90	56.00	63.90		65.43	0.001016	9.93	266.12	47.61	0.71
Reach-1	18	PF 1	2600.00	10.32	54.00	64.32		64.99	0.004175	6.55	397.14	71.88	0.43
Reach-1	17	PF 1	2600.00	10.06	54.00	64.06		64.56	0.003413	5.63	461.70	97.74	0.39
Reach-1	16	PF 1	2600.00	9.26	54.00	63.26	60.64	64.08	0.006018	7.25	360.00	76.69	0.52
Reach-1	15	PF 1	2600.00	6.38	54.00	60.38	60.37	62.91	0.019830	12.76	203.85	50.49	1.00
Reach-1	14.9		Lat Struct										
Reach-1	14	PF 1	1852.19	6.38	54.00	60.38		61.19	0.006954	6.98	259.26	62.14	0.57
Reach-1	13	PF 1	1622.65	7.90	52.00	59.90	57.14	60.55	0.005051	6.48	250.58	54.95	0.48
Reach-1	12	PF 1	1622.65	7.47	52.00	59.47		60.04	0.004735	6.06	267.79	50.71	0.46
Reach-1	11.9		Lat Struct										
Reach-1	11	PF 1	1554.66	7.01	52.00	59.01		59.58	0.004426	6.03	259.71	57.61	0.46
Reach-1	10	PF 1	1355.88	8.77	50.00	58.77		59.16	0.003015	5.01	273.13	55.64	0.36
Reach-1	9	PF 1	1218.09	8.74	50.00	58.74		58.90	0.001215	3.27	375.23	71.20	0.23
Reach-1	8	PF 1	1119.79	8.69	50.00	58.69		58.80	0.000636	2.73	412.36	69.26	0.19
Reach-1	7	PF 1	1034.03	8.55	50.00	58.55		58.71	0.001230	3.26	318.13	59.94	0.24
Reach-1	6	PF 1	938.90	8.42	50.00	58.42		58.58	0.001432	3.16	297.25	54.26	0.23

HEC-RAS Plan: Existing Con River: RIVER-1 Reach: Reach-1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Max Chl Dpth	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)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	841.81	8.31	50.00	58.31		58.43	0.001339	2.72	309.92	58.82	0.20
Reach-1	4	PF 1	837.66	8.23	50.00	58.23		58.31	0.000849	2.25	372.06	64.05	0.16
Reach-1	3	PF 1	837.66	8.24	50.00	58.24	52.00	58.26	0.000190	1.29	657.94	106.62	0.09
Reach-1	2.5		Bridge										
Reach-1	2	PF 1	837.66	8.23	50.00	58.23		58.25	0.000168	1.02	820.58	144.14	0.07
Reach-1	1	PF 1	837.66	8.23	50.00	58.23	51.31	58.24	0.000048	0.79	1081.46	241.63	0.05
Reach-1	0.5		Bridge										
Reach-1	0.1	PF 1	837.66	10.22	48.00	58.22	49.45	58.22	0.000020	0.56	1601.53	259.25	0.04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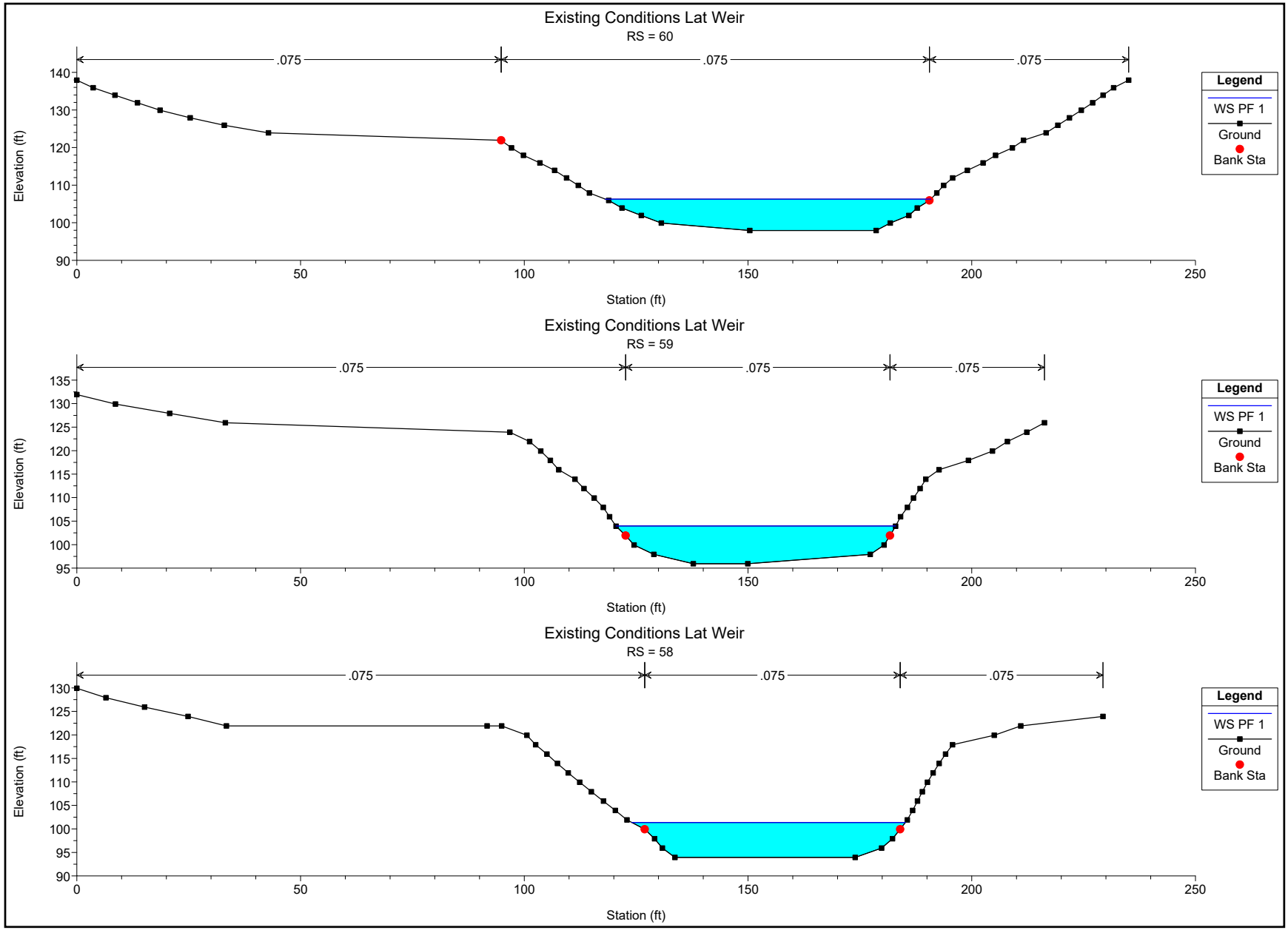
125
120
115
110
105
0
50
100
150
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 62
.075
.075
.075
Elevation (ft)
150
140
130
120
110
100
0
50
100
150
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 61
.075
.075
.075
Elevation (ft)
150
140
130
120
110
100
90
0
50
100
150
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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Elevation (ft)
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130
120
110
100
90
0
50
100
150
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 59
.075
.075
.075
Elevation (ft)
135
130
125
120
115
110
105
100
95
0
50
100
150
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 58
.075
.075
.075
Elevation (ft)
130
125
120
115
110
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95
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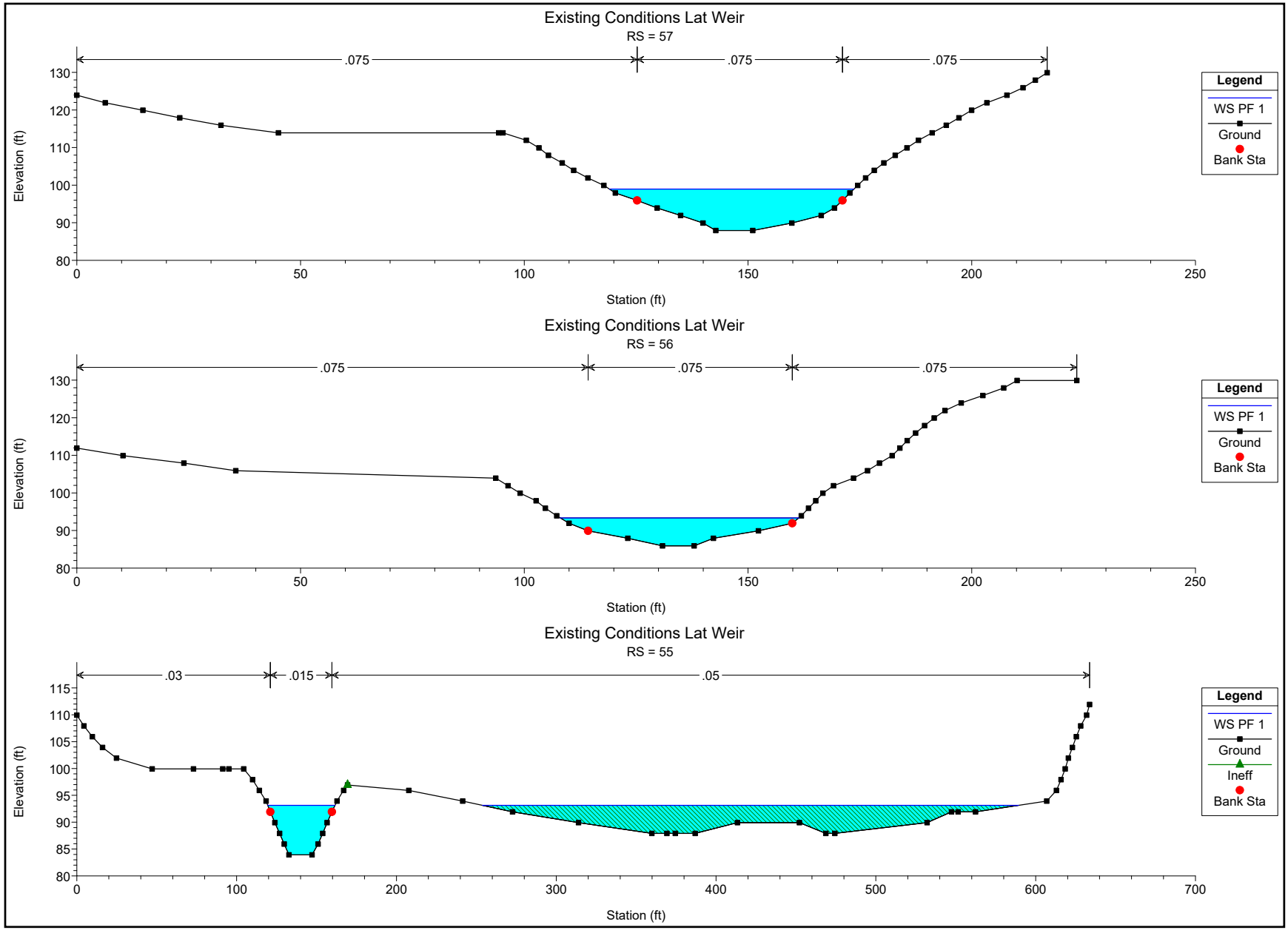
200
250
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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Elevation (ft)
Station (ft)
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WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 56
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.075
.075
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 55
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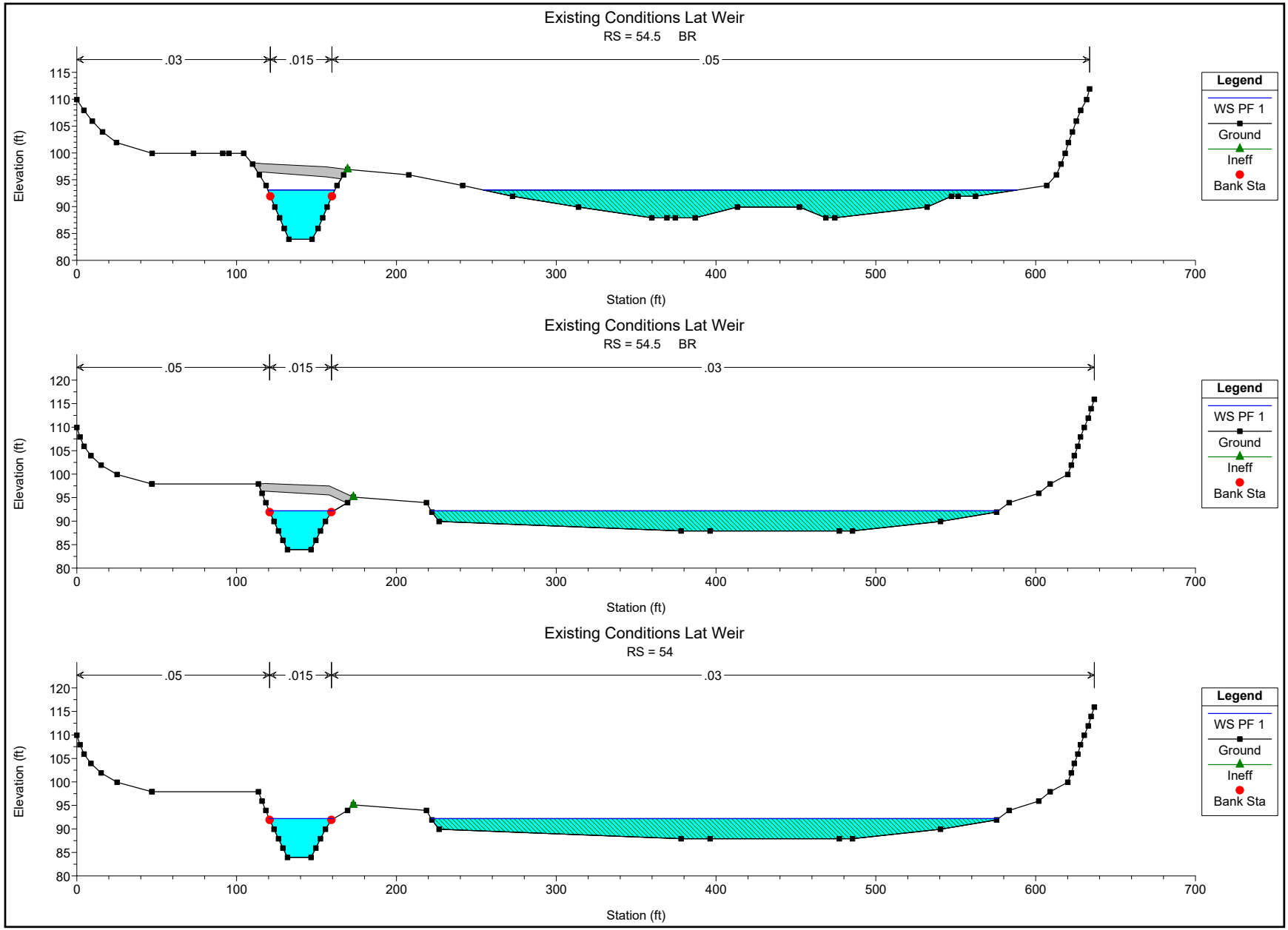
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
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.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 54.5 BR
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 54
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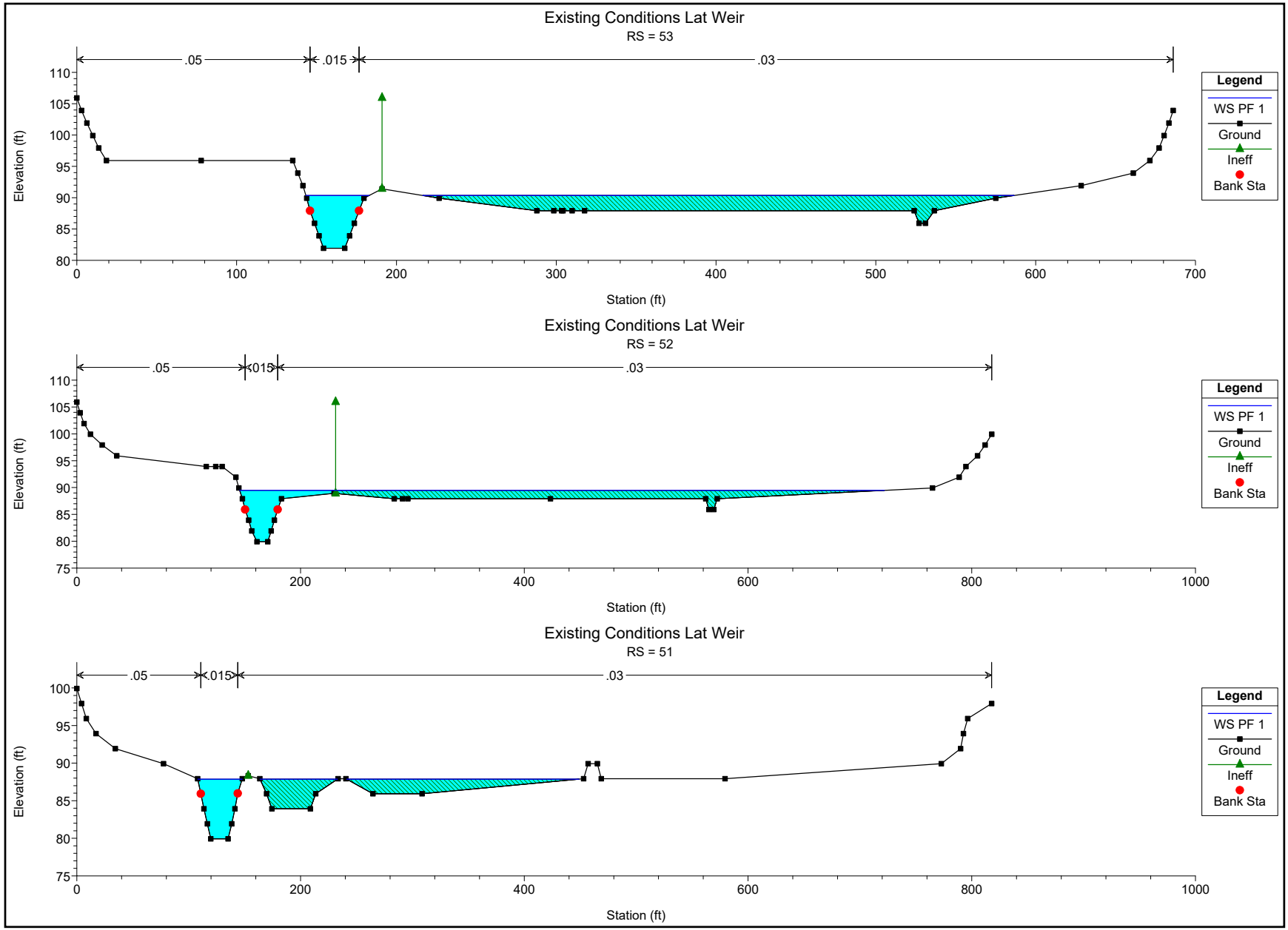
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta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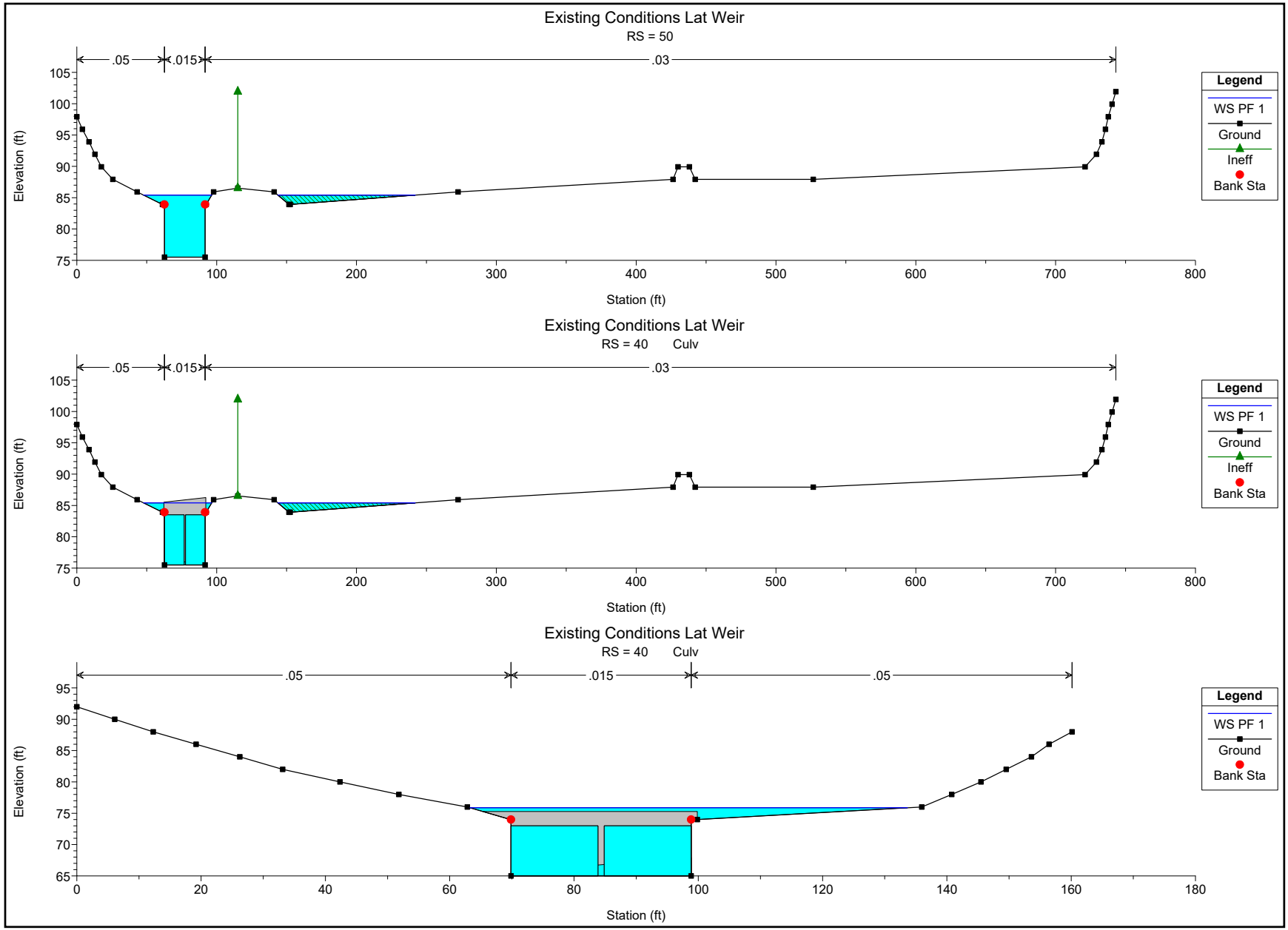
RS = 53
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 52
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 51
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta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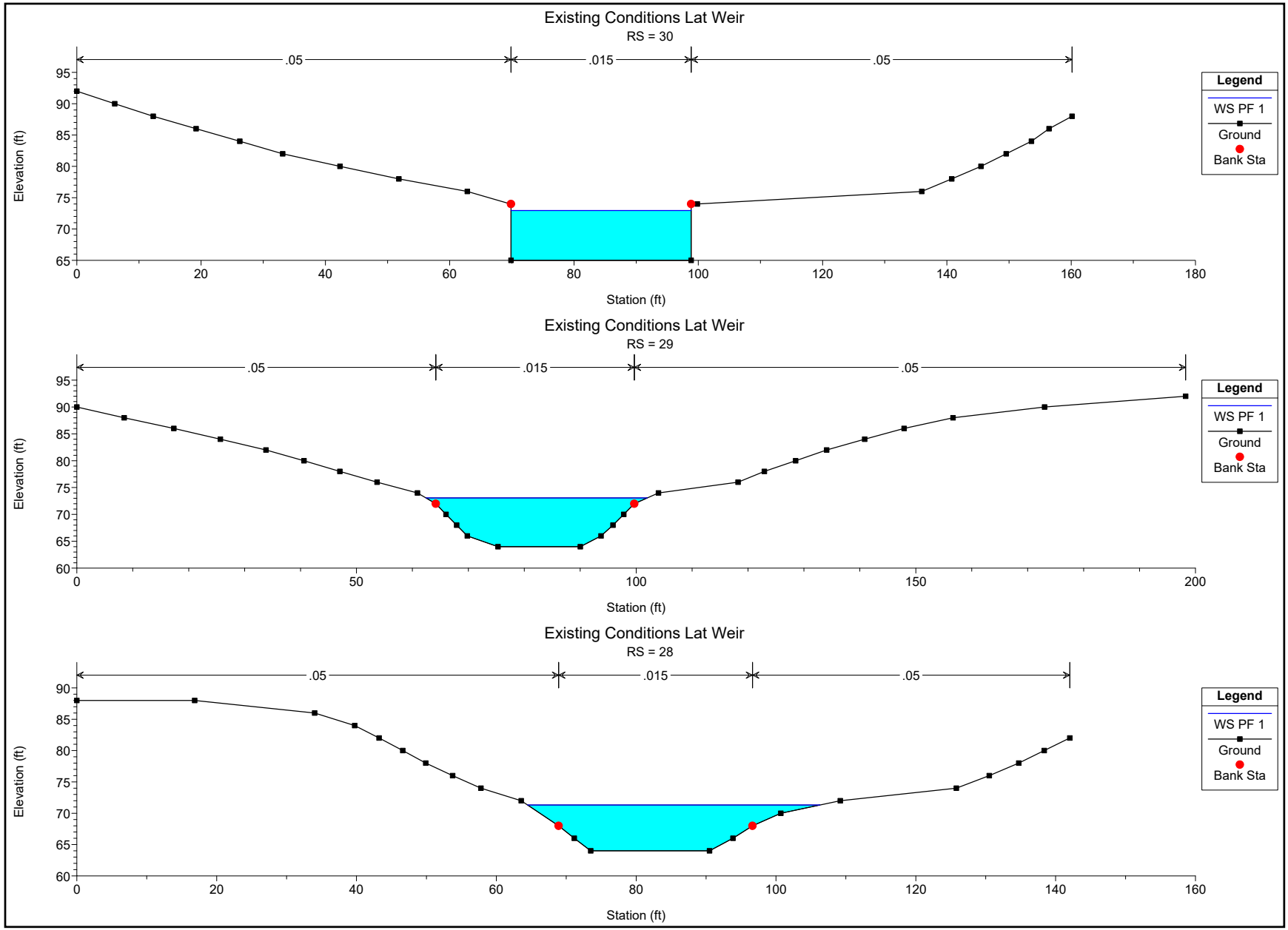
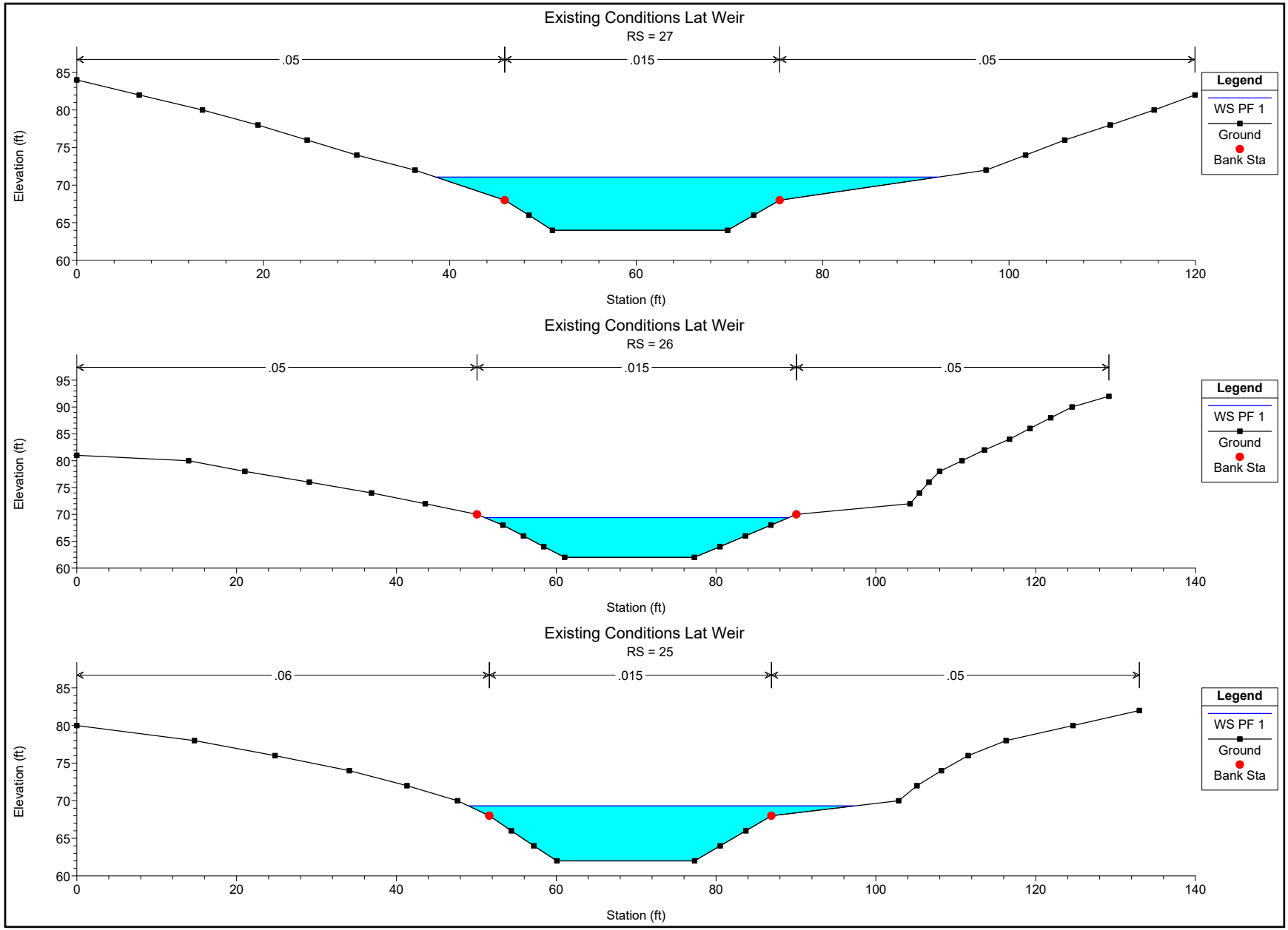
RS = 50
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 40 Culv
.05
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 40 Culv
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 30
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 29
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 28
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 27
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 26
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 25
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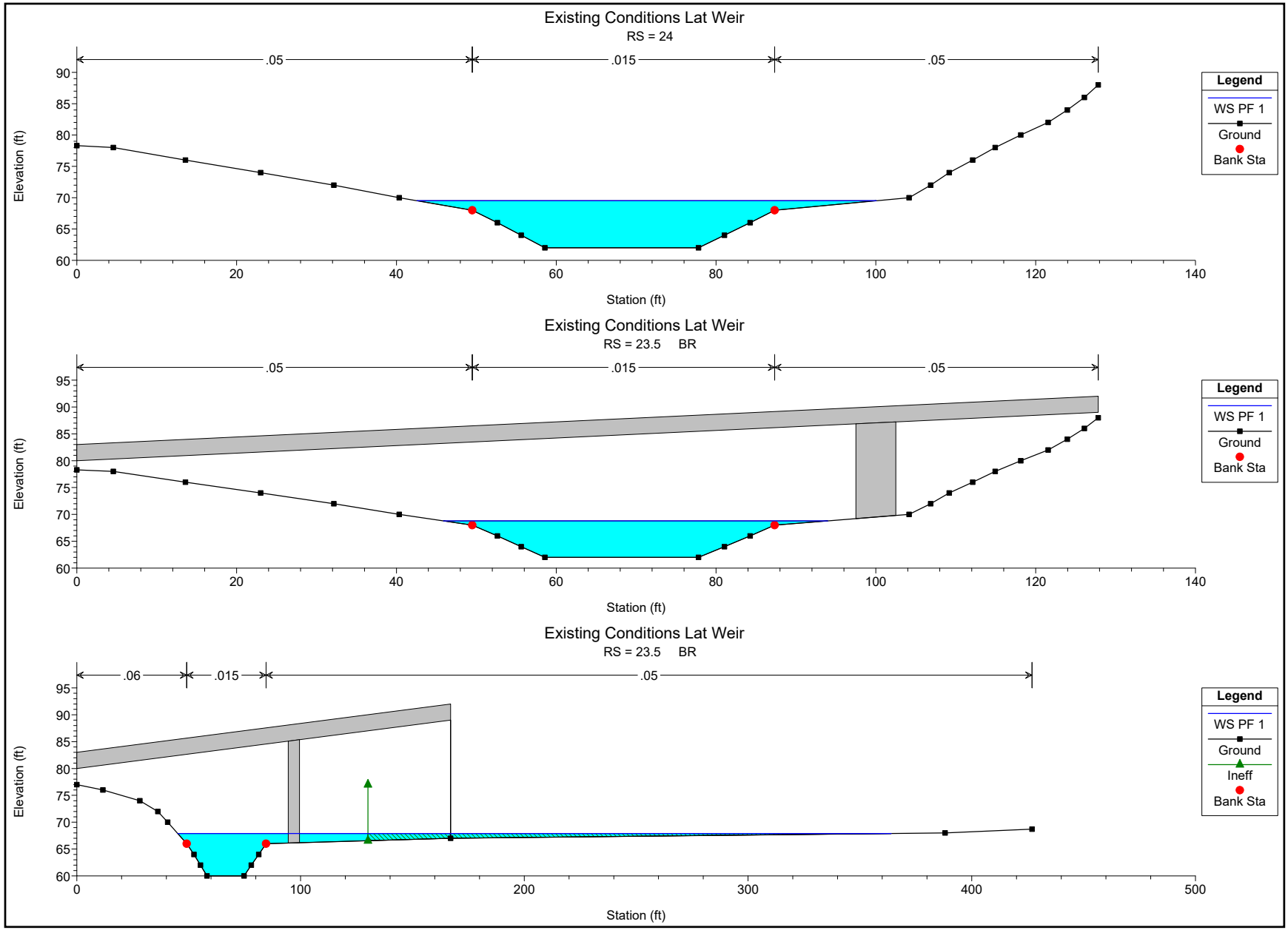
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 24
.05
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 23.5 BR
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.015
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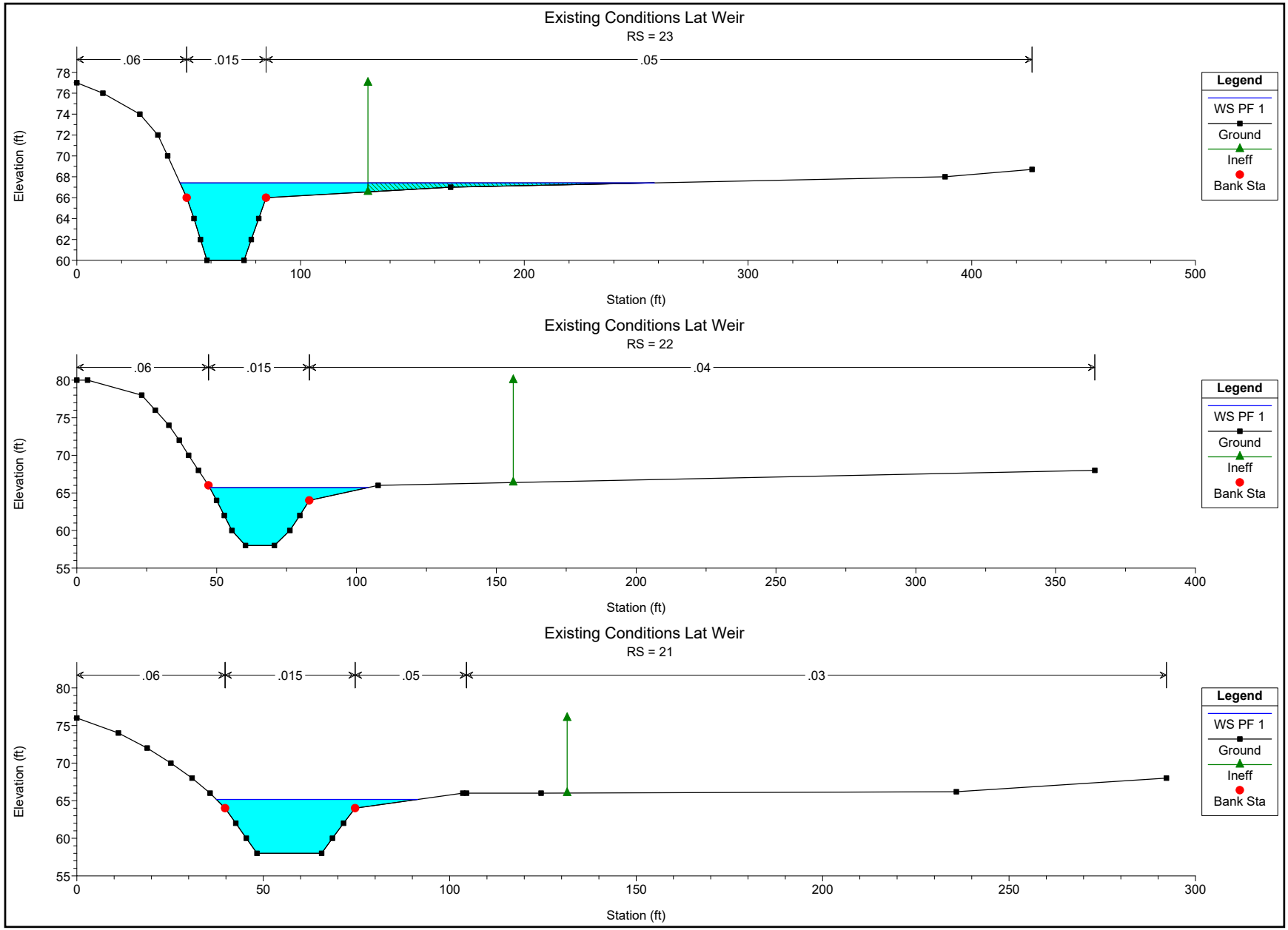
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 23.5 BR
.06
.015
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
RS = 23
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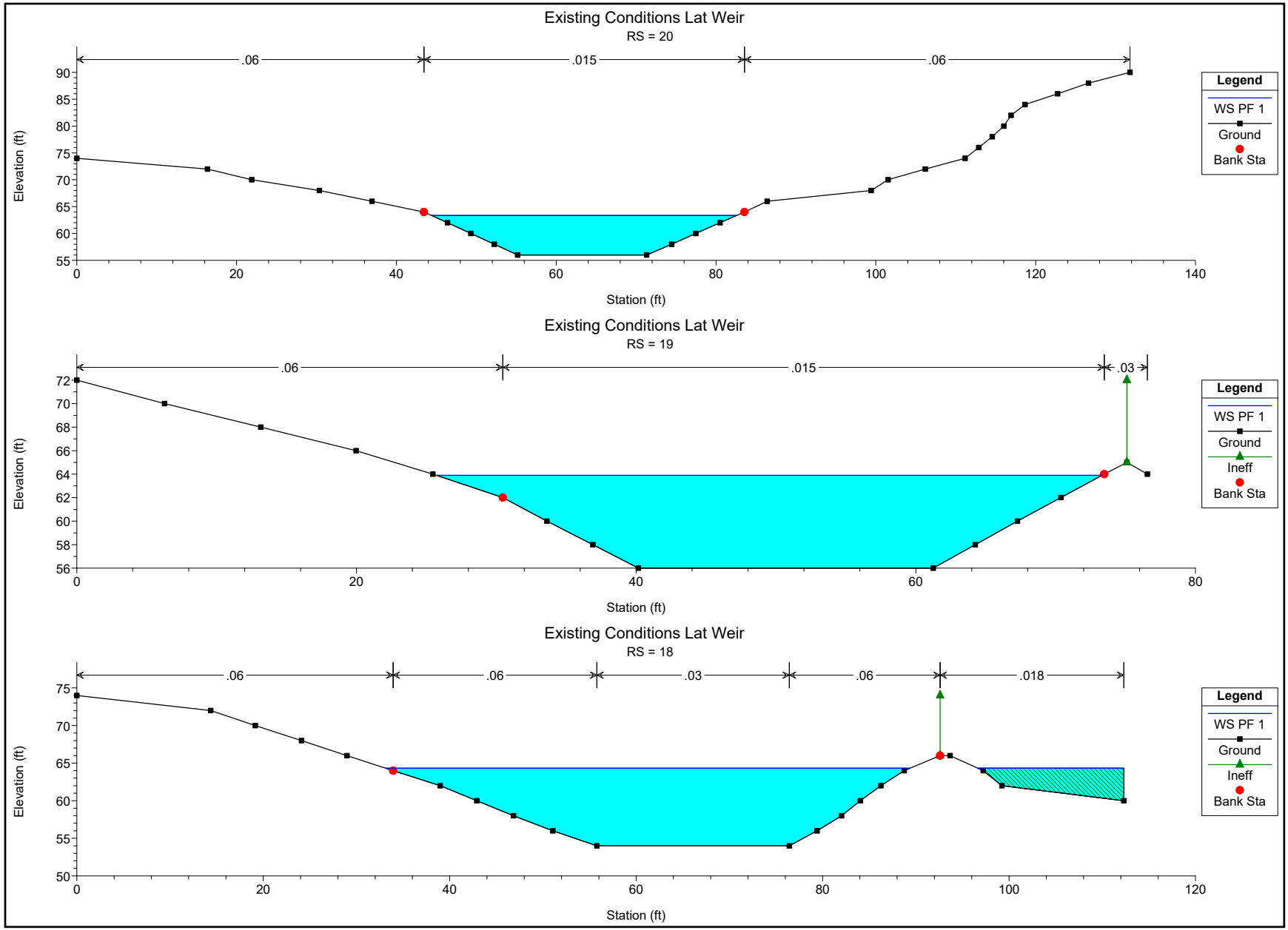
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 22
.06
.015
.04
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 21
.06
.015
.05
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
RS = 20
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 19
.06
.015
.03
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 18
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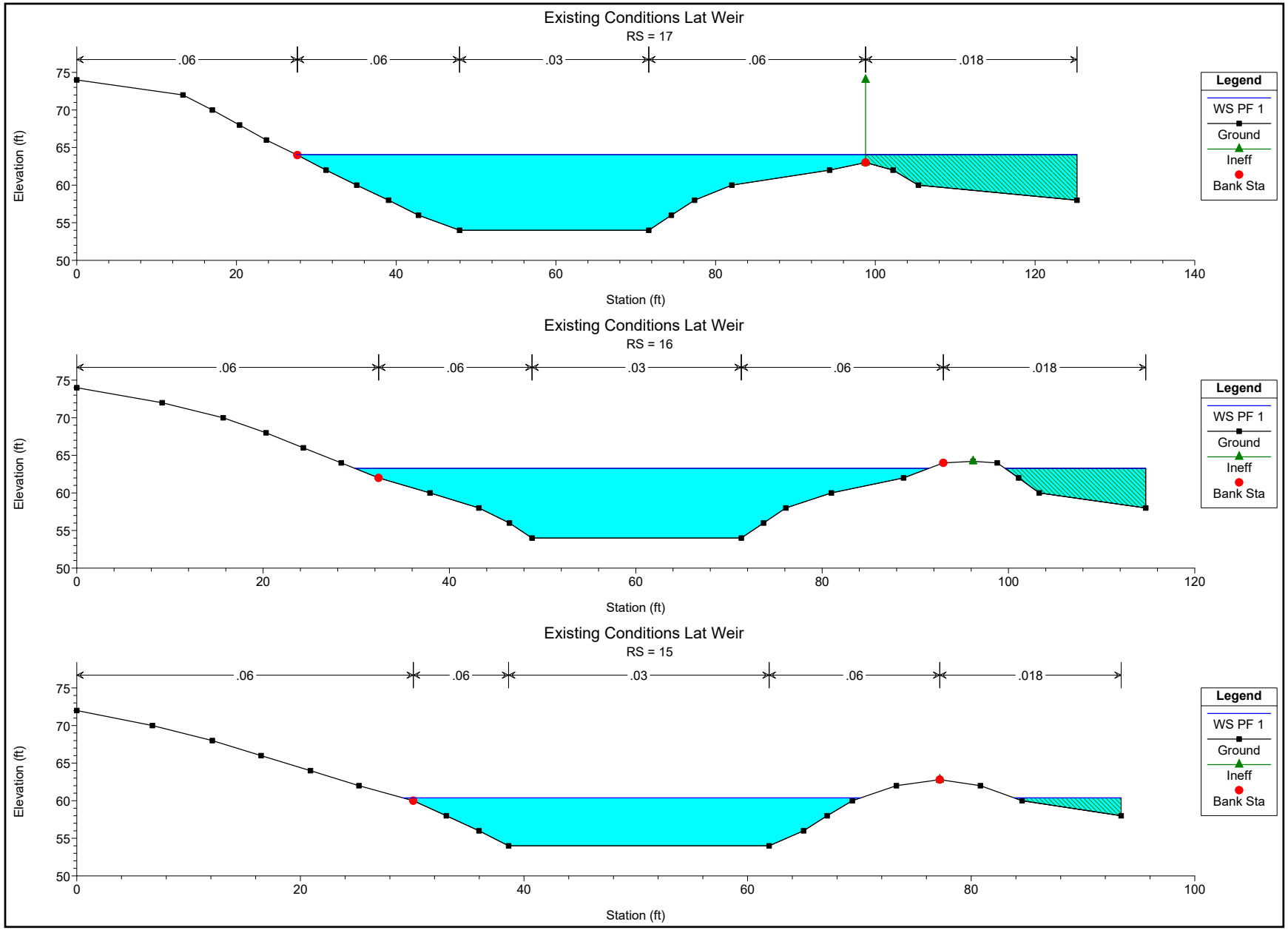
.06
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
RS = 17
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Elevation (ft)
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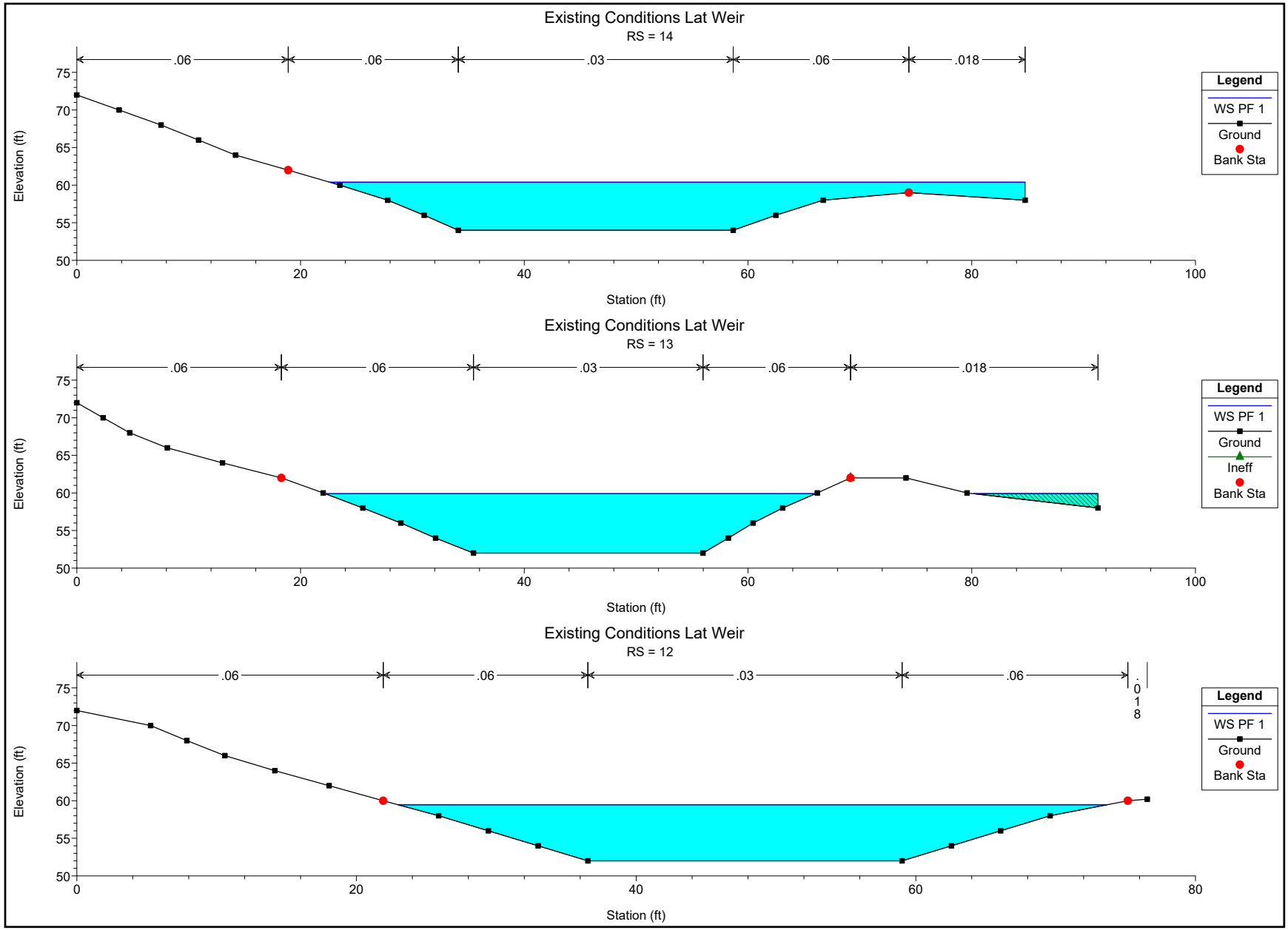
70
65
60
55
50
0
20
40
60
80
100
120
140
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 16
.06
.06
.03
.06
.018
Elevation (ft)
75
70
65
60
55
50
0
20
40
60
80
100
120
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 15
.06
.06
.03
.06
.018
Elevation (ft)
75
70
65
60
55
50
0
20
40
60
80
100
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
RS = 14
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.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 13
.06
.06
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
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.03
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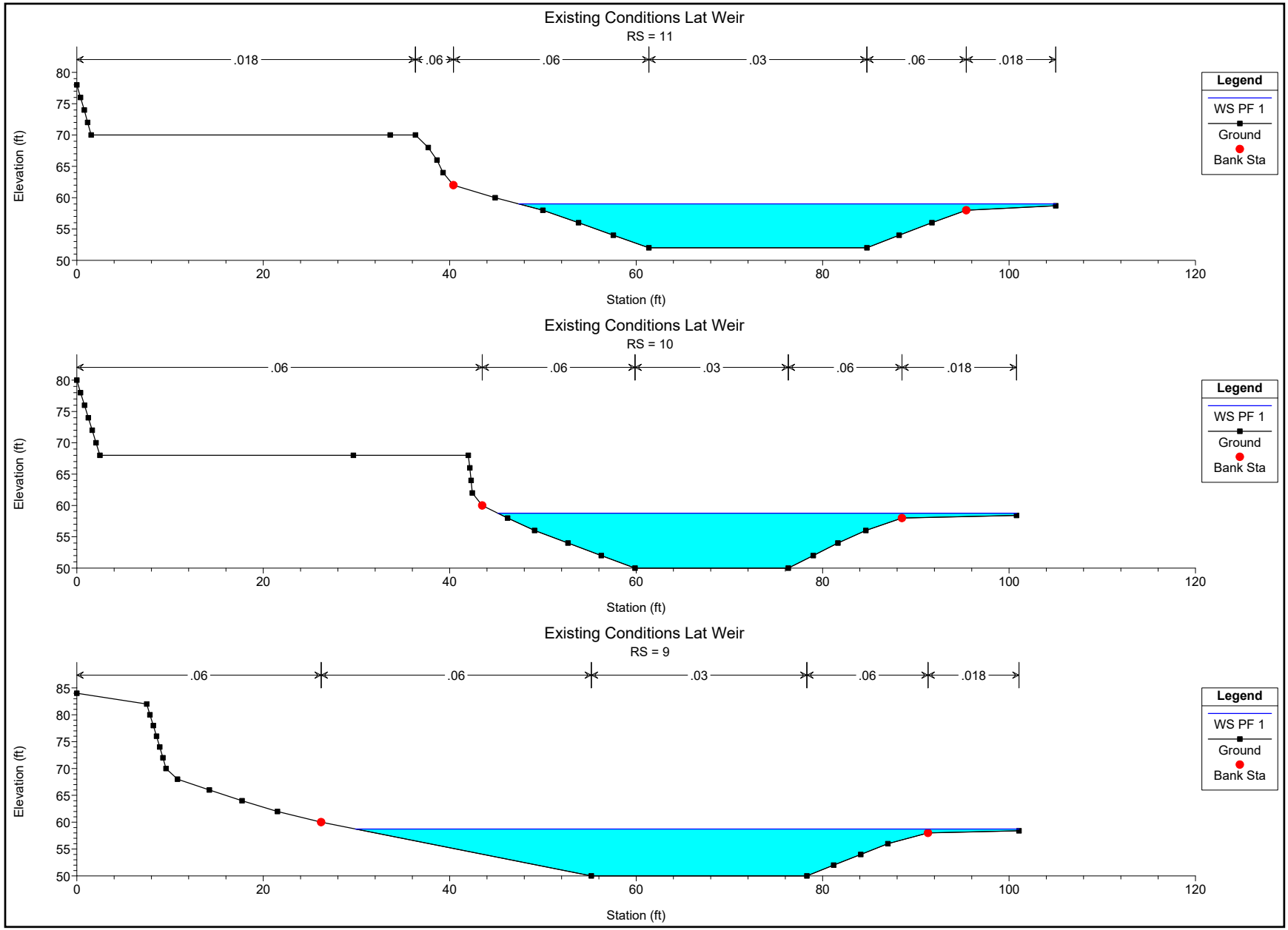
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 11
.018
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.06
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.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 10
.06
.06
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
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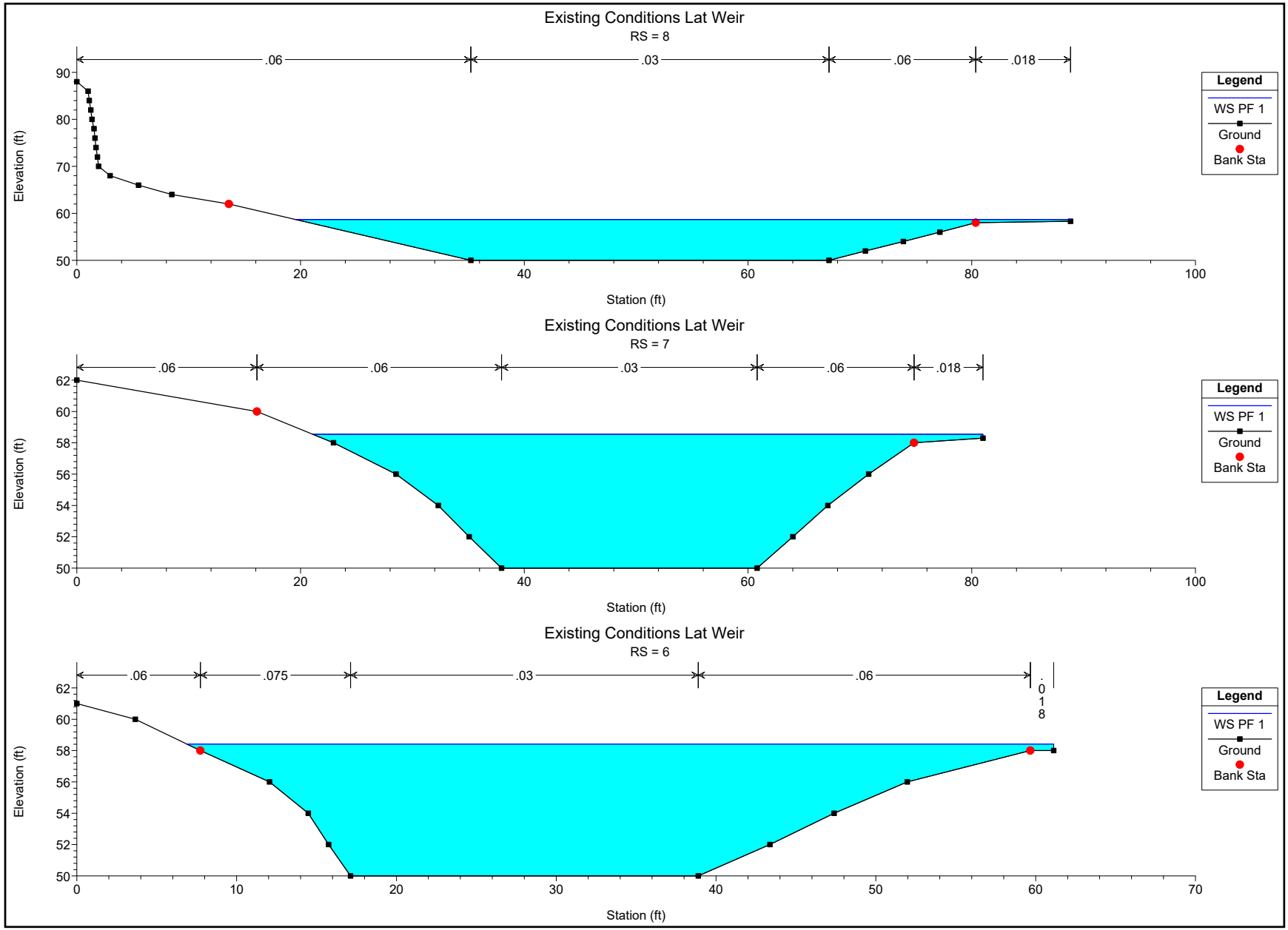
.06
.06
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 8
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.03
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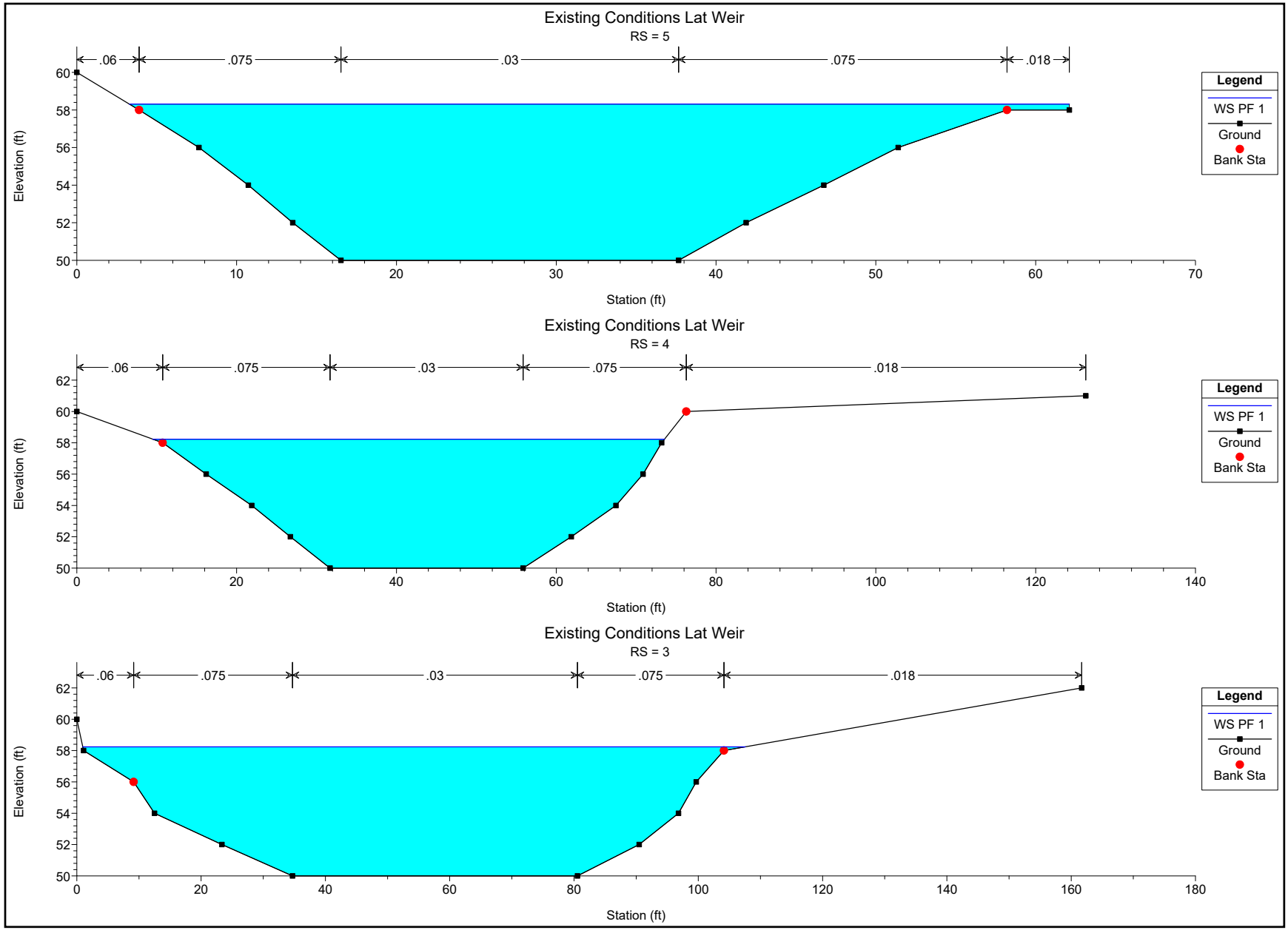
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 7
.06
.06
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 6
.06
.075
.03
.06
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 5
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 4
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.03
.075
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
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.075
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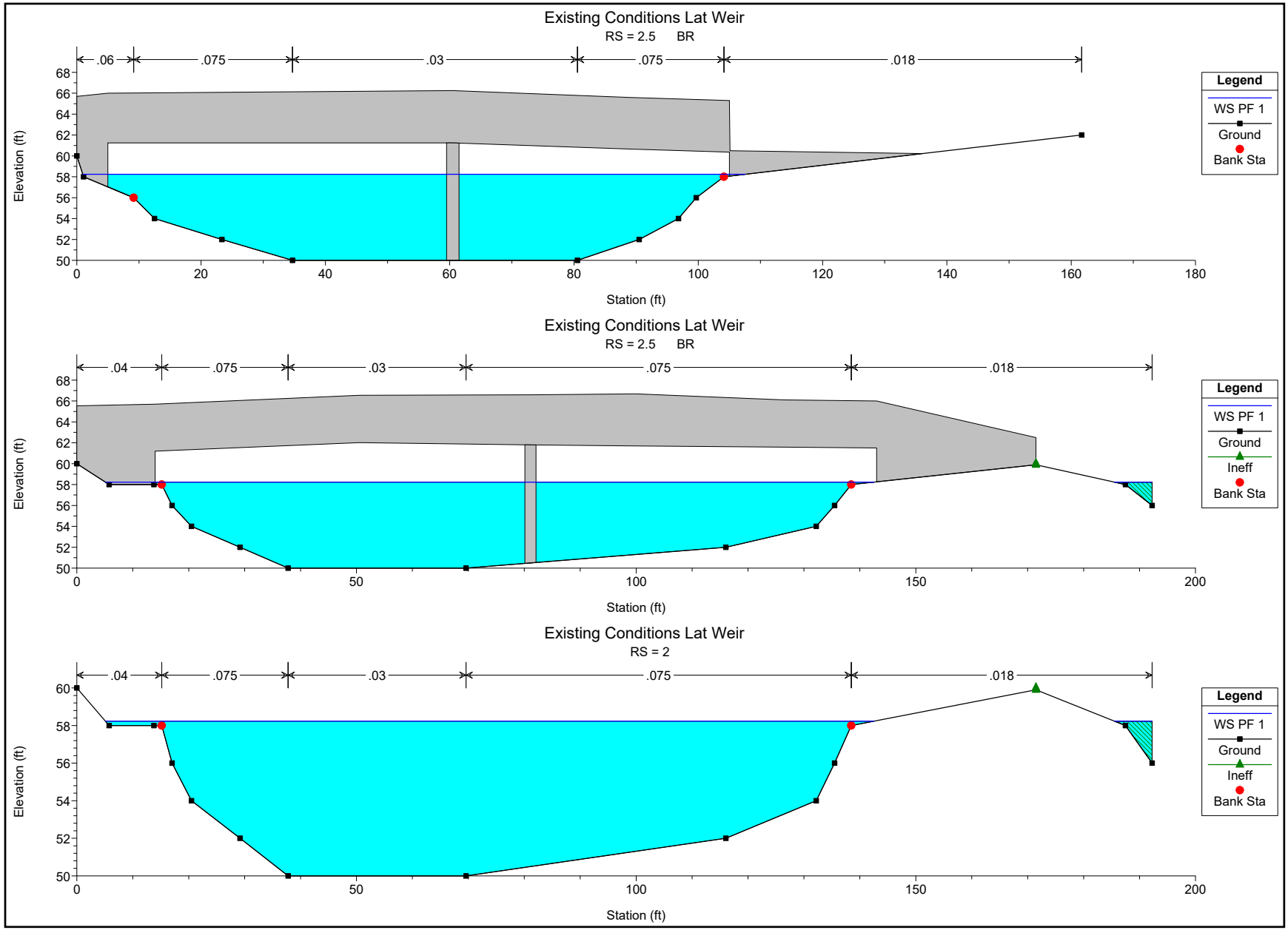
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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RS = 2.5 BR
.06
.075
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.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Existing Conditions Lat Weir
RS = 2.5 BR
.04
.075
.03
.075
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 2
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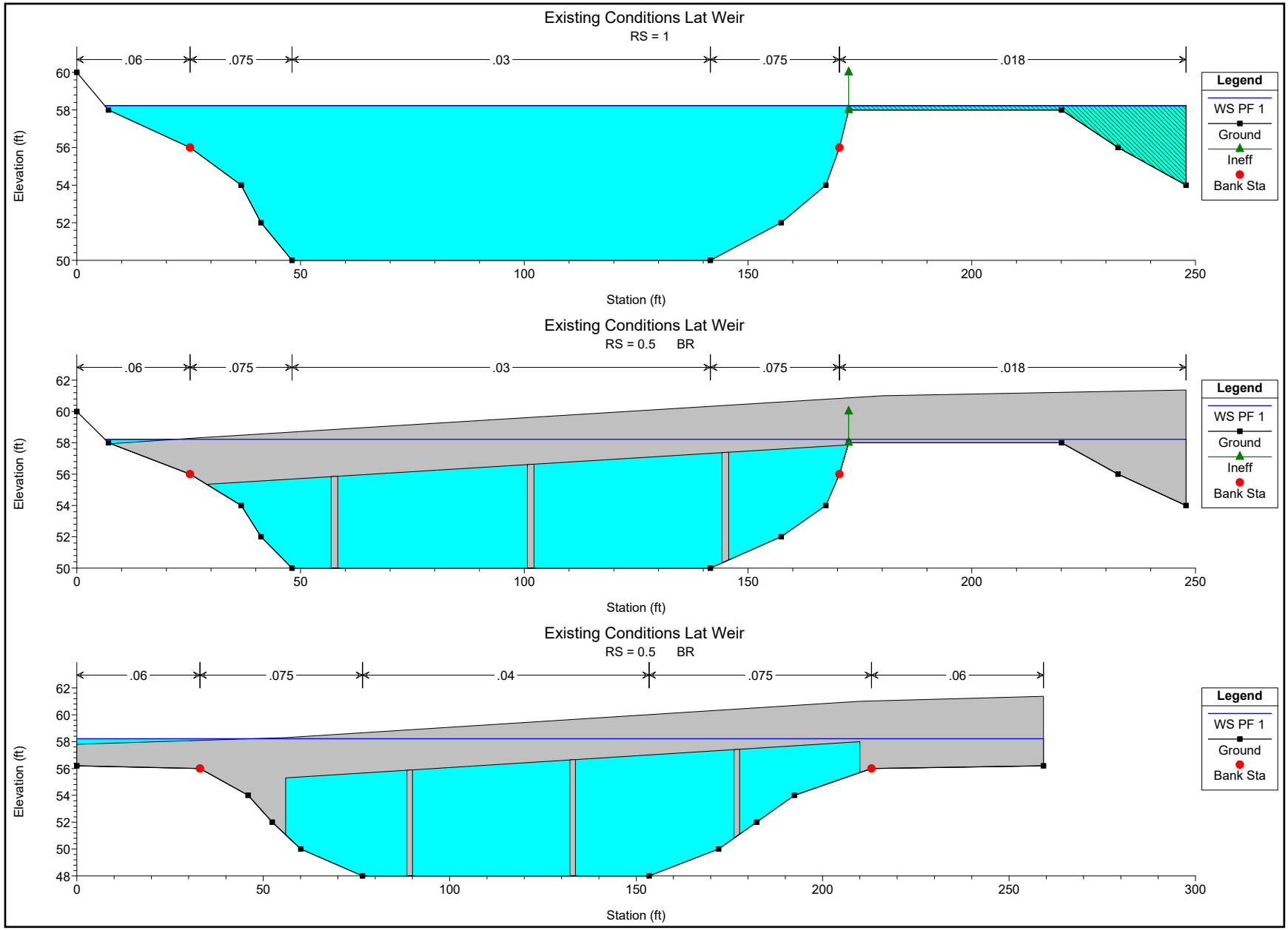
.03
.075
.018
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Existing Conditions Lat Weir
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
RS = 0.5 BR
.06
.075
.03
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Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Existing Conditions Lat Weir
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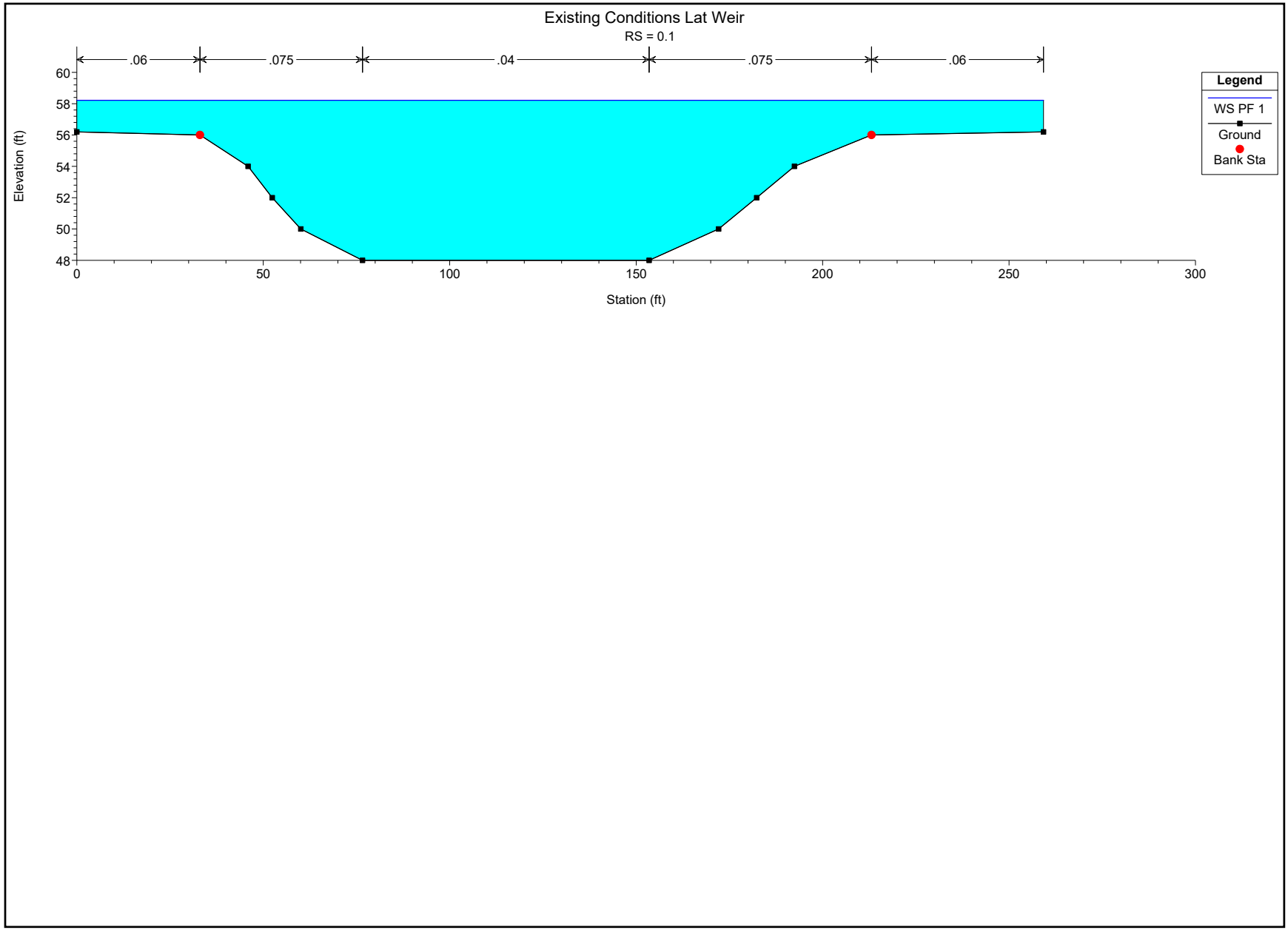
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


Existing Conditions Lat Weir
RS = 0.1
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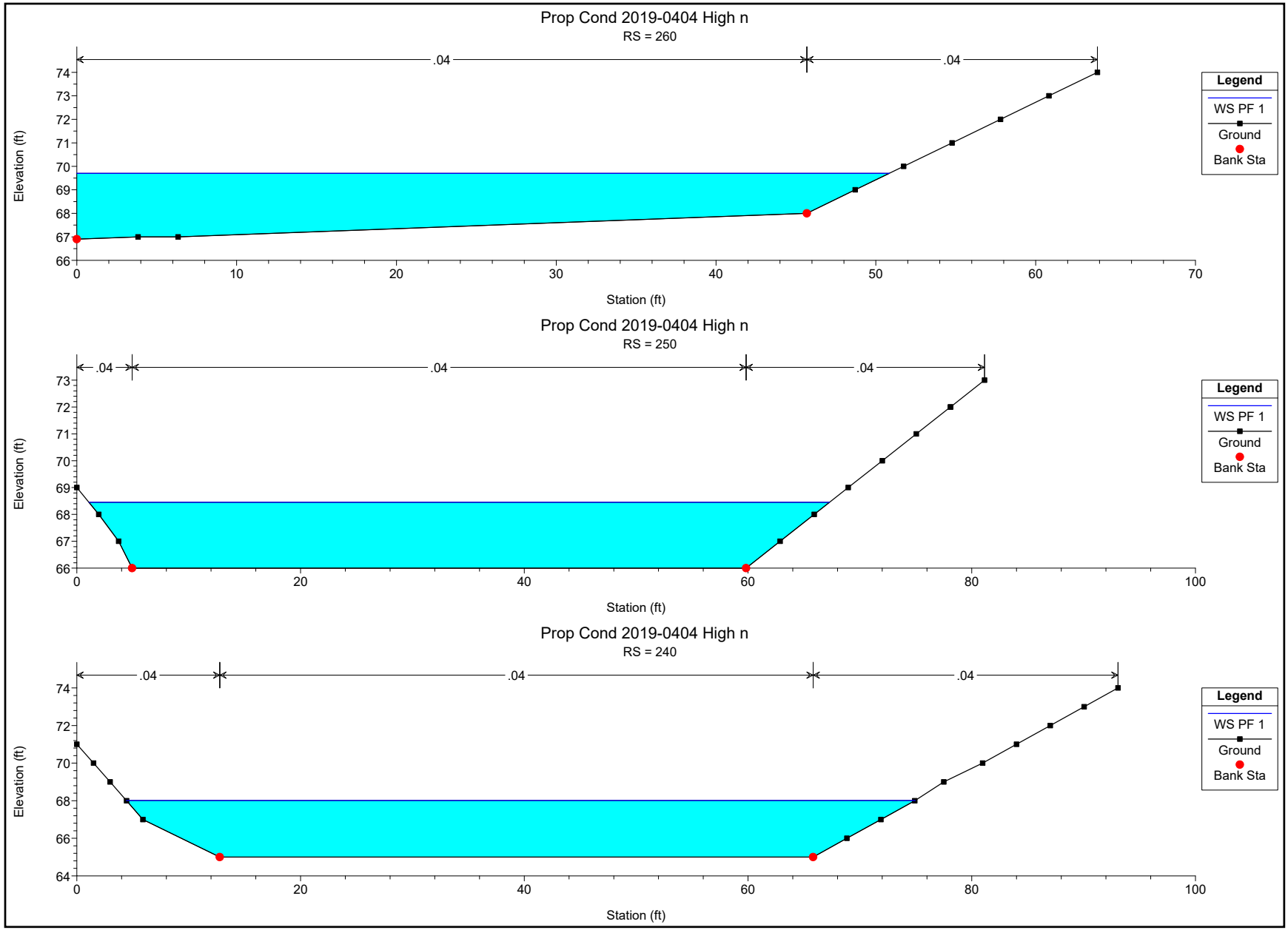
.075
.04
.075
.06
Elevation (ft)
60
58
56
54
52
50
48
0
50
100
150
200
250
300
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

Proposed Conditions within Park

HEC-RAS Plan: PC 2019-0404 Hi N River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Max Chl Dpth	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)	(ft/s)	(sq ft)	(ft)	
Reach-1	260	PF 1	900.00	2.80	66.90	69.70	69.70	70.80	0.018740	8.46	108.48	50.85	0.99
Reach-1	250	PF 1	900.00	2.45	66.00	68.45		69.05	0.008794	6.33	147.79	66.21	0.71
Reach-1	240	PF 1	900.00	3.01	65.00	68.01		68.39	0.004258	5.06	188.22	70.52	0.51
Reach-1	230	PF 1	900.00	3.55	64.00	67.55		67.95	0.003761	5.30	182.39	60.22	0.50
Reach-1	220	PF 1	900.00	4.49	63.00	67.49		67.66	0.001186	3.48	282.21	74.25	0.29
Reach-1	210	PF 1	900.00	5.43	62.10	67.53		67.58	0.000271	1.85	520.07	113.14	0.14
Reach-1	200	PF 1	900.00	4.90	62.00	66.90	65.04	67.49	0.003286	6.14	146.70	125.29	0.49
Reach-1	195		Culvert										
Reach-1	190	PF 1	900.00	3.03	58.30	61.33	61.33	62.85	0.020595	9.91	90.78	92.01	1.00
Reach-1	180	PF 1	1648.00	4.95	56.05	61.00		61.10	0.002440	3.40	657.08	229.55	0.28
Reach-1	170	PF 1	1877.00	5.46	55.06	60.52		60.62	0.002161	3.36	785.44	270.37	0.26
Reach-1	160	PF 1	2144.00	5.73	54.12	59.85		60.02	0.003814	4.54	721.43	286.22	0.35
Reach-1	150	PF 1	2380.00	4.91	53.35	58.26		58.69	0.013467	7.37	527.41	303.56	0.63
Reach-1	140	PF 1	2466.00	5.50	52.73	58.23		58.30	0.001184	2.44	1346.53	533.60	0.20
Reach-1	130	PF 1	2658.00	6.21	51.90	58.11		58.16	0.000909	1.96	1653.02	629.35	0.17
Reach-1	120	PF 1	2662.00	6.86	51.20	58.06		58.08	0.000394	1.34	2255.94	660.49	0.11
Reach-1	110	PF 1	2662.00	5.33	52.70	58.03		58.04	0.000249	1.17	2696.06	695.97	0.09
Reach-1	100	PF 1	2662.00	5.50	52.50	58.00	54.13	58.01	0.000204	1.07	2928.99	759.98	0.08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Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
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RS = 250
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 240
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.04
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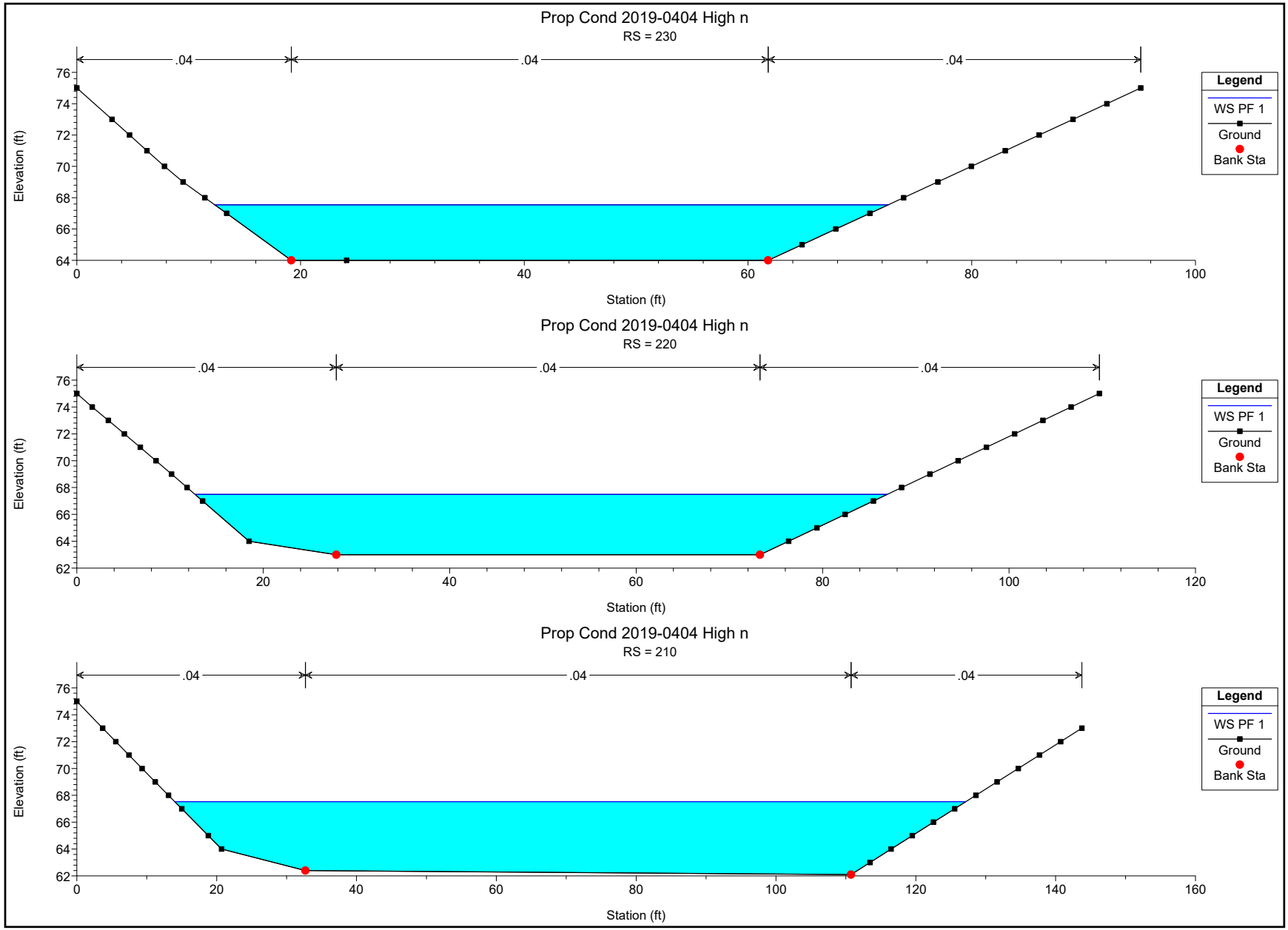
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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.04
.04
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Elevation (ft)
Station (ft)
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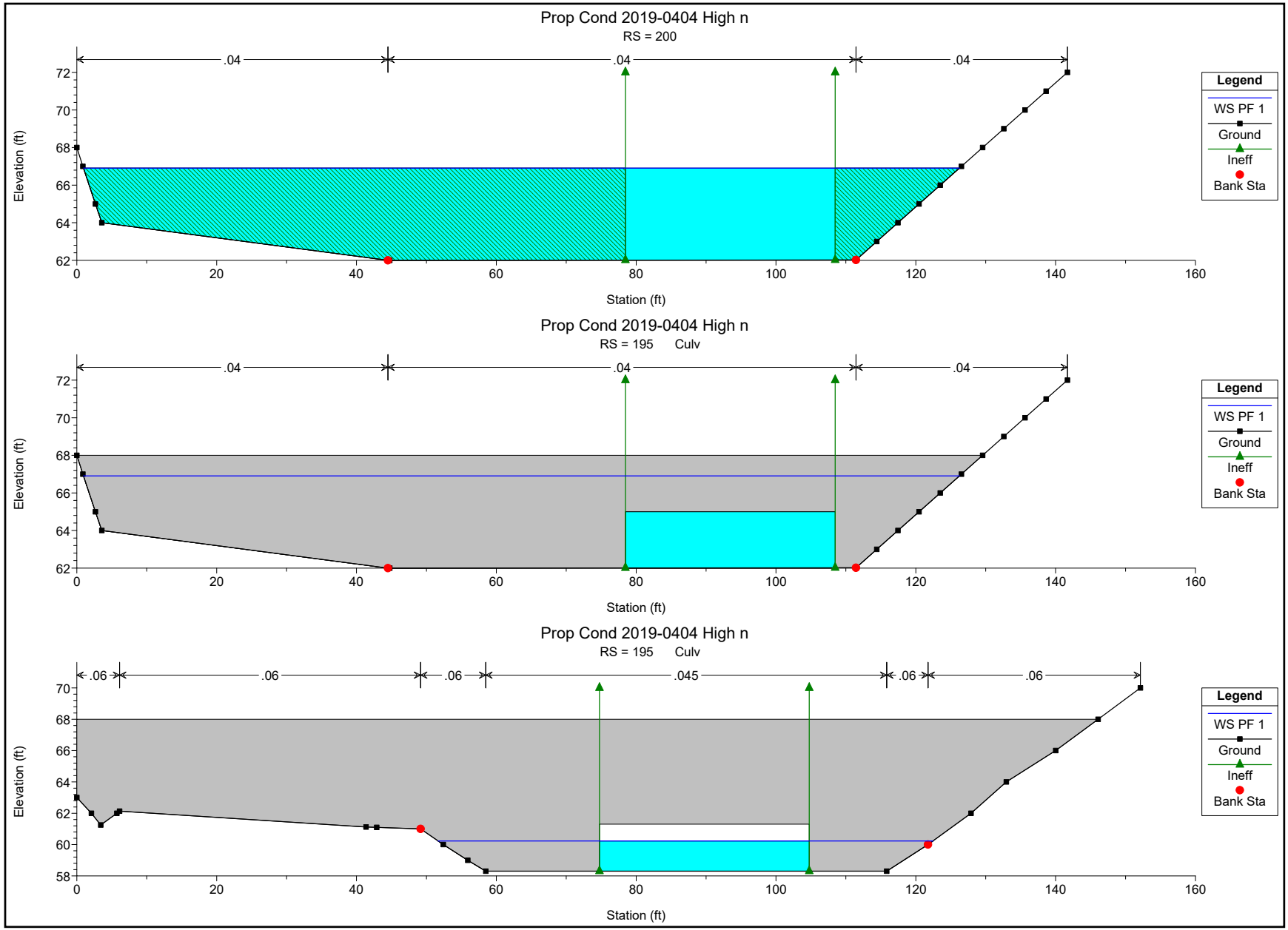
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 220
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 210
.04
.04
.04
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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Elevation (ft)
72
70
68
66
64
62
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Prop Cond 2019-0404 High n
RS = 195 Culv
.04
.04
.04
Elevation (ft)
72
70
68
66
64
62
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Prop Cond 2019-0404 High n
RS = 195 Culv
.06
.06
.06
.045
.06
.06
Elevation (ft)
70
68
66
64
62
60
58
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20
40
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80
100
120
140
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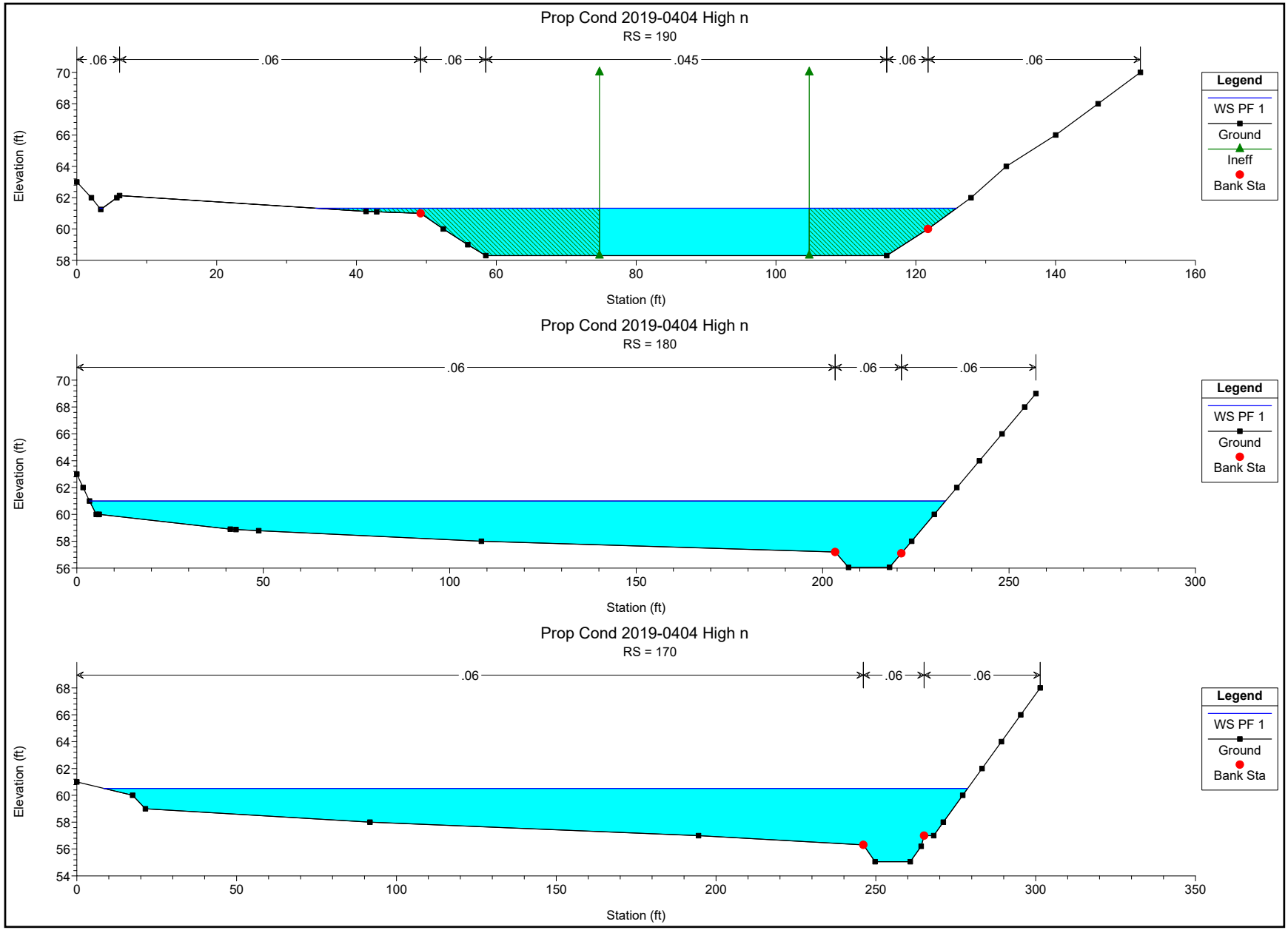
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta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.06
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Elevation (ft)
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68
66
64
62
60
58
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Prop Cond 2019-0404 High n
RS = 180
.06
.06
.06
Elevation (ft)
70
68
66
64
62
60
58
56
0
50
100
150
200
250
300
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 170
.06
.06
.06
Elevation (ft)
68
66
64
62
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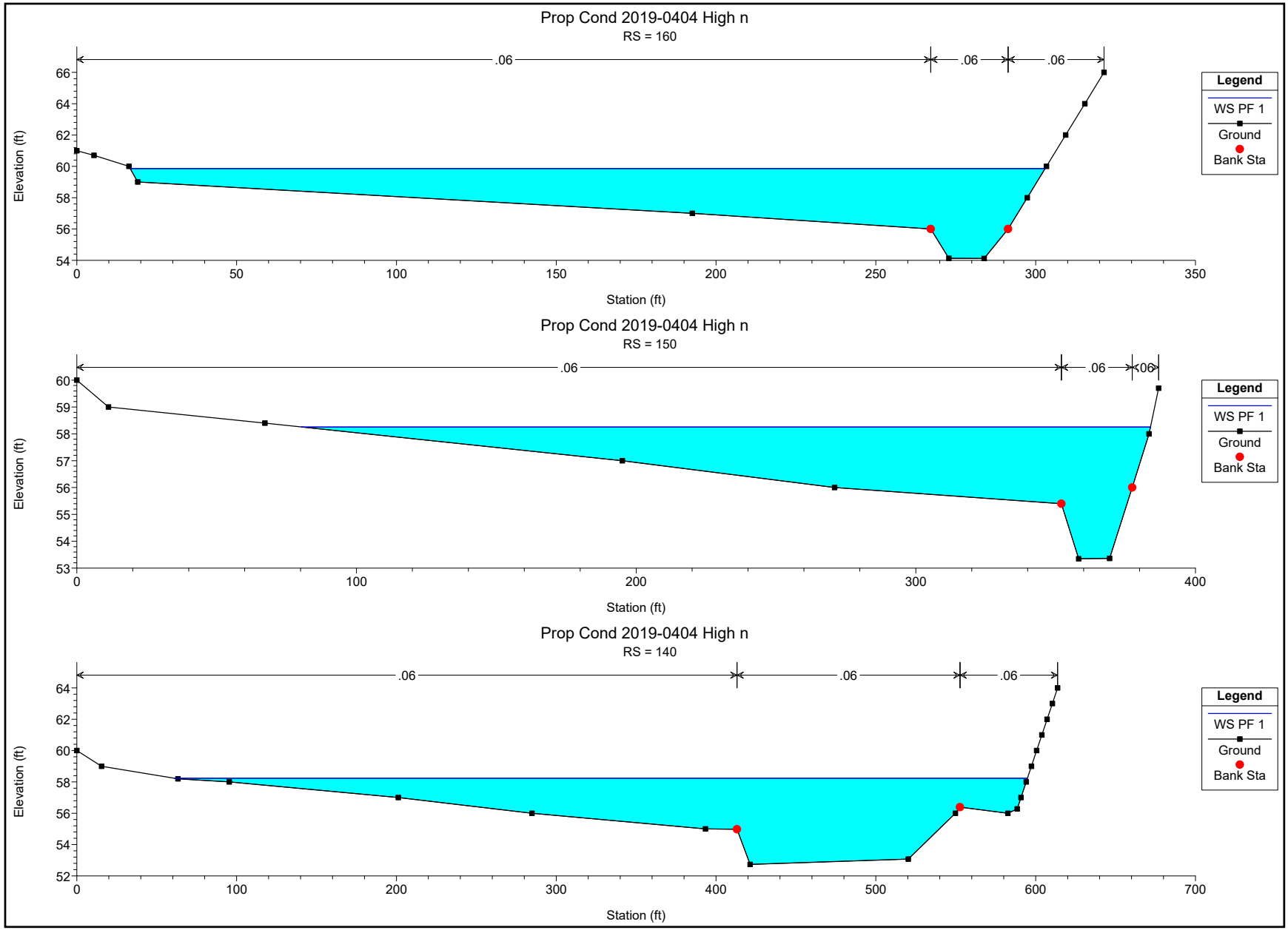
50
100
150
200
250
300
350
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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Elevation (ft)
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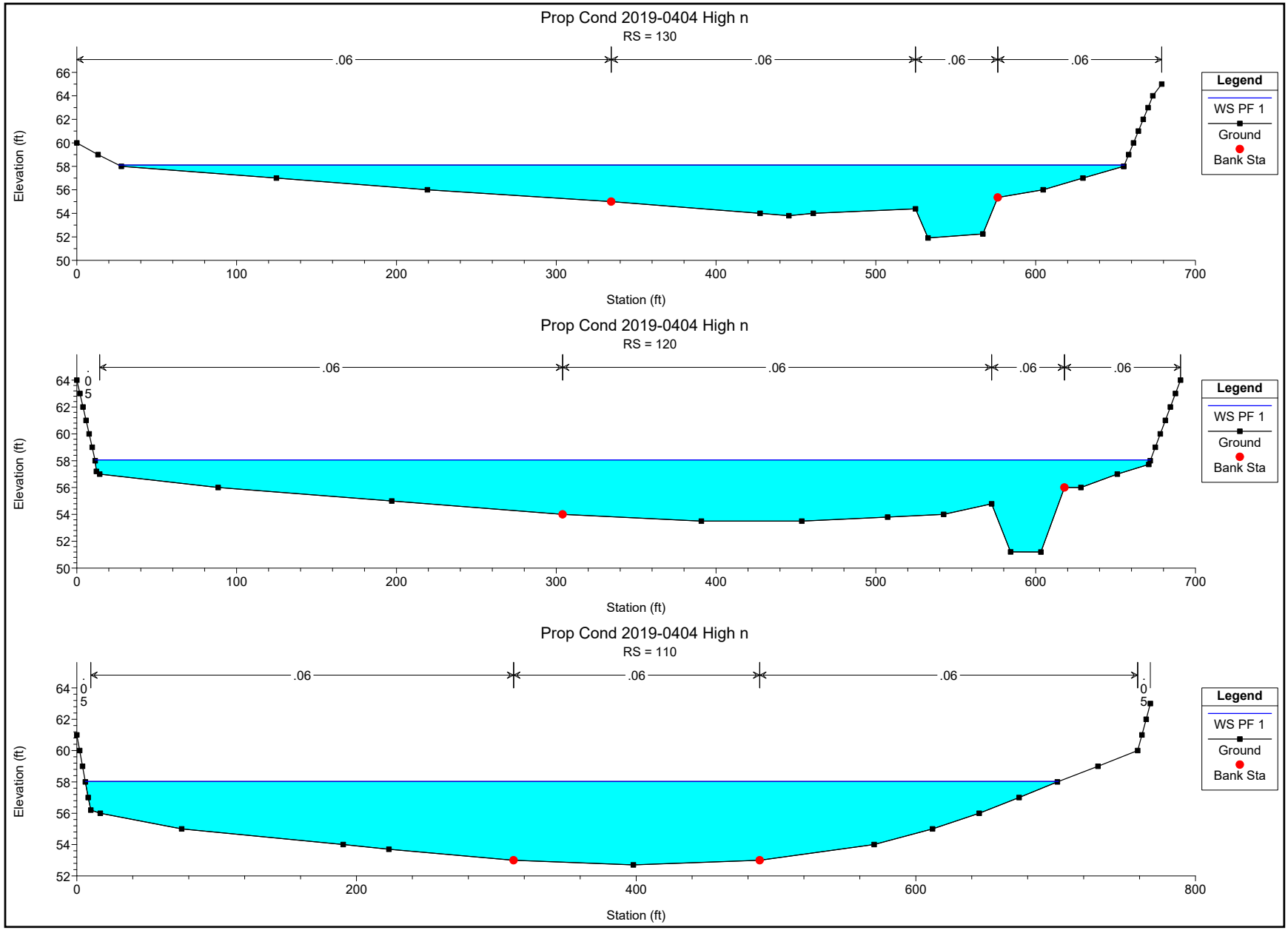
64
62
60
58
56
54
0
50
100
150
200
250
300
350
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 150
.06
.06
.06
Elevation (ft)
60
59
58
57
56
55
54
53
0
100
200
300
400
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 140
.06
.06
.06
Elevation (ft)
64
62
60
58
56
54
52
0
100
200
300
400
500
600
700
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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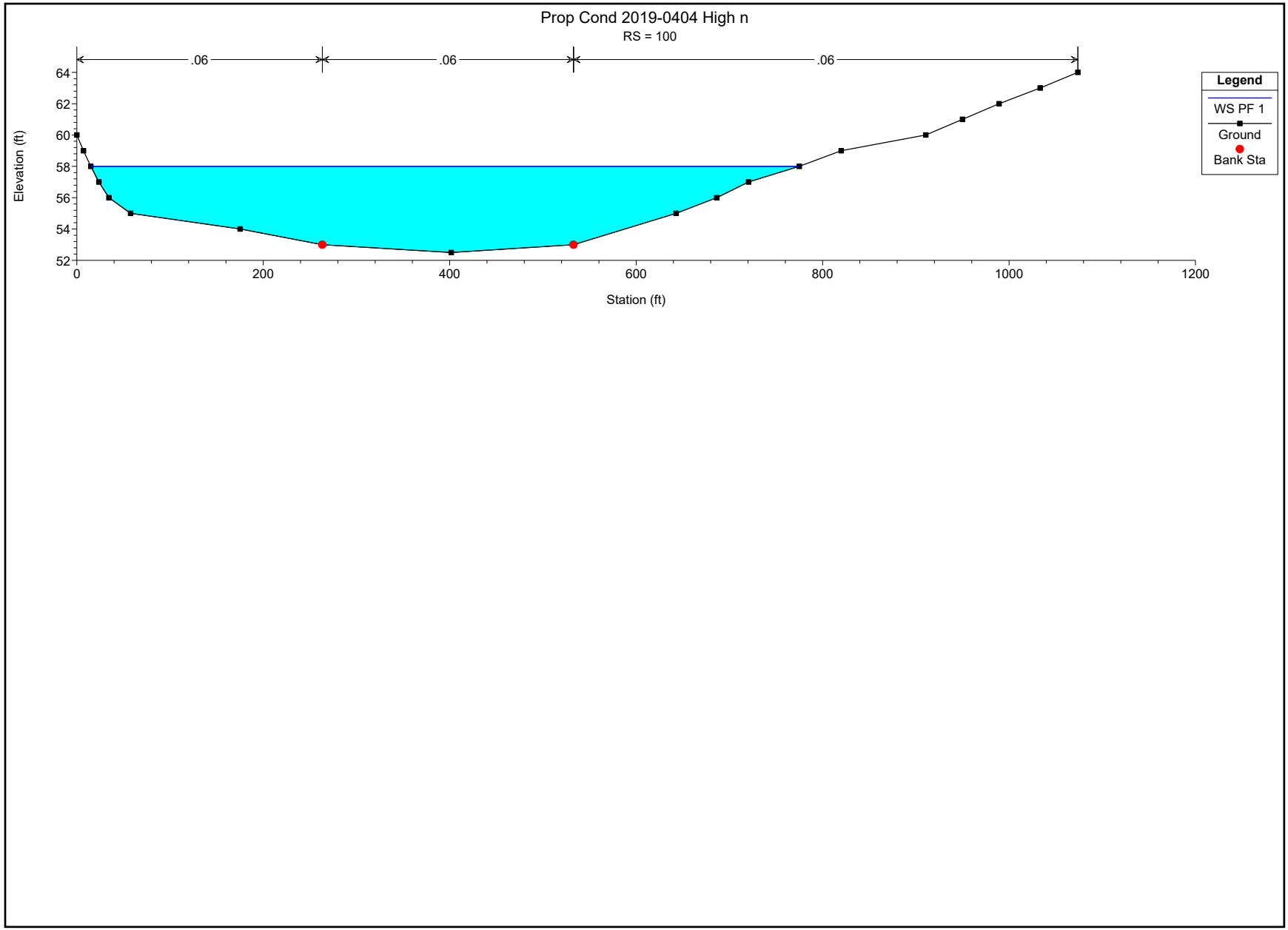
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 120
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
Prop Cond 2019-0404 High n
RS = 110
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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.06
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64
62
60
58
56
54
52
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

APPENDIX C

WSPGW RESULTS

Program Package Serial Number: 1559

WATER SURFACE PROFILE LISTING Date: 4- 6-2019 Time:10: 3:10

SDSU Mission Valley Campus
Murphy Canyon Creek Double 14'x8' Box Culvert
100-Year Storm Event, Downstream starting wsel based on HEC-RAS with 2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
7200.000	65.000	7.950	72.950	2600.00	11.68	2.12	75.07	.00	6.45	28.67	8.000	28.670	.00	1 .7
20.800	.0056					.0024	.05	7.95	.74	5.81	.015	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
7220.800	65.116	7.807	72.923	2600.00	11.89	2.20	75.12	.06	6.45	28.67	8.000	28.670	.00	1 .7
49.616	.0056					.0025	.13	7.87	.76	5.80	.015	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
7270.416	65.393	7.444	72.837	2600.00	12.47	2.42	75.25	.07	6.45	28.67	8.000	28.670	.00	1 .7
37.961	.0056					.0029	.11	7.51	.82	5.80	.015	.00	.00	BOX
		---------- WARNING - Flow depth near top of box conduit ----------												
7308.377	65.606	7.129	72.735	2600.00	13.03	2.63	75.37	.07	6.45	28.67	8.000	28.670	.00	1 .7
HYDRAULIC JUMP														
7308.377	65.606	5.805	71.410	2600.00	16.00	3.97	75.38	.11	6.45	28.67	8.000	28.670	.00	1 .7
227.163	.0056					.0056	1.27	5.92	1.18	5.80	.015	.00	.00	BOX
7535.540	66.876	5.805	72.681	2600.00	16.00	3.97	76.65	.00	6.45	28.67	8.000	28.670	.00	1 .7
234.160	.0056					.0056	1.31	5.81	1.18	5.81	.015	.00	.00	BOX

Program Package Serial Number: 1559

WATER SURFACE PROFILE LISTING Date: 4- 6-2019 Time:10: 3:10

SDSU Mission Valley Campus

Murphy Canyon Creek Double 14'x8' Box Culvert

100-Year Storm Event, Downstream starting wsel based on HEC-RAS with 2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
7769.700	68.185	5.806	73.991	2600.00	15.99	3.97	77.96	.06	6.45	28.67	8.000	28.670	.00	1 .7
105.213	.0056					.0056	.59	5.87	1.18	5.81	.015	.00	.00	BOX
7874.913	68.773	5.806	74.579	2600.00	15.99	3.97	78.55	.06	6.45	28.67	8.000	28.670	.00	1 .7
272.847	.0056					.0055	1.51	5.87	1.18	5.81	.015	.00	.00	BOX
8147.760	70.298	5.852	76.150	2600.00	15.87	3.91	80.06	.00	6.45	28.67	8.000	28.670	.00	1 .7
16.972	.0056					.0055	.09	5.85	1.17	5.80	.015	.00	.00	BOX
8164.732	70.393	5.858	76.251	2600.00	15.85	3.90	80.15	.00	6.45	28.67	8.000	28.670	.00	1 .7
146.376	.0056					.0051	.75	5.86	1.17	5.80	.015	.00	.00	BOX
8311.108	71.211	6.144	77.356	2600.00	15.11	3.55	80.90	.00	6.45	28.67	8.000	28.670	.00	1 .7
20.672	.0056					.0045	.09	6.14	1.09	5.80	.015	.00	.00	BOX
8331.780	71.327	6.445	77.772	2600.00	14.41	3.22	81.00	.06	6.45	28.67	8.000	28.670	.00	1 .7
37.108	.0056					.0056	.21	6.50	1.01	6.64	.018	.00	.00	BOX
8368.889	71.534	6.642	78.177	2600.00	13.98	3.03	81.21	.05	6.45	28.67	8.000	28.670	.00	1 .7
711.111	.0056					.0056	3.97	6.70	.97	6.64	.018	.00	.00	BOX
9080.000	75.510	6.642	82.152	2600.00	13.98	3.03	85.19	.11	6.45	28.67	8.000	28.670	.00	1 .7
WALL	ENTRANCE													
9080.000	75.510	9.903	85.413	2600.00	7.81	.95	86.36	.06	6.11	38.57	9.000	28.670	.50	0 .0

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	R70/R89	33	208

PROJECT ENGINEER: D.A. Brown — REGISTERED CIVIL ENGINEER NO. 14288

DATE APPROVED: December 26, 1978

"AS BUILT"
CONTRACT 11-048154
YEAR COMPLETED 5-22-82

Contour Grading & Drainage Layouts

Scale: 1" = 50'

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date
D.A. Brown		N.G. Larsen		J.C. Grasberger	

AS BUILT
Contract No. 11-048154
Date Completed 5-22-82
Document No.

DIST	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	R7.0/R9.9	34	208

L. F. Brown 14268
PROJECT ENGINEER REGISTERED CIVIL ENGINEER NO.
DATE APPROVED December 26, 1978

CITY OF SAN DIEGO
T 16 S R 2 W SB B&M

"MCB" R=1,560' Δ=27°28'51" T=381.45' L=748.22'

See Drainage Details on DU No. 1 for details of R.C. Box

Existing 18" CSP, Join to RCB (See Misc. Details)

Exist 18" RCP, Join to RCB (See Misc. Details)

Toe of Fill

Type "A" Dike

"MCB" LINE

"BP" Line (See Bicycle Path Plans for details)

"BP" Line

End "A" Dike

Begin "A" Dike Basin

Concrete Barrier Type 50C

8" Conduit w/3" Plastic Pipe

Outlet

275' Bench Transition 20' To 6'

Begin A.C. Gutter & Dike Transition

A.C. Gutter

Top El. 152

Top El. 172

Toe of Fill

Var. Slope 1½:1 to 2:1

Var. Slope 2:1 To 1¾:1

Top of cut

Var slope 1¾:1 To 2:1

Transmission Pole Protection (See Misc. Details)

Existing Transmission Pole

See Sheet For Concrete Layout

Begin CL-6 Fence

Proposed 12' locked gate Rt of Eng. Sta 2+84.59 (adjust to field location)

Existing Rt/W & Access Control

COUNTY OF SAN DIEGO
CITY OF SAN DIEGO

AS BUILT PLANS
Contract No. 11-048154
Date Completed 5-22-82
Document No.

AS BUILT
CONTRACT 11-048154
FAP COMPLETED 5-22-82

Contour Grading & Drainage Layouts
Scale: 1"=50'

Project Engineer	Date	Design Engineer	Date	Approved Recommended By	Date
L. F. Brown		N. G. Larson		J. C. Glasberger	

34

Contract No. 11-0X8154
Date Completed 5-22-82
Document No.

Dist.	County	Route	Post Mile (Abs.) Project	Sheet No.	Total Sheets
11	SD	15	R7.0/R8.9	45	208

PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 14288

DATE APPROVED December 26, 1978

Conform to Exist Ditch
69+50
(b) Outlet Ditch
See DU#1 Details
70+92.30 "MCB"
(c) Concrete Ditch Trans (See DU#1 Details)
℄ Connect Exist 42" RCP
Adjust To Grade (See Sewer Plans)
℄ Connect Exist 18" CSP (Approx Location)
(g) 18"x8" Bit. Cld. CSP (.109" Thick) W/Automatic Drainage Gate
(See DU#1 Details)
74+47.07 "MCB"2
(2) (a)
℄ 46.25
S=0.01 ft/ft
℄ 64.0
℄ 65.0
S=0.00056 ft/ft
℄ 72.49
S=0.00049
(d) Double 14'x8'w/10'RCB (Modified)
℄ 67.24
Match Line
(a) RSP Ditch t=4'
℄ 51.81
Connect Exist 60" RCP
Existing 33" V.C Sewer Line
℄ 52.28 MH #6
Exist. Seep Wall
Concrete Backfill over Exist. Sewer (See Sewer Plans)
℄ 54.76
Exist Seep Wall
68+50
70
71
72
73
74
76

77+92.86 "MCB"
℄ Connect Exist 24" RCP
(d) Double 14'x8'w/10'RCB (Modified)
Remodel M.H. (See Sewer Plans)
S=0.00049 ft/ft
℄ 67.24
Match Line
℄ 54.76
Exist. 33" V.C Sewer
Concrete Backfill over Exist. Sewer (See Sewer Plans)
℄ 55.71 M.H. #7
S=0.00056 ft/ft
℄ 75.00
℄ 70.60
(a)
Exist. Seep Wall
79+73.62 "MCB"
℄ 57.70
Match Line
76
77
78
79
80
81
82

83+16.88 "MCB"
(h) See Sewer Plans, M.H. #8
84+75.59 "MCB"2
(5)
86+07.23 "MCB"
℄ Connect Existing 18" CSP (Approx Location)
(j) 18"x8" Bit. Cld. C.S.P. (.109" Thick) W/Automatic Drainage Gate.
(See DU#1 Details)
72.3 Adjust to meet ℄ (See Sewer Plans)
(h)
(d) Double 14'x8'w/10'RCB (Modified)
S=0.00056 ft/ft
Remodel M.H. 2 (See Sewer Plans)
℄ 70.60
S=0.00049 ft/ft
S=0.000847 ft/ft
S=0.00085 ft/ft
℄ 73.96
Match Line
℄ 57.70
Exist 33" V.C Sewer
℄ 58.27 M.H. #8
Exist. 30" V.C Sewer w/ Concrete Cradle
Exist. Seep Wall
℄ 60.95 M.H. #9
Exist. 30" V.C Sewer w/Concrete Cradle
℄ 62.59
82
83
84
85
86
87
88

(f) Junction Inlet Ditch ("MCA" Line)
(f) Inlet Ditch
℄ 77.2 Join 5'Lt. "MCB"
S=0.023 ft/ft
℄ 78.8 End Ditch +73.0
0 "MCA" Profile
90
80
70
(6)
30+25.74 "MCB"2
℄ Connect Exist. 18" RCP (Approx Location)
(k) 18"x8' Bit. Ctd. C.S.P. (.109" Thick) W/Automatic Drainage Gate. (See DU#1 Details)
(e) Concrete Ditch Trans (See DU#1 Details)
(f) Inlet Ditch See DU#1 Details
(d) Double 14'x8' w/10'RCB (Modified)
S=0.0056 ft/ft
℄ 80.51
℄ 75.51 +80
S=0.02267 ft/ft
16.89 +40
S=0.0155 ft/ft
S=0.01531 ft/ft
℄ 79.4 Join Exist. Conc Ditch +03.31
℄ 77.51 +80
S=0.0085 ft/ft
Match Line
Exist. Seep Wall
Exist. 30" V.C Sewer w/Concrete Cradle
Exist. Seep Wall
Exist. 16" C.I Water Pipe Approx. Location (To be Abandonad See Water Plans.)
℄ 65.48
Exist. 30" V.C Sewer w/Concrete Encosement (Leaves "MCB")
88
89
90
91
92
93

Project Engineer: S.A. Brown
Design Engineer: R.G. Larsen
Approved Recommended By: S.A. Brashears
Date
Date

Drainage Unit (1) Profile
MCA & MCB Line

Scale: 1"=20' AS BUILT

Sheet 2 of 4

CONTRACT 11-0X8154

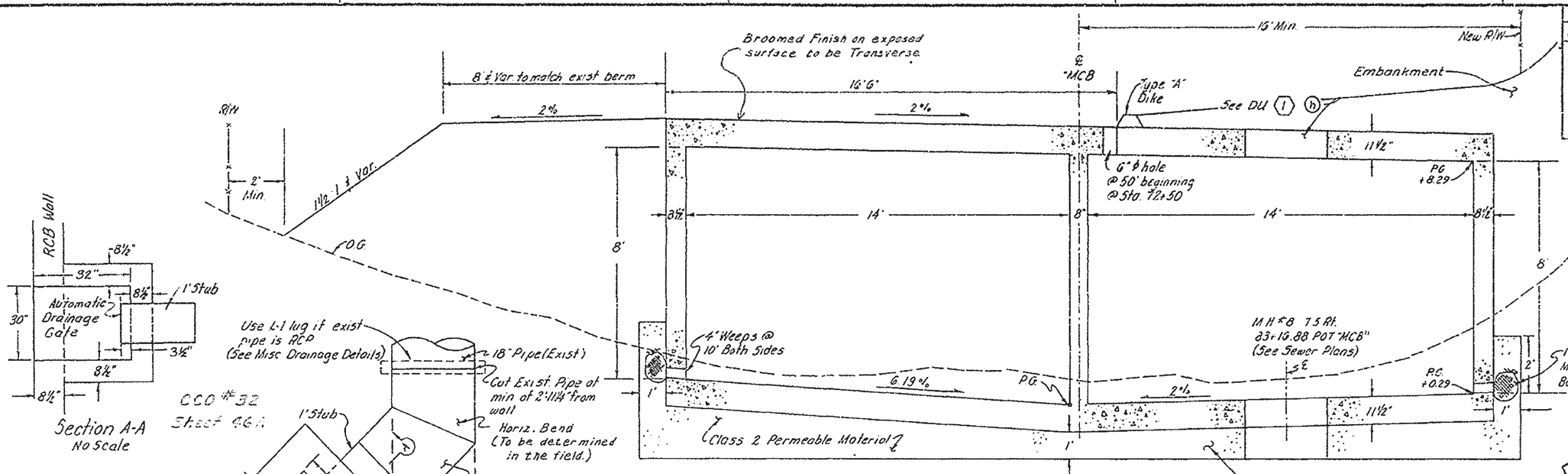
YEAR COMPLETED 1982

FORM DX-PD 92-04

Dist.	County	Route	Post Mile(s) Total Project	Sheet No.	Total Sheets
11	SD	15	R7.0/R8.9	46	208

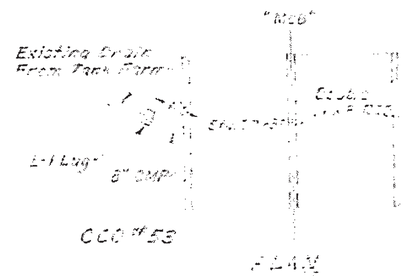
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO 14288

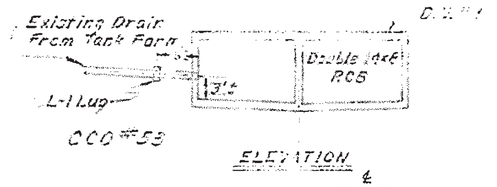
DATE APPROVED December 26,1978

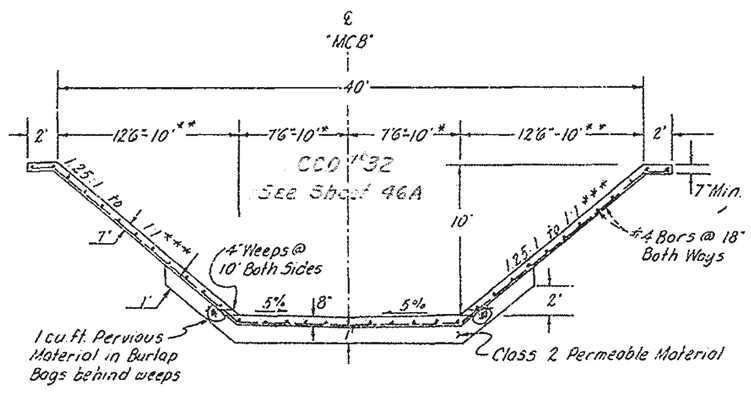


Scale 1"=20'

Typical Section
Double 14'x8' RCB
Sta. 72+00 to 90+80



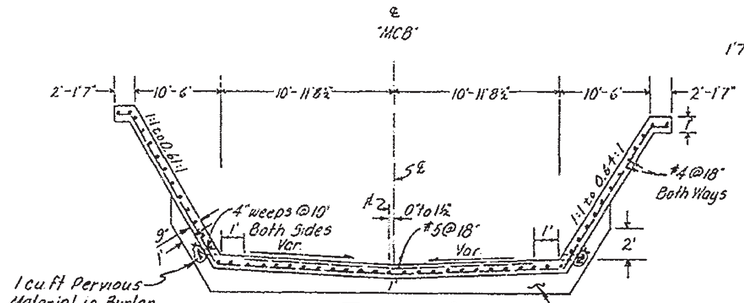


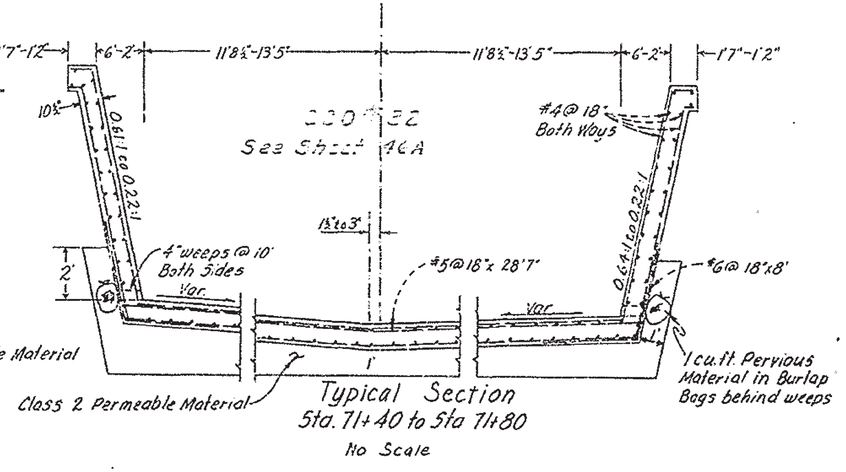


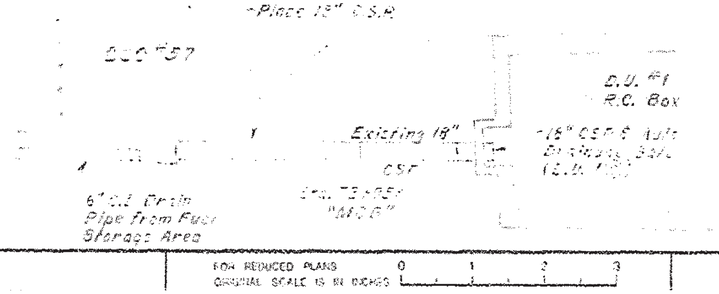
Scale 1"=5'

Typical Section
Sta. 69+50 to Sta. 71+00

	*	**	***
Sta. 69+50 to Sta. 70+00	7'6"	12'6"	1.25:1
Sta. 70+00 to Sta. 71+00	7'6"-10'0"	12'6" to 10'0"	1.25:1 to 1:1







AS BUILT PLANS
Contract No. 11-048154
Date Completed 5-22-82
Document No.

AS BUILT
CONTRACT 11-048154
YEAR COMPLETED 5-22-82

Drainage Unit No 1 Details
Sheet 3 of 4

Prepared By	Design Engineer	Date	Approved Recommended By	Date
B.O. Ehrens	N.G. Lauren		J.O. Gallagher	

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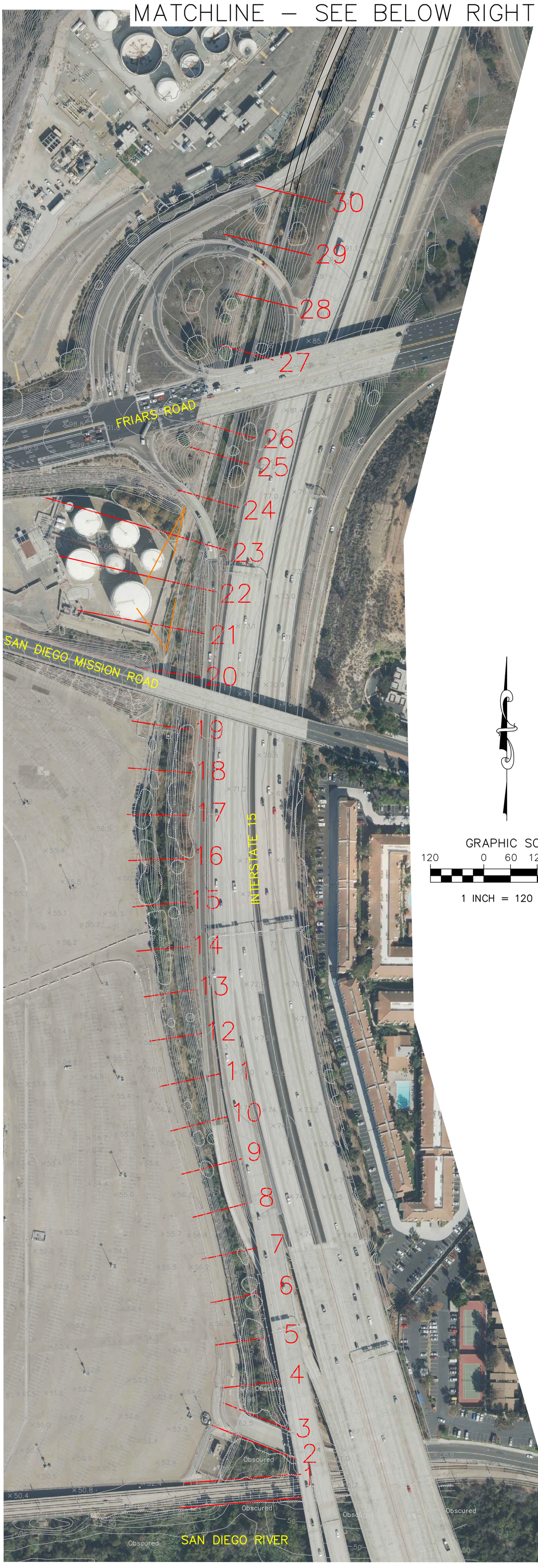
FOR REDUCED PLANS 0 1 2 3
ORIGINAL SCALE IS IN INCHES

MATCHLINE – SEE BELOW RIGHT



GRAPHIC SCALE

120 0 60 120 240

1 INCH = 120 FEET

MATCHLINE – SEE ABOVE LEFT

HEC–RAS WORK MAP

GRAPHIC SCALE

80 0 40 80 160

1 INCH = 80 FEET

200

210

220

230

240

250

260

270

190

180

170

160

150

140

130

120

110

100

PROPOSED CONDITION HEC-RAS WORK MAP