Appendix F

Flood Management

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3182
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the New York State Office of Cyber Security & Critical Infrastructure Coordination. This information was produced as one-foot and two-foot resolution natural color orthoimagery from photography dated April 2006.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

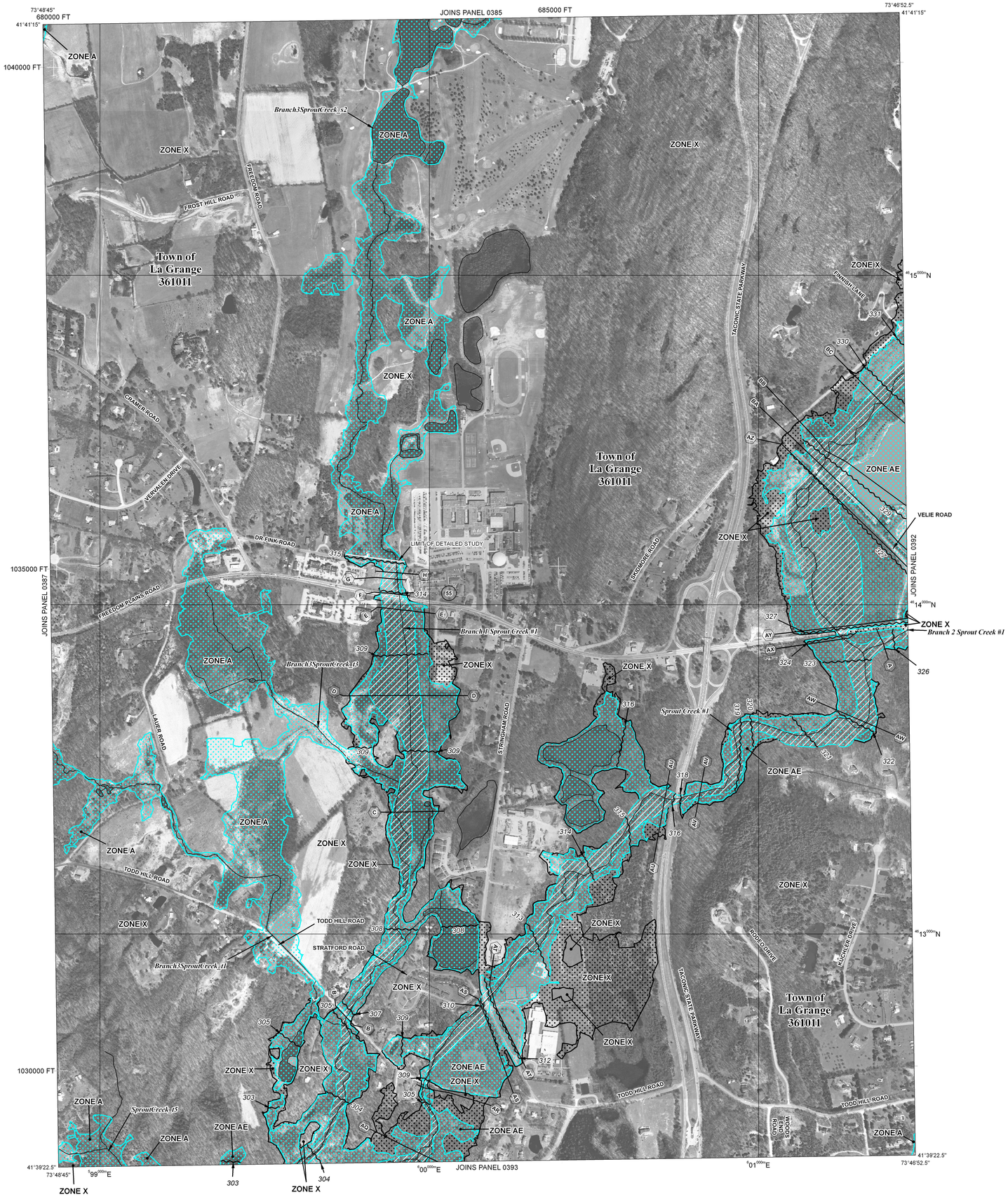
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM, visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL. 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 3 — 3 — Limited detail cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 21'76000"N — 1000-meter Universal Transverse Mercator grid values, zone 18
- 600000 FT — 5000-foot grid values: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
May 2, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0391E

FIRM
FLOOD INSURANCE RATE MAP

for DUTCHESS COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
LA GRANGE, TOWN OF	361011

PANEL 391 OF 602
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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
36027C0391E

EFFECTIVE DATE
MAY 2, 2012

Federal Emergency Management Agency

Federal Emergency Management Agency

Washington, D.C. 20472

March 13, 2020

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 19-02-1712R
Community Name: Town of LaGrange, NY
Community No.: 361011

Mr. Alan Bell
Town Supervisor, Town of LaGrange
Town Hall
120 Stringham Road
LaGrangeville, NY 12540

Dear Mr. Bell:

We are providing our comments with the enclosed Conditional Letter of Map Revision (CLOMR) on a proposed project within your community that, if constructed as proposed, could revise the effective Flood Insurance Rate Map for your community.

If you have any questions regarding the floodplain management regulations for your community, the National Flood Insurance Program (NFIP) in general, or technical questions regarding this CLOMR, please contact the Director, Mitigation Division of the Federal Emergency Management Agency (FEMA) Regional Office in New York, NY at (347) 838-0427, or the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

List of Enclosures:
Conditional Letter of Map Revision Comment Document

cc: Ms. Kelli Higgins-Roche, CFM
State Floodplain Manager
New York State Deptartment of Environmental Conservation

Mr. Leonard Jackson, P.E.
Project Engineer
Leonard Jackson Associates PE LLC

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	Town of LaGrange Dutchess County New York	CULVERT FILL	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS BASE MAP CHANGES UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 361011		
IDENTIFIER	LaGrange Town Center	APPROXIMATE LATITUDE & LONGITUDE: 41.667, -73.799 SOURCE: Google Earth DATUM: NAD 83	

AFFECTED MAP PANELS	
TYPE: FIRM* NO.: 36027C0391E DATE: May 2, 2012	* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) AND REACH DESCRIPTION See Page 2 for Additional Flooding Sources

Branch 3 Sprout Creek T1 – From just upstream of Todd Hill Road to approximately 200 feet downstream of Lauer Road

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Branch 3 Sprout Creek T1	Fill Placement	At approximately 330 feet upstream of Todd Hill Road

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Branch 3 Sprout Creek T1	Zone A	Zone A	Yes	Yes

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State/Commonwealth law have been received. State/Commonwealth, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood). If the State/Commonwealth, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

ADDITIONAL FLOODING SOURCES AFFECTED BY THIS CONDITIONAL REQUEST

FLOODING SOURCE(S) AND REACH DESCRIPTION

Branch 3 Sprout Creek T3 – From the confluence with Branch 1 Sprout Creek 1 to approximately 180 feet downstream of State Route 55.

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
Branch 3 Sprout Creek T3	New (details) Culvert	At approximately 1,230 feet upstream of the confluence with Branch 1 Sprout Creek 1
	Fill Placement	At approximately 1,170 feet upstream of the confluence with Branch 1 Sprout Creek 1

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
Branch 3 Sprout Creek T3	Zone A	Zone A	Yes	Yes

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

To determine the changes in flood hazards that will be caused by the proposed project, we compared the hydraulic modeling reflecting the proposed project (referred to as the proposed conditions model) to the hydraulic modeling reflecting the existing conditions.

The table below shows the changes in the base flood water-surface elevations (WSELs).

Base Flood WSEL Comparison Table

Flooding Source: Branch 3 Sprout Creek T1		Base Flood WSEL Change (feet)	Location of maximum change
Proposed vs. Existing	Maximum increase	0.79	At approximately 80 feet upstream of Todd Hill Road
	Maximum decrease	0.13	At approximately 540 feet upstream of Todd Hill Road

Flooding Source: Branch 3 Sprout Creek		Base Flood WSEL Change (feet)	Location of maximum change
Proposed vs. Existing	Maximum increase	0.95	At approximately 1,400 feet upstream of the confluence with Branch 1 Sprout Creek
	Maximum decrease	0.05	At approximately 360 feet upstream of the confluence with Branch 1 Sprout Creek

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

DATA REQUIRED FOR FOLLOW-UP LOMR

Upon completion of the project, your community must submit the data listed below and request that we make a final determination on revising the effective FIRM. If the project is built as proposed and the data below are received, a revision to the FIRM would be warranted.

• Form 1, entitled "Overview & Concurrence Form". Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1 must be included. If as-built conditions differ from the proposed plans, please submit new forms, which may be accessed at http://www.fema.gov/plan/prevent/fhm/dl_mt-2.shtm, or annotated copies of the previously submitted forms showing the revised information.

• Form 2, entitled "Riverine Hydrology & Hydraulics Form."

• Form 3, entitled "Riverine Structures Form."

• Hydraulic analyses, for as-built conditions, of the base flood together with a topographic work map showing the revised floodplain boundaries. Please ensure that the revised information ties in with the current effective information at the downstream and upstream ends of the revised reach.

• An annotated copy of the FIRM, at the scale of the effective FIRM, that shows the revised floodplain boundary delineations shown on the submitted work map and how they tie into the floodplain boundary delineations shown on the current effective FIRM at the downstream and upstream ends of the revised reach.

• As-built plans, certified by a registered professional engineer, of all proposed project elements.

• Documentation of the individual legal notices sent to property owners who will be affected by any widening/shifting of the base floodplain and/or any BFE increases along Branch 3 Sprout Creek T1 and Branch 3 Sprout Creek T3.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

• FEMA's fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps may be accessed at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm. The fee at the time of the map revision submittal must be received before we can begin processing the request. Payment of this fee can be made through a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). Please forward the payment, along with the revision application, to the following address:

LOMC Clearinghouse
3601 Eisenhower Avenue, Suite 500
Alexandria,VA 22304-6426

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

COMMUNITY REMINDERS

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Michael Moriarty
Director, Mitigation Division
Federal Emergency Management Agency, Region II
26 Federal Plaza
New York, NY 10278
(347) 838-0427

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

LJA | Leonard Jackson Associates Consulting Engineers

26 Firemans Memorial Drive . Pomona, New York 10970 . (845) 354-4382 . FAX (845) 354-4401

January 17, 2020

Rieger Homes
Steven Reiger
6 Old North Plank Road
Newburgh, NY 12550

Re: **Hydraulic Analysis for LaGrange Town Center**
LJA #19032

Dear Ms. Wanda,

Rieger Homes Inc. proposes to build LaGrange Town Center in the Town of LaGrange, Dutchess County, New York. The project is located on effective FEMA FIRM Panel 36027C0391E. The project site contains two waterways mapped as Zone A with no floodway. The two tributaries are Branch 3 Sprout Creek-T1 and Branch 3 Sprout Creek-T3. The floodplains of the waterways are confined to the project site.

Regulations promulgated by FEMA and adopted by the Town of LaGrange, NY limit any rise in the floodplain resulting from construction to a maximum of one foot. A rise of more than one foot is permitted provided that the water surface elevation rise is entirely confined to the floodplain within the project site. Zero rise resulting from construction is permitted in the floodway. This project site contains no floodway.

We have analyzed the Existing and Post-project conditions to evaluate the effect on flood elevations resulting from the project development and found that the project reduces flood elevations on both tributaries except for one limited area upstream of on-site bridge on Branch3 Sprout Creek_T3 approximately 100 feet long with the rise varying from 0.0 to 0.95 feet and for another limited area approximately 150 feet long in the downstream portion of Branch3 Sprout Creek_T1 with the rise varying from 0.0 to 0.79 feet. The rises are confined entirely to the project site and affects no one off the project site. The project design accommodates these rises.

The project proposes construction of buildings within the former floodplain that will be displaced by project grading. The minimum floor elevation of any building located within this area of the floodplain will be two feet or more higher than the original floodplain elevation.

No basements therefore are proposed below this minimum floor elevation located within the former floodplain in accordance with floodplain regulations adopted by the Town of LaGrange.

FEMA regulations state that the minimum floor elevation constructed within floodplain must be at or above the base flood elevation. The Town of LaGrange requires that the minimum floor elevation must be at least 2 feet higher than the base flood elevation.

The project design complies with the regulations promulgated by FEMA and adopted by Town of LaGrange. The effects in base flood elevations resulting from project are summarized in the following tables.

TABLE 1: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T3)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t3	3041	321.0	321.0	0.00	0.9
SproutCreek_t3	2905	320.1	320.1	-0.01	0.6
SproutCreek_t3	2781	319.6	319.6	0.00	0.7
SproutCreek_t3	2585	319.6	319.6	0.00	1.4
SproutCreek_t3	2463	319.6	319.6	0.01	1.6
SproutCreek_t3	2118	319.6	319.6	0.00	1.6
SproutCreek_t3	1750	319.3	319.3	0.01	0.8
SproutCreek_t3	1578	318.6	318.6	0.01	0.6
SproutCreek_t3	1470	317.7	317.7	-0.01	0.6
SproutCreek_t3	1388	316.7	317.0	0.29	1.0
SproutCreek_t3	1262	315.9	316.9	0.95	0.9
SproutCreek_t3	1200 (Culvert)				
SproutCreek_t3	1162	314.1	314.2	0.07	0.3
SproutCreek_t3	1050	312.6	312.7	0.10	0.5
SproutCreek_t3	997	312.5	312.6	0.06	0.6
SproutCreek_t3	958	312.5	312.6	0.05	0.5
SproutCreek_t3	845	312.1	312.1	0.00	0.5
SproutCreek_t3	603	309.1	309.0	-0.05	0.7
SproutCreek_t3	378	308.3	308.3	0.00	0.3

TABLE 2: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T1)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t1	3210	331.2	331.2	0.00	1.0
SproutCreek_t1	3089	329.4	329.4	0.00	1.1
SproutCreek_t1	2895	326.7	326.7	0.00	0.7
SproutCreek_t1	2703	325.1	325.1	0.00	1.0
SproutCreek_t1	2522	322.8	322.8	0.00	0.7
SproutCreek_t1	2375	320.5	320.5	0.00	0.5
SproutCreek_t1	2262	318.6	318.6	0.00	0.6
SproutCreek_t1	2073	318.4	318.4	0.00	0.4
SproutCreek_t1	1666	316.2	316.2	0.00	0.2
SproutCreek_t1	1272	314.8	315.4	0.63	1.4
SproutCreek_t1	1104	314.7	315.4	0.71	1.4
SproutCreek_t1	900	314.5	315.1	0.58	1.1
SproutCreek_t1	829	314.1	314.0	-0.13	0.8
SproutCreek_t1	725	312.9	312.9	0.05	0.9
SproutCreek_t1	666	312.6	312.7	0.13	0.6
SproutCreek_t1	617	312.1	312.5	0.43	0.5
SproutCreek_t1	465	310.6	311.3	0.79	0.9

Very truly yours,

LEONARD JACKSON ASSOCIATES
Leonard Jackson, P.E.

LJA | Leonard Jackson Associates Consulting Engineers
26 Firemens Memorial Drive. Pomona, New York 10970. (845) 354-4382. FAX (845) 354-4401

HYDRAULIC ANALYSIS FOR LAGRANGE TOWN CENTER

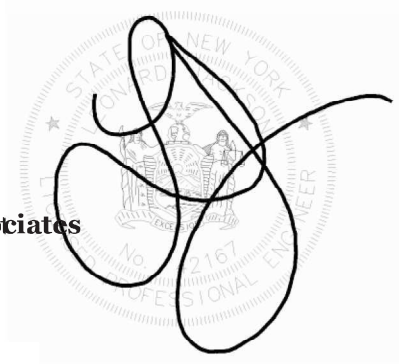
Prepared for

JMC SITE DEVELOPMENT CONSULTANTS

LJA # 19032

DATE: 1/17/2020

Leonard Jackson PE PLLC dba Leonard Jackson Associates



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Leonard Jackson Associates

1. SUMMARY AND RESULTS

Rieger Homes Inc. proposes to build LaGrange Town Center in the Town of LaGrange, Dutchess County, New York. The project is located on effective FEMA FIRM Panel 36027C0391E. The project site contains two waterways mapped as Zone A with no floodway as shown in the attached annotated FIRM. The two tributaries are Branch 3 Sprout Creek-T1 and Branch 3 Sprout Creek-T3. The floodplains of the waterways are confined to the project site.

Regulations promulgated by FEMA and adopted by the Town of LaGrange, NY limit any rise in the floodplain resulting from construction to a maximum of one foot. A rise of more than one foot is permitted provided that the water surface elevation rise is entirely confined to the floodplain within the project site. Zero rise resulting from construction is permitted in the floodway. This project site contains no floodway.

We have analyzed the Existing and Post-project conditions to evaluate the effect on flood elevations resulting from the project development and found that the project reduces flood elevations on both tributaries except for one limited area upstream of on-site bridge on Branch3 Sprout Creek_T3 approximately 100 feet long with the rise varying from 0.0 to 0.95 feet and for another limited area approximately 150 feet long in the downstream portion of Branch3 Sprout Creek_T1 with the rise varying from 0.0 to 0.79 feet. The rises are confined entirely to the project site and affects no one off the project site. The project design accommodates these rises.

The project proposes construction of buildings within the former floodplain that will be displaced by project grading. The minimum floor elevation of any building located within this area of the floodplain will be two feet or more higher than the original floodplain elevation.

No basements therefore are proposed below this minimum floor elevation located within the former floodplain in accordance with floodplain regulations adopted by the Town of LaGrange.

FEMA regulations state that the minimum floor elevation constructed within floodplain must be at or above the base flood elevation. The Town of LaGrange requires that the minimum floor elevation must be at least 2 feet higher than the base flood elevation.

The project design complies with the regulations promulgated by FEMA and adopted by Town of LaGrange. The effects in base flood elevations resulting from project are summarized in the following tables. Refer to attached workmap for section location.

Project: LaGrange Town Center LJA # 19032
Location: Town of LaGrange Date: 1/17/2020
Dutchess County

TABLE 1-1: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T3)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t3	3041	321.0	321.0	0.00	0.9
SproutCreek_t3	2905	320.1	320.1	-0.01	0.6
SproutCreek_t3	2781	319.6	319.6	0.00	0.7
SproutCreek_t3	2585	319.6	319.6	0.00	1.4
SproutCreek_t3	2463	319.6	319.6	0.01	1.6
SproutCreek_t3	2118	319.6	319.6	0.00	1.6
SproutCreek_t3	1750	319.3	319.3	0.01	0.8
SproutCreek_t3	1578	318.6	318.6	0.01	0.6
SproutCreek_t3	1470	317.7	317.7	-0.01	0.6
SproutCreek_t3	1388	316.7	317.0	0.29	1.0
SproutCreek_t3	1262	315.9	316.9	0.95	0.9
SproutCreek_t3	1200 (Culvert)				
SproutCreek_t3	1162	314.1	314.2	0.07	0.3
SproutCreek_t3	1050	312.6	312.7	0.10	0.5
SproutCreek_t3	997	312.5	312.6	0.06	0.6
SproutCreek_t3	958	312.5	312.6	0.05	0.5
SproutCreek_t3	845	312.1	312.1	0.00	0.5
SproutCreek_t3	603	309.1	309.0	-0.05	0.7
SproutCreek_t3	378	308.3	308.3	0.00	0.3

TABLE 1-2: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T1)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t1	3210	331.2	331.2	0.00	1.0
SproutCreek_t1	3089	329.4	329.4	0.00	1.1
SproutCreek_t1	2895	326.7	326.7	0.00	0.7
SproutCreek_t1	2703	325.1	325.1	0.00	1.0
SproutCreek_t1	2522	322.8	322.8	0.00	0.7
SproutCreek_t1	2375	320.5	320.5	0.00	0.5
SproutCreek_t1	2262	318.6	318.6	0.00	0.6
SproutCreek_t1	2073	318.4	318.4	0.00	0.4
SproutCreek_t1	1666	316.2	316.2	0.00	0.2
SproutCreek_t1	1272	314.8	315.4	0.63	1.4
SproutCreek_t1	1104	314.7	315.4	0.71	1.4
SproutCreek_t1	900	314.5	315.1	0.58	1.1
SproutCreek_t1	829	314.1	314.0	-0.13	0.8
SproutCreek_t1	725	312.9	312.9	0.05	0.9
SproutCreek_t1	666	312.6	312.7	0.13	0.6
SproutCreek_t1	617	312.1	312.5	0.43	0.5
SproutCreek_t1	465	310.6	311.3	0.79	0.9

2. METHODOLOGY

2.a. Hydrologic Analysis

1. The SCS Unit Hydrograph Transformation method was used to determine storm flows. A rainfall-runoff model was developed using Hydrologic Modeling System (HEC-HMS) version 4.2.1 software developed by the Hydrologic Engineering Center of U.S. Army Corps of Engineers.
2. The subbasins have been delineated using the Dutchess County Topography. See Exhibit 1.
3. The rainfall depth was obtained from NOAA, Atlas 14 Volume 8. The rainfall depth for 24hr are provided in Table 2-1.

Table 2-1. Rainfall Depth Summary (inch)

Duration	Average recurrence interval (years)
	100
24-hr	9.34

4. The rainfall depth was uniformly distributed over a period of 24-hour duration with the peak intensity at 24-hour using the HEC-HMS inbuilt curve. See Exhibit 2.
5. The soils data was downloaded from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) website. Exhibit 3 shows the hydrologic soil group map and soil report located within the watershed.
6. The land use data was downloaded from the National Land Cover Database 2001. The land use categories that cover the project watershed are listed in Table 2-2. Landuse Categories and Curve Numbers. The table includes the curve number for each landuse category for each of the four hydrologic soil groups. The curve number for each land use category is referenced from the Hydrology National Engineering Book, Part 630, Chapter 9 Hydrologic Soil-Cover Complexes by USDA (NEH). The corresponding name for each land use category used in NEH is also listed in the table. See Exhibit 4 for the land use map.

Table 2-2. Landuse Categories and Curve Numbers

NJDEP LU Description	Corresponding National Engineering Handbook LU Description	Curve Number by Hydrologic Soil Group			
		A	B	C	D
Cultivated Crops	Pasture, grassland, or range-continuous forage for grazing: Good condition	39	61	74	80
Deciduous Forest	Woods: Fair condition	36	60	73	79
Developed, Low Intensity	Residential districts by average lot size 1 acre	51	68	79	84
Developed, Medium Intensity	Residential districts by average lot size 1/3 acre	57	72	81	86
Developed, high Intensity	Residential districts by average lot size 1/8 acre	77	85	90	92
Developed, Open Space	Open space- Good condition (grass cover > 75%)	39	61	74	80
Emergent Herbaceuous Wetlands	Herbaceous - mixture of grass, weeds and low-growing brush, with brush the minor element-Fair	71	71	81	89
Evergreen Forest	Woods: Good condition	30	55	70	77
Hay/Pasture	Pasture, grassland, or range-continuous forage for grazing: Good condition	39	61	74	80
Herbaceuous	Herbaceous - mixture of grass, weeds and low-growing brush, with brush the minor element-Good	62	62	74	85
Mixed Forest	Woods: Good condition	30	55	70	77
Open Water		98	98	98	98
Shrub/Scrub	Brush-brush-forbs-grass mixture with brush the major element	48	67	77	83
Woody Wetlands	Woods: Poor condition	45	66	77	83

7. The curve numbers are calculated using ArcGIS by intersecting the land use and soils layers described above with the subbasin boundary. Table 2-3 shows the calculated curve numbers. A summary of the curve number calculations are included in the attachments.

Table 2-3. Calculated Curve Numbers

Watershed	Area (acres)	Curve Number
Branch3 Sprout Creek_T1	221.9	67
Branch3 Sprout Creek_T3	468.2	66

8. For all basins, the time of concentration (Tc) were calculated using the SCS method.
9. The HEC-HMS model runs generate the peak flows listed in Table 2-4.

Table 2-4. Flow Summary

Location	Area (acres)	100-Year Peak Discharge (cfs)
Confluence of Branch 3 Sprout Creek_T1 with Branch 1 Sprout Creek #1	221.9	139.45
Confluence of Branch 3 Sprout Creek_T3 with Branch 1 Sprout Creek #1	468.2	75.17

A summary of the time of concentration calculations are included in the attachments.

Hydrologic analysis was also conducted to reflect the developed conditions. Since the existing and developed conditions flow differences are negligible, the flows representing the existing conditions were used for the hydraulic analysis.

2.b. Hydraulic Analysis

1. Analyses of pre-project and post-project construction were prepared to evaluate compliance with FEMA and Town of LaGrange floodplain regulations. HEC-RAS Version 5.0.6 was used for these analyses.

2. The existing condition HEC-RAS model for the Branch3 Sprout Creek T1 and Branch3 Sprout Creek T3 were created.

3. The HEC-RAS model cross section locations were plotted on both the existing condition and Post-project condition plan.

4. Effective and non-effective flow areas were defined for existing and post-project conditions on the project site and implemented on the cross sections for each model.

5. The following summarizes the procedure utilized to develop Floodplain Models for the analyses:

6.a. Existing Condition

i. The HEC-RAS models were created as per the existing condition of the site based on site topographic survey.
ii. The HEC-HMS was used for the hydrologic analysis of the site.
iii. Effective and Non-Effective flow areas are defined on the cross sections

6.b. Post-Project Condition

i. The existing condition models were modified to reflect post-project conditions based on proposed site plan prepared by JMC Consultants.
ii. Effective and Non-Effective flow areas are redefined in the post-project layout plan.

3. BASE FLOOD MODEL TABLES

Table 3-1: Existing Condition Output Table (Branch3 Sprout Creek_T3)

Table 3-2: Existing Condition Output Table (Branch3 Sprout Creek_T1)

Table 3-3: Post-Project Condition Output Table (Branch3 Sprout Creek_T3)

Table 3-4: Post-Project Condition Output Table (Branch3 Sprout Creek_T1)

Table 3-5: Natural Base Flood Table Comparison of Existing Vs. Post-Project Conditions (Branch3 Sprout Creek_T3)

Table 3-6: Natural Base Flood Table Comparison of Existing Vs. Post-Project Conditions (Branch3 Sprout Creek_T1)

Project: LaGrange Town Center
Location: Town of LaGrange
Dutchess County

LJA #19032
Date: 1/17/2020

TABLE 3-1: Existing Condition Base Flood Output Table (Branch3 Sprout Creek_T3)

HEC-RAS Plan: Existing Plan River: Branch3 Sprout Creek Reach: Branch3_Sprout_Creek_t3 Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Vel Left	Vel Right	Frctn Loss	C & E Loss	Headloss	Vel Head
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(ft/s)	(ft/s)	(ft)	(ft)	(ft)	(ft)
SproutCreek_t3	3041	100yr	75.17	320.06	320.97	320.75	321.04	2.97	1.27	1.3	0.86	0	0.86	0.07
SproutCreek_t3	2905	100yr	75.17	319.46	320.12		320.17	2.57	1.16	1.13	0.54	0	0.55	0.05
SproutCreek_t3	2781	100yr	75.17	318.86	319.59		319.63	1.9	0.86	0.73	0.03	0.01	0.04	0.04
SproutCreek_t3	2585	100yr	75.17	318.02	319.59		319.59	0.33	0.12	0.15	0.01	0	0.01	0
SproutCreek_t3	2463	100yr	75.17	318	319.58		319.59	0.38	0.16	0.15	0.02	0	0.02	0
SproutCreek_t3	2118	100yr	75.17	318	319.56		319.56	0.72	0.33	0.31	0.17	0.01	0.19	0
SproutCreek_t3	1750	100yr	75.17	318.14	319.25		319.38	2.88	1.12	0.65	0.74	0.03	0.77	0.13
SproutCreek_t3	1578	100yr	75.17	318	318.58		318.61	1.68	0.73	0.75	0.78	0.01	0.79	0.04
SproutCreek_t3	1470	100yr	75.17	317.03	317.67	317.67	317.83	4.93	2.04	2.34	0.67	0.03	0.71	0.16
SproutCreek_t3	1388	100yr	75.17	316	316.72		316.78	2.11	0.95	0.89	0.8	0	0.81	0.05
SproutCreek_t3	1262	100yr	75.17	315.46	315.92	315.82	315.97	2.52	1.68	1.32	1.81	0	1.81	0.05
SproutCreek_t3	1162	100yr	75.17	313.76	314.11	314.08	314.16	3.06	1.61	1.28	1.51	0	1.52	0.05
SproutCreek_t3	1050	100yr	75.17	312.02	312.58		312.64	2.11	0.63	0.77	0.1	0.02	0.11	0.07
SproutCreek_t3	997	100yr	75.17	312	312.52		312.53	0.75	0.44	0.32	0.02	0	0.02	0.01
SproutCreek_t3	958	100yr	75.17	312	312.5		312.51	0.62	0.4	0.29	0.18	0.02	0.19	0
SproutCreek_t3	845	100yr	75.17	311.56	312.14	312.14	312.31	3.9	1.49	1.83	0.82	0.05	0.87	0.18
SproutCreek_t3	603	100yr	75.17	308.02	309.09	308.6	309.12	1.54	0.6	0.64	0.72	0.01	0.72	0.03
SproutCreek_t3	378	100yr	75.17	308	308.31	308.26	308.4	2.38	0.96	0.89				0.09

TABLE 3-2: Existing Condition Base Flood Output Table (Branch3 Sprout Creek_T1)

HEC-RAS Plan: Existing Plan River: Branch3 Sprout Creek Reach: Branch3_Sprout_Creek_t1 Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Vel Left	Vel Right	Frctn Loss	C & E Loss	Headloss	Vel Head
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(ft/s)	(ft/s)	(ft)	(ft)	(ft)	(ft)
SproutCreek_t1	3210	100yr	139.45	330	331.21	331.16	331.54	4.89	1.7	1.71	1.79	0	1.79	0.34
SproutCreek_t1	3089	100yr	139.45	328.29	329.41	329.41	329.75	6.08	2.62	2.67	1.32	0.09	1.41	0.34
SproutCreek_t1	2895	100yr	139.45	326	326.69		326.75	2	1.1	1.03	1.27	0.03	1.31	0.06
SproutCreek_t1	2703	100yr	139.45	324	325.07	325.07	325.45	5.54	2.41	2.42	2.42	0.06	2.48	0.38
SproutCreek_t1	2522	100yr	139.45	322	322.78	322.68	322.97	3.64	1.24	1.39	2.19	0.01	2.2	0.19
SproutCreek_t1	2375	100yr	139.45	319.98	320.53	320.53	320.77	4.09	1.79	1.92	0.46	0.07	0.53	0.24
SproutCreek_t1	2262	100yr	139.45	318	318.59		318.6	1.2	0.77	0.52	0.22	0	0.22	0.01
SproutCreek_t1	2073	100yr	139.45	318	318.37		318.38	0.92	0.64	0.63	2.09	0.01	2.1	0.01
SproutCreek_t1	1666	100yr	139.45	316	316.18	316.18	316.27	2.41	1.06	1.06	1.05	0.02	1.07	0.09
SproutCreek_t1	1272	100yr	139.45	314	314.78		314.79	1.05	0.32	0.44	0.1	0	0.1	0.02
SproutCreek_t1	1104	100yr	139.45	314	314.69		314.69	0.67	0.28	0.32	0.15	0	0.15	0.01
SproutCreek_t1	900	100yr	139.45	314	314.53		314.55	1.12	0.63	0.61	0.24	0.02	0.25	0.02
SproutCreek_t1	829	100yr	139.45	313.2	314.13	314.13	314.3	4.01	1.2	1.71	0.32	0.04	0.36	0.17
SproutCreek_t1	736	100yr	139.45	312	312.85		312.89	1.57	0.76	0.85	0.23	0.01	0.24	0.03
SproutCreek_t1	666	100yr	139.45	312	312.55		312.65	2.59	0.55	0.58	0.47	0	0.47	0.1
SproutCreek_t1	617	100yr	139.45	311.32	312.06	311.92	312.18	3.13	1.33	0.82	1.51	0	1.51	0.12
SproutCreek_t1	465	100yr	139.45	310	310.55	310.44	310.67	2.98	1.52	1.51				0.12

Project: LaGrange Town Center
Location: Town of LaGrange
Dutchess County

LJA# 19032
Date: 1/17/2020

TABLE 3-3: Post-Project Condition Base Flood Output Table (Branch3 Sprout Creek_T3)

HEC-RAS Plan: Post-Project Plan River: Branch3 Sprout Creek Reach: Branch3_Sprout_Creek_t3 Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Vel Left	Vel Right	Frctn Loss	C & E Loss	Headloss	Vel Head
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(ft/s)	(ft/s)	(ft)	(ft)	(ft)	(ft)
SproutCreek_t3	3041	100yr	75.17	320.06	320.97	320.75	321.04	2.97	1.27	1.3	0.86	0	0.86	0.07
SproutCreek_t3	2905	100yr	75.17	319.46	320.11		320.17	2.58	1.16	1.13	0.54	0.01	0.55	0.05
SproutCreek_t3	2781	100yr	75.17	318.86	319.59		319.63	1.9	0.86	0.72	0.03	0.01	0.04	0.04
SproutCreek_t3	2585	100yr	75.17	318.02	319.59		319.59	0.33	0.12	0.14	0.01	0	0.01	0
SproutCreek_t3	2463	100yr	75.17	318	319.59		319.59	0.38	0.16	0.15	0.02	0	0.02	0
SproutCreek_t3	2118	100yr	75.17	318	319.56		319.56	0.72	0.33	0.31	0.17	0.01	0.18	0
SproutCreek_t3	1750	100yr	75.17	318.14	319.26	319	319.38	2.86	1.11	0.65	0.73	0.03	0.76	0.12
SproutCreek_t3	1578	100yr	75.17	318	318.59		318.62	1.7	0.82	0.76	0.79	0.01	0.8	0.04
SproutCreek_t3	1470	100yr	75.17	317.03	317.66	317.66	317.83	5.01	2.07	2.37	0.23	0.04	0.28	0.17
SproutCreek_t3	1388	100yr	75.17	316	317.01		317.03	1.35	0.61	0.57	0.13	0	0.13	0.02
SproutCreek_t3	1262	100yr	75.17	316	316.87	316.34	316.9	1.31		0.9				0.02
SproutCreek_t3	1200		Culvert											
SproutCreek_t3	1162	100yr	75.17	313.85	314.18	314.18	314.32	3.06			0.97	0.05	1.02	0.15
SproutCreek_t3	1050	100yr	75.17	312.02	312.68		312.72	1.74	0.66	0.65	0.12	0.01	0.12	0.04
SproutCreek_t3	997	100yr	75.17	312	312.58		312.6	1.05	0.41	0.33	0.04	0	0.04	0.02
SproutCreek_t3	958	100yr	75.17	312	312.55		312.56	0.74	0.22	0.31	0.23	0.02	0.24	0.01
SproutCreek_t3	845	100yr	75.17	311.56	312.14	312.14	312.31	3.9	1.49	1.83	0.76	0.05	0.81	0.18
SproutCreek_t3	603	100yr	75.17	308.02	309.04	308.57	309.07	1.2	0.55	0.29	0.66	0.01	0.67	0.02
SproutCreek_t3	378	100yr	75.17	308	308.31	308.26	308.4	2.38	0.96	0.89				0.09

TABLE 3-4: Post-Project Condition Base Flood Output Table (Branch3 Sprout Creek_T1)

HEC-RAS Plan: Post-Project Plan River: Branch3 Sprout Creek Reach: Branch3_Sprout_Creek_t1 Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Vel Left	Vel Right	Frctn Loss	C & E Loss	Headloss	Vel Head
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(ft/s)	(ft/s)	(ft)	(ft)	(ft)	(ft)
SproutCreek_t1	3210	100yr	139.45	330	331.21	331.16	331.54	4.89	1.7	1.7	1.78	0	1.78	0.33
SproutCreek_t1	3089	100yr	139.45	328.29	329.41	329.41	329.75	6.08	2.62	2.67	1.32	0.09	1.41	0.34
SproutCreek_t1	2895	100yr	139.45	326	326.69		326.75	2	1.1	1.03	1.27	0.03	1.31	0.06
SproutCreek_t1	2703	100yr	139.45	324	325.07	325.07	325.45	5.54	2.41	2.42	2.42	0.06	2.48	0.38
SproutCreek_t1	2522	100yr	139.45	322	322.78	322.68	322.97	3.63	1.24	1.39	2.19	0.01	2.2	0.19
SproutCreek_t1	2375	100yr	139.45	319.98	320.53	320.53	320.77	4.09	1.8	1.91	0.46	0.07	0.53	0.25
SproutCreek_t1	2267	100yr	139.45	318	318.59		318.6	1.2	0.78	0.51	0.22	0	0.22	0.01
SproutCreek_t1	2124	100yr	139.45	318	318.37		318.38	0.92	0.64	0.63	2.09	0.01	2.1	0.01
SproutCreek_t1	1666	100yr	139.45	316	316.18	316.18	316.27	2.42	1.06	1.06	0.12	0.03	0.15	0.09
SproutCreek_t1	1272	100yr	139.45	314	315.41		315.41	0.49	0.23	0.19	0.01	0	0.01	0
SproutCreek_t1	1104	100yr	139.45	314	315.4		315.4	0.32	0.14	0.16	0.02	0.02	0.05	0
SproutCreek_t1	900	100yr	139.45	314.03	315.11	315.04	315.35	4.95	2.21	1.76	1.07	0	1.08	0.24
SproutCreek_t1	829	100yr	139.45	313.19	314	314	314.28	4.84	2.13	2.03	0.51	0.07	0.58	0.28
SproutCreek_t1	736	100yr	139.45	312	312.9		312.95	2.02	1.01	1.08	0.22	0	0.22	0.05
SproutCreek_t1	666	100yr	139.45	312	312.68		312.73	1.81	0.67	0.53	0.19	0	0.2	0.05
SproutCreek_t1	617	100yr	139.45	312	312.49		312.53	1.61	0.83	0.75	0.93	0.02	0.95	0.04
SproutCreek_t1	465	100yr	139.45	310.16	311.34	311.24	311.59	4.11	1.64	1.23				0.25

Project: LagGrange Town Center LJA # 19032
Location: Town of LaGrange Date: 1/17/2020
Dutchess County

TABLE 3-5: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T3)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t3	3041	321.0	321.0	0.00	0.9
SproutCreek_t3	2905	320.1	320.1	-0.01	0.6
SproutCreek_t3	2781	319.6	319.6	0.00	0.7
SproutCreek_t3	2585	319.6	319.6	0.00	1.4
SproutCreek_t3	2463	319.6	319.6	0.01	1.6
SproutCreek_t3	2118	319.6	319.6	0.00	1.6
SproutCreek_t3	1750	319.3	319.3	0.01	0.8
SproutCreek_t3	1578	318.6	318.6	0.01	0.6
SproutCreek_t3	1470	317.7	317.7	-0.01	0.6
SproutCreek_t3	1388	316.7	317.0	0.29	1.0
SproutCreek_t3	1262	315.9	316.9	0.95	0.9
SproutCreek_t3	1200 (Culvert)				
SproutCreek_t3	1162	314.1	314.2	0.07	0.3
SproutCreek_t3	1050	312.6	312.7	0.10	0.5
SproutCreek_t3	997	312.5	312.6	0.06	0.6
SproutCreek_t3	958	312.5	312.6	0.05	0.5
SproutCreek_t3	845	312.1	312.1	0.00	0.5
SproutCreek_t3	603	309.1	309.0	-0.05	0.7
SproutCreek_t3	378	308.3	308.3	0.00	0.3

TABLE 3-6: NATURAL BASE FLOOD TABLE COMPARISON OF EXISTING VS. POST- PROJECT CONDITIONS (BRANCH3 SPROUT CREEK_T1)

A	B	c	D	E	F
Reach	Model Section #	Existing Condition Elevation	Post-project Condition Elevation	△ F (-) D	Post-Project Channel Flood Depth (ft)
SproutCreek_t1	3210	331.2	331.2	0.00	1.0
SproutCreek_t1	3089	329.4	329.4	0.00	1.1
SproutCreek_t1	2895	326.7	326.7	0.00	0.7
SproutCreek_t1	2703	325.1	325.1	0.00	1.0
SproutCreek_t1	2522	322.8	322.8	0.00	0.7
SproutCreek_t1	2375	320.5	320.5	0.00	0.5
SproutCreek_t1	2262	318.6	318.6	0.00	0.6
SproutCreek_t1	2073	318.4	318.4	0.00	0.4
SproutCreek_t1	1666	316.2	316.2	0.00	0.2
SproutCreek_t1	1272	314.8	315.4	0.63	1.4
SproutCreek_t1	1104	314.7	315.4	0.71	1.4
SproutCreek_t1	900	314.5	315.1	0.58	1.1
SproutCreek_t1	829	314.1	314.0	-0.13	0.8
SproutCreek_t1	725	312.9	312.9	0.05	0.9
SproutCreek_t1	666	312.6	312.7	0.13	0.6
SproutCreek_t1	617	312.1	312.5	0.43	0.5
SproutCreek_t1	465	310.6	311.3	0.79	0.9

4. EXISTING CONDITIONS WORK MAP

N

Legend

- Cross Section
- Stream Centerline
- Existing_100year_Floodplain
- Ex Contour 10ft
- Ex Contour 2ft

Effective Flood Data

- Zone A
- Zone AE
- FLOODWAY
- Zone X (SHADED)

0 250 500 1,000 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Drawing Number: FP
Scale: 1" = 200'
Date: 1/17/2020
Drawn by: SB
Job Number: 19032

LaGrange Town Center

DUTCHESS COUNTY, NEW YORK
TOWN OF LA GRANGE

EXISTING CONDITION WORKMAP

LJA
LEONARD JACKSON ASSOCIATES
CONSULTING ENGINEERS
26 FIREMENS MEMORIAL DRIVE, POMONA, NY 10970
Phone: (845) 354-4382 Fax: (845) 354-4401
www.leonardjackson.net

5. POST-PROJECT CONDITIONS WORK MAP

N

XS:3041 BFE:320.97
XS:2905 BFE:320.11
XS:2781 BFE:319.59
XS:2585 BFE:319.59
XS:2463 BFE:319.59
XS:2118 BFE:319.56
XS:1750 BFE:319.25
XS:1578 BFE:318.59
XS:1470 BFE:317.66
XS:1388 BFE:317.01
XS:1262 BFE:316.87
XS:1162 BFE:314.18
XS:1050 BFE:312.68
XS:997 BFE:312.63
XS:958 BFE:312.55
XS:845 BFE:312.14
XS:603 BFE:309.04
XS:373 BFE:308.31
XS:3210 BFE:331.21
XS:3089 BFE:329.41
XS:2935 BFE:326.69
XS:2703 BFE:325.07
XS:2672 BFE:322.78
XS:2375 BFE:320.53
XS:2262 BFE:318.49
XS:2073 BFE:318.37
XS:1666 BFE:316.18
XS:1272 BFE:315.41
XS:1104 BFE:315.4
XS:900 BFE:315.11
XS:829 BFE:314
XS:738 BFE:312.9
XS:666 BFE:312.66
XS:617 BFE:312.49
XS:485 BFE:311.34

Branch1SproutCreek #1
Branch3SproutCreek_13

Legend

- Cross-Section
- Stream Centerline
- Revised 100year Floodplain
- Proposed Buildings
- Contour 10ft
- Contour 2ft

Effective Flood Data

- Zone A
- Zone AE
- FLOODWAY
- Zone X (SHADED)

0 250 500 1,000 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

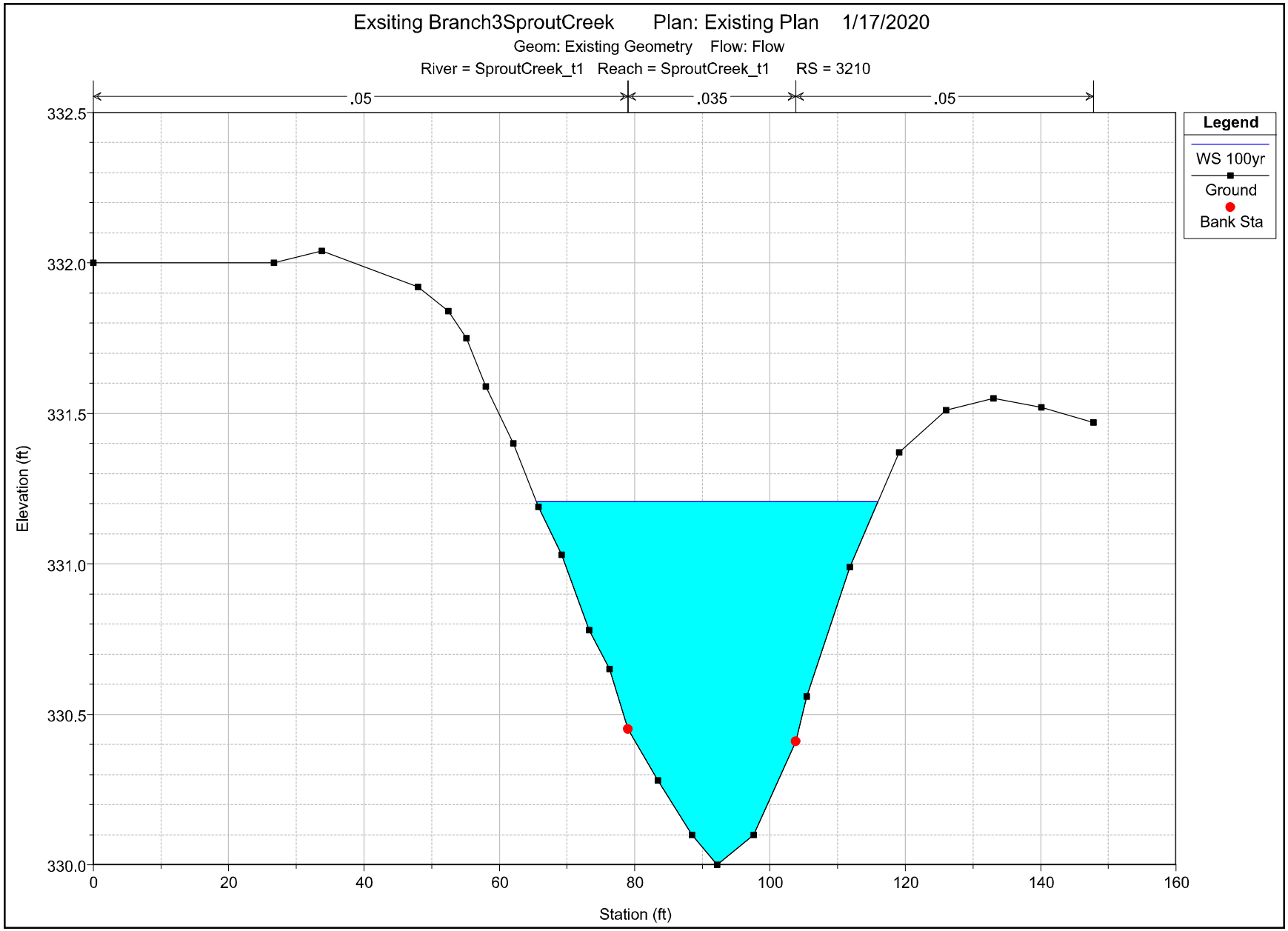
Drawing Number:	FP
Scale:	1" = 200'
Date:	1/17/2020
Drawn by:	SB
Job Number:	19032

LaGrange Town Center
DUTCHESS COUNTY, NEW YORK
TOWN OF LA GRANGE

POST-PROJECT CONDITION WORKMAP

LJA
LEONARD JACKSON ASSOCIATES
CONSULTING ENGINEERS
26 FIREMENS MEMORIAL DRIVE, POMONA, NY 10970
Phone: (845) 354-4382 Fax: (845) 354-4401
www.leonardjackson.net

6. CROSS SECTION PLOTS - EXISTING CONDITIONS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Geom: Existing Geometry Flow: Flow
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.035
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Legend
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Ground
Bank Sta
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Station (ft)
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331.5
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40
60
80
100
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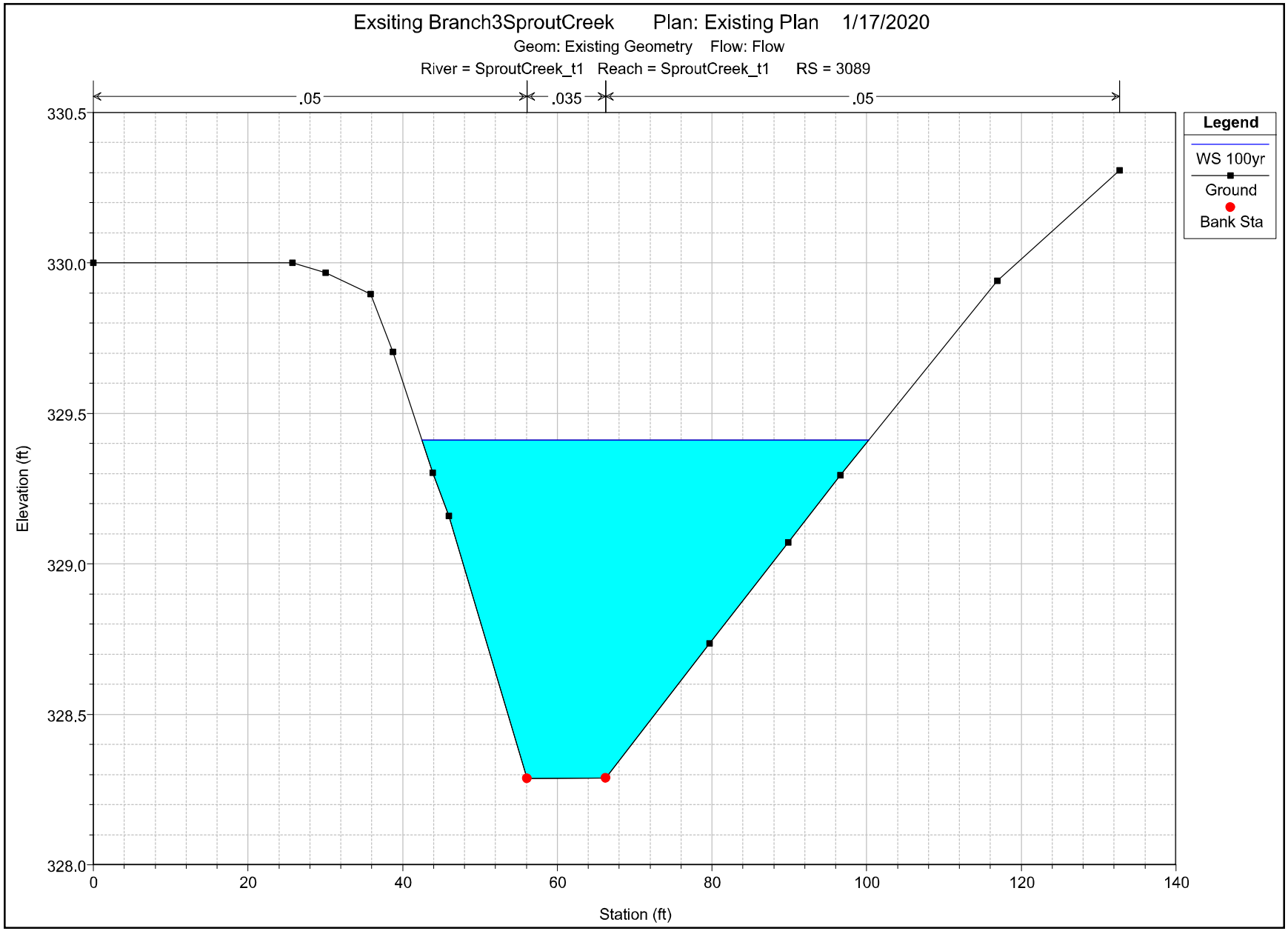
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Ground
Bank Sta
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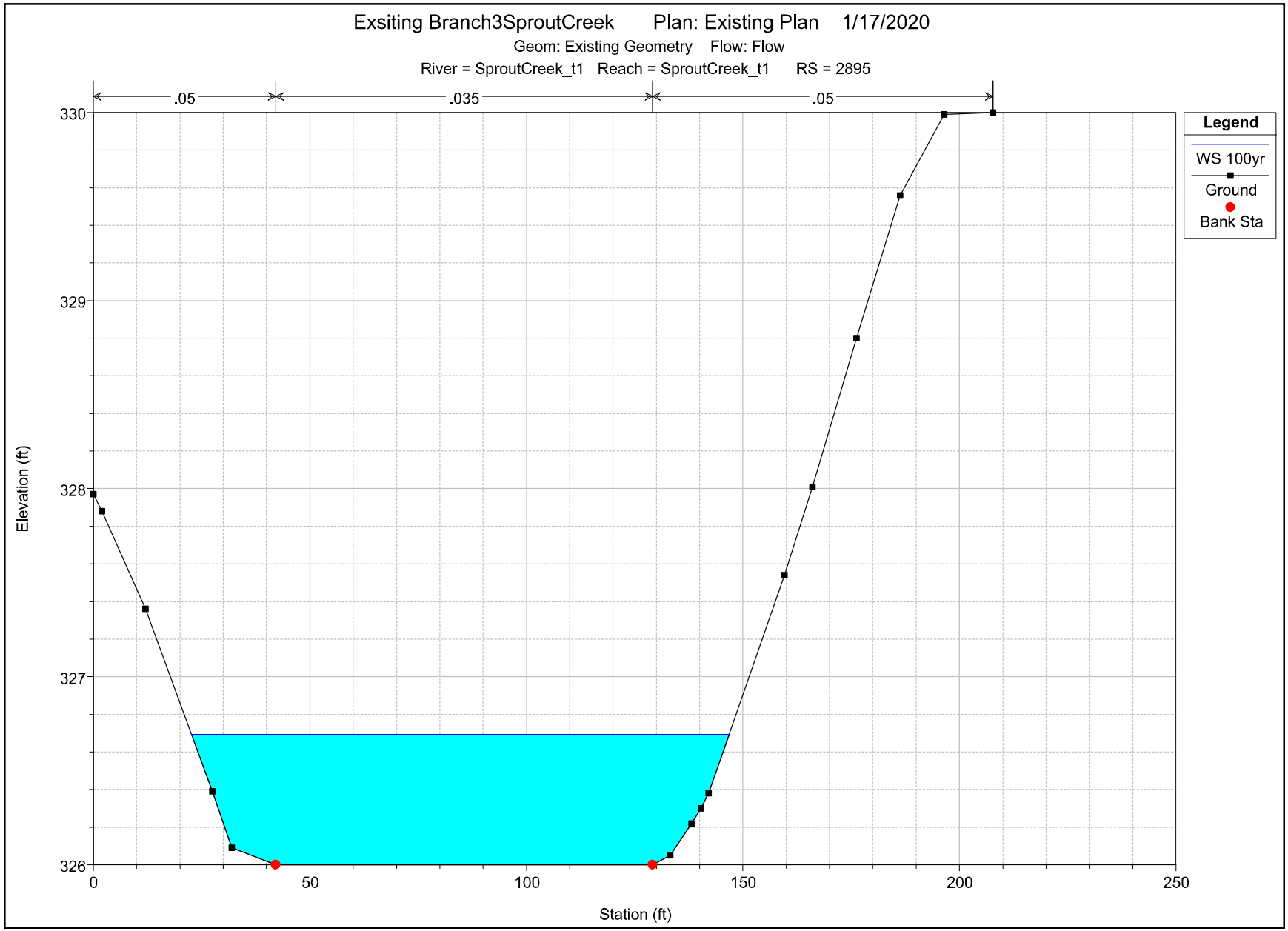
Station (ft)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.035
.05
330
329
328
327
326
Elevation (ft)
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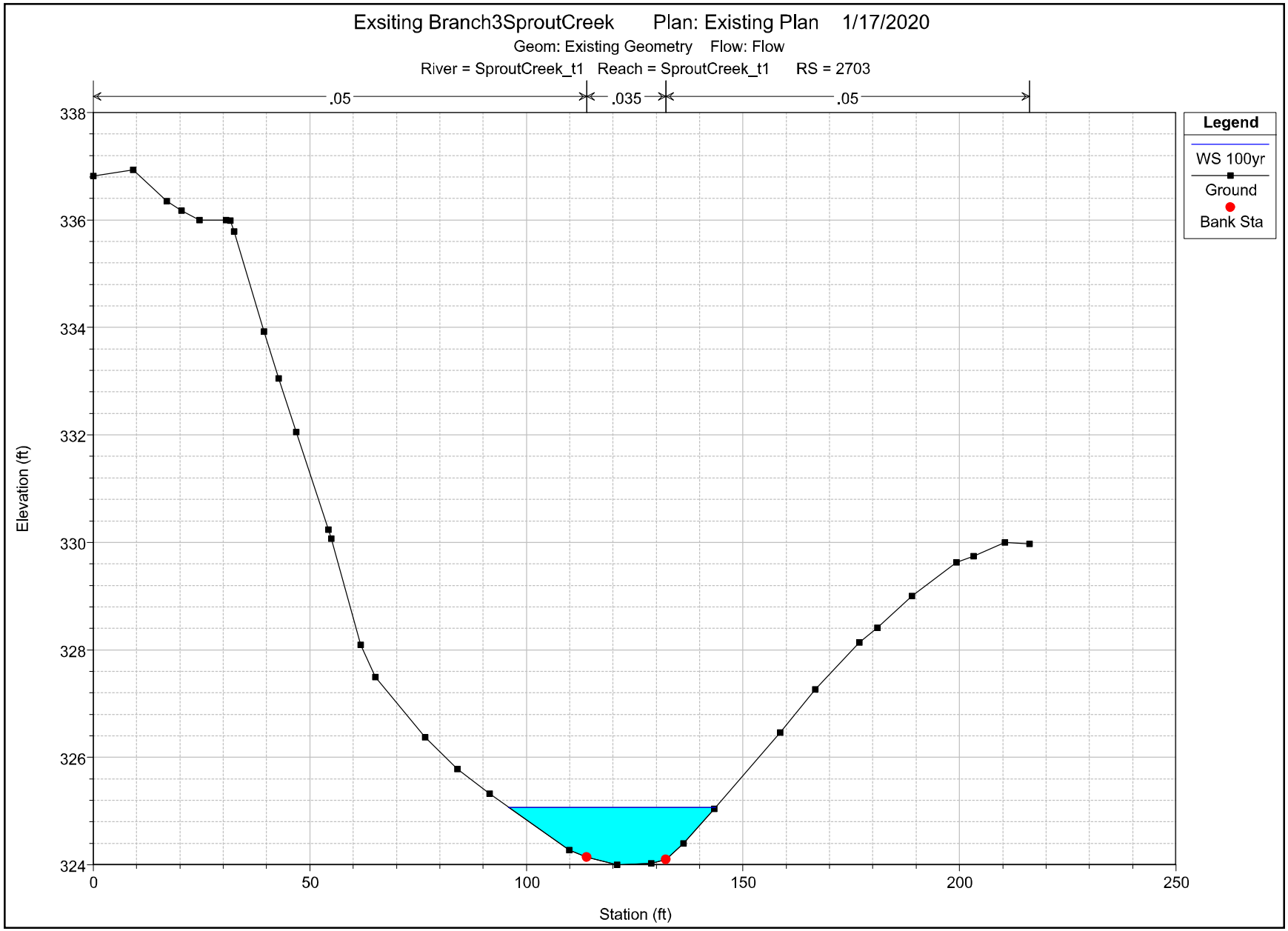
50
100
150
200
250
Station (ft)
Legend
WS 100yr
Ground
Bank Sta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.035
.05
Legend
WS 100yr
Ground
Bank Sta
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Station (ft)
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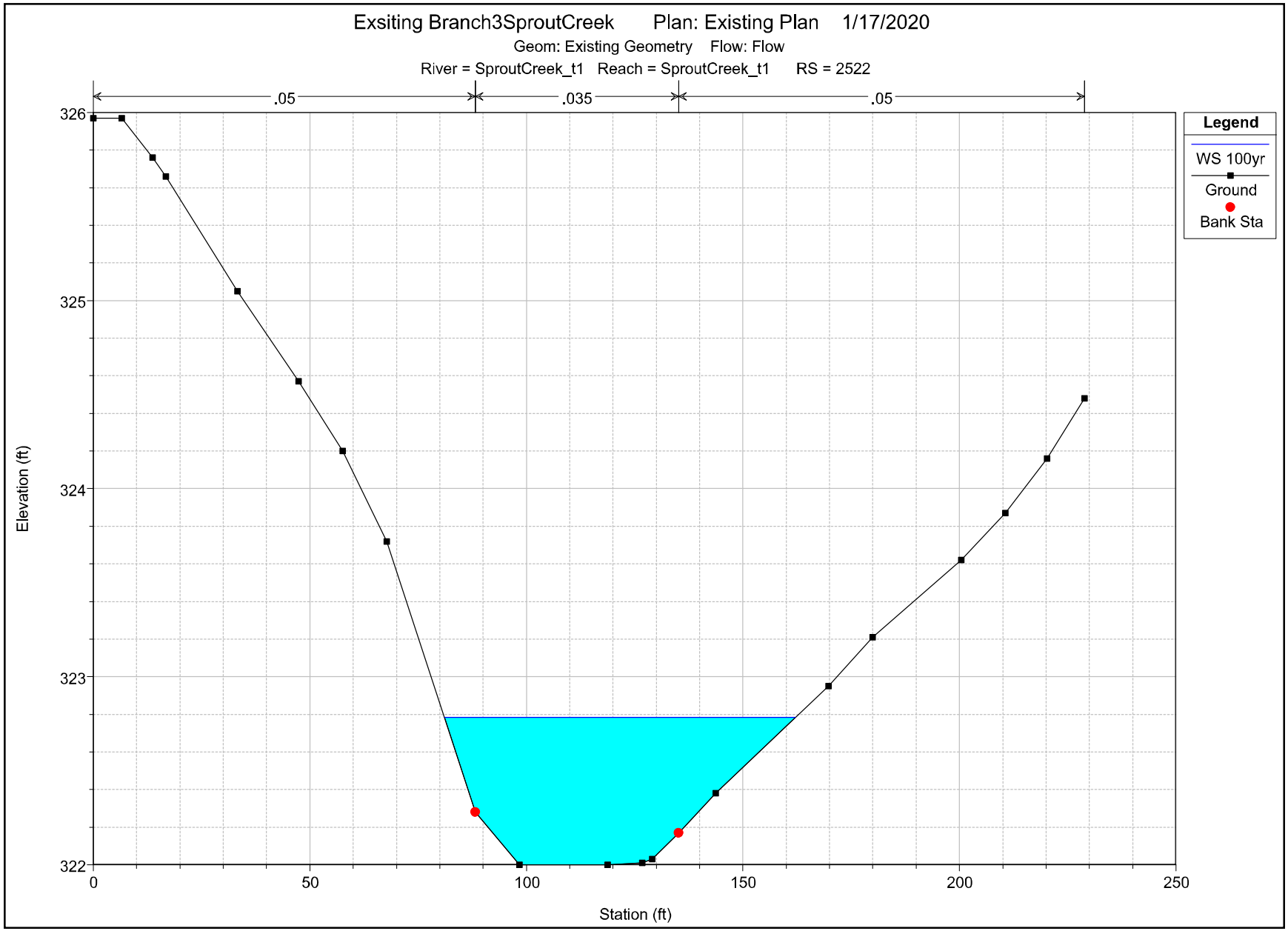
336
334
332
330
328
326
324
0
50
100
150
200
250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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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324
323
322
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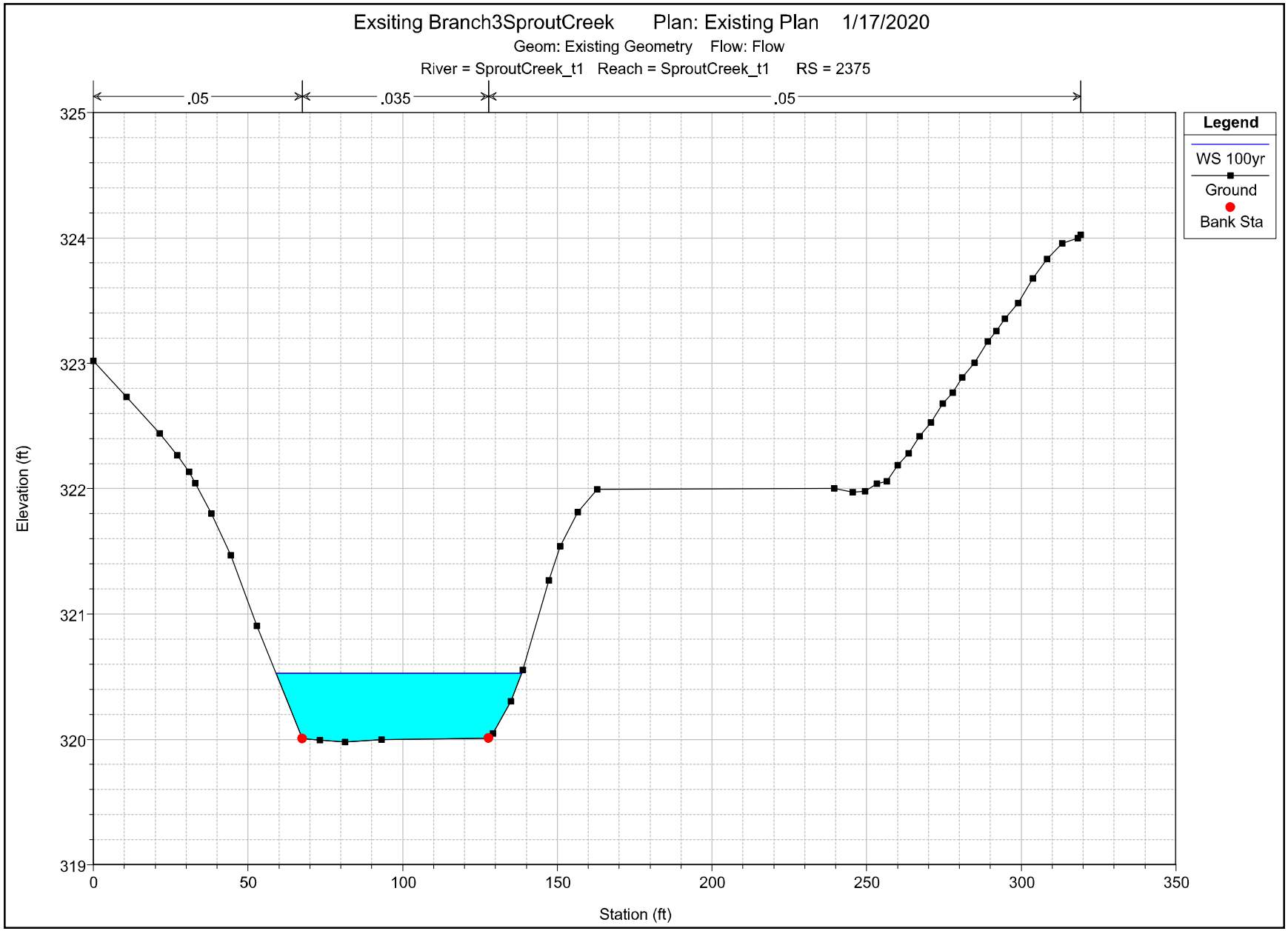
150
200
250
Station (ft)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Geom: Existing Geometry Flow: Flow
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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324
323
322
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319
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200
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300
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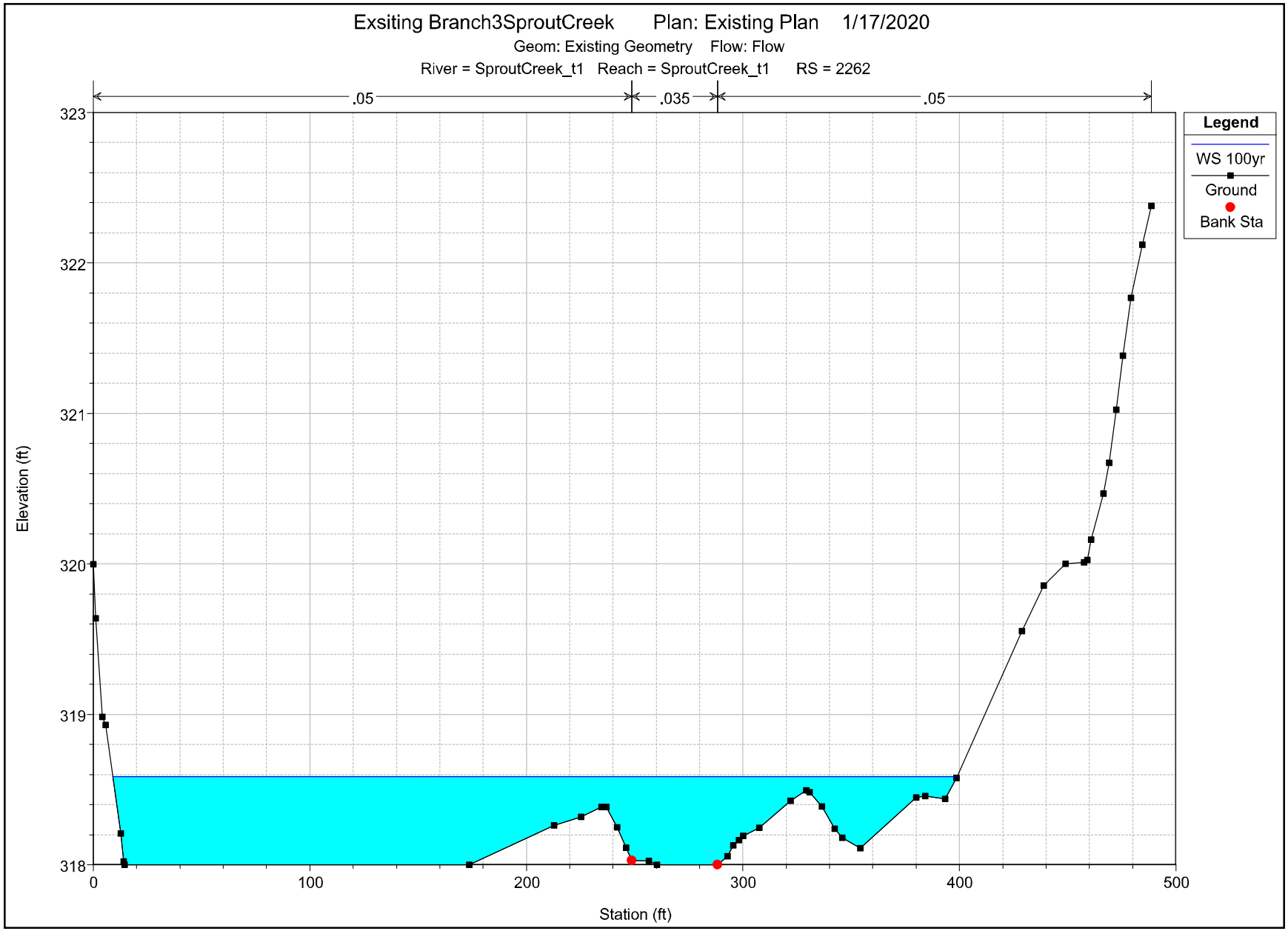
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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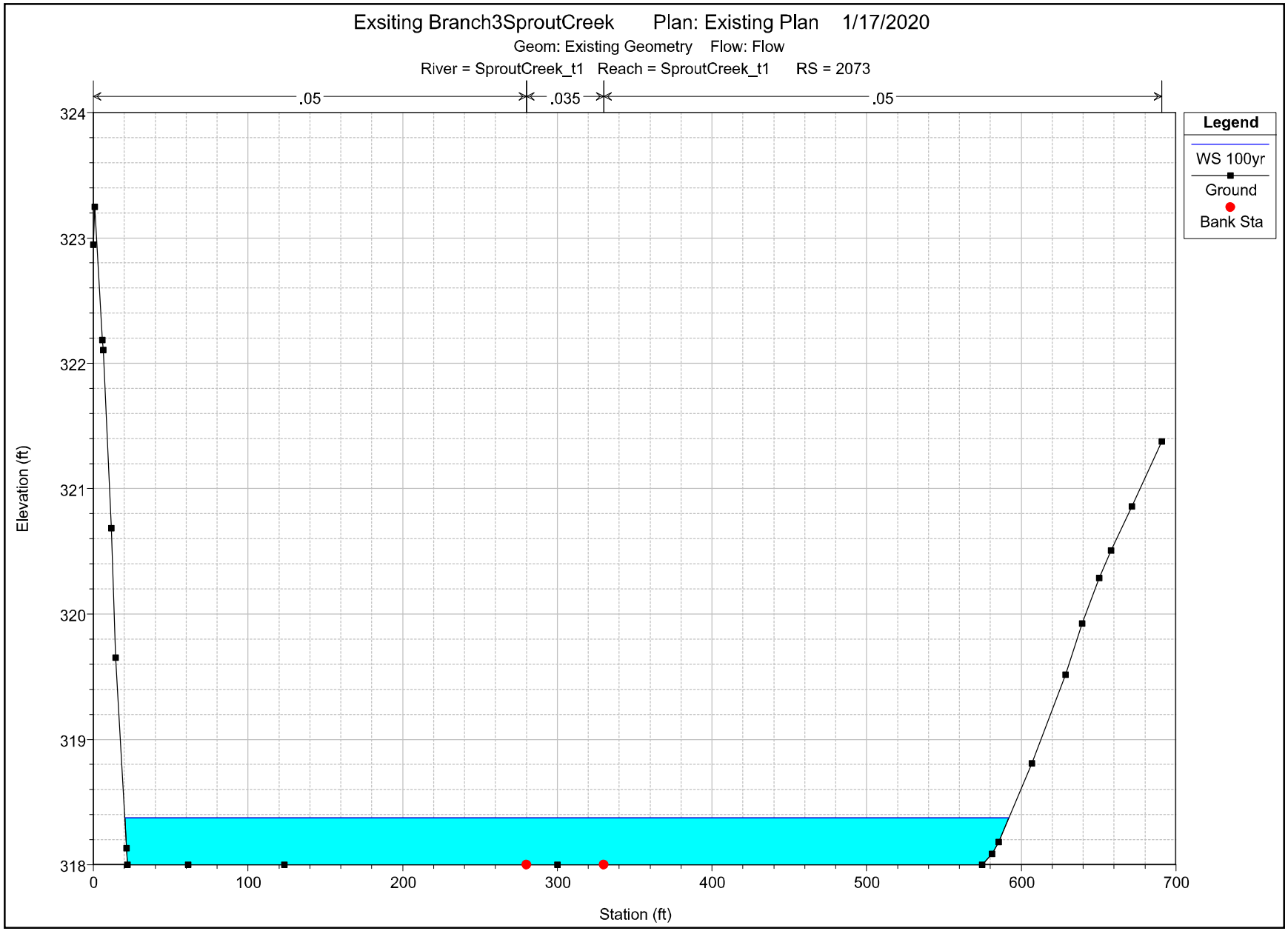
300
400
500
Station (ft)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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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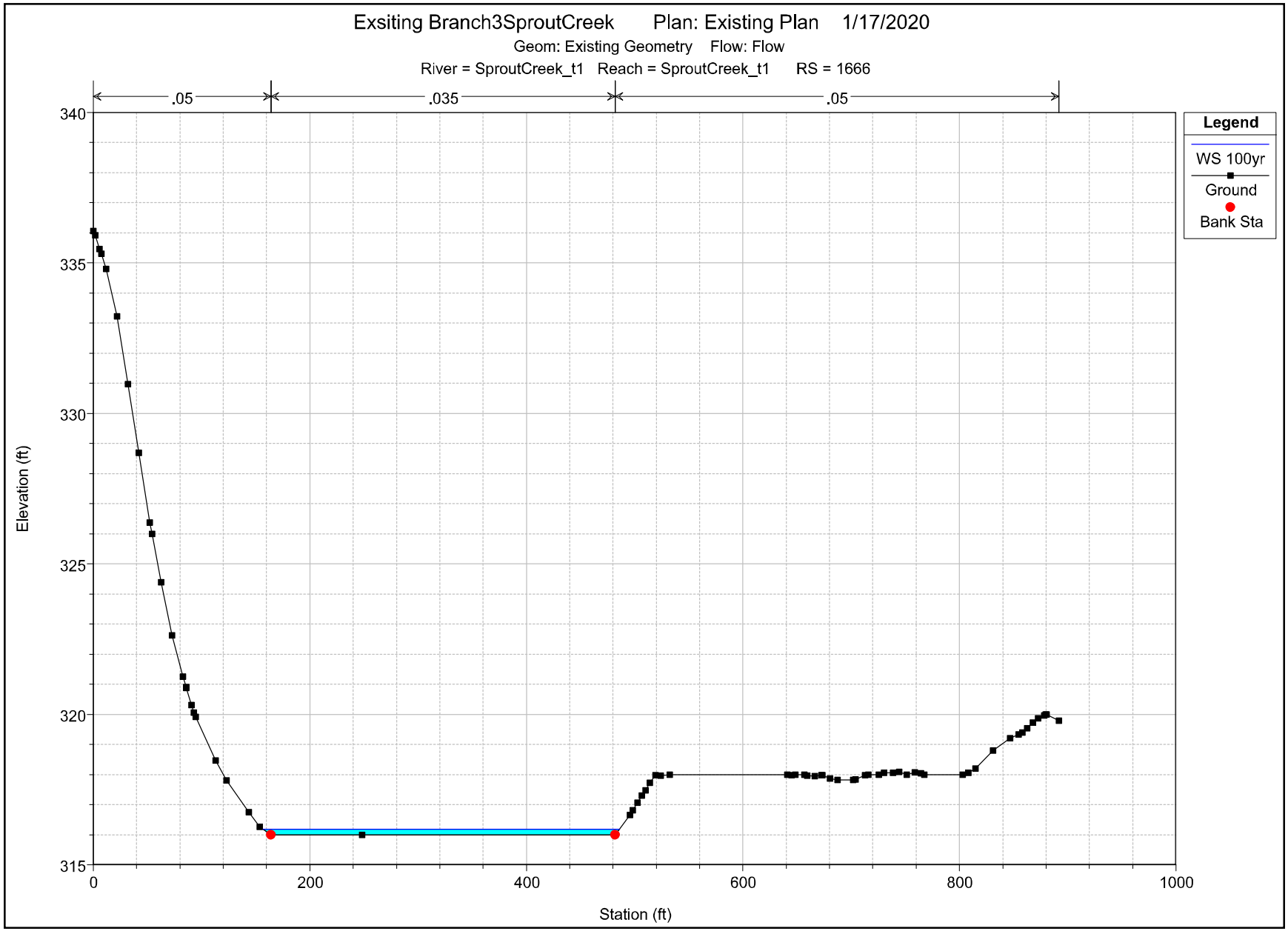
323
322
321
320
319
318
0
100
200
300
400
500
600
700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Geom: Existing Geometry Flow: Flow
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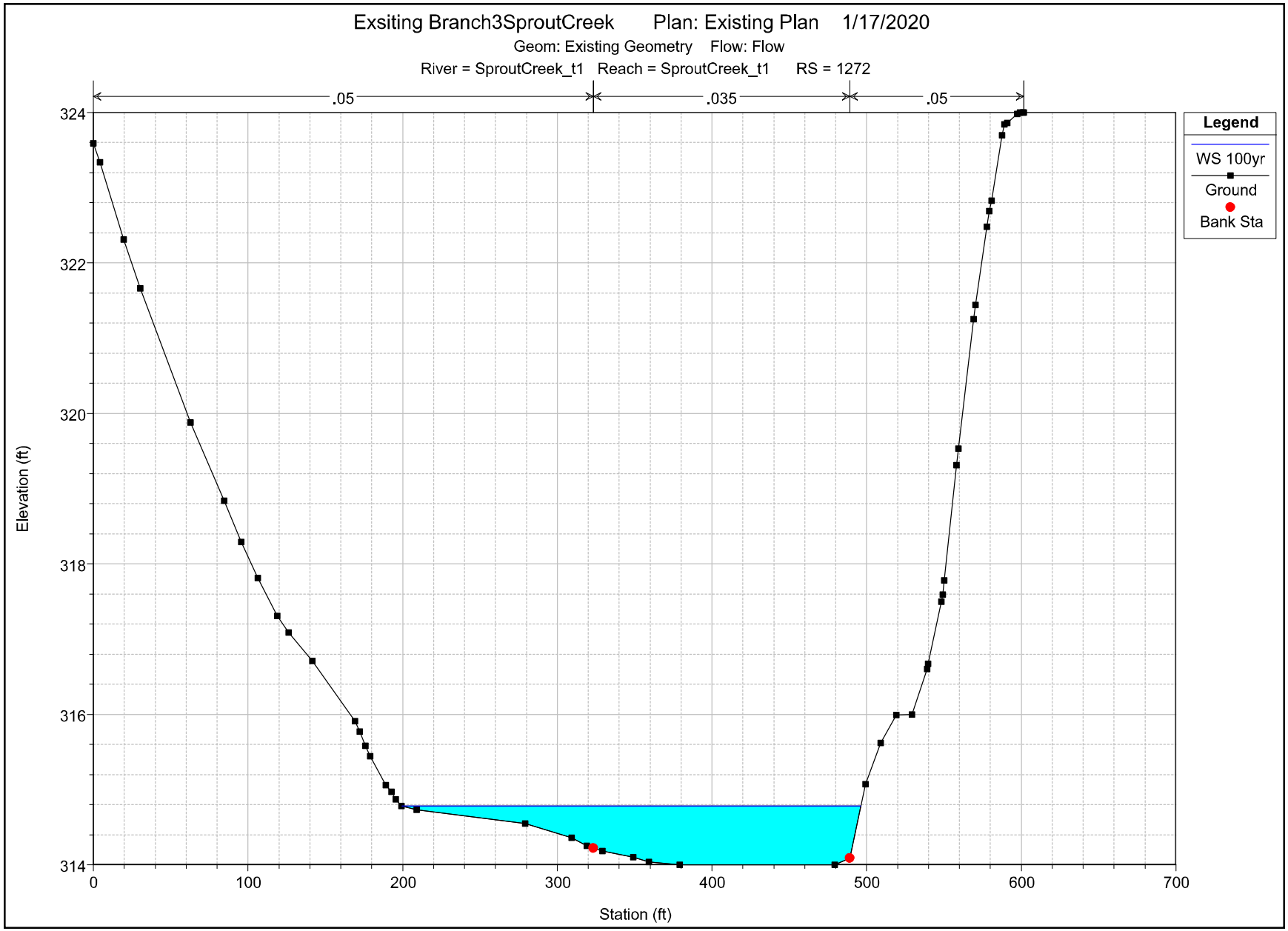
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
340
335
330
325
320
315
0
200
400
600
800
1000
Station (ft)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Geom: Existing Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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318
316
314
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100
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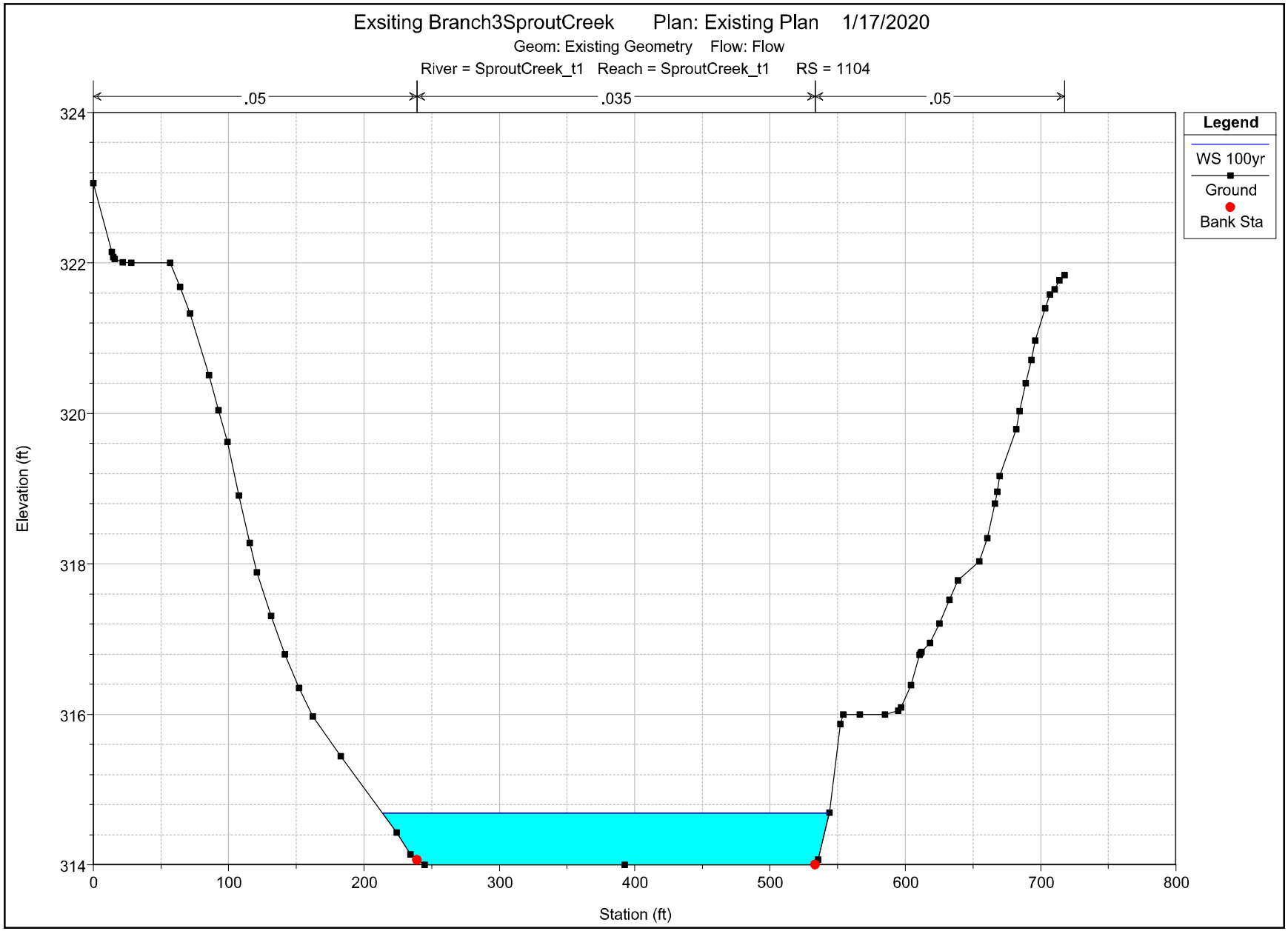
400
500
600
700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Geom: Existing Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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322
320
318
316
314
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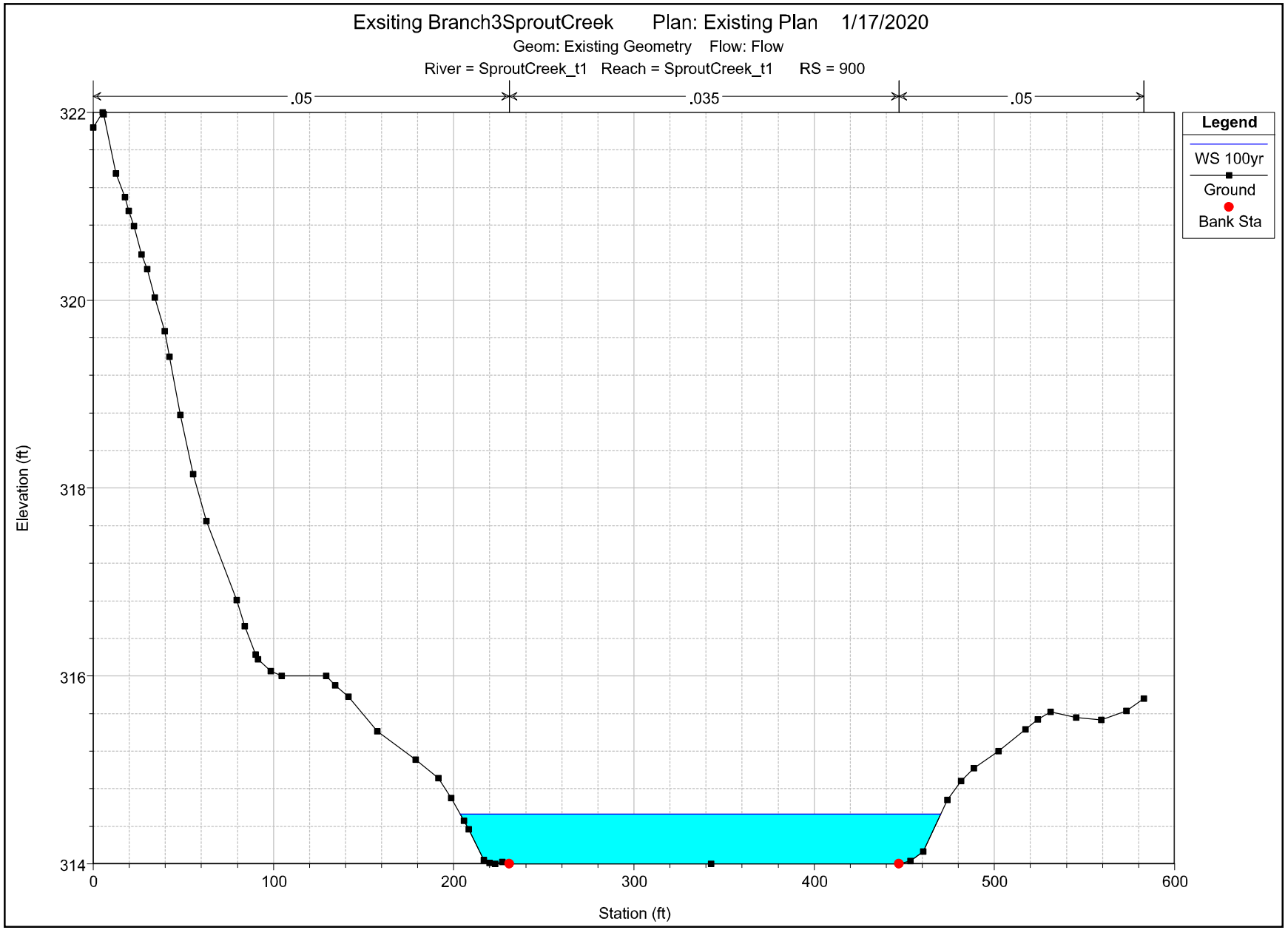
100
200
300
400
500
600
700
800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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
322
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314
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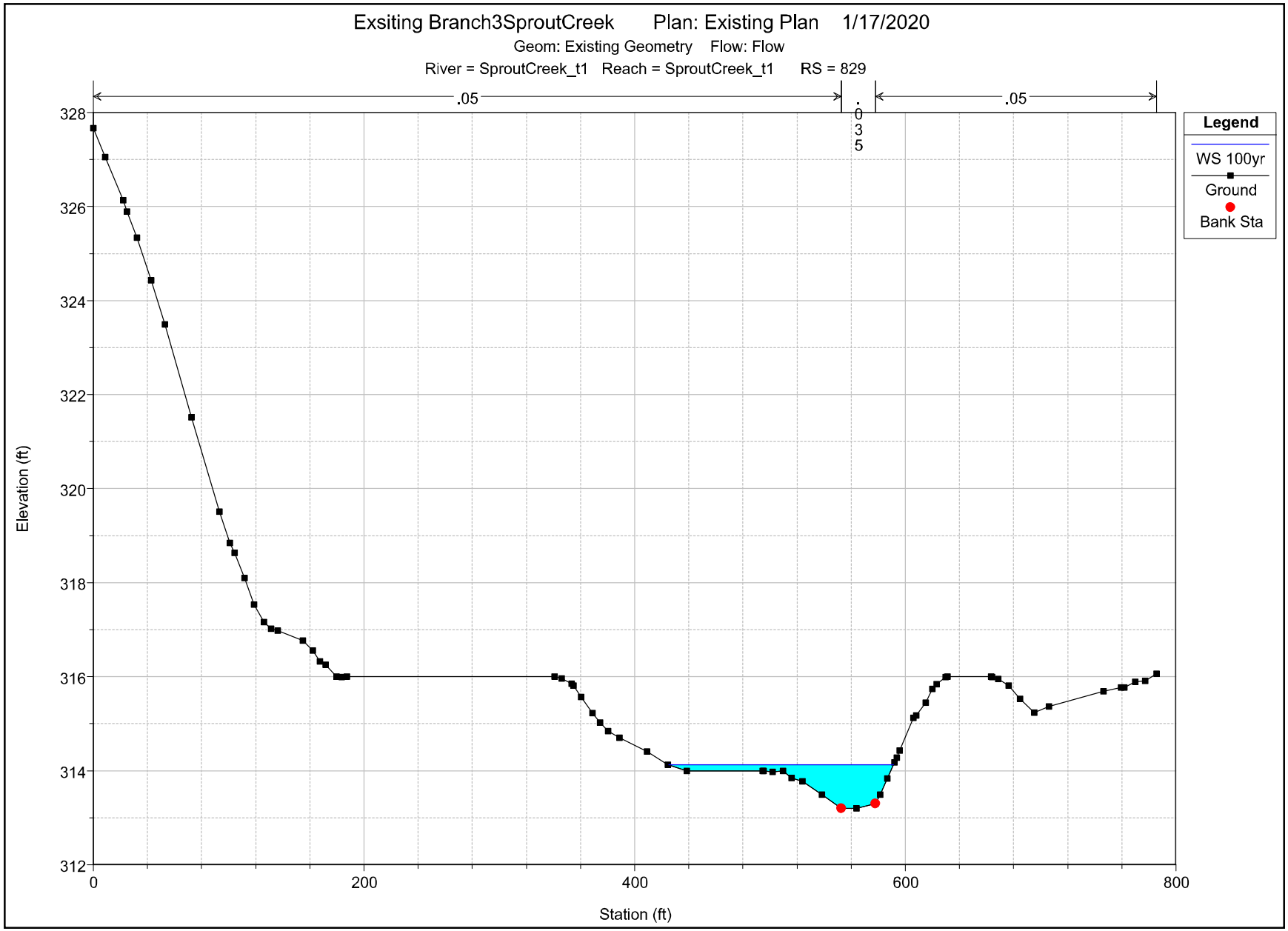
400
500
600
Station (ft)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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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326
324
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320
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316
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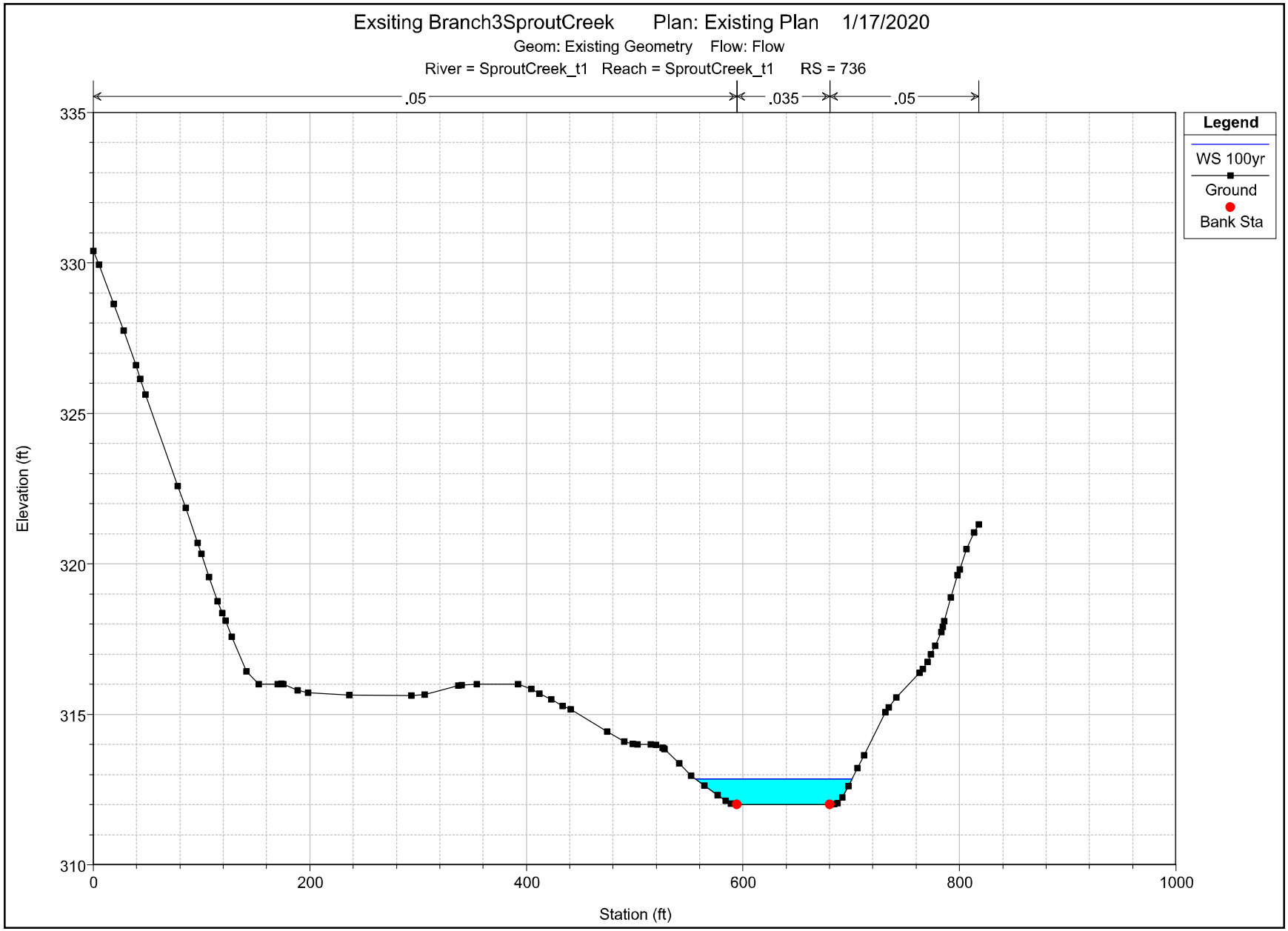
312
0
200
400
600
800
Station (ft)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Geom: Existing Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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330
325
320
315
310
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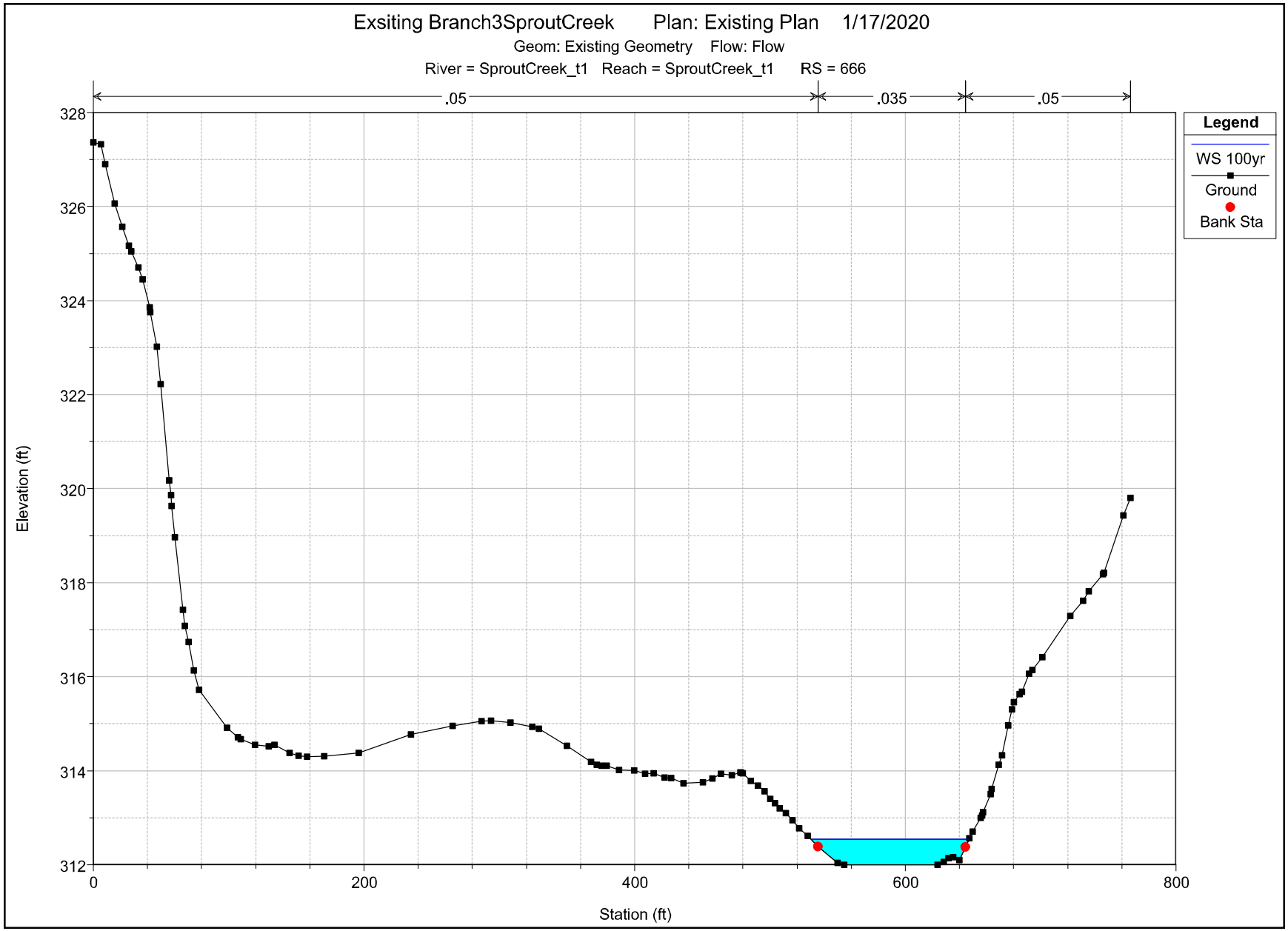
200
400
600
800
1000
Station (ft)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Geom: Existing Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 666
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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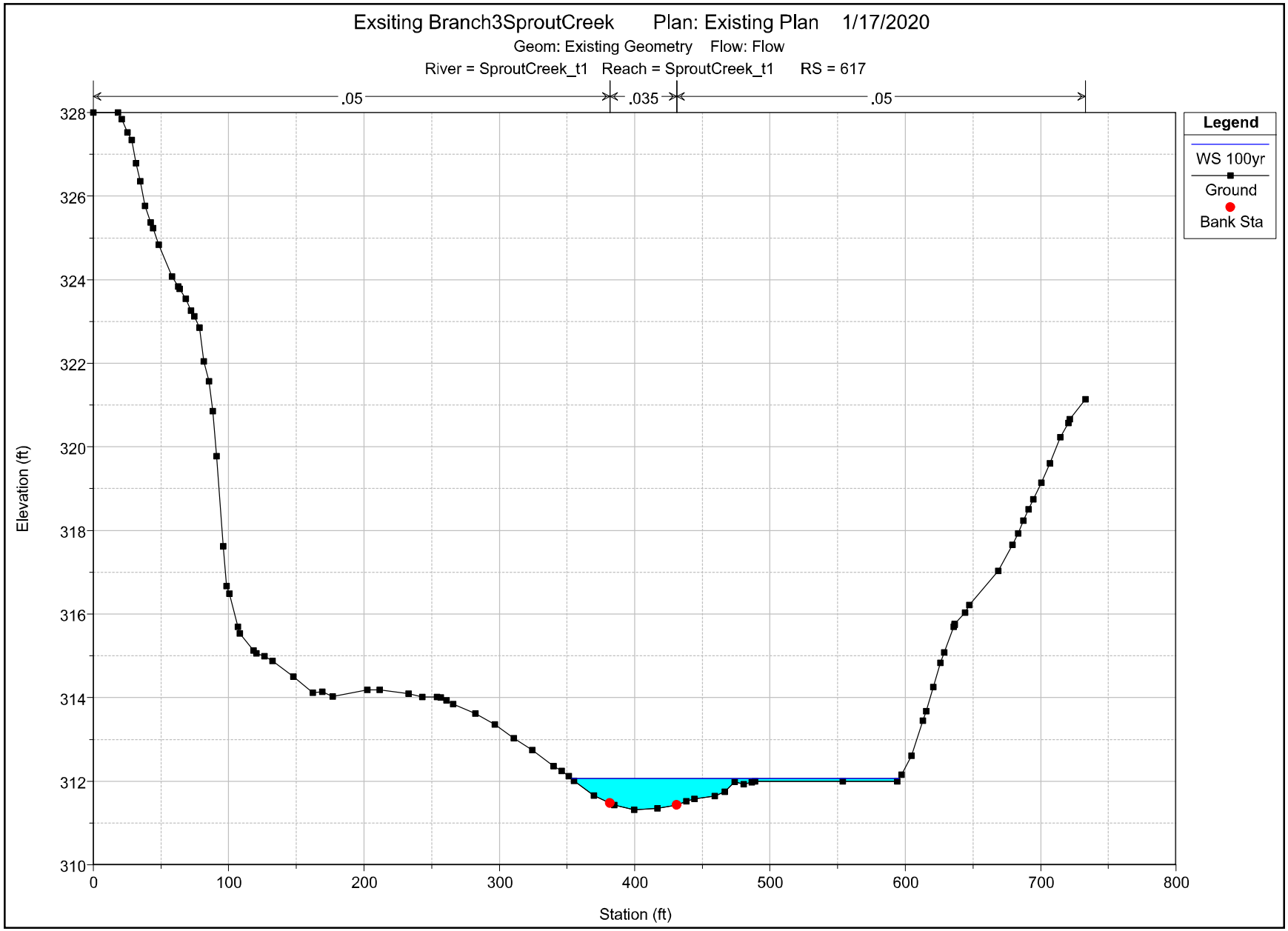
326
324
322
320
318
316
314
312
0
200
400
600
800
Station (ft)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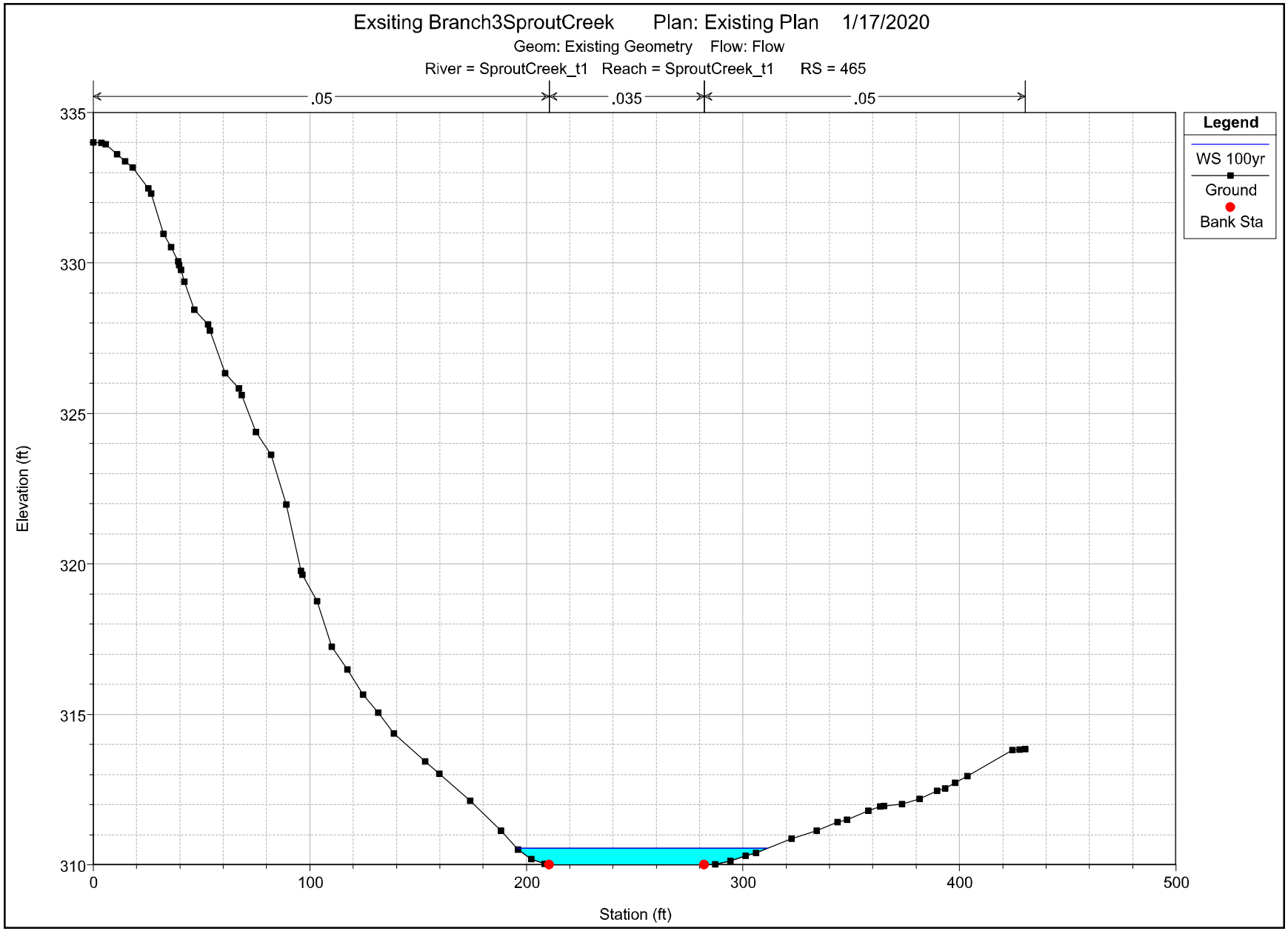
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 617
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
328
326
324
322
320
318
316
314
312
310
0
100
200
300
400
500
600
700
800
Station (ft)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Geom: Existing Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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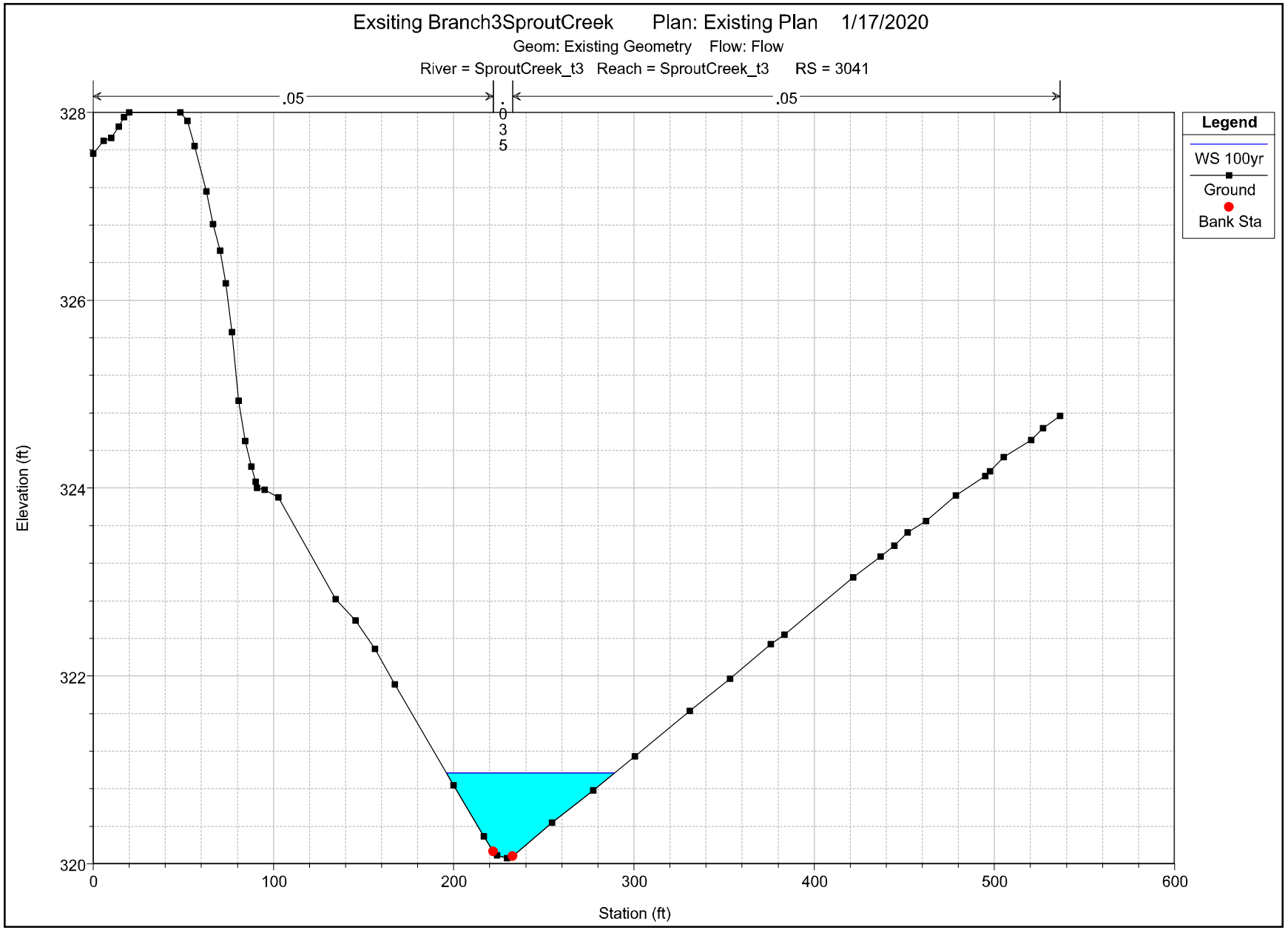
330
325
320
315
310
0
100
200
300
400
500
Station (ft)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Geom: Existing Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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326
324
322
320
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100
200
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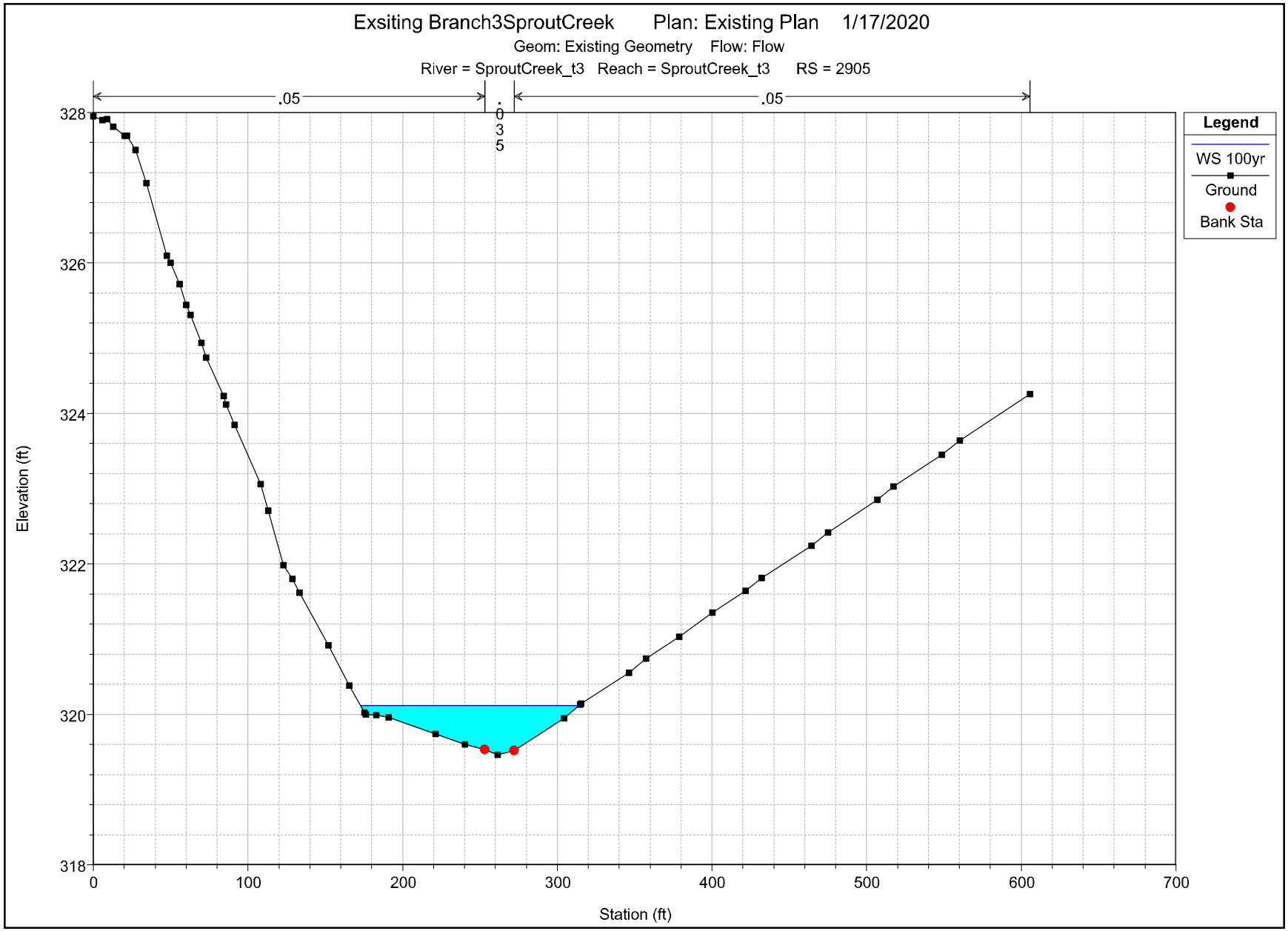
500
600
Station (ft)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Geom: Existing Geometry Flow: Flow
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.05
.03
5
.05
Legend
WS 100yr
Ground
Bank Sta
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326
324
322
320
318
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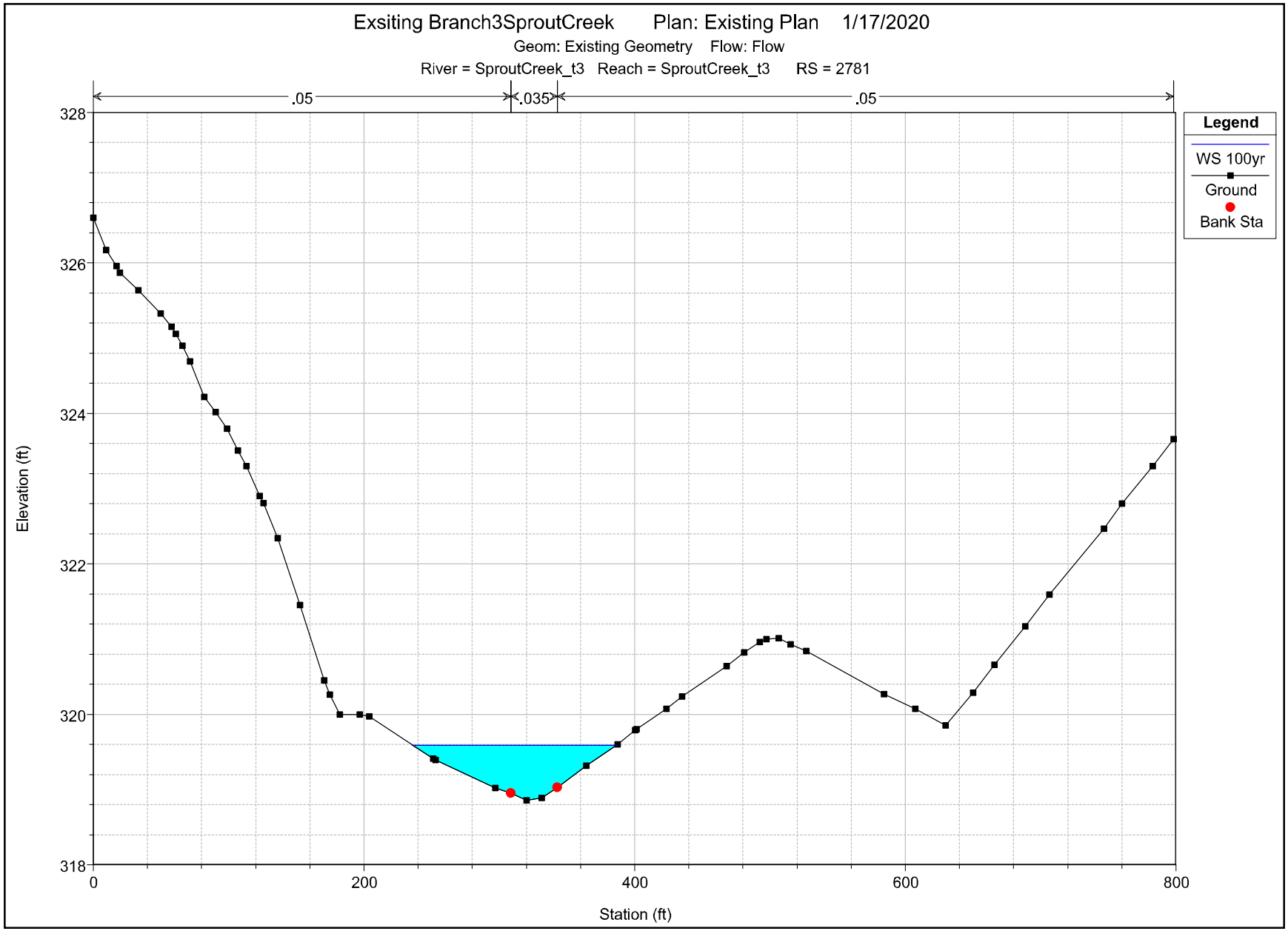
100
200
300
400
500
600
700
Station (ft)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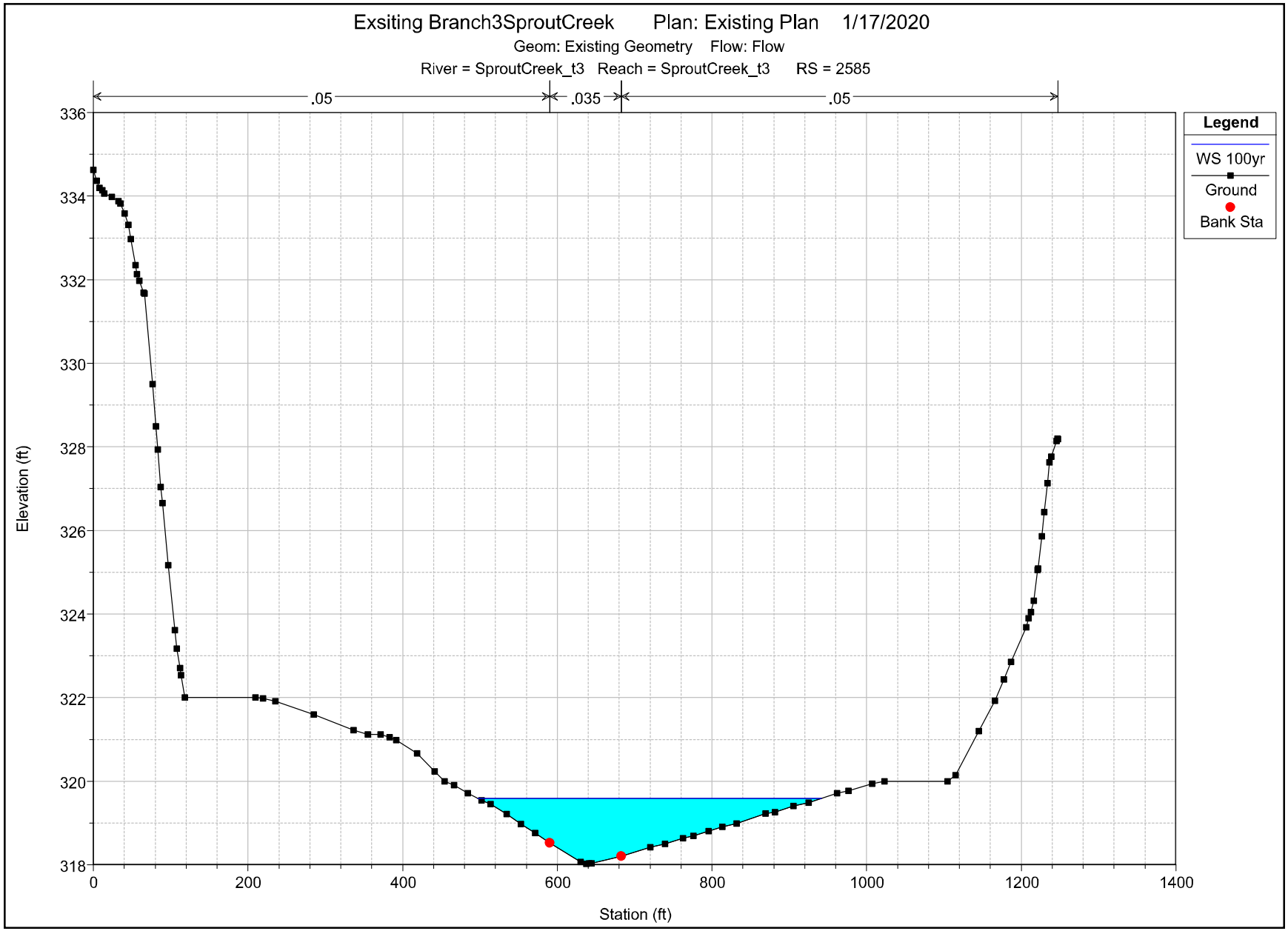
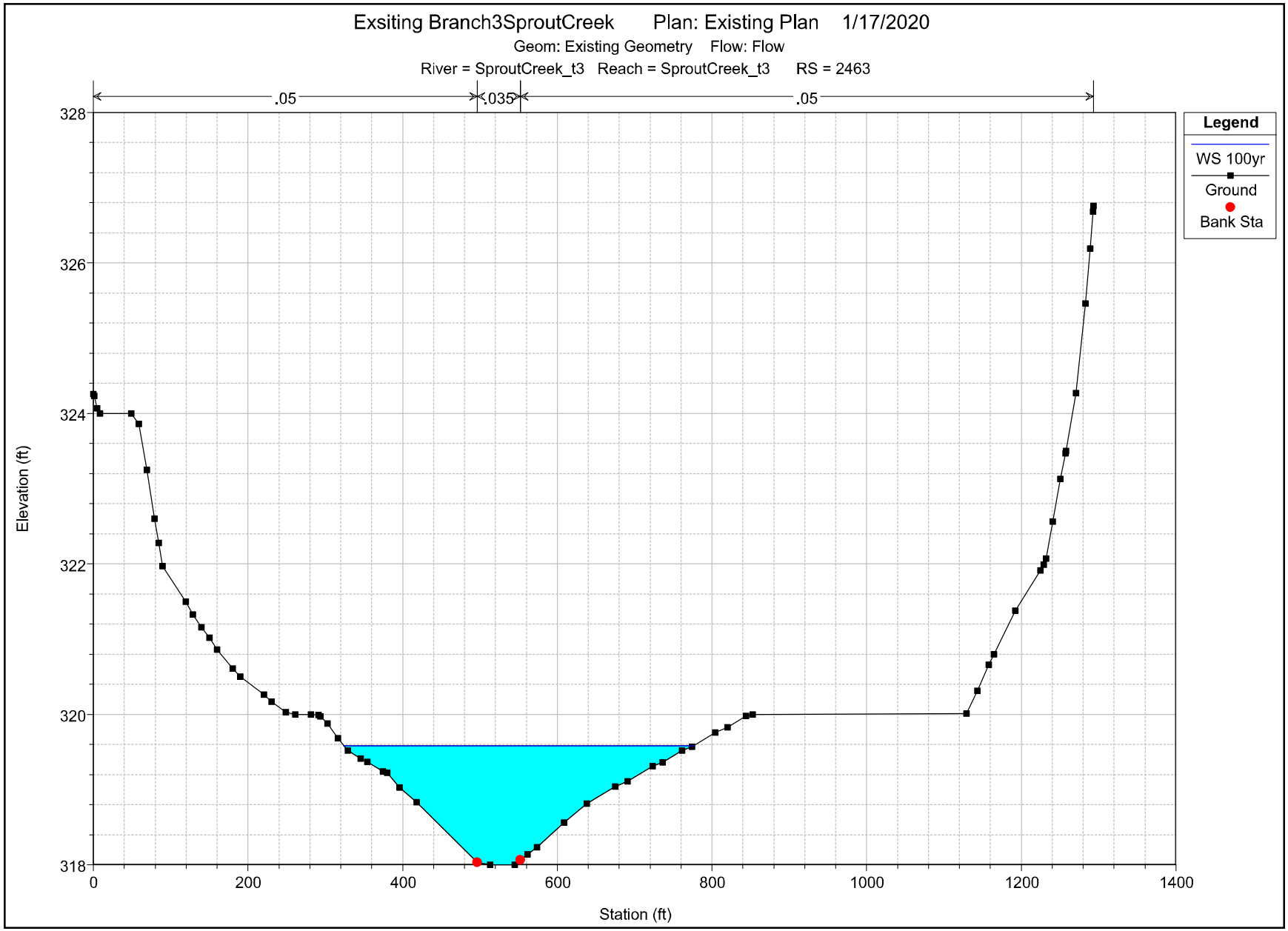
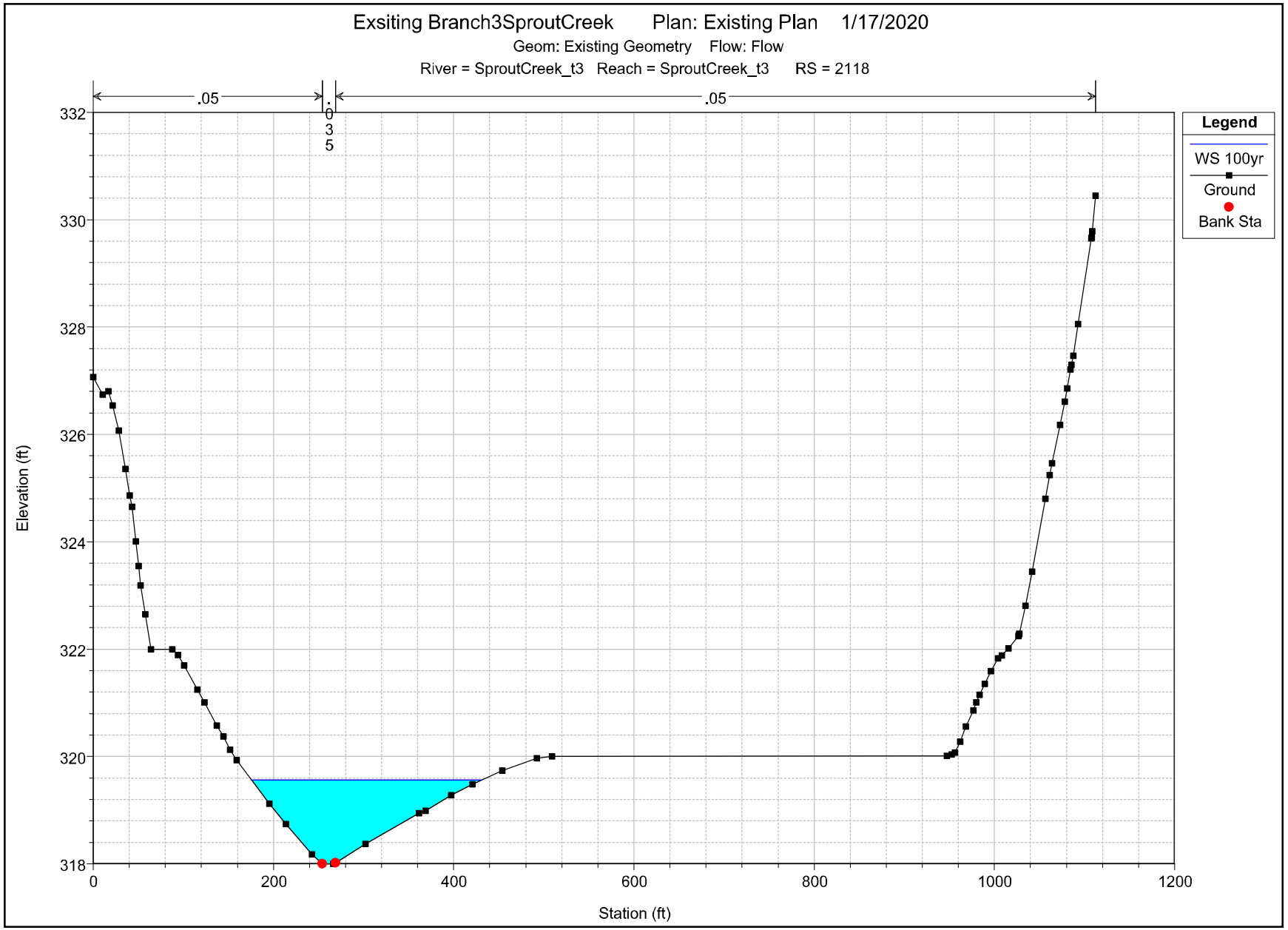
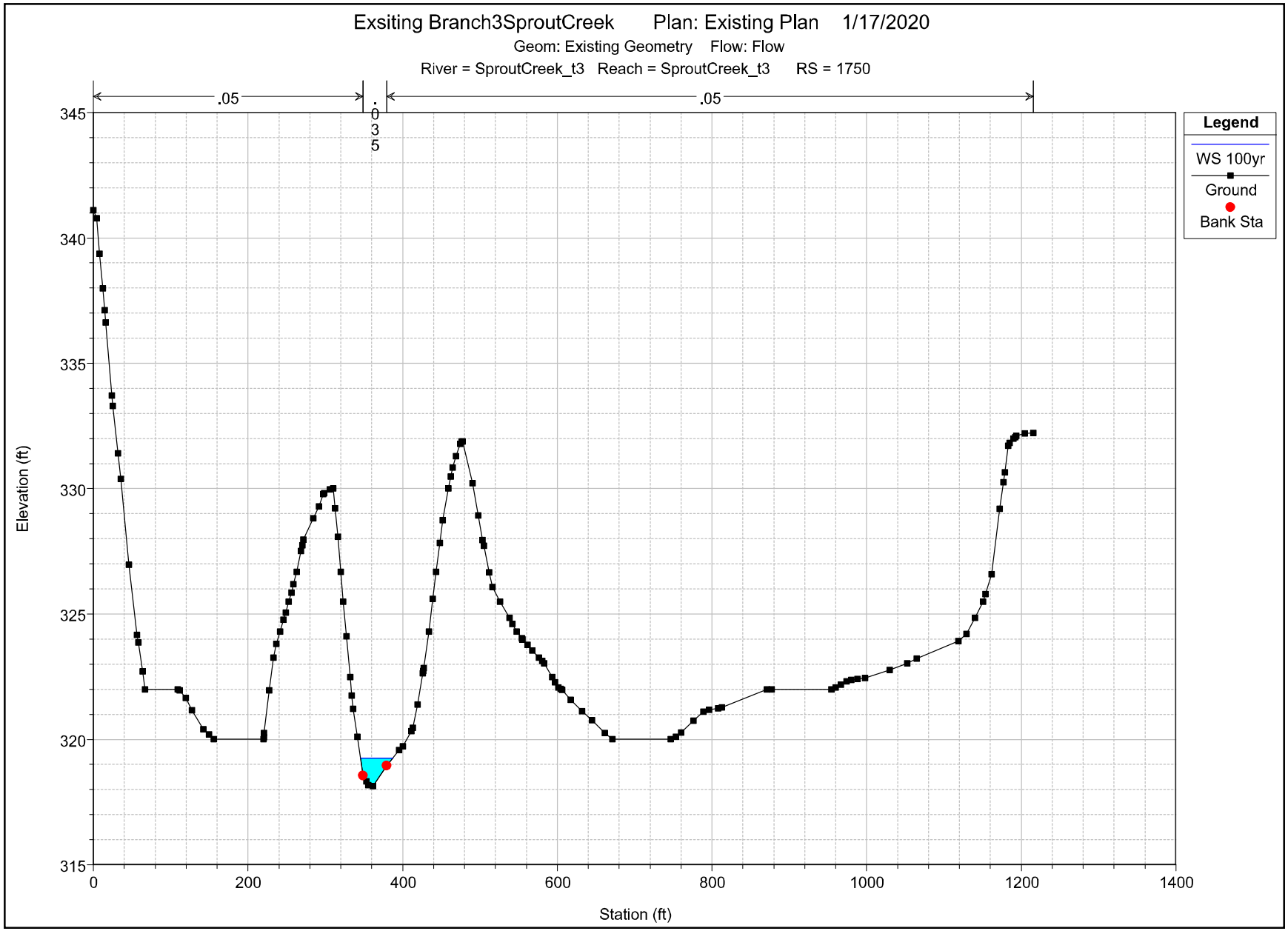
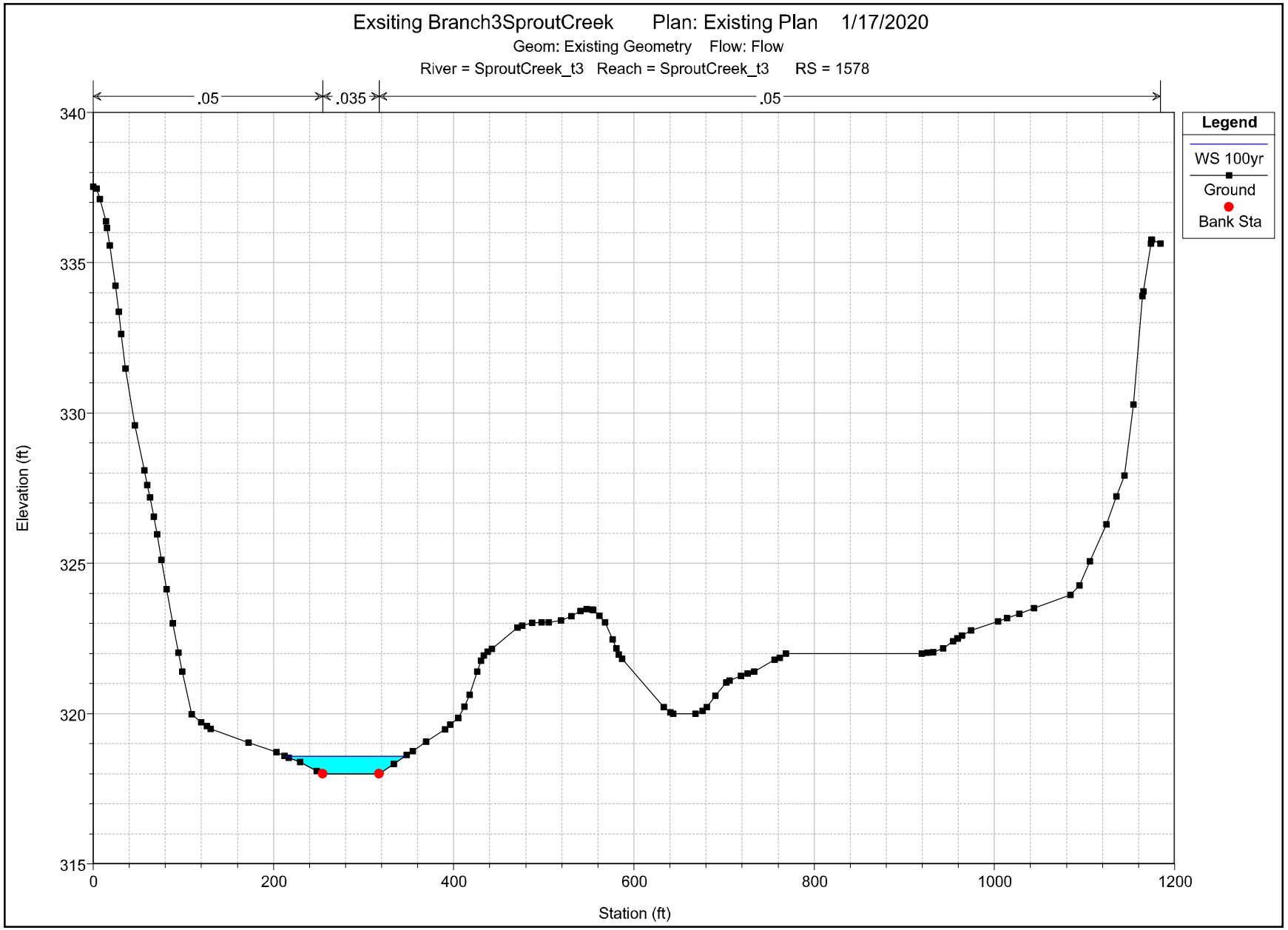
.035
.05
Legend
WS 100yr
Ground
Bank Sta
328
326
324
322
320
318
Elevation (ft)
0
200
400
600
800
Station (ft)

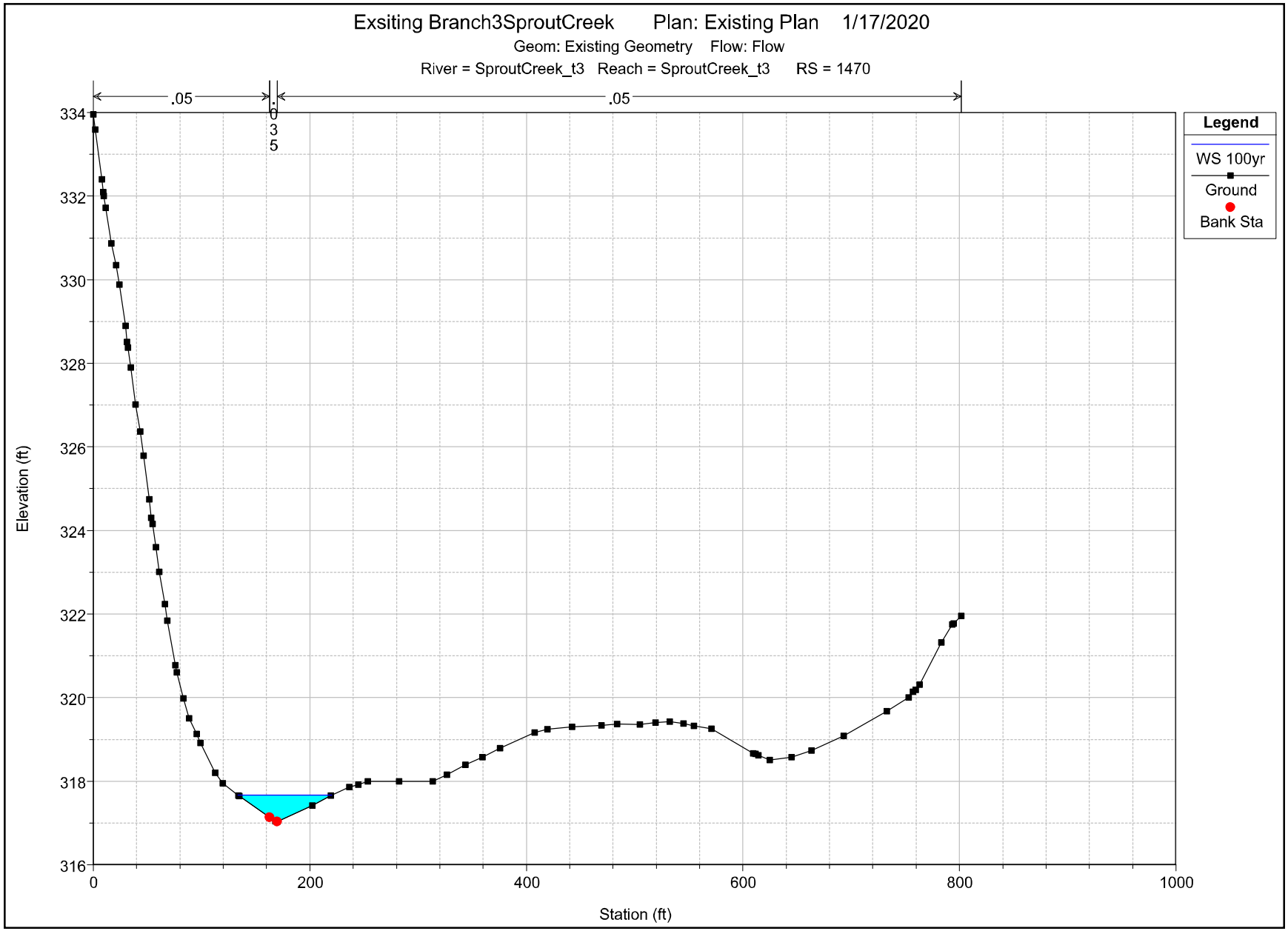

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 2585
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
336
334
332
330
328
326
324
322
320
318
0
200
400
600
800
1000
1200
1400

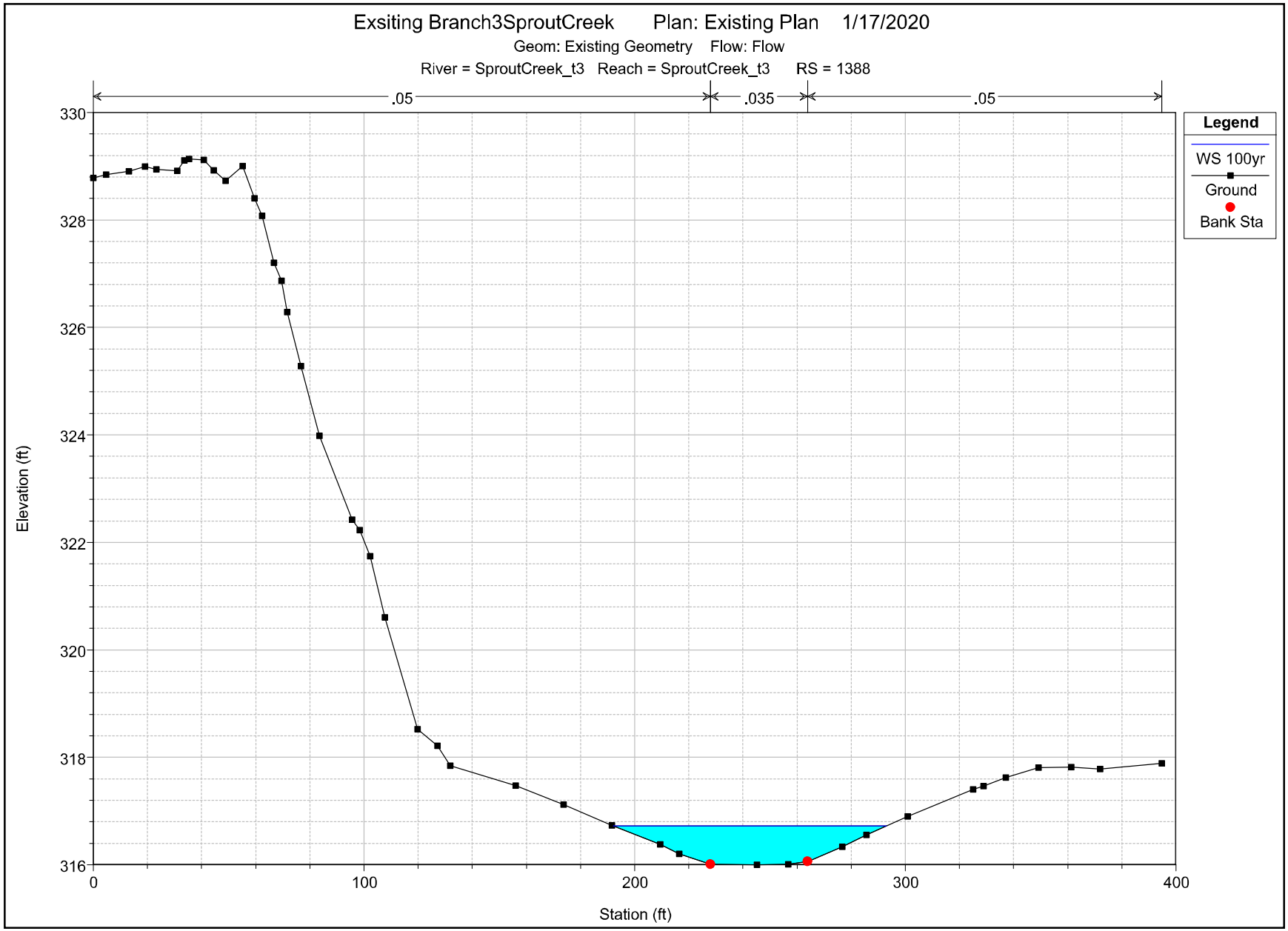

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 2463
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
328
326
324
322
320
318
0
200
400
600
800
1000
1200
1400
Station (ft)

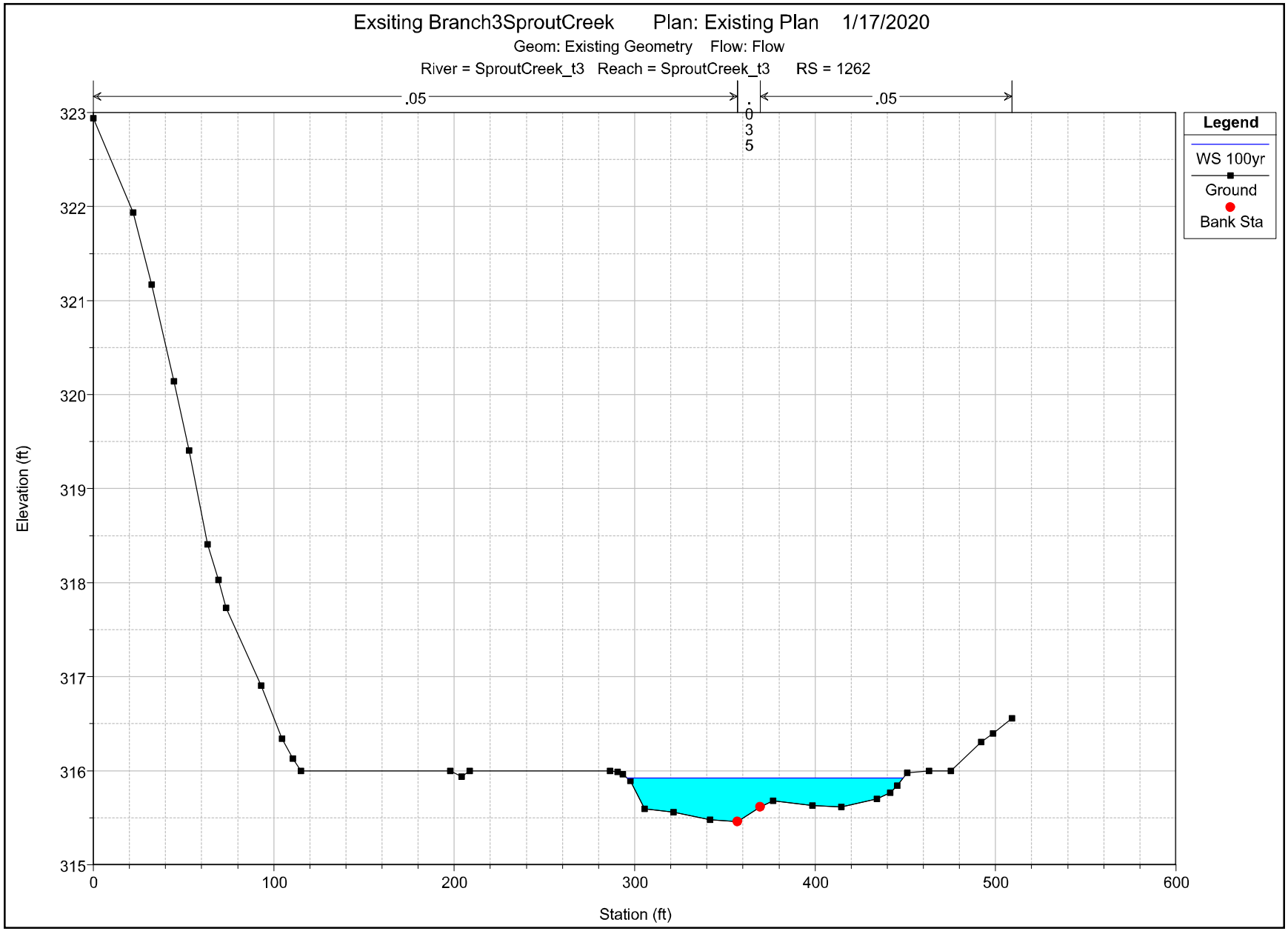

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 2118
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
332
330
328
326
324
322
320
318
0
200
400
600
800
1000
1200

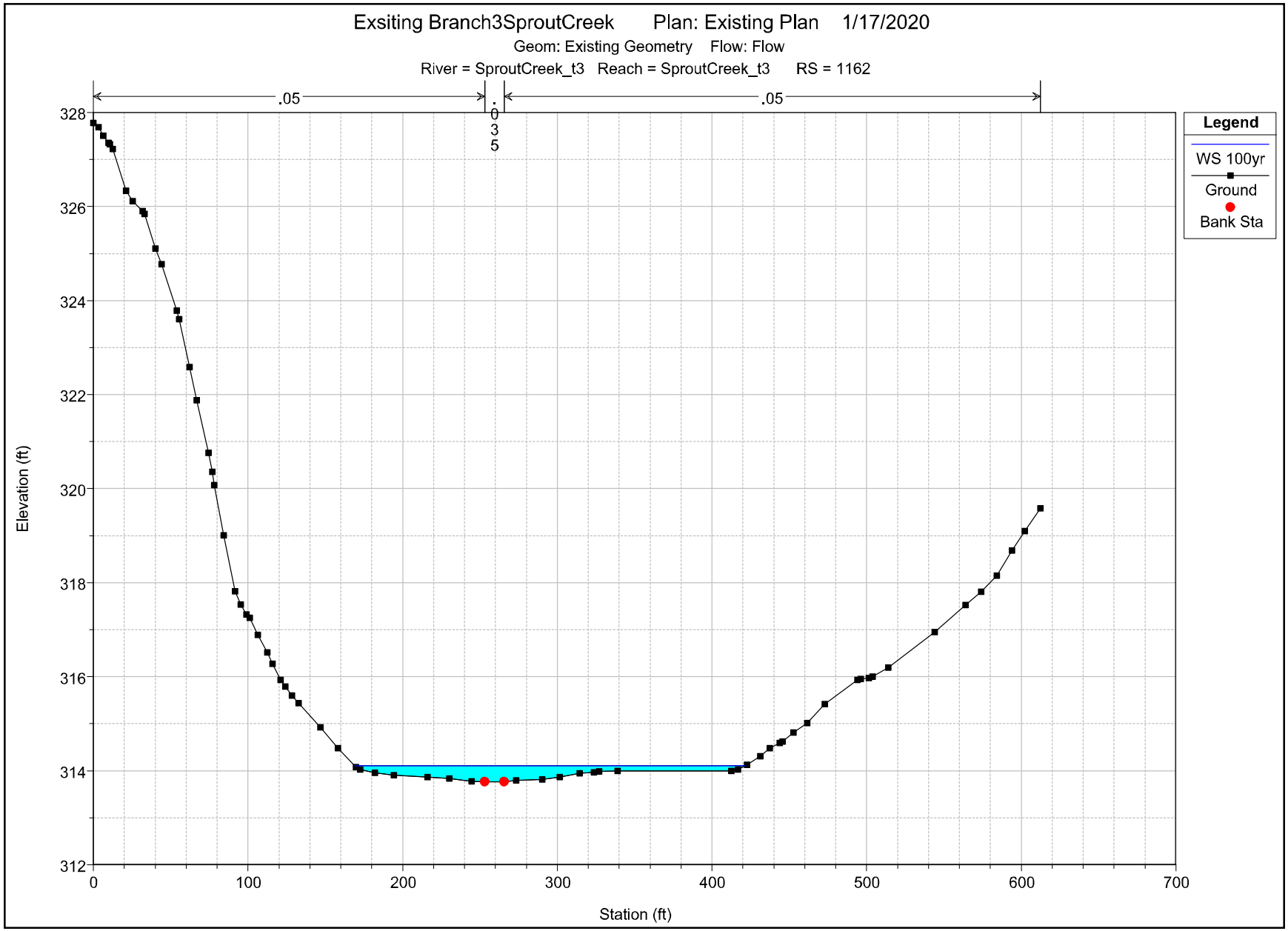

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1750
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
345
340
335
330
325
320
315
0
200
400
600
800
1000
1200
1400

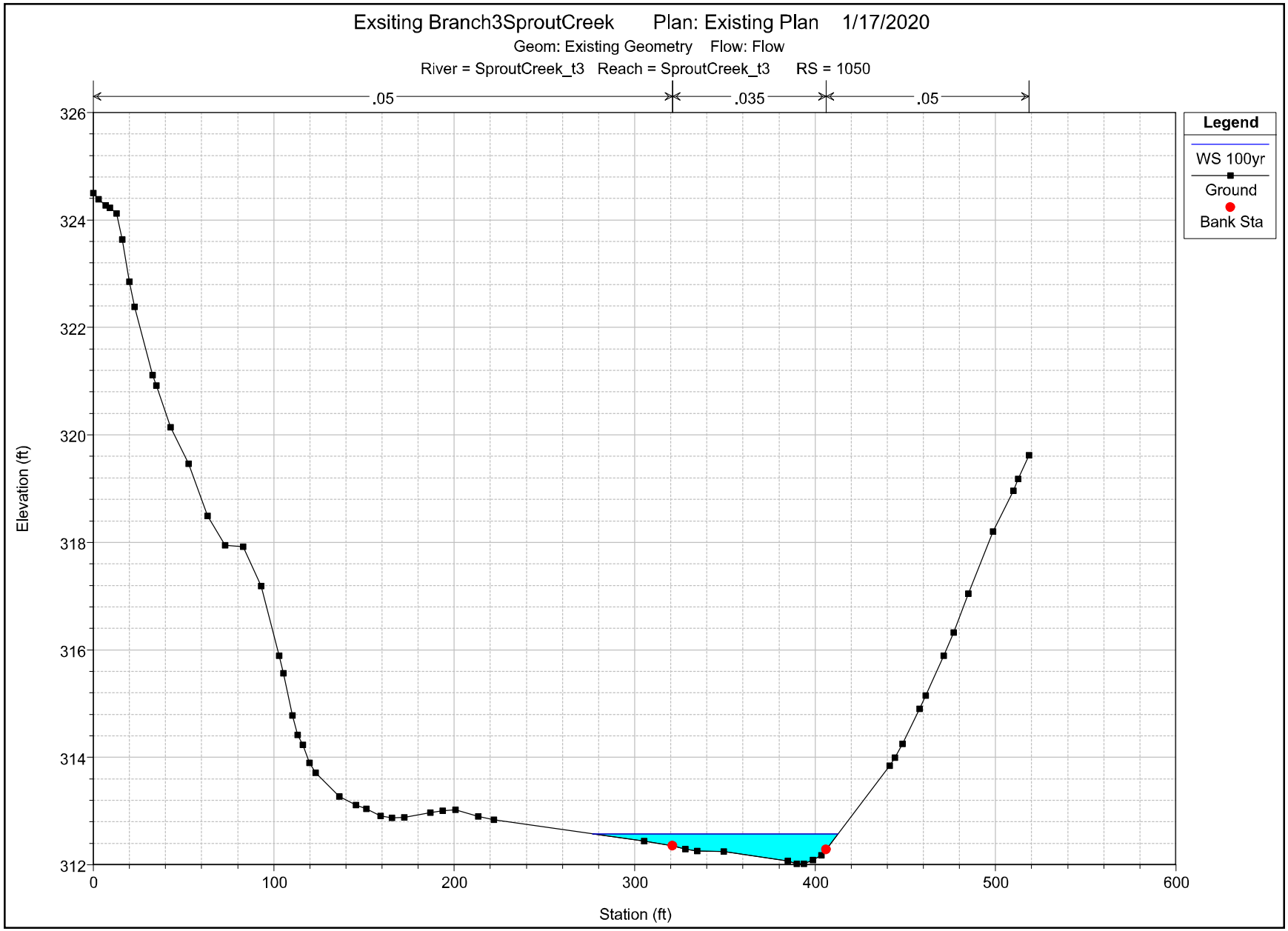

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1578
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
340
335
330
325
320
315
0
200
400
600
800
1000
1200
Station (ft)

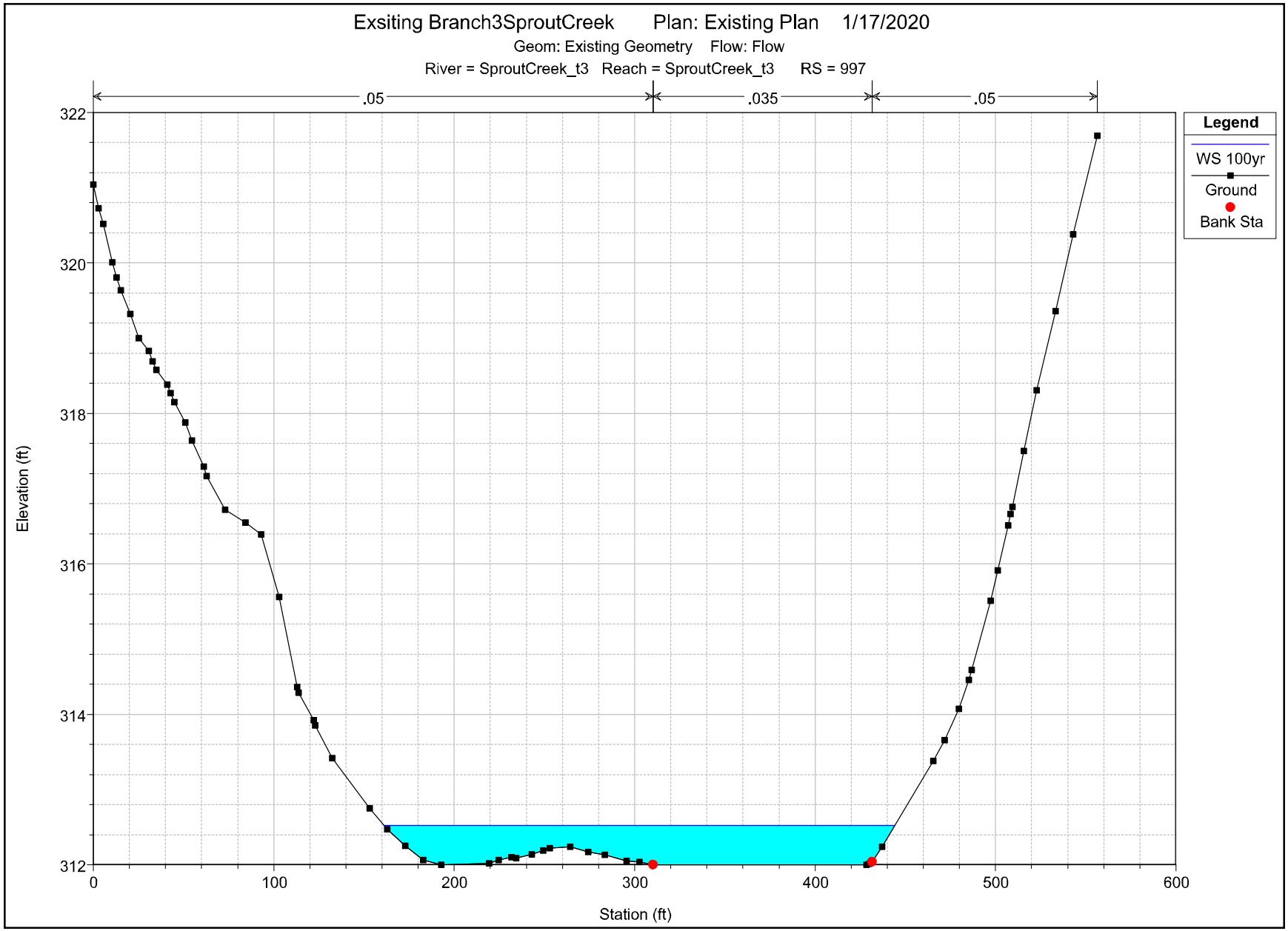

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1470
.05
.
0
3
5
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
334
332
330
328
326
324
322
320
318
316
0
200
400
600
800
1000
Station (ft)

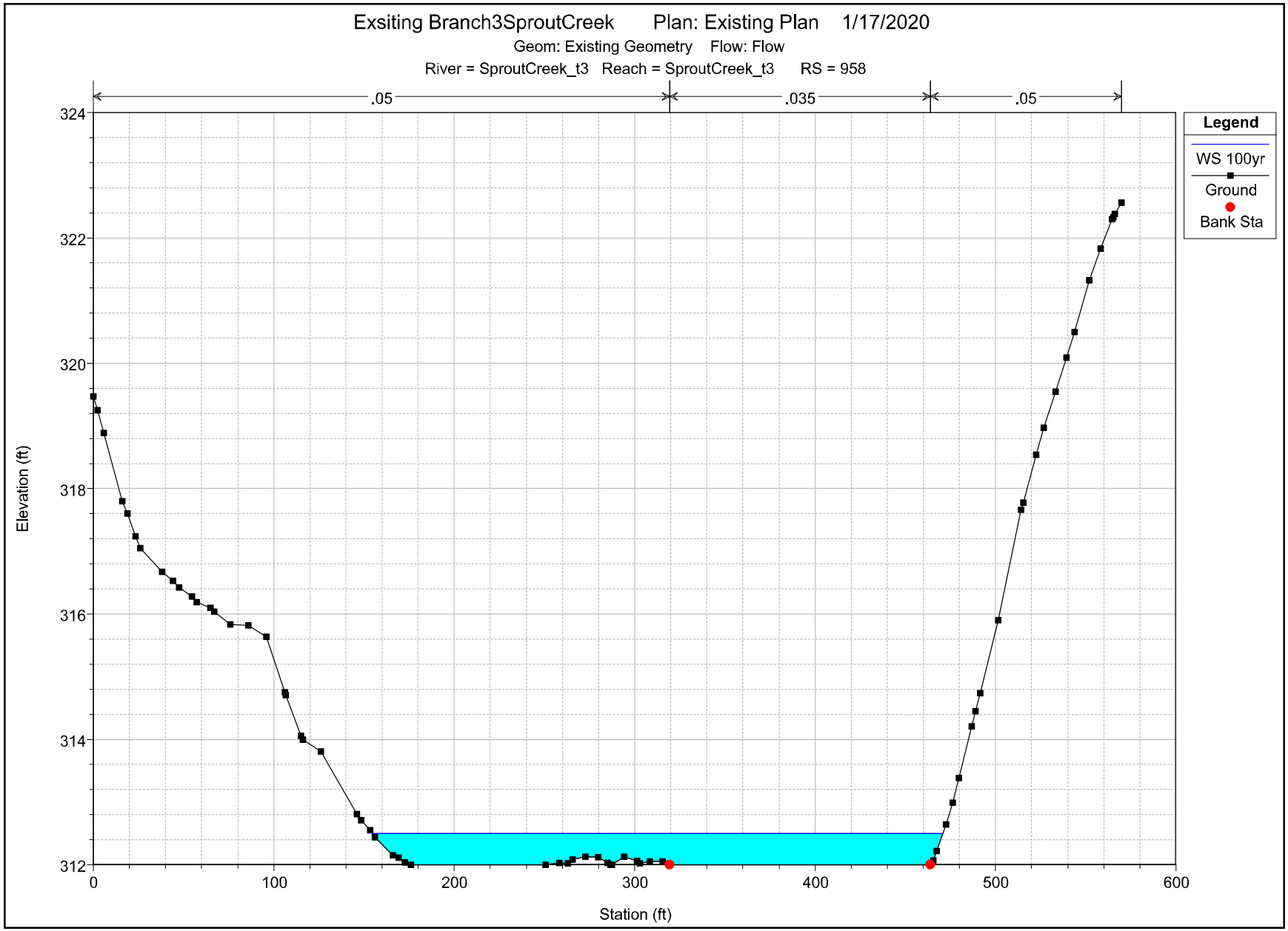

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1388
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
330
328
326
324
322
320
318
316
0
100
200
300
400
Station (ft)

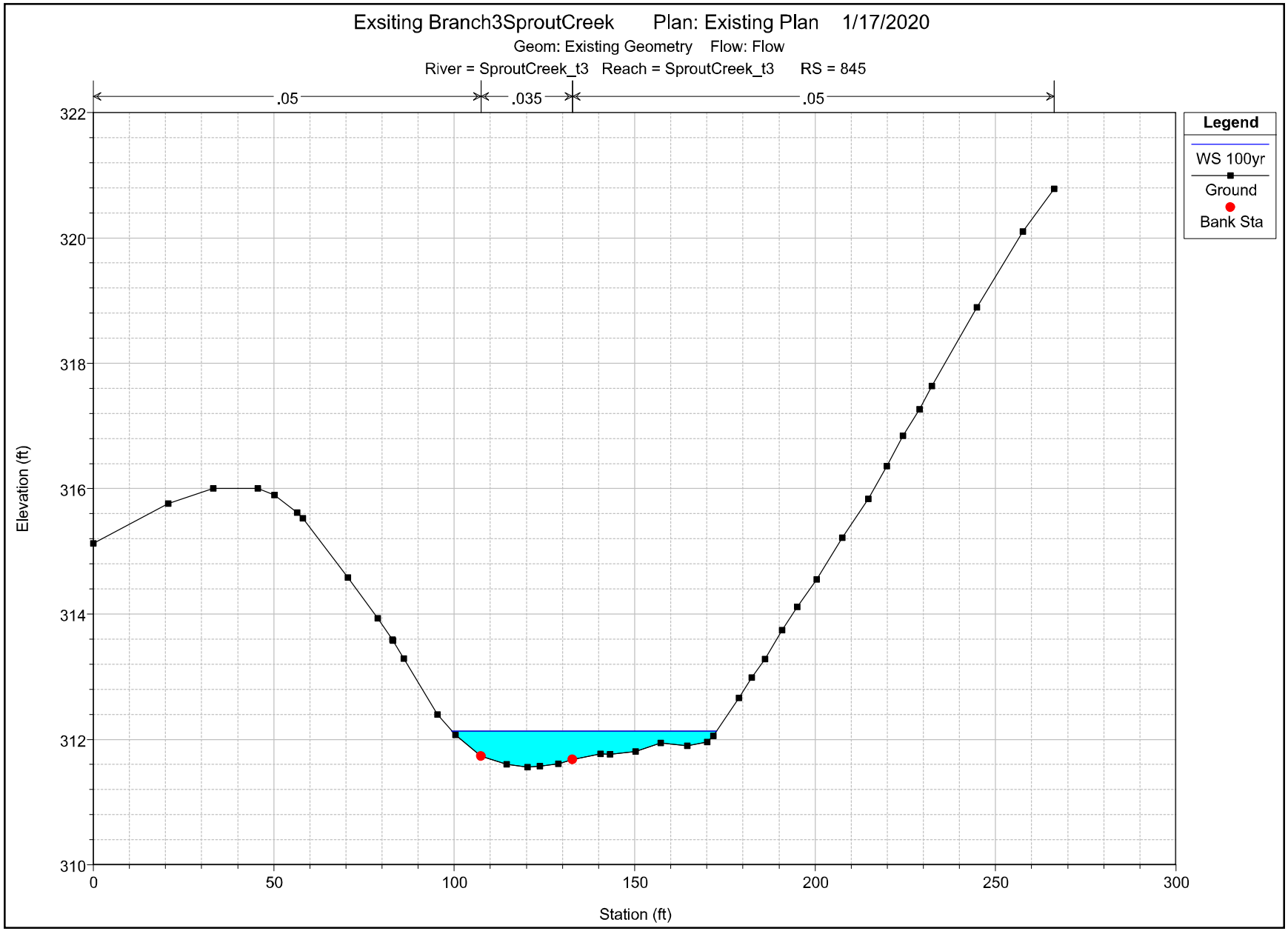

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1262
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
323
322
321
320
319
318
317
316
315
0
100
200
300
400
500
600

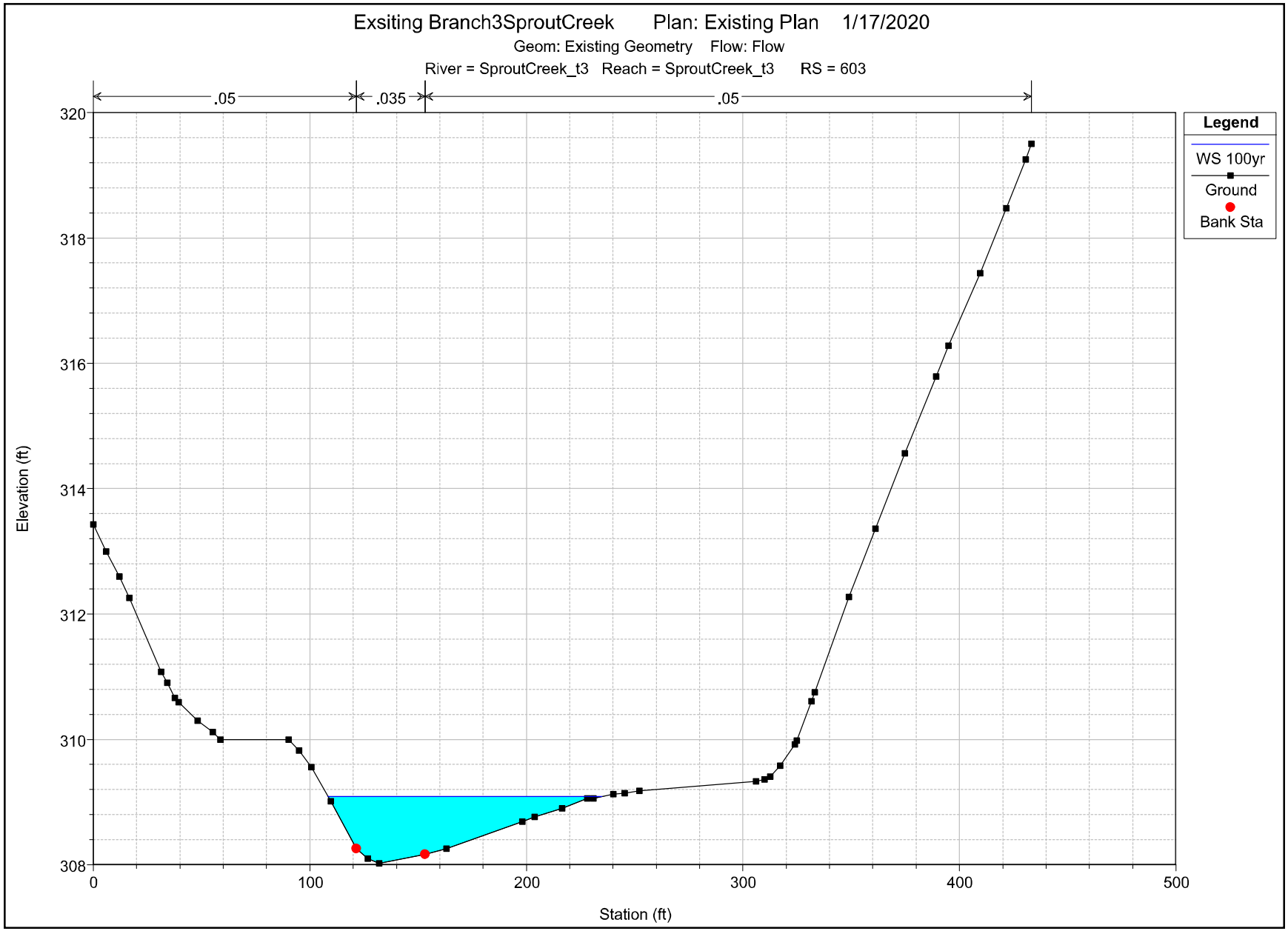

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1162
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
328
326
324
322
320
318
316
314
312
0
100
200
300
400
500
600
700

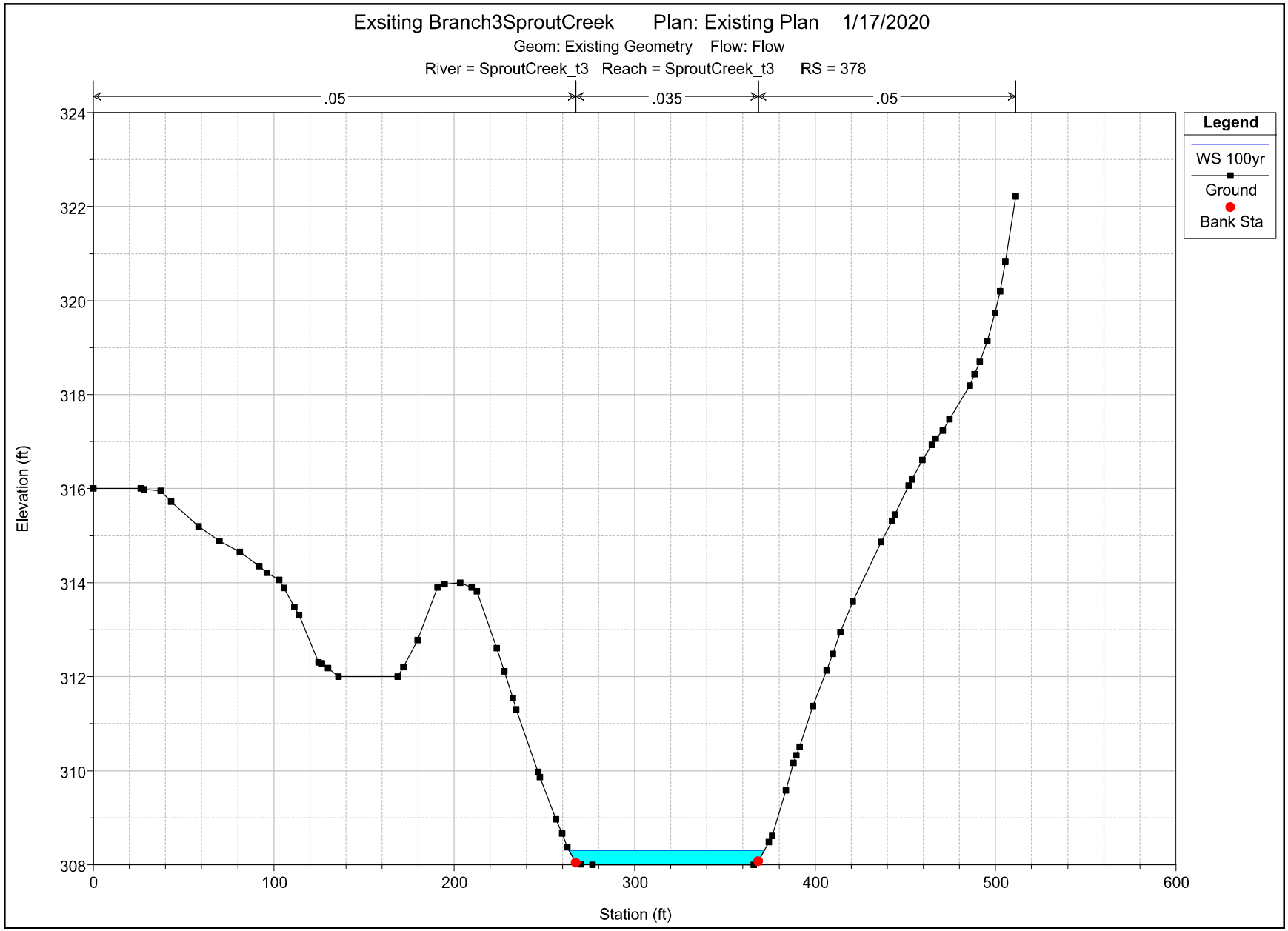

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 1050
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
326
324
322
320
318
316
314
312
0
100
200
300
400
500
600
Station (ft)


Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 997
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
322
320
318
316
314
312
0
100
200
300
400
500
600
Station (ft)

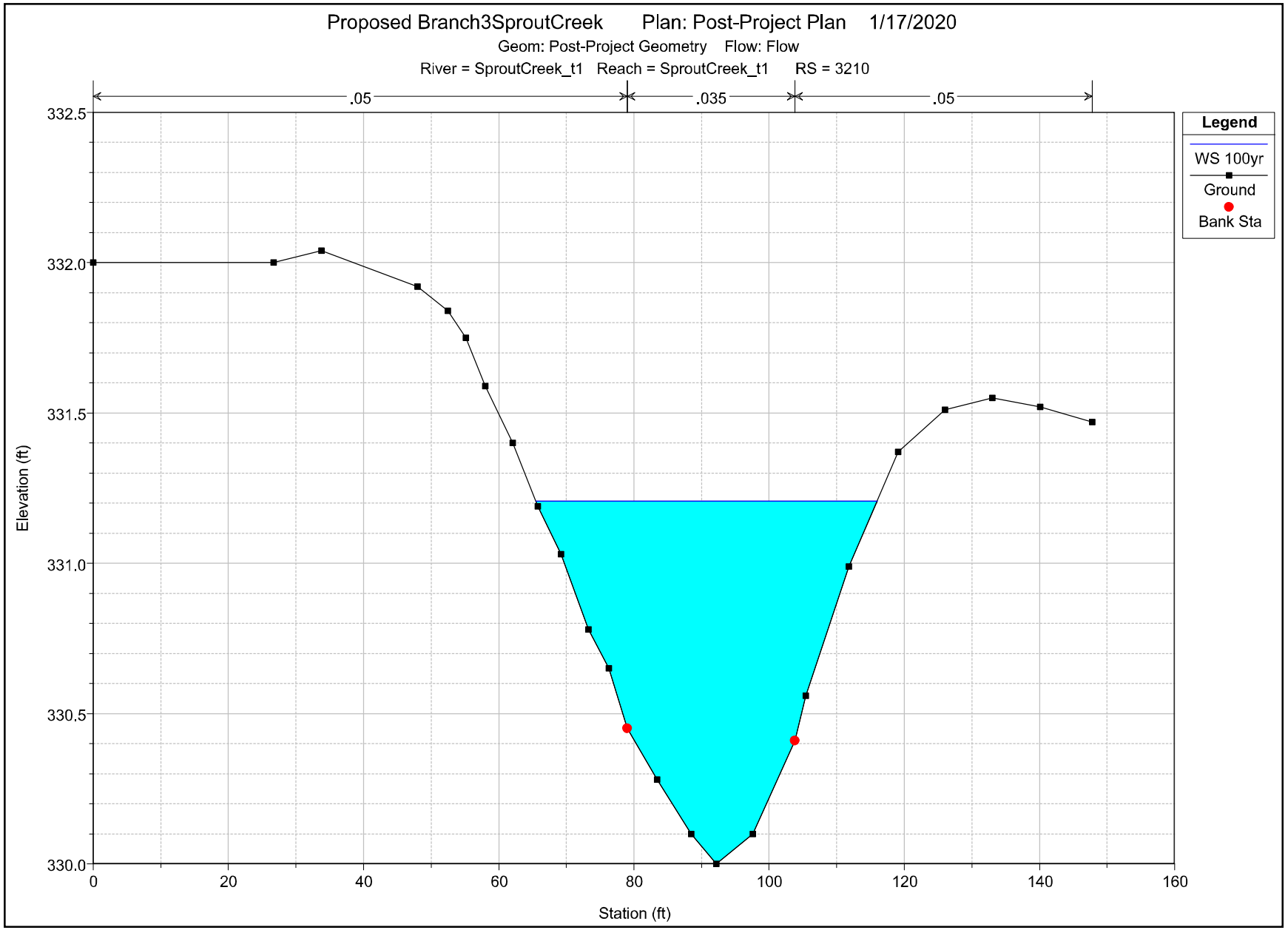

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 958
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
324
322
320
318
316
314
312
0
100
200
300
400
500
600

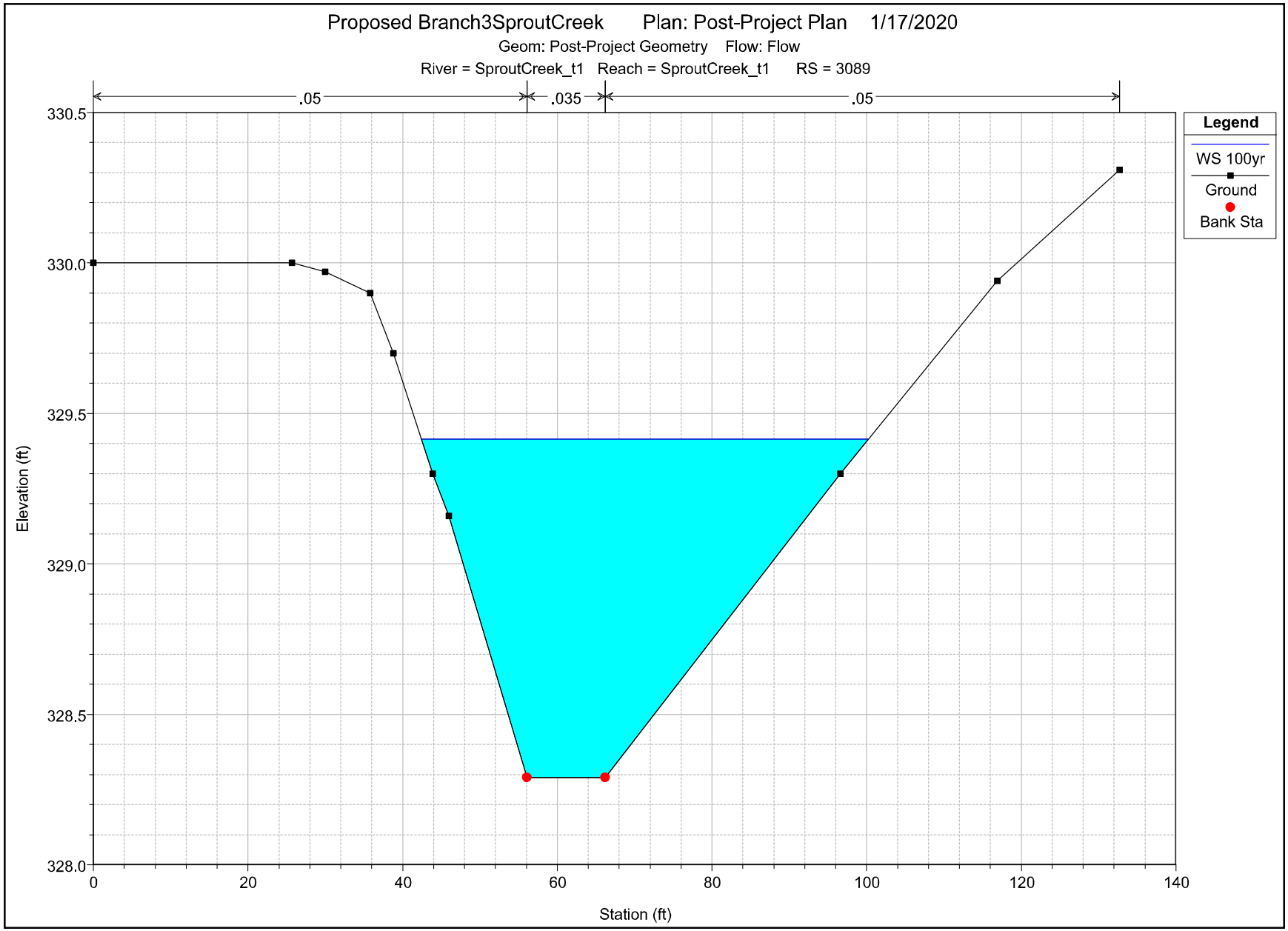

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 845
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
322
320
318
316
314
312
310
0
50
100
150
200
250
300
Station (ft)

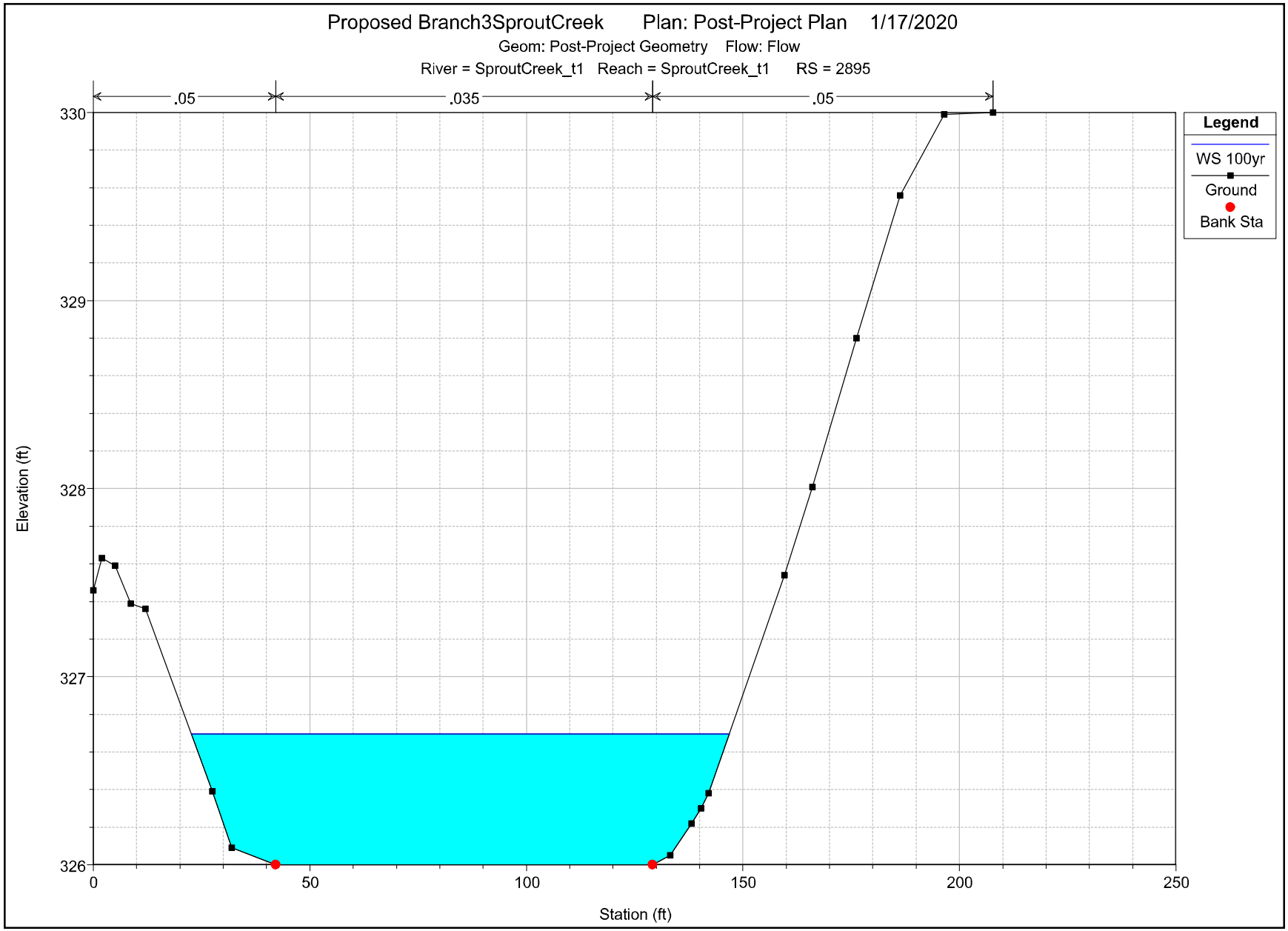

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 603
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
320
318
316
314
312
310
308
0
100
200
300
400
500

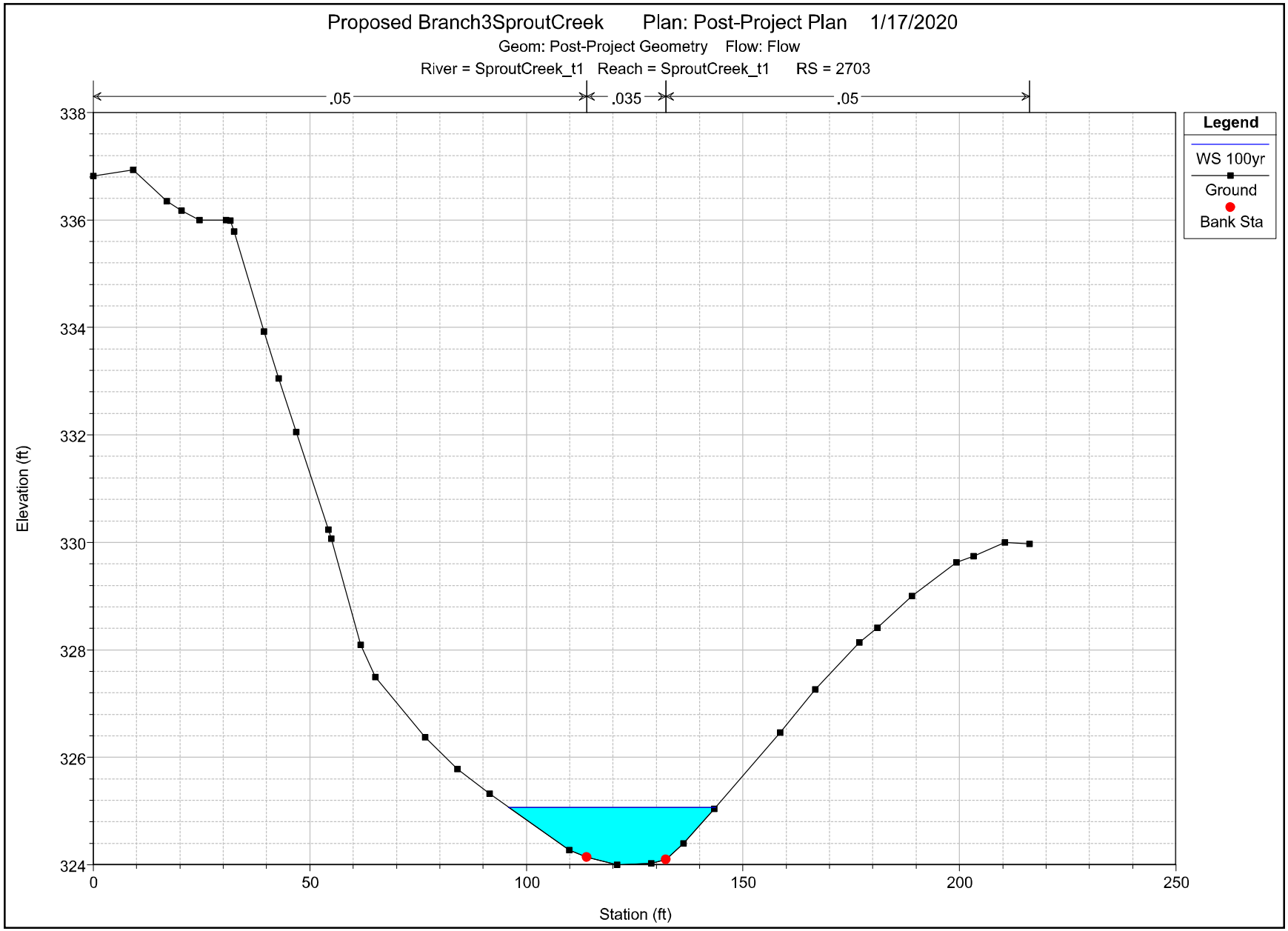

Exsiting Branch3SproutCreek Plan: Existing Plan 1/17/2020
Geom: Existing Geometry Flow: Flow
River = SproutCreek_t3 Reach = SproutCreek_t3 RS = 378
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
324
322
320
318
316
314
312
310
308
0
100
200
300
400
500
600

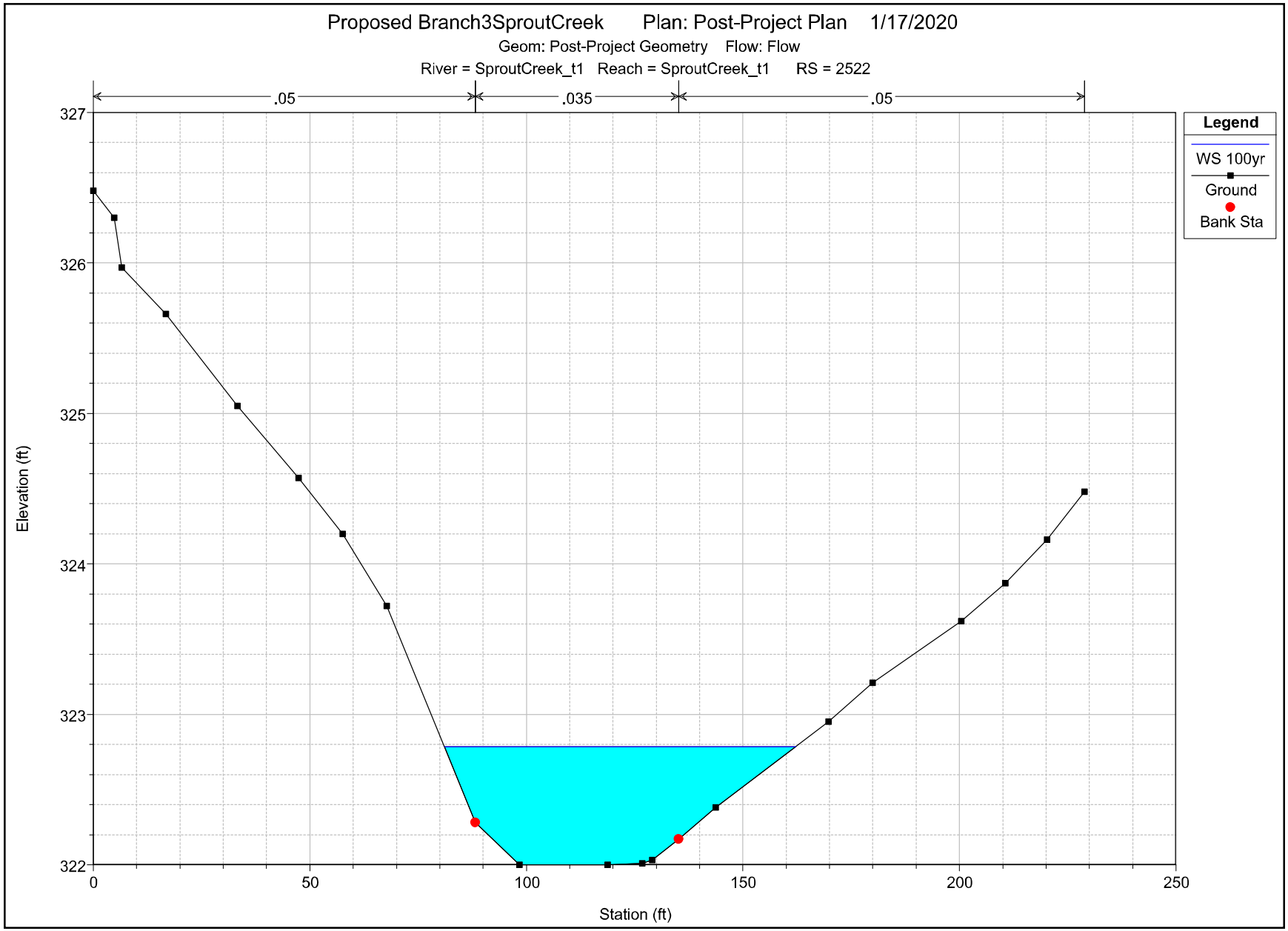
7. CROSS SECTION PLOTS – POST-PROJECT CONDITIONS

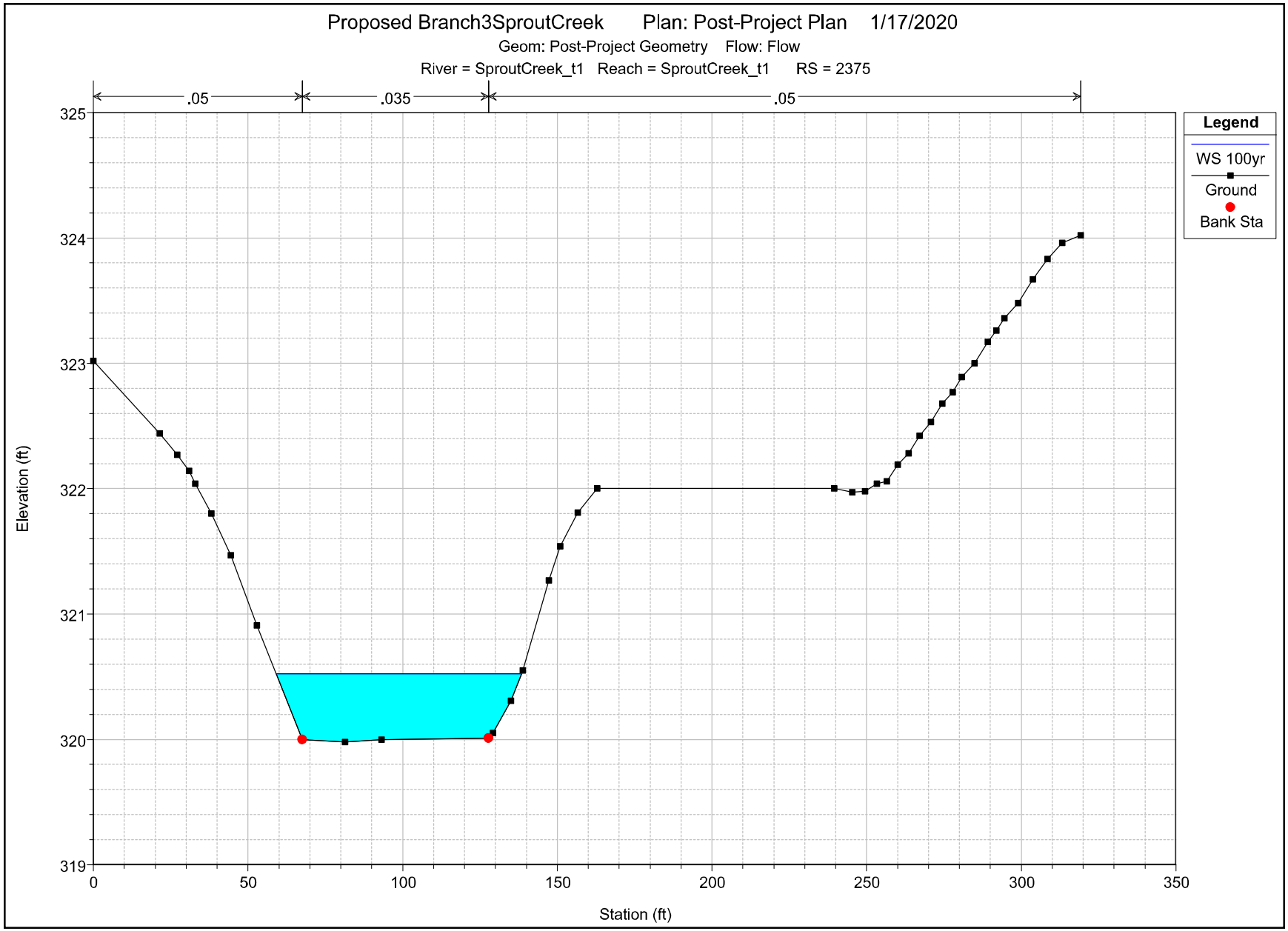

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 3210
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
332.5
332.0
331.5
331.0
330.5
330.0
0
20
40
60
80
100
120
140
160

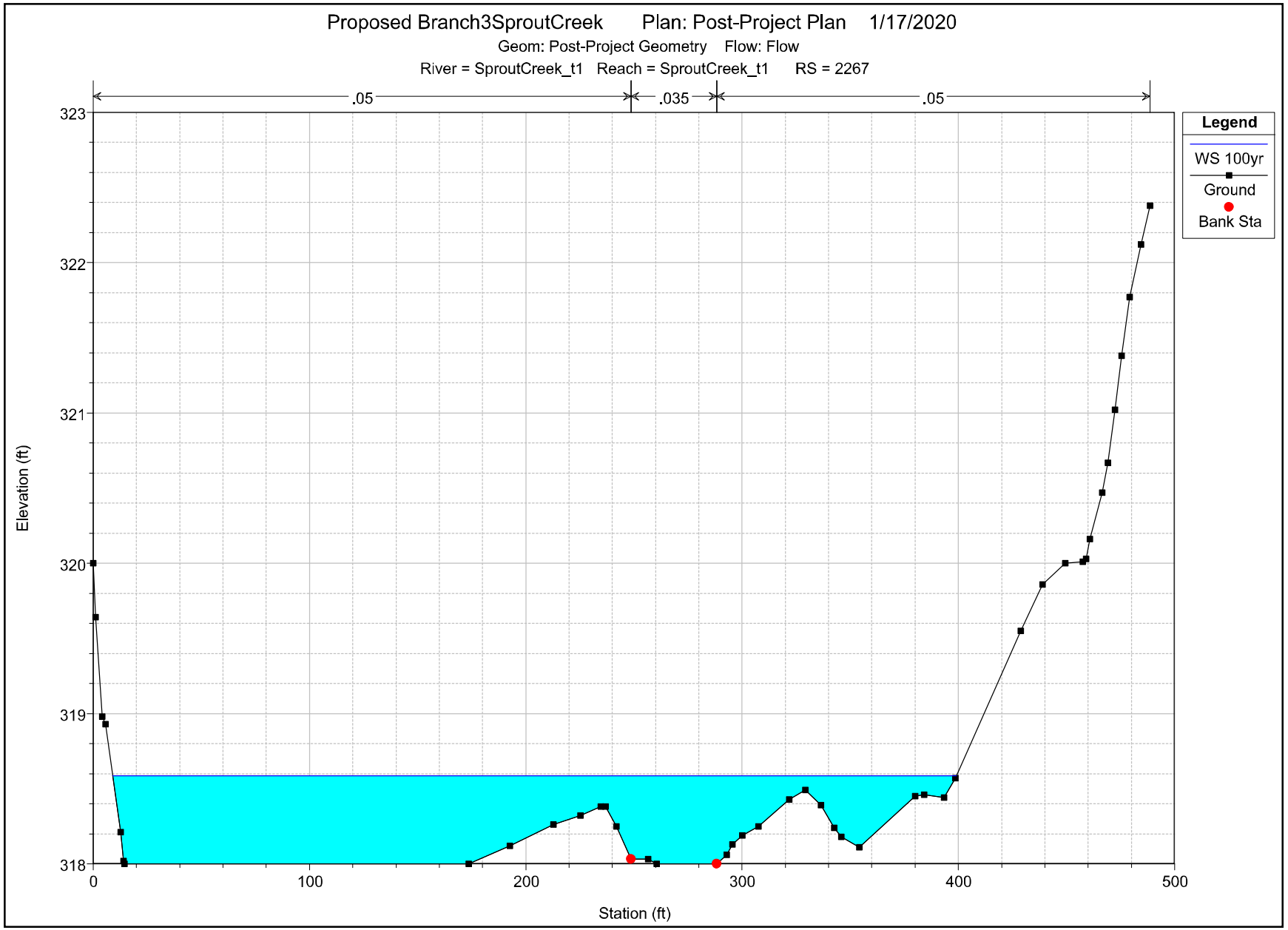

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 3089
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
330.5
330.0
329.5
329.0
328.5
328.0
0
20
40
60
80
100
120
140
Station (ft)

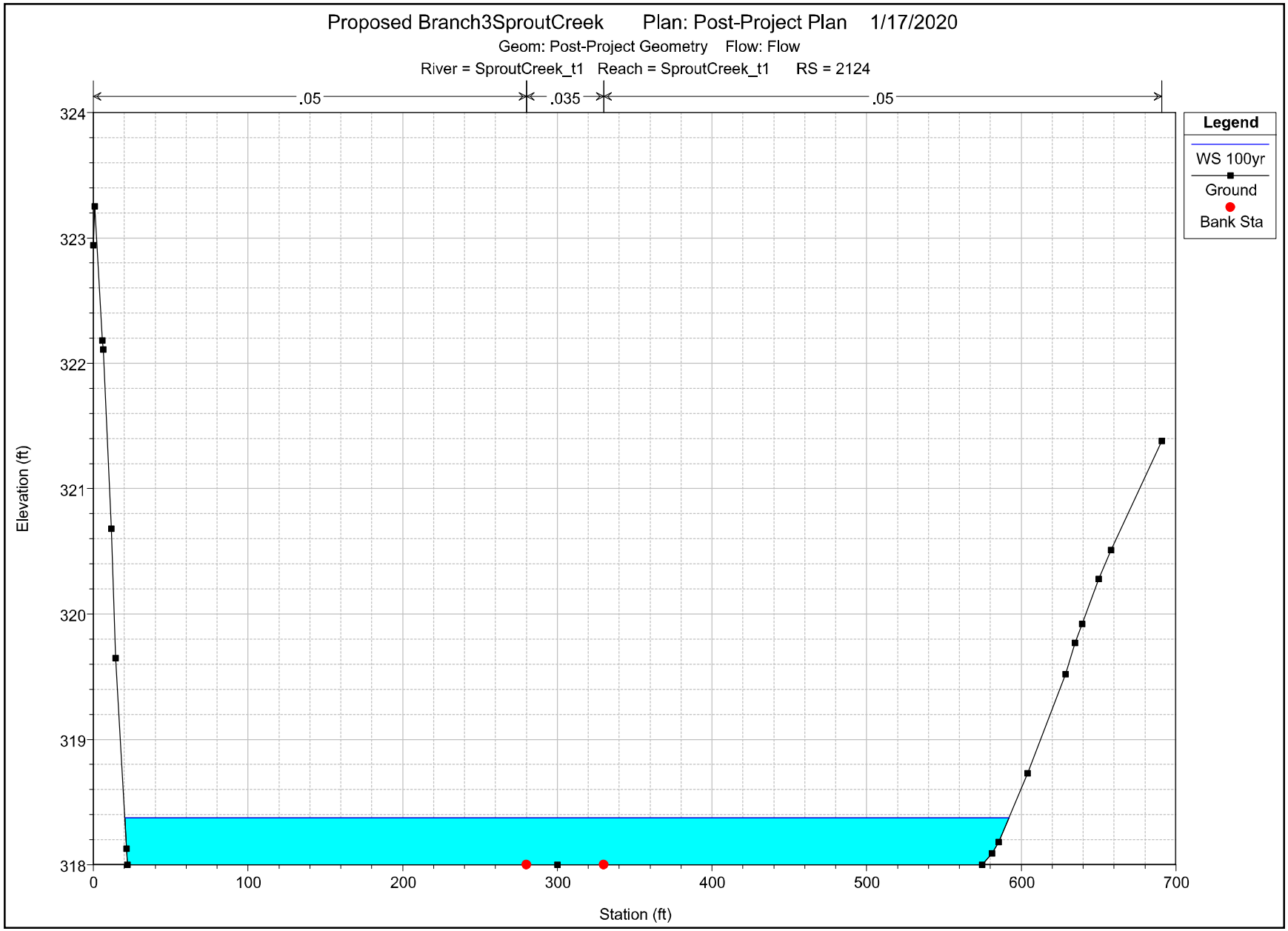

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2895
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
330
329
328
327
326
0
50
100
150
200
250
Station (ft)

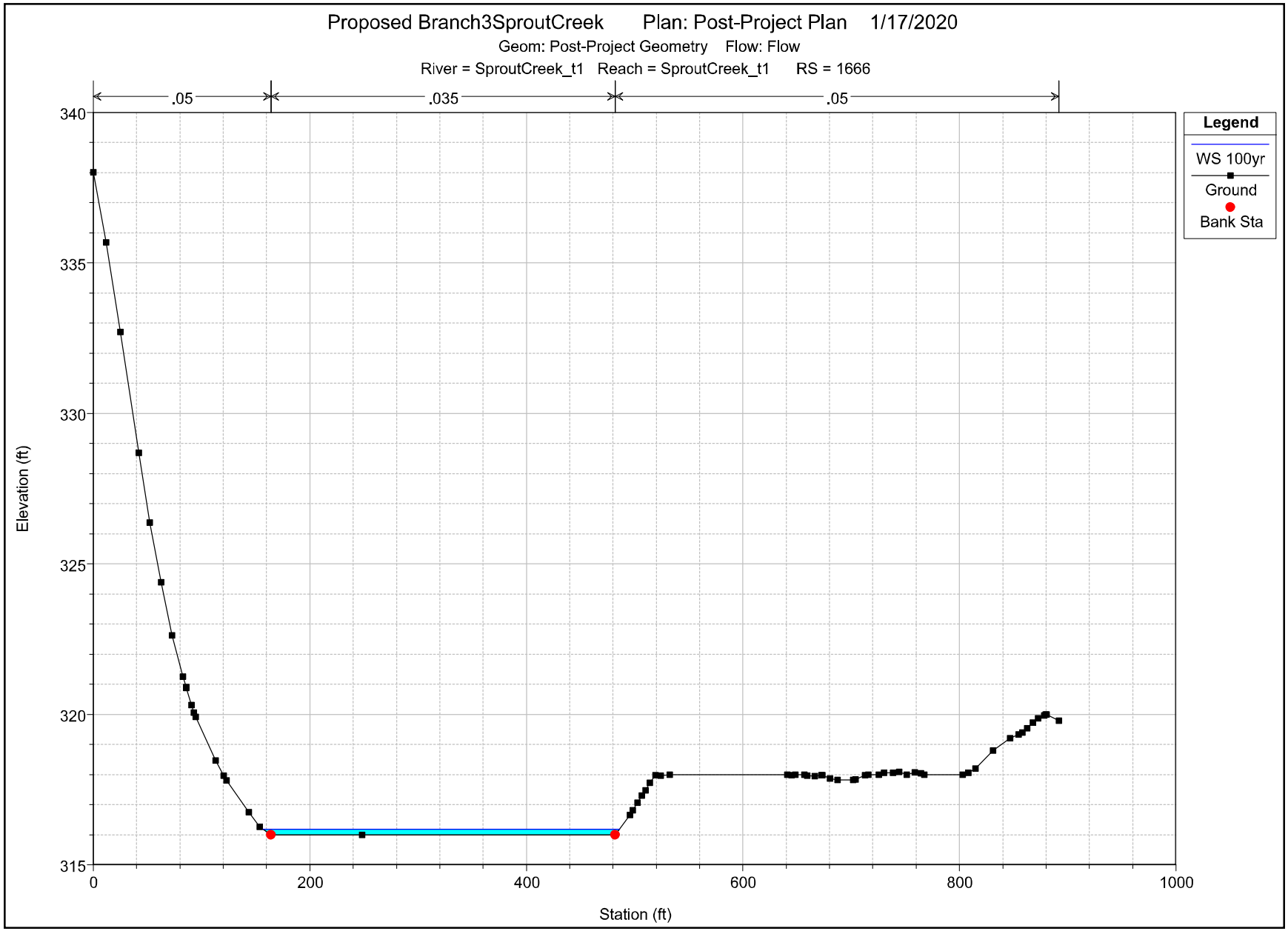

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2703
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
338
336
334
332
330
328
326
324
0
50
100
150
200
250

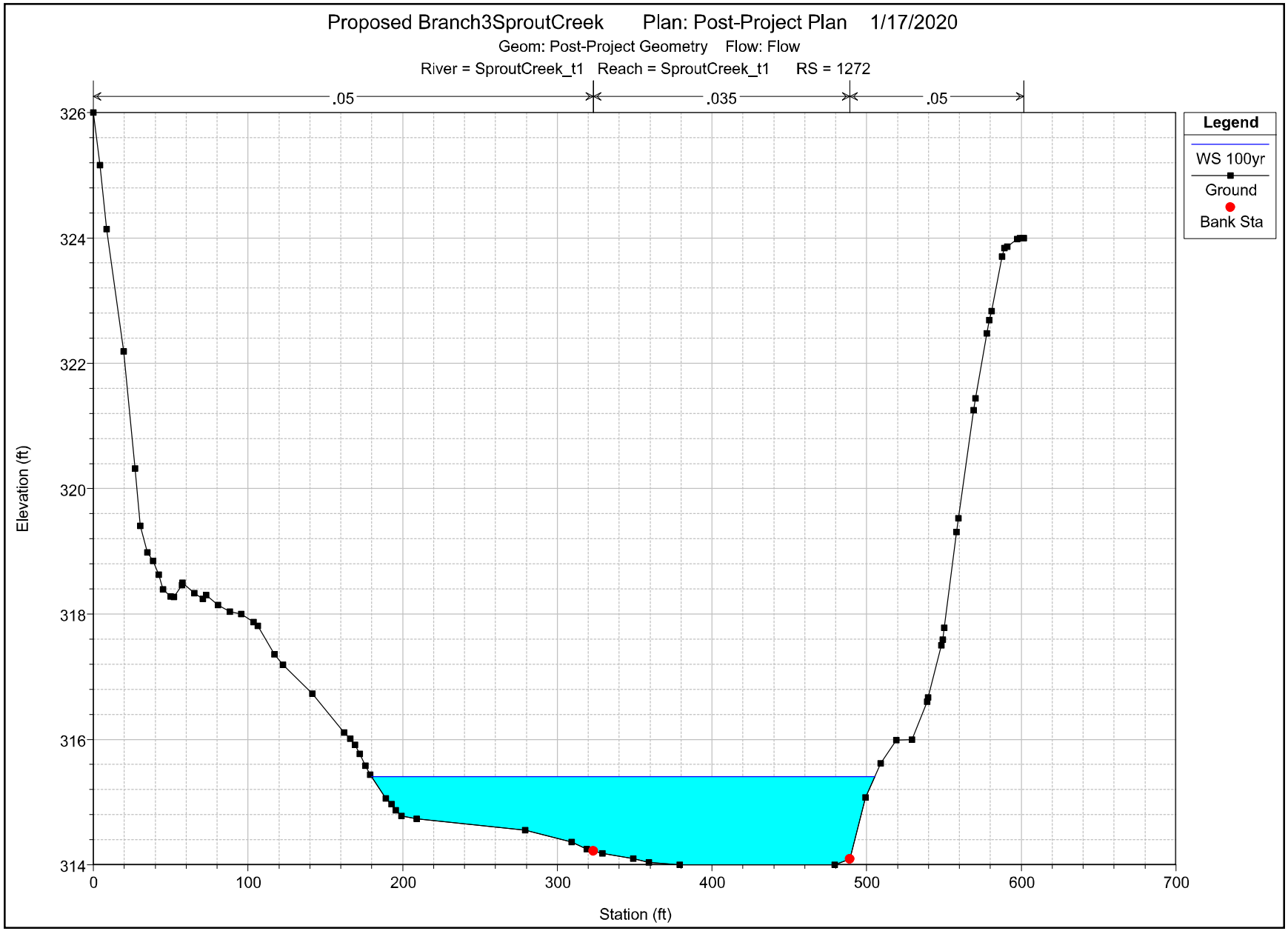

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2522
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
327
326
325
324
323
322
0
50
100
150
200
250

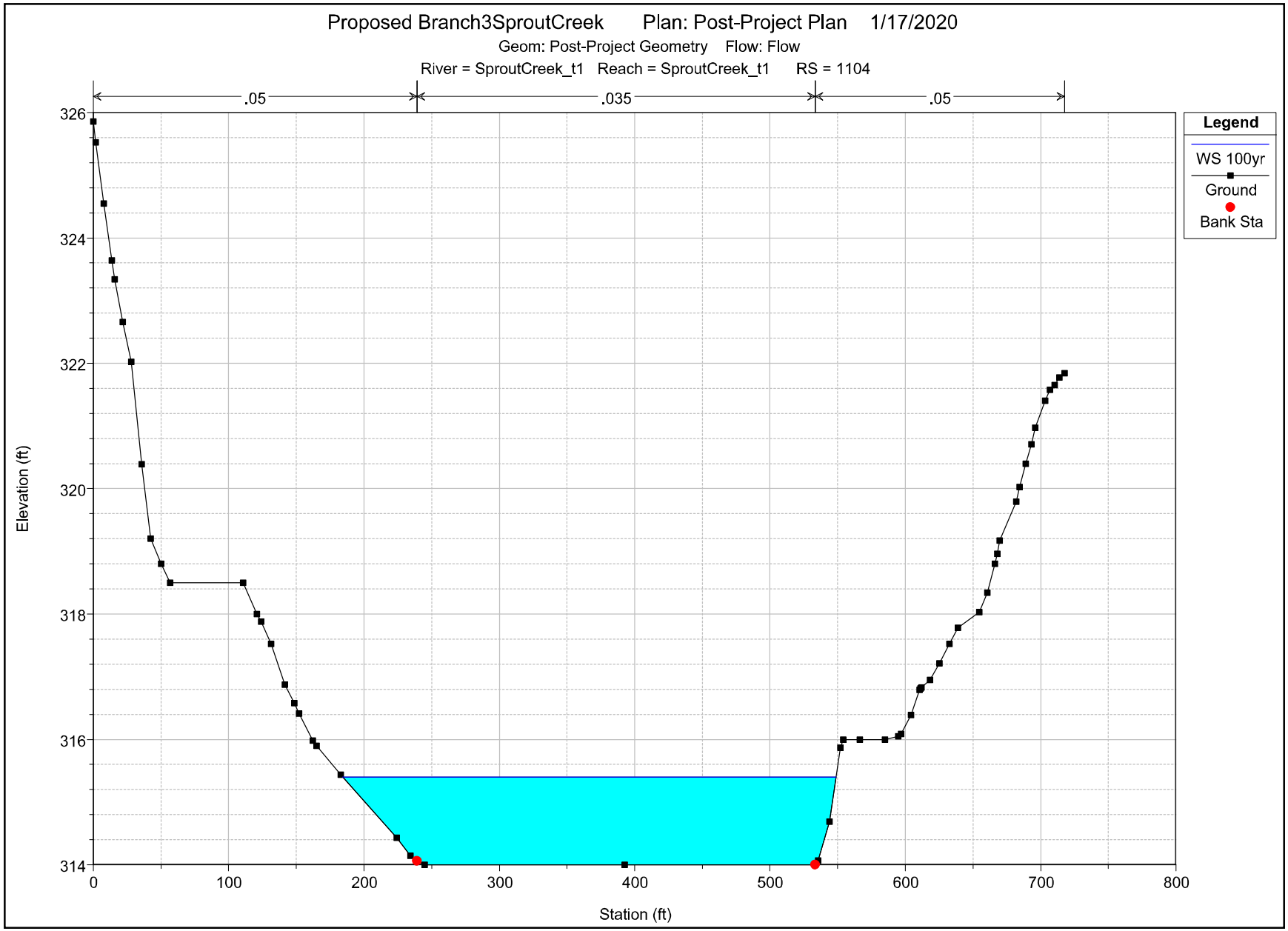

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2375
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
325
324
323
322
321
320
319
0
50
100
150
200
250
300
350

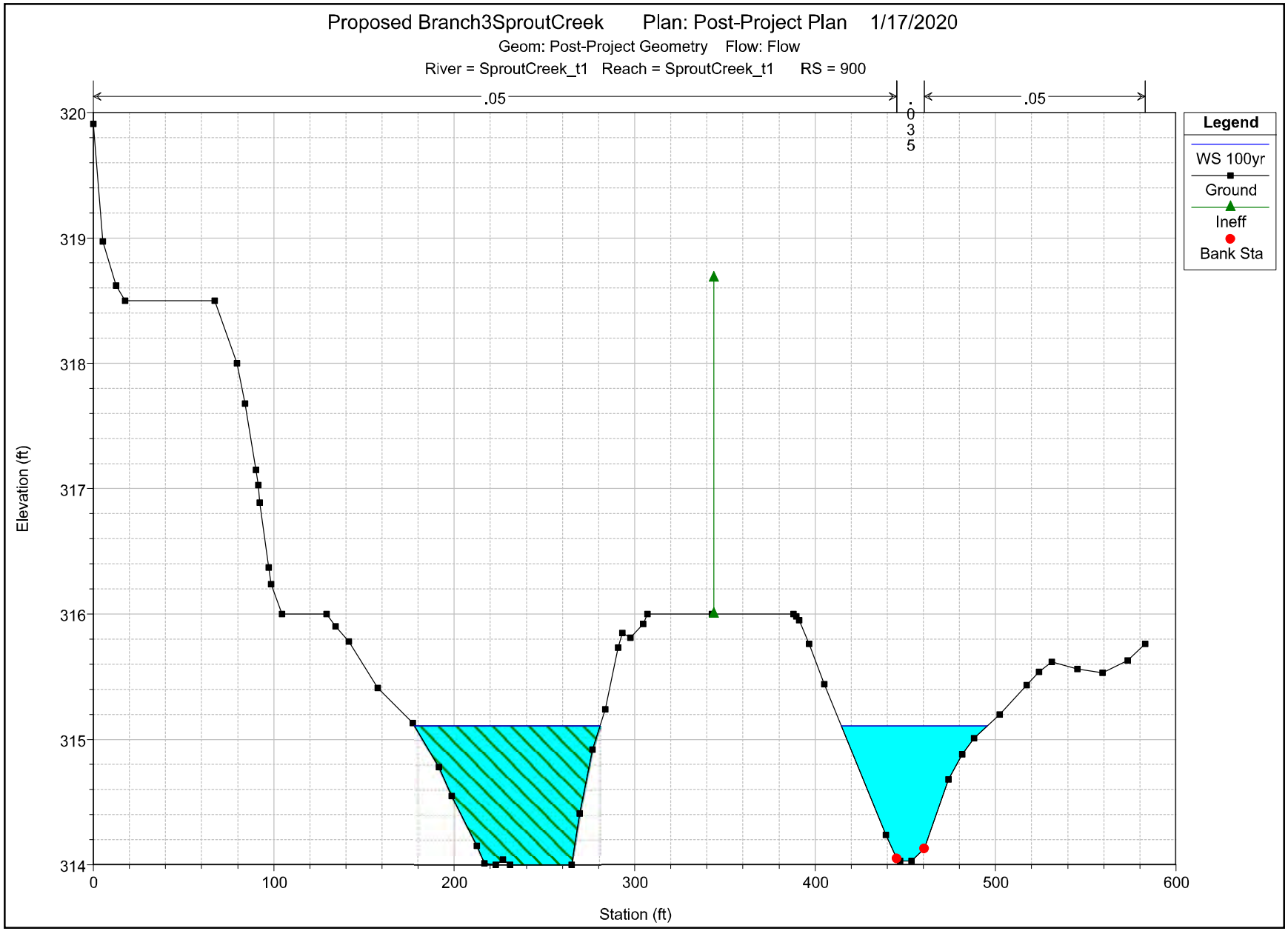

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2267
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
323
322
321
320
319
318
0
100
200
300
400
500
Station (ft)

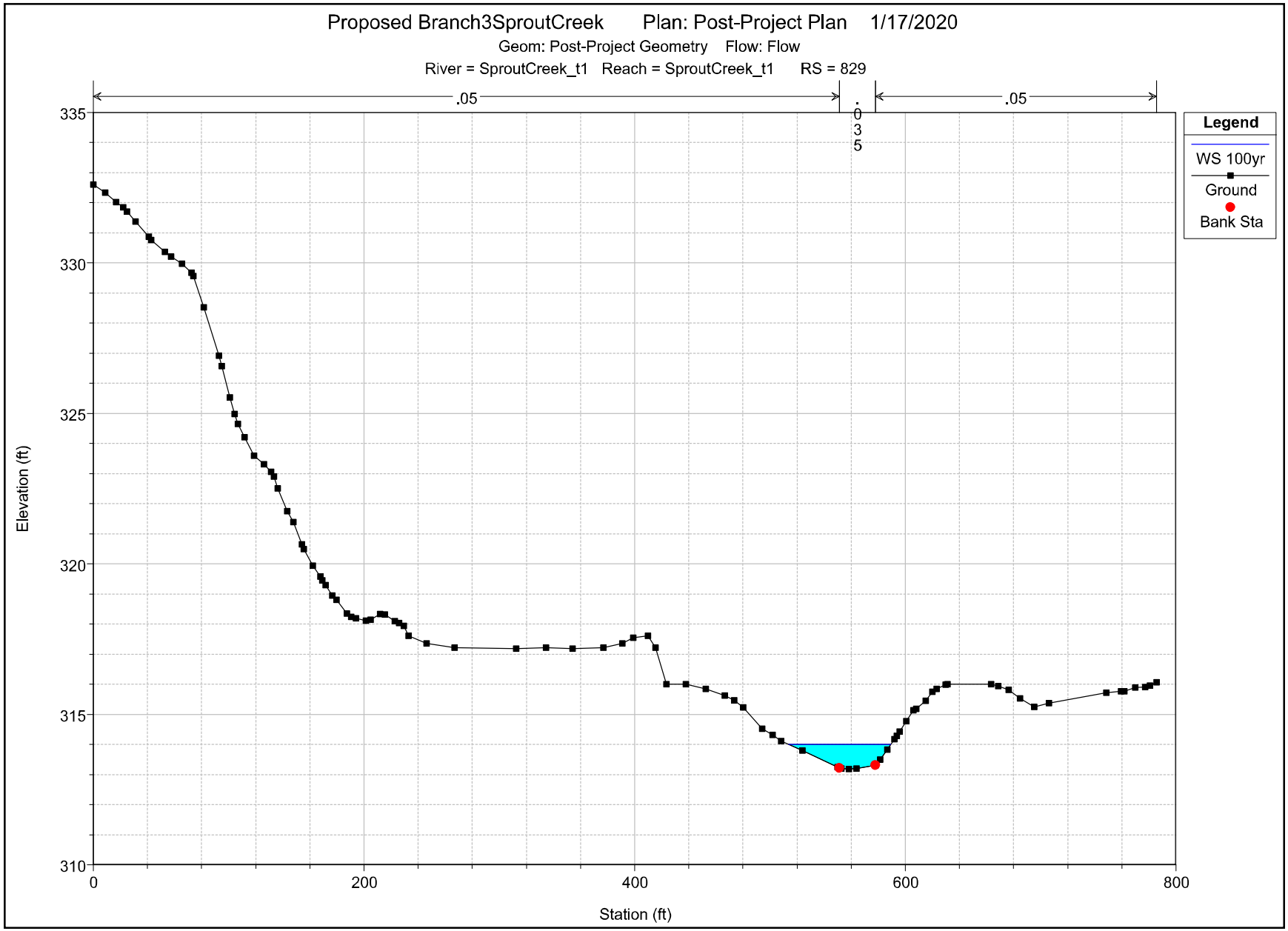

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 2124
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
324
323
322
321
320
319
318
0
100
200
300
400
500
600
700

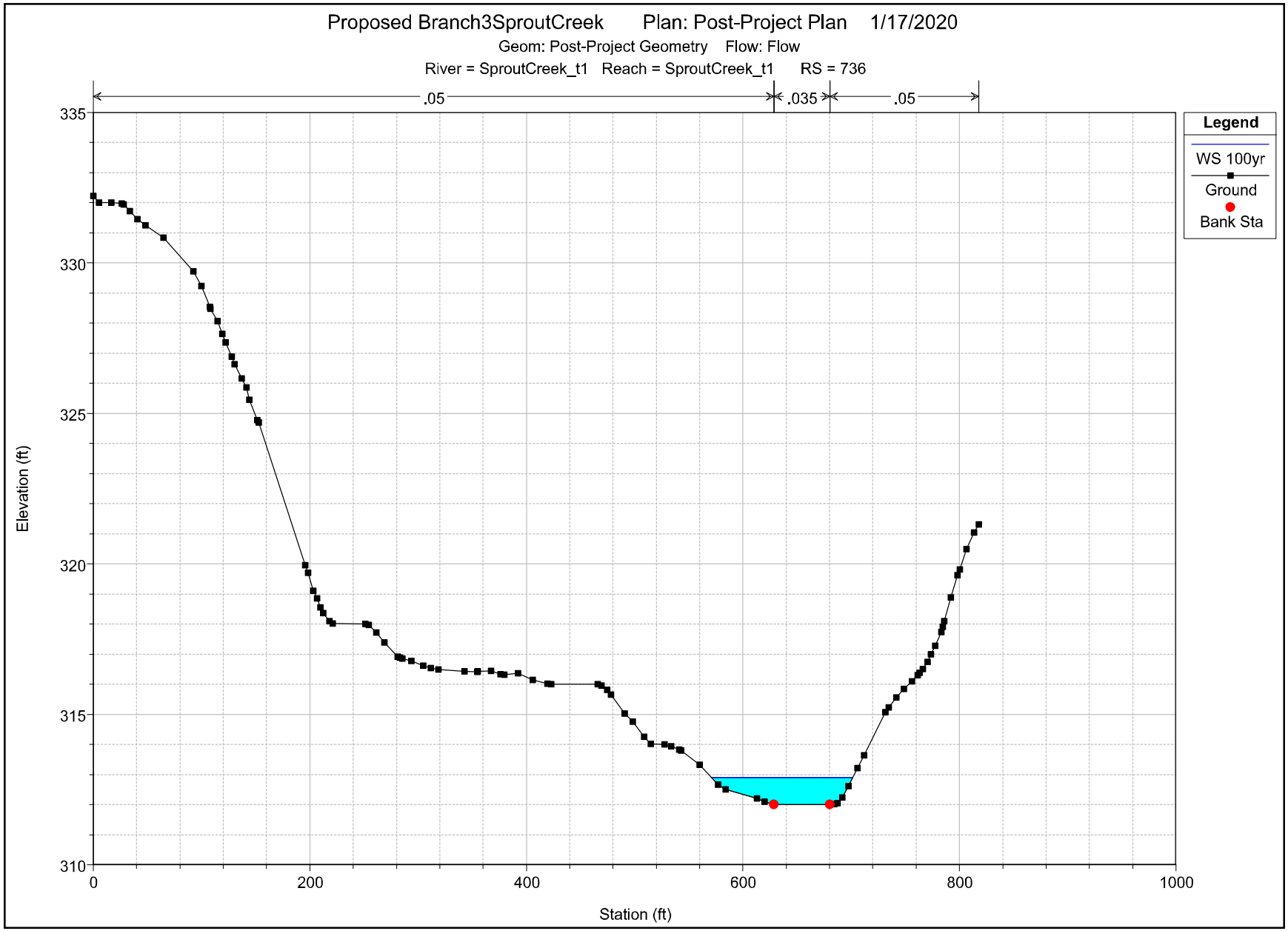

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 1666
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
340
335
330
325
320
315
0
200
400
600
800
1000
Station (ft)

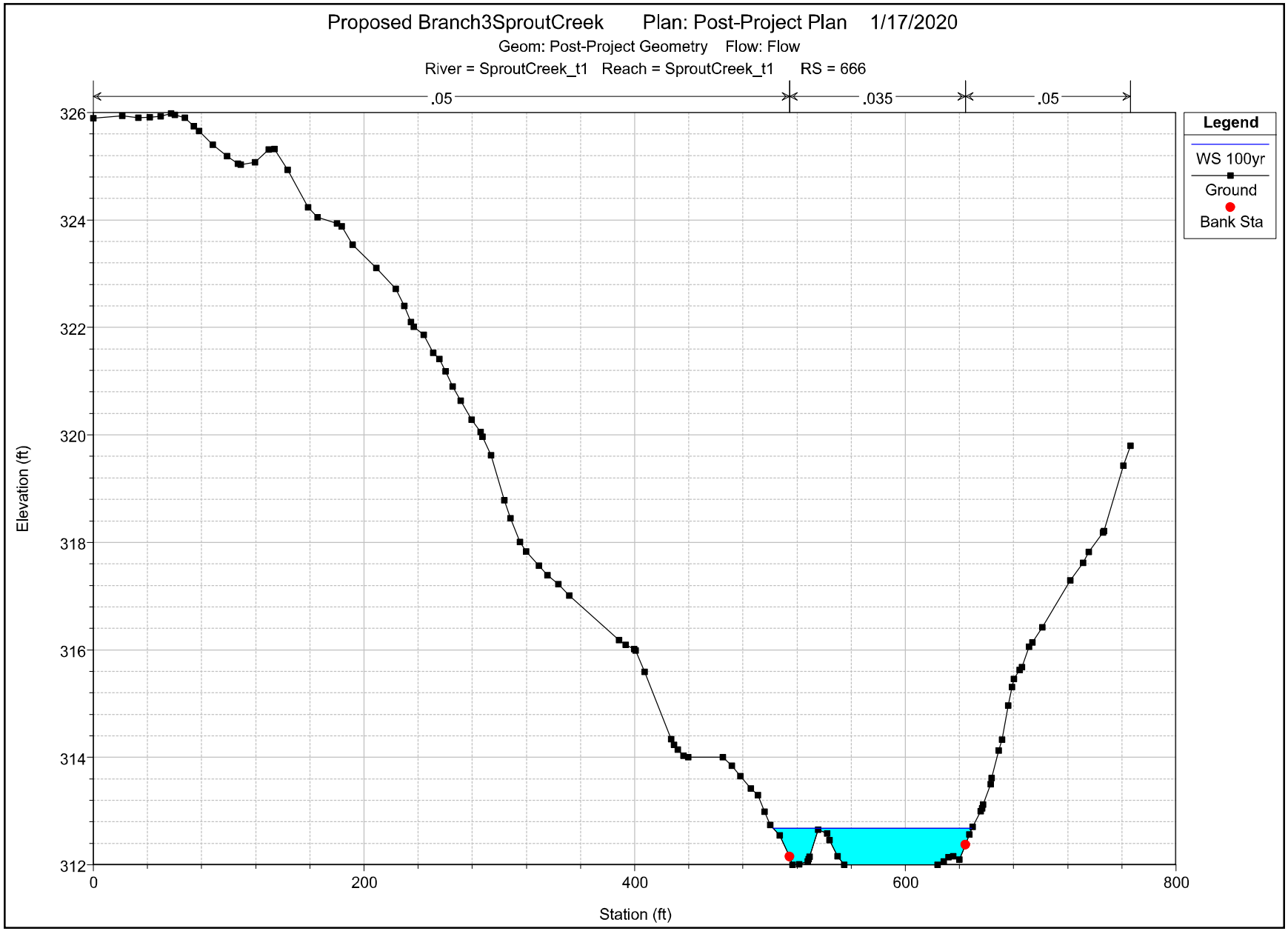

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 1272
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
326
324
322
320
318
316
314
0
100
200
300
400
500
600
700

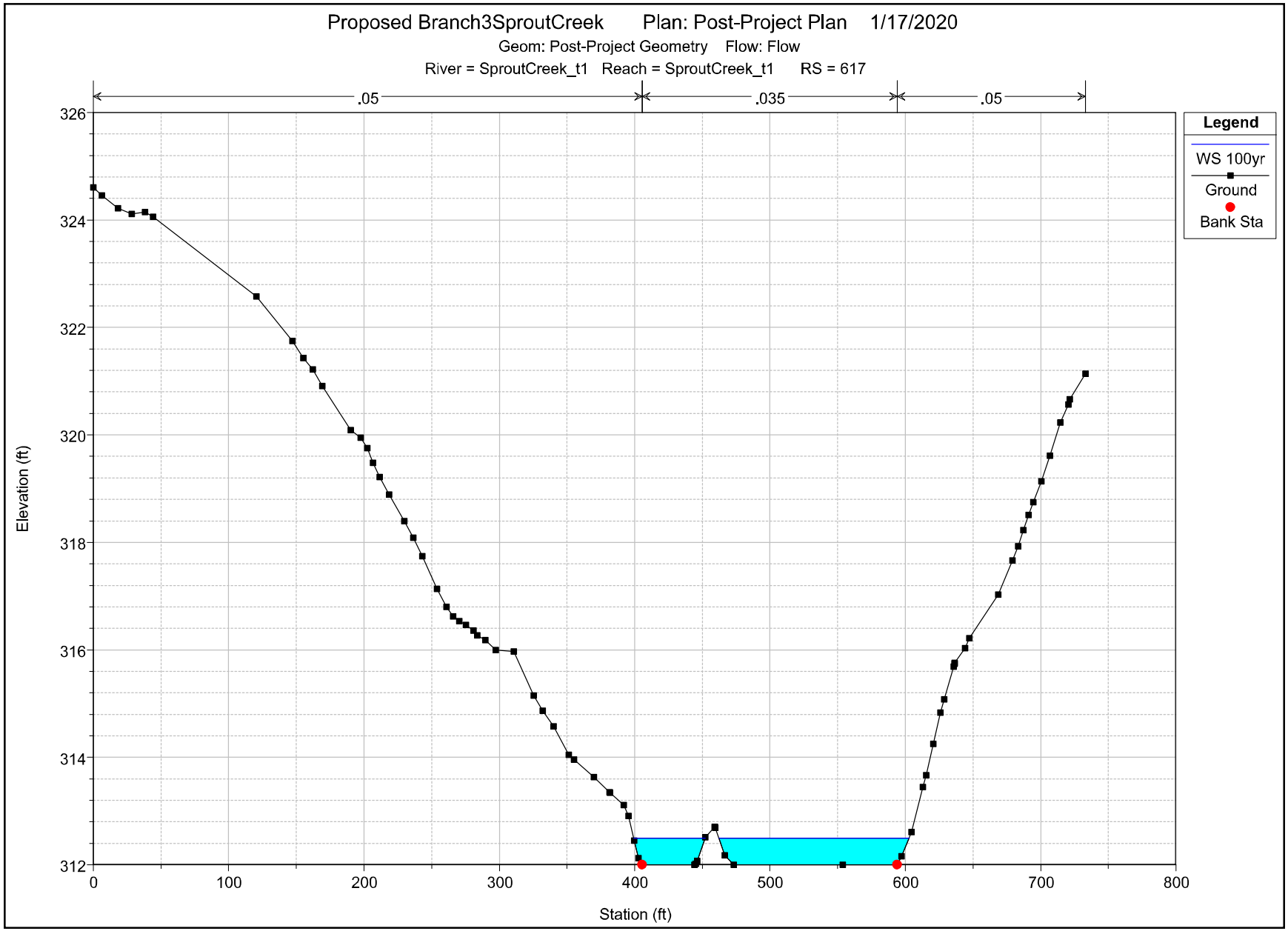

Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 1104
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
326
324
322
320
318
316
314
0
100
200
300
400
500
600
700
800


Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 900
.05
.05
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
320
319
318
317
316
315
314
0
100
200
300
400
500
600
Station (ft)


Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 829
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
335
330
325
320
315
310
0
200
400
600
800
Station (ft)


Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 736
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
335
330
325
320
315
310
0
200
400
600
800
1000
Station (ft)


Proposed Branch3SproutCreek Plan: Post-Project Plan 1/17/2020
Geom: Post-Project Geometry Flow: Flow
River = SproutCreek_t1 Reach = SproutCreek_t1 RS = 666
.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
326
324
322
320
318
316
314
312
0
200
400
600
800
Station (ft)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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
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320
318
316
314
312
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100
200
300
400
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600
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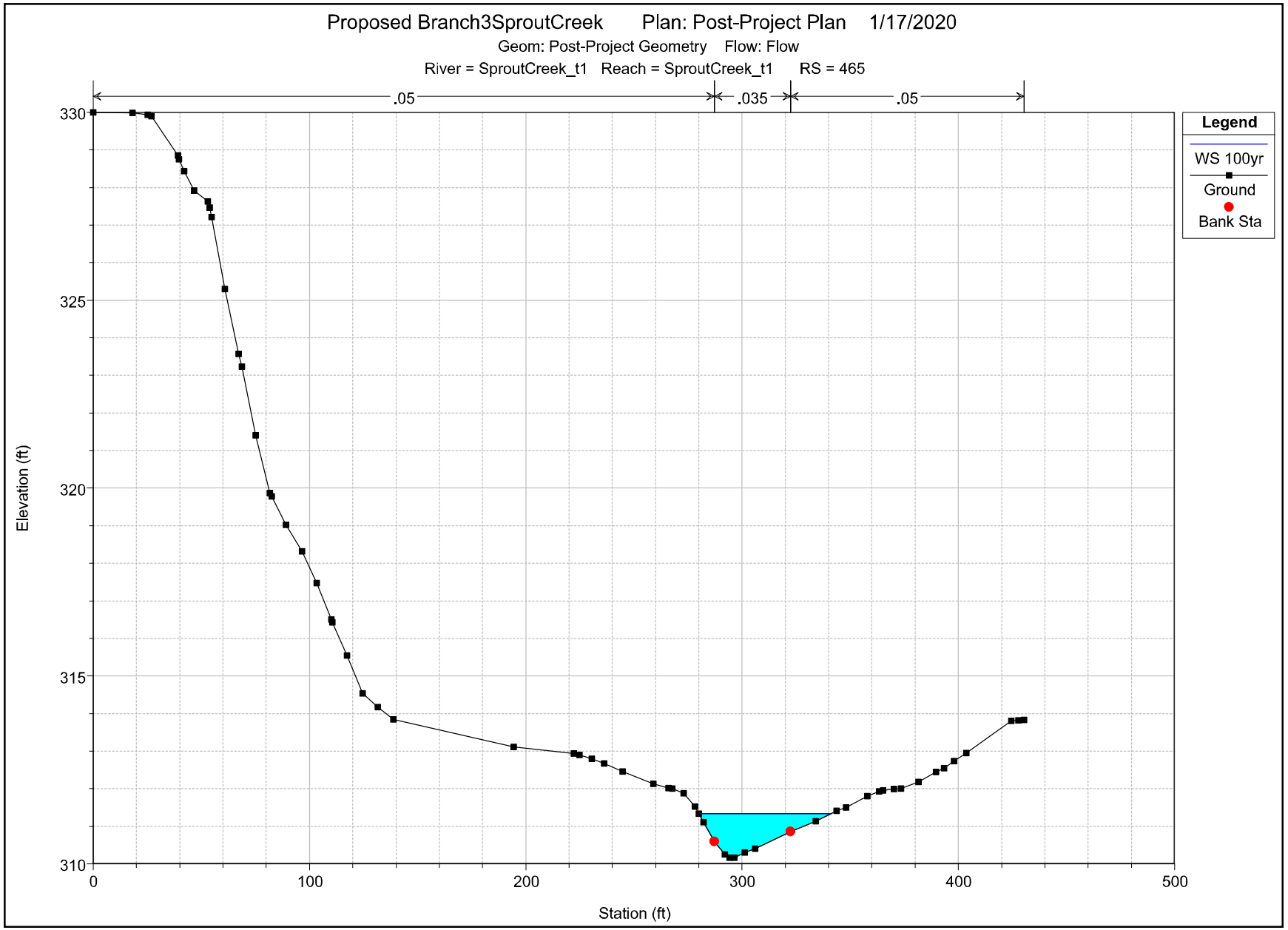
800
Station (ft)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.035
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Ground
Bank Sta
Elevation (ft)
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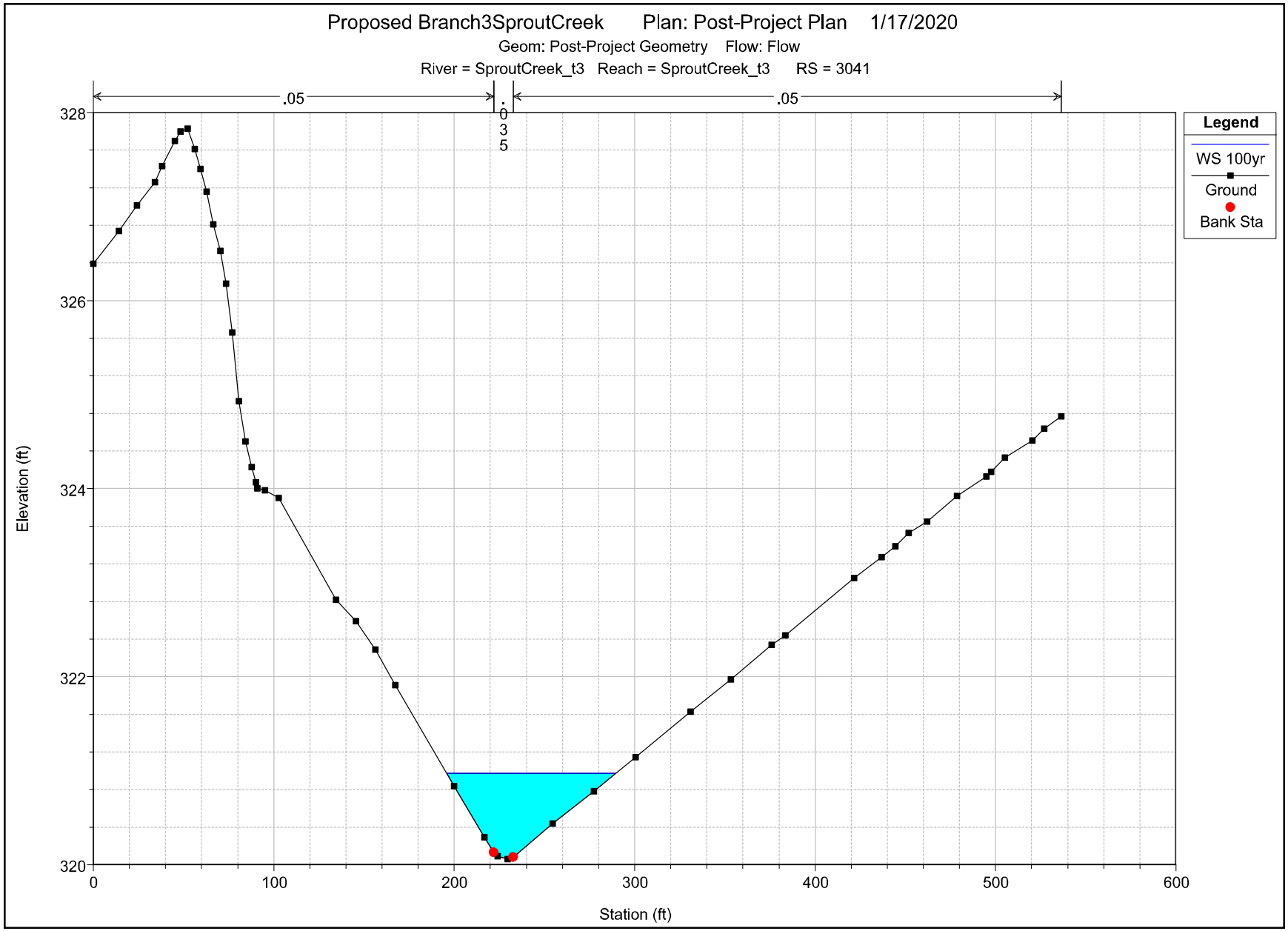
300
400
500
Station (ft)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.035
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Legend
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324
322
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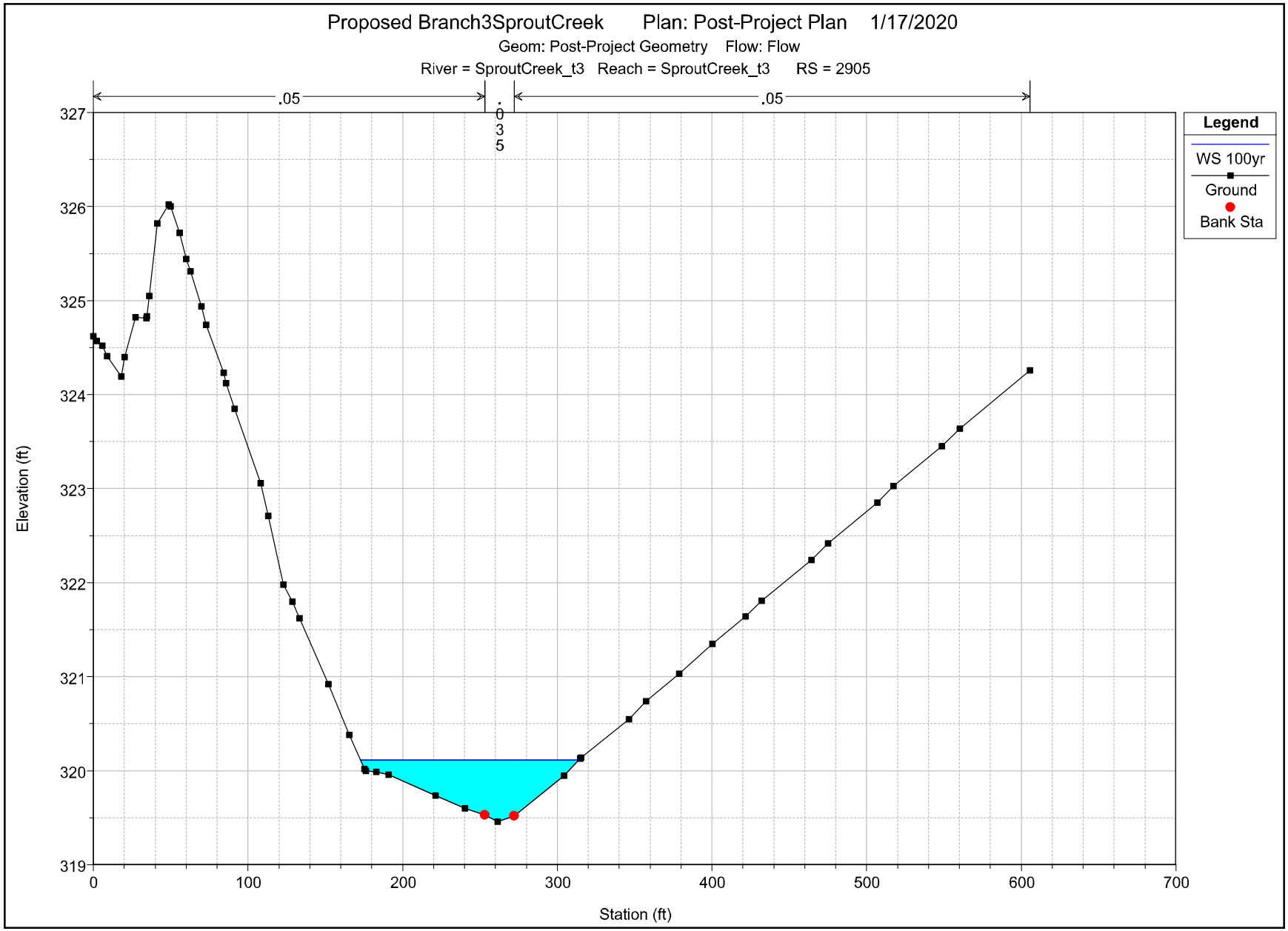
600
Station (ft)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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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326
325
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0
100
200
300
400
500
600
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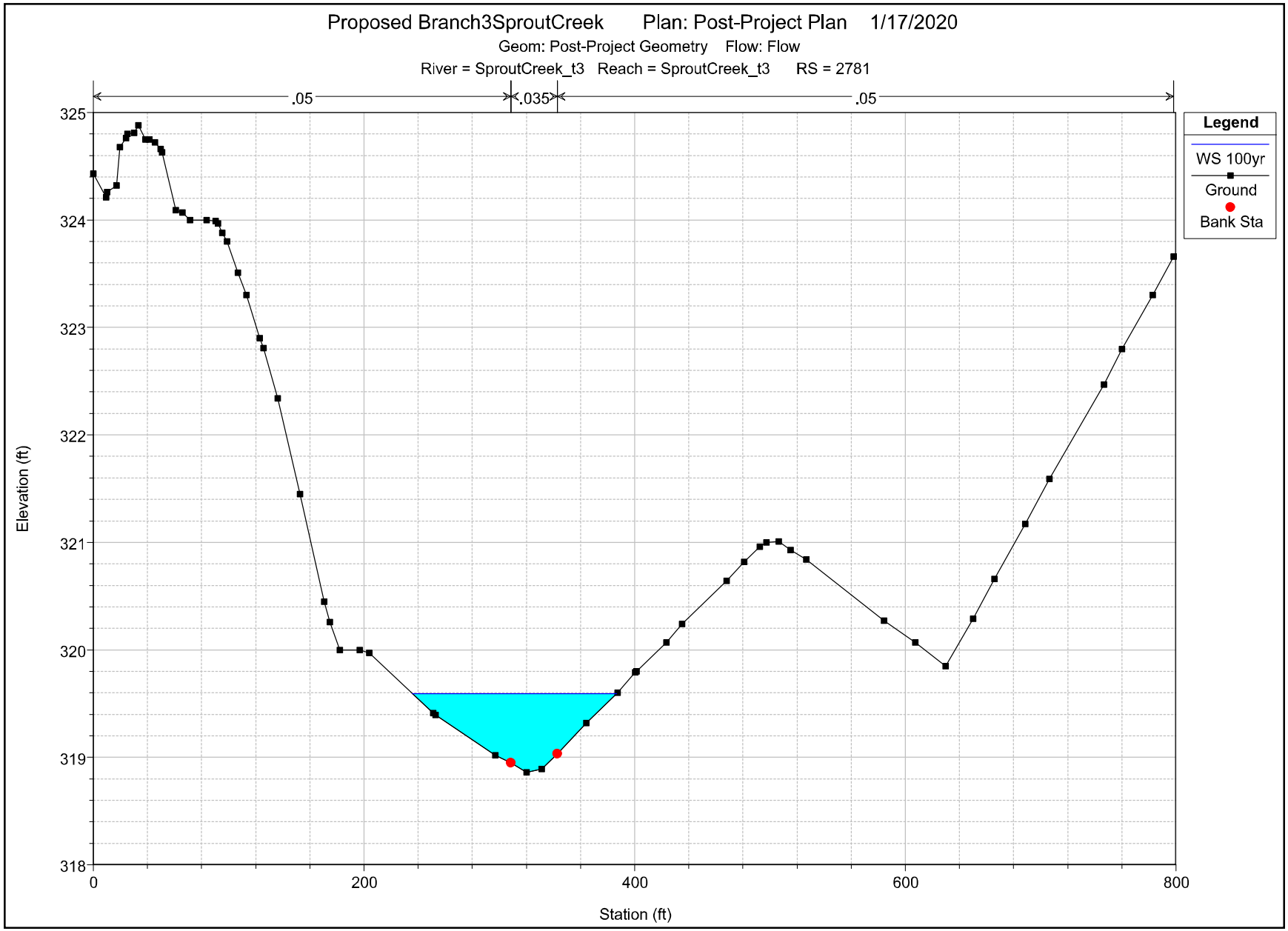
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
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Station (ft)
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600
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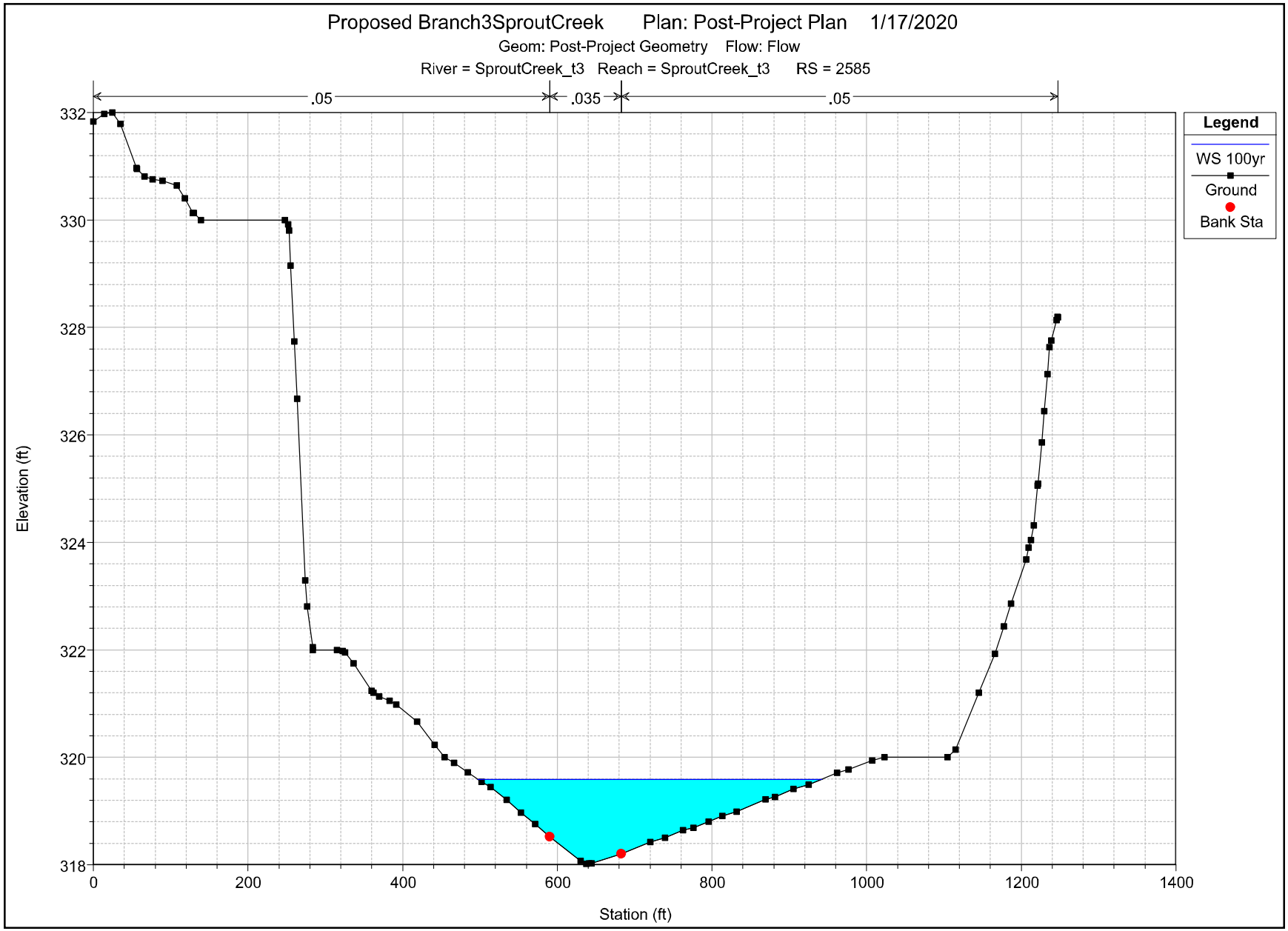
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
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Station (ft)
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200
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800
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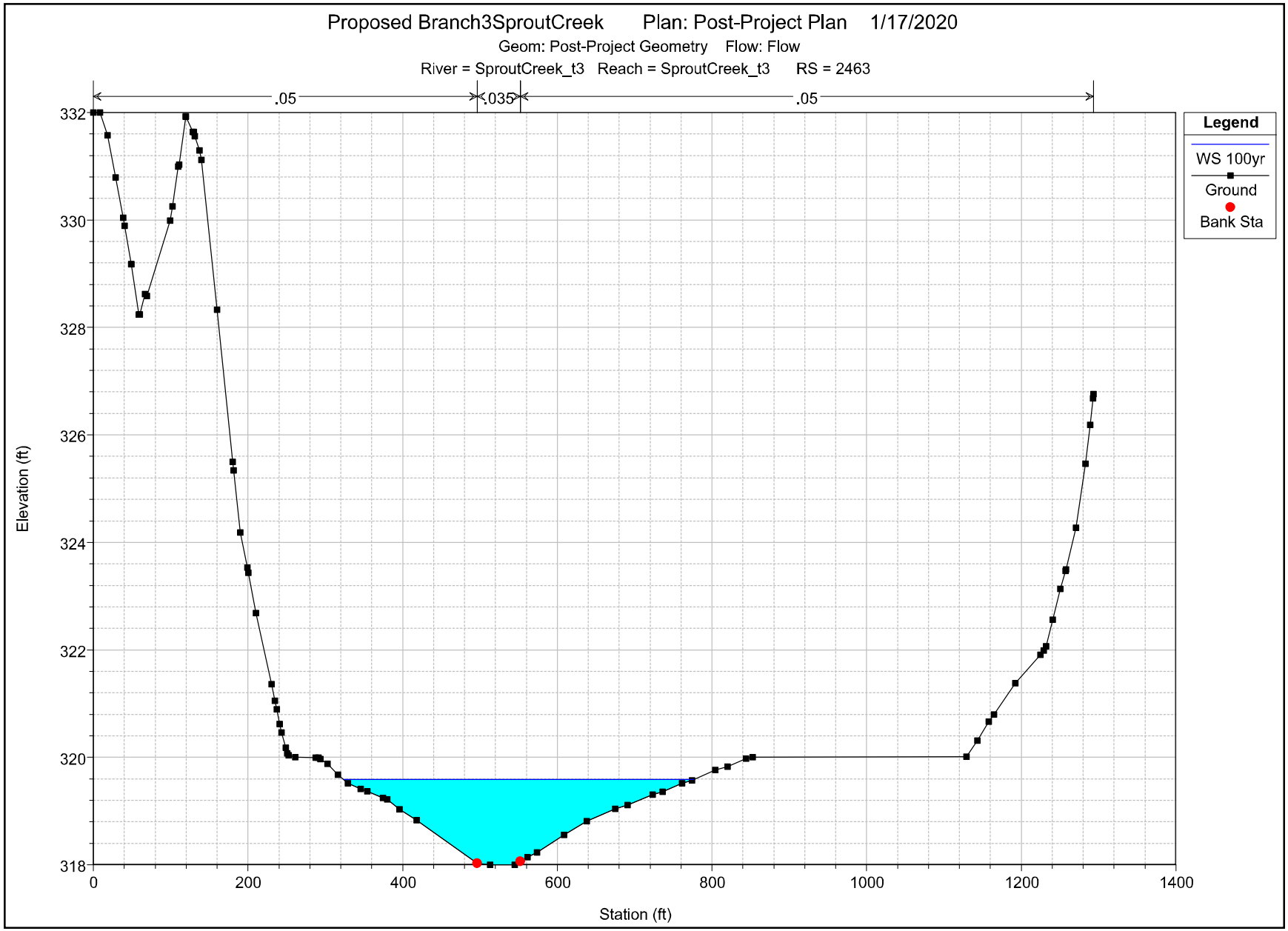
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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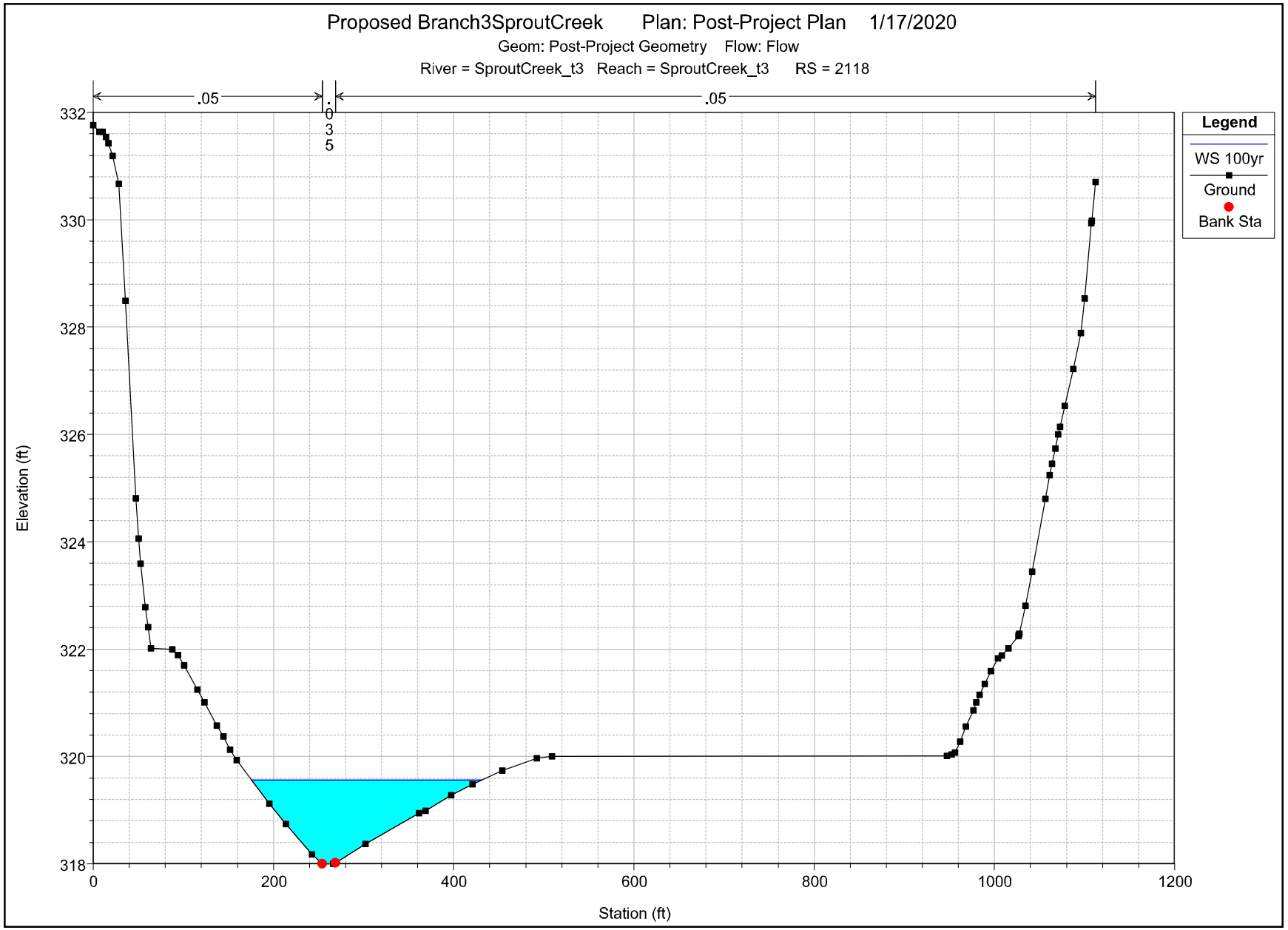
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
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Station (ft)
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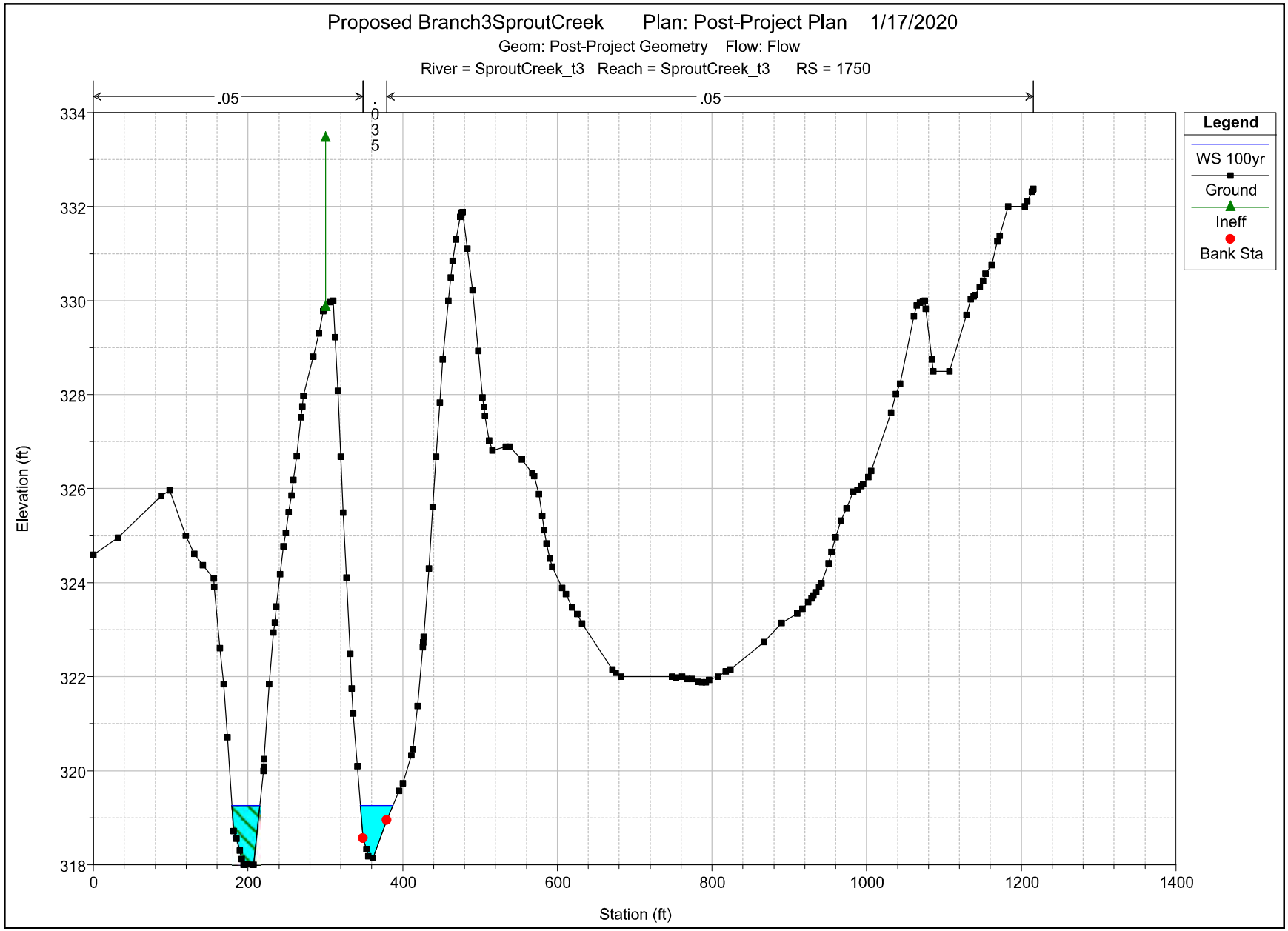
0
200
400
600
800
1000
1200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Geom: Post-Project Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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332
330
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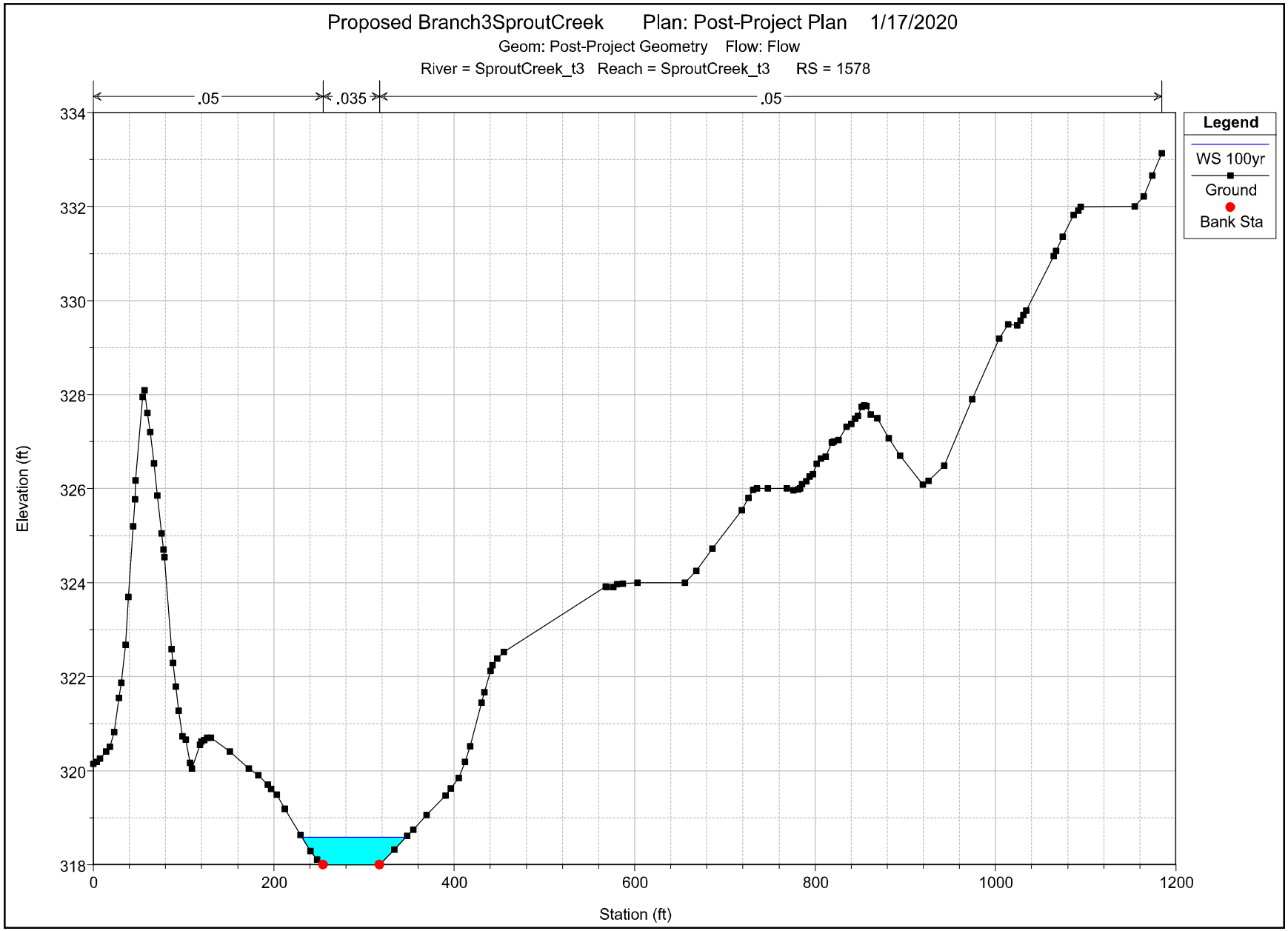
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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332
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1000
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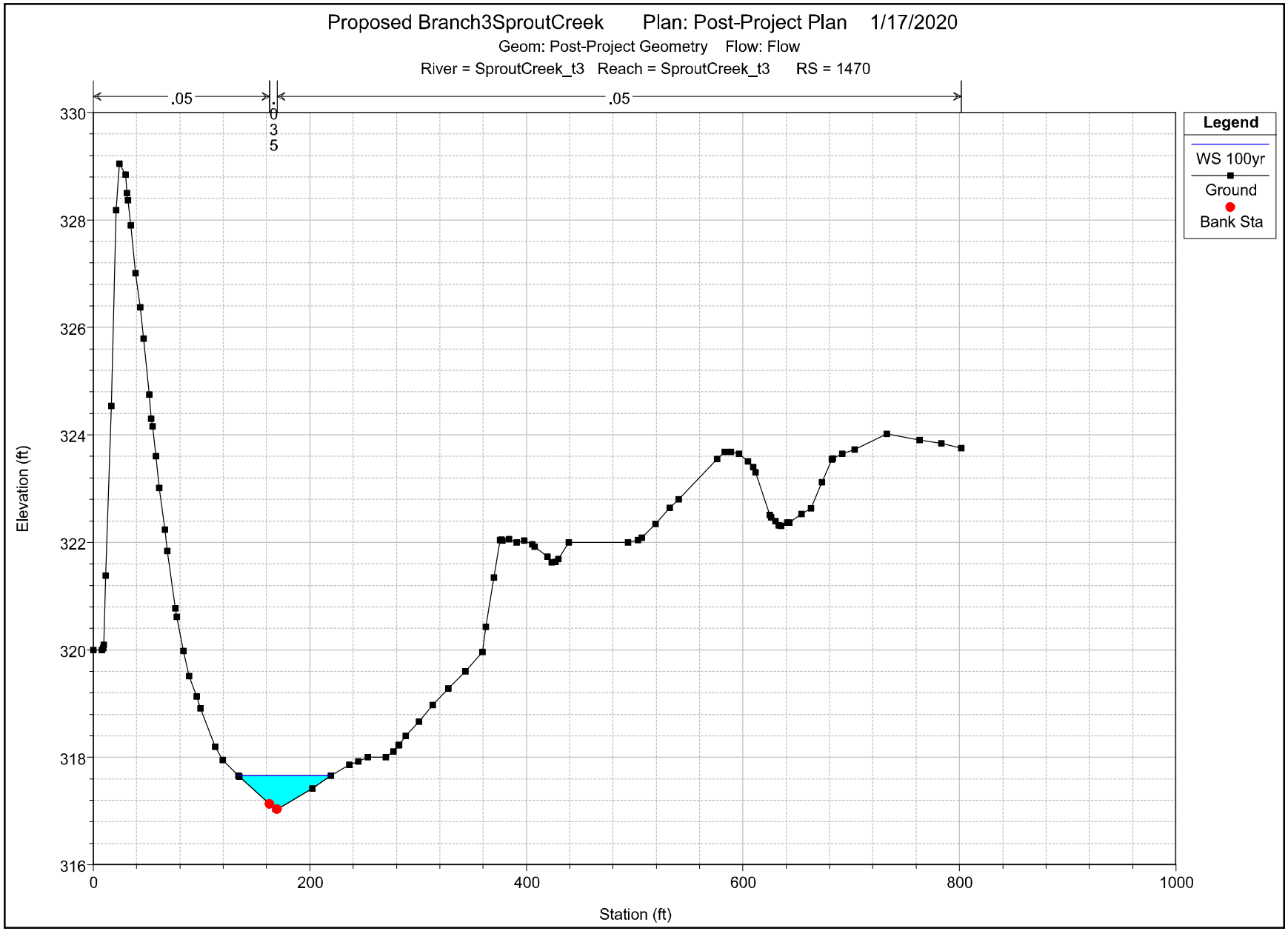
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.05
.
0
3
5
.05
Legend
WS 100yr
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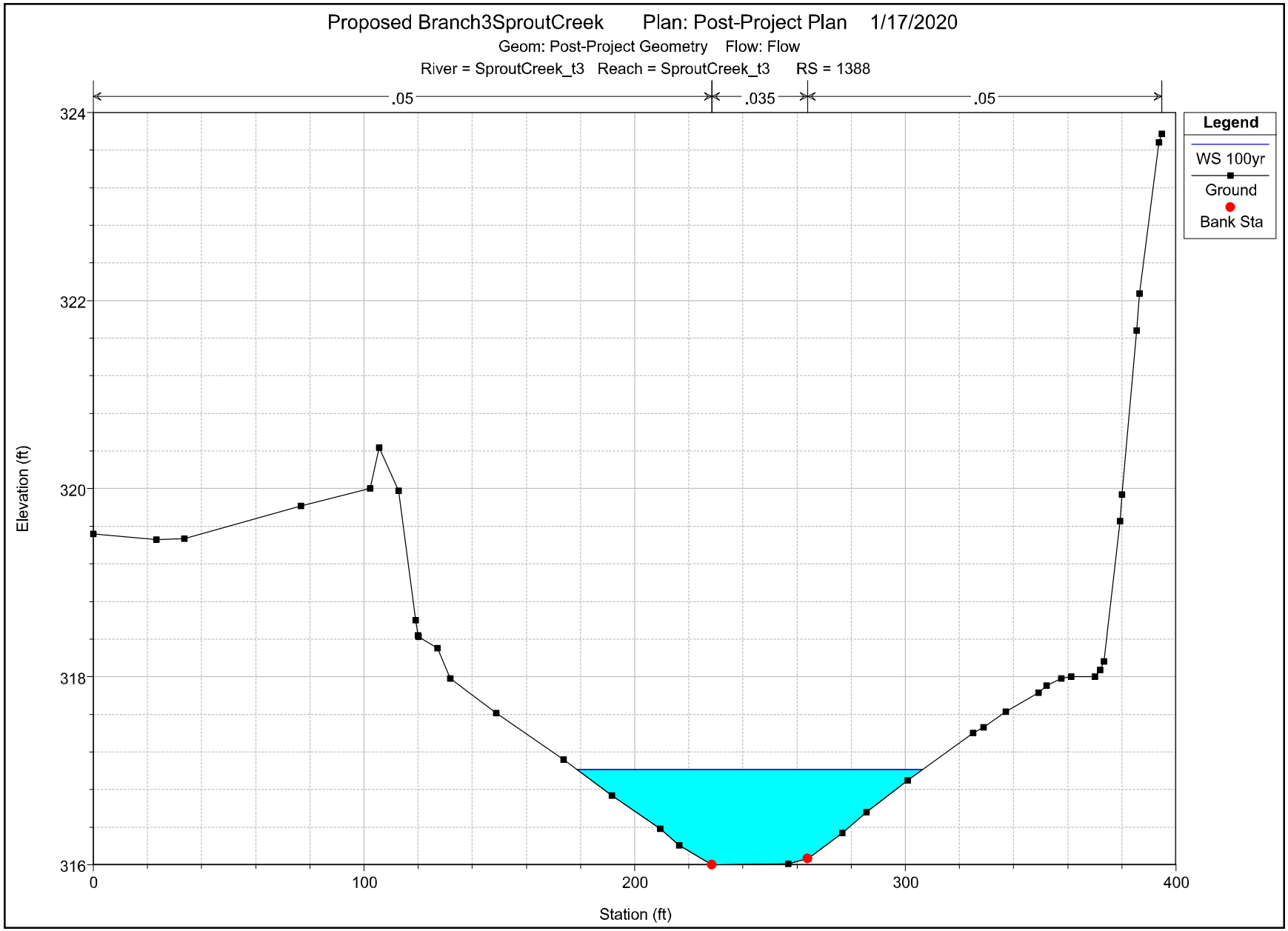
600
800
1000
Station (ft)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.05
.035
.05
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Ground
Bank Sta
Elevation (ft)
Station (ft)
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300
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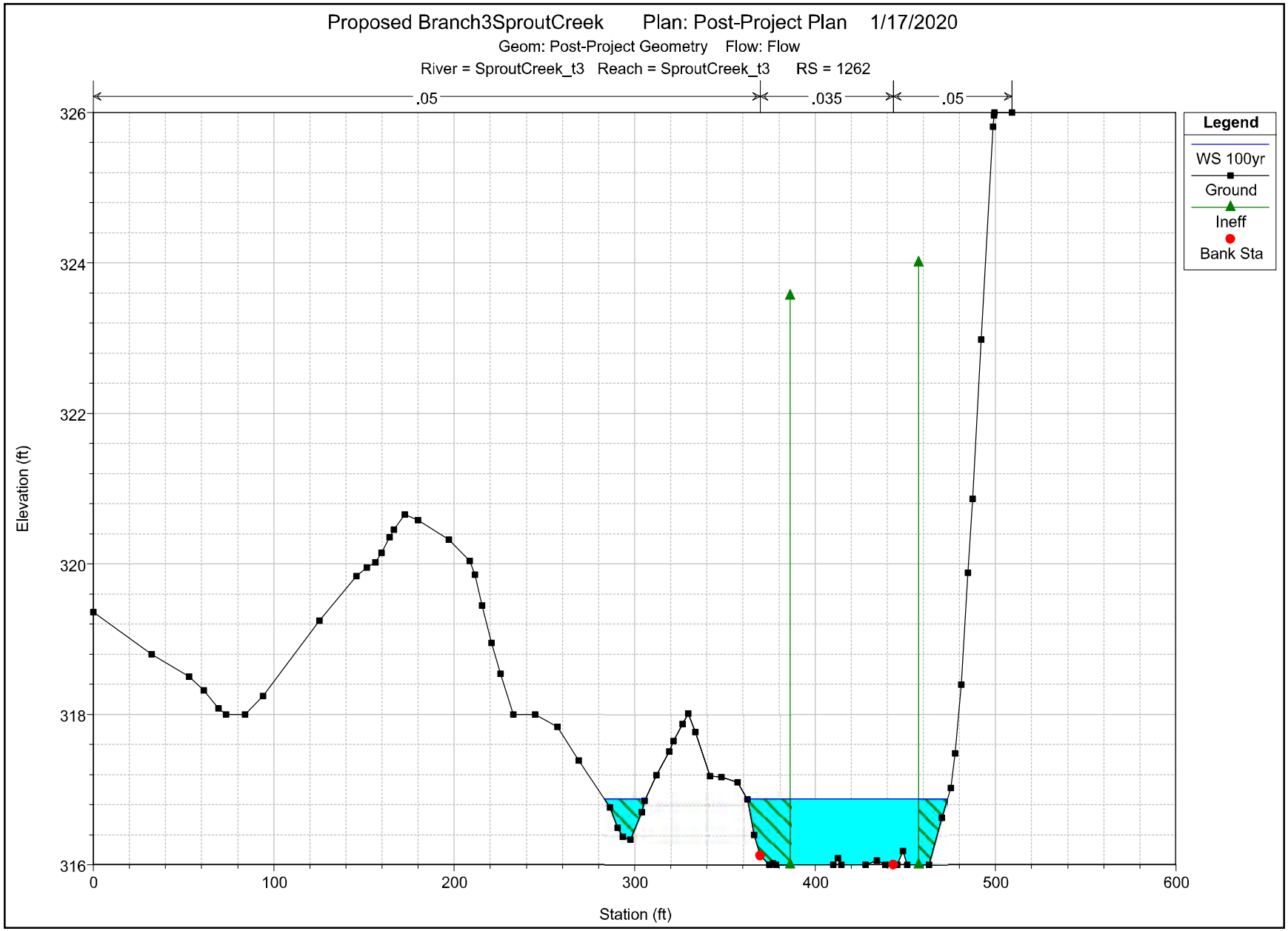
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.05
.035
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
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324
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320
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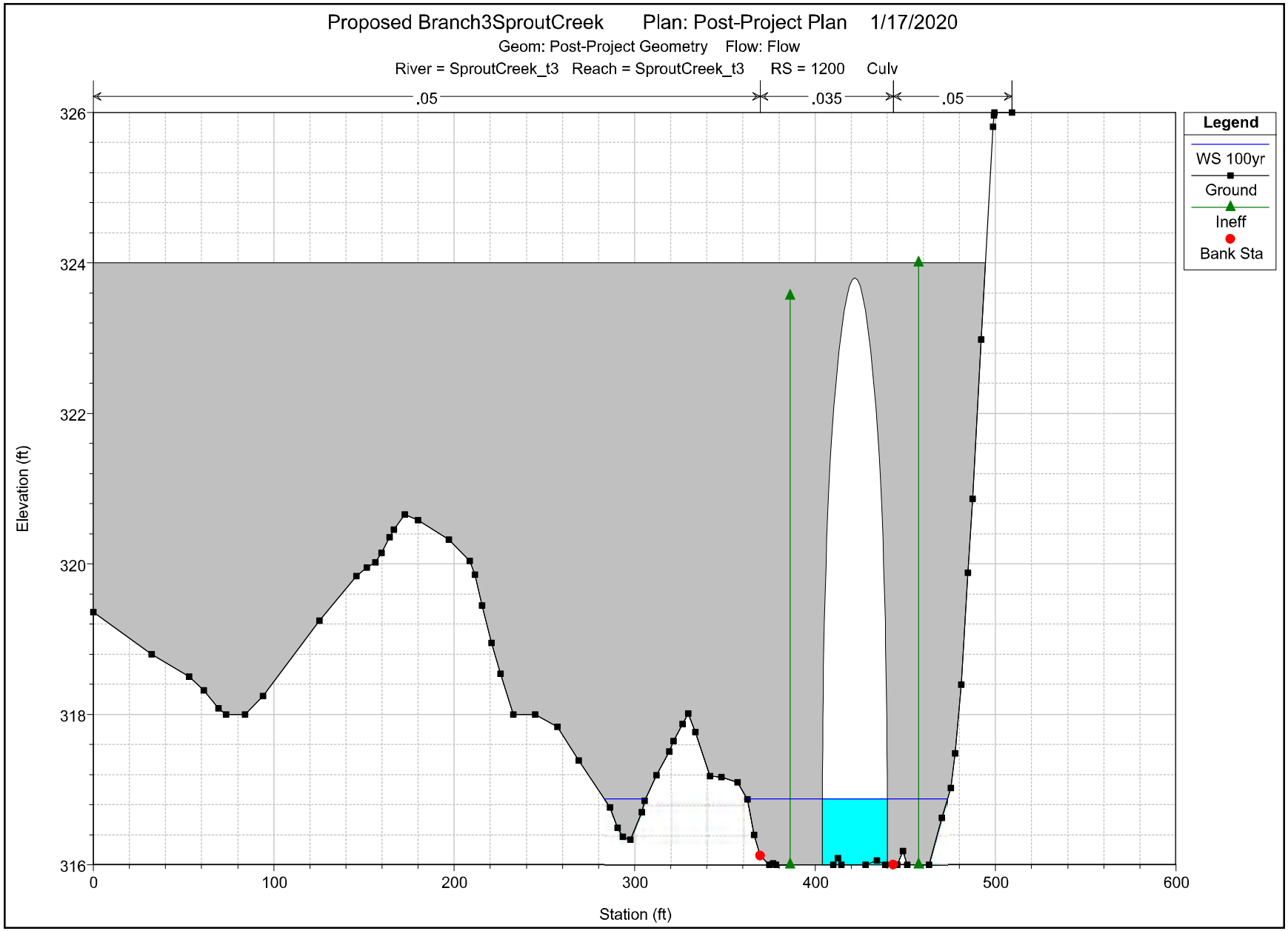
100
200
300
400
500
600
Station (ft)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Geom: Post-Project Geometry Flow: Flow
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.05
.035
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
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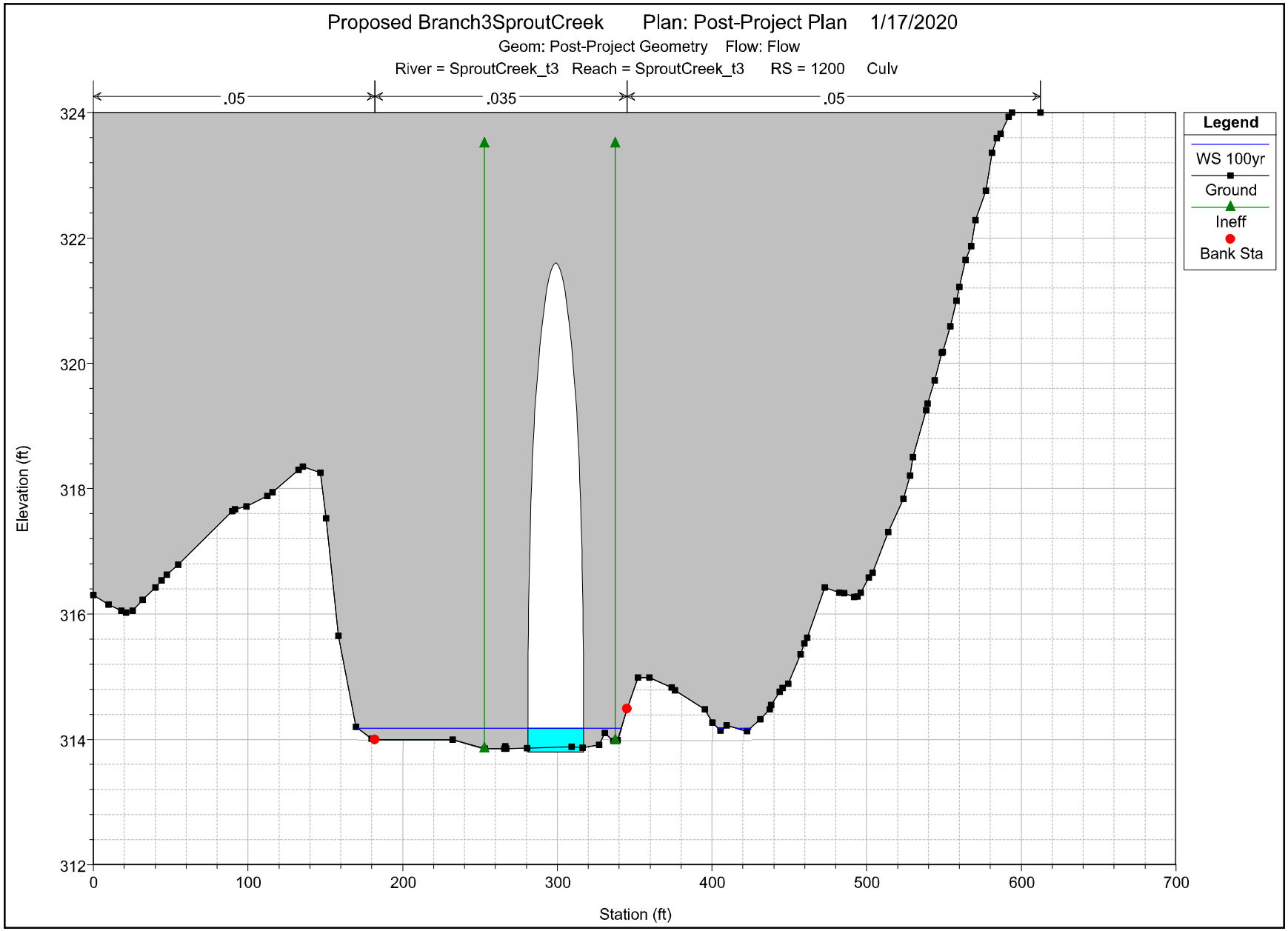
100
200
300
400
500
600
Station (ft)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.05
.035
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
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0
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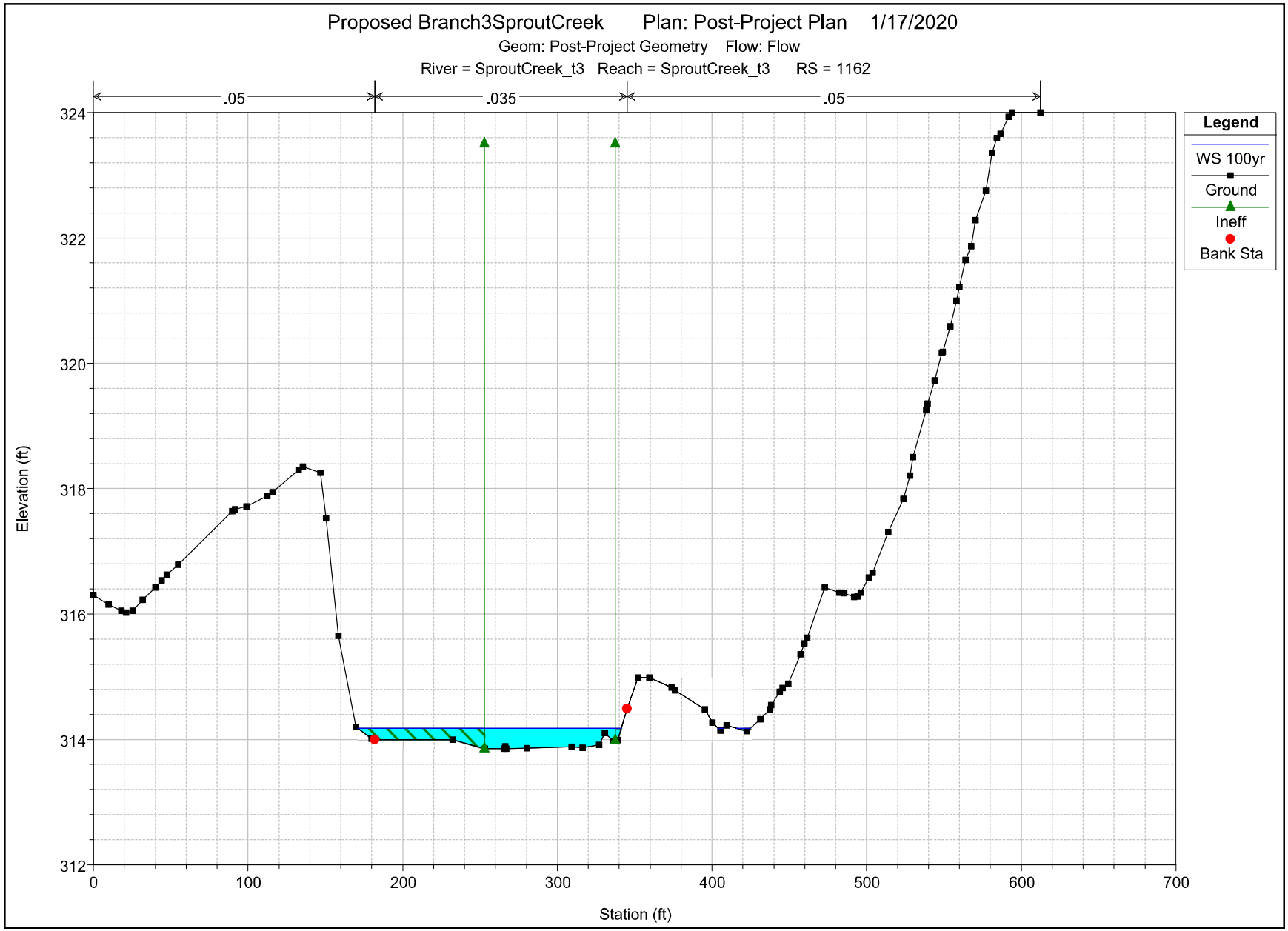
600
700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.05
.035
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
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Station (ft)
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0
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200
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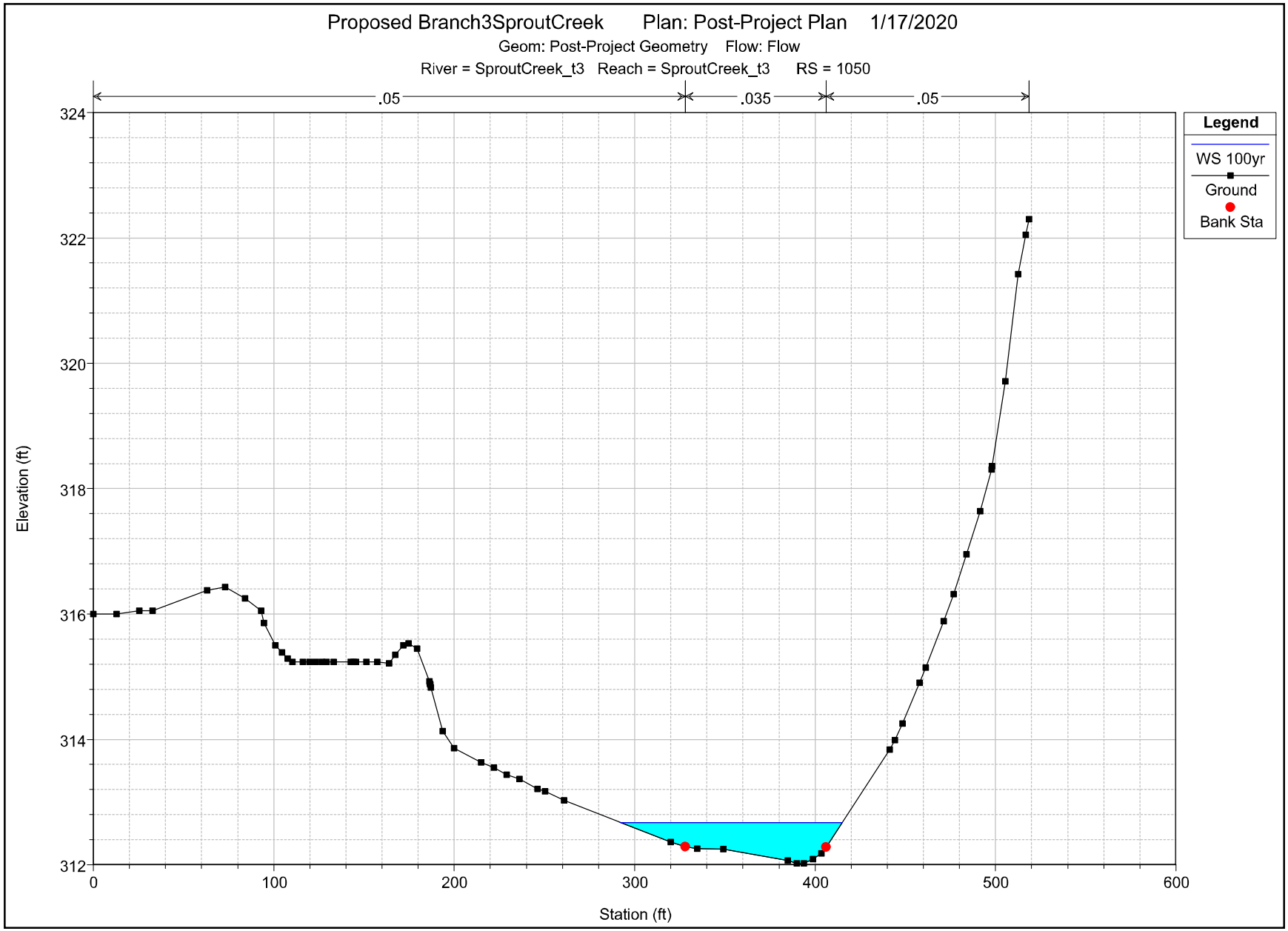
400
500
600
700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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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320
318
316
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312
0
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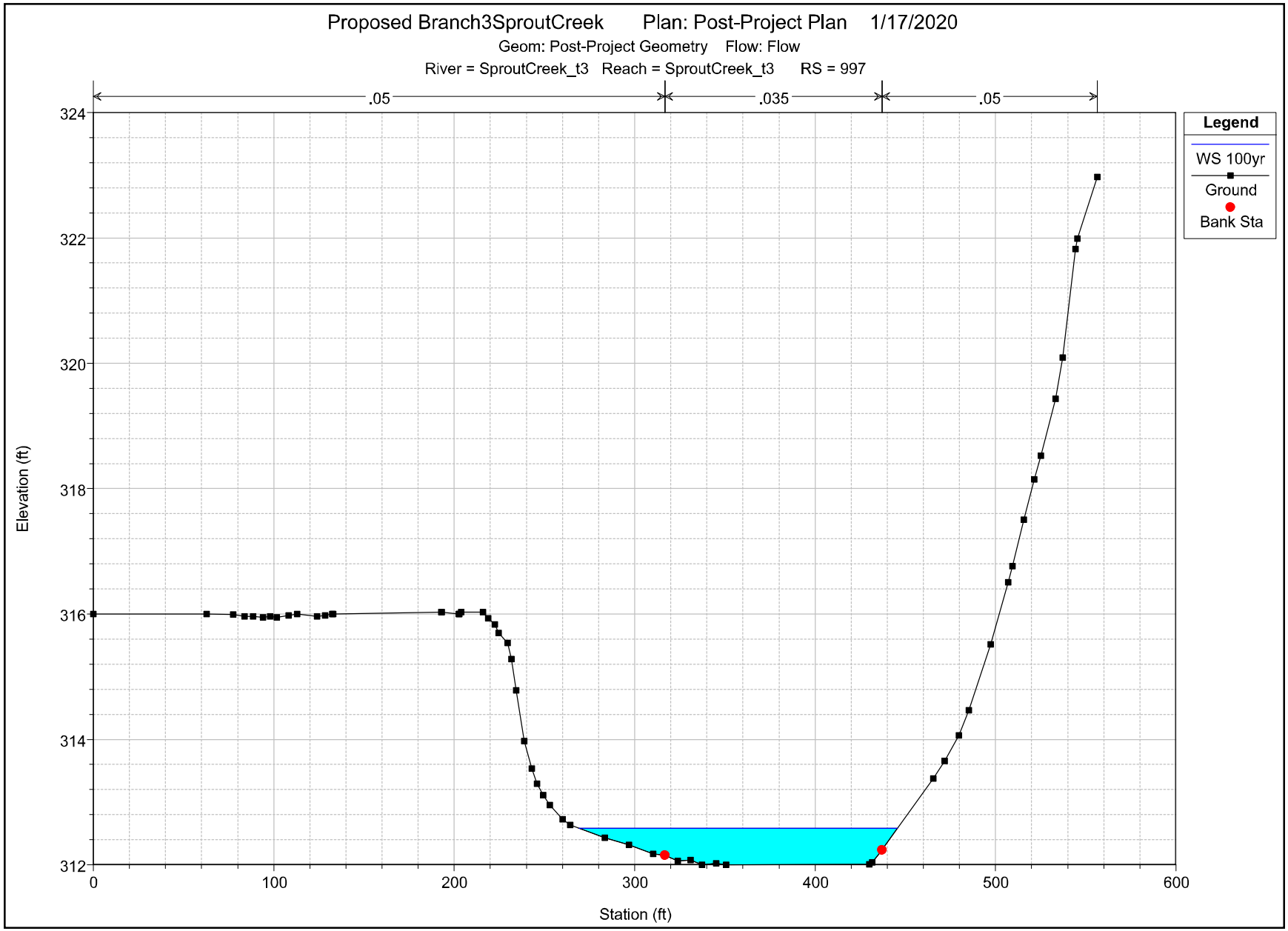
300
400
500
600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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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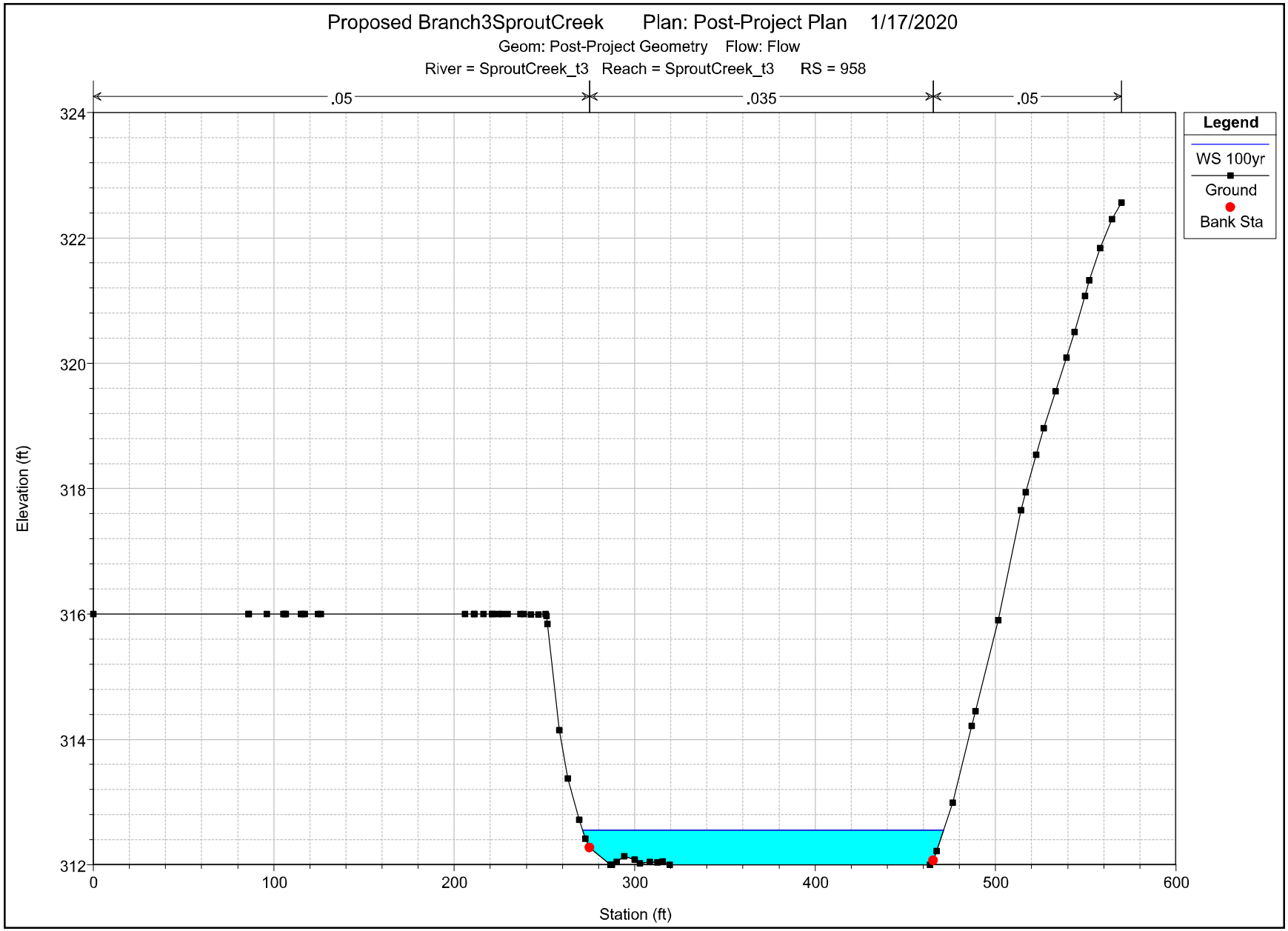
600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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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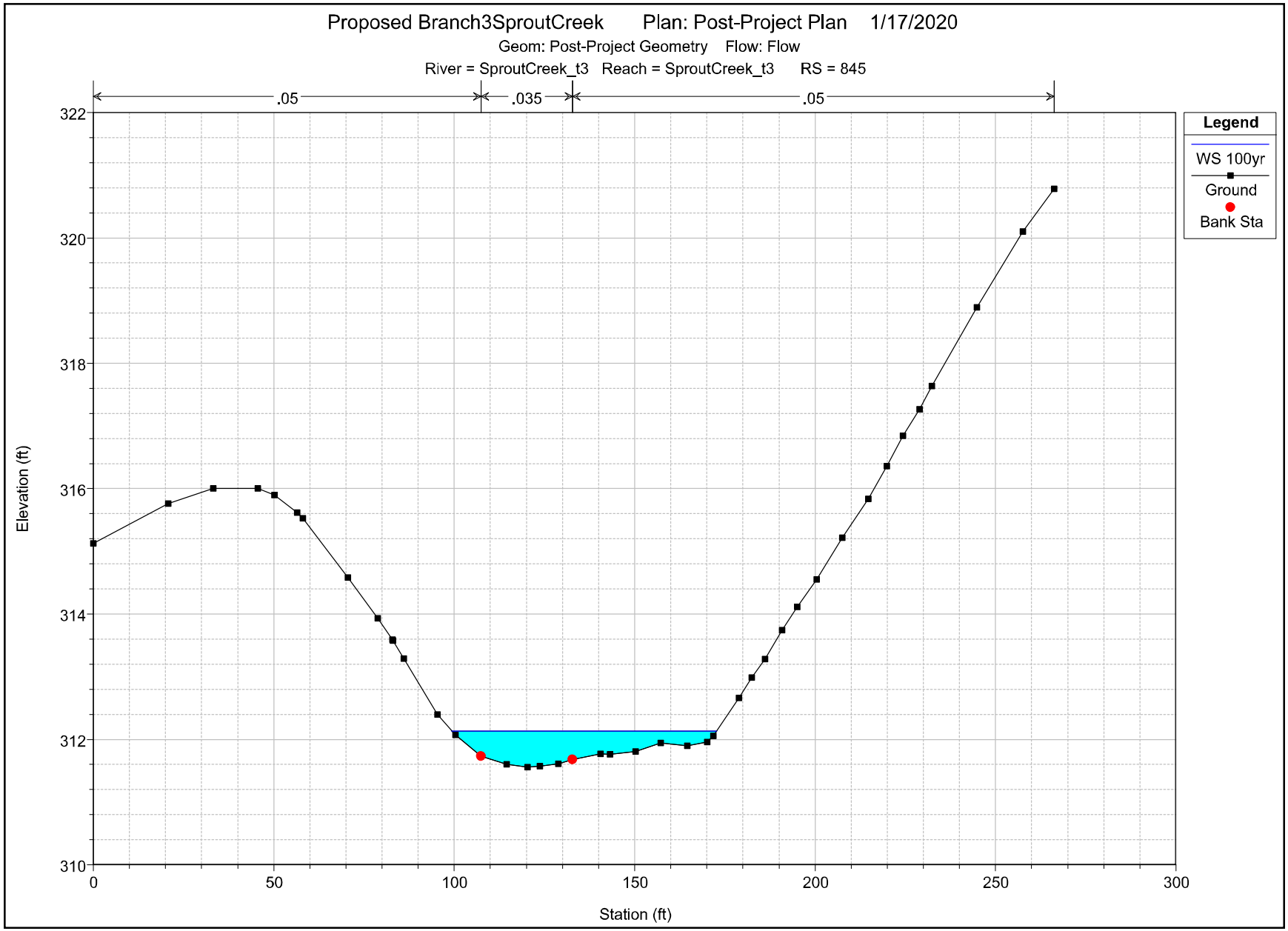
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.035
.05
Legend
WS 100yr
Ground
Bank Sta
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Station (ft)
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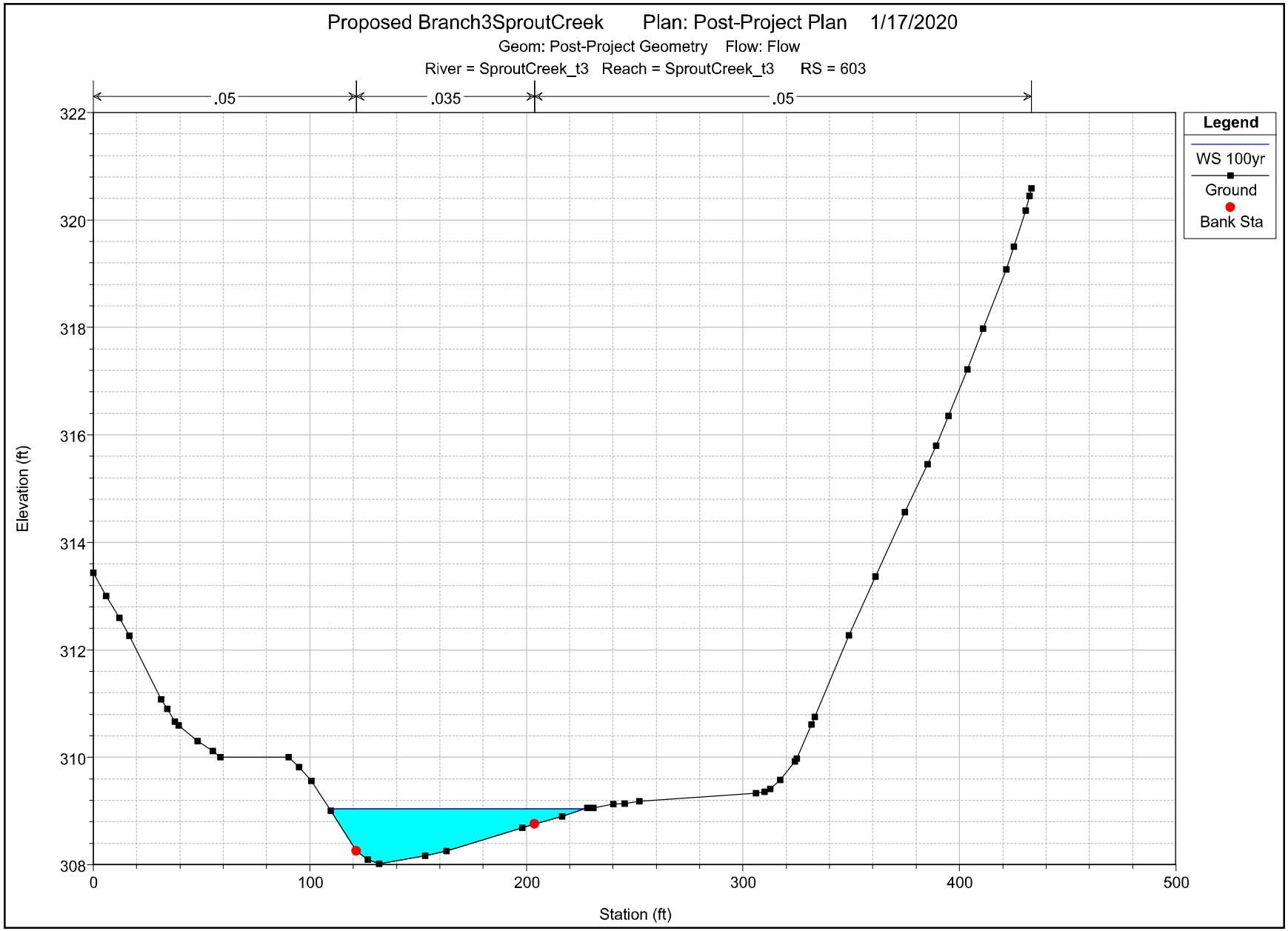
300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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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400
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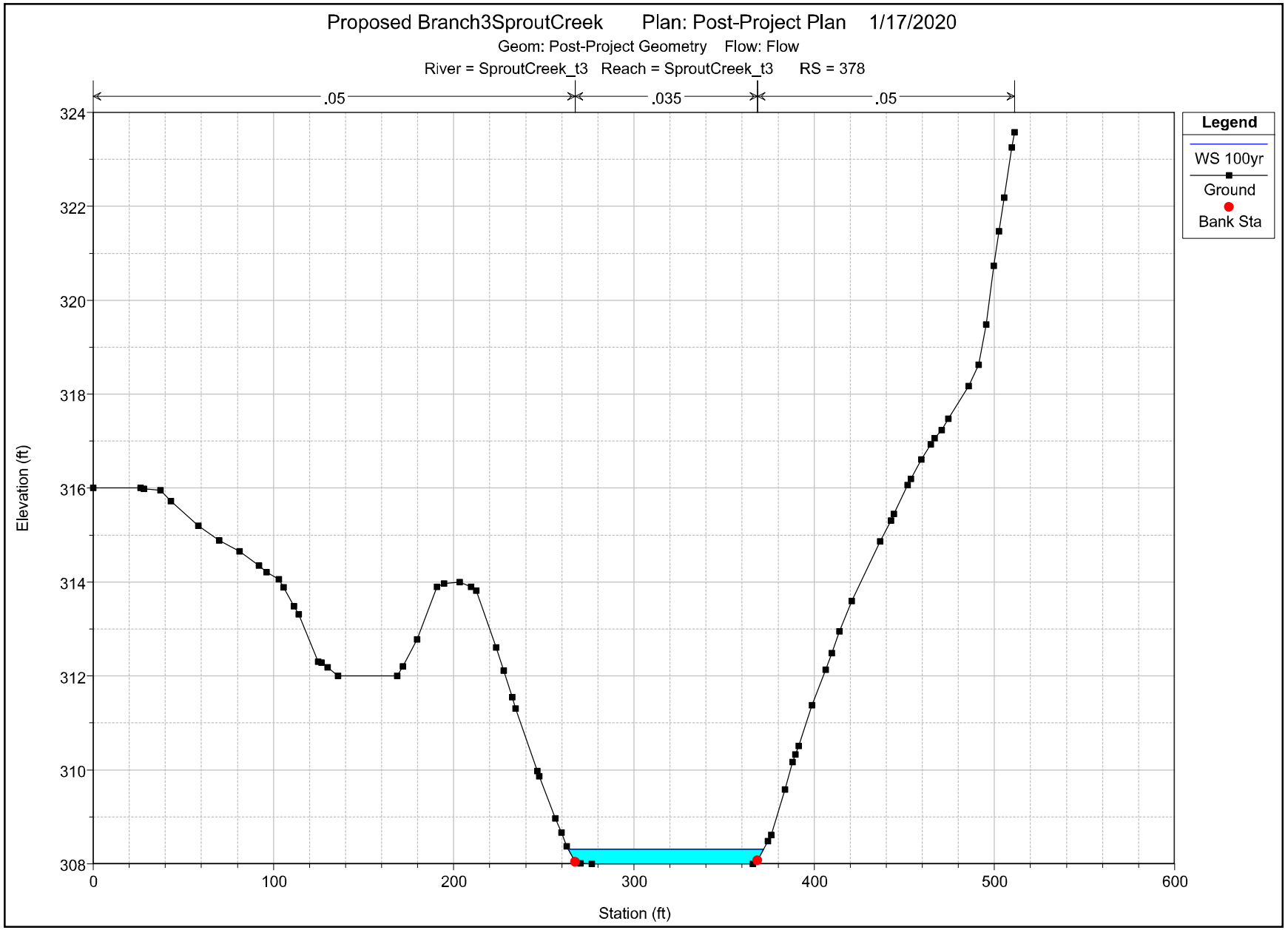
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.05
.035
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
324
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308
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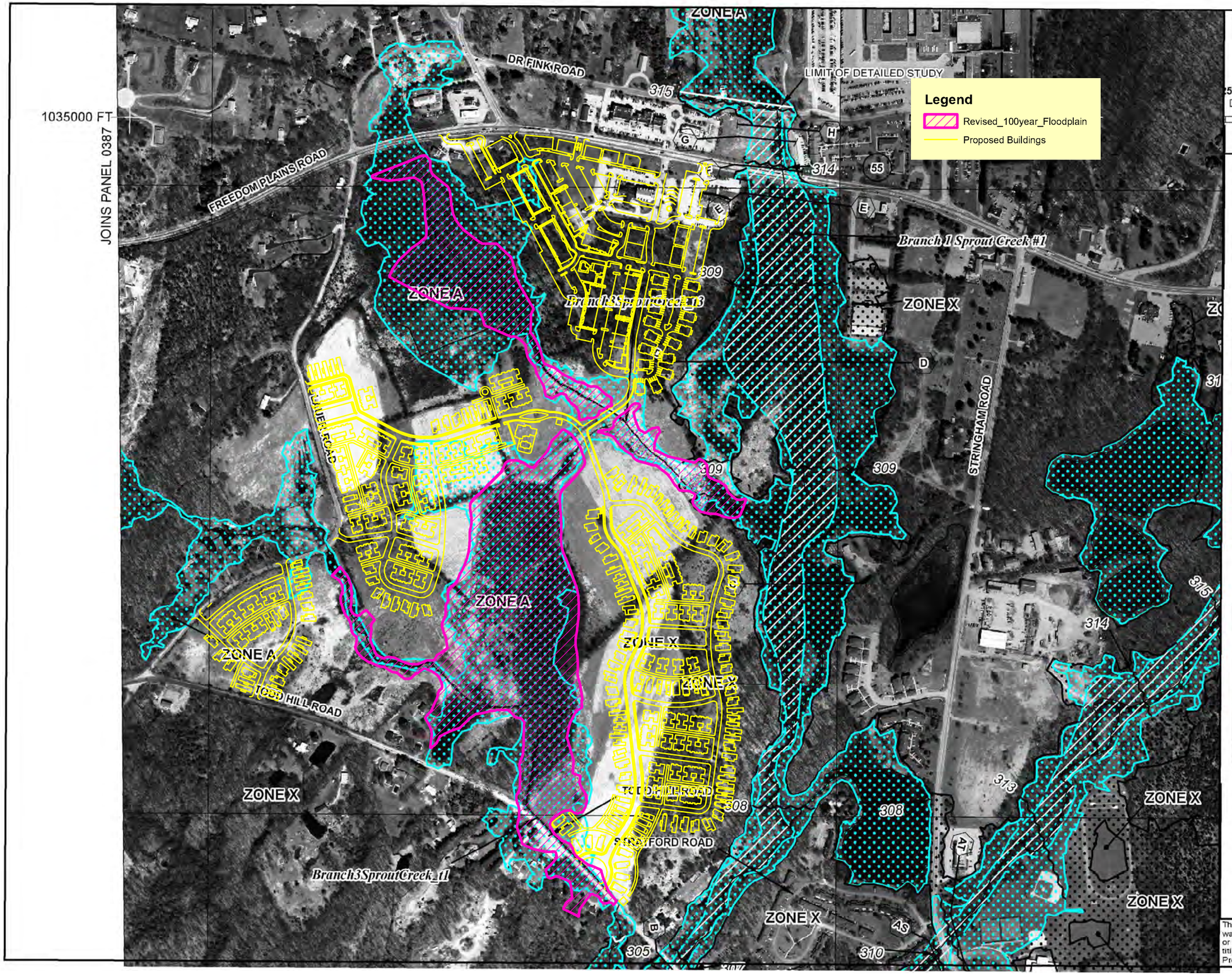
200
300
400
500
600

8. ANNOTATED FIRM

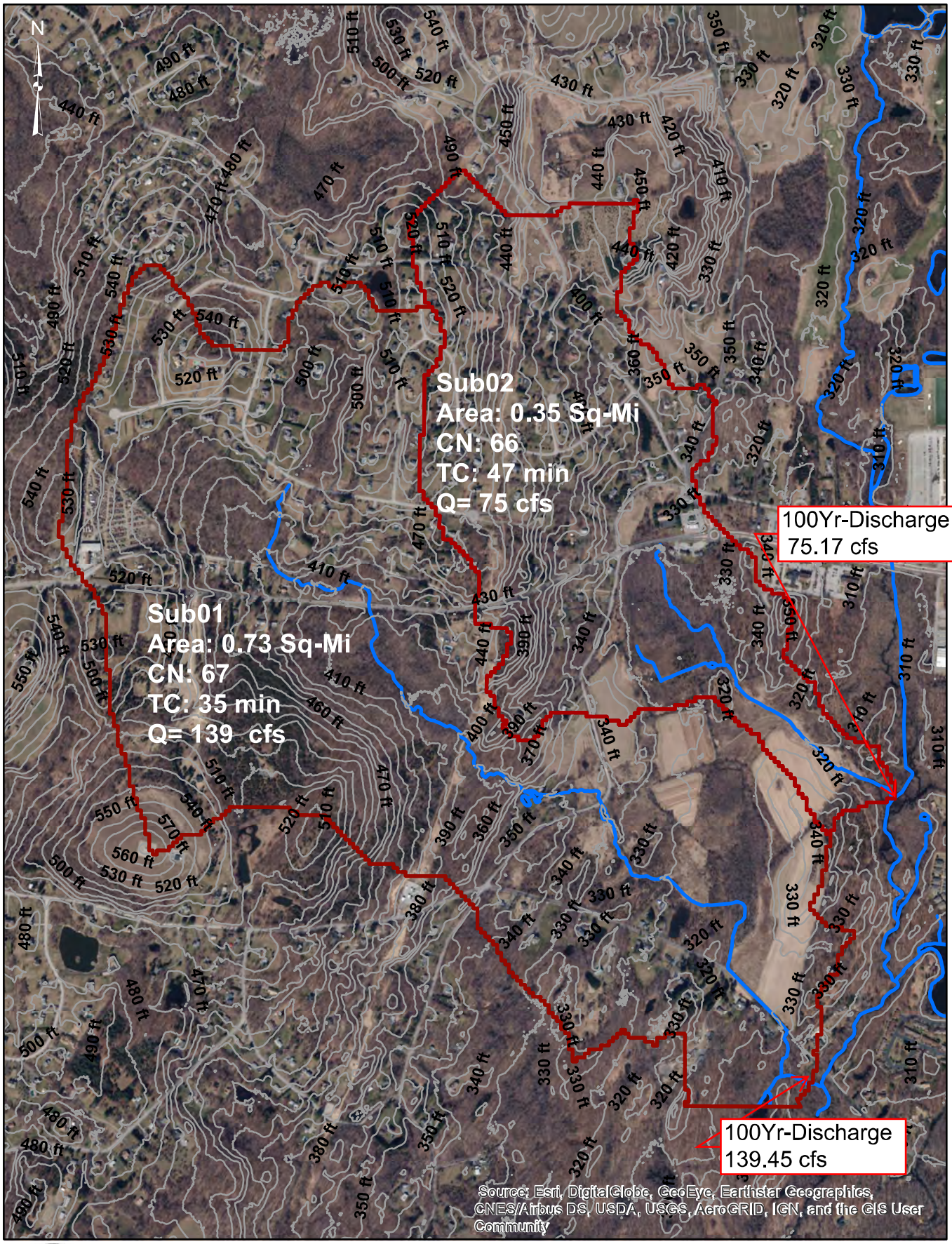


ATTACHMENTS

Hydrologic Exhibits and Supporting Data

Appendix 1: Drainage Basin Map
Appendix 2: NOAA Precipitation
Appendix 3: Soils Map
Appendix 4: Landuse Map
Appendix 5: Curve Number Calculations for Branch3SproutCreek_t1
Appendix 6: Curve Number Calculations for Branch3SproutCreek_t3
Appendix 7: Time of Concentration Calculations for Branch3SproutCreek_t1
Appendix 8: Time of Concentration Calculations for Branch3SproutCreek_t3

Appendix 1: Drainage Basin Map



LEONARD JACKSON ASSOCIATES
26 FIREMENS MEMORIAL DRIVE, POMONA NY- 10970
PHONE: 845-354-4382, FAX: 845-354-4401

0 0.125 0.25 Miles

Appendix 2: NOAA Precipitation

NOAA Atlas 14, Volume 10, Version 3
Location name: Lagrangeville, New York, USA*
Latitude: 41.665°, Longitude: -73.8029°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.344** (0.261-0.449)	**0.406** (0.307-0.529)	**0.506** (0.381-0.661)	**0.589** (0.442-0.774)	**0.703** (0.513-0.958)	**0.790** (0.566-1.10)	**0.879** (0.613-1.26)	**0.975** (0.652-1.43)	**1.11** (0.715-1.67)	**1.21** (0.766-1.86)
10-min	**0.488** (0.369-0.636)	**0.574** (0.435-0.749)	**0.716** (0.540-0.937)	**0.834** (0.626-1.10)	**0.996** (0.726-1.36)	**1.12** (0.802-1.55)	**1.25** (0.868-1.78)	**1.38** (0.923-2.02)	**1.57** (1.01-2.37)	**1.72** (1.09-2.64)
15-min	**0.574** (0.434-0.748)	**0.676** (0.511-0.882)	**0.843** (0.636-1.10)	**0.981** (0.736-1.29)	**1.17** (0.855-1.60)	**1.32** (0.942-1.83)	**1.47** (1.02-2.09)	**1.62** (1.09-2.38)	**1.84** (1.19-2.78)	**2.02** (1.28-3.10)
30-min	**0.786** (0.595-1.02)	**0.924** (0.699-1.21)	**1.15** (0.867-1.50)	**1.34** (1.00-1.76)	**1.59** (1.16-2.17)	**1.79** (1.28-2.48)	**1.99** (1.39-2.84)	**2.20** (1.47-3.22)	**2.49** (1.61-3.76)	**2.72** (1.72-4.18)
60-min	**0.997** (0.755-1.30)	**1.17** (0.886-1.53)	**1.46** (1.10-1.90)	**1.69** (1.27-2.22)	**2.02** (1.47-2.74)	**2.27** (1.62-3.13)	**2.52** (1.75-3.59)	**2.78** (1.86-4.07)	**3.14** (2.03-4.74)	**3.42** (2.16-5.25)
2-hr	**1.30** (0.989-1.68)	**1.51** (1.15-1.96)	**1.87** (1.42-2.43)	**2.17** (1.64-2.83)	**2.57** (1.89-3.48)	**2.89** (2.08-3.96)	**3.20** (2.24-4.53)	**3.53** (2.37-5.13)	**3.98** (2.58-5.96)	**4.32** (2.74-6.60)
3-hr	**1.49** (1.14-1.92)	**1.74** (1.34-2.25)	**2.16** (1.65-2.80)	**2.51** (1.91-3.26)	**2.99** (2.20-4.02)	**3.35** (2.42-4.59)	**3.73** (2.62-5.26)	**4.12** (2.78-5.97)	**4.67** (3.04-6.98)	**5.10** (3.25-7.77)
6-hr	**1.84** (1.42-2.35)	**2.19** (1.69-2.80)	**2.77** (2.13-3.55)	**3.25** (2.49-4.19)	**3.91** (2.91-5.24)	**4.41** (3.22-6.02)	**4.93** (3.51-6.97)	**5.52** (3.73-7.95)	**6.38** (4.16-9.48)	**7.09** (4.52-10.7)
12-hr	**2.20** (1.72-2.79)	**2.70** (2.10-3.42)	**3.51** (2.72-4.46)	**4.18** (3.22-5.34)	**5.10** (3.83-6.82)	**5.78** (4.27-7.90)	**6.52** (4.71-9.27)	**7.42** (5.03-10.6)	**8.78** (5.74-13.0)	**9.95** (6.37-15.0)
24-hr	**2.58** (2.03-3.24)	**3.21** (2.52-4.04)	**4.25** (3.32-5.36)	**5.11** (3.97-6.48)	**6.29** (4.76-8.37)	**7.16** (5.33-9.75)	**8.11** (5.92-11.5)	**9.30** (6.33-13.2)	**11.2** (7.32-16.4)	**12.8** (8.20-19.1)
2-day	**2.98** (2.36-3.72)	**3.71** (2.94-4.63)	**4.90** (3.86-6.14)	**5.89** (4.62-7.41)	**7.25** (5.53-9.58)	**8.24** (6.19-11.2)	**9.34** (6.86-13.2)	**10.7** (7.33-15.2)	**12.9** (8.48-18.8)	**14.8** (9.50-21.9)
3-day	**3.26** (2.60-4.05)	**4.03** (3.21-5.01)	**5.30** (4.20-6.60)	**6.35** (5.00-7.95)	**7.79** (5.97-10.2)	**8.85** (6.67-11.9)	**10.0** (7.38-14.1)	**11.5** (7.86-16.2)	**13.8** (9.07-20.0)	**15.7** (10.2-23.3)
4-day	**3.50** (2.80-4.33)	**4.30** (3.44-5.33)	**5.62** (4.47-6.99)	**6.72** (5.31-8.39)	**8.22** (6.32-10.8)	**9.33** (7.04-12.5)	**10.5** (7.78-14.7)	**12.1** (8.28-16.9)	**14.4** (9.53-20.9)	**16.5** (10.6-24.3)
7-day	**4.13** (3.32-5.08)	**5.01** (4.03-6.17)	**6.46** (5.17-7.97)	**7.66** (6.10-9.50)	**9.31** (7.19-12.1)	**10.5** (7.98-14.0)	**11.9** (8.75-16.4)	**13.5** (9.29-18.8)	**16.0** (10.6-23.0)	**18.1** (11.7-26.5)
10-day	**4.77** (3.85-5.83)	**5.70** (4.60-6.99)	**7.23** (5.82-8.89)	**8.50** (6.80-10.5)	**10.2** (7.93-13.2)	**11.5** (8.76-15.2)	**12.9** (9.55-17.8)	**14.6** (10.1-20.3)	**17.1** (11.4-24.6)	**19.2** (12.5-28.1)
20-day	**6.79** (5.54-8.25)	**7.83** (6.37-9.51)	**9.51** (7.72-11.6)	**10.9** (8.80-13.4)	**12.8** (9.99-16.4)	**14.3** (10.9-18.6)	**15.8** (11.6-21.3)	**17.5** (12.2-24.1)	**19.9** (13.3-28.3)	**21.8** (14.2-31.6)
30-day	**8.51** (6.97-10.3)	**9.61** (7.87-11.6)	**11.4** (9.31-13.8)	**12.9** (10.5-15.7)	**15.0** (11.7-18.9)	**16.5** (12.6-21.3)	**18.1** (13.3-24.1)	**19.8** (13.8-27.2)	**22.1** (14.8-31.3)	**23.8** (15.5-34.5)
45-day	**10.6** (8.77-12.8)	**11.8** (9.74-14.2)	**13.8** (11.3-16.6)	**15.4** (12.5-18.7)	**17.6** (13.8-22.1)	**19.4** (14.8-24.7)	**21.1** (15.5-27.7)	**22.7** (16.0-31.0)	**24.9** (16.7-35.2)	**26.5** (17.3-38.3)
60-day	**12.4** (10.3-14.9)	**13.7** (11.3-16.4)	**15.8** (13.0-19.0)	**17.5** (14.3-21.2)	**19.9** (15.6-24.9)	**21.8** (16.6-27.7)	**23.6** (17.3-30.8)	**25.3** (17.8-34.4)	**27.4** (18.5-38.6)	**29.0** (18.9-41.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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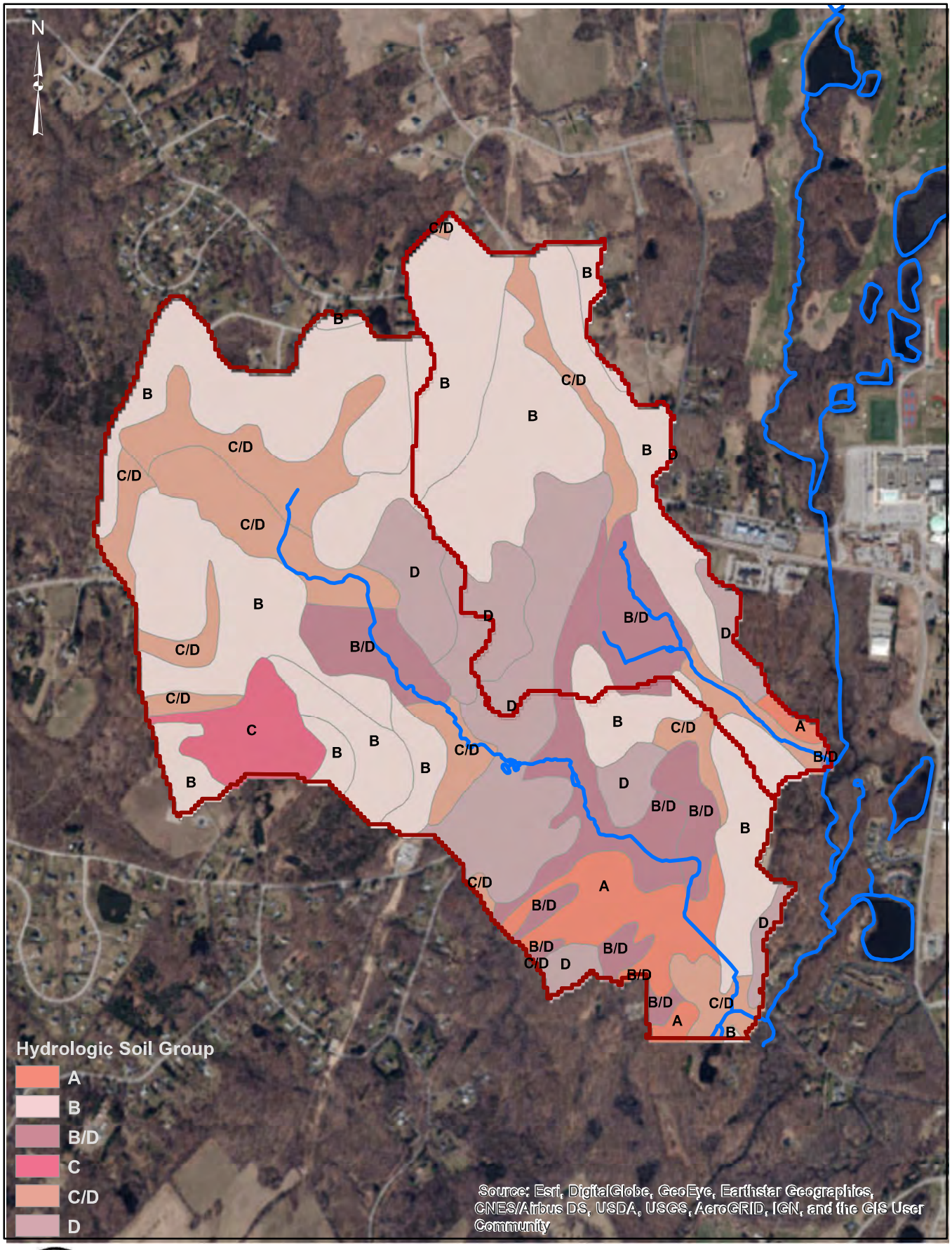
PF graphical

Appendix 3: Soils Map

SOILS MAP

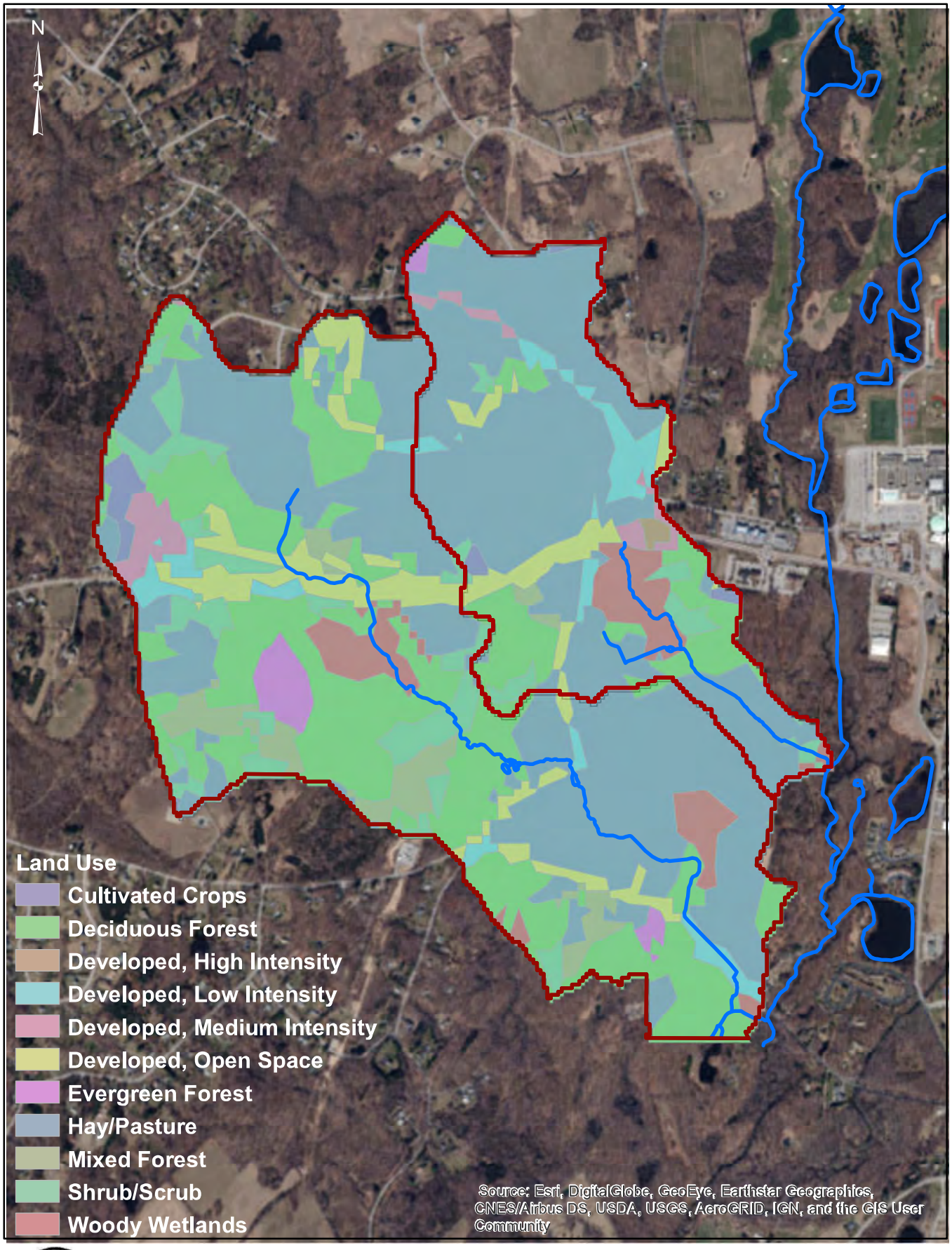


LEONARD JACKSON ASSOCIATES
26 FIREMENS MEMORIAL DRIVE, POMONA NY- 10970
PHONE: 845-354-4382, FAX: 845-354-4401

0 0.15 0.3 Miles

Appendix 4: Landuse Map

LANDUSE MAP



LEONARD JACKSON ASSOCIATES
26 FIREMENS MEMORIAL DRIVE, POMONA NY- 10970
PHONE: 845-354-4382, FAX: 845-354-4401

0 0.15 0.3 Miles

Appendix 5: Curve Number Calculations for Branch3SproutCreek_t1

Branch3 Sprout Creek_T1

FID	HSG	LANDCOVER	Area_Sq_Mi	CN	AreaxCN
0	A	Hay/Pasture	0.003	39	0.389
1	A	Shrub/Scrub	0.000	48	0.034
2	A		0.000	45	0.003
3	B	Cultivated Crops	0.002	61	0.349
4	B	Deciduous Forest	0.014	60	2.410
5	B	Developed, High Intensity	0.002	85	0.491
6	B	Developed, Low Intensity	0.009	68	1.747
7	B	Developed, Medium Intensity	0.006	72	1.304
8	B	Developed, Open Space	0.007	61	1.160
9	B	Evergreen Forest	0.001	55	0.222
10	B	Hay/Pasture	0.151	61	26.622
11	B	Shrub/Scrub	0.007	67	1.295
12	B	Woody Wetlands	0.002	66	0.366
13	B/D	Deciduous Forest	0.005	60	0.818
14	B/D	Developed, Low Intensity	0.002	68	0.398
15	B/D	Developed, Medium Intensity	0.001	72	0.202
16	B/D	Developed, Open Space	0.003	61	0.553
17	B/D	Hay/Pasture	0.013	61	2.304
18	B/D	Shrub/Scrub	0.001	67	0.170
19	B/D	Woody Wetlands	0.019	66	3.586
20	C/D	Deciduous Forest	0.002	73	0.422
21	C/D	Developed, Low Intensity	0.006	79	1.294
22	C/D	Developed, Medium Intensity	0.000	81	0.000
23	C/D	Developed, Open Space	0.000	74	0.071
24	C/D	Hay/Pasture	0.018	74	3.866
25	C/D	Shrub/Scrub	0.001	77	0.320
26	C/D	Woody Wetlands	0.001	77	0.126
27	D	Cultivated Crops	0.001	80	0.249
28	D	Deciduous Forest	0.026	79	5.855
29	D	Developed, Low Intensity	0.001	84	0.212
30	D	Developed, Open Space	0.010	80	2.240
31	D	Hay/Pasture	0.028	80	6.396
32	D	Mixed Forest	0.002	77	0.521
33	D	Shrub/Scrub	0.003	83	0.646
			0.347		66.6

Appendix 6: Curve Number Calculations for Branch3SproutCreek_t3

Branch3 Sprout Creek_T3

FID	HSG	LANDCOVER	Area_Sq_Mi	CN	AreaxCN
0	A	Deciduous Forest	0.017	36	0.837
1	A	Developed, Low Intensity	0.002	51	0.155
2	A	Developed, Open Space	0.005	39	0.252
3	A	Evergreen Forest	0.002	30	0.088
4	A	Hay/Pasture	0.016	39	0.868
5	A	Mixed Forest	0.005	30	0.185
6	A	Shrub/Scrub	0.000	48	0.000
7	A	Woody Wetlands	0.002	45	0.105
8	B	Cultivated Crops	0.002	61	0.191
9	B	Deciduous Forest	0.081	60	6.630
10	B	Developed, Low Intensity	0.011	68	1.044
11	B	Developed, Medium Intensity	0.009	72	0.882
12	B	Developed, Open Space	0.021	61	1.714
13	B	Evergreen Forest	0.006	55	0.418
14	B	Hay/Pasture	0.128	61	10.663
15	B	Mixed Forest	0.015	55	1.102
16	B	Shrub/Scrub	0.023	67	2.067
17	B	Woody Wetlands	0.001	66	0.096
18	B/D	Deciduous Forest	0.026	60	2.164
19	B/D	Developed, Low Intensity	0.001	68	0.131
20	B/D	Developed, Open Space	0.003	61	0.240
21	B/D	Evergreen Forest	0.000	55	0.033
22	B/D	Hay/Pasture	0.040	61	3.306
23	B/D	Mixed Forest	0.000	55	0.037
24	B/D	Shrub/Scrub	0.001	67	0.098
25	B/D	Woody Wetlands	0.024	66	2.197
26	C	Deciduous Forest	0.011	73	1.084
27	C	Evergreen Forest	0.006	70	0.591
28	C	Hay/Pasture	0.002	74	0.201
29	C	Mixed Forest	0.010	70	0.925
30	C	Shrub/Scrub	0.005	77	0.516
31	C/D	Cultivated Crops	0.005	74	0.492
32	C/D	Deciduous Forest	0.058	73	5.793
33	C/D	Developed, Low Intensity	0.001	79	0.148
34	C/D	Developed, Medium Intensity	0.002	81	0.228
35	C/D	Developed, Open Space	0.013	74	1.341
36	C/D	Evergreen Forest	0.000	70	0.001
37	C/D	Hay/Pasture	0.039	74	3.959
38	C/D	Mixed Forest	0.003	70	0.317
39	C/D	Shrub/Scrub	0.016	77	1.682
40	C/D	Woody Wetlands	0.002	77	0.241
41	D	Cultivated Crops	0.000	80	0.001
42	D	Deciduous Forest	0.034	79	3.691
43	D	Developed, Low Intensity	0.003	84	0.295
44	D	Developed, Open Space	0.013	80	1.367
45	D	Hay/Pasture	0.055	80	6.016
46	D	Mixed Forest	0.002	77	0.230
47	D	Shrub/Scrub	0.009	83	1.030
48	D	Woody Wetlands	0.001	83	0.135
					66

Appendix 7: Time of Concentration Calculations for Branch3SproutCreek_t1

LEONARD JACKSON ASSOCIATES
26 Firemens Memorial Drive
Pomona, NY 10970
845-354-4382

Worksheet 3: Time of Concentration (Tc) Calculations

PROJECT: La Grange JOB #: 19032 BY: SC
LOCATION: La Grange, NK DATE: July, 7

Mark One: Existing Developed

To Design Point: #1
Time of Concentration thru Sub-Area: Branch3 Sprout Creek_T1

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic or description of flow segments.

Sheet Flow:

	Segment ID:				
1. Surface description (table 3-1)……	Grass-Dense				
2. Manning's Roughness Coeff., n (table 3-1)…..…	0.24				
3. Flow Length, L (total < or = to 100 ft.)…..…..(ft.)	100				
4. Two year, 24 hr rainfall, P_2……..……..(in.)	3.2				
5. Land Slope, S……..……..……..(ft./ft.)	0.140				
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,S^{0.4}}$ Compute T_t = ..…..…(hr.)	0.11		=	**0.11**	(hrs.)

Shallow Concentrated Flow:

	Segment ID:				
7. Surface description (paved or unpaved)……	unpaved	paved			
8. Flow Length, L ……..…..…….…..…. (ft.)		4200			
9. Watercourse Slope, s…..……..…….(ft./ft.)		0.044			
10. Average Velocity, V (figure 3-1)…….. (ft./s)		4.3			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t = ..…..…(hr.)		0.27	=	**0.27**	(hrs.)

Channel Flow (SCS Method):

	Segment ID:				
12. Cross Sectional Flow Area, a……..……..…(ft^2)	34.230				*Assumed
13. Wetted Perimeter, P_w ……..…..…..…… (ft.)	23.282				10' wide channel
14. Hydraulic Radius, r = a/P_w..…..……..…….(ft.)	1.470				with 1:3 sideslopes
15. Channel Slope, s…..……..…….(ft./ft.)	0.005				
16. Mannings Roughness Coefficient, n…….……	0.035				
17. $V=1.49\ r^{2/3}\ s^{1/2}/n$ Compute V ……..…….(ft/s)	4.0				
18. Flow Length, L ……..…..…….…..…. (ft.)	3000				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t = ..…..…(hr.)	0.21		=	**0.21**	(hrs.)

20. Total Watershed T_t or T_c = **0.59** (hrs.)
35.3 (min.)

Appendix 8: Time of Concentration Calculations for Branch3SproutCreek_t3

LEONARD JACKSON ASSOCIATES
26 Firemens Memorial Drive
Pomona, NY 10970
845-354-4382

Worksheet 3: Time of Concentration (Tc) Calculations

PROJECT: La Grange JOB #: 19032 BY: SC
LOCATION: La Grange, NK DATE: July, 7

Mark One: Existing Developed

To Design Point: #1
Time of Concentration thru Sub-Area: Branch3 Sprout Creek_T3

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic or description of flow segments.

Sheet Flow:

	Segment ID:				
1. Surface description (table 3-1)……		Woods-Dense			
2. Manning's Roughness Coeff., n (table 3-1)…..…		0.8			
3. Flow Length, L (total < or = to 100 ft.)…..…..(ft.)		100			
4. Two year, 24 hr rainfall, P_2……..……..(in.)		3.2			
5. Land Slope, S……..……..……..(ft./ft.)		0.150			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ S^{0.4}}$ Compute T_t = ..…..…(hr.)		0.28		=	**0.28** (hrs.)

Shallow Concentrated Flow:

	Segment ID:				
7. Surface description (paved or unpaved)……		unpaved	paved		
8. Flow Length, L ……..…..……..…..… (ft.)		1500			
9. Watercourse Slope, s…..……..…….(ft./ft.)		0.014			
10. Average Velocity, V (figure 3-1)…….. (ft./s)		1.9			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t = ..…..…(hr.)		0.22		=	**0.22** (hrs.)

Channel Flow (SCS Method):

	Segment ID:				
12. Cross Sectional Flow Area, a……..……..…(ft^2)		34.230			*Assumed
13. Wetted Perimeter, P_w ……..…..……..…… (ft.)		23.282			10' wide channel
14. Hydraulic Radius, r = a/P_w..…..……..…….(ft.)		1.470			with 1:3 sideslopes
15. Channel Slope, s…..……..…….(ft./ft.)		0.020			
16. Mannings Roughness Coefficient, n…….……		0.035			
17. $V=1.49\ r^{2/3}\ s^{1/2}/n$ Compute V ……..……(ft/s)		7.8			
18. Flow Length, L ……..…..……..…..… (ft.)		8000			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t = ..…..…(hr.)		0.29		=	**0.29** (hrs.)

20. Total Watershed T_t or T_c = **0.78** (hrs.)
47.0 (min.)