LEGAL DESCRIPTION

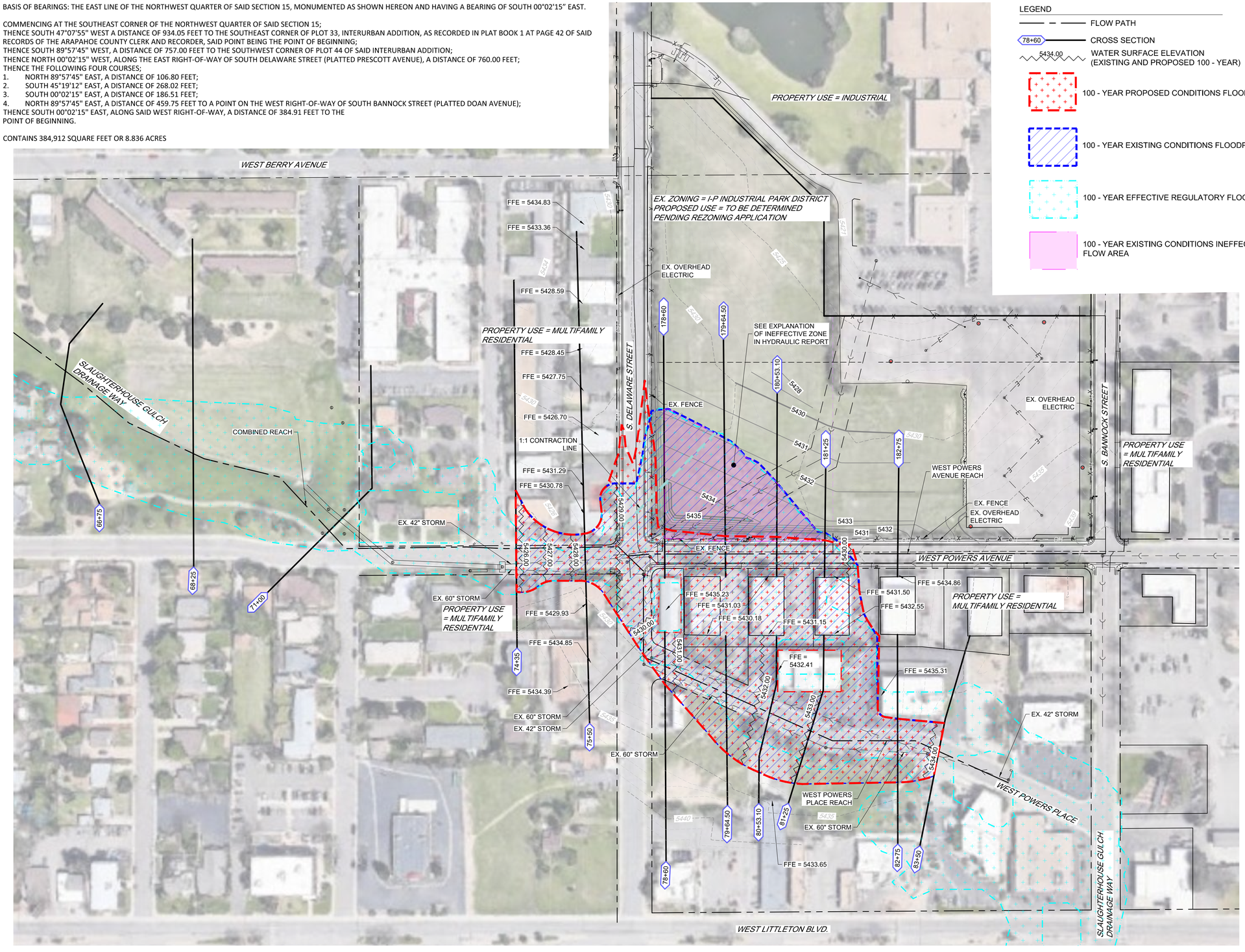
A PORTION OF THAT PARCEL OF LAND DESCRIBED IN BOOK 1507 AT PAGE 398 IN THE RECORDS OF THE ARAPAHOE COUNTY CLERK AND RECORDER; SITUATED IN THE WEST HALF OF SECTION 15, TOWNSHIP 5 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN; CITY OF LITTLETON, COUNTY OF ARAPAHOE,STATE OF COLORADO; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 15, MONUMENTED AS SHOWN HEREON AND HAVING A BEARING OF SOUTH 00°02'15" EAST.

COMMENCING AT THE SOUTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 15;
THENCE SOUTH 47°07'55" WEST A DISTANCE OF 934.05 FEET TO THE SOUTHEAST CORNER OF PLOT 33, INTERURBAN ADDITION, AS RECORDED IN PLAT BOOK 1 AT PAGE 42 OF SAID RECORDS OF THE ARAPAHOE COUNTY CLERK AND RECORDER, SAID POINT BEING THE POINT OF BEGINNING;
THENCE SOUTH 89°57'45" WEST, A DISTANCE OF 757.00 FEET TO THE SOUTHWEST CORNER OF PLOT 44 OF SAID INTERURBAN ADDITION;
THENCE NORTH 00°02'15" WEST, ALONG THE EAST RIGHT-OF-WAY OF SOUTH DELAWARE STREET (PLATTED PRESCOTT AVENUE), A DISTANCE OF 760.00 FEET;
THENCE THE FOLLOWING FOUR COURSES;
1. NORTH 89°57'45" EAST, A DISTANCE OF 106.80 FEET;
2. SOUTH 45°19'12" EAST, A DISTANCE OF 268.02 FEET;
3. SOUTH 00°02'15" EAST, A DISTANCE OF 186.51 FEET;
4. NORTH 89°57'45" EAST, A DISTANCE OF 459.75 FEET TO A POINT ON THE WEST RIGHT-OF-WAY OF SOUTH BANNOCK STREET (PLATTED DOAN AVENUE);

THENCE SOUTH 00°02'15" EAST, ALONG SAID WEST RIGHT-OF-WAY, A DISTANCE OF 384.91 FEET TO THE
POINT OF BEGINNING.

CONTAINS 384,912 SQUARE FEET OR 8.836 ACRES



LEGEND

- FLOW PATH
- 78+60 — CROSS SECTION
- 5434.00 — WATER SURFACE ELEVATION (EXISTING AND PROPOSED 100 - YEAR)
- 100 - YEAR PROPOSED CONDITIONS FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS FLOODPLAIN
- 100 - YEAR EFFECTIVE REGULATORY FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS INEFFECTIVE FLOW AREA

NOTE: THE VERTICAL DATUM FOR ELEVATIONS SHOWN ON THIS PLAN ARE NAVD88. IT SHOULD BE NOTED THAT THE VERTICAL DATUM FOR THE EFFECTIVE LOMR IS NAVD29. THE ELEVATION DIFFERENCE BEING THAT ELNAVD88=ELNAVD29+3.06'.

0 40 80 160
SCALE: 1" = 80'

YEARS
Redland
WHERE GREAT PLACES BEGIN
720.283.4783 Office
5800 Ward Road, Suite 101, Court, Littleton, Colorado 80120
REDLAND.COM

DRAWN	BDW
CHECKED	MDC
APPROVED	MDC
PROJECT NO.	16024.01
HORZ. SCALE	1" = 80'
VERT. SCALE	NA

NOTES

NO.	DATE	
1	07.05.2018	ISSUED FOR REVIEW
2	09.21.2018	REISSUED FOR REVIEW
3	11.26.2018	REISSUED FOR REVIEW

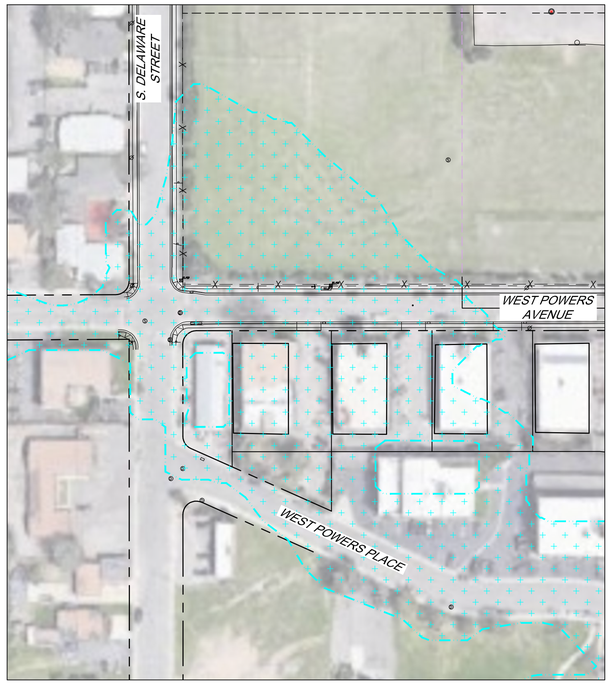
SITE PLAN

DELAWARE AND POWERS
FLOODPLAIN USE BY SPECIAL EXCEPTION

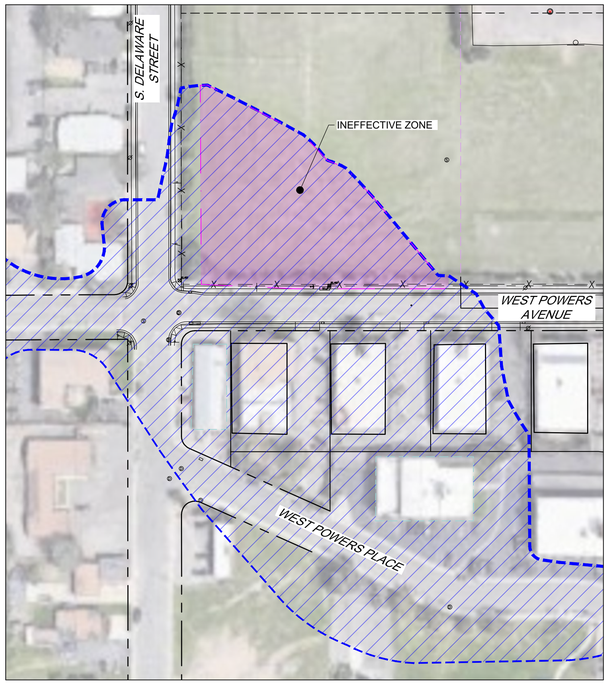
SHEET 1

LEGEND

- 100 - YEAR PROPOSED CONDITIONS FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS FLOODPLAIN
- 100 - YEAR EFFECTIVE REGULATORY FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS INEFFECTIVE FLOW AREA



100-YEAR EFFECTIVE REGULATORY FLOODPLAIN



100-YEAR EXISTING CONDITIONS FLOODPLAIN

100-YEAR PROPOSED CONDITIONS FLOODPLAIN

N

0 40 80 160

SCALE: 1" = 80'

YEARS IN THE Redland WHERE GREAT PLACES BEGIN
720.283.4783 Office
5500 Greenwood Plaza Court, Littleton, Colorado 80120
REDLAND.COM

DRAWN	BDW
CHECKED	MDC
APPROVED	MDC
PROJECT NO.	16024.01
HORZ. SCALE	1" = 80'
VERT. SCALE	NA

NOTES

NO.	DATE	
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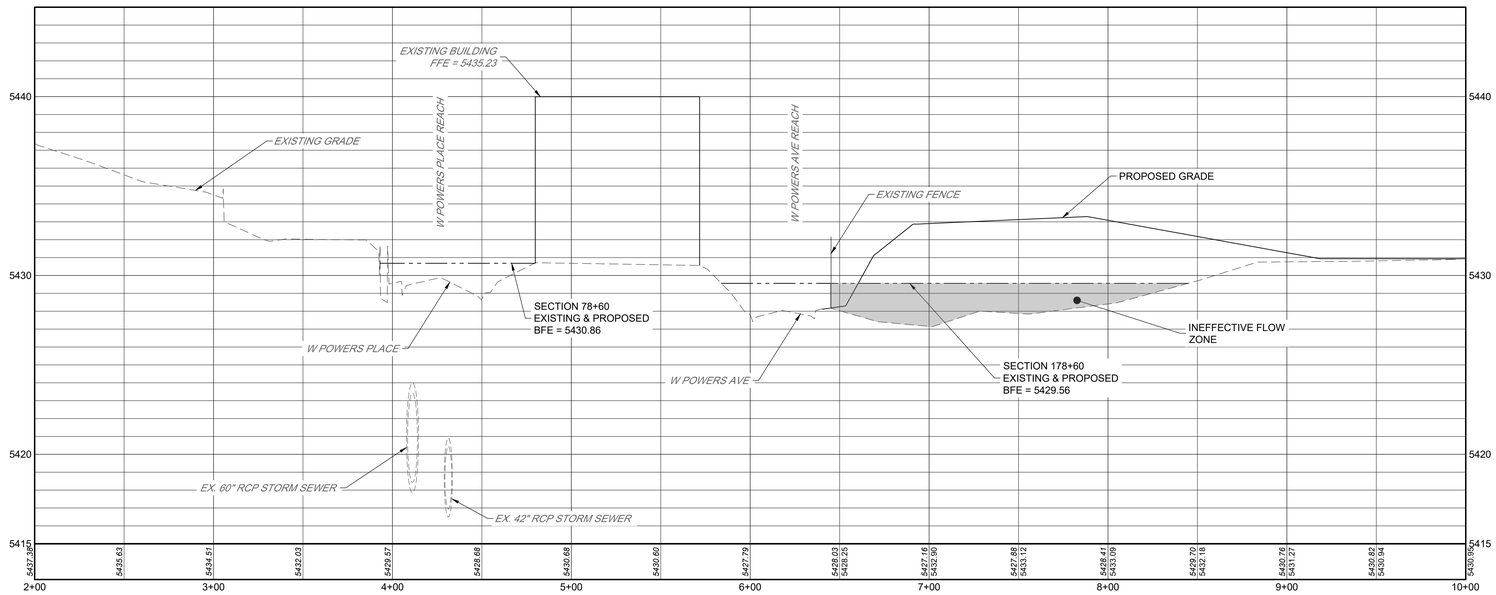
SITE PLAN

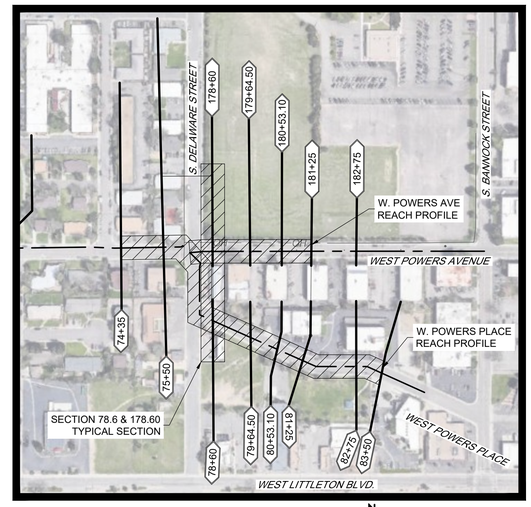
DELAWARE AND POWERS
FLOODPLAIN USE BY SPECIAL EXCEPTION

SHEET 2

I:\2016\16024 - Delaware Self Storage\CADD\Exhibits\16024.01 CLOMR\16024.01 CLOMR Proposed Floodplain_Sheet 2.dwg tab: Use by Special Exception Site Plan Nov 26, 2018 - 1:31pm dwatson

SECTION 78.6 & 178.6 TYPICAL SECTION
H: 1" = 40'
V: 1" = 4'

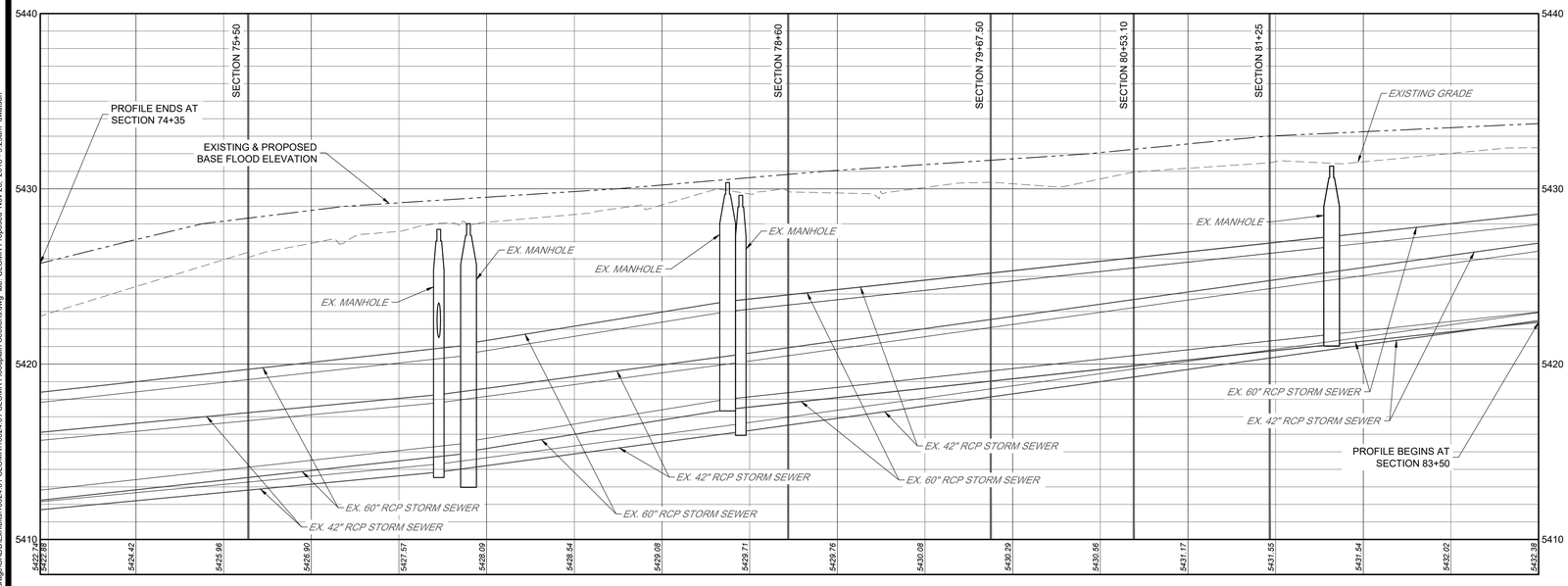




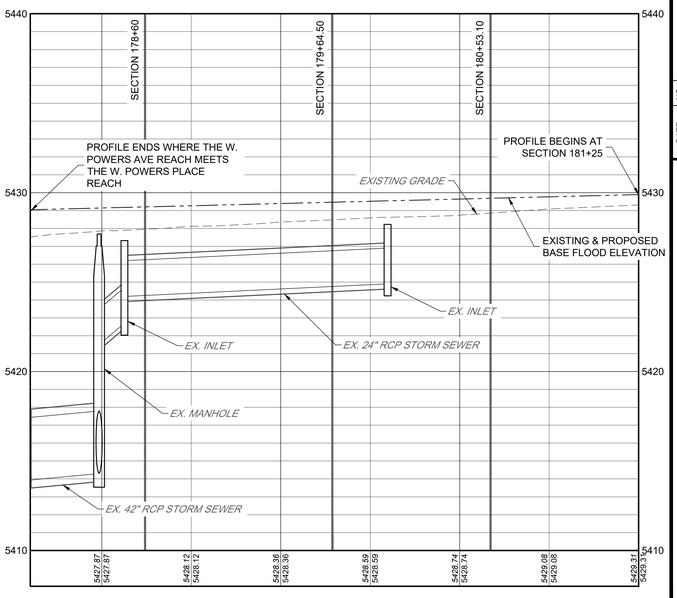
KEY MAP
1" = 200'

N

WEST POWERS PLACE REACH PROFILE
H: 1" = 40'
V: 1" = 4'



WEST POWERS AVE REACH PROFILE
H: 1" = 40'
V: 1" = 4'



YEARS
Redland
WHERE GREAT PLACES BEGIN
720.283.4783 Office
5800 Ward Road, Suite 101, Arvada, Colorado 80002
REDLAND.COM

DRAWN	BDW
CHECKED	MDC
APPROVED	MDC
PROJECT NO.	16024.01
HORZ. SCALE	1" = 80'
VERT. SCALE	NA

NO.	DATE	NOTES
1	07.05.2018	ISSUED FOR REVIEW
2	09.21.2018	REISSUED FOR REVIEW
3	11.26.2018	REISSUED FOR REVIEW

CROSS-SECTION & PROFILES
DELAWARE AND POWERS
FLOODPLAIN USE BY SPECIAL EXCEPTION

SHEET
3

Floodplain Use By Special Exception/Conditional Letter of Map Revision (CLOMR) Request
Delaware and Powers
Littleton, CO

(FIRM Panel 08005CO451K)

Prepared for:

Mr. David Richardson
Theodore Fitzgerald Richardson 2015 Trust
4725 S. Monaco Street
Denver, CO 80237
303-882-7715

Prepared by:

REDLAND
Where Great Places Begin
720.283.6783 Office
1500 West Canal Court
Littleton, Colorado 80120
REDLAND.COM
Contact: Mr. Mark Cevaal, P.E.

November 2018
September 2018
July 2018
Project No. 16024.01

Table of Contents

Purpose and Background

Purpose

The subject property for this Floodplain Use by Special Exception/Conditional Letter of Map Revision (CLOMR) request is located at the northeast corner of the intersection of West Powers Avenue and South Delaware Street in Littleton, CO; hereafter referred to as the Site. The purpose of this request is to remove a portion of the Site from the 100-Year FEMA floodplain.

Background

The flooding source associated with the Site is Slaughterhouse Gulch. A Letter of Map Revision (LOMR) which included the reach adjacent to the Site – Application for Letter of Map Revision Slaughterhouse Gulch was prepared by Boyle Engineering in May 1995. The effective hydrologic and hydraulic modeling from the LOMR was used to create the Duplicate Effective HEC-RAS model for this CLOMR.

Study Limits and Mapping

The Site is contained within FEMA FIRM Panel 08005CO451K, effective December 17, 2010; located within the city of Littleton, Arapahoe County, Colorado. The study limits were established based on the Effective Model from the LOMR; the downstream limit for this study is Station 65+75, which is located directly downstream of the Powers Park Detention Pond and the upstream limit is Station 83+50 which is located approximately midway between South Delaware Street and South Bannock Street.

The horizontal datum for the Site is based upon the Colorado Coordinate System of 1983 Central Zone (NAD 83, 2011).

Topographic mapping used for the project was obtained by field survey, performed by Aztec Consultants, Inc., on March 22, 2018. The vertical datum of the field survey is NAVD88. It should be noted that the vertical datum for the effective LOMR is NAVD29, the elevation difference being that $EL_{NAVD88}=EL_{NAVD29}+3.06$' for the Site.

Hydrology

The hydrology used for this report was obtained from the effective LOMR for Slaughterhouse Gulch. The HEC-2 analysis in the LOMR included 100-year flow rates at the same cross-section locations for this analysis. At the upstream limit (Station 83+50) the 100-year flow rate is 800 cfs, the flow rate increases gradually downstream, to a peak 100-year flow rate of 1,130 cfs at the downstream limit (Station 65+75).

Hydraulics

The Effective Conditions Model (FEMA regulatory model) was obtained from the effective LOMR. An electronic copy of the HEC-2 input was not available from the Urban Drainage and Flood Control District, so the cross-section data was manually entered into the HEC-RAS version 5.0.3 computer program. After vertically adjusting the cross-sectional elevations to the current NAVD88 datum, the HEC-RAS model was executed to obtain the Duplicate Effective Conditions Model. The Effective Conditions Model consisted of a single reach which followed the storm sewer alignment in West Powers Place then north along Delaware Street to West Powers Avenue, then west to the Powers Park Detention Pond. Excerpts from the Slaughterhouse Gulch Application for LOMR are included in Appendix E.

Upon analysis of the Effective Conditions Model, it was concluded that due to the significant differences in elevation as compared to the new field-surveyed topographic data, the revisions necessary for this model would require the preparation of an Existing Conditions Model in lieu of the Corrected Effective Model. According to the effective LOMR report, the construction plans for the LOMR improvements note that 'Topographic mapping is from aerial survey reconnaissance performed in 1985 during the preliminary phase of the project, and supplemental topographical field surveys performed in 1989 for limited areas of the site. Topographic mapping is provided for general information only and is not to be considered exact.'

Existing Conditions Model

As stated previously, the Effective Conditions Model consisted of a single reach which followed the storm sewer alignment in West Powers Avenue, then south along Delaware Street to West Powers Place. Based on field investigations, it appears that surface runoff within West Powers Place could potentially spill over to the north in between buildings and into West Powers Avenue, then flow west towards Delaware Street, where the two reaches combine. Since this possibility was not reflected in the Effective Conditions Model, a second reach was added within West Powers Avenue along with two lateral weirs in the West Powers Place reach to allow runoff to potentially spill over to West Powers Avenue, if the water surface elevations were high enough. The two Lateral weirs were added in between buildings in the West Powers Place Reach - between Stations 79+64.50/80+53.10 (Lateral Weir 1) and 81+25/82+75 (Lateral Weir 2) - in order to determine if any flow spills over into the West Powers Avenue Reach. The other significant difference between the Existing Conditions Model and the Effective Conditions Model is the implementation of new field-surveyed topography.

The nine cross-sections locations used in the Effective Conditions Model – Stations 65+75, 68+25, 71+00, 74+35, 75+50, 78+60, 81+25, 82+75, and 83+50 were field-surveyed to obtain updated topographic data for the creation of and Existing Conditions Model. Two additional cross-section locations, Stations 79+64.50 and 80+53.10 were

incorporated into the model to provide further detail within the Site. The cross-sections at Stations 78+60, 79+64.50, 80+53.10, 81+25, and 82+75 where extended into the Site and used to establish the West Powers Avenue reach that has been added to the modelling. The stations were renumbered in the West Powers Avenue reach to Stations 178+60, 179+64.50, 180+53.10, 181+25, and 182+75, to avoid confusion between the two reaches.

The results from the Existing Conditions Model showed 100.8 cfs overtopped Lateral Weir 1, flowing north to West Powers Avenue, which is reflected at Station 179+64.50 in the West Powers Avenue reach of the model. Lateral Weir 2 only showed a minimal amount of flow overtopping to West Powers Avenue at Station 181+25.

It should be noted that in the Effective Conditions Model, at two cross-sections locations which are located within the Site (Stations 82+75 and 81+25), the cross-section topography was truncated within the Site. As a result, the Effective Conditions Model reflected no conveyance of runoff within the Site (ineffective flow). For the establishment of the Existing Conditions Model for the two added cross-sections within the Site (Stations 179+64.50 and 180+53.10) this condition was maintained to be shown as ineffective flow as it was in the FEMA regulatory model.

Additional information is provided in 'Appendix F – Ineffective Floodplain Modeling Supplemental Information' in order to help explain the basis for the ineffective flow elements as reflected in the Existing Conditions Model. A written description along with figures and annotated Google Streetview images have been included for clarity.

Proposed Conditions Model

The Existing Conditions Model was used as the base model to create the Proposed Conditions Model. The only difference between the two models is that the topography within the Site was modified to reflect the developed conditions adjacent to the north right-of-way of West Powers Avenue at cross-section Stations 178+60, 179+64.50, 180+53.10, and 181+25. The water surface elevations between the Existing Conditions Model and the Proposed Conditions Model were then compared to identify if there were any impacts as a result of the developed conditions topography. The results showed that there are no negative impacts created as a result of the proposed grading improvements within the Site, as the water surface elevations only differed in two locations – Stations 181+25 and 180+53.10, where the Proposed Conditions Model water surface elevations were 0.01 feet lower than the Existing Conditions Model water surface elevations.

ESA Compliance

A Study showing compliance with the Endangered Species Act was performed and the compliance documentation is included in Appendix G.

References

1. Flood Insurance Study, Arapahoe County Colorado and Incorporated Areas, Volume 4 of 5, FEMA, February 17, 2017.

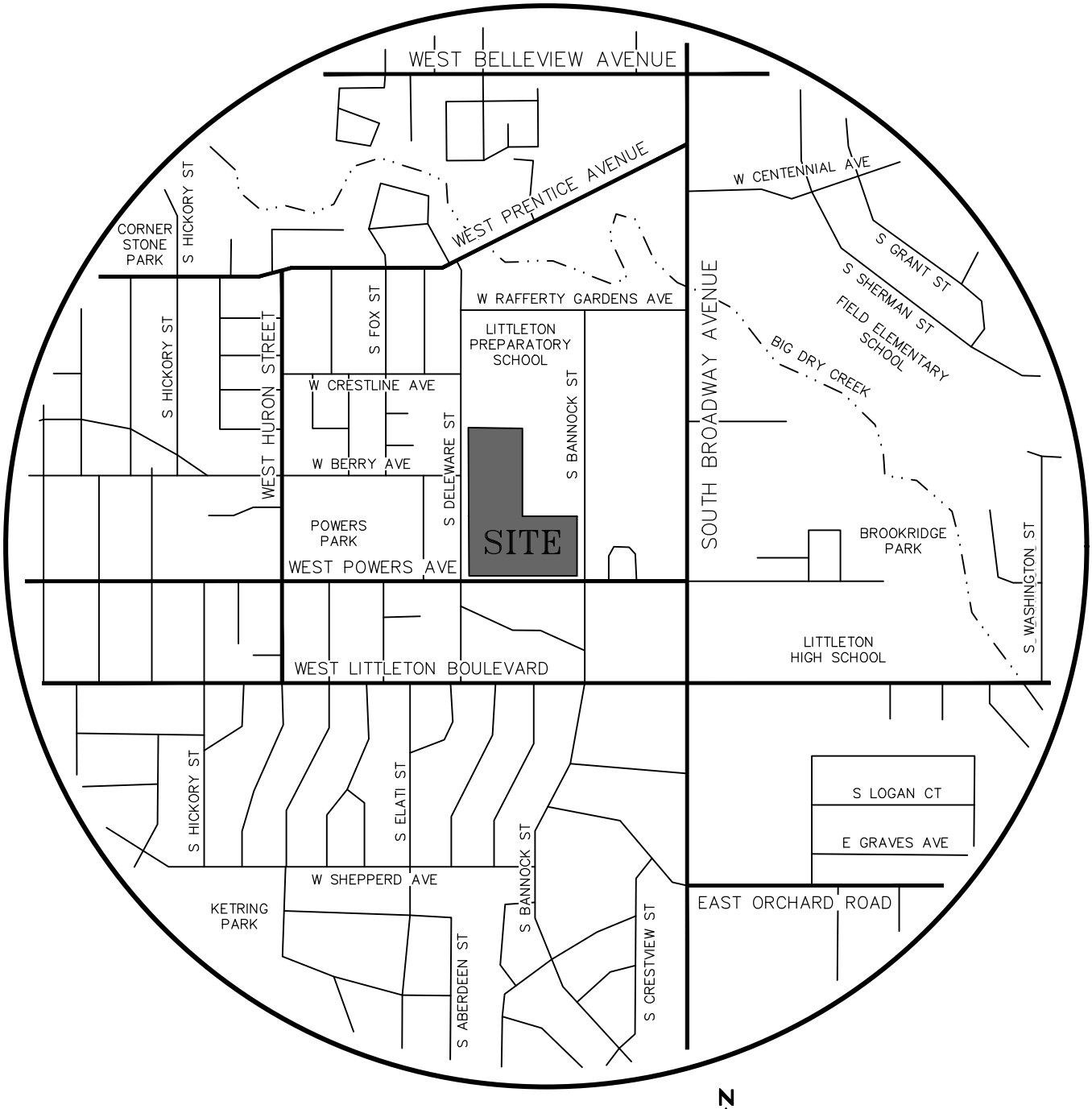
2. Flood Insurance Rate Map, Panel 08005CO451K, effective December 17, 2010; located within the city of Littleton, Arapahoe County, Colorado.

3. Urban Storm Drainage Criteria Manual, Volume 1-3, Urban Drainage and Flood Control District, Denver Colorado, latest online edition.

4. Application for Letter of Map Revision, Slaughterhouse Gulch, Boyle Engineering Corporation, May 1995.

5. Major Drainageway Planning Upper Slaughterhouse Gulch Phase B Report, Water Resource Consultants, Inc., March 1983.

Appendix A – Vicinity Map



VICINITY MAP

1" = 1000'

REDLAND 10 YEARS 2008
Where Great Places Begin
720.283.6783 Office
1500 West Canal Court
Littleton, Colorado 80120
REDLAND.COM

VICINITY MAP

DELAWARE AND POWERS

LITTLETON COLORADO

DATE JUL. 2018

PROJ. NO. 16024.01

SHEET 1

Appendix B – FEMA Forms

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☒ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
08005	City of Littleton Arapahoe County	CO	08005	0451K	12/17/10

2. a. Flooding Source: Slaughterhouse Gulch

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)
   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Delaware and Powers

4. FEMA zone designations affected: AE (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☒ Physical Change ☒ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☐ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☒ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☐ Channelization ☐ Levee/Floodwall ☐ Bridge/Culvert

☐ Dam ☒ Fill ☐ Other (Attach Description)

6. ☒ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $_____

☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: David Richardson	Company: Theodore Fitzgerald Richardson 2015Trust	
Mailing Address: 4725 S. Monaco Street, Suite 200 Denver, CO 80237	Daytime Telephone No.: 303-882-7715	Fax No.:
	E-Mail Address:	
Signature of Requester (required):	Date:	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:	Community Name: City of Littleton	
Mailing Address: 2255 West Berry Avenue Littleton, CO 80120	Daytime Telephone No.:	Fax No.:
	E-Mail Address:	
Community Official's Signature (required):	Date:	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Stephen R. Pangburn	License No.: 35818		Expiration Date: 10/2019
Company Name: Redland	Telephone No.: 720-283-6783		Fax No.:
Signature:	Date:	E-Mail Address: spangburn@redland.com	

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Slaughterhouse Gulch

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☒ Not revised (skip to section B) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model → Specify Model: _____
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	West Limit - Section L	74+35	5425.75	5425.75
Upstream Limit*	East Limit	83+50	5434.20	5434.20

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS 5.0.3

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: 16024_DelawareSS	Plan Name: Duplicate Effective	File Name:	Plan Name:	__NAVD88__
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	__
Existing or Pre-Project Conditions Model	File Name: 16024_DelawareSS	Plan Name: Ex Conditions-Post Site Visit5	File Name:	Plan Name:	__NAVD88_
Revised or Post-Project Conditions Model	File Name: 16024_DelawareSS	Plan Name: Proposed Conditions-Post Site Visit5	File Name:	Plan Name:	_NAVD88_
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	__NAVD88_

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information: GPS Topo

Source: Field Survey Date: 3/22/2018

Accuracy: 0.1'

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

   b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? ☐ Yes ☒ No

   If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☐ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. NO. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20598-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program; Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Slaughterhouse Gulch

Note**:** Fill out one form for each flooding source studied.

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization.....complete Section B
Bridge/Culvert.....complete Section C
Dam.....complete Section D
Levee/Floodwall.....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Modeled Structure

1. Name of Structure: Slaughterhouse Gulch Channelization in West Powers Avenue Upstream of Delaware Street

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: 30 feet upstream of Delaware Street

   Downstream Limit/Cross Section: 78+60

   Upstream Limit/Cross Section: 82+75

2. Name of Structure: _____

   Type (check one): ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: _____

   Downstream Limit/Cross Section: _____

   Upstream Limit/Cross Section: _____

3. Name of Structure: _____

   Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: _____

   Downstream Limit/Cross Section: _____

   Upstream Limit/Cross Section: _____

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: Slaughterhouse Gulch

Name of Structure: Slaughterhouse Gulch Channelization in West Powers Avenue Upstream of Delaware Street

1. Hydraulic Considerations

The channel was designed to carry 820 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions

☐ Other locations (specify): _____

2. Channel Design Plans

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Accessory Structures

The channelization includes (check one):

☐ Levees [Attach Section E (Levee/Floodwall)] ☐ Drop structures ☐ Superelevated sections

☒ Transitions in cross sectional geometry ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] ☐ Energy dissipator

☐ Weir ☐ Other (Describe):

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: _____

Name of Structure: _____

1. This revision reflects (check one):

☐ Bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): _____
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

☐ Dimensions (height, width, span, radius, length)
☐ Shape (culverts only)
☐ Material
☐ Beveling or Rounding
☐ Wing Wall Angle
☐ Skew Angle
☐ Distances Between Cross Sections
☐ Erosion Protection
☐ Low Chord Elevations – Upstream and Downstream
☐ Top of Road Elevations – Upstream and Downstream
☐ Structure Invert Elevations – Upstream and Downstream
☐ Stream Invert Elevations – Upstream and Downstream
☐ Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the structure affected by sediment transport? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport) of Form 3. If no, then attach an explanation.

D. DAM/BASIN

Flooding Source: _____
Name of Structure: _____

1. This request is for (check one): ☐ Existing dam/basin ☐ New dam/basin ☐ Modification of existing dam/basin

2. The dam/basin was designed by (check one): ☐ Federal agency ☐ State agency ☐ Private organization ☐ Local government agency

   Name of the agency or organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number _____ Permitting Agency or Organization _____

   a. ☐ Local Government Dam ☐ Private Dam

   Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

   ☐ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

FREQUENCY (% annual chance)	Stillwater Elevation Behind the Dam/Basin FIS	REVISED
10-year (10%)	_____	_____
50-year (2%)	_____	_____
100-year (1%)	_____	_____
500-year (0.2%)	_____	_____
Normal Pool Elevation	_____	_____

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one): ☐ upgrading of an existing levee/floodwall system ☐ a newly constructed levee/floodwall system ☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ earthen embankment, dike, berm, etc. Station _____ to _____
☐ structural floodwall Station _____ to _____
☐ Other (describe): Station _____ to _____

c. Structural Type (check one): ☐ monolithic cast-in place reinforced concrete ☐ reinforced concrete masonry block ☐ sheet piling ☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers: _____
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: _____

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope land side is: _____

b. The maximum levee slope flood side is: _____

c. The range of velocities along the levee during the base flood is: _____ (min.) to _____ (max.)

d. Embankment material is protected by (describe what kind): _____

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:
_____

☐ Overall height: Sta.: _____, height _____ ft.

☐ Limiting foundation soil strength:

Strength ϕ = _____ degrees, c = _____ psf

Slope: SS = _____ (h) to _____ (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):
_____

c. Summary of stability analysis results:

E. LEVEE/FLOODWALL (CONTINUED)

5. Embankment And Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability (continued)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No

b. The computed range of settlement is _____ ft. to _____ ft.

c. Settlement of the levee crest is determined to be primarily from : ☐ Foundation consolidation ☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Draining to pressure conduit: _____ acres
Draining to ponding area: _____ acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

e. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No Attach supporting documentation

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan And Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: _____ Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-Mail Address: _____

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acre-feet

Debris load associated with the base flood discharge: Volume _____ acre-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: _____

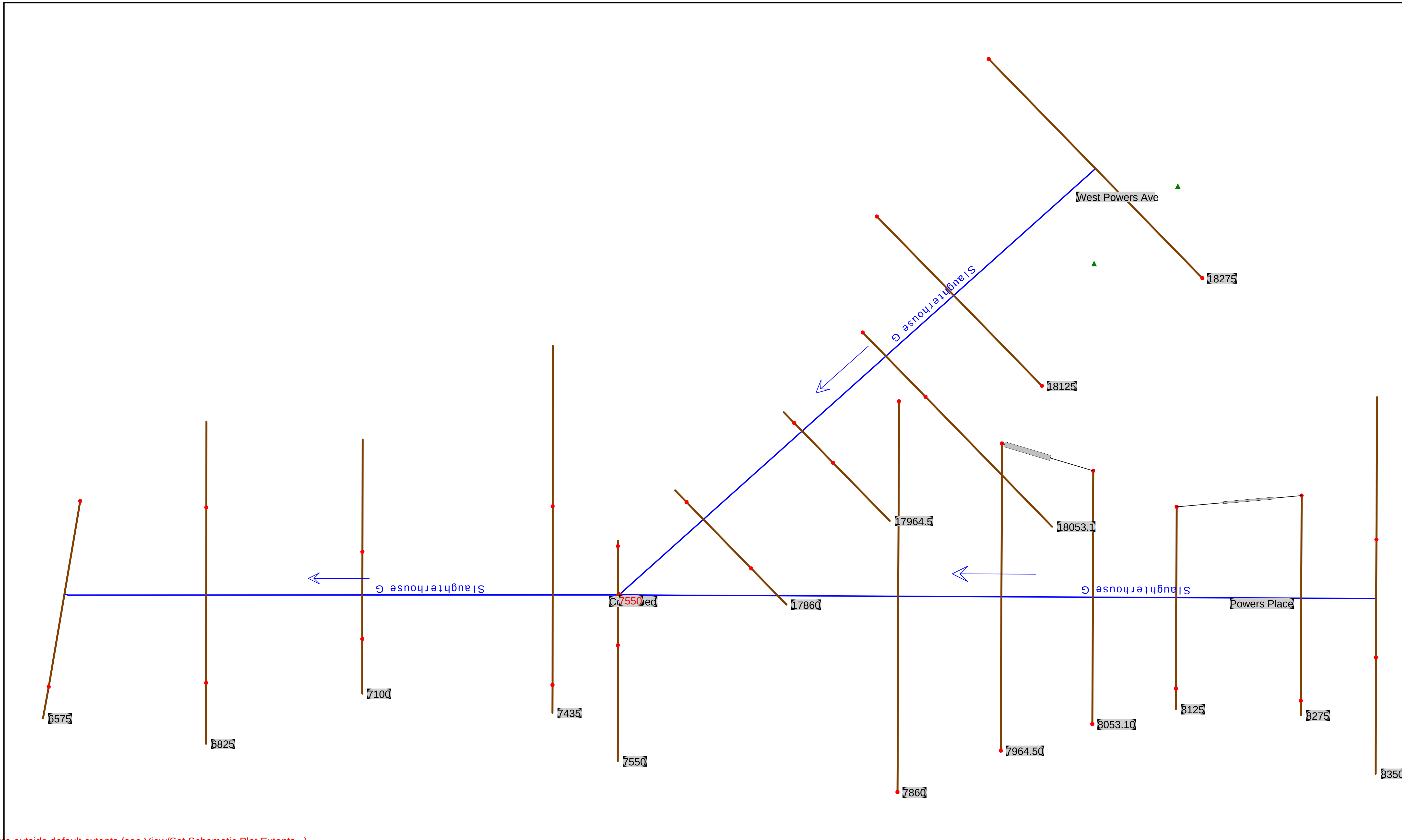
Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

The floodplain being analyzed is in a highly developed area with nearly all of the ground surface being paved, with little chance for erosion.

Appendix C –Hydraulic Calculations



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

UDFCD DLOMC Submittal - BFE Comparison Table

Project Name :	**Delaware and Powers**
Flooding Source:	**Slaughterhouse Gulch**
Company:	**Redland**
Completed By:	**Steve Pangburn, P.E.**

SOURCE DATA											COMPARISONS				
HYDRAULIC CROSS-SECTION INFO.						BASE FLOOD ELEVATIONS (NAVD)									
Effective Cross-Section ID (Letter)	Corrected Effective Cross-Section ID	Corrected Effective Stream Station	Existing Cross-Section ID	Proposed Cross-Section ID	Proposed Stream Station	EFFECTIVE	DUP. EFF.	COR. EFF.*	EXISTING*	PROPOSED	DUP. EFF vs. EFF.	COR. EFF. vs. EFF.	EX. vs. EFF.*	PP. vs. COR. EFF.	PP. vs. EFF.
						BFE	BFE	BFE	BFE	BFE	BFE	BFE	BFE	BFE	BFE
	Powers Place														
L	74+35	74+35	**L**	**L**	74+35	5426.72	5426.58	-	5425.75	5425.75	-0.14	-	-0.97	-	-0.97
	75+50	75+50			75+50	5428.9	5428.91	-	5428.59	5428.59	0.01	-	-0.31	-	-0.31
	78+60	78+60			78+60	5431.68	5430.1	-	5430.86	5430.86	-1.58	-	-0.82	-	-0.82
	79+64.5	79+64.5			79+64.5	*5432.1*	*5430.14*	-	5431.7	5431.7	-1.96	-	-0.40	-	-0.40
	80+53.1	80+53.1			80+53.1	*5432.6*	*5430.18*	-	5432.12	5432.12	-2.42	-	-0.48	-	-0.48
	81+25	81+25			81+25	5432.84	5430.21	-	5432.63	5432.63	-2.63	-	-0.21	-	-0.21
	82+75	82+75			82+75	5434.57	5430.21	-	5433.69	5433.69	-4.36	-	-0.88	-	-0.88
	83+50	83+50			83+50	5434.96	5434.67	-	5434.2	5434.2	-0.29	-	-0.76	-	-0.76
	West Powers Ave														
	182+75	182+75			182+75	-	-	-	5430.96	5430.96	-	-	-	-	-
	181+25	181+25			181+25	-	-	-	5429.64	5429.63	-	-	-	-	-
	18053.1	18053.1			18053.1	-	-	-	5429.64	5429.63	-	-	-	-	-
	17964.5	17964.5			17964.5	-	-	-	5429.57	5429.56	-	-	-	-	-
	17860	17860			17860	-	-	-	5429.56	5429.56	-	-	-	-	-

-- = Not applicable or no direct comparison available

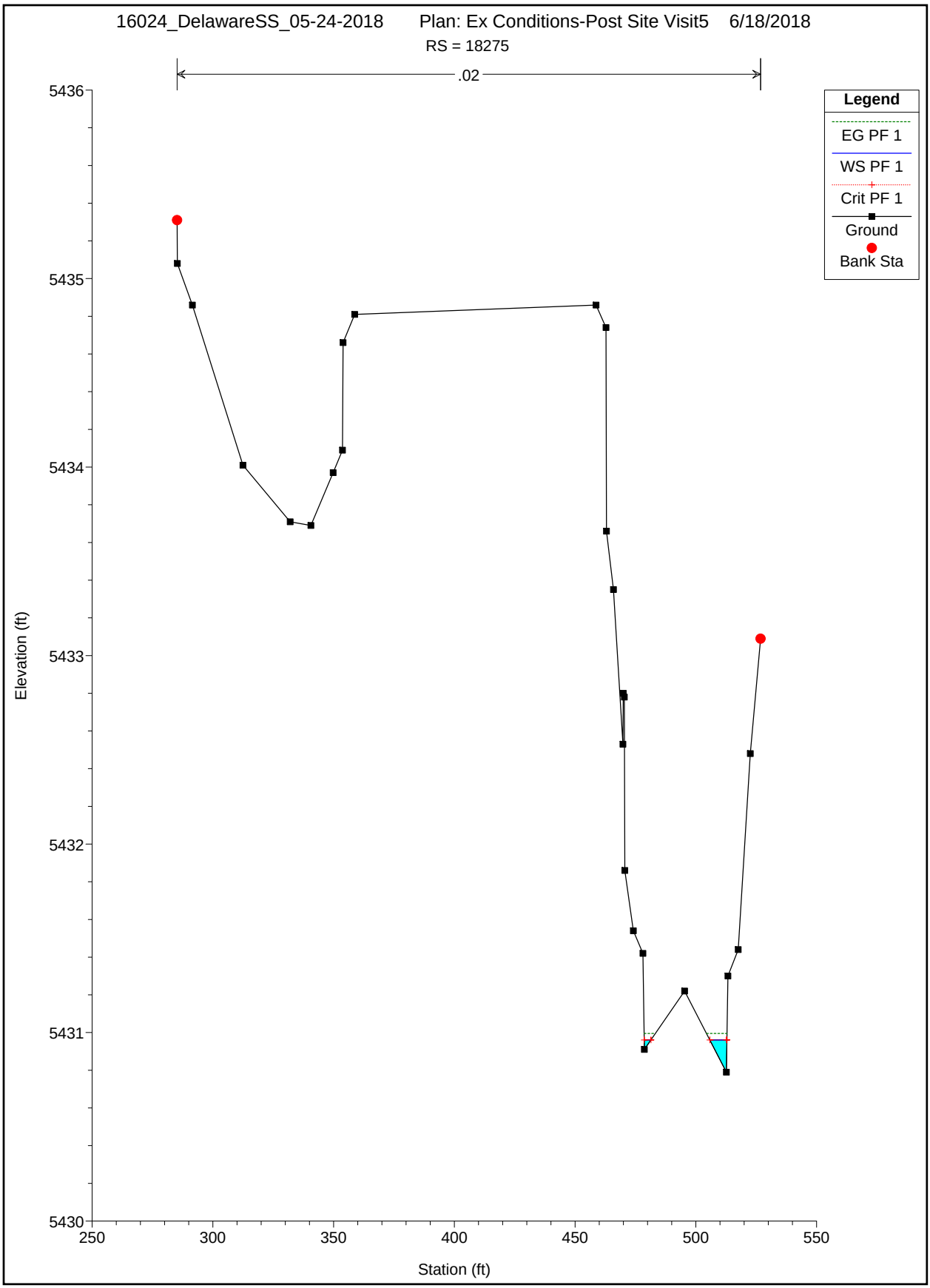
5432.1 = Interpolated value or value pulled directly from the effective FIS profile

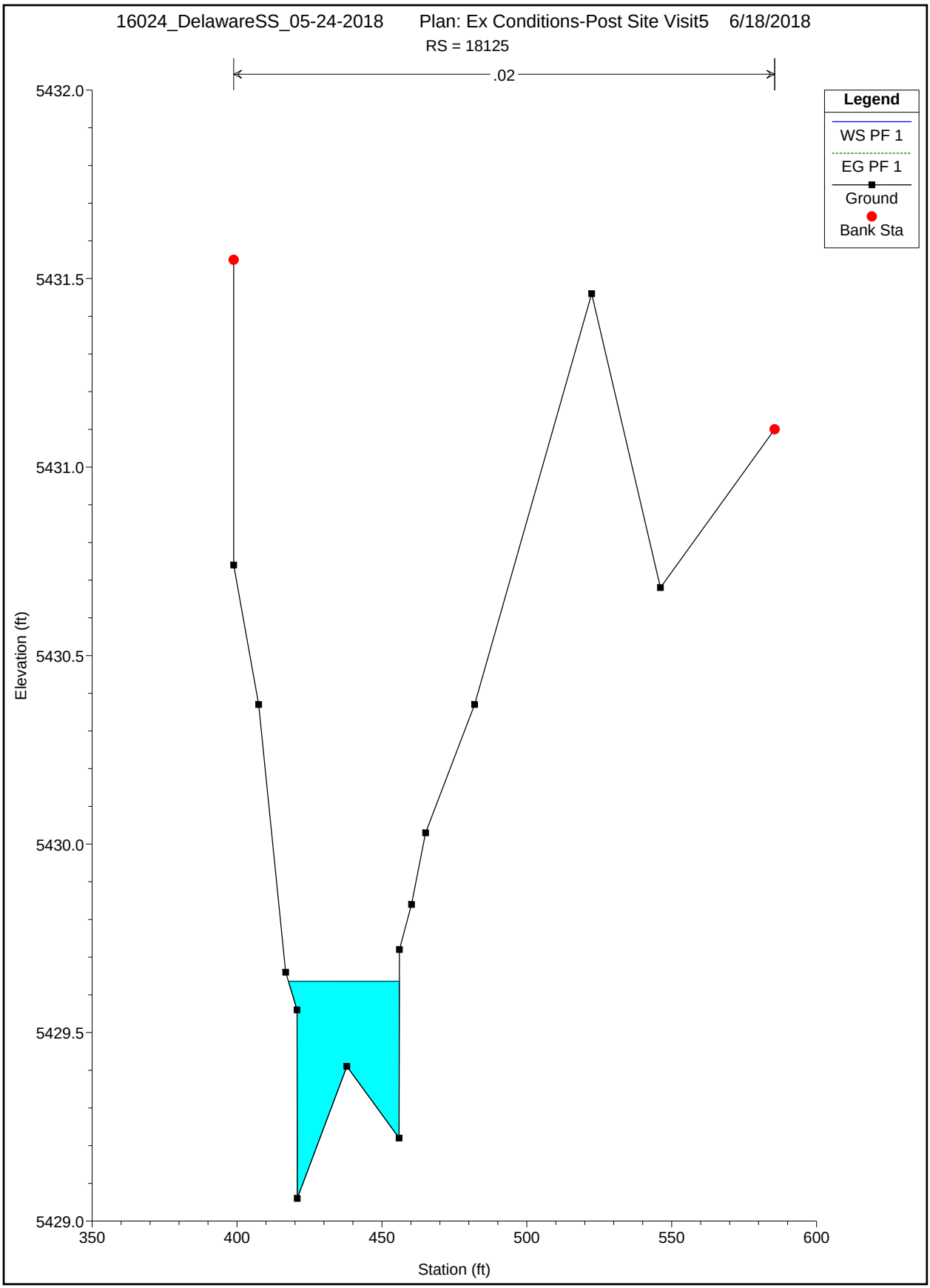
HEC-RAS Plan: Existing Con5 Profile: PF 1

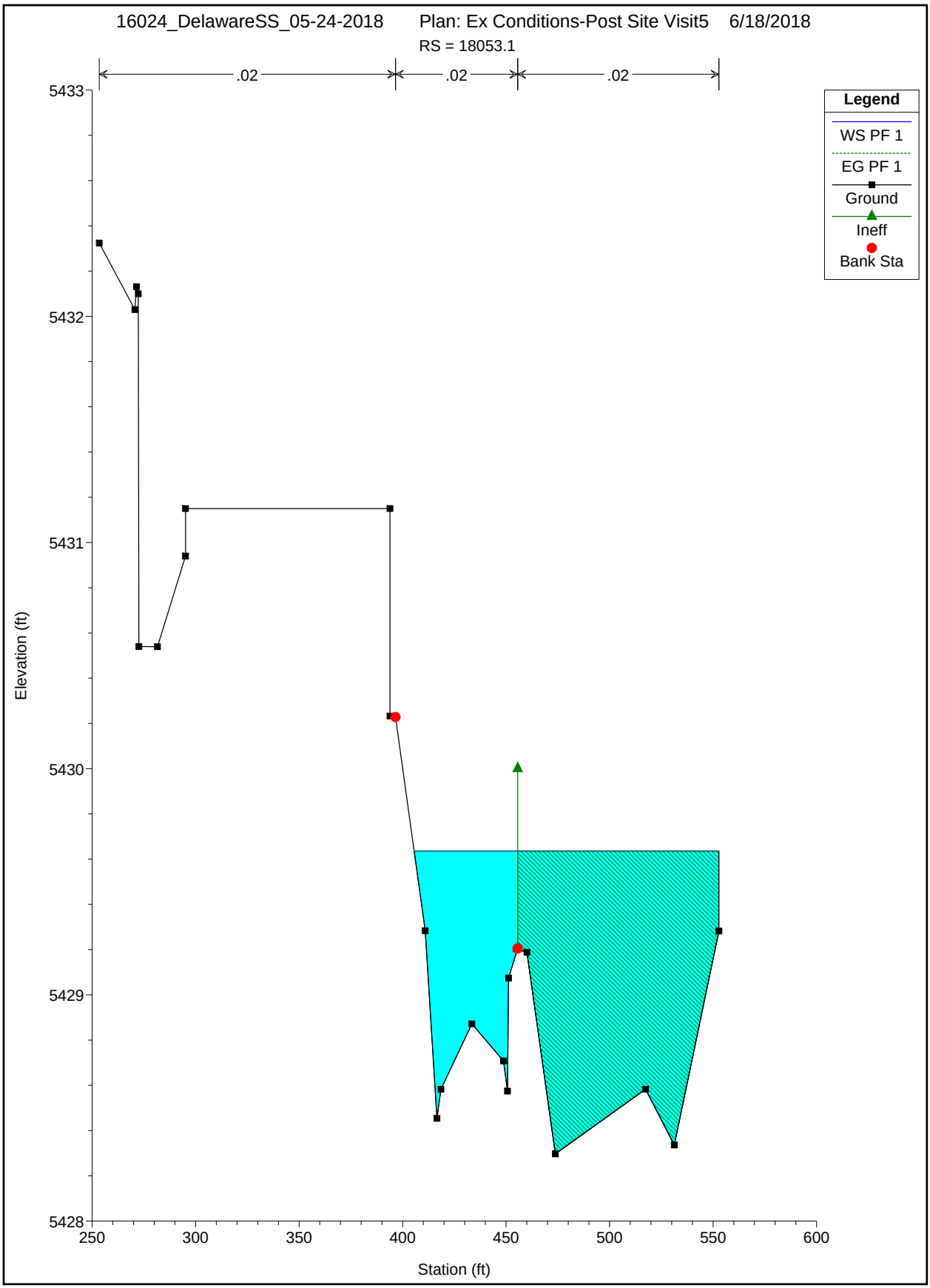
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
West Powers Ave	18275	PF 1	1.00	5430.79	5430.96	5430.96	5431.00	0.014312	1.48	0.68	9.87	1.00
West Powers Ave	18125	PF 1	1.00	5429.06	5429.64		5429.64	0.000005	0.08	12.81	38.28	0.02
West Powers Ave	18053.1	PF 1	1.00	5428.45	5429.64		5429.64	0.000000	0.03	38.47	147.25	0.01
West Powers Ave	17964.5	PF 1	100.79	5427.93	5429.57		5429.61	0.000433	1.78	58.65	231.14	0.28
West Powers Ave	17860	PF 1	100.79	5427.42	5429.56	5428.41	5429.58	0.000138	1.13	89.58	261.04	0.16
Powers Place	8350	PF 1	800.00	5431.95	5434.20	5434.20	5434.86	0.005567	6.51	122.84	96.17	1.02
Powers Place	8275	PF 1	800.00	5431.51	5433.69	5433.69	5434.31	0.005663	6.30	127.03	105.82	1.01
Powers Place	8247.50		Lat Struct									
Powers Place	8125	PF 1	810.00	5430.64	5432.63	5432.62	5433.07	0.005872	5.34	151.61	166.43	0.99
Powers Place	8053.10	PF 1	810.00	5430.19	5432.12	5432.12	5432.56	0.006302	5.37	150.80	173.07	1.01
Powers Place	8010.05		Lat Struct									
Powers Place	7964.50	PF 1	710.21	5429.73	5431.70		5431.82	0.001270	2.87	247.35	217.76	0.47
Powers Place	7860	PF 1	720.21	5428.50	5430.86	5430.86	5431.52	0.006080	6.52	110.42	86.04	1.02
Combined	7550	PF 1	830.00	5426.04	5428.59	5428.59	5429.30	0.003046	6.75	122.94	87.86	1.01
Combined	7435	PF 1	840.00	5422.63	5425.75	5425.06	5425.96	0.001044	3.68	228.20	184.49	0.58
Combined	7100	PF 1	840.00	5423.26	5424.90	5424.90	5425.33	0.003634	5.90	172.62	206.20	1.05
Combined	6825	PF 1	1130.00	5405.94	5415.61		5415.62	0.000003	0.64	1772.38	244.78	0.04
Combined	6575	PF 1	1130.00	5413.03	5414.96	5414.96	5415.56	0.003133	6.21	182.02	153.51	1.01

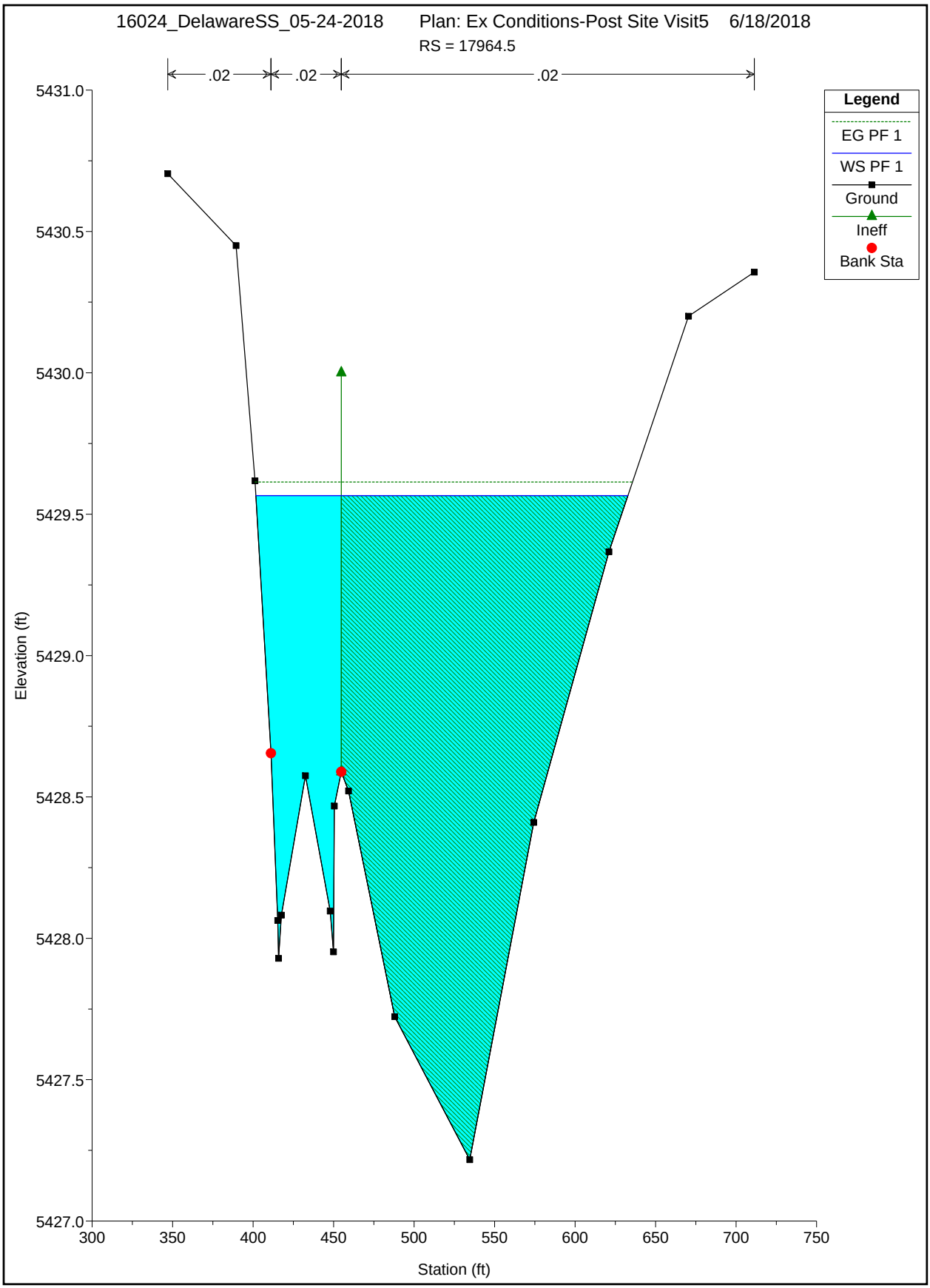
HEC-RAS Plan: Existing Con5 Profile: PF 1

Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Q Gates	Wr Top Wdth	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
			(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Powers Place	8247.50	PF 1	800.00	0.00	810.00	0.00					5433.20	5434.04	5433.46	5433.53	5433.03
Powers Place	8010.05	PF 1	810.00	101.04	710.21	101.04		46.00	1.52	1.28	5430.30	5432.22	5431.92	5431.84	5431.71


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 18275
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5436
5435
5434
5433
5432
5431
5430
250
300
350
400
450
500
550


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 18125
.02
Legend
WS PF 1
EG PF 1
Ground
Bank Sta
5432.0
5431.5
5431.0
5430.5
5430.0
5429.5
5429.0
Elevation (ft)
350
400
450
500
550
600
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 18053.1
.02
.02
.02
Legend
WS PF 1
EG PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
5433
5432
5431
5430
5429
5428
250
300
350
400
450
500
550
600
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 17964.5
.02
.02
.02
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
5431.0
5430.5
5430.0
5429.5
5429.0
5428.5
5428.0
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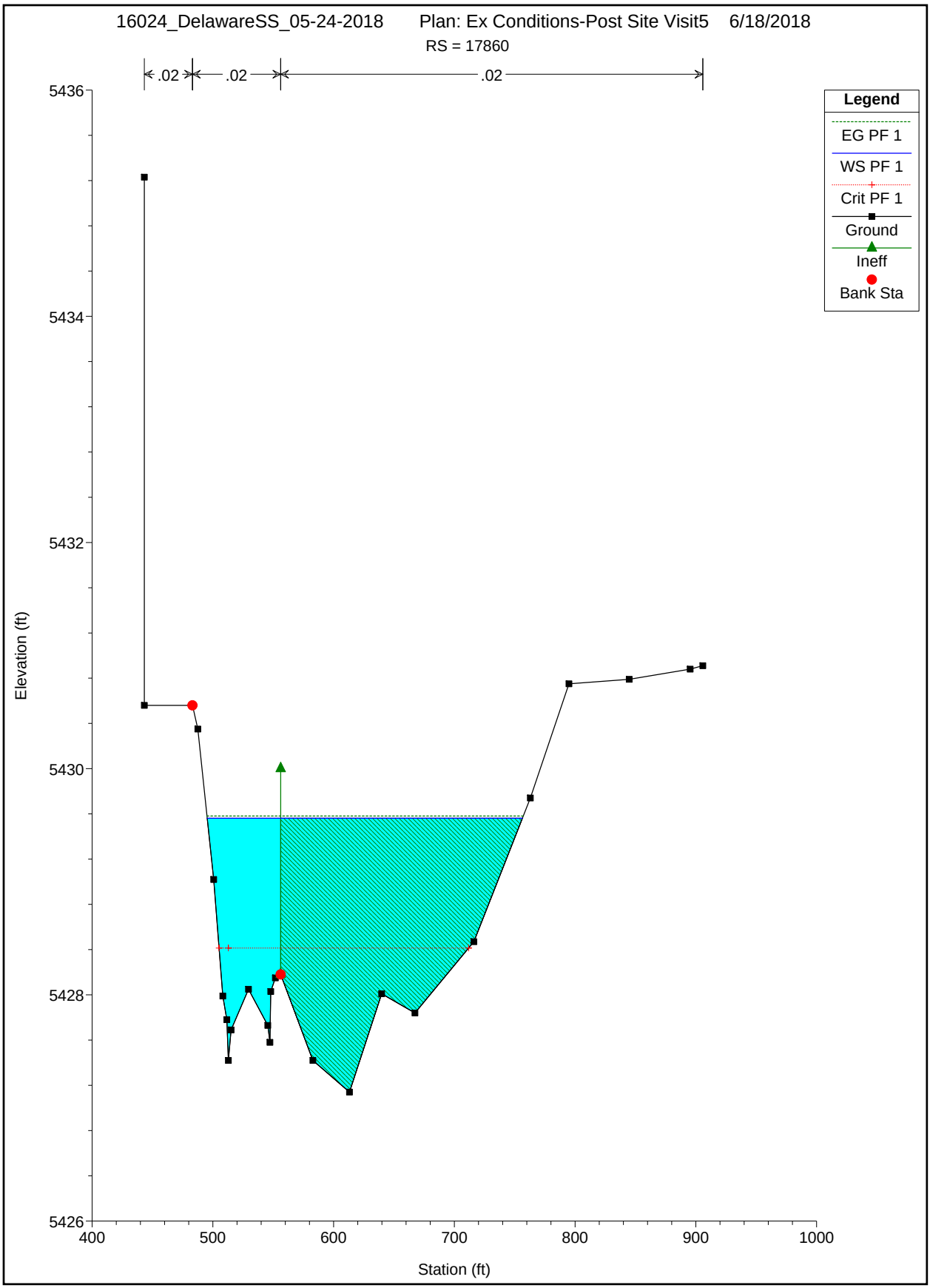
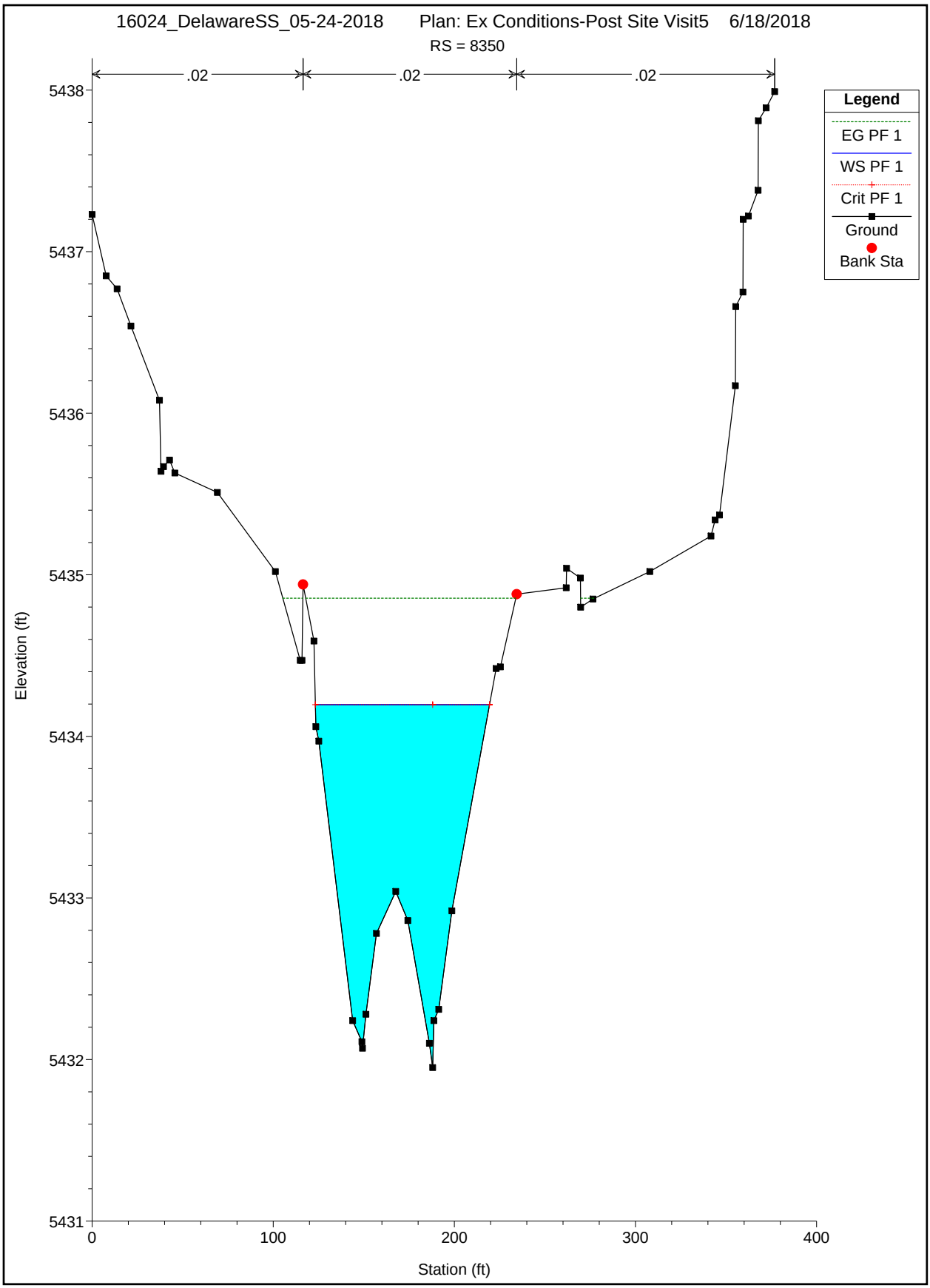
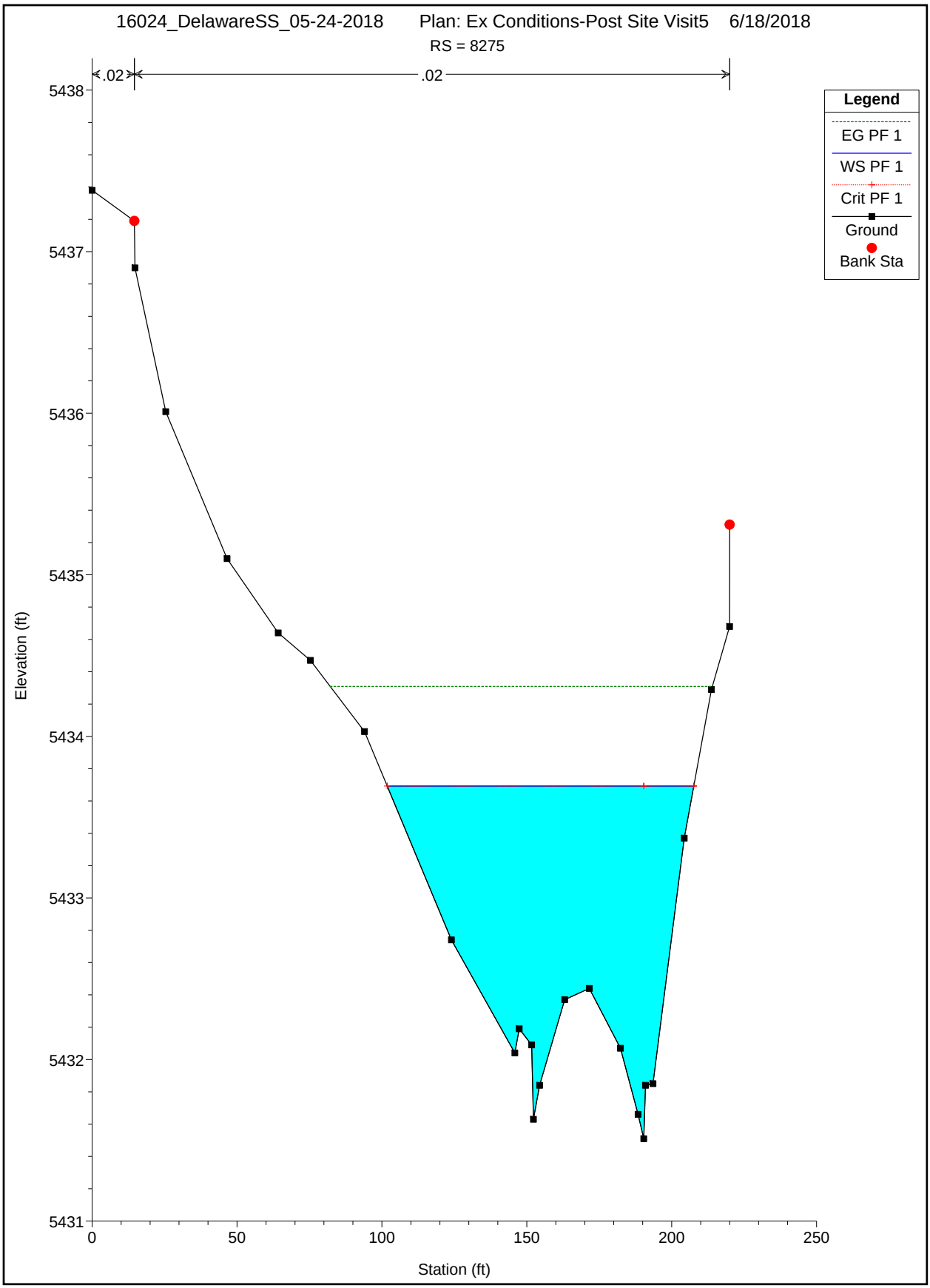
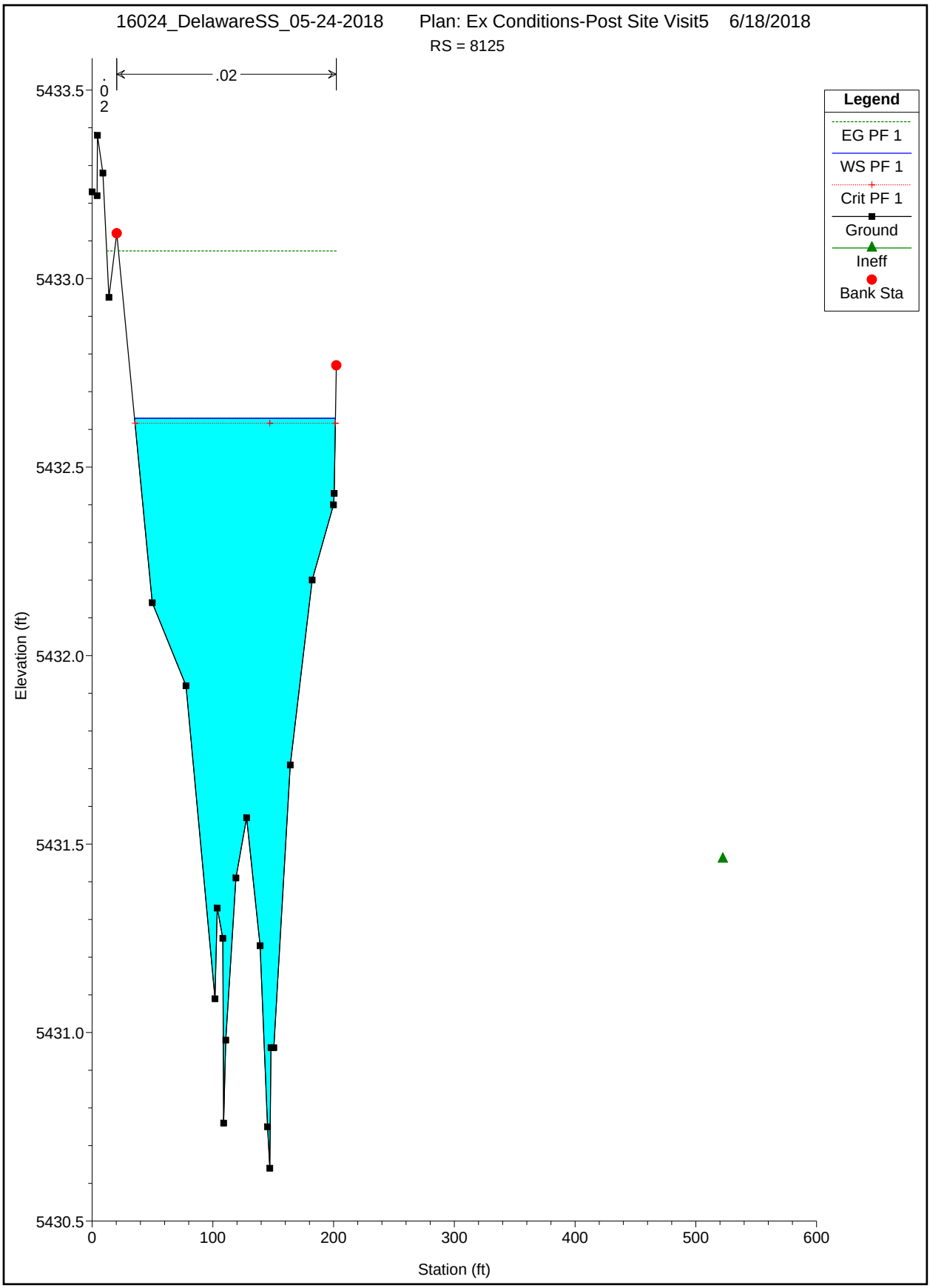
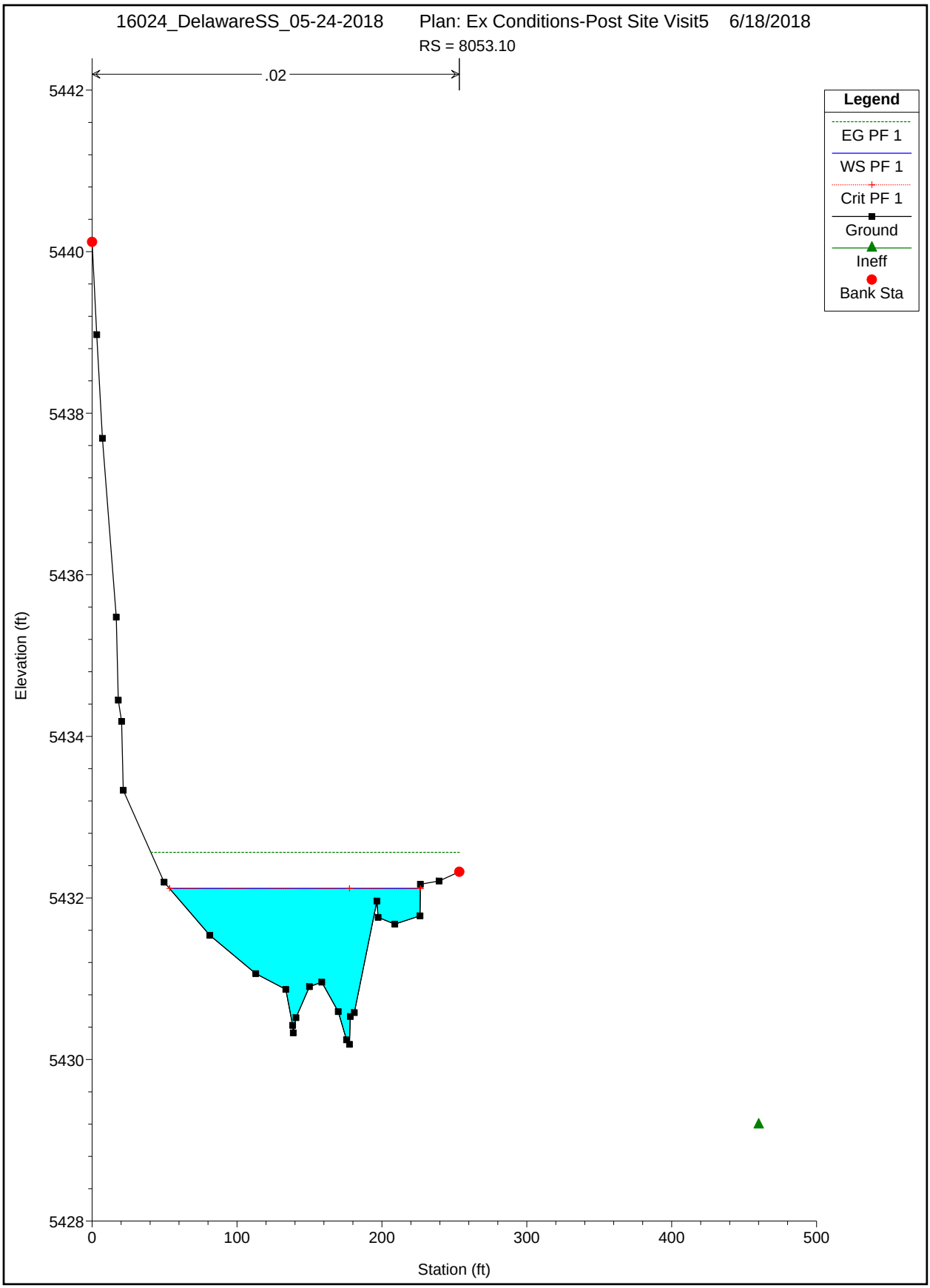
300
350
400
450
500
550
600
650
700
750

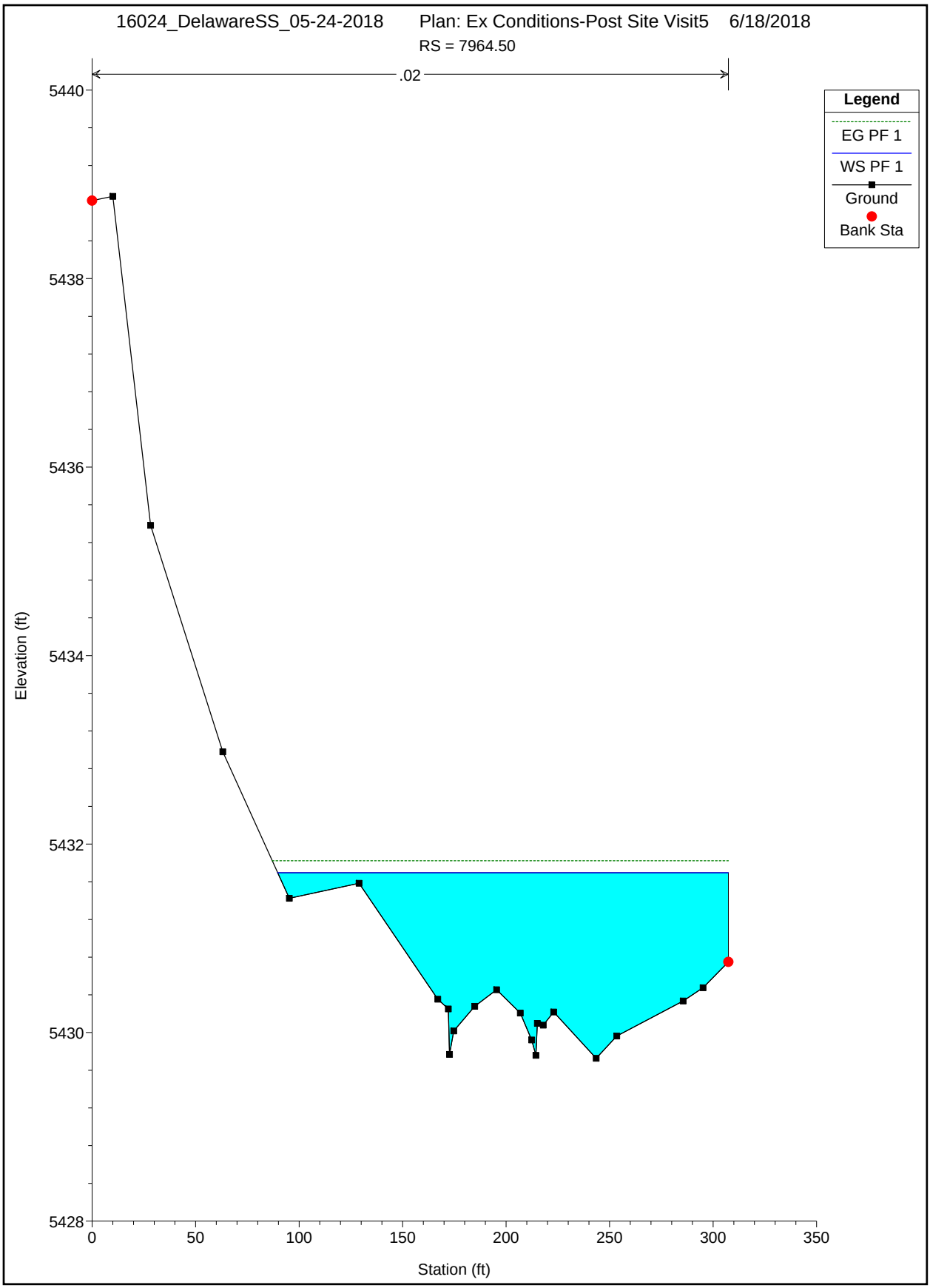

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 17860
.02
.02
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
5436
5434
5432
5430
5428
5426
400
500
600
700
800
900
1000

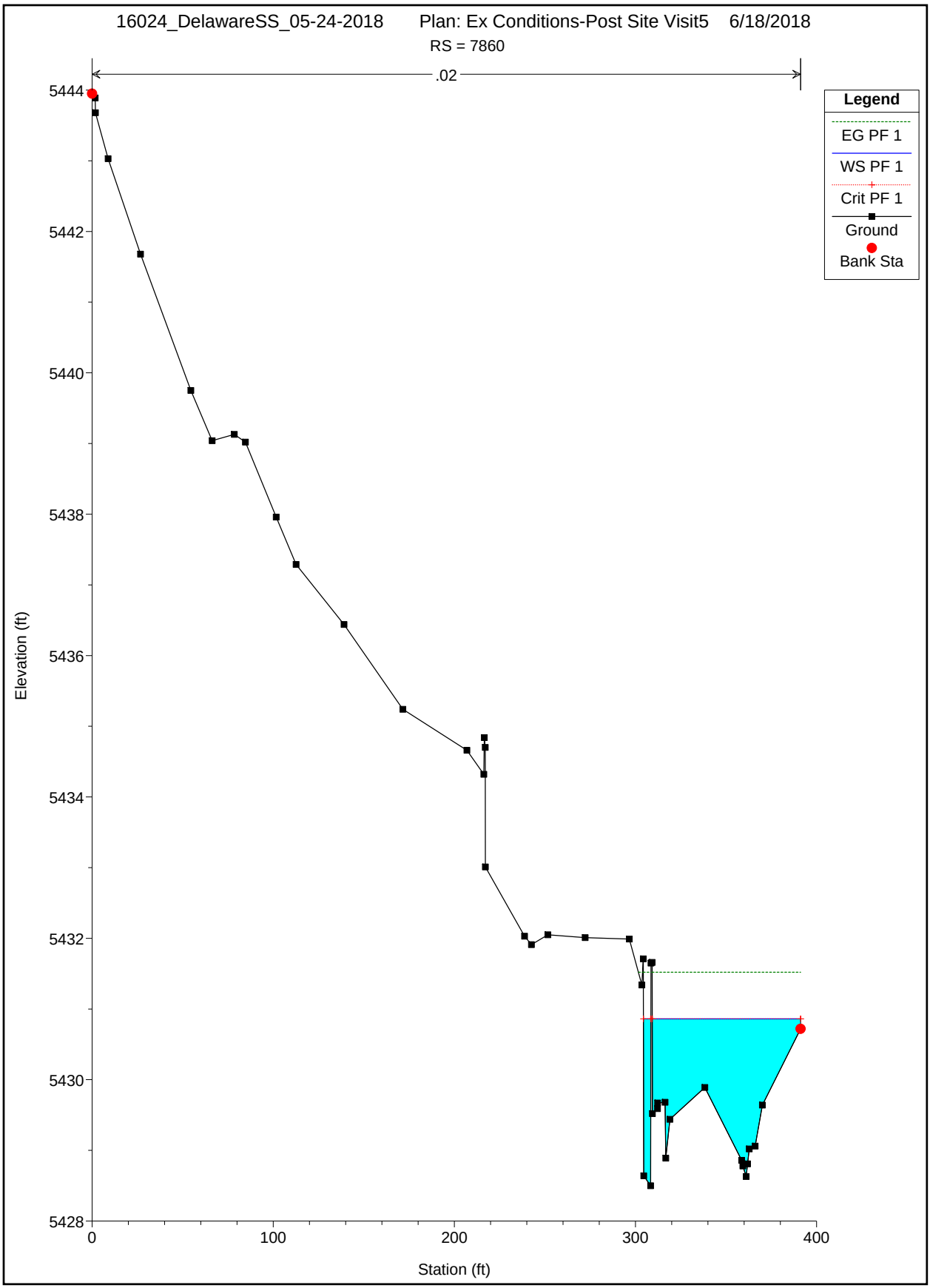

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 8350
.02
.02
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
5438
5437
5436
5435
5434
5433
5432
5431
0
100
200
300
400
Station (ft)

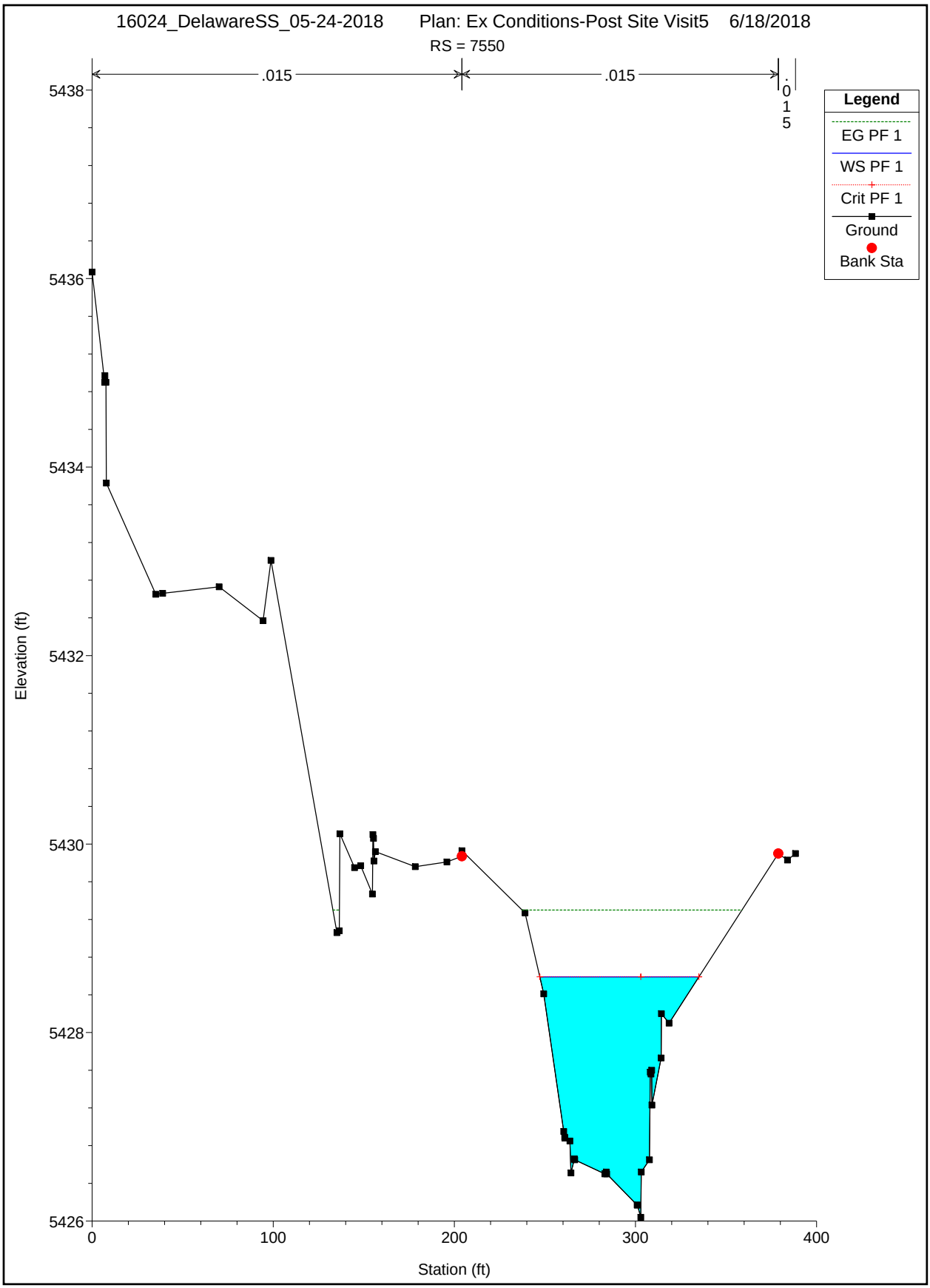

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 8275
.02
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
5438
5437
5436
5435
5434
5433
5432
5431
0
50
100
150
200
250
Station (ft)

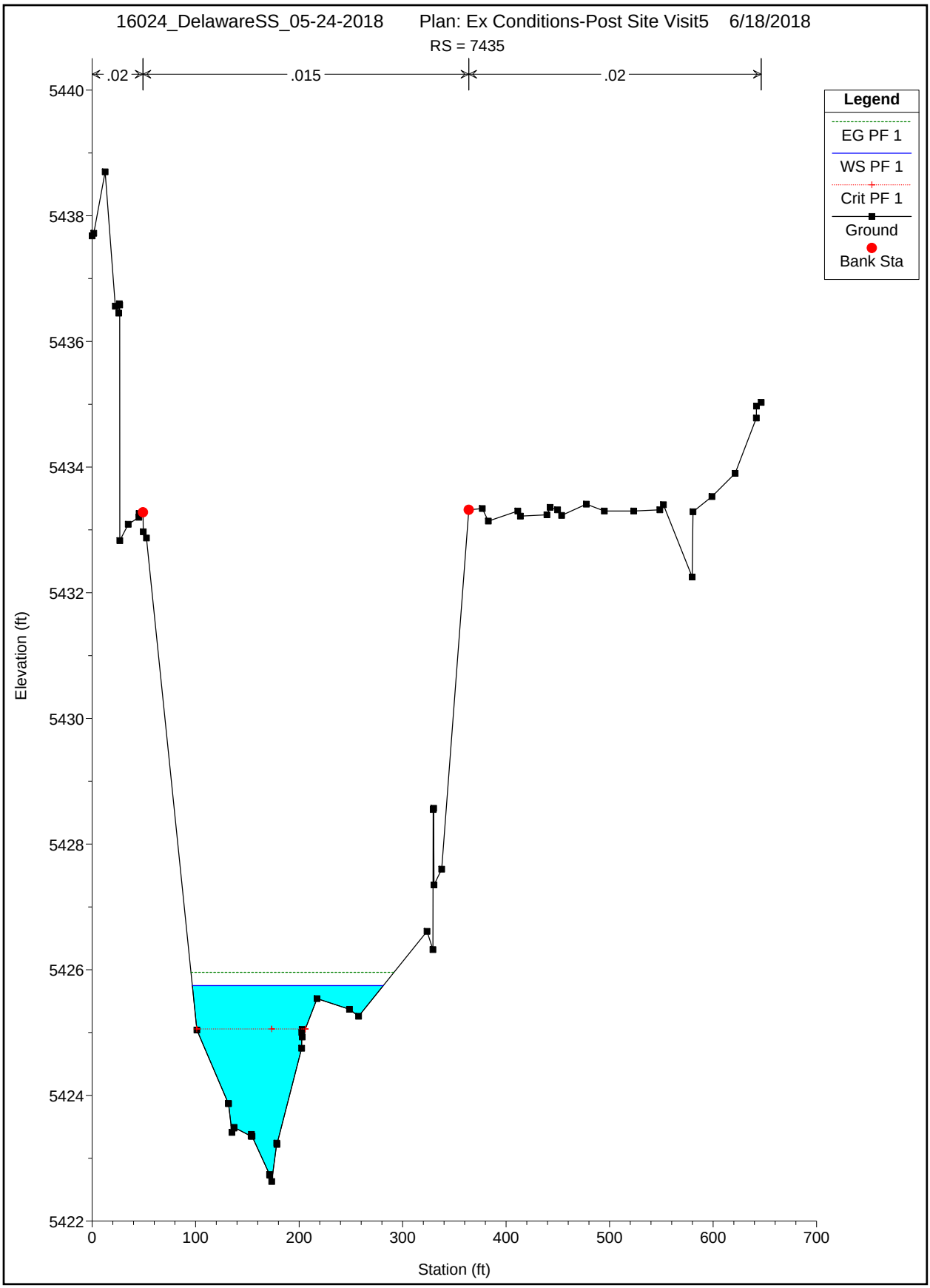

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 8125
.02
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
5433.5
5433.0
5432.5
5432.0
5431.5
5431.0
5430.5
0
100
200
300
400
500
600
Station (ft)

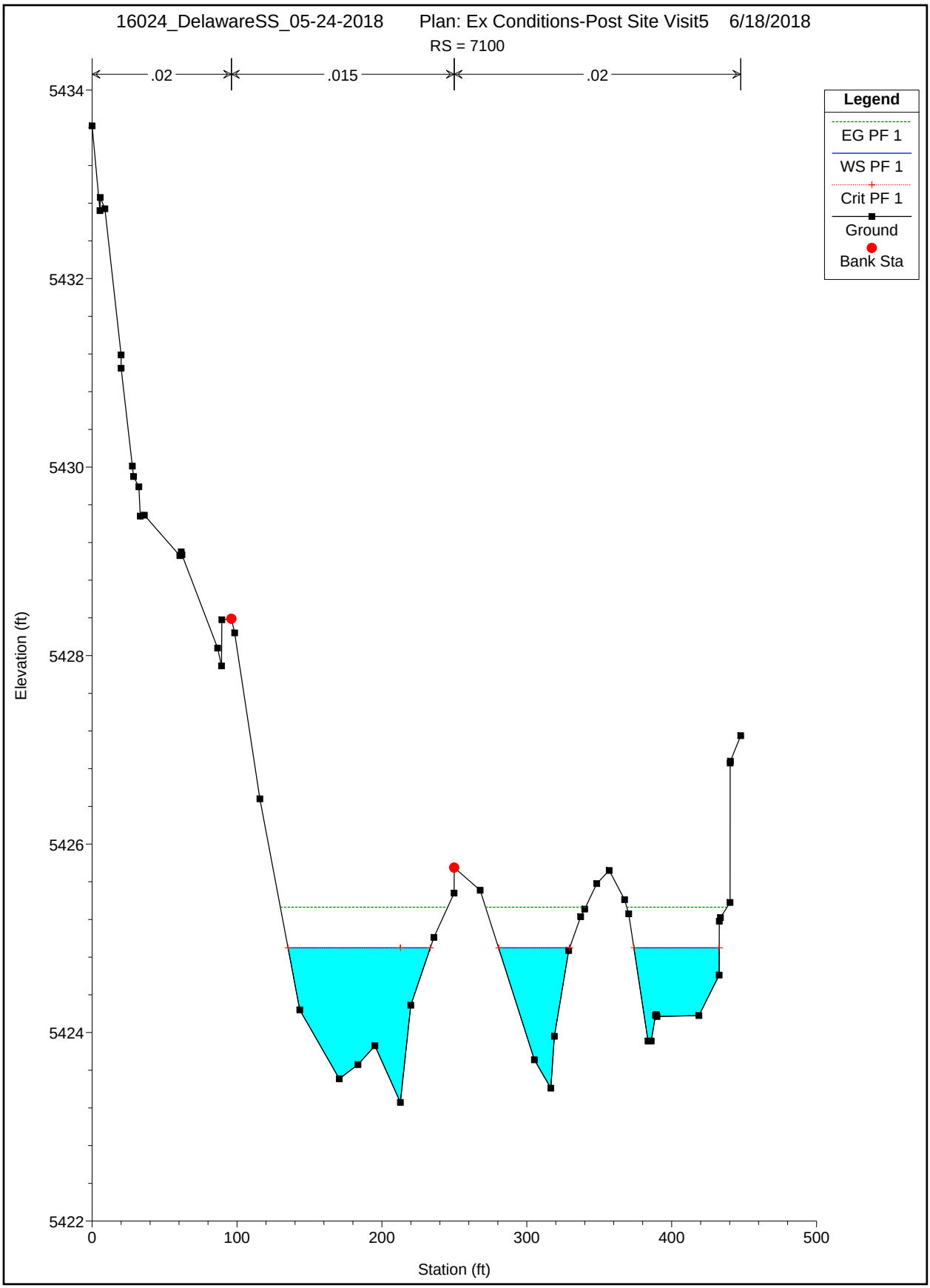

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 8053.10
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
5442
5440
5438
5436
5434
5432
5430
5428
0
100
200
300
400
500
Station (ft)

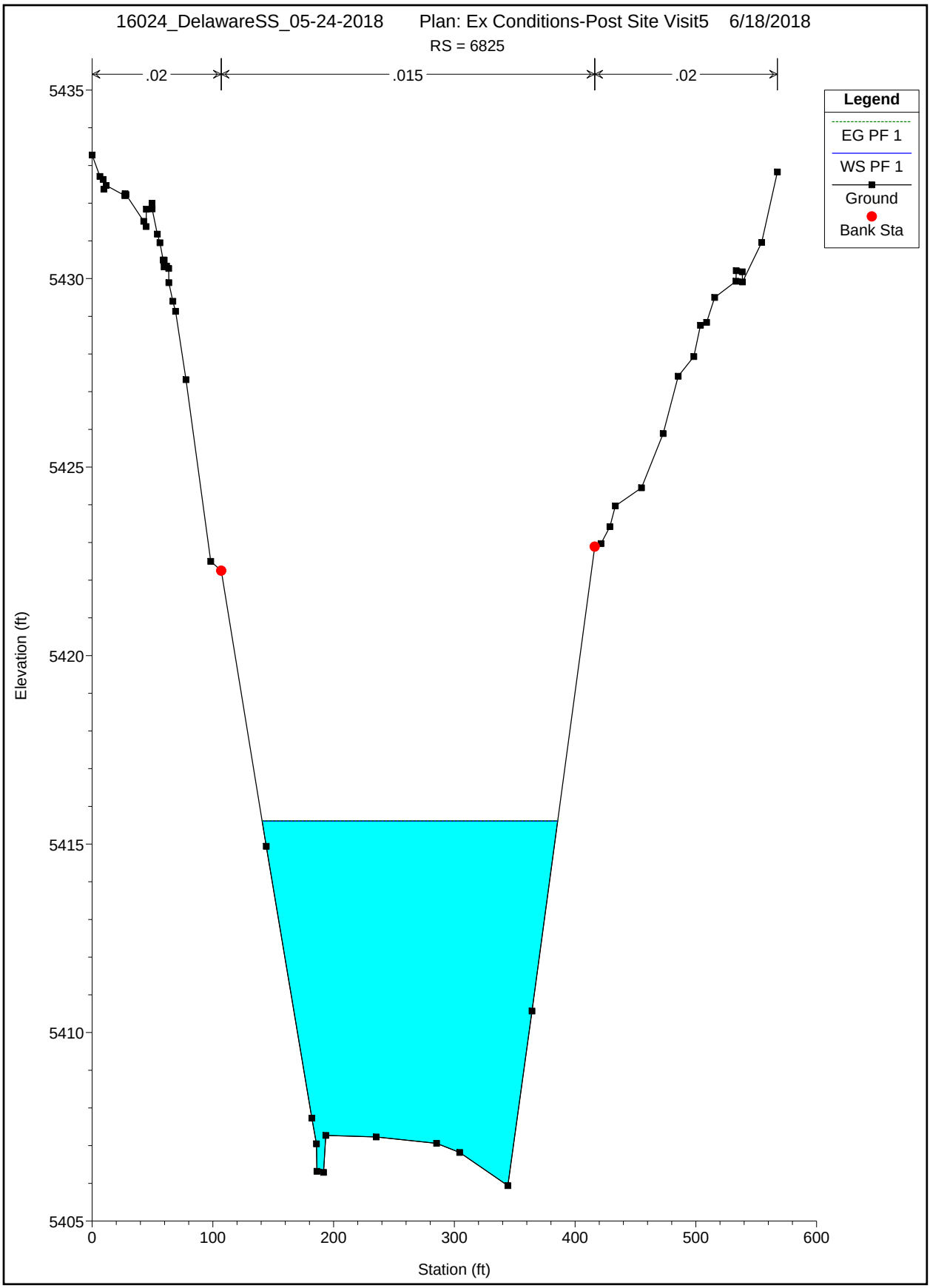

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 7964.50
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5440
5438
5436
5434
5432
5430
5428
0
50
100
150
200
250
300
350

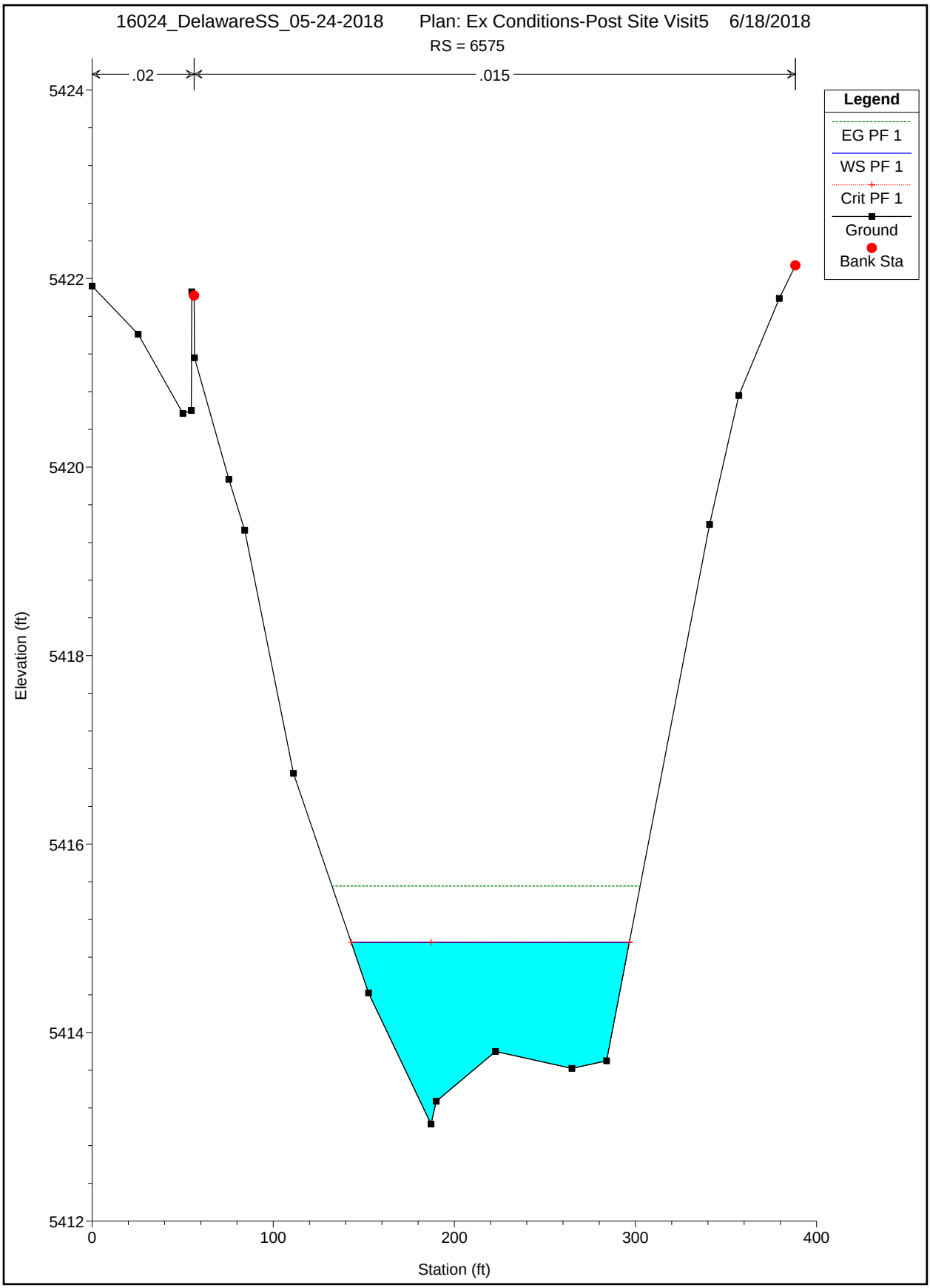

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 7860
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5444
5442
5440
5438
5436
5434
5432
5430
5428
0
100
200
300
400


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 7550
.015
.015
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5438
5436
5434
5432
5430
5428
5426
0
100
200
300
400


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 7435
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5440
5438
5436
5434
5432
5430
5428
5426
5424
5422
0
100
200
300
400
500
600
700


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 7100
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
5434
5432
5430
5428
5426
5424
5422
0
100
200
300
400
500
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 6825
.02
.015
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
5435
5430
5425
5420
5415
5410
5405
0
100
200
300
400
500
600
Station (ft)

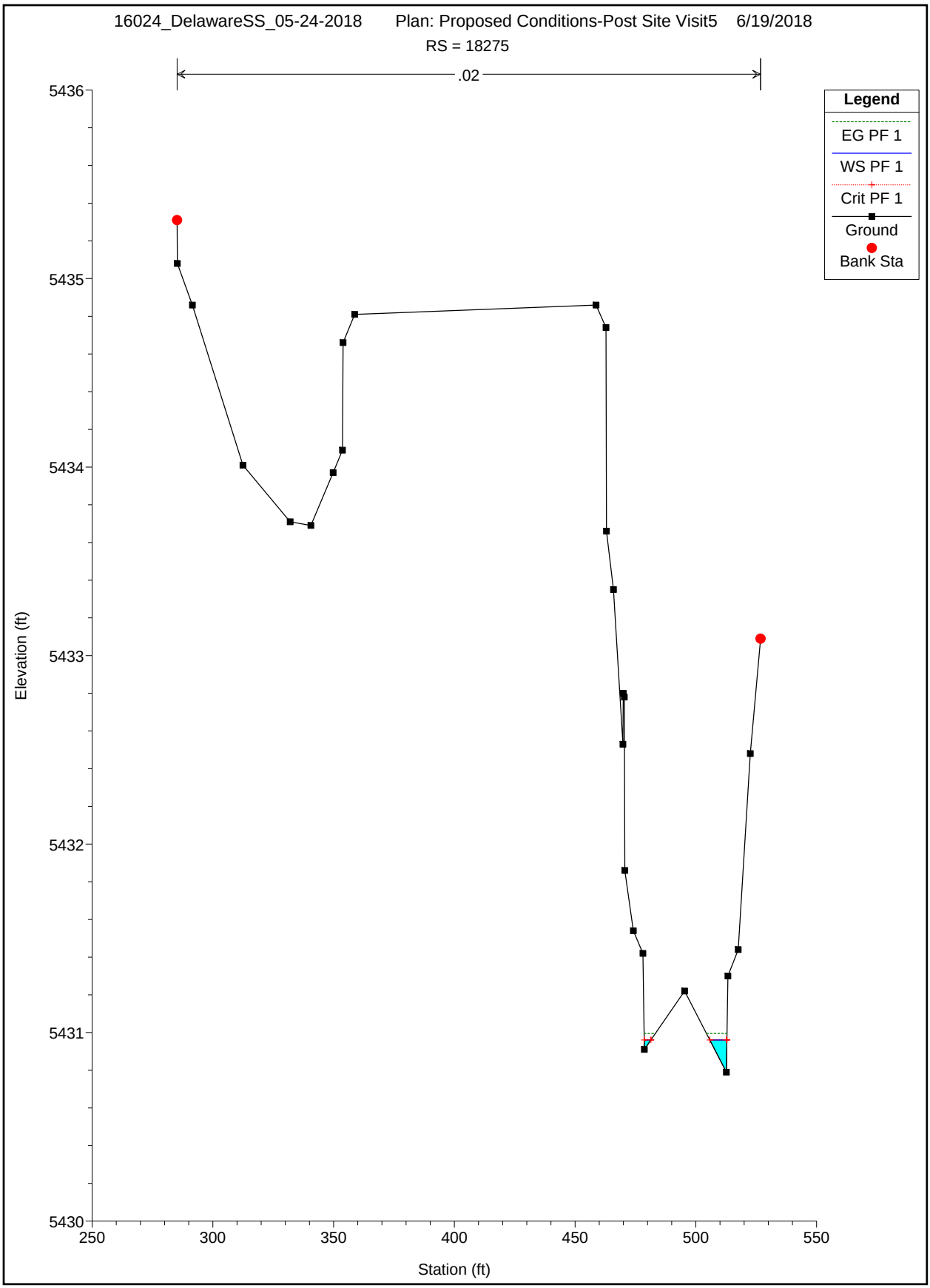

16024_DelawareSS_05-24-2018 Plan: Ex Conditions-Post Site Visit5 6/18/2018
RS = 6575
.02
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5424
5422
5420
5418
5416
5414
5412
0
100
200
300
400

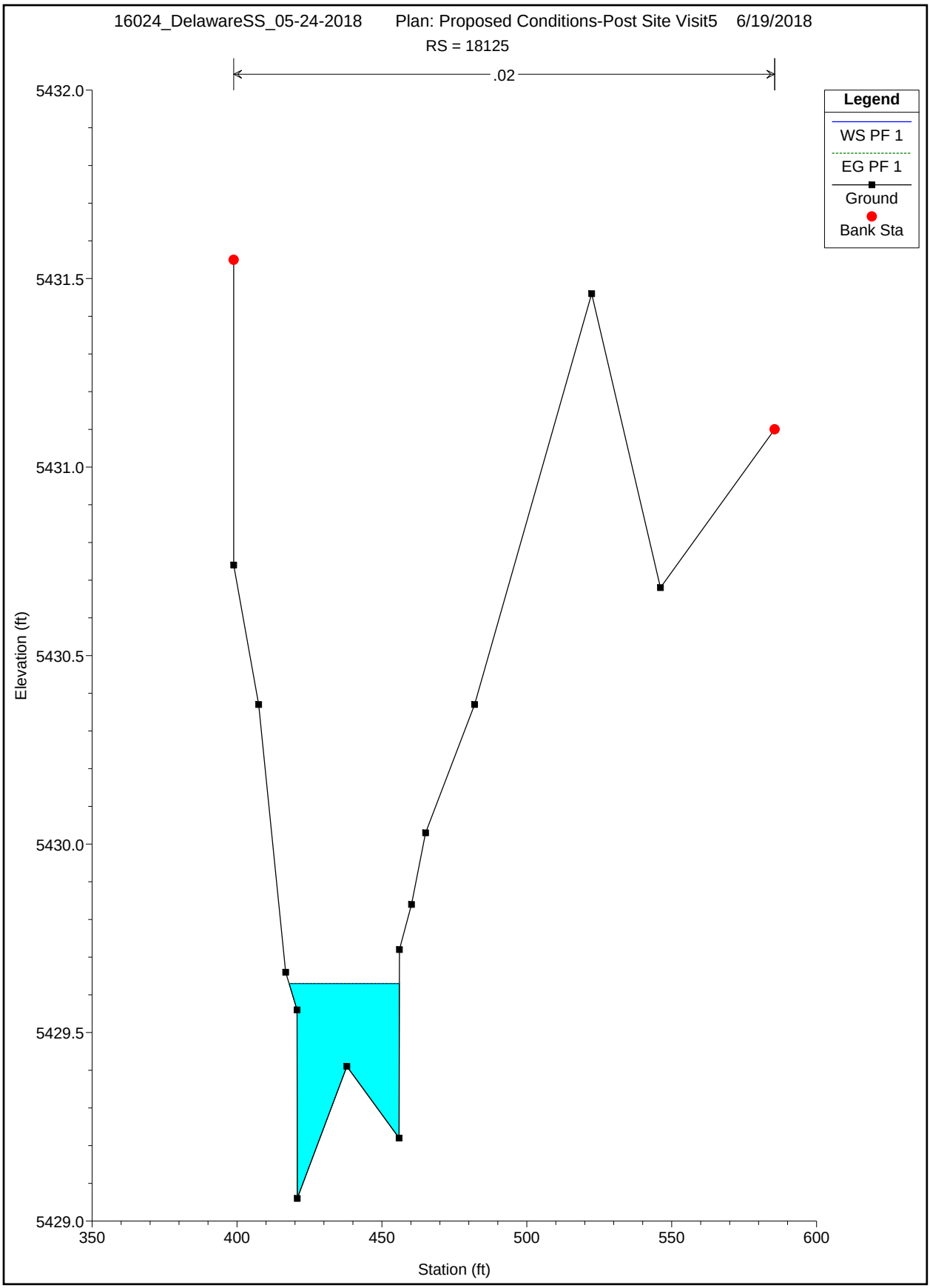
HEC-RAS Plan: Proposed Cond 5 Profile: PF 1

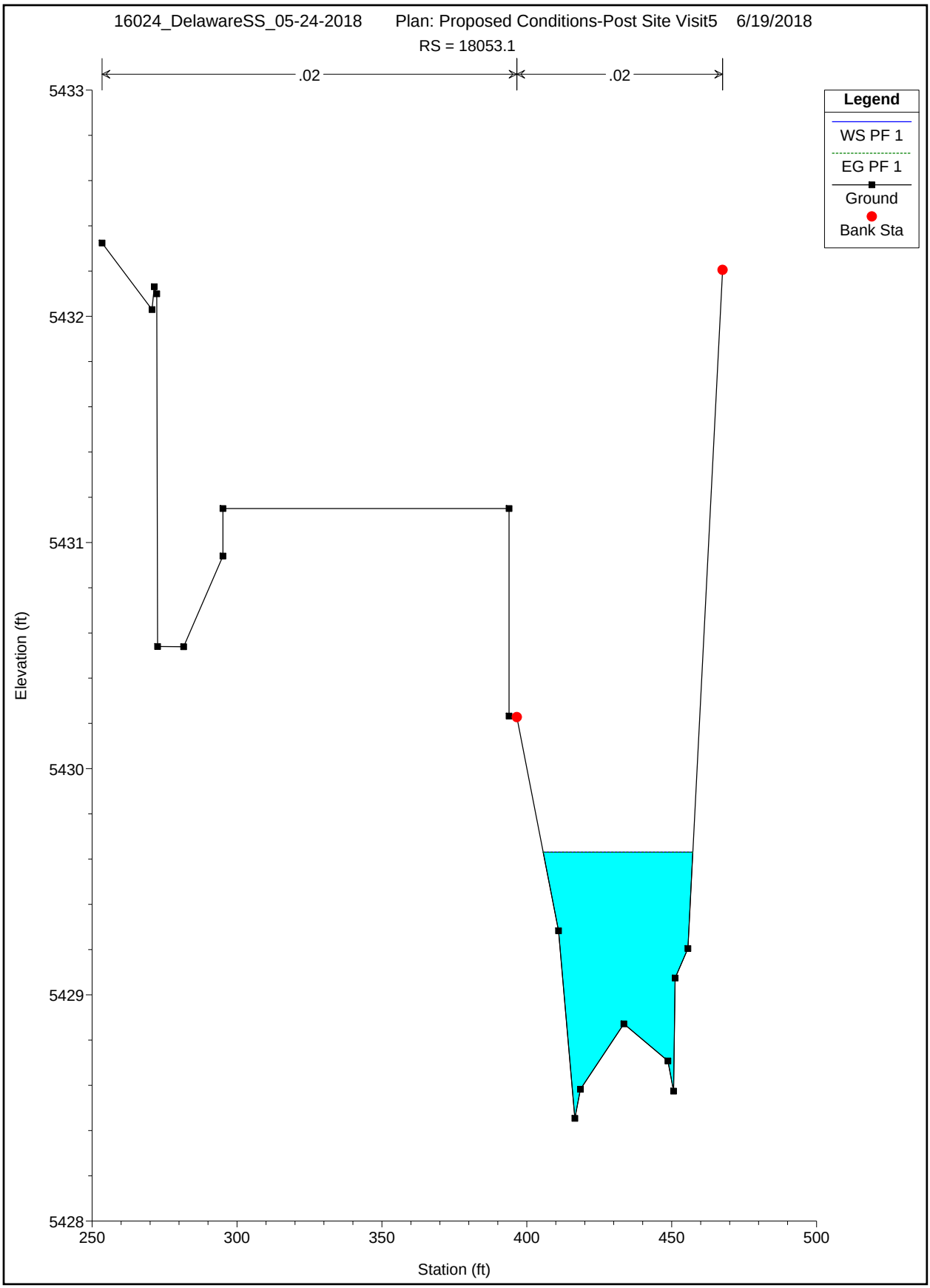
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
West Powers Ave	18275	PF 1	1.00	5430.79	5430.96	5430.96	5431.00	0.014312	1.48	0.68	9.87	1.00
West Powers Ave	18125	PF 1	1.00	5429.06	5429.63		5429.63	0.000005	0.08	12.59	38.05	0.02
West Powers Ave	18053.1	PF 1	1.00	5428.45	5429.63		5429.63	0.000000	0.03	38.54	51.62	0.01
West Powers Ave	17964.5	PF 1	100.80	5427.93	5429.56		5429.61	0.000422	1.76	60.37	56.93	0.28
West Powers Ave	17860	PF 1	100.80	5427.42	5429.56		5429.58	0.000132	1.10	93.52	66.84	0.16
Powers Place	8350	PF 1	800.00	5431.95	5434.20	5434.20	5434.86	0.005567	6.51	122.84	96.17	1.02
Powers Place	8275	PF 1	800.00	5431.51	5433.69	5433.69	5434.31	0.005663	6.30	127.03	105.82	1.01
Powers Place	8247.50		Lat Struct									
Powers Place	8125	PF 1	810.00	5430.64	5432.63	5432.62	5433.07	0.005872	5.34	151.61	166.43	0.99
Powers Place	8053.10	PF 1	810.00	5430.19	5432.12	5432.12	5432.56	0.006302	5.37	150.80	173.07	1.01
Powers Place	8010.05		Lat Struct									
Powers Place	7964.50	PF 1	710.20	5429.73	5431.70		5431.82	0.001272	2.87	247.25	217.75	0.48
Powers Place	7860	PF 1	720.20	5428.50	5430.86	5430.86	5431.52	0.006050	6.51	110.59	86.04	1.01
Combined	7550	PF 1	830.00	5426.04	5428.59	5428.59	5429.30	0.003046	6.75	122.94	87.86	1.01
Combined	7435	PF 1	840.00	5422.63	5425.75	5425.06	5425.96	0.001044	3.68	228.20	184.49	0.58
Combined	7100	PF 1	840.00	5423.26	5424.90	5424.90	5425.33	0.003634	5.90	172.62	206.20	1.05
Combined	6825	PF 1	1130.00	5405.94	5415.61		5415.62	0.000003	0.64	1772.38	244.78	0.04
Combined	6575	PF 1	1130.00	5413.03	5414.96	5414.96	5415.56	0.003133	6.21	182.02	153.51	1.01

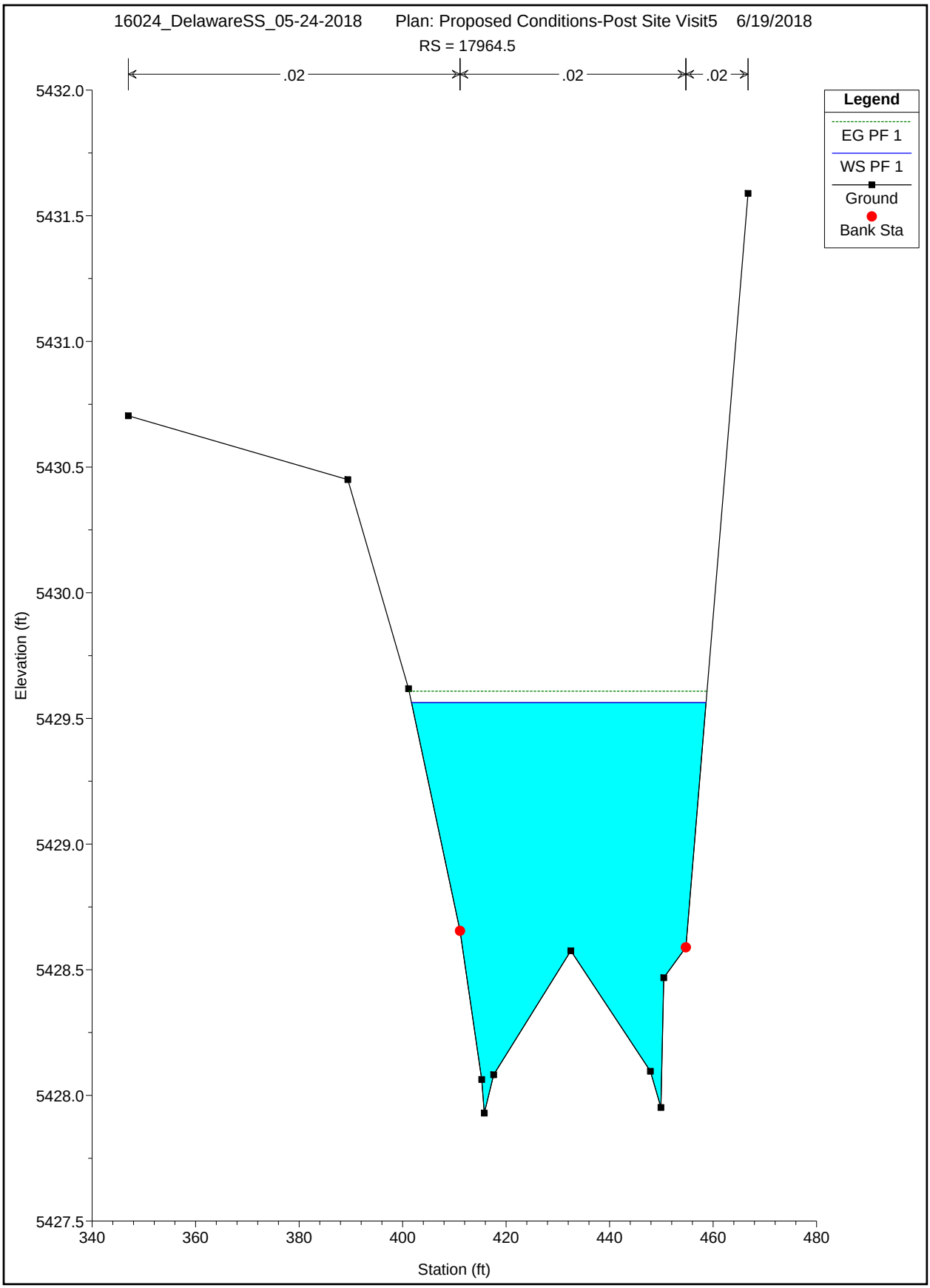
HEC-RAS Plan: Proposed Cond 5 Profile: PF 1

Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Q Gates	Wr Top Wdth	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
			(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Powers Place	8247.50	PF 1	800.00	0.08	810.00	0.08		6.89	0.07	0.04	5433.05	5434.04	5433.46	5433.53	5433.03
Powers Place	8010.05	PF 1	810.00	101.03	710.20	101.03		46.00	1.52	1.28	5430.30	5432.22	5431.92	5431.84	5431.71


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 18275
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5436
5435
5434
5433
5432
5431
5430
250
300
350
400
450
500
550


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 18125
.02
Legend
WS PF 1
EG PF 1
Ground
Bank Sta
5432.0
5431.5
5431.0
5430.5
5430.0
5429.5
5429.0
Elevation (ft)
350
400
450
500
550
600
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 18053.1
.02
.02
Legend
WS PF 1
EG PF 1
Ground
Bank Sta
5433
5432
5431
5430
5429
5428
Elevation (ft)
250
300
350
400
450
500
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 17964.5
.02
.02
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5432.0
5431.5
5431.0
5430.5
5430.0
5429.5
5429.0
5428.5
5428.0
5427.5
340
360
380
400
420
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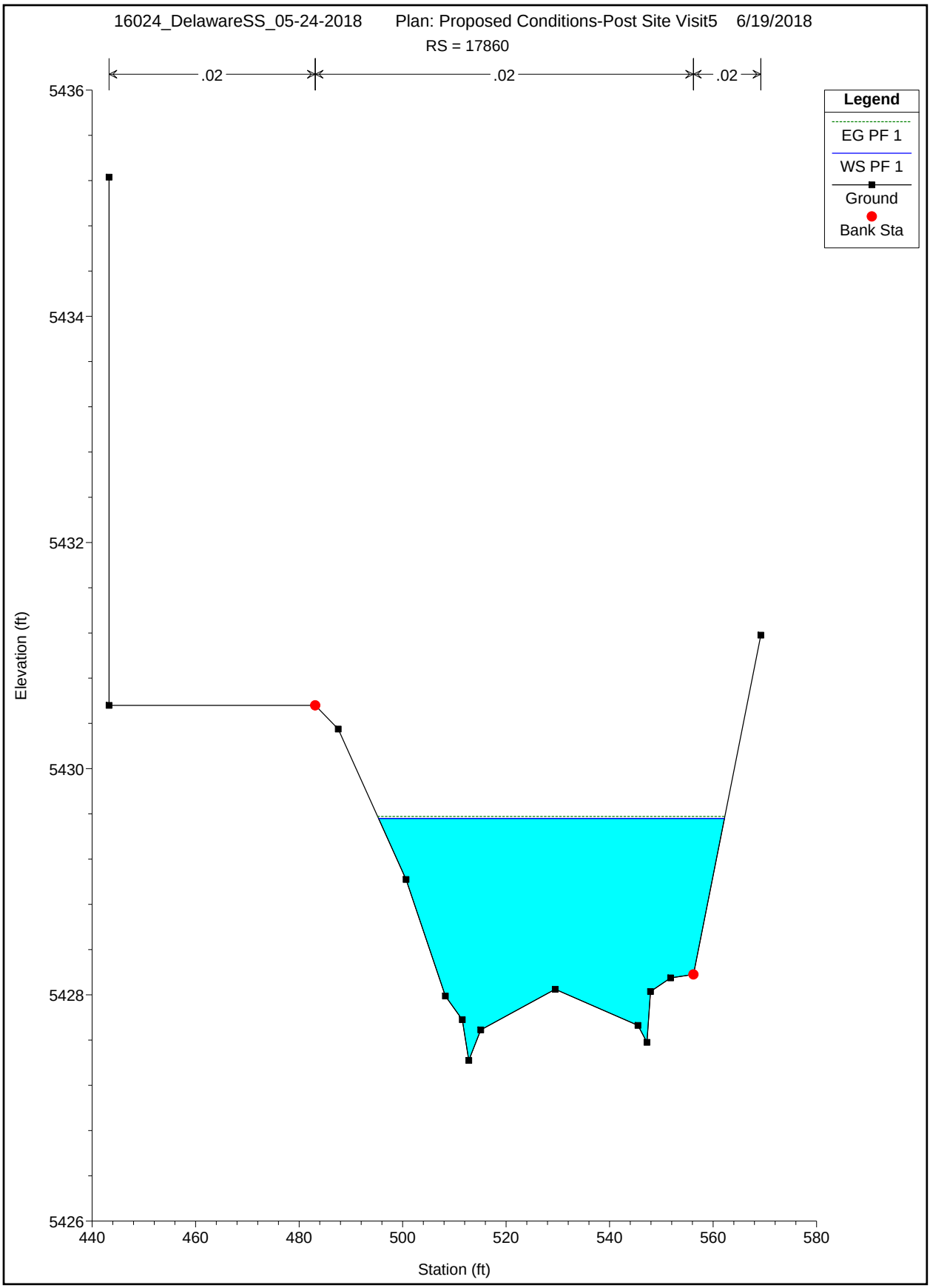
460
480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.02
.02
Legend
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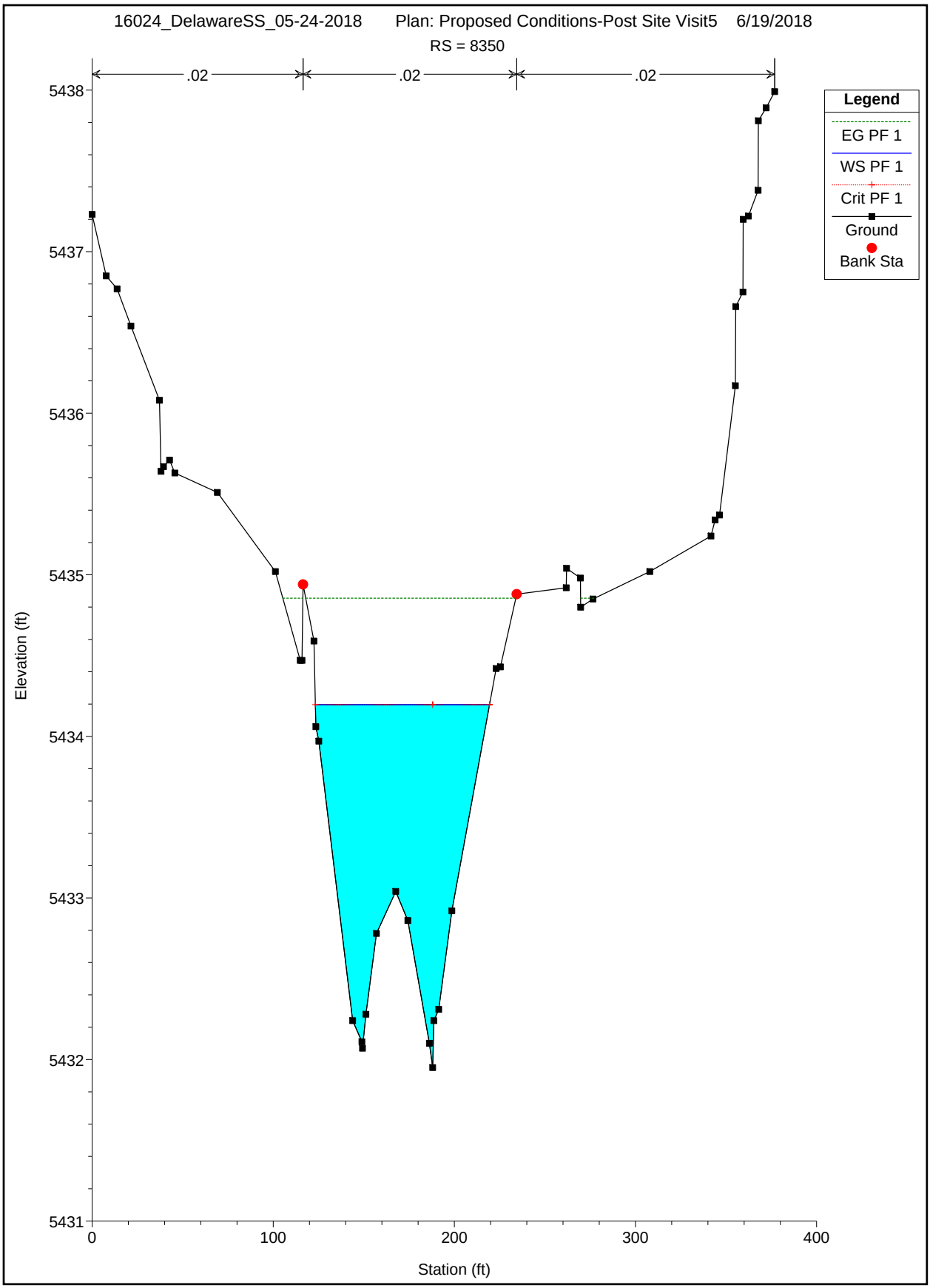
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5436
5434
5432
5430
5428
5426
440
460
480
500
520
540
560
580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RS = 8350
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.02
Legend
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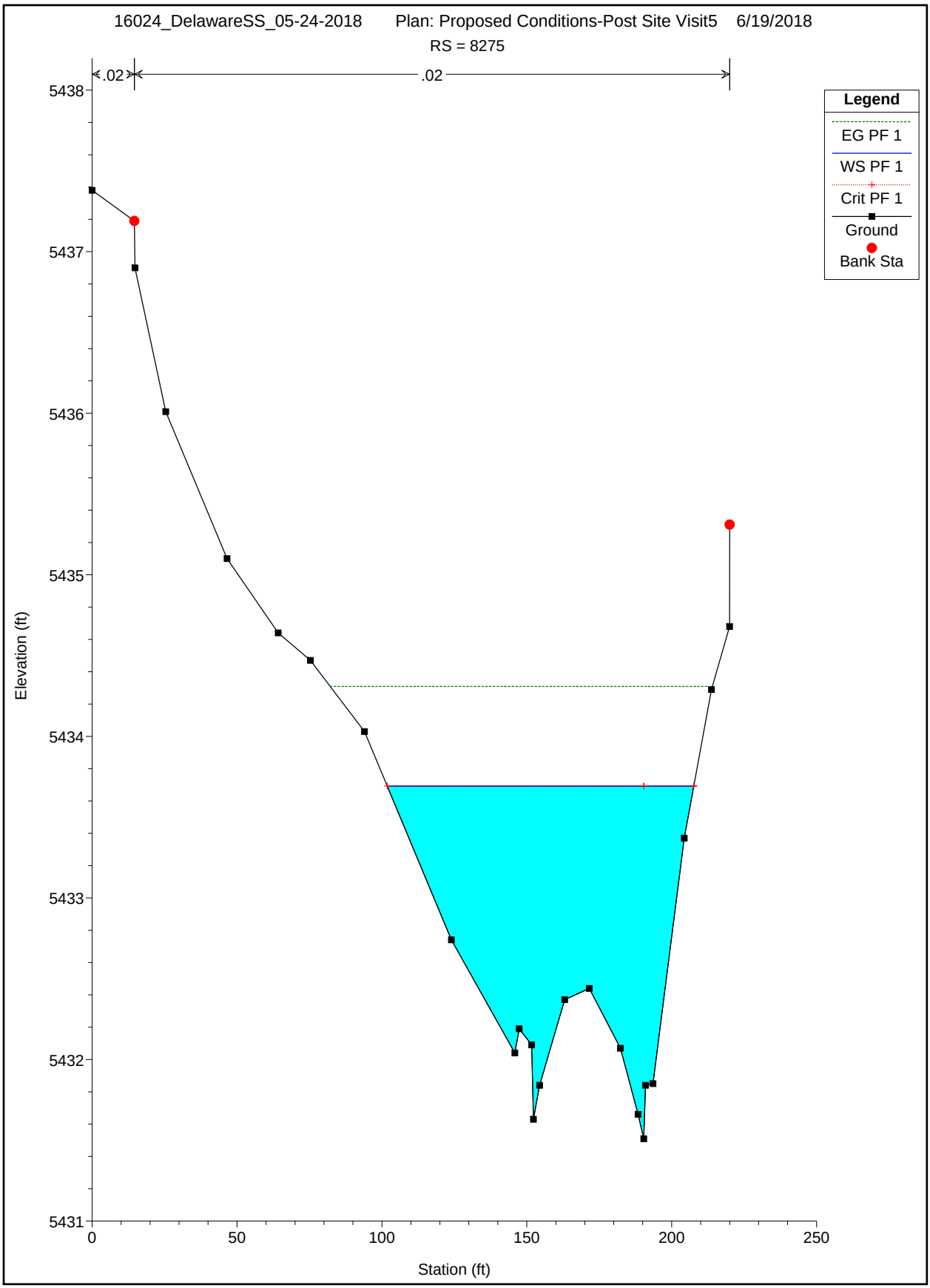
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5438
5437
5436
5435
5434
5433
5432
5431
0
100
200
300
400


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 8275
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.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
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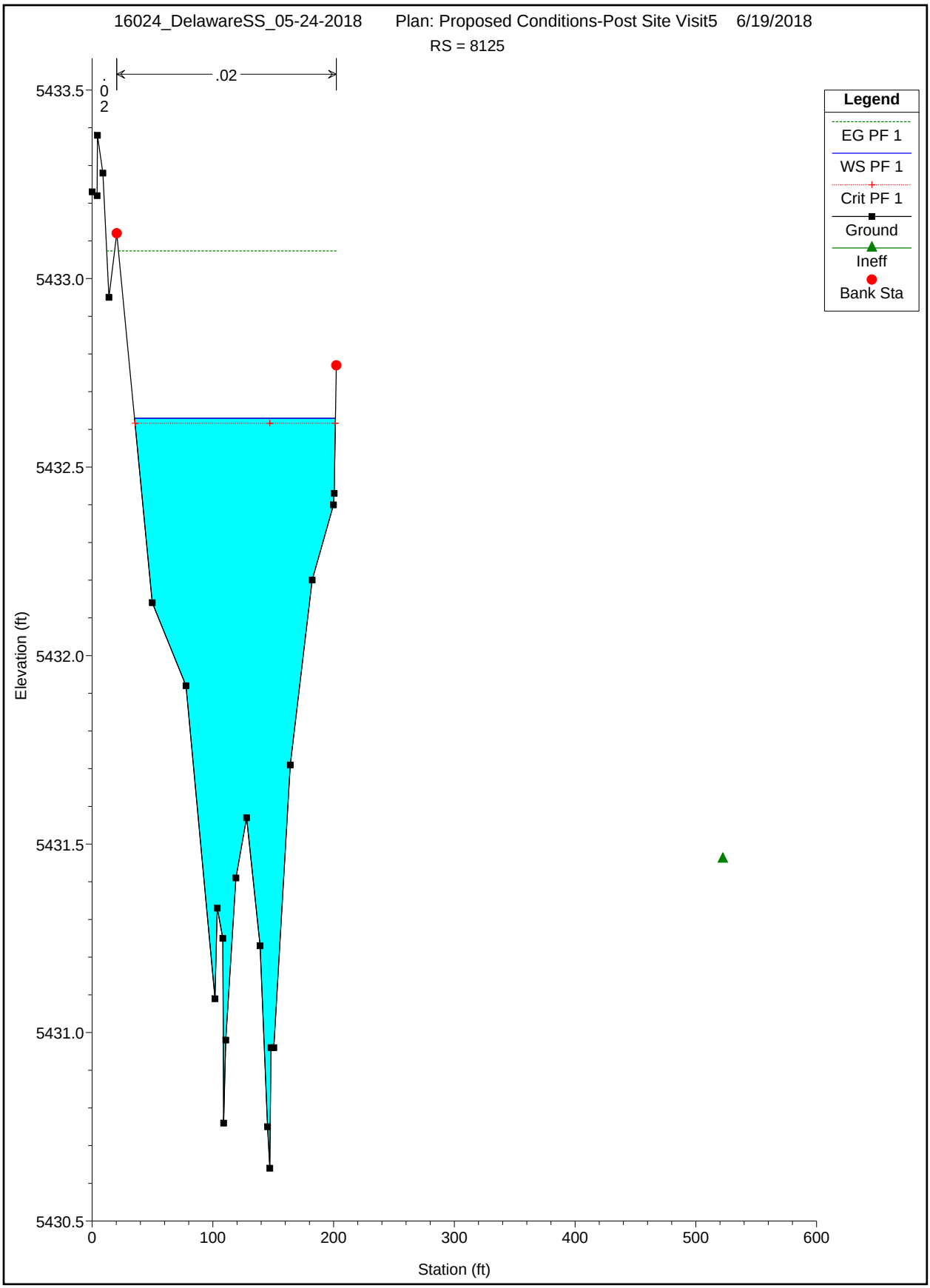
5437
5436
5435
5434
5433
5432
5431
0
50
100
150
200
250
Station (ft)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.02
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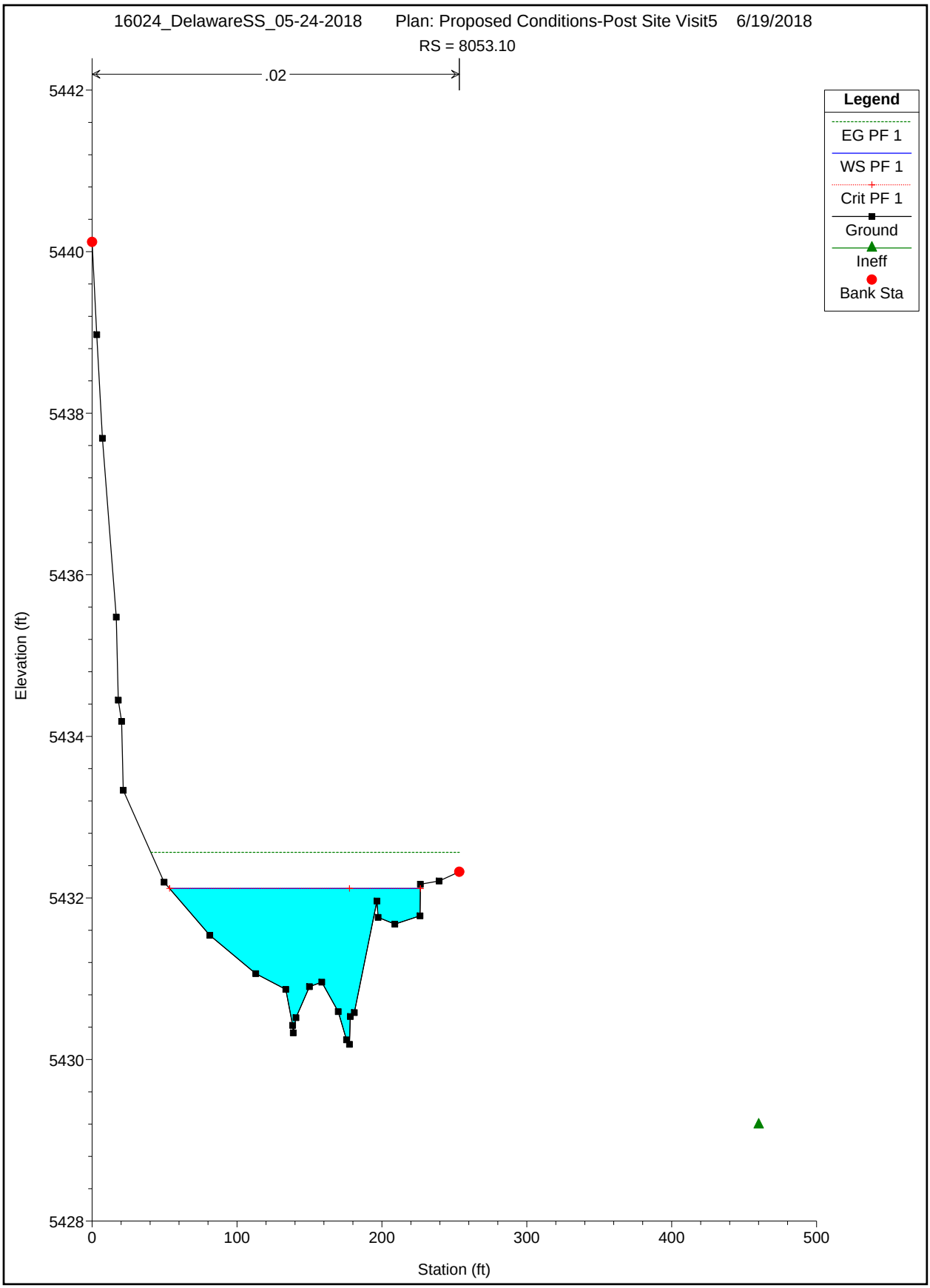
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
5433.5
5433.0
5432.5
5432.0
5431.5
5431.0
5430.5
0
100
200
300
400
500
600
Station (ft)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RS = 8053.10
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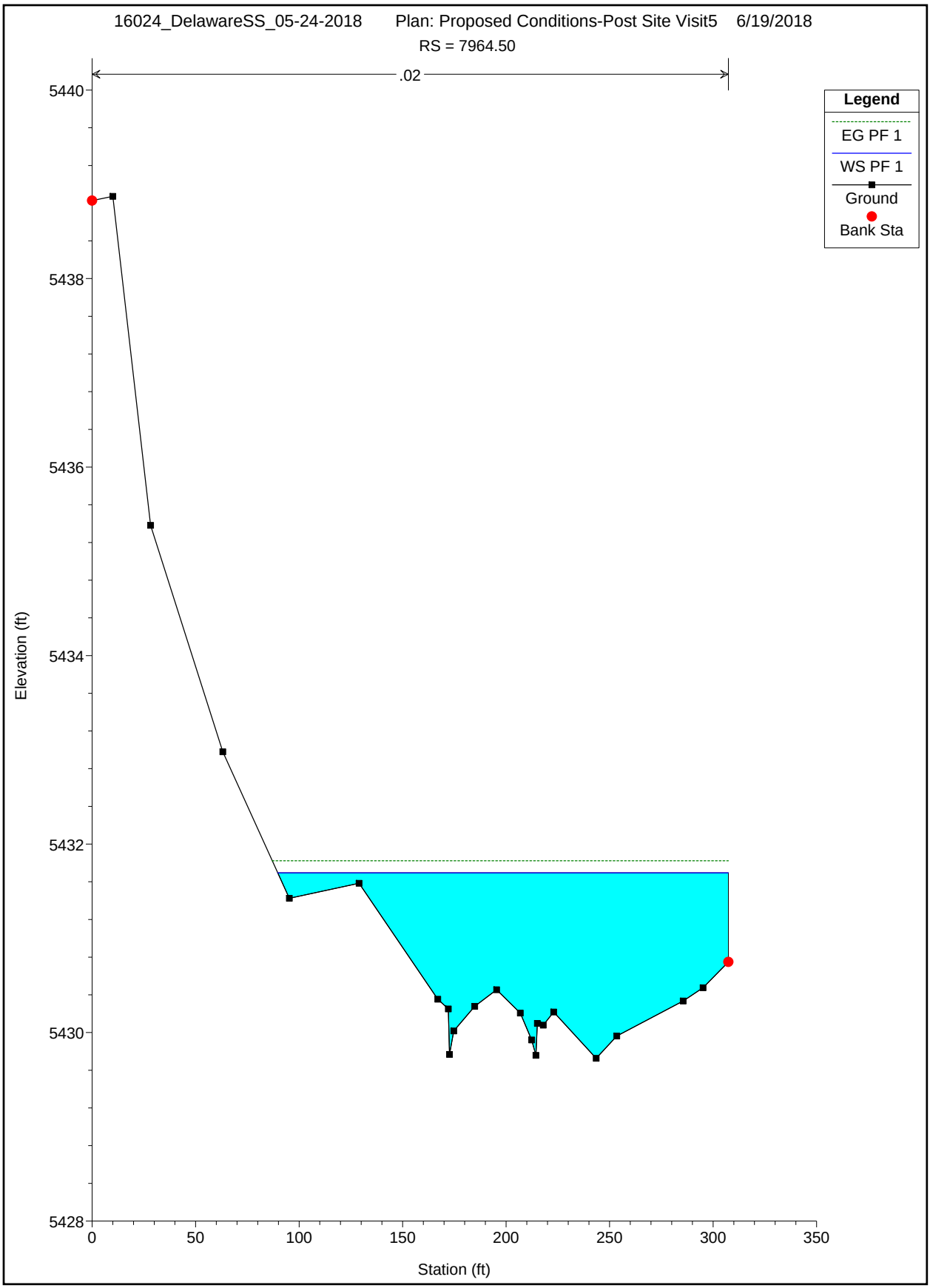
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
5442
5440
5438
5436
5434
5432
5430
5428
0
100
200
300
400
500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RS = 7964.50
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Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5438
5436
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5432
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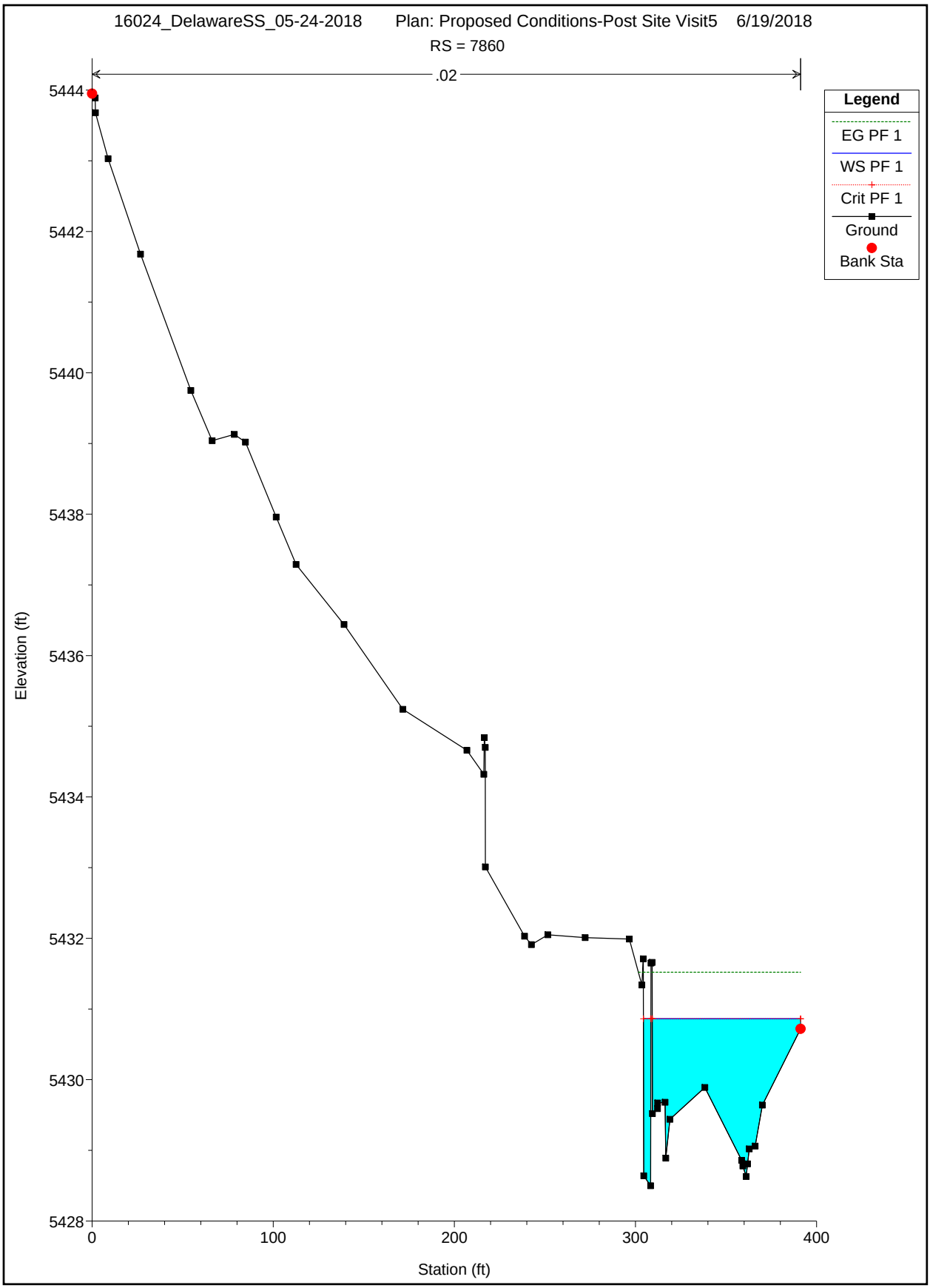
5428
0
50
100
150
200
250
300
350


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 7860
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5442
5440
5438
5436
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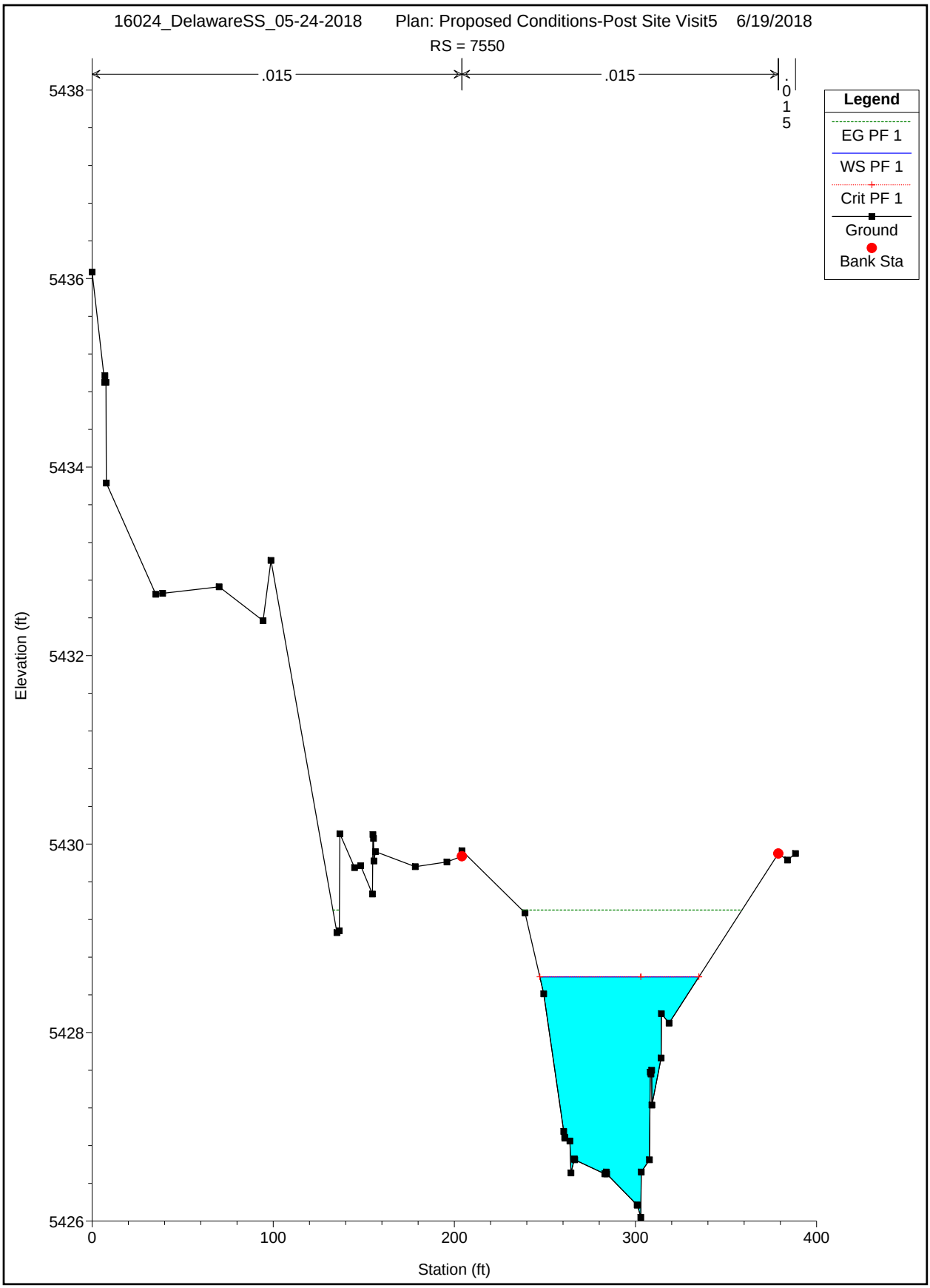
5432
5430
5428
0
100
200
300
400


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 7550
.015
.015
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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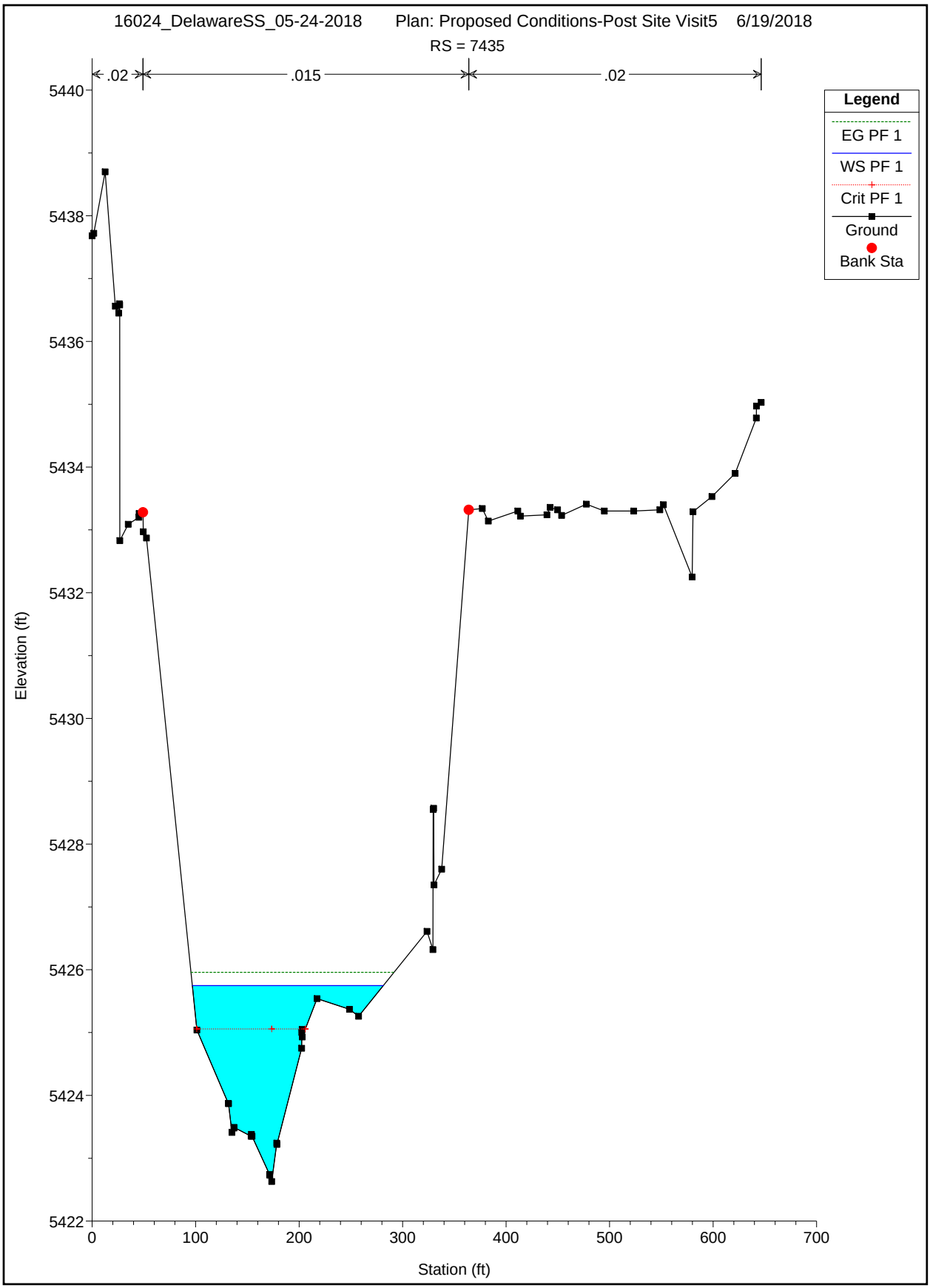
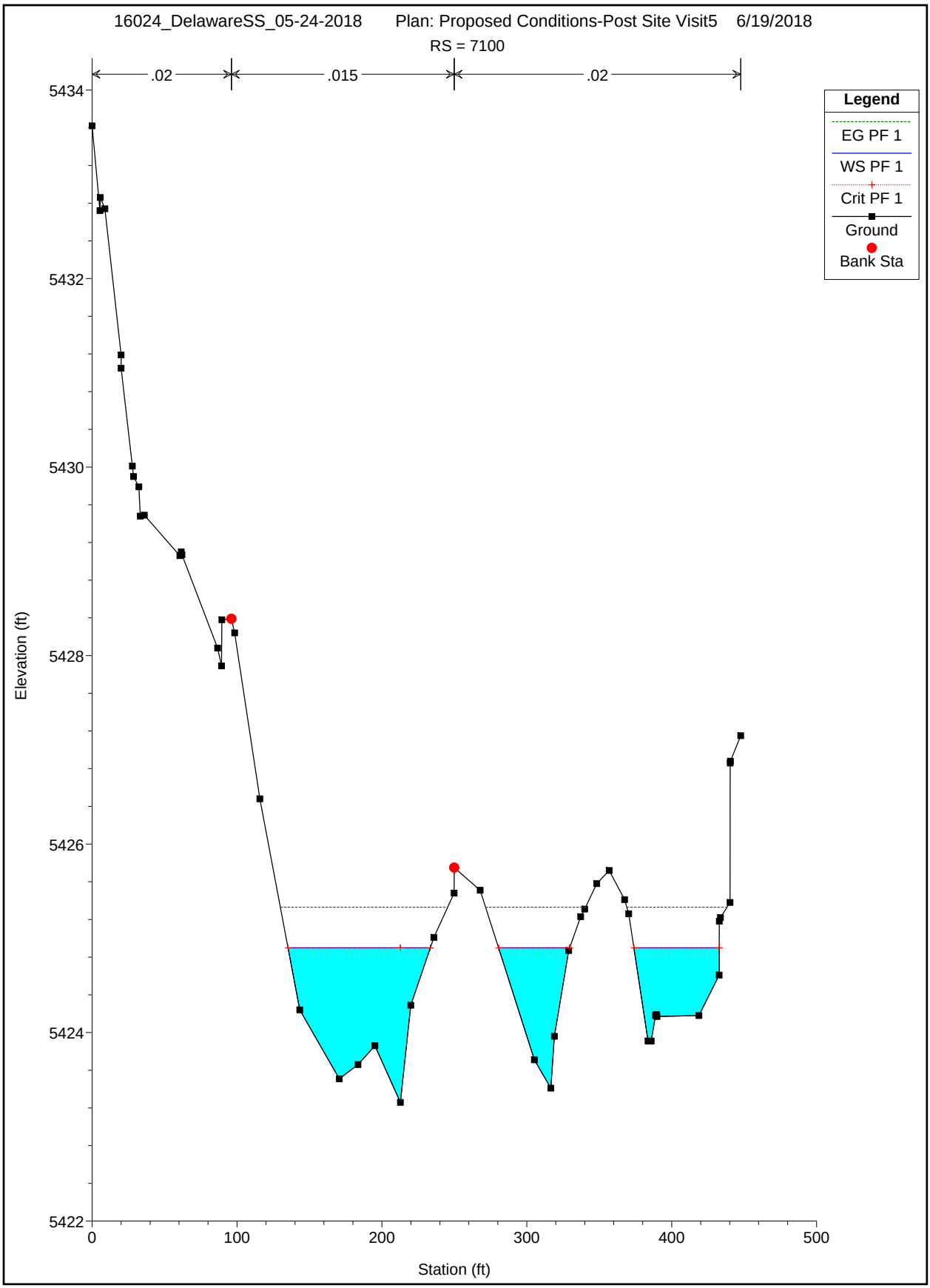
5436
5434
5432
5430
5428
5426
0
100
200
300
400


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 7435
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5440
5438
5436
5434
5432
5430
5428
5426
5424
5422
0
100
200
300
400
500
600
700


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 7100
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
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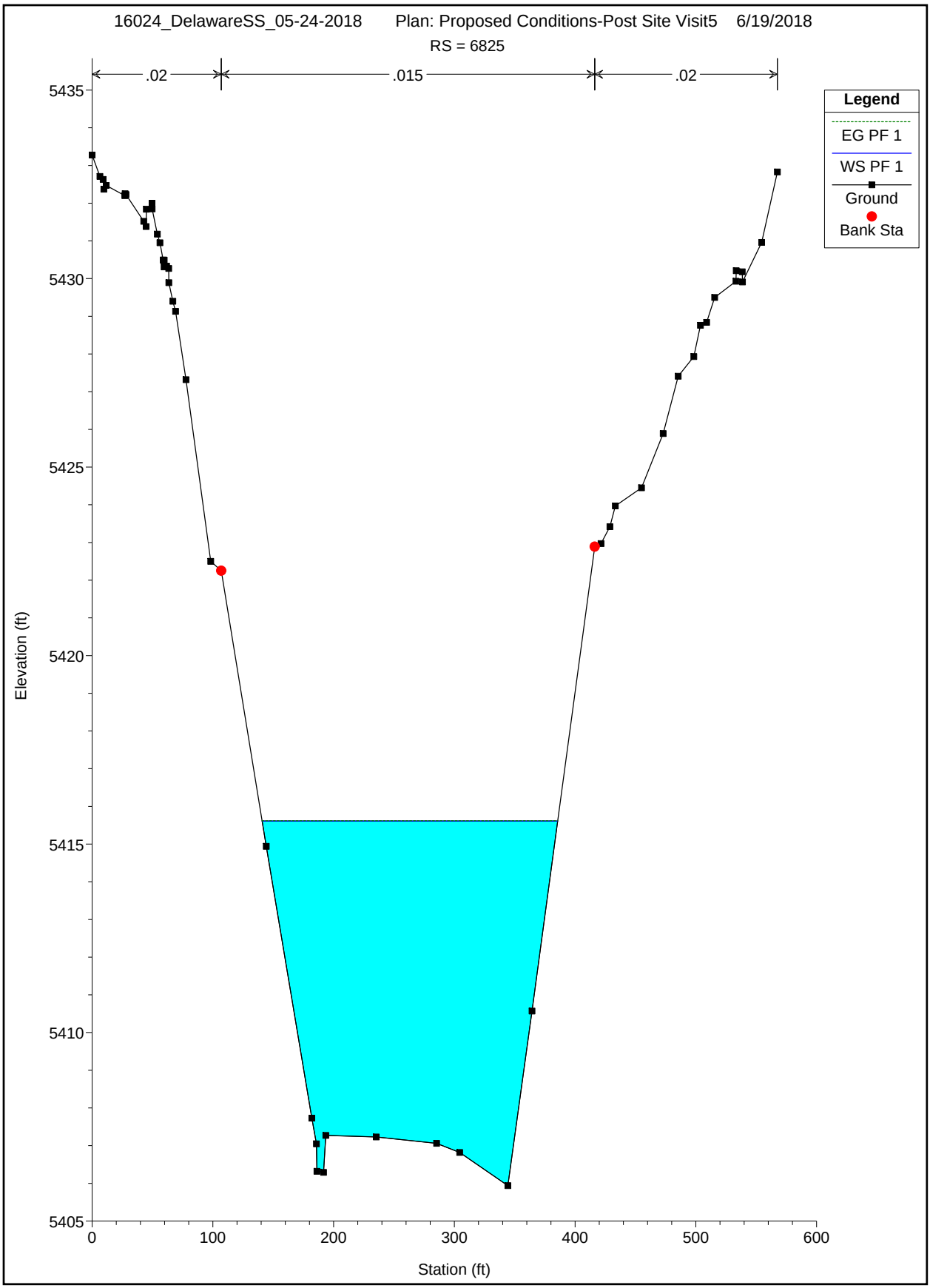
5432
5430
5428
5426
5424
5422
0
100
200
300
400
500
Station (ft)


16024_DelawareSS_05-24-2018 Plan: Proposed Conditions-Post Site Visit5 6/19/2018
RS = 6825
.02
.015
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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5425
5420
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5405
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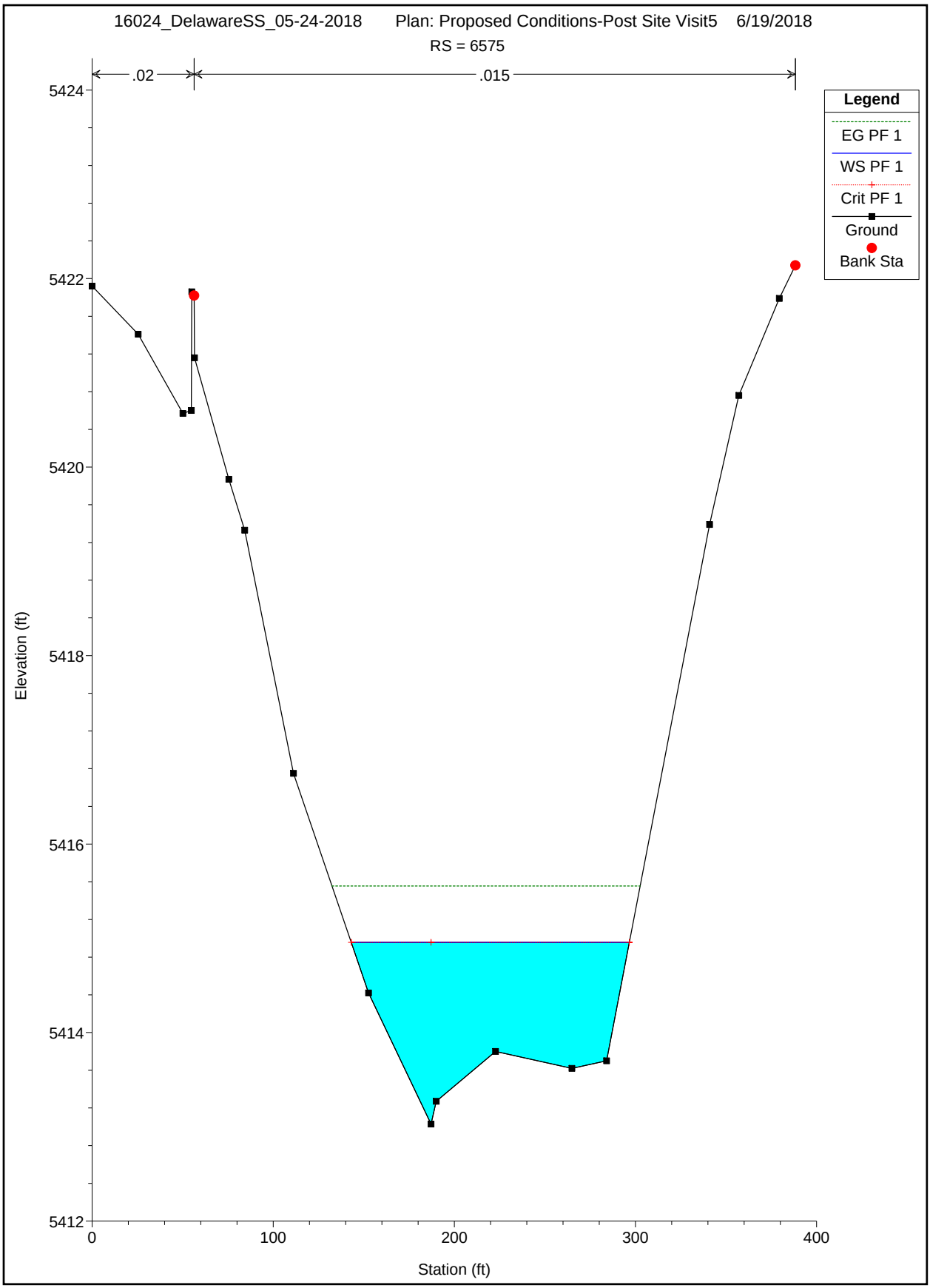
100
200
300
400
500
600
Station (ft)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RS = 6575
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.015
Legend
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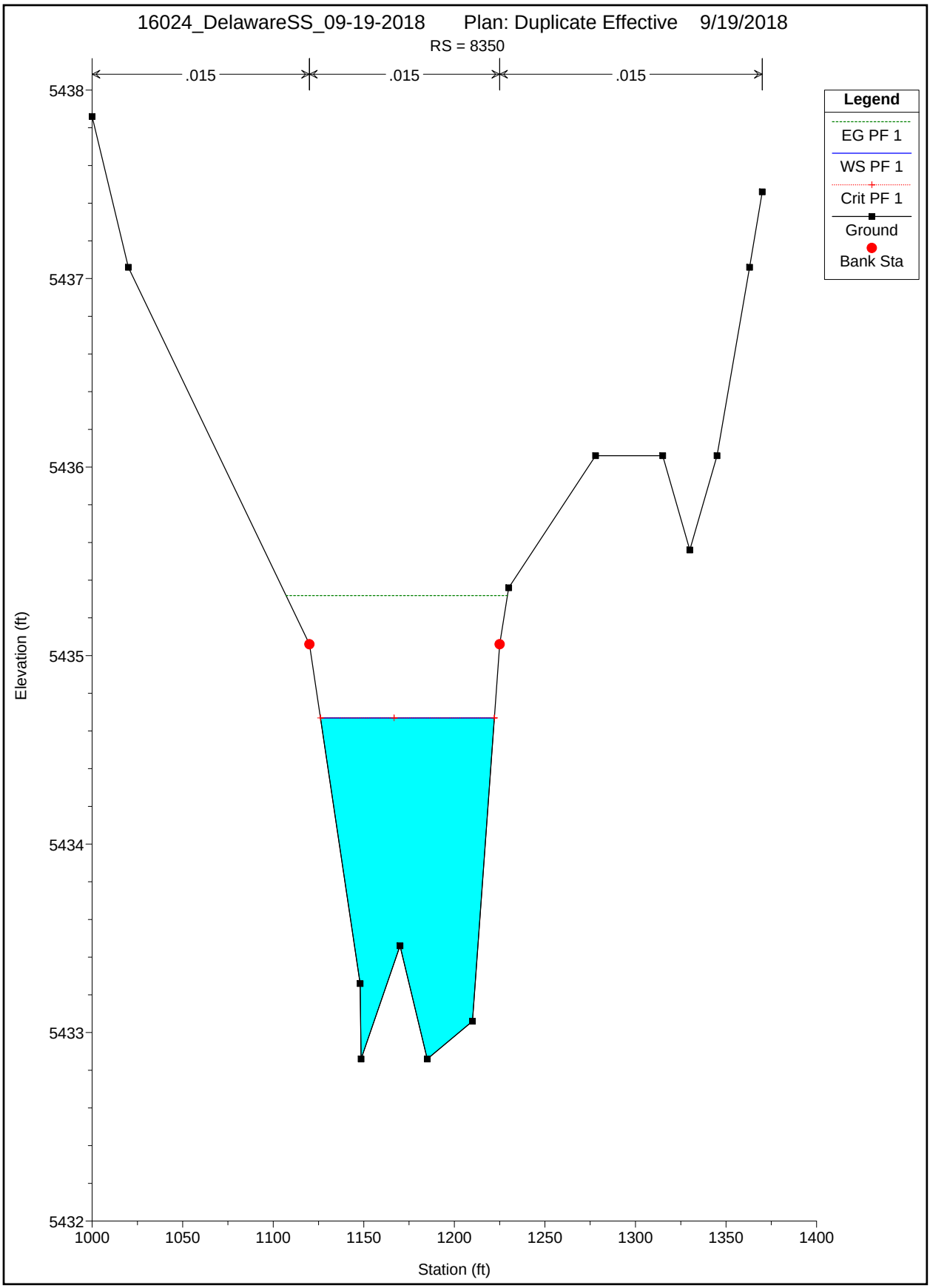
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5424
5422
5420
5418
5416
5414
5412
0
100
200
300
400

HEC-RAS Plan: DupEff River: Upper Slaughterh Reach: Delaware SS Profile: PF 1

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)	
Delaware SS	8350	PF 1	800.00	5432.86	5434.67	5434.67	5435.32	0.003047	6.46	123.76	95.98	1.00
Delaware SS	8275	PF 1	800.00	5432.56	5430.21		5430.22	0.000007		1177.68	270.87	0.00
Delaware SS	8125	PF 1	810.00	5431.36	5430.21		5430.22	0.000012		1232.98	302.40	0.00
Delaware SS	7860	PF 1	820.00	5429.66	5430.10		5430.20	0.000843	0.68	331.45	286.32	0.28
Delaware SS	7550	PF 1	830.00	5426.66	5428.91	5428.91	5429.69	0.002894	7.09	117.02	75.99	1.01
Delaware SS	7435	PF 1	840.00	5423.86	5426.58	5425.91	5426.86	0.000756	4.28	200.72	113.37	0.54
Delaware SS	7100	PF 1	840.00	5424.46	5425.88	5425.88	5426.35	0.003756	6.00	160.17	184.84	1.07
Delaware SS	6825	PF 1	1130.00	5408.06	5417.39		5417.39	0.000002	0.57	2002.02	249.47	0.03
Delaware SS	6575	PF 1	1130.00	5415.06	5416.66	5416.61	5417.32	0.002683	6.53	173.13	120.40	0.96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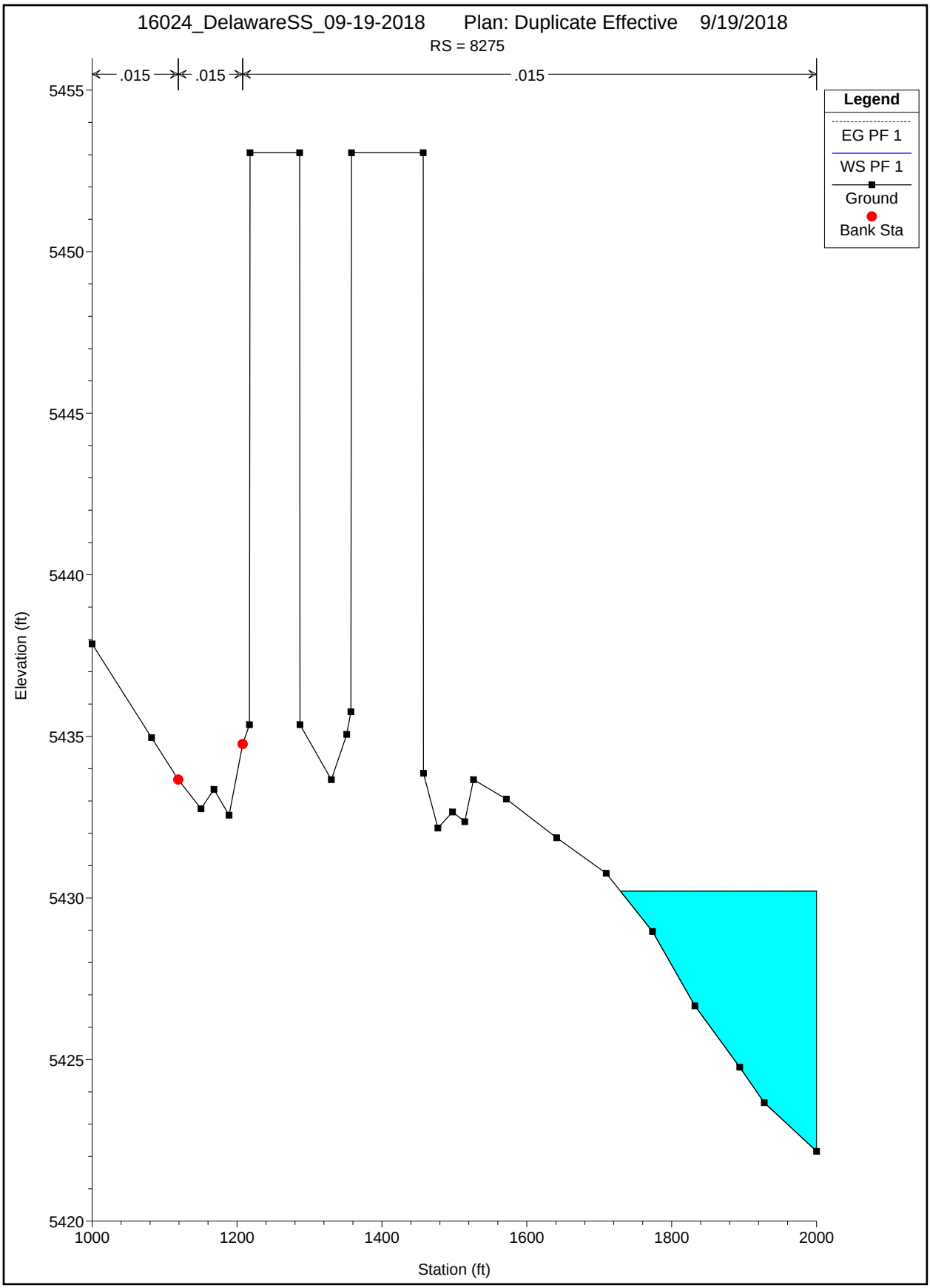
RS = 8350
.015
.015
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5438
5437
5436
5435
5434
5433
5432
1000
1050
1100
1150
1200
1250
1300
1350
1400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.015
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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5450
5445
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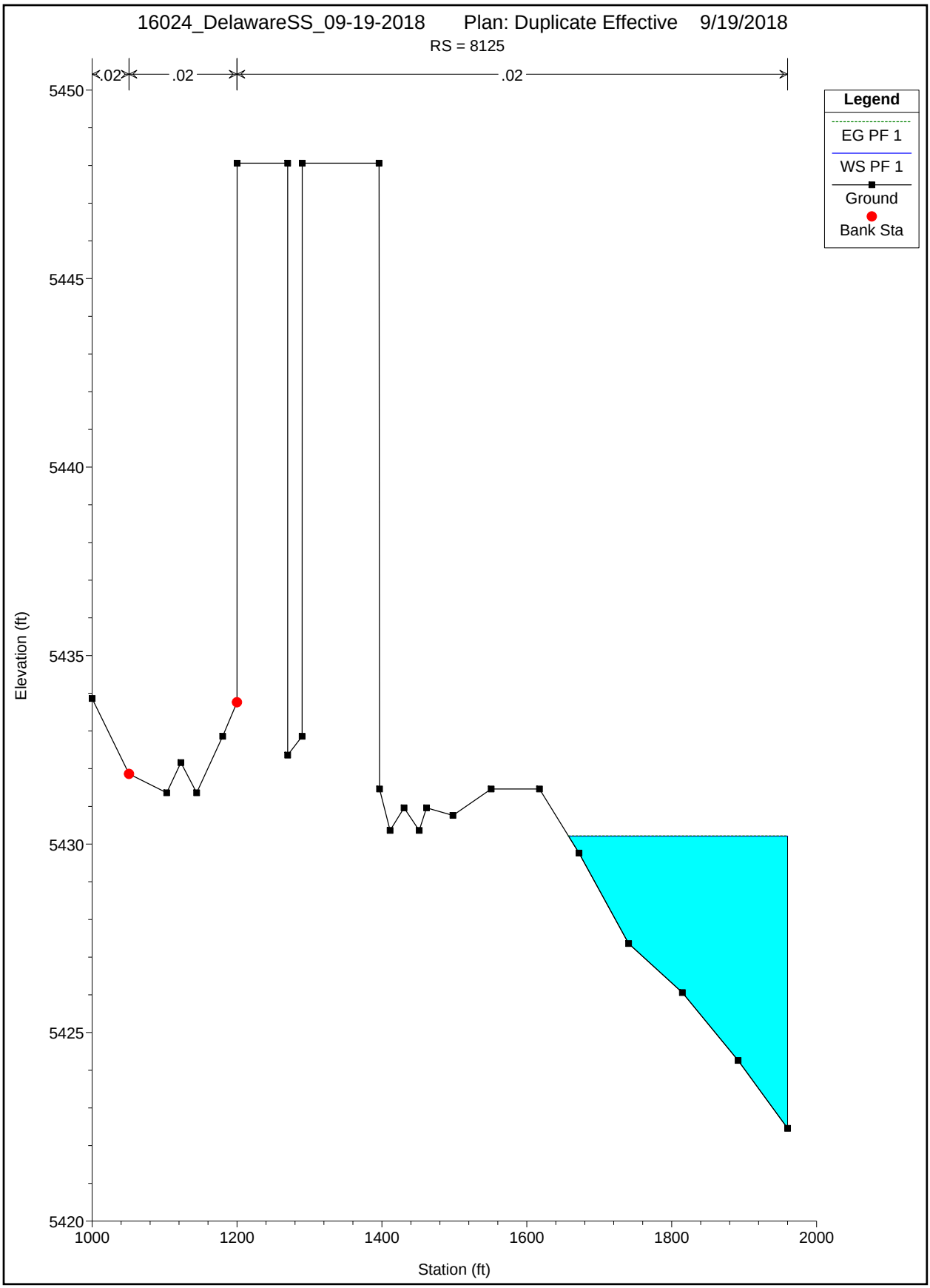
5435
5430
5425
5420
1000
1200
1400
1600
1800
2000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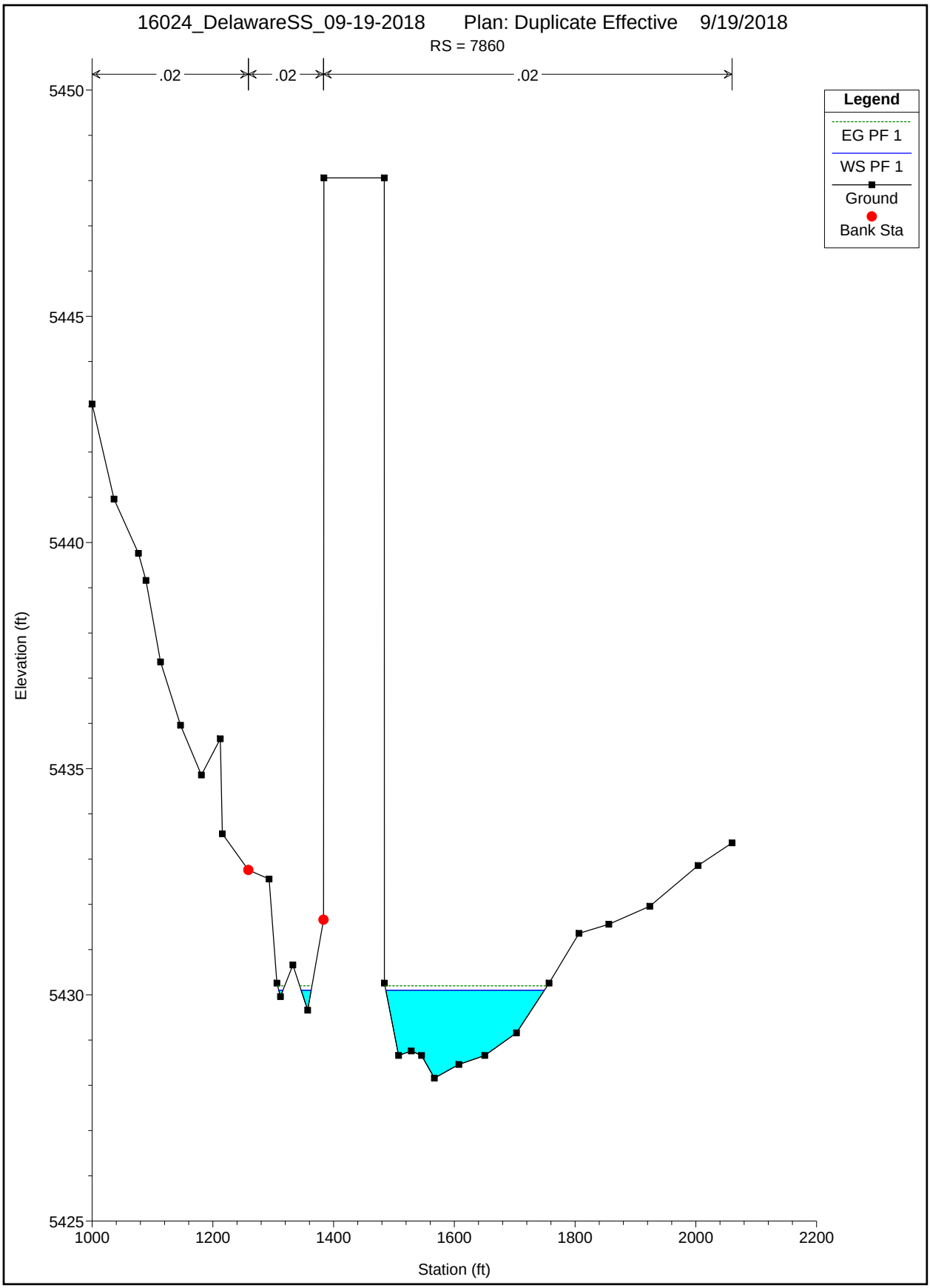
.02
.02
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
5450
5445
5440
5435
5430
5425
5420
1000
1200
1400
1600
1800
2000
Station (ft)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RS = 7860
.02
.02
.02
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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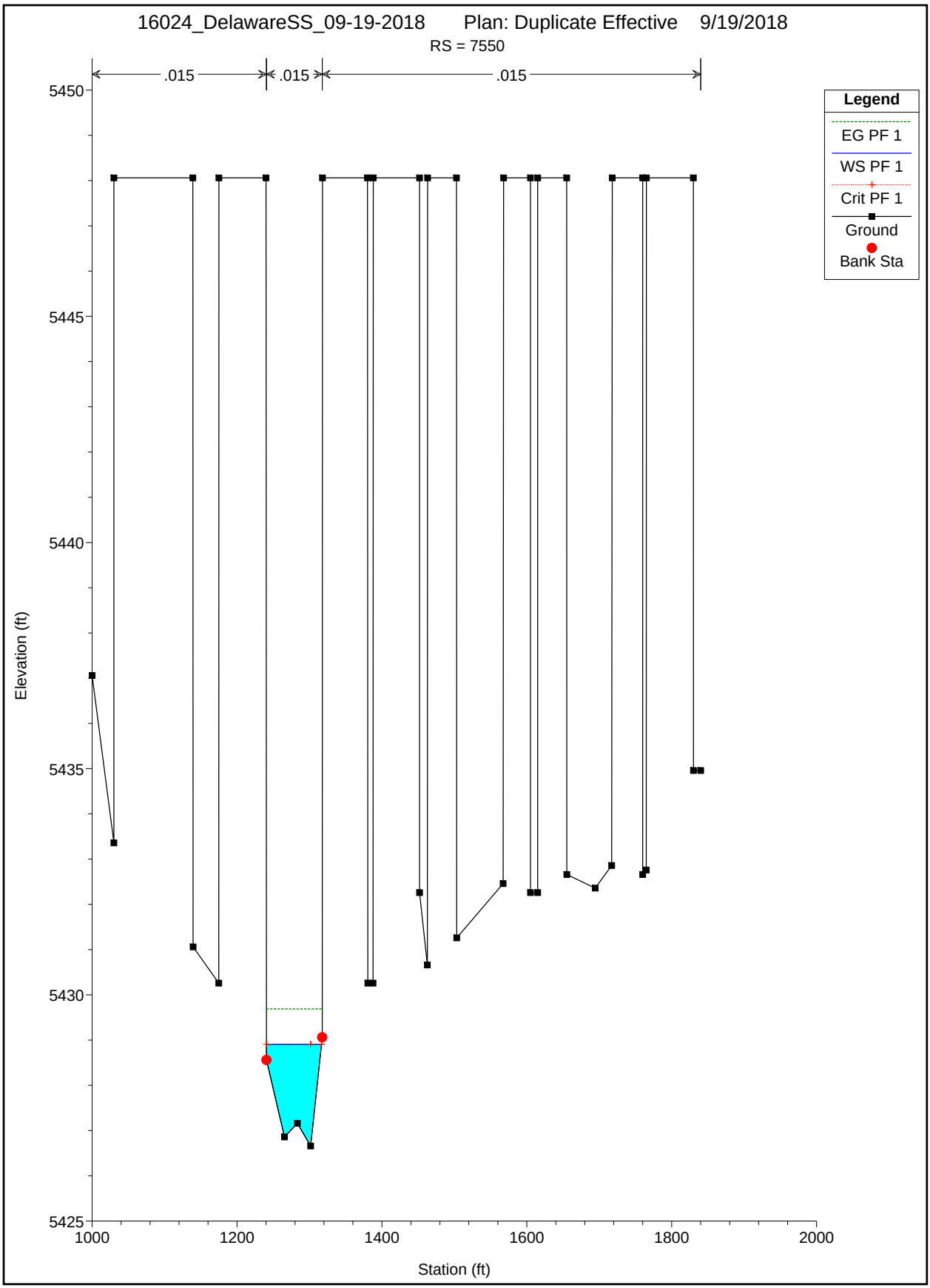
5445
5440
5435
5430
5425
1000
1200
1400
1600
1800
2000
2200


16024_DelawareSS_09-19-2018 Plan: Duplicate Effective 9/19/2018
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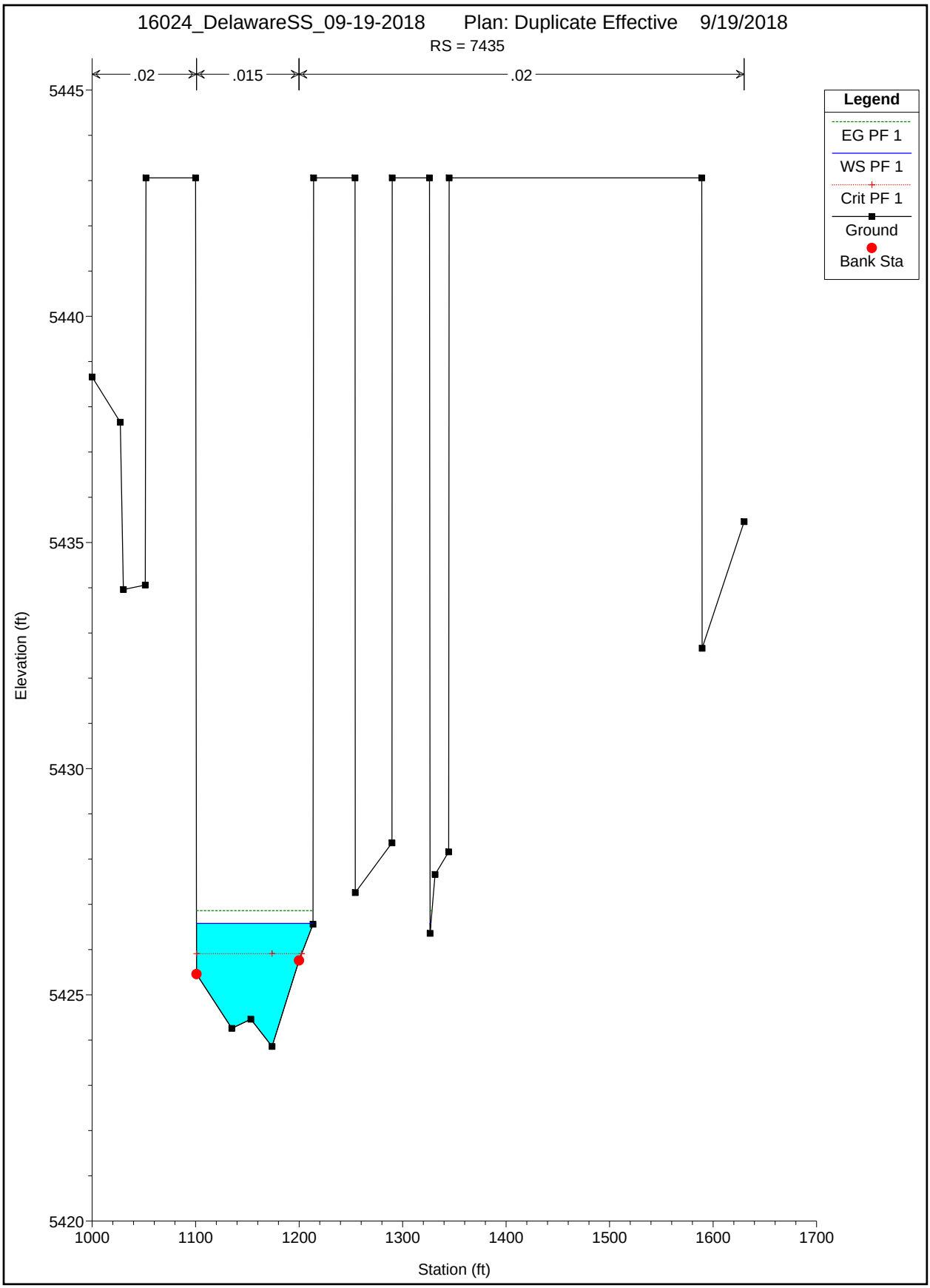
.015
.015
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5450
5445
5440
5435
5430
5425
1000
1200
1400
1600
1800
2000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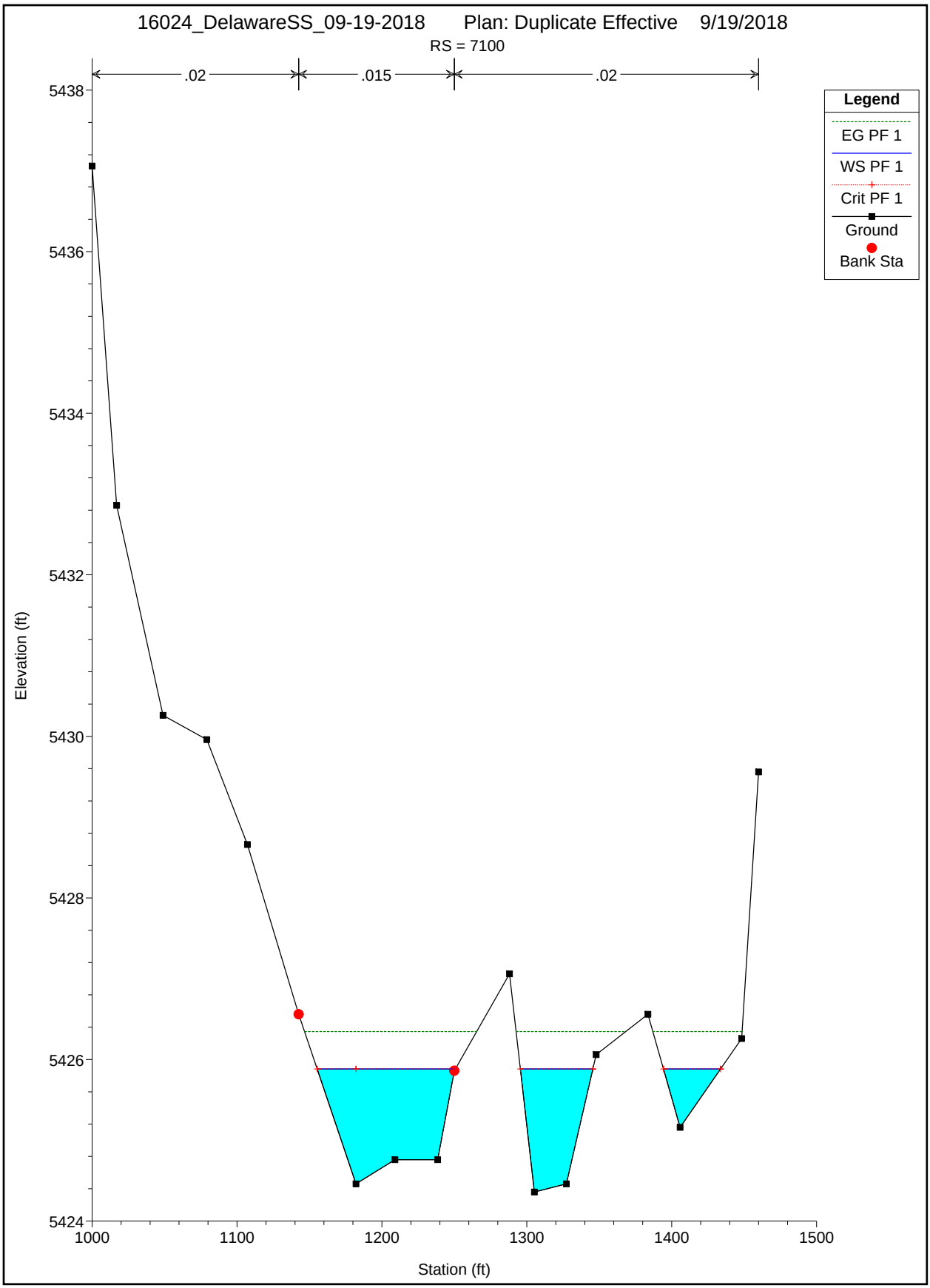
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5445
5440
5435
5430
5425
5420
1000
1100
1200
1300
1400
1500
1600
1700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RS = 7100
.02
.015
.02
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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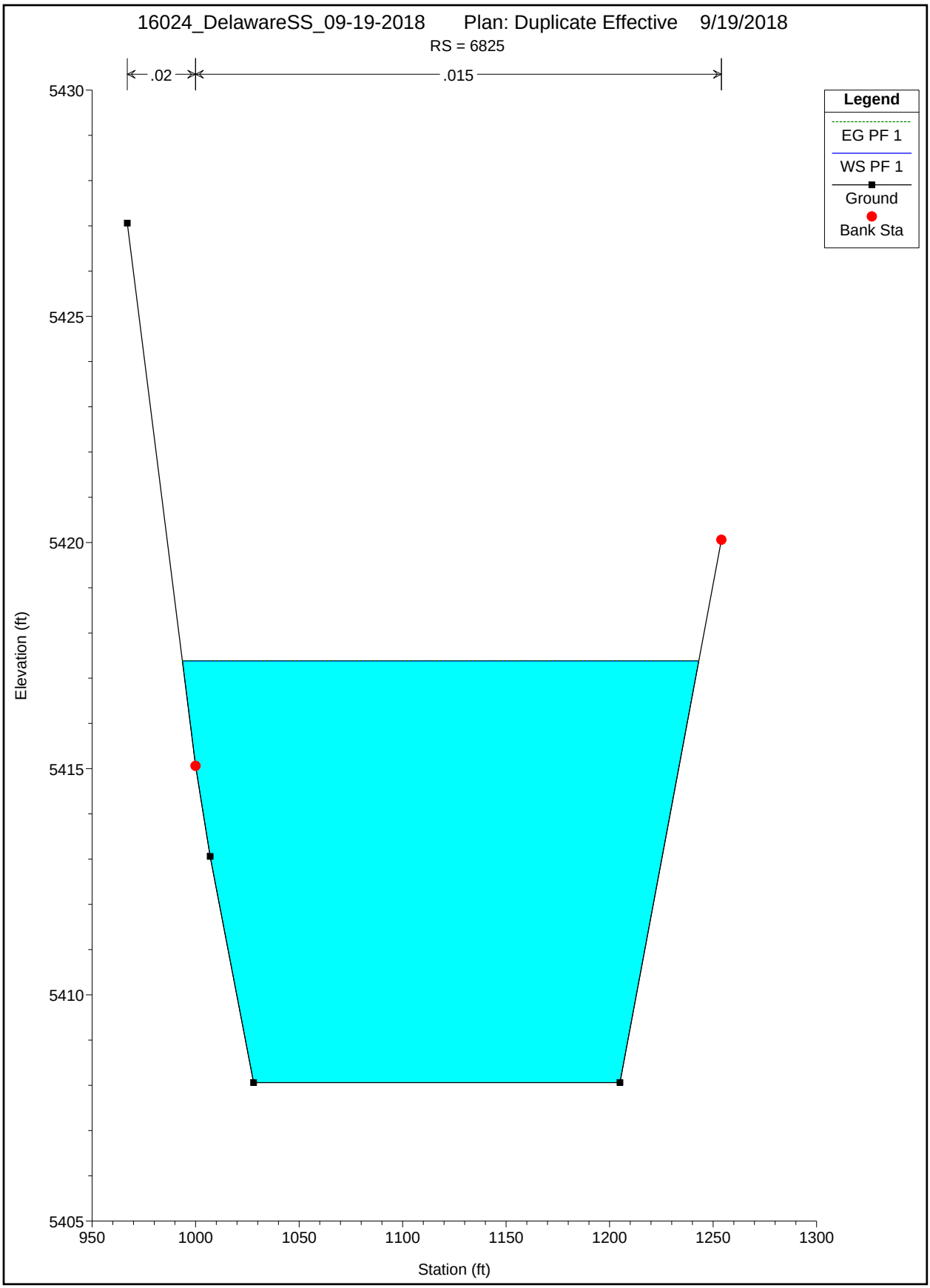
5434
5432
5430
5428
5426
5424
1000
1100
1200
1300
1400
1500


16024_DelawareSS_09-19-2018 Plan: Duplicate Effective 9/19/2018
RS = 6825
.02
.015
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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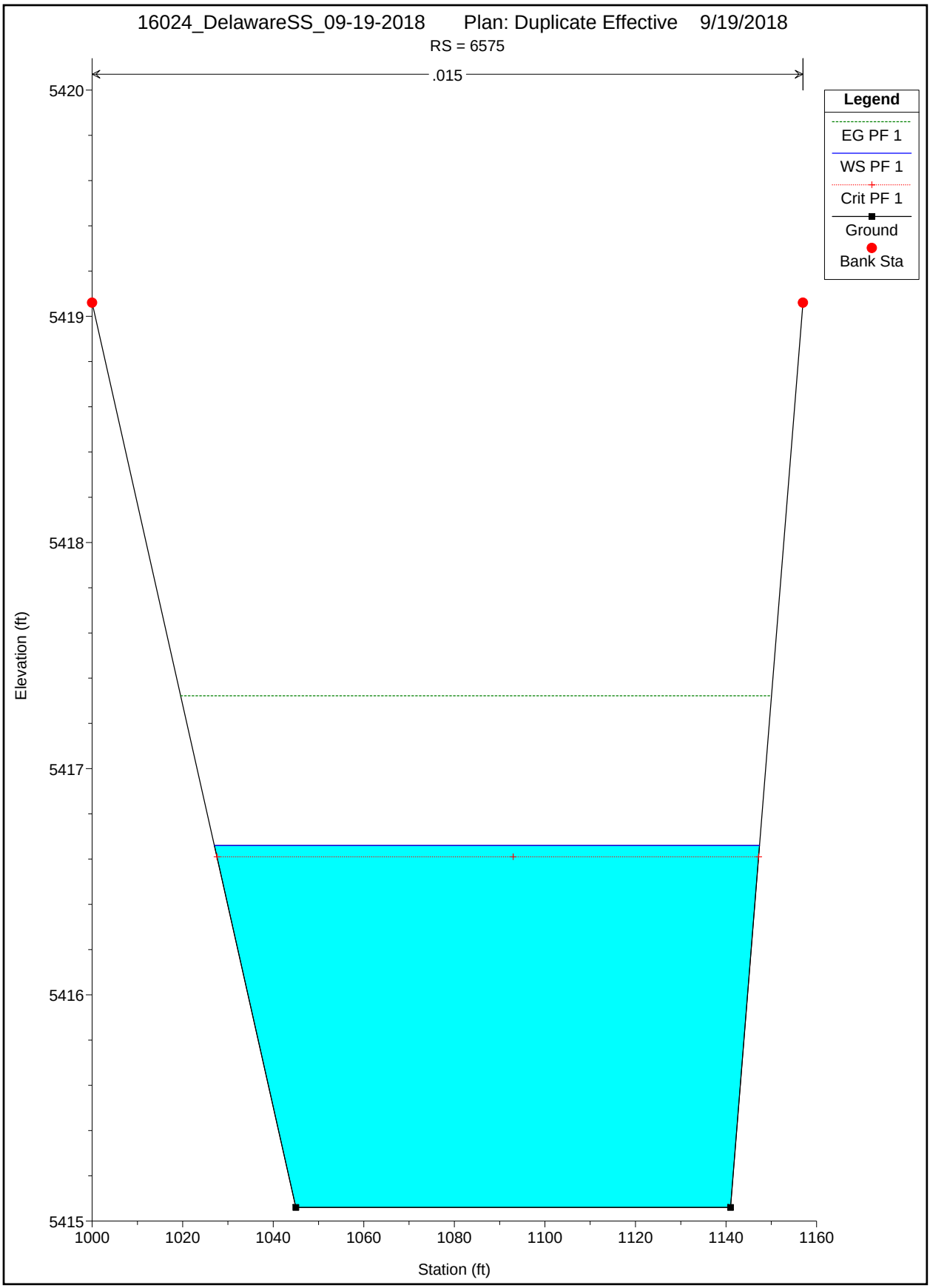
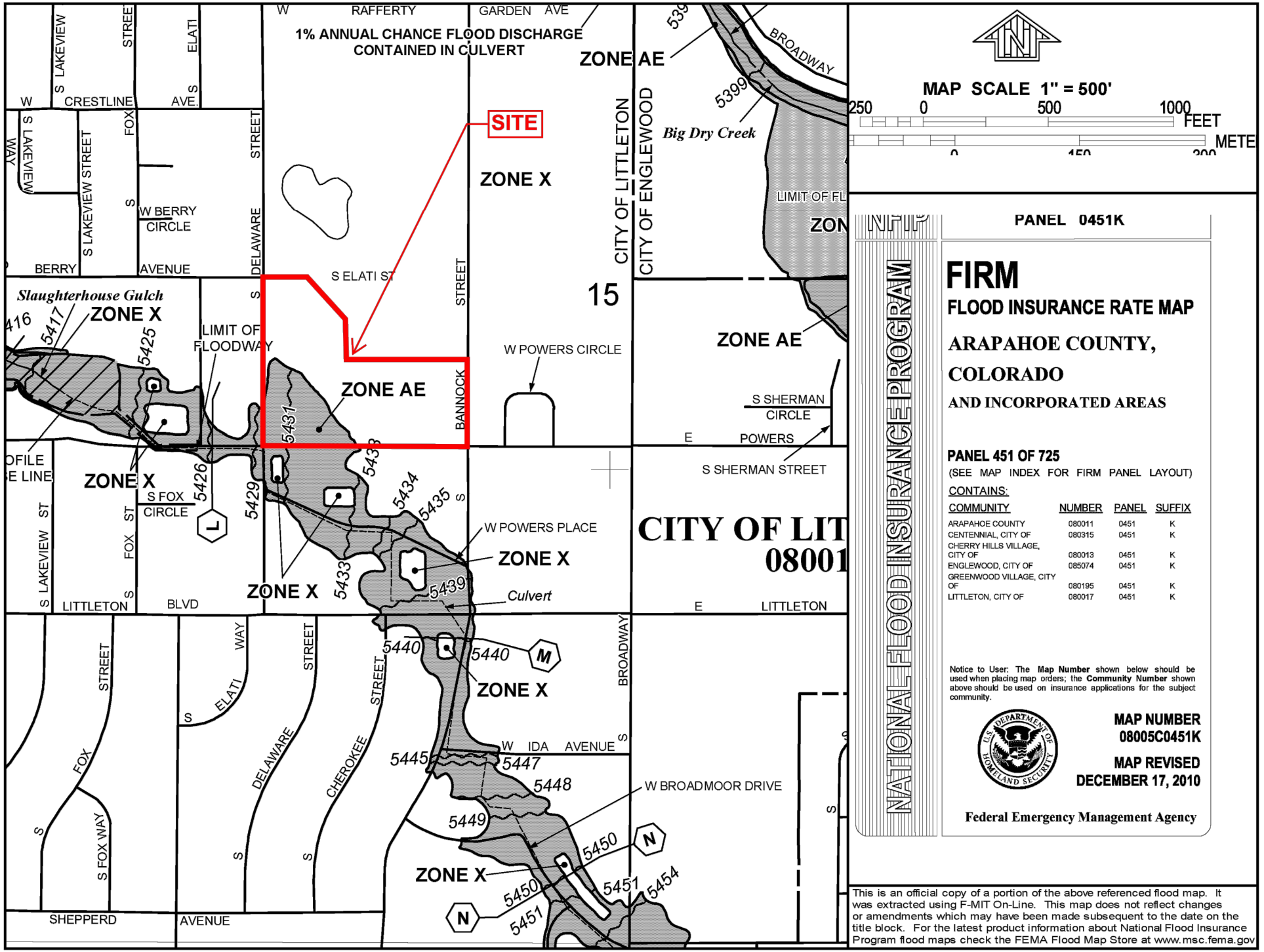
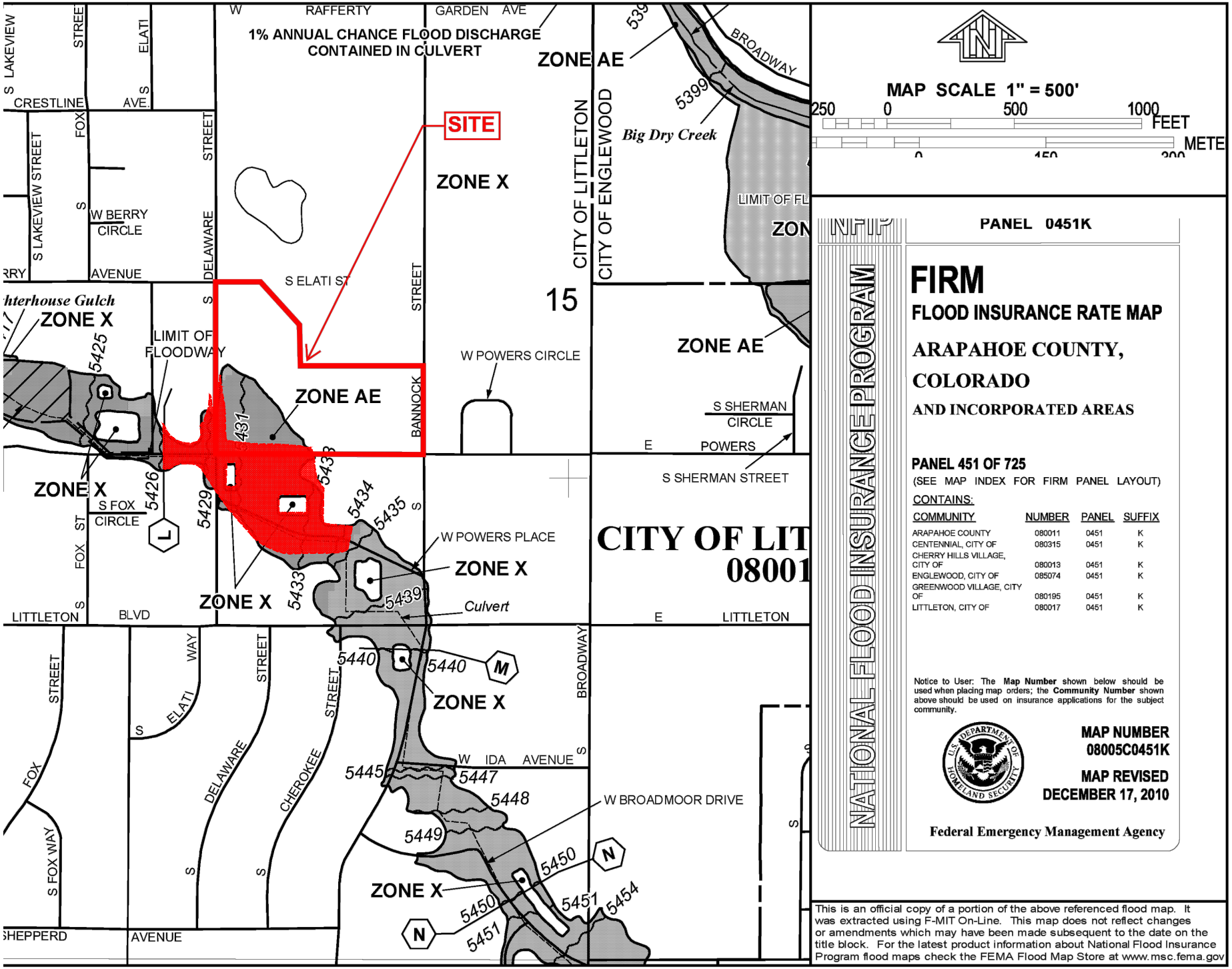
5425
5420
5415
5410
5405
950
1000
1050
1100
1150
1200
1250
1300


16024_DelawareSS_09-19-2018 Plan: Duplicate Effective 9/19/2018
RS = 6575
.015
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
5420
5419
5418
5417
5416
5415
1000
1020
1040
1060
1080
1100
1120
1140
1160
Station (ft)

Appendix D –FIRM Panels


1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
SITE
ZONE X
ZONE AE
ZONE A
Big Dry Creek
Slaughterhouse Gulch
LIMIT OF FLOODWAY
CITY OF LITTLETON
CITY OF ENGLEWOOD
15
W RAFFERTY GARDEN AVE
S ELATI ST
W POWERS CIRCLE
S SHERMAN CIRCLE
S SHERMAN STREET
W POWERS PLACE
Culvert
W BROADMOOR DRIVE
W IDA AVENUE
W CRESTLINE AVE.
W BERRY CIRCLE
S FOX CIRCLE
S FOX WAY
SHEPPERD AVENUE
LITTLETON BLVD
E LITTLETON
BROADWAY
S LAKEVIEW STREET
S DELAWARE STREET
S CHEROKEE STREET
BANNOCK STREET
5399
5416
5417
5425
5426
5429
5431
5433
5434
5435
5439
5440
5445
5447
5448
5449
5450
5451
5454
L
M
N
MAP SCALE 1" = 500'
250 0 500 1000 FEET
METE
PANEL 0451K
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
ARAPAHOE COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 451 OF 725
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ARAPAHOE COUNTY 080011 0451 K
CENTENNIAL, CITY OF 080315 0451 K
CHERRY HILLS VILLAGE, CITY OF 080013 0451 K
ENGLEWOOD, CITY OF 085074 0451 K
GREENWOOD VILLAGE, CITY OF 080195 0451 K
LITTLETON, CITY OF 080017 0451 K
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
08005C0451K
MAP REVISED
DECEMBER 17, 2010
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


1% ANNUAL CHANCE FLOOD DISCHARGE
CONTAINED IN CULVERT
SITE
ZONE X
ZONE AE
ZONE X
ZONE AE
ZONE X
ZONE X
ZONE X
ZONE X
ZONE AE
ZONE X
LIMIT OF FLOODWAY
Big Dry Creek
Culvert
W RAFFERTY GARDEN AVE
S ELATI ST
W POWERS CIRCLE
S SHERMAN CIRCLE
E POWERS
S SHERMAN STREET
W POWERS PLACE
W IDA AVENUE
W BROADMOOR DRIVE
S FOX CIRCLE
W BERRY CIRCLE
CRESTLINE AVE.
S LAKEVIEW STREET
AVENUE
LITTLETON BLVD
E LITTLETON
S FOX WAY
SHEPPERD AVENUE
BROADWAY
CITY OF LITTLETON
CITY OF ENGLEWOOD
BANNOCK STREET
DELAWARE STREET
CHEROKEE STREET
FOX STREET
S ELATI WAY
15
CITY OF LIT
08001
5425
5426
5429
5431
5433
5434
5435
5438
5439
5440
5445
5447
5448
5449
5450
5451
5454
5399
539
MAP SCALE 1" = 500'
250 0 500 1000 FEET
METE
PANEL 0451K
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
ARAPAHOE COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 451 OF 725
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ARAPAHOE COUNTY 080011 0451 K
CENTENNIAL, CITY OF 080315 0451 K
CHERRY HILLS VILLAGE, CITY OF 080013 0451 K
ENGLEWOOD, CITY OF 085074 0451 K
GREENWOOD VILLAGE, CITY OF 080195 0451 K
LITTLETON, CITY OF 080017 0451 K
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
08005C0451K
MAP REVISED
DECEMBER 17, 2010
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

Appendix E –Reference Information

GENERAL NOTES

1. Floodplain based upon future development conditions with existing drainage facilities.
2. This drawing is a "Master Planning Sheet" representing preliminary and conceptual engineering and is subject to change. This drawing shall not be used for construction purposes.

E 43,000

N 649,000

S. HURON ST.

S. FOX ST.

S. ELATI ST.

W. BERRY AVE.

W. POWERS DR.

POWERS AVE.

S. DELAWARE ST.

S. BANNOCK ST.

LITTLETON BLVD.

POWERS PLACE

100 YEAR FLOODPLAIN

Elevation water first enters structure

Benchmark USHG-1 (brass cap)

Powers Park

℄ Low flow channel, Detail A

STUDY LIMITS STATION 62+10

MATCH LINE FLOODPLAIN STATION 91+00 (SHEET 3)

Construct new 8" VCP

EXISTING 10" STORM SEWER EASEMENT (NOT TO SCALE)

100 Year floodplain with improvements

Benchmark (nail) 1-2 5443.38

100 50 0 100 200

DATUM IS MEAN SEA LEVEL

PROPOSED SYSTEM CAPACITY
Sta. 70+00 to 78+75 BK Q=324 cfs (5 Year)
78+25 AHD
Sta. 78+25 to 88+00 Q=303 cfs (5 Year)
Sta. 88+80 to 91+00 Q=282 cfs (5 Year)

EXISTING OUTLET SYSTEM
EXISTING 12" RCP LOW FLOW DIVERSION
Proposed additional outlet structure
Remove wall
EXISTING 54" RCP
Proposed 54" RCP

PLAN

PROFILE

Cross Section Location (Typ.)

DETAIL A-LOW FLOW CHANNEL
(Looking U/S)

MATCH LINE

EXISTING OUTFALL SYSTEM STA. 70+00
5 YEAR WATER SURFACE=5410.3
SPILLWAY CREST EL.=5410 ±
POWERS PARK
EXISTING 2 x 48" CMP
EXISTING 36" CMP
EXISTING 12" RCP LOW FLOW INVERT
10" VCP
EXISTING 54" RCP @ 0.5 % INSTALL PARALLEL 54" RCP @ 0.5 %
100 YEAR WATER SURFACE
TELEPHONE
8" VCP
EXISTING 54" RCP @ 1.8 % INSTALL PARALLEL 54" RCP @ 1.8 %
100 Year water surface with improvements
EXISTING 42" RCP @ 0.76 % INSTALL PARALLEL 48"x75" HERCP @ 0.76 %
5 Year HGL proposed system
EXISTING RCP TO REMAIN
EXISTING 42" RCP @ 1.3 % INSTALL PARALLEL 66" RCP @ 1.3 %
Proposed RCP
EXISTING 42" RCP @ 1.4 % INSTALL PARALLEL 66" RCP @ 1.4 %
APPROX. ℄ POWER AVE.
100 YEAR WATER SURFACE
EL. 5422.99
100 Year water surface with improvements
EXISTING 42" RCP
Proposed 48" x 76" HERCP
STATION 75+35
REMOVE EXISTING 42" RCP
8" VCP (CUT AND PLUG)
30" W
Proposed 56"x91" HERCP @ 0.35 %
EXISTING 42" RCP @ 1.20 % INSTALL PARALLEL 60" RCP @ 1.20 %
EXISTING PARALLEL 2-48" RCP'S TO REMAIN
APPROX. ℄ LITTLETON BLVD

NOTE: See Sheet 8 for Area-Capacity and Outlet Rating Curves for Power Park Detention Facility

EXISTING FACILITIES
Q_{100} = 1575 cfs (Total)
WS = El. 5424.4

WITH IMPROVEMENTS (U/S DETENTION & CALEY)
Q_{100} = 600 cfs (Surface) AND STORM SEWER)
Q_5 Pipe = 324 cfs
WS = El. 5423.3

62+00 65+00 70+00 75+00 80+00 85+00 90+00 92+00

5460 5450 5440 5430 5420 5410 5400 5390 5380 5370

TOPOGRAPHIC MAPPING BY
LANDMARK MAPPING, LTD.
7500 W. MISSISSIPPI STE. 21
LAKEWOOD, COLORADO 80226
CONTOUR INTERVAL = 2 FEET DATE FLOWN 11-10-81

WRC WATER RESOURCES CONSULTANTS INC.
2765 South Colorado Boulevard
Denver, Colorado 80222
(303) 757-8513

DESIGNED B.G.R. DATE 1/83
DRAWN B.K.H. DATE 1/83
CHECKED WPR DATE 3-23-83
REVISED ____ DATE ____

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
CITY OF LITTLETON ARAPAHOE COUNTY

MAJOR DRAINAGEWAY PLANNING
UPPER SLAUGHTERHOUSE GULCH

UPPER SLAUGHTERHOUSE GULCH
PLAN AND PROFILE
STATION 62+10 TO STATION 91+00

PLAN AND PROFILE
SHEET 2 OF 6

Application for

Letter of Map Revision

Slaughterhouse Gulch

APPLICANT:

City of Littleton Colorado

Urban Drainage & Flood Control District

PREPARED BY:

Boyle Engineering Corporation

MAY 1995

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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES           *
 *                                         *
 *  Version   4.6.2;  May 1991             *
 *                                         *
 *  RUN DATE    18JAN95    TIME   16:55:53  *
 *****************************************
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*****************************
*  U.S. ARMY CORPS OF ENGINEER
*  HYDROLOGIC ENGINEERING CENT
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-468
*          (916) 756-1104
*****************************
```

FILE: BEC-BASE-OUT

"REVISED CONDITIONS MODEL"

```
X     X  XXXXXXX   XXXXX            XXXXX
X     X  X        X     X          X     X
X     X  X        X                      X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX            XXXXXXX
```

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
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```
T1       UPPER SLAUGHTERHOUSE GULCH - CLOMR
T2       BEC BASELINE MODEL, 100-YR FUTURE DEVEL WITH IMPROVEMENTS
T3       BOYLE ENGINEERING CORPORATION, DN U02 300 14

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0        2         0         0        -1         0         0      1125      5415         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      -1         0        -1         0         0         0         0         0         0         0

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    150       200

NC     .015     0.015     0.015        .1        .3
X1   65.75         4    1000.0    1157.0
GR 5416.0    1000.0    5412.0    1045.0    5412.0    1141.0    5416.0    1157.0

NC   0.035     0.040     0.032
QT       1      1130
X1   68.25         6    1000.0    1254.0     270.0     210.0     250.0
GR 5424.0     967.0    5412.0    1000.0    5410.0    1007.0    5405.0    1028.0    5405.0    1205.0
GR 5417.0    1254.0

NC   0.035     0.040     0.032
QT       1       840
X1   71.00        18    1142.6    1250.0     240.0     400.0     275.0
X4       4    5435.0    1251.0    5435.0    1288.0    5435.0    1348.0    5435.0    1383.0       0.0
GR 5434.0    1000.0    5429.8    1016.9    5427.2    1048.9    5426.9    1079.2    5425.6    1107.2
GR 5423.5    1142.6    5421.4    1182.1    5421.7    1209.0    5421.7    1238.5    5422.8    1250.0
GR 5424.0    1288.1    5421.3    1305.2    5421.4    1327.3    5423.0    1347.9    5423.5    1383.6
GR 5422.1    1405.8    5423.2    1448.3    5426.5    1460.0

NC   0.020     0.020     0.015
QT       1       840
X1   74.35        17    1100.9    1199.9     365.0     290.0     335.0
X4     8.0    5440.0    1052.0    5440.0    1100.0    5440.0    1214.0    5440.0    1254.0    5440.0
X4  1290.0    5440.0    1326.0    5440.0    1345.0    5440.0    1589.0
GR 5435.6    1000.0    5434.6    1027.2    5430.9    1030.2    5431.0    1051.3    5422.4    1100.9
GR 5421.2    1135.0    5421.4    1153.4    5420.8    1173.8    5422.7    1199.9    5423.5    1213.4
GR 5424.2    1254.3    5425.3    1289.7    5423.3    1326.5    5424.6    1331.3    5425.1    1344.5
GR 5429.6    1589.4    5432.4    1630.0
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QT	1	830								
X1	75.5	42	1240.7	1317.7	115.0	115.0	115.0			
GR	5434.0	1000.0	5430.3	1030.0	5445.0	1030.1	5445.0	1139.0	5428.0	1139.4
GR	5427.2	1174.9	5445.0	1175.0	5445.0	1240.0	5425.5	1240.7	5423.8	1265.5
GR	5424.1	1283.3	5423.6	1301.6	5426.0	1317.7	5445.0	1318.0	5445.0	1380.0
GR	5427.2	1380.5	5427.2	1387.8	5445.0	1388.0	5445.0	1451.9	5429.2	1452.0
GR	5427.6	1462.7	5445.0	1463.0	5445.0	1503.0	5428.2	1503.3	5429.4	1567.3
GR	5445.0	1568.0	5445.0	1605.0	5429.2	1605.1	5429.2	1615.0	5445.0	1615.1
GR	5445.0	1655.0	5429.6	1655.2	5429.3	1694.5	5429.8	1717.1	5445.0	1718.0
GR	5445.0	1759.9	5429.6	1760.0	5429.7	1764.9	5445.0	1765.0	5445.0	1829.9
GR	5431.9	1830.0	5431.9	1840.0						
QT	1	820								
X1	78.6	30	1258.9	1383.4	310	310	310			
X3	10									
X4	2.0	5445.0	1384.0	5445.0	1484.0					
GR	5440.0	1000.0	5437.9	1036.3	5436.7	1076.7	5436.1	1089.2	5434.3	1113.4
GR	5432.9	1146.5	5431.8	1181.0	5432.6	1212.4	5430.5	1215.7	5429.7	1258.9
GR	5429.5	1293.2	5427.2	1306.0	5426.9	1311.9	5427.6	1332.5	5426.6	1357.1
GR	5428.6	1383.4	5427.2	1484.1	5425.6	1507.6	5425.7	1528.7	5425.6	1545.7
GR	5425.1	1566.9	5425.4	1607.5	5425.6	1650.3	5426.1	1702.9	5427.2	1756.9
GR	5428.3	1806.4	5428.5	1855.8	5428.9	1923.8	5429.8	2003.7	5430.3	2060.0
NC	0.020	0.020	0.020							
QT	1	810								
X1	81.25	22	1050.9	1200.0	250	280	265			
X3	10					1617.5				
X4	4	5445.0	1200.1	5445.0	1269.9	5445.0	1290.0	5445.0	1396.0	0.0
GR	5430.8	1000.0	5428.8	1050.9	5428.3	1103.0	5429.1	1122.5	5428.3	1144.2
GR	5429.8	1180.2	5430.7	1200.0	5429.3	1270.0	5429.8	1289.9	5428.4	1396.8
GR	5427.3	1411.2	5427.9	1430.5	5427.3	1451.5	5427.9	1461.6	5427.7	1498.1
GR	5428.4	1550.8	5428.4	1617.5	5426.7	1672.1	5424.3	1740.6	5423.0	1814.7
GR	5421.2	1891.6	5419.4	1960.0						
QT	1	800								
X1	82.75	25	1119.0	1207.9	170.0	125.0	150.0			
X3	10					1218.0				
X4	4	5450.0	1218.0	5450.0	1286.5	5450.0	1358.0	5450.0	1457.0	0.0
GR	5434.8	1000.0	5431.9	1082.0	5430.6	1119.0	5429.7	1150.3	5430.3	1168.2
GR	5429.5	1189.1	5431.7	1207.9	5432.3	1217.2	5432.3	1287.0	5430.6	1330.3
GR	5432.0	1351.4	5432.7	1357.2	5430.8	1457.4	5429.1	1477.3	5429.6	1497.5
GR	5429.3	1514.4	5430.6	1526.4	5430.0	1571.8	5428.8	1641.1	5427.7	1709.7
GR	5425.9	1773.6	5423.6	1832.0	5421.7	1893.9	5420.6	1927.7	5419.1	2000.0
NC	0.015	0.015	0.015							
QT	1	800								
X1	83.5	16	1120.0	1225.0	65.0	85.0	75.0			
X3	10									
GR	5434.8	1000.0	5434.0	1020.0	5432.0	1120.0	5430.2	1148.0	5429.8	1148.5
GR	5430.4	1170.0	5429.8	1185.0	5430.0	1210.0	5432.0	1225.0	5432.3	1230.0
GR	5433.0	1278.0	5433.0	1315.0	5432.5	1330.0	5433.0	1345.0	5434.0	1363.0
GR	5434.4	1370.0								

NC	0.020	0.020	0.015							
X1	85.6	25	1000.0	1101.0	100	210	210			
X3	10									
GR	5445.0	1000.0	5435.2	1001.0	5435.0	1004.0	5433.5	1038.0	5433.0	1038.1
GR	5434.0	1058.0	5435.0	1080.0	5435.0	1081.0	5435.5	1081.1	5436.0	1091.0
GR	5437.2	1101.0	5445.0	1101.1	5445.0	1170.0	5436.0	1170.1	5433.0	1183.0
GR	5434.0	1192.0	5445.0	1192.1	5445.0	1220.0	5434.5	1220.1	5434.5	1235.0
GR	5434.0	1235.1	5434.4	1253.1	5434.0	1271.1	5434.5	1271.2	5436.0	1300.0
X1	86.0	26	1000.0	1076.0	40	40	40			
X3	10									
GR	5445.0	1000.0	5435.2	1001.0	5435.0	1003.0	5434.7	1008.0	5433.0	1011.0
GR	5433.0	1014.0	5433.0	1020.0	5434.0	1037.0	5435.0	1055.0	5435.5	1055.1
GR	5436.0	1061.0	5437.0	1071.0	5437.5	1076.0	5445.0	1076.1	5445.0	1145.0
GR	5436.5	1145.1	5434.0	1157.0	5435.0	1166.0	5445.0	1166.1	5445.0	1275.0
GR	5436.3	1275.1	5436.3	1285.0	5436.6	1320.0	5438.0	1350.0	5440.0	1400.0
GR	5442.0	1480.0								

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X1     86.1        27     1000.0     1084.0        10        25        10
X3       10
GR   5445.0    1000.0    5436.2     1001.0    5435.2    1006.0    5434.8    1014.0    5434.3    1014.1
GR   5433.5    1020.0    5434.0     1020.0    5434.1    1040.0    5433.6    1040.1    5435.0    1065.0
GR   5435.5    1065.1    5437.3     1084.0    5445.0    1084.1    5445.0    1147.0    5436.5    1147.1
GR   5434.3    1160.0    5434.8     1169.0    5445.0    1169.1    5445.0    1280.0    5436.0    1280.1
GR   5436.0    1292.0    5436.7     1308.0    5436.4    1308.1    5437.0    1313.0    5437.2    1338.0
GR   5437.5    1338.1    5440.0     1365.0

QT       1       790
X1    86.4        23     1000.0     1115.0        30        30        30
X3       10
GR   5440.0    1000.0    5435.4     1000.1    5435.0    1010.0    5434.0    1019.0    5433.5    1042.0
GR   5434.0    1050.0    5435.0     1073.0    5436.0    1084.0    5436.3    1084.1    5437.0    1105.0
GR   5437.2    1115.0    5440.0     1115.1    5440.0    1144.0    5437.0    1144.1    5434.7    1157.0
GR   5435.0    1165.0    5440.0     1165.0    5440.0    1283.3    5435.0    1283.4    5435.3    1310.0
GR   5435.0    1328.9    5437.1     1368.0    5439.9    1420.0

X1    86.75        22     1196.0     1303.0        35.0      35.0      35.0
X3       10
GR   5438.6    1000.0    5438.1     1070.0    5445.0    1070.1    5445.0    1080.0    5436.8    1080.1
GR   5436.0    1105.0    5436.0     1140.0    5436.0    1140.1    5435.4    1196.0    5435.0    1208.0
GR   5435.0    1213.0    5434.3     1256.0    5434.1    1258.0    5434.3    1260.0    5435.0    1285.0
GR   5435.4    1303.0    5445.0     1303.1    5445.0    1470.0    5434.7    1470.5    5435.3    1505.0
GR   5436.4    1540.8    5440.0     1570.5

NC    0.025     0.015     0.015
QT       1       840
X1    89.5        18     1190.0     1275.0       275.0     275.0     275.0
X3       10                                                          5436.6
GR   5439.6    1000.0    5439.0     1033.7    5437.0    1062.0    5435.4    1091.3    5433.9    1116.7
GR   5435.8    1141.0    5450.0     1141.5    5450.0    1189.5    5436.6    1190.0    5436.6    1214.0
GR   5436.2    1214.1    5437.0     1223.0    5438.0    1240.0    5438.0    1268.0    5438.4    1268.1
GR   5438.5    1275.0    5441.5     1275.1    5441.5    1300.0
1
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QT       1       830
X1    92.1        20     1210.6     1320.0       260       260       260
GR   5444.6    1000.0    5444.4     1011.3    5445.6    1017.6    5446.0    1055.3    5445.2    1100.6
GR   5442.6    1127.3    5441.5     1135.5    5442.5    1169.5    5450.0    1170.0    5450.0    1210.5
GR   5442.0    1210.6    5441.0     1226.0    5440.1    1236.0    5439.6    1236.1    5440.0    1261.0
GR   5440.2    1293.0    5440.7     1293.1    5441.0    1296.0    5442.0    1310.0    5442.5    1320.0

NC    0.015     0.020     0.015
QT       1       820
X1   93.45        12     1000.0     1200.0       200       120       135
GR   5450.0    1000.0    5446.0     1000.1    5445.0    1010.0    5443.5    1027.0    5443.1    1027.1
GR   5443.0    1040.0    5443.4     1080.0    5443.0    1096.0    5442.5    1115.0    5443.0    1115.1
GR   5443.0    1199.9    5450.0     1200.0

NC    0.020     0.015     0.015
QT       1       815
X1    95.0        20     1219.6     1320.0        40        70       155
X3       10
GR   5448.1    1000.0    5448.0     1005.0    5446.0    1008.0    5445.0    1055.0    5444.4    1074.0
GR   5444.5    1084.0    5460.0     1084.5    5460.0    1121.0    5460.0    1121.5    5460.0    1135.0
GR   5460.0    1135.5    5460.0     1219.5    5444.5    1219.6    5444.5    1246.0    5444.2    1246.1
GR   5444.8    1265.0    5444.1     1296.0    5444.4    1296.1    5444.4    1320.0    5460.0    1320.1

NC    0.025     0.025     0.025
QT       1       805
X1    95.5        23.0   1225.0     1277.9        15.0      100.0      50.0
X3       10
GR   5448.1    1000.0    5448.0     1010.0    5445.5    1015.0    5445.5    1055.0    5444.9    1073.0
GR   5445.1    1089.0    5460.0     1089.5    5460.0    1126.0    5460.0    1126.5    5460.0    1139.0
GR   5460.0    1139.5    5460.0     1224.5    5444.0    1225.0    5443.6    1242.9    5445.0    1277.9
GR   5460.0    1278.0    5460.0     1375.0    5447.1    1375.1    5447.9    1386.7    5460.0    1387.0
GR   5460.0    1426.0    5448.5     1426.4    5450.2    1465.0

QT       1       805
X1    96.4        19     1277.4     1336.1        90        90        90
X3       10              1277.4     5460.0
X4       10    5460.0    1000.5     5460.0    1043.9    5460.0    1066.0    5460.0    1105.0    5460.0
X4   1150.5    5460.0    1184.0     5460.0    1189.0    5460.0    1277.0    5460.0    1453.0    5460.0
X4   1489.5
GR   5451.0    1000.0    5452.0     1044.0    5451.7    1065.6    5451.2    1105.4    5448.0    1113.1
GR   5448.5    1150.0    5447.5     1184.5    5445.2    1188.8    5445.0    1277.4    5443.1    1309.6
```

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 GR   5443.7     1336.1     5460.0     1337.0     5460.0     1439.0     5443.8     1439.6     5444.4     1452.5
 GR   5444.5     1490.0     5446.8     1508.6     5448.7     1526.3     5450.0     1540.0

 NC     0.035      0.035      0.020
 QT         1        820
 X1     99.55         16     1170.6     1255.0        270        200        315
 X4         4     5460.0     1091.0     5460.0     1152.0     5460.0     1272.5     5460.0     1303.0
 GR   5449.9     1000.0     5448.4     1020.9     5448.5     1055.5     5446.0     1067.6     5445.8     1090.8
 GR   5445.4     1152.7     5444.0     1170.6     5441.4     1193.3     5442.1     1212.3     5441.7     1229.8
 GR   5444.3     1255.0     5445.8     1272.1     5446.0     1303.2     5445.7     1347.0     5445.5     1377.7
 GR   5448.8     1390.0
1
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 QT         1        820
 X1     101.5         16     1189.5     1272.6        200        190        195
 X4         4     5460.0     1105.0     5460.0     1152.0     5460.0     1289.0     5460.0     1322.0        0.0
 GR   5451.8     1000.0     5452.0     1027.4     5449.2     1049.9     5448.8     1104.9     5448.8     1152.3
 GR   5447.8     1189.5     5446.2     1207.5     5446.7     1226.6     5446.3     1247.6     5449.0     1272.6
 GR   5449.1     1288.8     5449.7     1322.2     5449.0     1371.1     5452.4     1408.1     5454.3     1442.9
 GR   5455.0     1460.0

 QT         1        820
 X1     103.4         22     1362.1     1457.0        220        190        190
 X4        18     5460.0     1000.5     5460.0     1059.0     5460.0     1089.0     5460.0     1135.0     5460.0
 X4    1151.0     5460.0     1208.0     5460.0     1223.0     5460.0     1268.0     5460.0     1306.0     5460.0
 X4    1362.0     5460.0     1457.5     5460.0     1492.0     5460.0     1560.5     5460.0     1618.0     5460.0
 X4    1641.0     5460.0     1701.0     5460.0     1713.0     5460.0     1759.5     5460.0
 GR   5458.0     1000.0     5457.0     1059.5     5456.0     1088.3     5454.8     1135.3     5453.4     1150.8
 GR   5452.8     1208.2     5453.2     1222.7     5452.9     1268.3     5451.3     1290.2     5451.7     1305.5
 GR   5450.0     1362.1     5448.7     1383.8     5449.6     1404.9     5448.7     1422.6     5451.3     1457.0
 GR   5451.4     1492.9     5452.9     1560.1     5453.5     1618.8     5454.3     1640.5     5455.7     1701.4
 GR   5457.3     1712.9     5457.6     1760.0

 NC     0.015      0.015      0.015
 QT         1        832
 X1     105.7         15     1237.9     1404.6        245        190        230
 GR   5456.2     1000.0     5455.2     1041.4     5454.1     1106.9     5453.0     1139.3     5451.4     1237.9
 GR   5451.2     1280.5     5451.0     1338.6     5451.3     1404.6     5451.5     1440.6     5452.7     1539.1
 GR   5453.9     1600.9     5454.2     1637.9     5454.8     1684.1     5455.5     1739.3     5455.5     1750.0

 NC     0.015      0.015      0.015
 QT         1        777
 X1     109.2         13     1194.7     1327.6        250        400        350
 GR   5460.1     1000.0     5459.8     1034.4     5458.8     1095.7     5456.8     1153.4     5455.0     1194.7
 GR   5455.0     1212.3     5455.0     1258.1     5454.2     1299.7     5454.6     1313.2     5456.1     1327.6
 GR   5457.6     1395.0     5460.2     1415.6     5461.7     1440.0

 QT         1        757
 X1     110.7         15     1102.2     1308.2        135        135        150
 GR   5458.6     1000.0     5456.5     1049.9     5455.6     1102.2     5454.6     1154.9     5454.0     1197.4
 GR   5452.0     1207.0     5452.3     1216.1     5454.1     1228.7     5454.5     1263.5     5455.7     1308.2
 GR   5457.7     1343.7     5460.2     1351.7     5461.4     1399.2     5462.1     1409.2     5462.2     1410.0

 QT         1        737
 X1     112.5         13     1013.0     1105.0        270        120        180
 GR   5465.0     1000.0     5461.0     1000.1     5457.0     1013.0     5457.0     1022.0     5457.0     1056.0
 GR   5456.0     1069.0     5455.0     1077.0     5454.8     1080.0     5455.0     1084.0     5456.0     1096.0
 GR   5457.0     1105.0     5460.0     1133.0     5462.0     1144.0
1
    18JAN95      16:55:53                                                                                  PAGE    6


     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


 *PROF 1
0

 CCHV=      .100 CEHV=      .300
 *SECNO 65.750
 3720 CRITICAL DEPTH ASSUMED
     65.750       1.55    5413.55    5413.55    5415.00    5414.25        .70        .00        .00    5416.00
     1125.0         .0     1125.0         .0         .0      167.3         .0         .0         .0    5416.00
        .00        .00       6.72        .00       .000       .015       .000       .000    5412.00    1027.54
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    .002954        0.        0.        0.         0        10         0       .00    119.66   1147.21

*SECNO 68.250

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO = 18.13

    68.250      9.33   5414.33       .00       .00   5414.33       .00       .01       .07   5412.00
    1130.0       1.0    1129.0        .0       7.4    1994.8        .0       6.2       1.1   5417.00
       .12       .14       .57       .00      .035      .032      .000      .000   5405.00    993.60
   .000009      270.      250.      210.         2         0         0       .00    249.48   1243.08


*SECNO 71.000

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    71.000      1.51   5422.81   5422.81       .00   5423.27       .46       .01       .14   5423.50
     840.0        .0     534.0     306.0        .0      91.5      65.8      13.1       2.5   5422.80
       .14       .00      5.84      4.65      .000      .032      .040      .000   5421.30   1155.63
   .016477      240.      275.      400.        20        20         0       .00    182.66   1433.11


*SECNO 74.350

3265 DIVIDED FLOW

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   18JAN95      16:55:53                                                                          PAGE     7

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  5.07

    74.350      2.82   5423.62       .00       .00   5423.87       .25       .58       .02   5422.40
     840.0        .0     831.6       8.4        .0     204.5       7.1      14.5       3.6   5422.70
       .16       .02      4.07      1.18      .020      .015      .020      .000   5420.80   1100.84
   .000641      365.      335.      290.         5         0         0       .00    113.74   1327.66


*SECNO 75.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    75.500      2.24   5425.84   5425.84       .00   5426.63       .79       .14       .16   5425.50
     830.0        .0     830.0        .0        .0     116.7        .0      15.0       3.9   5426.00
       .17       .04      7.11       .00      .000      .015      .000      .000   5423.60   1240.69
   .002917      115.      115.      115.        20        15         0       .00     75.97   1316.66


*SECNO 78.600

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      5429.70 ELREA=      5428.60

    78.600      2.02   5428.62   5428.62       .00   5428.63       .01       .04       .08   5429.70
     820.0        .0      78.9     741.1        .0     107.2     811.9      18.6       5.9   5428.60
```

.26	.00	.74	.91	.000	.015	.020	.000	5426.60	1298.10
.000041	310.	310.	310.	20	18	0	.00	477.27	1876.06

*SECNO 81.250

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3280 CROSS SECTION 81.25 EXTENDED 10.38 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= .0 1617.5 TYPE= 1 TARGET= 1617.499

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5428.80 ELREA= 5430.70

81.250	1.48	5429.78	5429.78	.00	5430.27	.49	.04	.14	5428.80
810.0	41.9	768.1	.0	12.2	134.7	.0	22.0	7.8	5430.70
.27	3.44	5.70	.00	.020	.020	.000	.000	5428.30	1026.00
.005556	250.	265.	280.	20	19	0	.00	153.69	1179.68

*SECNO 82.750
3280 CROSS SECTION 82.75 EXTENDED 12.41 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= .0 1218.0 TYPE= 1 TARGET= 1217.999

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5430.60 ELREA= 5431.70

82.750	2.01	5431.51	5431.51	.00	5432.11	.60	.78	.03	5430.60
800.0	35.7	764.3	.0	11.8	120.5	.0	22.5	8.3	5431.70
.28	3.03	6.34	.00	.020	.020	.000	.000	5429.50	1093.11
.004754	170.	150.	125.	20	11	0	.00	113.17	1206.27

*SECNO 83.500

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.70

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5432.00 ELREA= 5432.00

83.500	2.10	5431.90	.00	.00	5432.33	.43	.20	.02	5432.00
800.0	.0	800.0	.0	.0	152.9	.0	22.7	8.5	5432.00
.29	.00	5.23	.00	.000	.015	.000	.000	5429.80	1121.52
.001649	65.	75.	85.	2	0	0	.00	102.75	1224.27

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 85.600
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5445.00 ELREA= 5437.20

85.600	2.64	5435.64	5435.64	.00	5436.36	.72	.46	.09	5445.00
800.0	.0	800.0	.0	.0	117.3	.0	23.4	8.9	5437.20

.29	.00	6.82	.00	.000	.015	.000	.000	5433.00	1000.96
.003042	100.	210.	210.	20	11	0	.00	82.83	1083.79

*SECNO 86.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5445.00 ELREA= 5437.50

86.000	2.88	5435.88	5435.88	.00	5436.78	.91	.12	.06	5445.00
800.0	.0	800.0	.0	.0	104.8	.0	23.5	9.0	5437.50
.30	.00	7.64	.00	.000	.015	.000	.000	5433.00	1000.93
.002838	40.	40.	40.	20	8	0	.00	58.61	1059.54

*SECNO 86.100
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5445.00 ELREA= 5437.30

86.100	2.58	5436.08	5436.08	.00	5436.89	.81	.03	.01	5445.00
800.0	.0	800.0	.0	.0	110.9	.0	23.5	9.0	5437.30
.30	.00	7.22	.00	.000	.015	.000	.000	5433.50	1001.58
.002962	10.	10.	25.	20	11	0	.00	69.65	1071.23

*SECNO 86.400

3301 HV CHANGED MORE THAN HVINS

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.07

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5440.00 ELREA= 5437.20

86.400	3.23	5436.73	.00	.00	5436.99	.26	.04	.06	5440.00
790.0	.0	790.0	.0	.0	194.5	.0	23.6	9.1	5437.20
.30	.00	4.06	.00	.000	.015	.000	.000	5433.50	1000.07
.000676	30.	30.	30.	3	0	0	.00	96.65	1096.72

*SECNO 86.750

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.91

86.750	2.86	5436.96	.00	.00	5437.02	.06	.01	.02	5435.40
790.0	125.4	518.6	146.1	117.8	230.5	108.6	23.9	9.2	5435.40
.30	1.06	2.25	1.34	.020	.015	.020	.000	5434.10	1080.10
.000185	35.	35.	35.	2	0	0	.00	297.93	1545.40

*SECNO 89.500

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 5436.60 ELREA= 5438.50

89.500	.70	5436.90	5436.90	.00	5437.51	.60	.15	.16	5436.60
840.0	807.8	32.2	.0	127.8	10.0	.0	25.8	10.5	5438.50
.32	6.32	3.20	.00	.025	.015	.000	.000	5436.20	1063.79
.004943	275.	275.	275.	20	11	0	.00	109.18	1221.91

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 92.100

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

92.100	2.17	5441.77	5441.77	.00	5442.44	.67	.98	.02	5442.00
830.0	1.2	828.8	.0	1.5	125.9	.0	26.6	11.2	5442.50
.33	.84	6.58	.00	.025	.015	.000	.000	5439.60	1133.52
.002963	260.	260.	260.	20	23	0	.00	103.49	1306.71

*SECNO 93.450
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

93.450	1.43	5443.93	5443.93	.00	5444.37	.44	.44	.02	5450.00
820.0	.0	820.0	.0	.0	154.2	.0	27.0	11.6	5450.00
.33	.00	5.32	.00	.000	.015	.000	.000	5442.50	1022.16
.003528	200.	135.	120.	20	14	0	.00	177.75	1199.91

*SECNO 95.000

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

95.000	1.49	5445.59	5445.59	.00	5446.10	.51	.49	.02	5444.50
815.0	129.3	685.7	.0	36.3	113.1	.0	27.5	12.1	5444.40
.34	3.56	6.06	.06	.020	.015	.015	.000	5444.10	1027.42
.003214	40.	155.	70.	20	8	0	.00	157.03	1320.01

*SECNO 95.500

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

95.500	2.37	5445.97	5445.97	.00	5446.54	.57	.18	.02	5444.00
805.0	165.6	639.4	.0	48.5	97.3	.0	27.6	12.2	5445.00
.34	3.41	6.57	.04	.025	.025	.025	.000	5443.60	1014.06
.005423	15.	50.	100.	20	14	0	.00	127.94	1277.91

*SECNO 96.400

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.09

3470 ENCROACHMENT STATIONS= 1277.4 1540.0 TYPE= 1 TARGET= -1277.400
ELENCL= 5460.00 ELENCR= 100000.00

96.400	3.44	5446.54	.00	.00	5446.78	.24	.20	.03	5445.00
805.0	.0	675.8	129.2	.0	163.2	48.7	28.0	12.5	5443.70
.35	.00	4.14	2.65	.000	.025	.025	.000	5443.10	1277.40
.001243	90.	90.	90.	2	0	0	.00	88.47	1506.48

*SECNO 99.550

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.62

99.550	5.41	5446.81	.00	.00	5446.87	.05	.07	.02	5444.00
820.0	33.4	733.0	53.6	60.6	371.6	112.7	30.5	13.4	5444.30
.39	.55	1.97	.48	.035	.020	.035	.000	5441.40	1063.67
.000098	270.	315.	200.	2	0	0	.00	226.05	1382.59

*SECNO 101.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

101.500	2.14	5448.34	5448.34	.00	5449.07	.73	.06	.20	5447.80
820.0	6.8	813.2	.0	5.5	118.3	.0	32.0	14.1	5449.00
.40	1.24	6.88	.00	.035	.020	.000	.000	5446.20	1169.34
.004850	200.	195.	190.	20	18	0	.00	97.17	1266.51

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 103.400
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

103.400	2.07	5450.77	5450.77	.00	5451.47	.70	.96	.00	5450.00
820.0	.0	820.0	.0	.0	122.4	.0	32.5	14.5	5451.30
.41	.03	6.70	.00	.000	.020	.000	.000	5448.70	1362.09
.005251	220.	190.	190.	20	8	0	.00	87.95	1450.04

*SECNO 105.700

105.700	1.04	5452.04	.00	.00	5452.35	.31	.84	.04	5451.40
832.0	30.7	686.4	114.9	12.6	144.7	34.9	33.3	15.5	5451.30
.42	2.44	4.74	3.29	.015	.015	.015	.000	5451.00	1198.51
.002768	245.	230.	190.	2	0	0	.00	286.33	1484.84

*SECNO 109.200
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

109.200	1.65	5455.85	5455.85	.00	5456.33	.48	1.03	.05	5455.00
777.0	26.3	750.7	.0	8.4	133.6	.0	34.7	17.2	5456.10
.44	3.14	5.62	.00	.015	.015	.000	.000	5454.20	1175.08
.003121	250.	350.	400.	20	14	0	.00	150.17	1325.25

*SECNO 110.700

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 4.46

110.700	4.38	5456.38	.00	.00	5456.44	.05	.06	.04	5455.60
757.0	11.6	743.0	2.4	17.8	397.2	4.1	35.6	17.9	5455.70
.47	.65	1.87	.59	.015	.015	.015	.000	5452.00	1056.65
.000149	135.	150.	135.	2	0	0	.00	263.68	1320.33

*SECNO 112.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3720 CRITICAL DEPTH ASSUMED

112.500	2.84	5457.64	5457.64	.00	5458.27	.63	.07	.17	5457.00
737.0	1.6	730.5	4.8	.7	114.1	1.9	36.8	18.7	5457.00
.47	2.51	6.40	2.57	.015	.015	.015	.000	5454.80	1010.95
.003140	270.	180.	120.	20	23	0	.00	99.98	1110.93

1

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THIS RUN EXECUTED 18JAN95 16:55:56

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

BOYLE ENGINEERING CORPO

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
*	65.750	.00	.00	.00	5412.00	1125.00	5413.55	5413.55	5414.25	29.54	6.72	167.33
*	68.250	250.00	.00	.00	5405.00	1130.00	5414.33	.00	5414.33	.09	.57	2002.26
*	71.000	275.00	.00	.00	5421.30	840.00	5422.81	5422.81	5423.27	164.77	5.84	157.27
*	74.350	335.00	.00	.00	5420.80	840.00	5423.62	.00	5423.87	6.41	4.07	211.67
*	75.500	115.00	.00	.00	5423.60	830.00	5425.84	5425.84	5426.63	29.17	7.11	116.73
*	78.600	310.00	.00	.00	5426.60	820.00	5428.62	5428.62	5428.63	.41	.74	919.13
*	81.250	265.00	.00	.00	5428.30	810.00	5429.78	5429.78	5430.27	55.56	5.70	146.85
*	82.750	150.00	.00	.00	5429.50	800.00	5431.51	5431.51	5432.11	47.54	6.34	132.26
*	83.500	75.00	.00	.00	5429.80	800.00	5431.90	.00	5432.33	16.49	5.23	152.91
*	85.600	210.00	.00	.00	5433.00	800.00	5435.64	5435.64	5436.36	30.42	6.82	117.31
*	86.000	40.00	.00	.00	5433.00	800.00	5435.88	5435.88	5436.78	28.38	7.64	10[illegible]
*	86.100	10.00	.00	.00	5433.50	800.00	5436.08	5436.08	5436.89	29.62	7.22	11[illegible].86
*	86.400	30.00	.00	.00	5433.50	790.00	5436.73	.00	5436.99	6.76	4.06	194.55
*	86.750	35.00	.00	.00	5434.10	790.00	5436.96	.00	5437.02	1.85	2.25	457.01

*	89.500	275.00	.00	.00	5436.20	840.00	5436.90	5436.90	5437.51	49.43	3.20	137.83
*	92.100	260.00	.00	.00	5439.60	830.00	5441.77	5441.77	5442.44	29.63	6.58	127.40
*	93.450	135.00	.00	.00	5442.50	820.00	5443.93	5443.93	5444.37	35.28	5.32	154.18

1

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
*	95.000	155.00	.00	.00	5444.10	815.00	5445.59	5445.59	5446.10	32.14	6.06	149.45
*	95.500	50.00	.00	.00	5443.60	805.00	5445.97	5445.97	5446.54	54.23	6.57	145.86
*	96.400	90.00	.00	.00	5443.10	805.00	5446.54	.00	5446.78	12.43	4.14	211.94
*	99.550	315.00	.00	.00	5441.40	820.00	5446.81	.00	5446.87	.98	1.97	544.97
*	101.500	195.00	.00	.00	5446.20	820.00	5448.34	5448.34	5449.07	48.50	6.88	123.73
*	103.400	190.00	.00	.00	5448.70	820.00	5450.77	5450.77	5451.47	52.51	6.70	122.36
	105.700	230.00	.00	.00	5451.00	832.00	5452.04	.00	5452.35	27.68	4.74	192.24
*	109.200	350.00	.00	.00	5454.20	777.00	5455.85	5455.85	5456.33	31.21	5.62	141.99
*	110.700	150.00	.00	.00	5452.00	757.00	5456.38	.00	5456.44	1.49	1.87	419.23
*	112.500	180.00	.00	.00	5454.80	737.00	5457.64	5457.64	5458.27	31.40	6.40	116.68

1

BOYLE ENGINEERING CORPO

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	65.750	1125.00	5413.55	.00	.00	-1.45	119.66	.00
*	68.250	1130.00	5414.33	.00	.77	.00	249.48	250.00
*	71.000	840.00	5422.81	.00	8.48	.00	182.66	275.00
*	74.350	840.00	5423.62	.00	.81	.00	113.74	335.00
*	75.500	830.00	5425.84	.00	2.23	.00	75.97	115.00
*	78.600	820.00	5428.62	.00	2.77	.00	477.27	310.00
*	81.250	810.00	5429.78	.00	1.16	.00	153.69	265.00
*	82.750	800.00	5431.51	.00	1.73	.00	113.17	150.00
*	83.500	800.00	5431.90	.00	.39	.00	102.75	75.00
*	85.600	800.00	5435.64	.00	3.73	.00	82.83	210.00
*	86.000	800.00	5435.88	.00	.24	.00	58.61	40.00
*	86.100	800.00	5436.08	.00	.21	.00	69.65	10.00
*	86.400	790.00	5436.73	.00	.65	.00	96.65	30.00
*	86.750	790.00	5436.96	.00	.23	.00	297.93	35.00
*	89.500	840.00	5436.90	.00	-.05	.00	109.18	275.00
*	92.100	830.00	5441.77	.00	4.86	.00	103.49	260.00
*	93.450	820.00	5443.93	.00	2.16	.00	177.75	135.00
*	95.000	815.00	5445.59	.00	1.66	.00	157.03	155.00

*	95.500	805.00	5445.97	.00	.38	.00	127.94	50.00
*	96.400	805.00	5446.54	.00	.57	.00	88.47	90.00
*	99.550	820.00	5446.81	.00	.28	.00	226.05	315.00
*	101.500	820.00	5448.34	.00	1.53	.00	97.17	195.00
*	103.400	820.00	5450.77	.00	2.43	.00	87.95	190.00
	105.700	832.00	5452.04	.00	1.26	.00	286.33	230.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	109.200	777.00	5455.85	.00	3.82	.00	150.17	350.00
*	110.700	757.00	5456.38	.00	.53	.00	263.68	150.00
*	112.500	737.00	5457.64	.00	1.25	.00	99.98	180.00

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 65.750 PROFILE= 1 CRITICAL DEPTH ASSUMED

WARNING SECNO= 68.250 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 71.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 71.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 71.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 74.350 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 75.500 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 75.500 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 75.500 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 78.600 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 78.600 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 78.600 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 81.250 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 81.250 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 81.250 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 82.750 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 82.750 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 82.750 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 83.500 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 85.600 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 85.600 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 85.600 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 86.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 86.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 86.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 86.100 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 86.100 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 86.100 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 86.400 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 86.750 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 89.500 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 89.500 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 89.500 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

```
 CAUTION SECNO=     92.100  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     92.100  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     92.100  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
1
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 CAUTION SECNO=     93.450  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     93.450  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     93.450  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 CAUTION SECNO=     95.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     95.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     95.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 CAUTION SECNO=     95.500  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     95.500  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     95.500  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 WARNING SECNO=     96.400  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 WARNING SECNO=     99.550  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 CAUTION SECNO=    101.500  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=    101.500  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=    101.500  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 CAUTION SECNO=    103.400  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=    103.400  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=    103.400  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 CAUTION SECNO=    109.200  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=    109.200  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=    109.200  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 WARNING SECNO=    110.700  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 CAUTION SECNO=    112.500  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=    112.500  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=    112.500  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

Appendix F – Ineffective Floodplain Modeling Supplemental Information

The following discussion had been provided to better describe the ineffective elements of the floodplain modeling provided in support of this Conditional Letter of Map Revision (CLOMR) request.

The following Figure 1 shows 3 sections from the 1995 Effective LOMR HEC-2 model (Effective Model): Sections 75.5, 78.6 and 81.25

Figure 1 *Google Image ©2018 of Area of Interest (section locations approximate – for illustration only)*

EFFECTIVE MODEL:

In reviewing the 1995 Effective LOMR HEC-2 model, the following elements related to effective flow characteristics were observed (Figures 2 through 4 below are taken from the Effective Model input data):

1. At Section 75.5 (see Figure 2 below) the flow is essentially confined to the W. Powers Avenue street section at a location that is associated with the first row of houses to the west of S. Delaware Street. The flow in this section is supercritical with a velocity of 7.1 feet per second (fps).

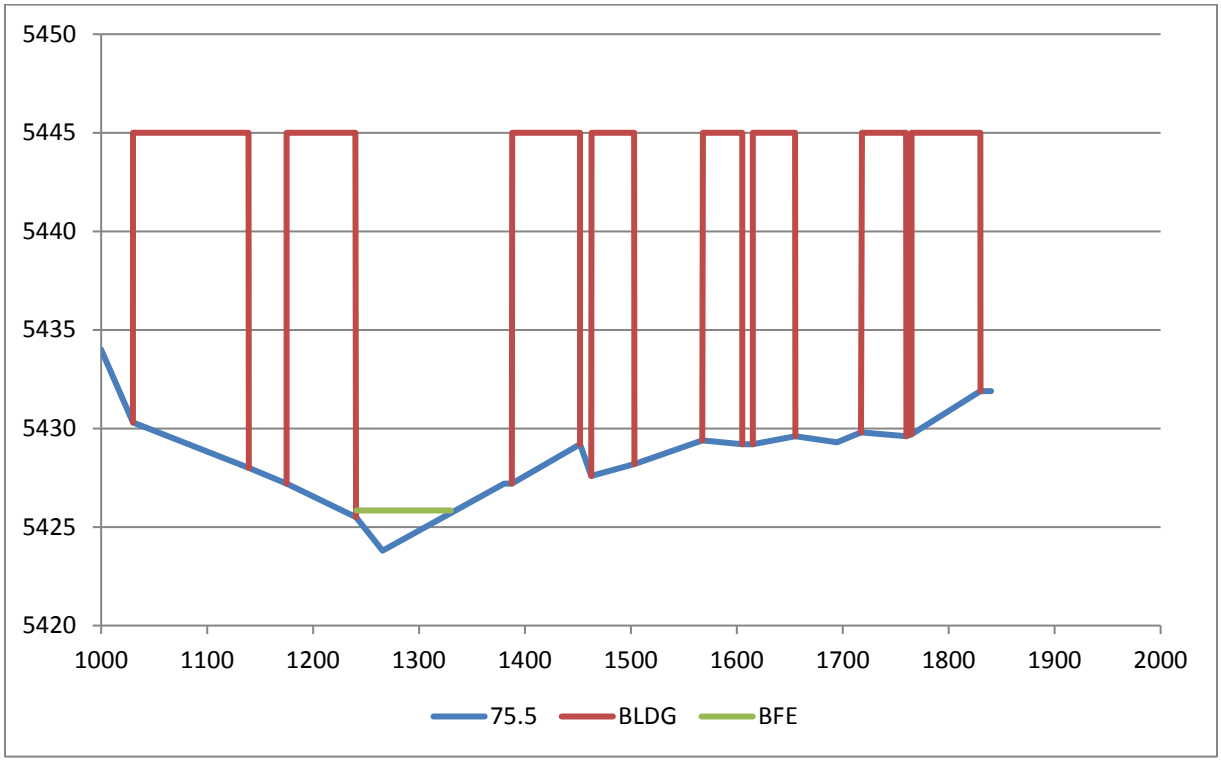

Figure 2: *HEC-2 Effective Model Section 75.5*

2. At Section 78.6 (see Figure 3 below) the 100-year water surface elevation is computed to be 0.02 feet above the potential overflow from W. Powers Place to W. Powers Avenue. The flow in W. Powers Avenue is delineated as ineffective flow until the water surface elevation in W. Powers Place rises above the right bank elevations. The flow in this section has a velocity of 0.74 fps. The model clearly is showing that a significant portion of the W. Powers Place flow gets to W. Powers Avenue. Our observation is that it is not reasonable due to the very shallow overflow depth of 0.02 feet and looking at the obstructions in the overflow path.

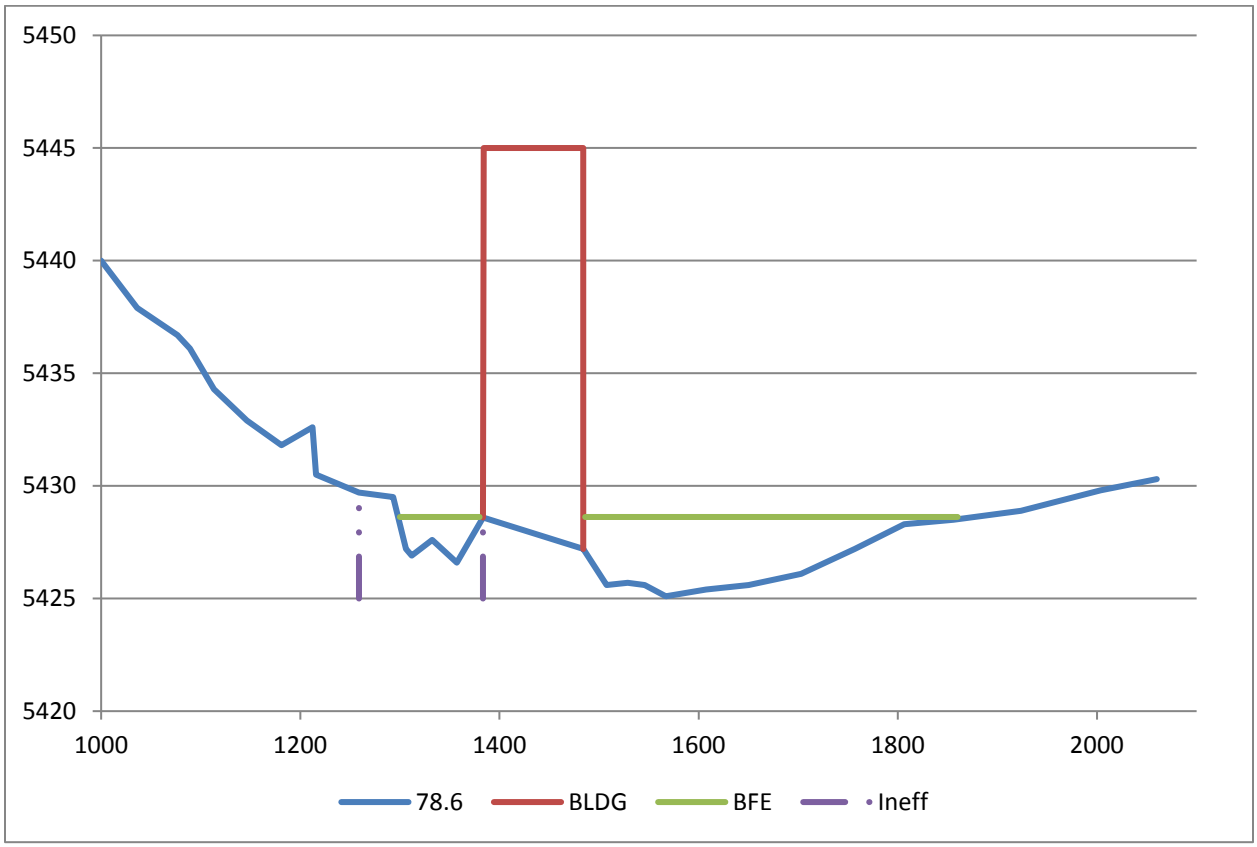

Figure 3: *HEC-2 Effective Model Section 78.6*

3. At Section 81.25 (see Figure 4 below) the 100-year water surface elevation is below the overflow elevation between W. Powers Place and W. Powers Avenue. Therefore, the northern portion of the section (in W. Powers Avenue) is cut off from consideration using an ineffective flow limit set at 1617.5. The flow in this section has a velocity of 5.7 fps. This condition recommended a further review of the hydraulic condition upstream of 81.25 through the downstream section 75.5 where flows re-combine and concentrate within W. Powers Avenue. Our review consisted of evaluation of additional surface topography and probable overflow conditions whereby flow could cross from W. Powers Place to W. Powers Avenue.

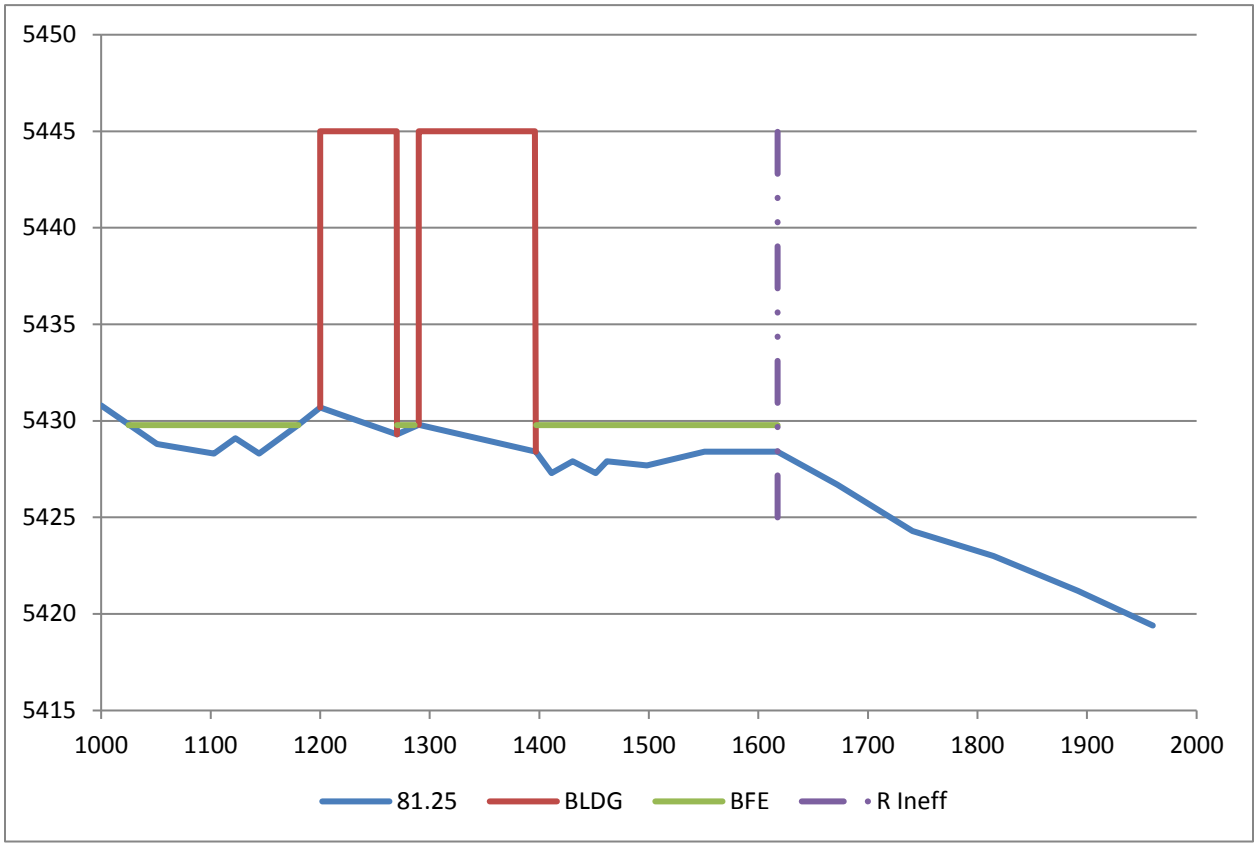

Figure 4: *HEC-2 Effective Model Section 81.25*

EXISTING CONDITIONS MODEL:

A site visit was conducted to evaluate the practical elements that would influence the hydraulic condition. It was determined that the following represents a reasonable hydraulic condition (Figures 5 through 13 are Google Streetview images provided to assist in the hydraulic discussion provided below):

1. A review of the original documents and available topography indicated that the primary flow path for surface water was northwesterly down W. Powers Place, northerly down S. Delaware Street and westerly down W. Powers Avenue.
2. A review of the Effective Model determined that the potential for overflow to the north through the buildings from W. Powers Place to W. Powers Avenue should be closely evaluated given the Effective HEC-2 model results. Figures 6 and 10 highlight the nature of this potential overflow path that delivers surface water from W. Powers Place to W. Powers Avenue. Conservative calculations determined that about 12 percent of the total flow will overflow from W. Powers Place to W. Powers Avenue (approximately 100 cfs). This is conservative as it relates to the subject property but is not conservative as it relates to the intersection of W. Powers Place and S. Delaware Street. This assumption may need to be reevaluated.
3. The overflow enters W. Powers Avenue approximately 160 feet east of the W. Powers Avenue and S. Delaware Street intersection (See Figure 12).
4. No overflow was computed for sections further to the east of this location, since 100-year flows at and upstream of Section 81.25 (Section 18125 in the CLOMR request) were below the overflow elevations along the ridge between W. Powers Place to W. Powers Avenue (based on the available topography and Effective mapping information, it is believed that surface water doesn't overtop the ridgeline).
5. The result is a reported potential for hydraulic flow for those sections upstream of the overflow connection 160 feet east of the West Powers and South Delaware intersection when viewing the HEC-RAS sections (1 cfs flow assignment from the steady flow step backwater condition of including sections in order to provide opportunity for flows over the lateral structure, which don't materialize due to higher topography in that area). Consequently those sections upstream of newly modeled section 17964.5 have no effective flow for the entire section and are limited to flow in the street as a practical consideration given the shallow depth of flow and the vegetative / property fence line condition (see Figures 9 and 11 below).
6. Once flow is present within the West Powers Avenue corridor east of its intersection with South Delaware Street, we reviewed the topography and concluded that the flows beyond the fence would be subject to the constraints of the topography downstream of Section 17860, which are (a) at most an effective flow limit of about 65 feet given a 1:1 effective limit from the buildings to the west and (b) a flow depth of less than 6-inches given the rise of topography on the eastern ROW of S. Delaware Street (see field topography and Figures 9, 10 and 12). We therefore selected the practical effective flow boundary at the southern fence boundary as being most representative of the probable hydraulic condition given overflow flow rates, steady flow calculations, computed flow depths, vegetation and topography. The 100-year flow depths thus computed represent a conservative and reasonable calculation of potential flood depths for this zone.

7. For flow to collect and combine into a single stream heading down W. Powers Avenue to the west, the homes on the west side of South Delaware would resist the flow and create an ineffective flow zone at a 1:1 relationship upstream of the intersection (see Figures 1, 8 and 11).

Figure 5: *Location A – View upstream primary flow path along West Powers Place (looking southeast)*

Figure 6: *Location A – Potential overflow path to north from West Powers Place (looking north)*

Figure 7: *Location B – View upstream primary flow path along South Delaware St (looking South)*

Figure 8: *Location B – View downstream primary flow path along West Powers Ave (looking Westerly). West Powers Ave drops off after intersection (hydraulics achieve critical flow).*

Figure 9: *Location B – View upstream secondary flow path along West Powers Ave (looking Easterly)*

Figure 10: *Location C – Potential overflow path from north from West Powers Place (looking south)*

Figure 11: *Location B – View of potential for flow from east of South Delaware St (looking North)*

Figure 12: *Location C – View down secondary flow path along West Powers Avenue (looking west)*

Figure 13: *Location D – View from South Delaware Street – Note: Back of curb/fence grades one or more feet higher than field grades of Section 178+60.*

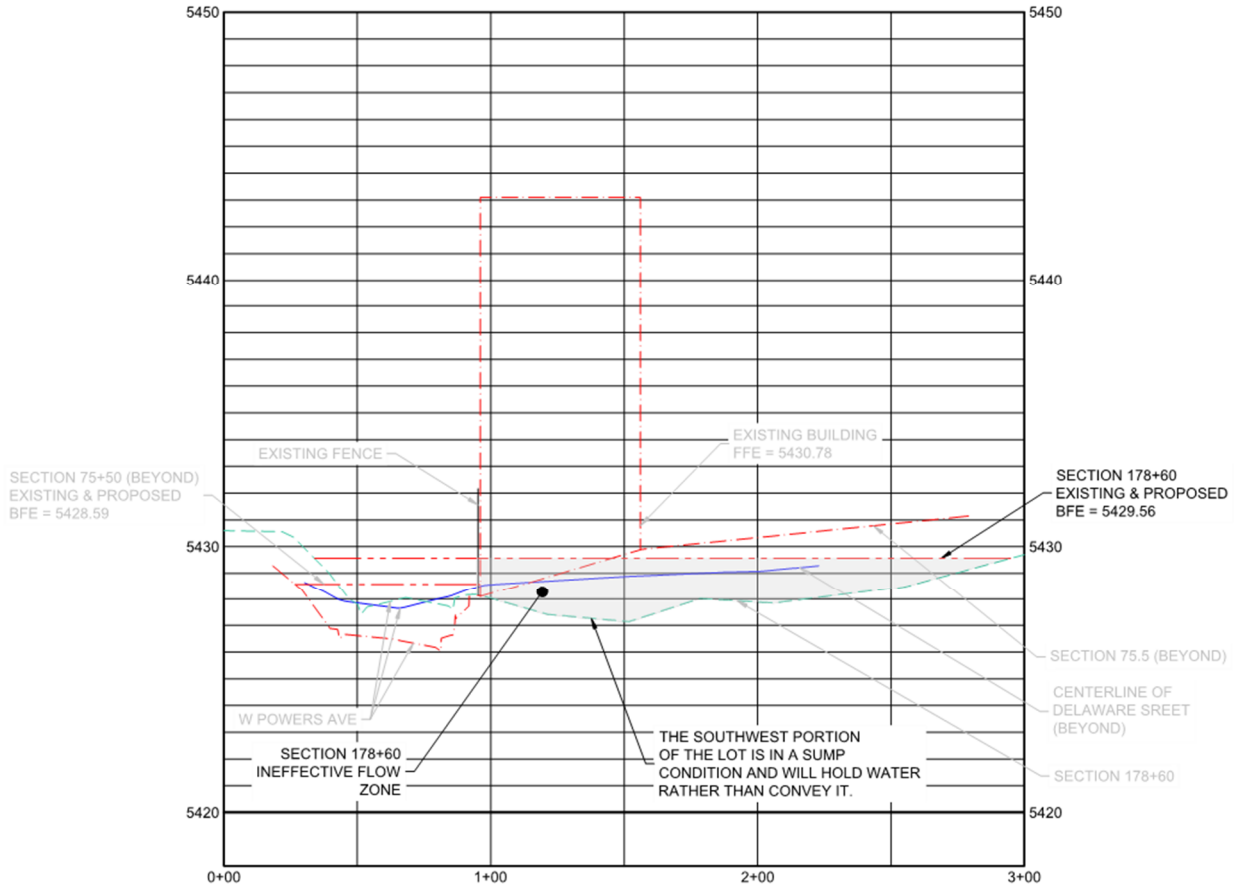

Figure 14: *Section 178+60 with view of Section 75+50 and Centerline of Delaware street*

Appendix G – ESA Compliance Documentation

LT Environmental, Inc.
4600 West 60th Avenue
Arvada, Colorado 80003
303.433.9788

August 24, 2018

Mark Cevaal, P.E.
Redland Consulting Group, Inc.
1500 West Canal Court
Littleton, Colorado 80120

RE: Incidental Take Statement
Conditional Letter of Map Revision
South Delaware Street and West Powers Avenue
Littleton, Colorado

Dear Mr. Cevaal:

A Conditional Letter of Map Revision (CLOMR) is requested for a parcel of land located on the northeast corner of South Delaware Street and West Powers Avenue in Littleton, Colorado (approximate Latitude 39.615392° North, Longitude -104.992774° West). On July 18, 2018, a biologist from LT Environmental, Inc. (LTE) conducted a survey of the property for Threatened and Endangered species and their potential habitat to assess whether project activities have the potential to cause a "take" of federally listed species. The results of the field survey are summarized below.

EXISTING CONDITIONS

The site consists of a field of nonnative grasses and forbs with trees lining the sidewalks on the west and south sides of the parcel. The site is surrounded by commercial development on the north and east sides and residential buildings on the west and south sides of the parcel. The project area is located within the Natural Resources Conservation Service Major Land Resource Region G - Western Great Plains Range and Irrigated Region[1].

The property is located within an established urban and suburban area. Urban expansion and frequent disturbances now dictate the vegetation and landscape surrounding the project area. A photographic log is provided as Attachment 1.

SPECIES OF CONCERN

The attached United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation[2] (IPaC) report provides a list of protected species with the potential to occur on or

[1] US Department of Agriculture, National Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin.
[2] USFWS. Information for Planning and Consultation (IPaC) https://ecos.fws.gov/ipac/ Accessed May 2018.

LT Environmental, Inc.
4600 West 60th Avenue
Arvada, Colorado 80003
303.433.9788

near the property, as listed by the USFWS and protected by the Endangered Species Act[3] (Attachment 2). None of the species of concern or threatened and endangered species or their associated habitat were observed. Additionally, no migratory bird nests protected by the Migratory Bird Treaty Act[4] were observed.

Project activities will likely have no effect on federally listed species with the potential to occur in the project area.

Sincerely,

LT ENVIRONMENTAL, INC.

Hank Raizen
Staff Biologist

Deidre Duffy
Project Ecologist

ATTACHMENTS:

Photographic Log
USFWS IPaC Report

[3] Endangered Species Act. 1973. 16 U.S.C. § 1531 et seq. United States of America.
[4] Migratory Bird Treaty Act. 1918. 16 U.S.C. 203-712. United States of America.

Photograph 1: View northeast from the southwest corner of the Subject Property.

Photograph 2: View east from the southwest corner of the Subject Property.

Photograph 3: View north from the southwest corner of the Subject Property.

Photograph 4: View south from the northwest corner of the Subject Property.

Photograph 5: View west from the southeast corner of the Subject Property.

Photograph 6: View of intersection southwest of the Subject Property from southwest corner of the Subject Property.

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Arapahoe County, Colorado

Local office

Colorado Ecological Services Field Office

(303) 236-4773
(303) 236-4005

MAILING ADDRESS
Denver Federal Center
P.O. Box 25486
Denver, CO 80225-0486

PHYSICAL ADDRESS
134 Union Boulevard, Suite 670
Lakewood, CO 80228-1807

http://www.fws.gov/coloradoES
http://www.fws.gov/platteriver

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Least Tern Sterna antillarum This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8505	Endangered
Mexican Spotted Owl Strix occidentalis lucida There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8196	Threatened
Piping Plover Charadrius melodus This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Whooping Crane Grus americana This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Fishes

NAME	STATUS
Pallid Sturgeon Scaphirhynchus albus This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7162	Endangered

Flowering Plants

NAME	STATUS
Ute Ladies'-tresses *Spiranthes diluvialis* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2159	Threatened
Western Prairie Fringed Orchid *Platanthera praeclara* This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ

below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Jul 31
Golden Eagle *Aquila chrysaetos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Willow Flycatcher *Empidonax traillii* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3482	Breeds May 20 to Aug 31

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix H – Work Map

LEGAL DESCRIPTION

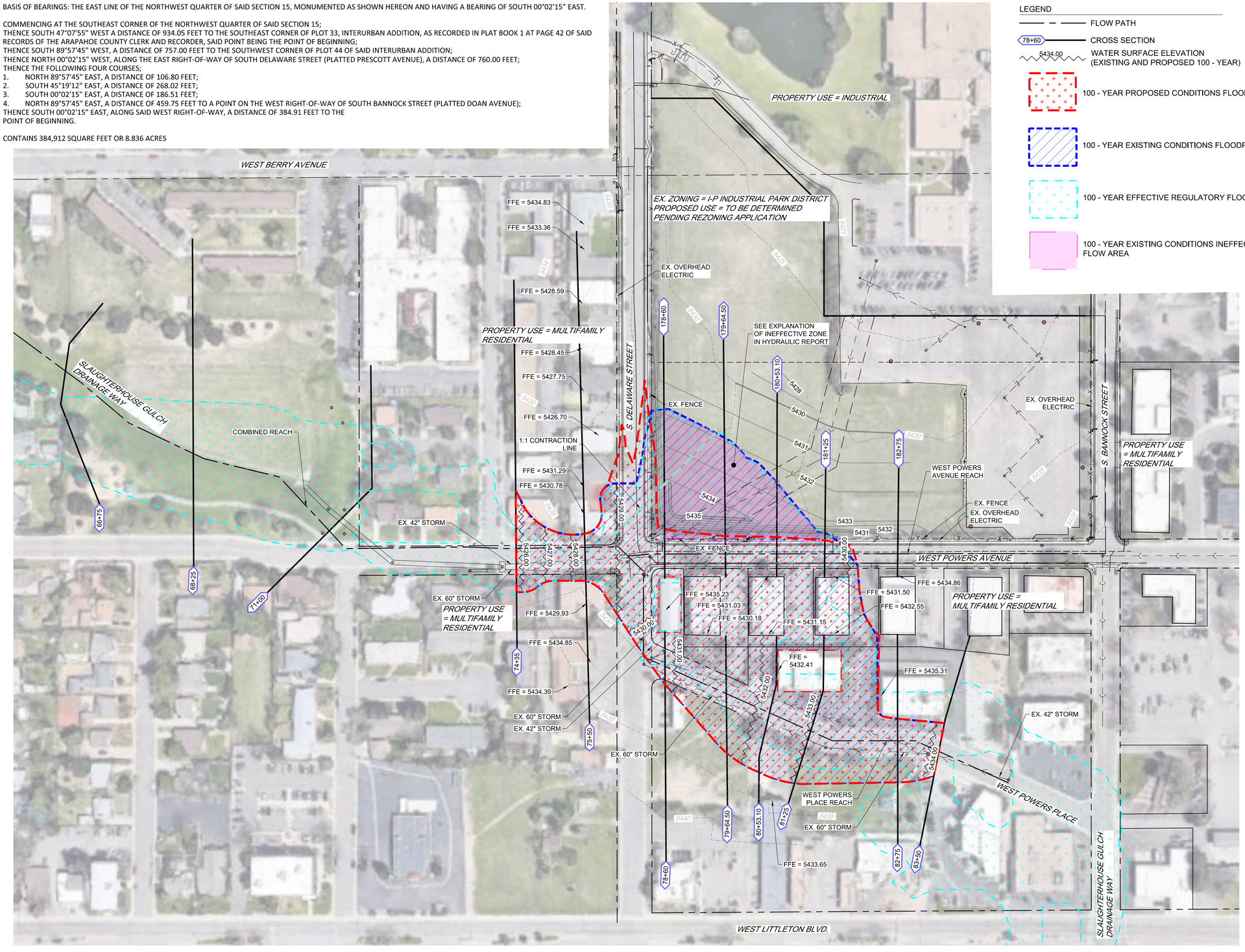
A PORTION OF THAT PARCEL OF LAND DESCRIBED IN BOOK 1507 AT PAGE 398 IN THE RECORDS OF THE ARAPAHOE COUNTY CLERK AND RECORDER; SITUATED IN THE WEST HALF OF SECTION 15, TOWNSHIP 5 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN; CITY OF LITTLETON, COUNTY OF ARAPAHOE,STATE OF COLORADO; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 15, MONUMENTED AS SHOWN HEREON AND HAVING A BEARING OF SOUTH 00°02'15" EAST.

COMMENCING AT THE SOUTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 15;
THENCE SOUTH 47°07'55" WEST A DISTANCE OF 934.05 FEET TO THE SOUTHEAST CORNER OF PLOT 33, INTERURBAN ADDITION, AS RECORDED IN PLAT BOOK 1 AT PAGE 42 OF SAID RECORDS OF THE ARAPAHOE COUNTY CLERK AND RECORDER, SAID POINT BEING THE POINT OF BEGINNING;
THENCE SOUTH 89°57'45" WEST, A DISTANCE OF 757.00 FEET TO THE SOUTHWEST CORNER OF PLOT 44 OF SAID INTERURBAN ADDITION;
THENCE NORTH 00°02'15" WEST, ALONG THE EAST RIGHT-OF-WAY OF SOUTH DELAWARE STREET (PLATTED PRESCOTT AVENUE), A DISTANCE OF 760.00 FEET;
THENCE THE FOLLOWING FOUR COURSES;
1. NORTH 89°57'45" EAST, A DISTANCE OF 106.80 FEET;
2. SOUTH 45°19'12" EAST, A DISTANCE OF 268.02 FEET;
3. SOUTH 00°02'15" EAST, A DISTANCE OF 186.51 FEET;
4. NORTH 89°57'45" EAST, A DISTANCE OF 459.75 FEET TO A POINT ON THE WEST RIGHT-OF-WAY OF SOUTH BANNOCK STREET (PLATTED DOAN AVENUE);

THENCE SOUTH 00°02'15" EAST, ALONG SAID WEST RIGHT-OF-WAY, A DISTANCE OF 384.91 FEET TO THE
POINT OF BEGINNING.

CONTAINS 384,912 SQUARE FEET OR 8.836 ACRES



LEGEND

- FLOW PATH
- 78+60 — CROSS SECTION
- 5434.00 — WATER SURFACE ELEVATION (EXISTING AND PROPOSED 100 - YEAR)
- 100 - YEAR PROPOSED CONDITIONS FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS FLOODPLAIN
- 100 - YEAR EFFECTIVE REGULATORY FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS INEFFECTIVE FLOW AREA

NOTE: THE VERTICAL DATUM FOR ELEVATIONS SHOWN ON THIS PLAN ARE NAVD88. IT SHOULD BE NOTED THAT THE VERTICAL DATUM FOR THE EFFECTIVE LOMR IS NAVD29. THE ELEVATION DIFFERENCE BEING THAT ELNAVD88=ELNAVD29+3.06'.

0 40 80 160
SCALE: 1" = 80'

YEARS
Redland
WHERE GREAT PLACES BEGIN
720.283.4783 Office
5800 Ward Road, Suite 101, Court, Littleton, Colorado 80120
REDLAND.COM

DRAWN	BDW
CHECKED	MDC
APPROVED	MDC
PROJECT NO.	16024.01
HORZ. SCALE	1" = 80'
VERT. SCALE	NA

NOTES

NO.	DATE	
1	07.05.2018	ISSUED FOR REVIEW
2	09.21.2018	REISSUED FOR REVIEW
3	11.26.2018	REISSUED FOR REVIEW

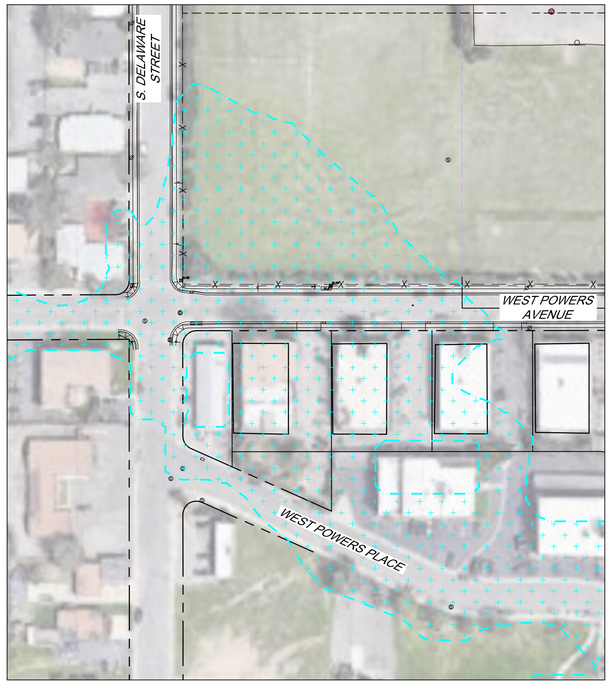
SITE PLAN

DELAWARE AND POWERS
FLOODPLAIN USE BY SPECIAL EXCEPTION

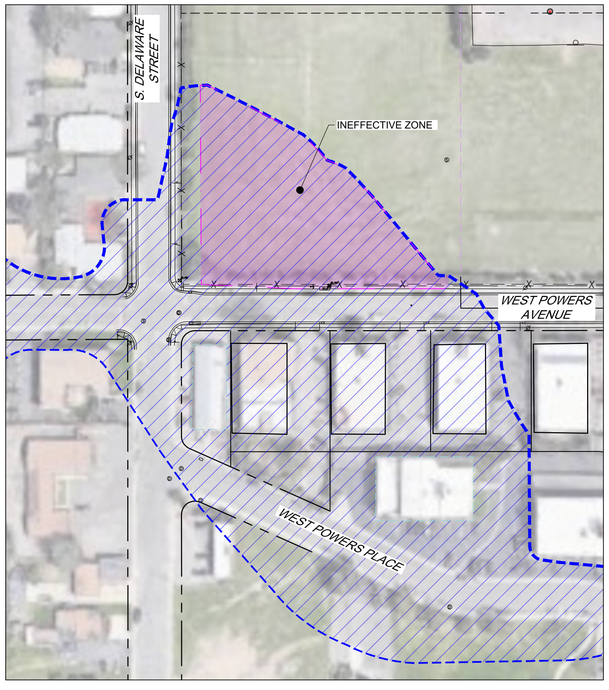
SHEET 1

LEGEND

- 100 - YEAR PROPOSED CONDITIONS FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS FLOODPLAIN
- 100 - YEAR EFFECTIVE REGULATORY FLOODPLAIN
- 100 - YEAR EXISTING CONDITIONS INEFFECTIVE FLOW AREA



100-YEAR EFFECTIVE REGULATORY FLOODPLAIN



100-YEAR EXISTING CONDITIONS FLOODPLAIN

100-YEAR PROPOSED CONDITIONS FLOODPLAIN

N

0 40 80 160

SCALE: 1" = 80'

YEARS IN THE Redland WHERE GREAT PLACES BEGIN
720.283.4783 Office
5500 Greenwood Plaza Court, Littleton, Colorado 80120
REDLAND.COM

DRAWN	BDW
CHECKED	MDC
APPROVED	MDC
PROJECT NO.	16024.01
HORZ. SCALE	1" = 80'
VERT. SCALE	NA

NOTES

NO.	DATE	
1	07.05.2018	ISSUED FOR REVIEW
2	09.21.2018	REISSUED FOR REVIEW
3	11.26.2018	REISSUED FOR REVIEW

SITE PLAN

DELAWARE AND POWERS
FLOODPLAIN USE BY SPECIAL EXCEPTION

SHEET 2

I:\2016\16024 - Delaware Self Storage\CADD\Exhibits\16024.01 CLOMR\16024.01 CLOMR Proposed Floodplain_Sheet 2.dwg tab: Use by Special Exception Site Plan Nov 26, 2018 - 1:31pm dwatson