Neefus Gulch Wood Loading – Design Project

Final Progress Report
PSFMC Grant No. 19-25G

Submitted to:
Pacific States Marine Fisheries Commission
205 Spokane Street, Suite 100
Portland, OR 97202

Submitted by:
North Coast Coho Project
Trout Unlimited
PO Box 1966
Fort Bragg, CA 95437

Contract Term: September 17, 2018 through September 30, 2019
Reporting Period: September 17, 2018 through September 30, 2019

Project Objectives: This project developed engineered designs for a wood loading project on Neefus Gulch, a salmon-bearing tributary to the North Fork Navarro River in Mendocino County, CA. The planned wood-loading work on Neefus Gulch is tied to an ongoing fish passage work in the watershed to address two complete (filter=RED) barriers. During the initial data collection and topographic survey work at the most downstream crossing site at Appian Way, the project team identified a design concern associated with the stream conditions on the downstream landowner's property (Mendocino Redwood Company). This project developed designs for large wood features that will address channel incision, trap sediment, raise the channel bed in the project reach, and stabilize downstream knickpoints to reduce sediment downstream sediment delivery and ensure structural integrity upstream of the Appian Way crossing.

Project Location and Background: Neefus Gulch drains a 1.4 square mile watershed that includes the Rancho Navarro community and surrounding woodlands. This project focuses on an approximately 1,600-foot long incised and geomorphically unstable reach of Neefus Gulch. Over time, this reach has been actively incising and widening through knick-point migration and bank failures that deliver sediment to the downstream channel, affecting fish passage and rearing habitat. Currently, the channel contains an approximately 3.5-foot high knickpoint and two smaller knickpoints in the channel profile.

The existing unstable ~3.5-foot knickpoint is located about 670 feet downstream of the Appian Way crossing (NAD 83 DD: 39.1759200, -123.5684600). Designing a new crossing to accommodate potential headward migrating incision of this magnitude would have required a large and deeply founded road crossing. Allowing this incision to move upstream of Appian Way would further incise the channel, causing channel instability and degradation of habitat. During the road crossing replacement design process, CDFW agreed that the knickpoint could be stabilized using large-wood structures placed between the knickpoint and Masonite Road.

Project Team:
Trout Unlimited (TU): Grantee and Project Manager
Michael Love and Associates (MLA): Project Engineer
Mendocino Redwood Company (MRC): Landowner

Work Completed:

Grant Administration: Trout Unlimited worked with its partners to secure subcontractor agreements, coordinate site visits, facilitate meetings, and to develop and submit invoices and reports.

Design Development: The majority of the work completed as a part of this grant consisted of performing a topographic survey, hydraulic and geomorphic assessments, and preparation of design plans suitable for field-directed placement of large-wood structures in Neefus Gulch. Specifically, the project's contracted deliverables included:

1. Topographic survey of the project reach, including representative channel cross-sections and the preparation of schematic plan-view base maps
2. Design development, including a geomorphic site characterization and hydraulic assessment, and;
3. Preparation of a technical memorandum (Att. A) summarizing the results of the above surveys and physical site characteristics.

In addition to the above-stated deliverables, the technical memorandum includes:

1. A summary of proposed construction methods, including potential on-site wood sources and equipment access routes.

The developed designs assume that MLA will field-direct placement of the large wood structures given the need to field-to-fit each structure.

Final Budget			
Neefus Gulch Wood Loading Design Project			
PSMFC Grant Agreement 19- 25G			
	FPF Award Amount	**Amount Expended**	**Remaining Balance**
A. PERSONNEL SERVICES			
TU Staff	$3,300.00	$3,299.62	0.38
Staff Benefits @ 43%	$1,419.00	$1,418.84	$0.16
Total	$4,719.00	$4,718.46	$0.54
B. OPERATING EXPENSES: SUBCONTRACTORS			
Subcontractors	**FPF Award Amount**	**Amount Expended**	**Remaining Balance**
Michael Love and Associates	$29,376.00	$29,376.00	$0.00
Subtotal of Subcontractors	**$29,376.00**	**$29,376.00**	$0.00
C. SUBTOTALS & INDIRECT CHARGES	**FPF Award Amount**	**Amount Expended**	**Remaining Balance**
Subtotal A+B (Personnel + Operating)	**$34,095.00**	**$34,094.46**	**$0.54**
Requested Indirect Amount (15.89%) *	**$5,418.00**	**$5,417.61**	**$0.39**
D. GRAND TOTAL	**$39,513.00**	**$39,512.07**	**$0.93**

Photos

Figure 1. Typical reach of Neefus Gulch.

Figure 2. 3.5-foot knickpoint below Appian Way Crossing (upstream).

Figure 3. 3.5-foot knickpoint below Appian Way Crossing (downstream).

Michael Love & Associates
Hydrologic Solutions
PO Box 4477 • Arcata, CA 95518 • (707) 822 -2411

Technical Memorandum

Date: August 18, 2019

To: Elizabeth Mackey North Coast Coho Project Manager, Trout Unlimited
Anna Halligan, North Coast Coho Project Director, Trout Unlimited

From: Rachel Shea, P.E. Engineering Geomorphologist, Michael Love & Associates, Inc.
Michael Love, P.E. Principal Engineer, Michael Love & Associates, Inc.

Subject: **Technical Memorandum for the Design of the Neefus Gulch Wood-Loading Design Project**

Purpose

This memorandum presents the results of the survey, analyses and design development to install large wood structures in an incising channel reach of Neefus Gulch, a tributary to the North Fork Navarro River near Navarro, California. Design plans for the project are provided as Attachment 1.

This project is part of a larger project coordinated by Trout Unlimited (TU) that includes preparation of design plans for a replacement culvert crossing on Appian Way, removal of an 18-foot tall earthen dam and associated impoundment, and restoration of about 1,600 feet of stream channel within the existing impoundment. Additional information on the overall project can be found in the following:

- Basis of Design for a Replacement Stream Crossing on Neefus Gulch at Appian Way, Mendocino California (MLA, 2018)
- Dam Removal and Restoration of Neefus Gulch at the Rancho Navarro Pond, Navarro, CA (MLA, 2018)

Background

Neefus Gulch drains a 1.4 square mile watershed that includes the Rancho Navarro community and surrounding woodlands. This project focuses on an approximately 1,600-foot long incised and geomorphically unstable reach of Neefus Gulch. Over time, this reach has been actively incising and widening through knick-point migration and bank failures that deliver sediment to the downstream channel, affecting fish passage and rearing habitat. Currently, the channel contains an approximately 3.5-foot high knickpoint and two smaller knickpoints in the channel profile.

In 2003, to improve fish habitat within Neefus Gulch on the Mendocino Redwood Company (MRC) property, MRC, with support from the Mendocino County Resource Conservation District, installed a series of about 10 large wood structures in the channel between the knickpoint and Masonite Road. Though these structures have trapped some gravels and forced some small pool development, they have not stabilized knickpoints or caused reach-scale aggradation.

The proposed culvert crossing at Appian Way will consist of a 56-foot long, 12-foot 10-inch wide by 8 foot 4-inch high structural plate metal pipe arch culvert with a closed bottom. A streambed will be established within the culvert following the California Department of Fish and Game (CDFW) stream simulation design approach. A series of 10 log steps will create a stable stream profile from the culvert outlet to the existing channel about 150 feet downstream of the crossing.

The existing unstable ~3.5-foot knickpoint is located about 670 feet downstream of the Appian Way crossing. Designing a new crossing to accommodate potential headward migrating incision of this magnitude would have required a large and deeply founded road crossing. Allowing this incision to move upstream of Appian Way would further incise the channel, causing channel instability and degradation of habitat. During the road crossing replacement design process, CDFW agreed that the knickpoint could be stabilized using large-wood structures placed between the knickpoint and Masonite Road.

The proposed wood structures would be designed to trap sediment and raise the streambed to arrest headward migration of the knickpoint and other drops in the channel. The removal of the upstream earthen dam is expected to restore sediment supply to this reach, providing substrate for recruitment. In addition to stabilizing the knickpoints in the channel, the large wood structures are expected to improve fish habitat within the channel reach.

This project is managed by Trout Unlimited (TU) with funding from the Pacific States Marine Fisheries Commission. TU retained the services of Michael Love & Associates, Inc. (MLA) to develop designs and to guide the implementation of the wood-loading project.

Approach

The project approach consisted of performing a topographic survey, hydraulic and geomorphic assessments, and preparation of design plans suitable for field-directed placement of large-wood structures in Neefus Gulch. The developed designs assume that MLA will field-direct placement of the large wood structures given the need to field-fit each structure.

Topographic Survey

In May 2019 MLA conducted a total station survey of about 1,700 feet of Neefus Gulch extending from just upstream of the existing 3.5-foot knickpoint to the bridge crossing over Neefus Gulch on Masonite Road. The survey included the channel thalweg, toe and top of bank, inset bench features, locations of debris jams and the large wood structures constructed by MRC. A topographic surface of the channel and banks was developed in AutoCAD Civil 3D based on the survey points. Standing trees adjacent to the stream were not surveyed, and equipment access points were not mapped. The area is relatively open for equipment access and minimal vegetation removal will be required for access. It is understood that trees to be felled for constructing wood structures, construction access routes, and vegetation clearing for access will be reviewed and agreed upon in the field with MRC and the construction contractor prior to construction.

During the survey, each of the existing MRC log structures were sketched, and the ends of each log was surveyed. The sketches and survey were used to draw the existing MRC structures on a basemap for the project area. The numbering of the MRC structures was assumed by MLA.

Existing condition plan and profiles obtained from the MLA survey are included in Attachment 1. An annotated longitudinal profile of the stream is shown in Figure 1. This profile includes a thalweg profile between the Navarro River to the Masonite Road bridge surveyed by MRC in 2013.

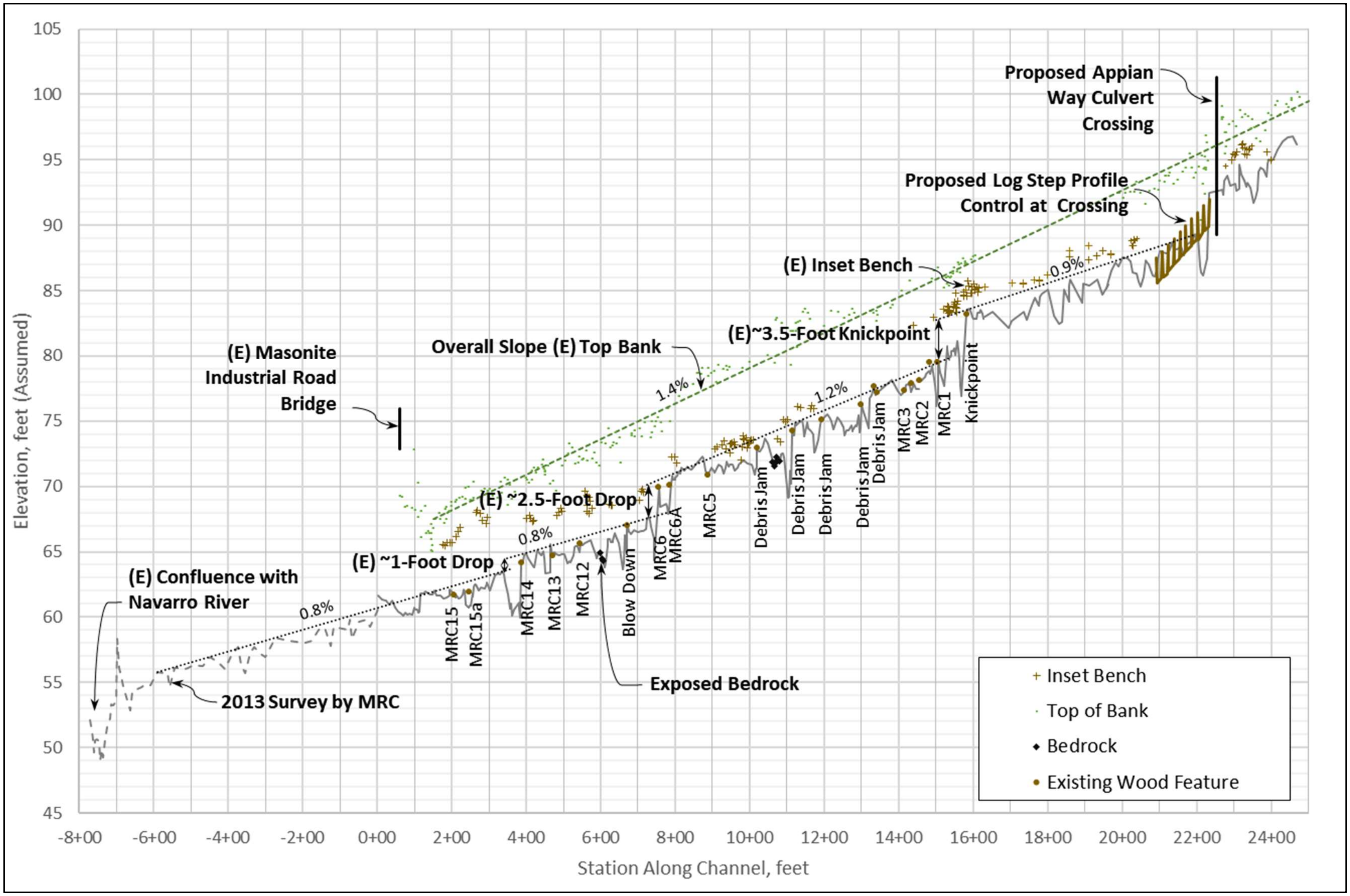

Figure 1. Longitudinal profile of the existing Neefus Gulch channel bottom from the Appian Way road-stream crossing to the Navarro River (2019 survey). "MRC" in a label indicates MRC-placed log structures. Dotted lines indicate overall reach slope.

Hydrology

Neefus Gulch drains a 1.4 square mile watershed that includes the Rancho Navarro community and surrounding woodlands. Elevations in the drainage area range from approximately 200 feet at the confluence with the Navarro River to just over 1,200 feet at its headwaters. The average annual rainfall for this watershed is 42 inches (USGS, 2019).

MLA (2018) estimated peak flows for Neefus Gulch using a Log Pearson Type III probabilistic analysis (USGS, 1982) and annual peak flows recorded at two stream gages from the adjacent Caspar Creek watershed operated by the U.S. Forest Service (USFS). The return period flows from the Caspar Creek gages were scaled to the drainage area of Neefus Gulch and averaged (Table 1).

Table 1. Peak flows calculated for Neefus Gulch at Masonite Road (drainage area 1.4 square miles).

Return Period	1.5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Peak Flow	72 cfs	94 cfs	149 cfs	186 cfs	227 cfs	258 cfs	287 cfs

Geomorphology

Figure 1 shows a profile of the surveyed channel thalweg and tops of banks. Attachment 1 shows plan and profile views of the project reach.

Between Appian Way and Masonite Road, Neefus Gulch is a moderately unstable single-thread plane-bedded channel (Montgomery and Buffington, 1997). It flows through a mature second-growth riparian forest consisting of large redwood trees, old growth redwood stumps, and native understory vegetation. Abandoned floodplains ranging in width from a few feet to over 100-feet wide form terraces on both sides of the stream channel.

The stream channel typically has a trapezoidal shape, with a flat bottom and relatively steep vertical banks. Narrow inset benches are present sporadically on one or both sides of the channel. A photograph of a typical incised channel reach is shown in Figure 2.

Bankfull widths in the channel range from 8.5 to 15 feet, averaging about 10.5 feet. The inset benches vary in width from 1-3 feet, range in elevations, and appear to represent the historical stable channel bottom and series of incision events. They generally are composed of cohesive material, and not formed through alluvial depositional. The bench elevations vary and do not correspond to bankfull width.

Based on the top of banks, the overall valley slope is about 1.4%, as shown on Figure 1. The stream thalweg consists of three discrete reaches with slopes ranging from 0.8% to 1.2%, interspersed by drops in the channel. The largest drop is a 3.5-foot unstable knickpoint near station 15+80 (Figure 3 and Figure 4). The upper part of the knickpoint is comprised of fine roots and small gravels embedded in clays, and appears to be actively eroding. The downstream portion of the knickpoint is comprised mostly of chunks of wood and tree roots, and also appears to be downcutting and migrating slowly upstream. The two other smaller drops in the channel profile, controlled by large chunks of redwood and MRC 6 and MRC14, are slightly more stable but show signs of flanking and piping under and around the structures.

The lower sloped reaches between knickpoints typically had a mix of small wood-forced features and debris jams. The channel bottom consists of exposed cohesive clayey soils or a thin veneer of gravels over clay that have accumulated upstream of the debris jams. The MRC large wood structures have caused some localized gravel accumulation and pool scouring. However, the structures are typically set a few feet above the channel and have not had a substantial influence on channel geomorphology.

The forest adjacent to the channel was once dominated by old-growth redwoods with diameters exceeding 10 feet based on the stumps adjacent to the channel. Historically, the channel profile was controlled by wood forcing features similar to those described by Montgomery and Buffington (1997). Evidence of cut old-growth redwood roots in the channel suggest that wood may have been purposely removed during historical logging or subsequent efforts to remove woody debris from streams. Lack of large wood in the channel and possibly historical channel realignment appears to have caused the current unstable nature of the channel, which is exacerbated by a decrease in sediment supply from the upstream earthen dam.

Currently, tree roots provide some bank stability near the top of bank. However, in most places the channel has incised well below the tree rooting elevation and the channel is actively eroding, resulting in undercut banks and localized slumping. The channel banks consist of clay or consolidated sands, gravels and cobbles that provide a source for in-stream material. Bedrock was observed in some locations in the channel bottom and western streambanks along the toe of the adjacent hillslope, as noted in the thalweg profile (Figure 1).

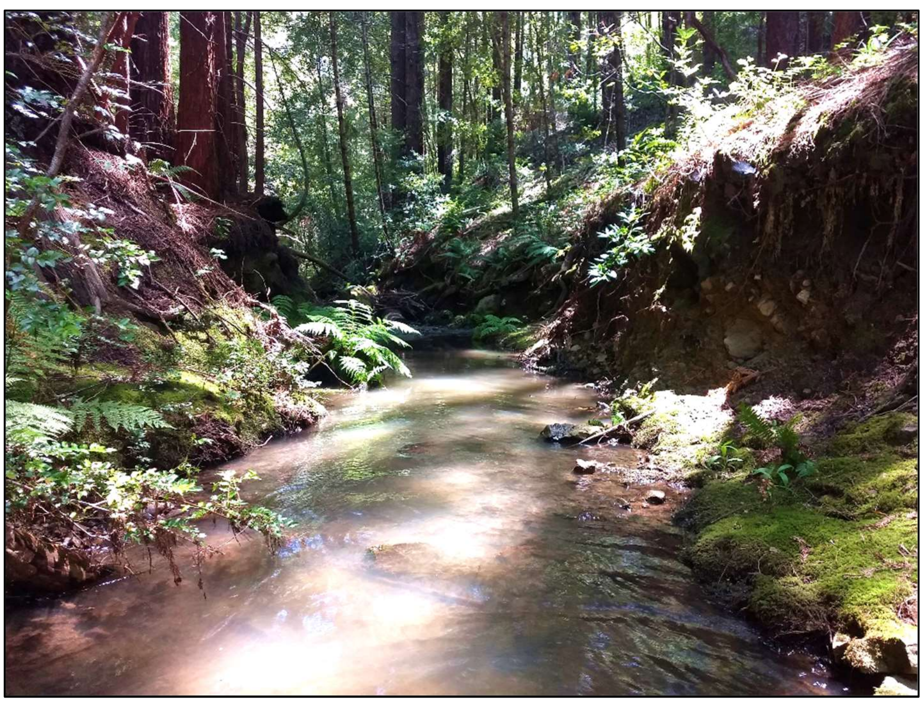

Figure 2. Typical reach of Neefus Gulch near station 13+00. Note undercut banks and sand, gravel and cobble bank composition.

Figure 3. Upstream portion of 3.5-foot high knickpoint on Neefus Gulch comprised of eroding clay with small roots.

Figure 4. Downstream portion of 3.5-foot high knickpoint on Neefus Gulch comprised of old growth redwood roots and stump.

Channel Hydraulics

To qualitatively assess the stability of the wood augmentation structures in terms of depth of submergence, potential buoyancy, and drag, a 1-dimensional steady-state HEC-RAS hydraulic model (ACOE, 2010) was developed for the project reach. The intent of the model was to evaluate 10- and 100-year depth of flow and velocities for existing conditions to guide the design process.

Cross sections for the model were obtained from the 2019 MLA topographic survey. Cross sections were located at riffle crests, tailouts and in deeper pools. Cross section spacing ranged from 3 to 82 feet apart, averaging about 28 feet apart.

The model was executed in the mixed flow regime to evaluate 1.5-year, 10-year and 100-year flows. A composite channel roughness value of 0.055 was used to the top of bank of the channel to simulate the roughness caused by the large wood structures and debris jams. A roughness value of 0.08 was used on the terrace beyond the top of bank. Contraction and expansion coefficient were set at 0.3 and 0.5 respectively, to reflect energy losses due to changing cross sectional areas and slopes.

The HEC-RAS model indicated that flows up to the 100-year event are contained within the channel banks from downstream of the 3.5-foot knickpoint to Masonite Bridge. Just upstream of the knickpoint, the 10-and 100-year flows are out-of-bank onto the floodplain, showing that this reach is less incised than downstream of the knickpoints. Model results of flow depths and velocities are summarized in Table 2 and presented in full in Attachment 2.

Table 2. Summary of existing normal depth flow hydraulics for Neefus Gulch for channel slopes ranging from 1% to 2.8%.

Return Period	Flow	Flow Depth in Riffles	Channel Velocity
1.5-Year	72 cfs	1.4 to 3.2 ft (2.3 ft)	1.4 to 6.3 fps (3.6 fps)
10-Year	186 cfs	2.3 to 4.9 ft (3.8 ft)	2.3 to 7.8 fps (4.6 fps)
100-Year	287 cfs	2.6 to 6 ft (4.8 ft)	2.7 to 8.5 fps (5.1 fps)

Proposed Project Design

The project proposes to construct large wood structures along Neefus Gulch on the MRC property between the knickpoint at station 15+80 and Masonite Bridge.

The design for the structures follows CDFW guidelines for Habitat Enhancement Projects using log structures with up to 4 logs per structure (FRGP Proposal Solicitation Notice 2019). CDFW indicates that engineering computations are not necessary for these structures if they are comprised of Key Pieces with lengths of at least twice bankfull width if they do not have root wads.

Bankfull widths in the channel range from 8.5 to 15 feet, averaging about 10.5 feet. Therefore, the key pieces for the project should have a minimum length of 21 feet, unless they are anchored in some fashion.

Design Profile

The project objective is to stabilize the knickpoint near station 15+80 using a series of large wood structures. The large wood structures are expected to slow the water, rack additional woody material, and retain sediment. Over time, these structures and the additional wood racking will promote gravel deposition, thus building-up the channel bed, reversing the incision that has occurred. The structures will be located to transition the channel bottom from the thalweg elevation upstream of Masonite Road to the thalweg elevation upstream of the upper knickpoint, eliminating discontinuities in the channel profile currently created by the existing knickpoints.

Based on the tops of bank, the overall valley slope is about 1.4%. Historically, the Neefus Gulch thalweg profile was likely similar to the overall top of bank slope, connecting the upstream and downstream stable channel reaches with no large discontinuities. Some of the observed inset benches may represent the historical elevation of the channel bottom.

Figure 5 shows the overall proposed design profile for the project as a dotted black line. The design profile was developed by assessing the elevations of the inset benches and exposed old-growth roots relative to the overall valley slope, considering the need to meet existing grade at the upstream and downstream limits of the project area. An overall channel slope of 1.3% extending from the Masonite Road bridge to station 11+00 generally follows the elevations of some of the inset benches in the channel.

Between station 11+00 and the knickpoint, the proposed channel slope would be 1.8%, slightly steeper than the overall valley slope. The increase in slope in the channel was driven by the need to match the elevation of the knickpoint with the most upstream large wood structure, and to meet existing grade on the MRC property upstream of the Masonite Road bridge.

The proposed large wood structures were located to achieve about a 1.6-foot drop between structures, as shown in Figure 5 as red diamonds and as shown in the design plans in Attachment A. Actual drop heights will vary slightly from the overall design slope based on field conditions and location of the structure. The drop height between structures is less than maximum drop heights measured in the reference reaches upstream of the project area (MLA, 2018). Spacing between the structures will range from 54 to 132 feet, averaging about 98 feet apart. In some cases, the overall drop between structures will be further reduced due to the presence of existing wood within the channel

It is expected that gravel will recruit between the log structures to a slope of about 0.8%, based on the localized slope of Neefus Gulch between the knickpoints in the channel profile. The gravel accumulation is expected to reduce the drop heights between structures to less than 1 foot. Residual pools are expected to form below each drop, and self-scour to a stable depth.

Typically, the new large wood structures will be placed between the existing MRC structures to increase the overall large wood content of the channel. Increasing large wood in the channel will ultimately result in a more complex fisheries habitat and additional roughness elements that help recruit gravel. In some cases, such as at MRC1 and 2, the existing structure will be augmented to facilitate trapping gravel.

Larger Wood Structure Design and Stabilization

MLA prepared field-based design of each large wood structures, including sketches for each structure, as shown in Attachment 1. The structures typically will consist of 3 to 4 logs ranging in length from 20 to 30 feet, with minimum diameters of 1.5 feet. The structures will typically consist of a "weir" log that is wedged diagonally across the channel, the top of which will meet the specified elevation on the design profile. Additional logs will be used to pin this log in place, and to serve as ballast.

Structure stability will be achieved by wedging logs between the streambanks, between trees located on the streambanks, shallow trenching, and using the stacked weight of logs that extend well above the floodprone depth to prevent floatation of the logs underneath. Rebar pinning (through or friction pins, as appropriate) will be used to augment structure stability, or where installed logs are smaller than the minimum key log size of 21 feet. The intent of the rebar pins is to allow the structure to deform slightly under higher flows, but for the logs to remain in their intended position. It is acceptable if the structures to float slightly or shift slightly in place.

Logs will be placed to minimize the void space between logs. Slash salvaged from the logging process will be packed densely under and between the logs to trap gravel. Some leakage around and under the weir logs at low flows is anticipated and acceptable, as it is the flow obstruction created by the logs at higher flows that will do the intended geomorphic work on the channel.

This is intended to be a "field fit" project, using the design drawings provided in Attachment A as a guide for each site. Notes on the plans provide for flexibility in project construction, including adjustment of the large wood structures to meet field conditions.

Construction Methods

It is expected that this project will be constructed by Blencowe Watershed Management in cooperation with full-time field direction from MLA staff. Heavy equipment to be used is expected to include a grapple skidder and a large backhoe. Therefore, only minimal channel bank excavation will be feasible, and installation of driven piles to maintain structure stability will not be feasible.

Log Sources

Logs for all the structures should consist of redwood or Douglass fir a minimum of 1.5 feet in diameter. It is anticipated that logs will be sourced from the adjacent MRC-owned forest along the stream corridor. Dimensions for each log in each proposed large wood structure is shown on the structure sketches in Attachment 1. It is preferable that single logs be used to achieve the proposed weir heights rather than stacking logs, but this may be dependent on the dimensions of available source logs.

It is expected that approximately 60 logs will be necessary for the project, with logs ranging in size from 10 to 30 feet in length and diameters up to 3 feet.

Construction Access

Construction will occur from the top of the river-left (northwest) channel bank. There is an MRC access road through the forest near the edge of Neefus Gulch. Some small tree and brush clearing may be necessary on the road and for equipment to reach each of the proposed large wood structure locations. Cleared material will be introduced into the structures as slash.

Construction access will be from the river-left side of the channel only. Similarly, the minor excavation into the channel bank for placing wood will be limited to the northwest side. No excavation will occur within the channel bottom, and no stream diversion will be implemented, though there may be some baseflow or isolated pools in the channel.

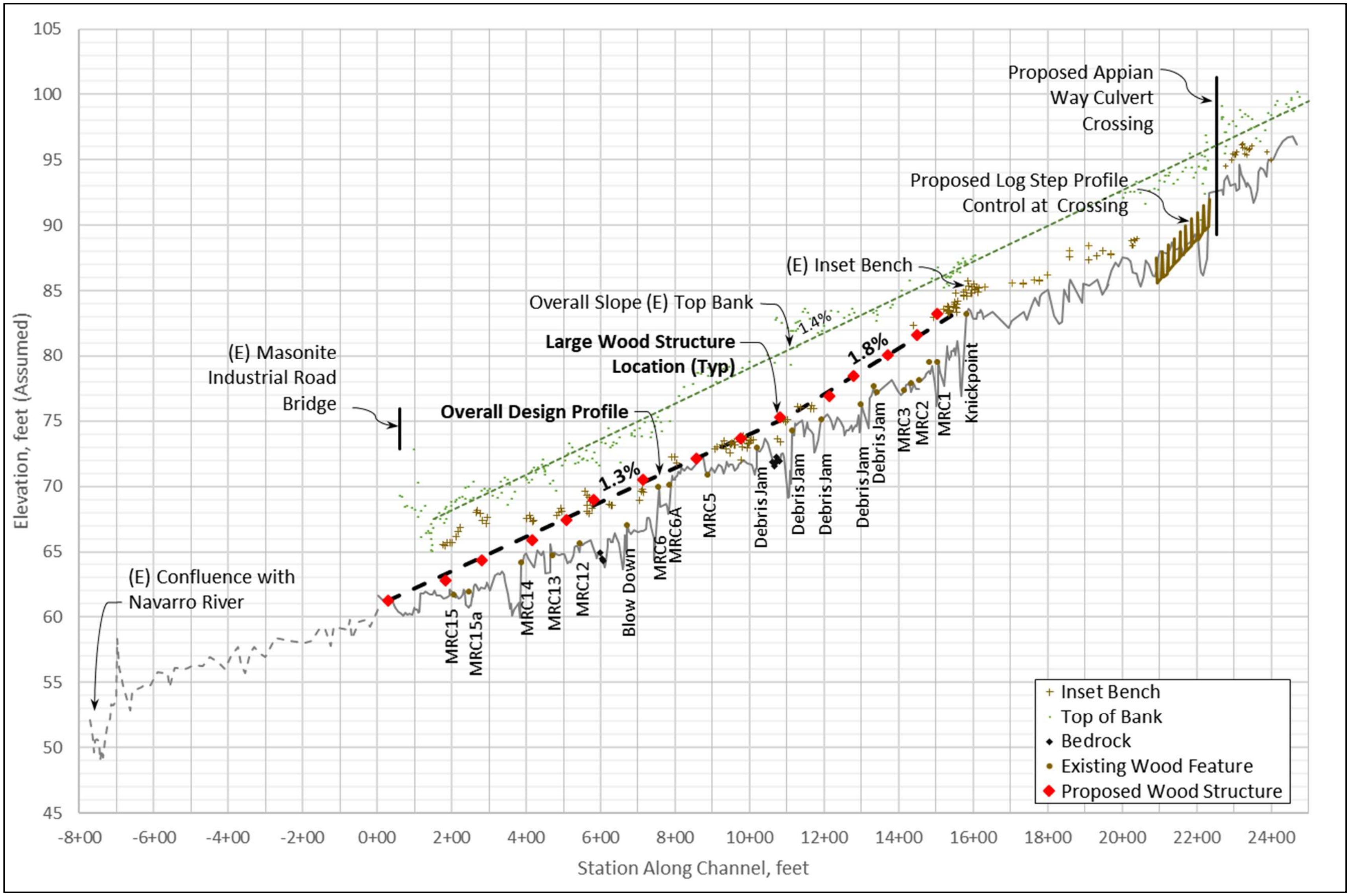

Figure 5. Profile of Neefus Gulch showing the overall design slope (dashed black line) and locations of each log structure (red diamonds). Over time, the channel is expected to aggrade towards the overall design slope.

References

ACOE. 2010. HEC-RAS, River Analysis System User's Manual. Hydraulic Reference Manual: Version 4.1, U.S. Army Corps of Engineers, Hydrologic Engineering Center.

Michael Love & Associates, Inc. (MLA). 2018. Basis of Design for a Replacement Stream Crossing on Neefus Gulch at Appian Way, Mendocino California

Michael Love & Associates, Inc. (MLA). 2018. Dam Removal and Restoration of Neefus Gulch at the Rancho Navarro Pond, Navarro, CA (MLA, 2018)

Montgomery D. and J. Buffington. 1997. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin 109(5): 596-611.

USGS. 2019. https://streamstats.usgs.gov/ss/

USGS. 1982. Guidelines for determining flood flow frequency. Bulletin #17B of the Hydrology Subcommittee. Virginia, Interagency Advisory Committee on Water Data, U.S. Dept. of Interior, U.S. Geological Survey.

Attachments:

Attachment 1 –Design Plans and Large Wood Structure Sketch Attachments

Attachment 2 – Existing Condition Hydraulic Analysis

ATTACHMENT 1

Design Plans and Large Wood Structure Sketch Attachments

TROUT UNLIMITED

PLANS FOR CONSTRUCTION OF

NEEFUS GULCH WOOD LOADING PROJECT
MENDOCINO COUNTY, CA

JULY, 2019
FINAL DESIGN

Prepared For:

- **TROUT UNLIMITED**
- **PACIFIC STATES MARINE FISHERIES COMMISSION**

Prepared By:

Michael Love & Associates
Hydrologic Solutions
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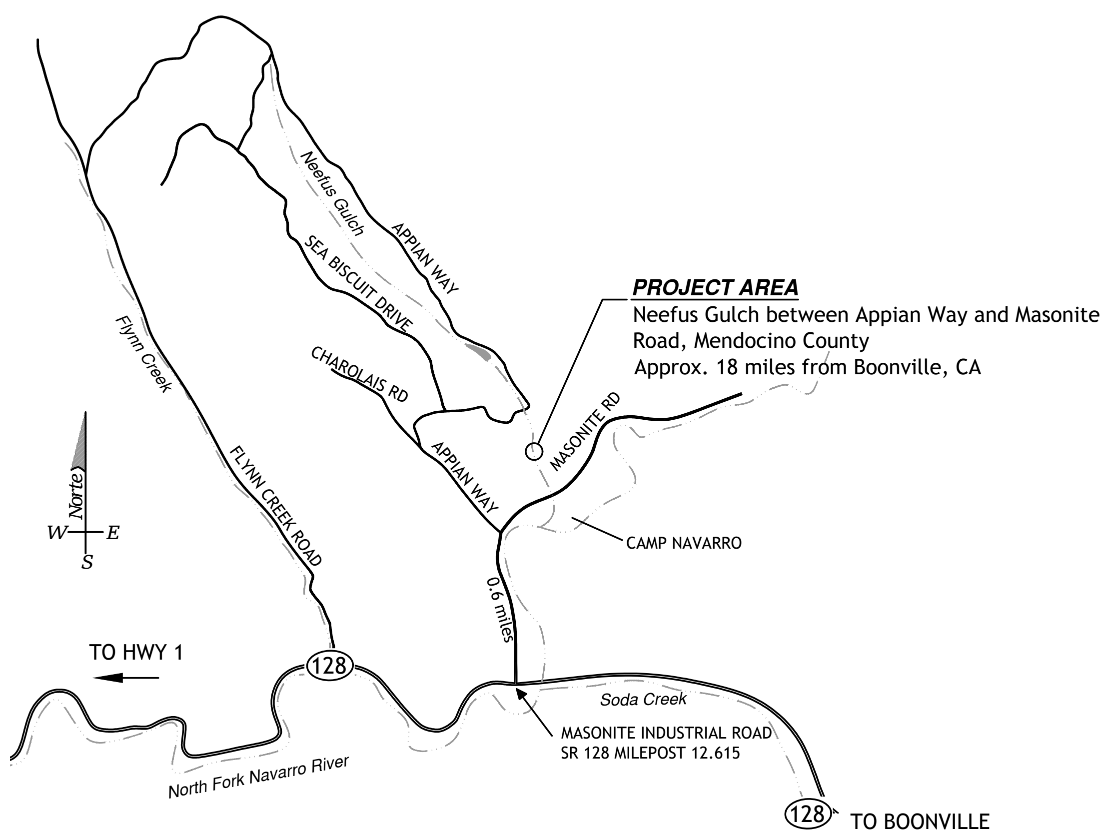
VICINITY MAP
NOT TO SCALE

SHEET INDEX



NEEFUS GULCH AT APPIAN WAY LOCATION MAP
NOT TO SCALE

NOTES:

1. STRUCTURES SHALL BE INSTALLED UNDER THE DIRECTION OF A REPRESENTATIVE FROM MICHAEL LOVE AND ASSOCIATES, INC. (MLA).
2. STRUCTURE LOCATION AND ELEVATION SHOWN ON THE PLANS ARE APPROXIMATE AND WILL BE FIELD-FIT BY MLA AND THE CONTRACTOR INSTALLING THE STRUCTURES. LOG SIZES SHALL MEET OR EXCEED SPECIFIED DIMENSIONS.
3. CONSTRUCTED TOP ELEVATIONS SHALL BE AS SHOWN ±0.5 FT.
4. INSTALL DENSELY PACKED SLASH TO THE SPECIFIED ELEVATION OF THE STRUCTURE. SLASH SHALL BE SALVAGED FROM LOGGING OPERATION AND BE A MINIMUM OF 10 FT LONG WITH FOLIAGE INTACT.

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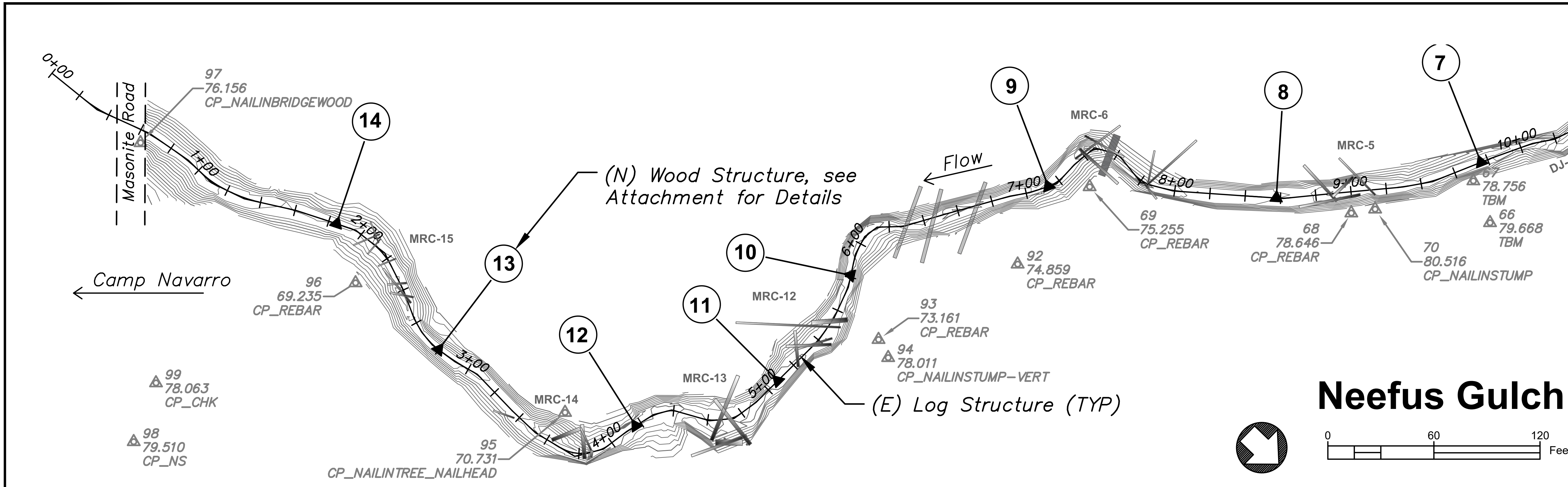
REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No. 71681
CIVIL
STATE OF CALIFORNIA

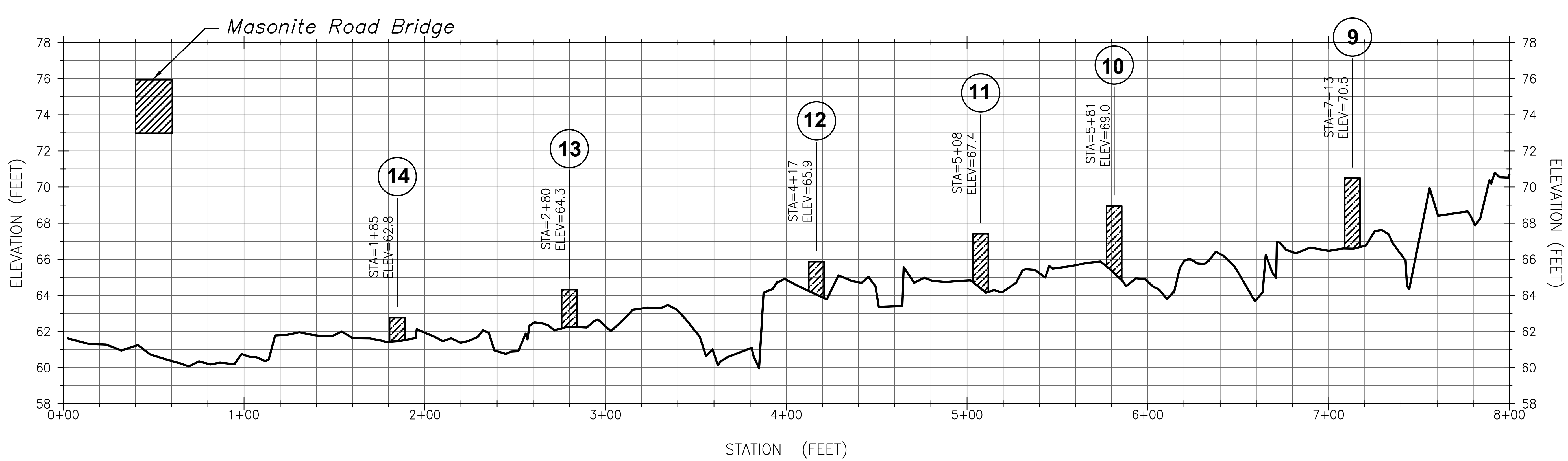
VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

TROUT UNLIMITED
NEEFUS GULCH
WOOD LOADING PROJECT

TITLE SHEET

DATE	JULY 2019
SUBMITTAL	FINAL
DESIGN	ML, RS, AL
DRAWN	LLANOS
SHEET	1 of 3
	G-1





PROFILE ALONG CENTERLINE

Michael Love & Associates, Inc.
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Fort Bragg, CA 95437

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

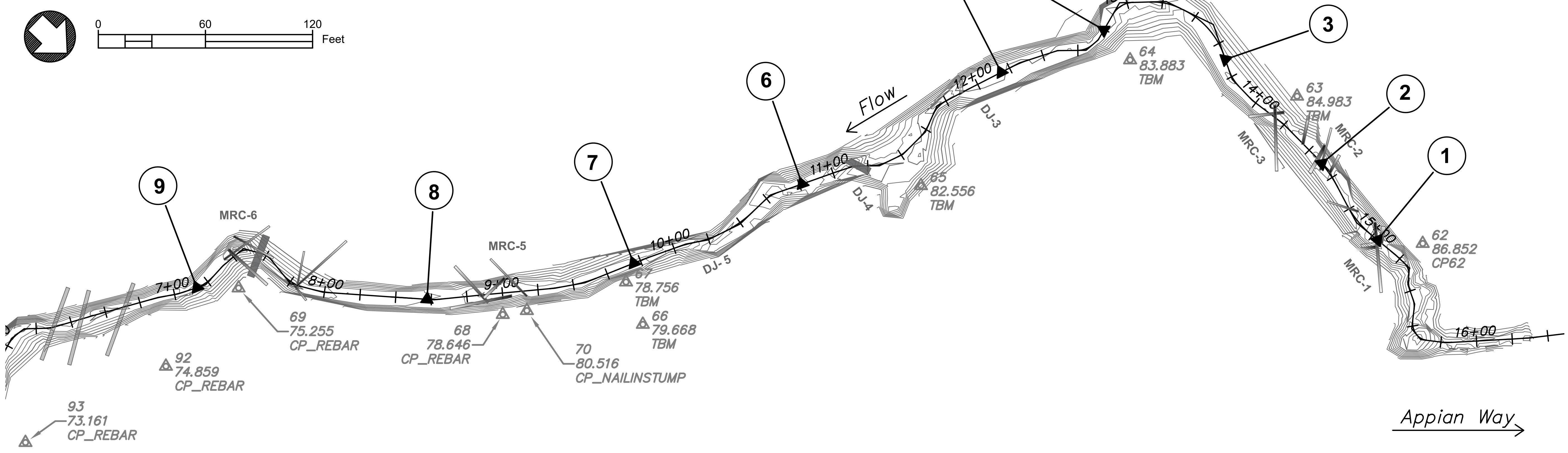
VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

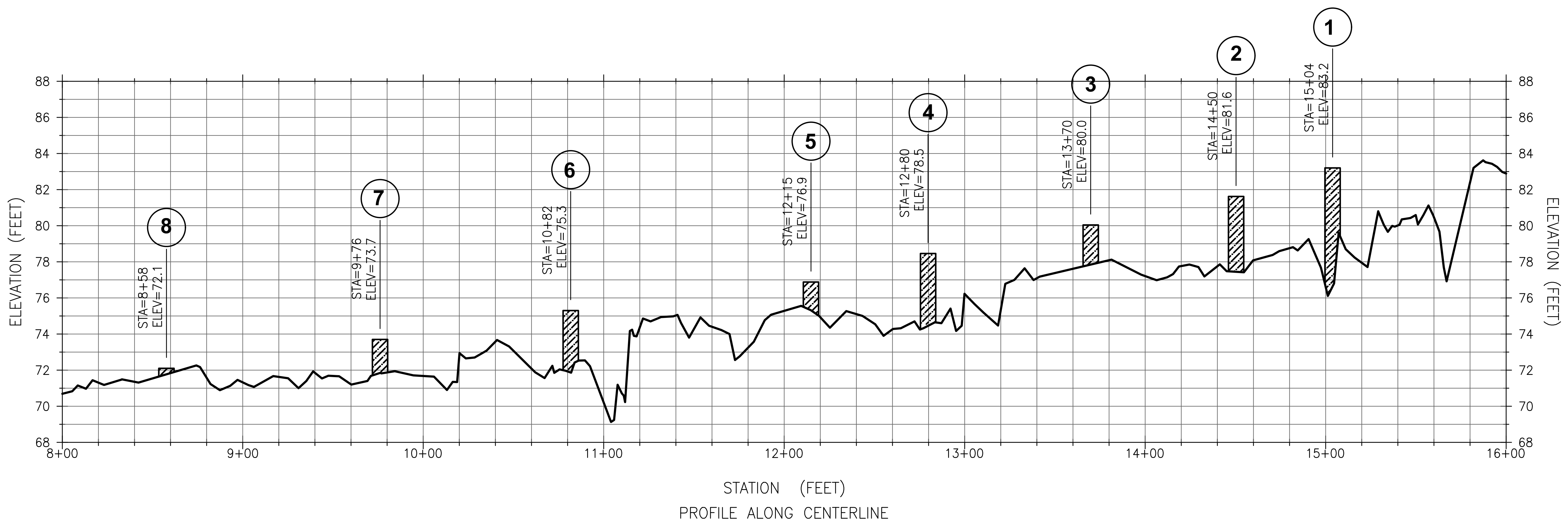
TROUT UNLIMITED
NEEFUS GULCH
WOOD LOADING PROJECT

PLAN AND PROFILE SHEET 1

DATE	JULY 2019
SUBMITTAL	FINAL
DESIGN	ML, RS, AL
DRAWN	LLANOS
SHEET	2 of 3

Neefus Gulch





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VERIFY SCALE
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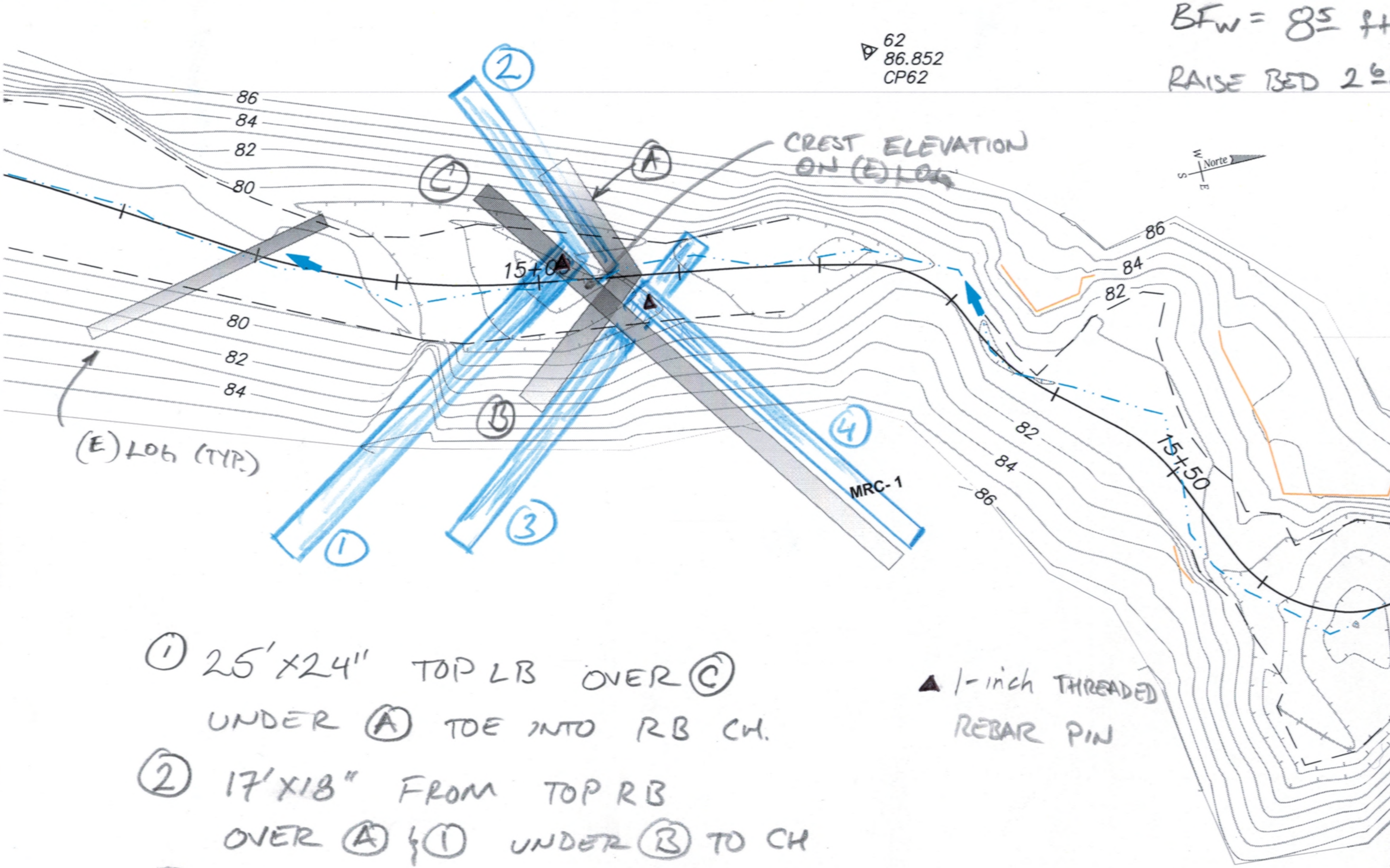
TROUT UNLIMITED
NEEFUS GULCH
WOOD LOADING PROJECT

PLAN AND PROFILE SHEET 2

DATE	JULY 2019
SUBMITTAL	FINAL
DESIGN	ML, RS, AL
DRAWN	LLANOS
SHEET	3 of 3



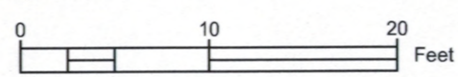
(1) 25'x24" TOP LB OVER (C) UNDER (A) TOE INTO RB CH.

(2) 17'x18" FROM TOP RB OVER (A) & (1) UNDER (B) TO CH

(3) 25'x24" TOP LB NEXT TO (B) UNDER (C) TO TOE RB

(4) 20'x18" NEXT TO (C) OVER (3) WEDGED TO U/S (B)

▲ 1-inch THREADED REBAR PIN



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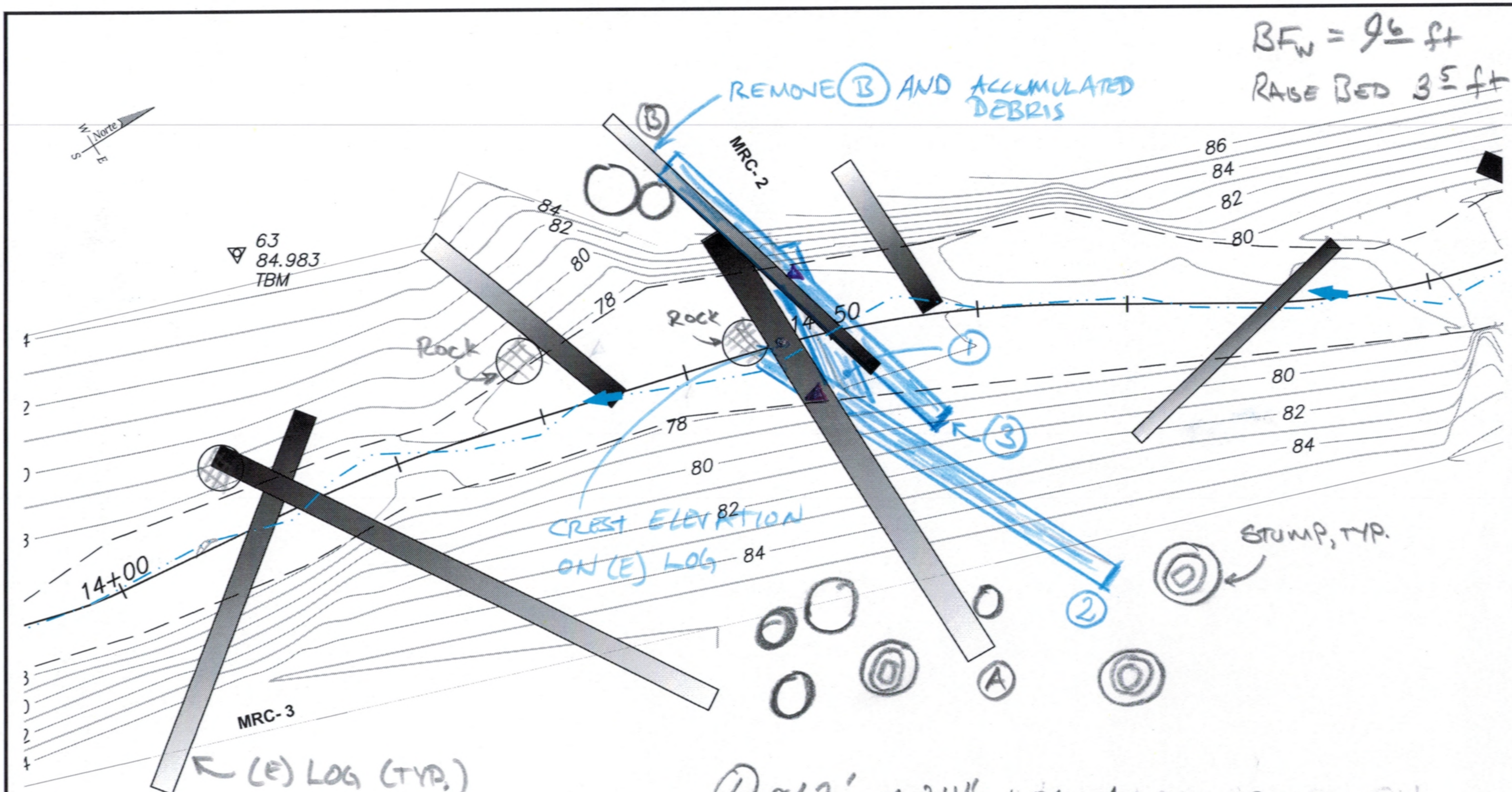
NEEFUS GULCH WOOD LOADING

DATE July, 2019

STX 1



① ~12' × 24" LOG ACROSS CHANNEL BED. SIZE TO FIT

② 30' × 18"-24" FROM TOP LB OVER ①, UNDER Ⓐ AGAINST ROCK

③ 25' × 18" TOP RB AGAINST TREE OVER ① TOE INTO LB CH.

▲ 1-INCH THREADED REBAR PIN

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NEEFUS GULCH WOOD LOADING

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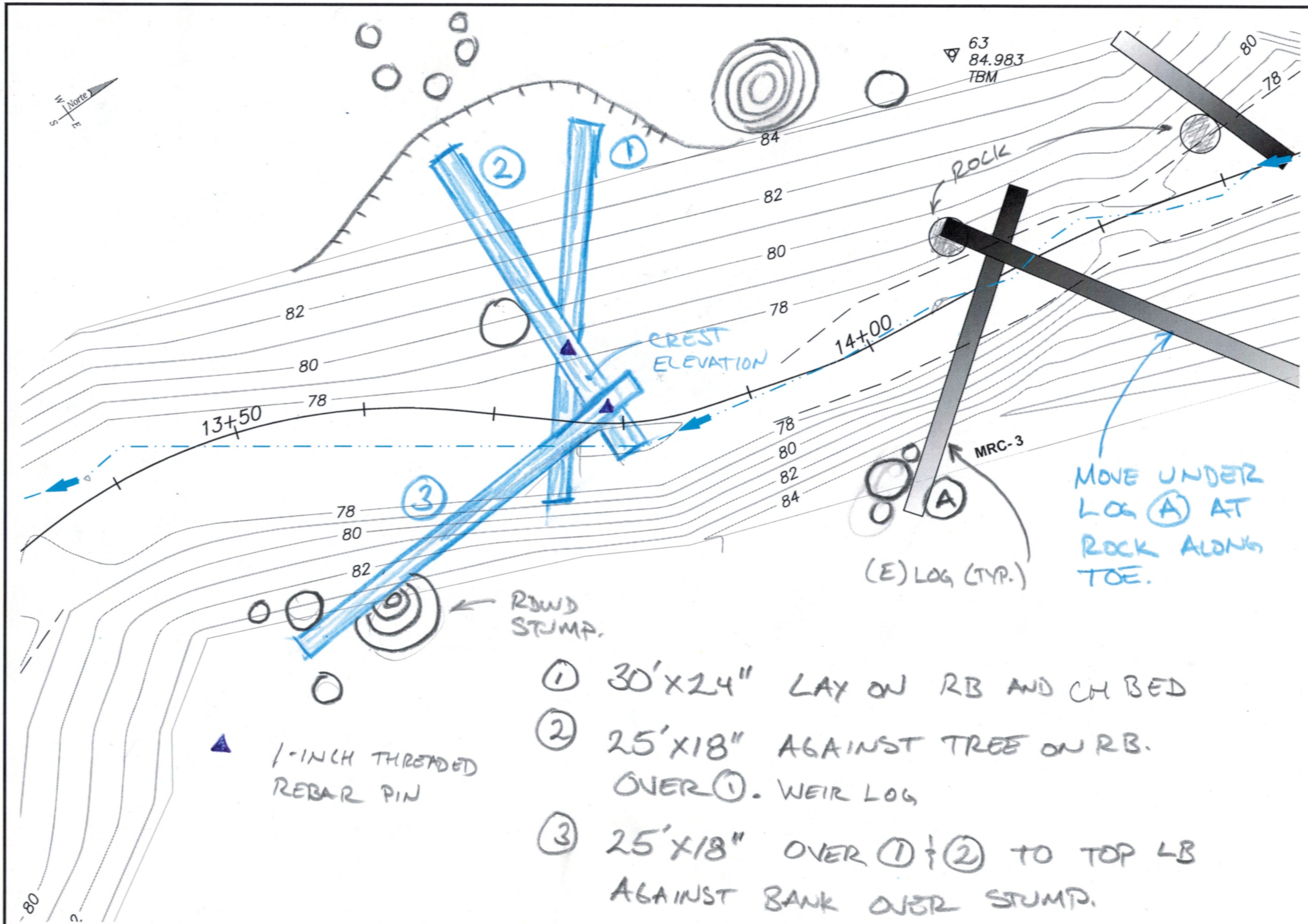
0 10 20 Feet

STX 2



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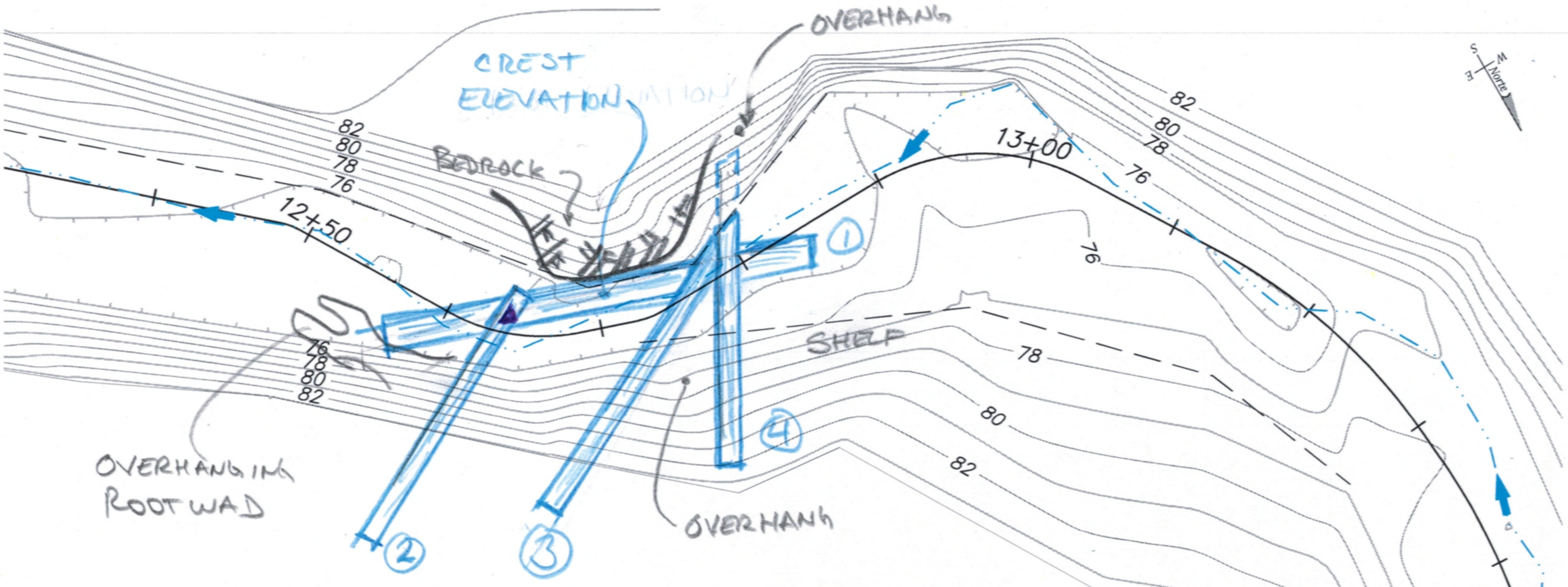
NEEFUS GULCH WOOD LOADING
DATE July, 2019

STX 3

RAISE BED 4'-4



(1) 30' x 36" OR 2x24" WEIR LOG
FILL SLOT AT BEDROCK, WEDGE UNDER D/S ROOT WAD OVERHANG

(2) 20'x18" FROM TOP LB OVER (1)

(3) 30'x22" TOP LB OVER (1) AGAINST BEDROCK SHELF.

(4) 20' x DIAMETER TO FIT, WEDGE INTO R.B. OVERHANG LAY ALONG LB SHELF OVER (1) & (3)

▲ 1-INCH THREADED REBAR PIN

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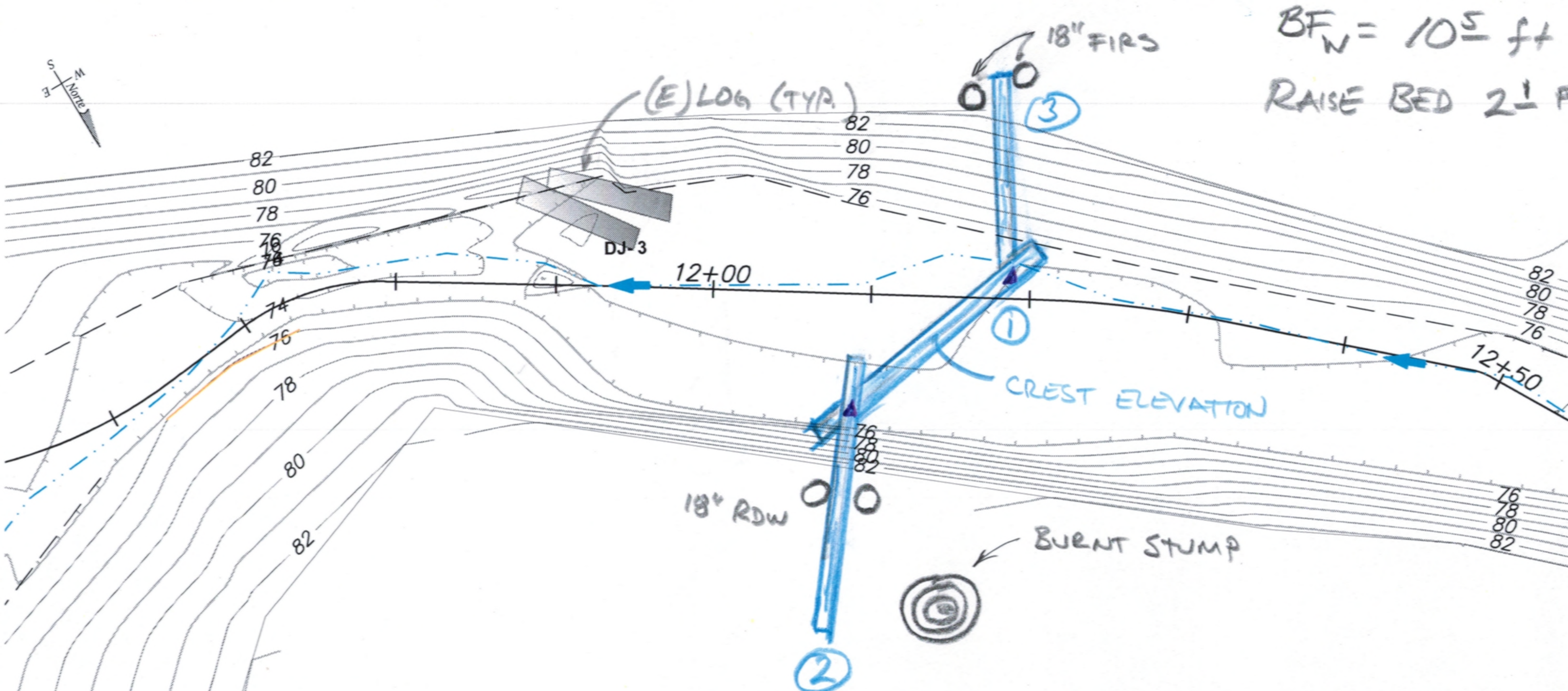
NEEFUS GULCH WOOD LOADING

DATE July, 2019

0 10 20 Feet

STX 4



① 20'x24" LAY FLAT ALONG CH. WEIR LOG

② 20'x12" WEDGE BETWEEN RDWD AT TOP LB. OVER ①

③ 25'-30' x 18" WEDGE BETWEEN FIRS ON RB TOP PLACE U/S OR D/S OVER ①

▲ 1-INCH THREADED REBAR PIN

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NEEFUS GULCH WOOD LOADING

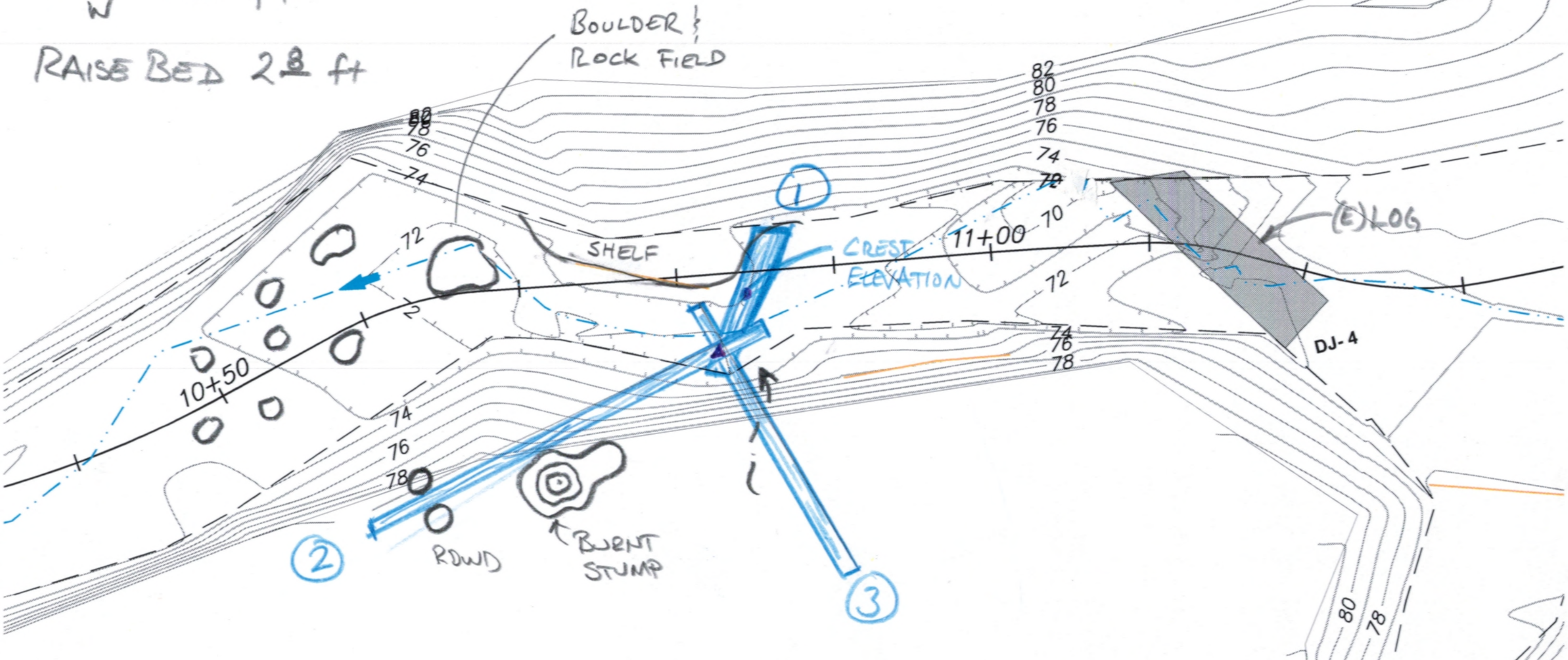
DATE July, 2019

0 10 20 Feet

STX 5

$BF_W = 10^{\pm}$ ft

RAISE BED 2± ft



▲ 1-INCH THREADED REBAR PIN

① 16'X3' WEIR LOG ALONG CH BED WEDGE INTO BANK ALONG SHELF (RB)

② 30'X18" BETWEEN RDWD @ TOP LB OVER ① & ③

③ 20'X18" FROM TOP BANK (LB) AT DRAINAGE OVER ① WEDGE INTO RB TOE

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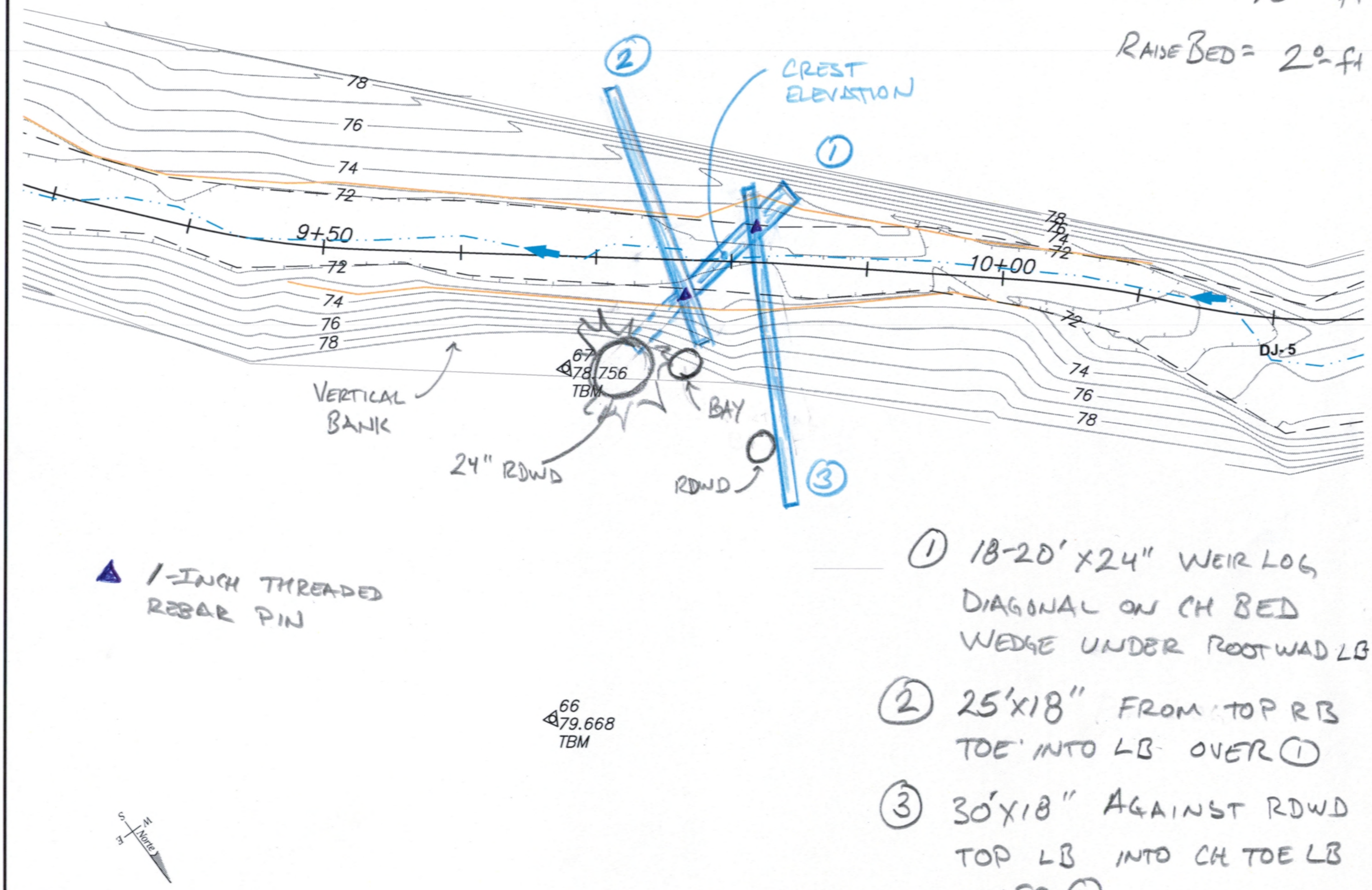
BFw = 10± ft

Raise Bed = 2.0 ft



① 18-20' x 24" WEIR LOG DIAGONAL ON CH BED WEDGE UNDER ROOTWAD LB

② 25' x 18" FROM TOP RB TOE INTO LB OVER ①

③ 30' x 18" AGAINST RDWD TOP LB INTO CH TOE LB OVER ①

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NEEFUS GULCH WOOD LOADING

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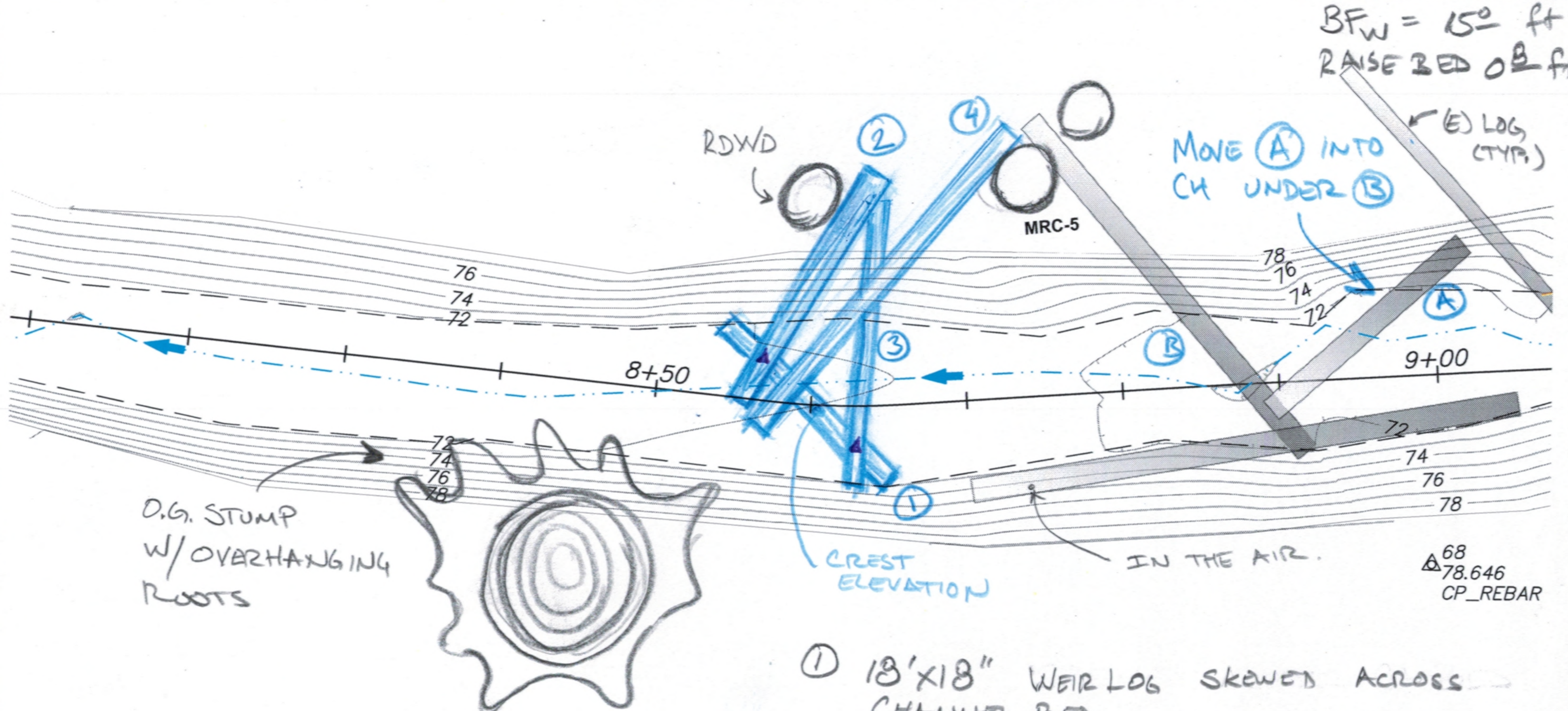
STX 7



▲ 1-INCH THREADED REBAR PIN

(1) 18'x18" WEIR LOG SKEWED ACROSS CHANNEL BED.

(2) 18'x18" FROM RB TOP OVER (1) & (3) KEY INTO CH BED.

(3) 24'x18" FROM RDWD TOP RB OVER (1) TO L.B. TOE.

(4) 25'x18" FROM RDWD @ MRC-5 OVER (3) & (1) KEY INTO CH BED.

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NEEFUS GULCH WOOD LOADING

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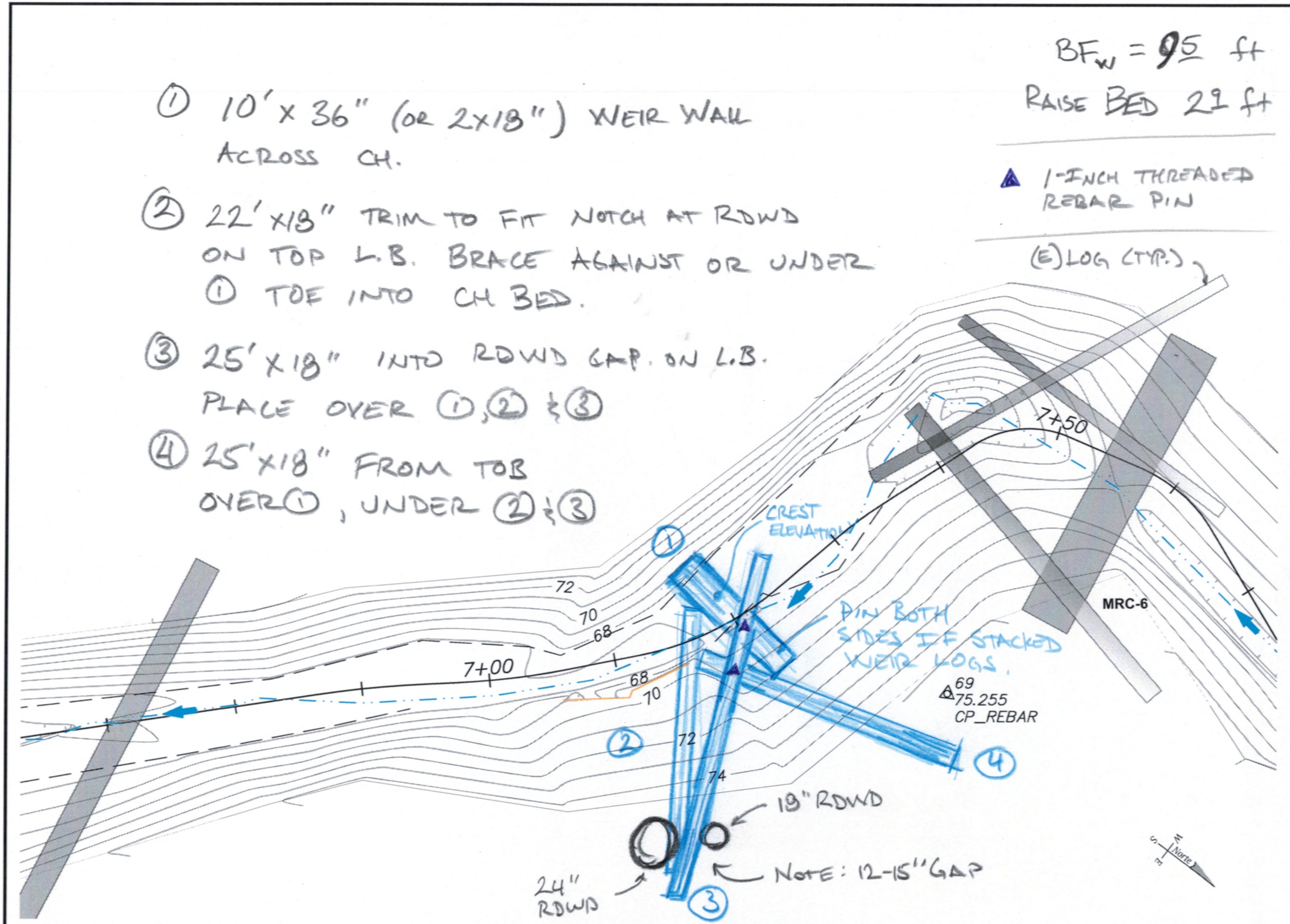
0 10 20 Feet

STX 8



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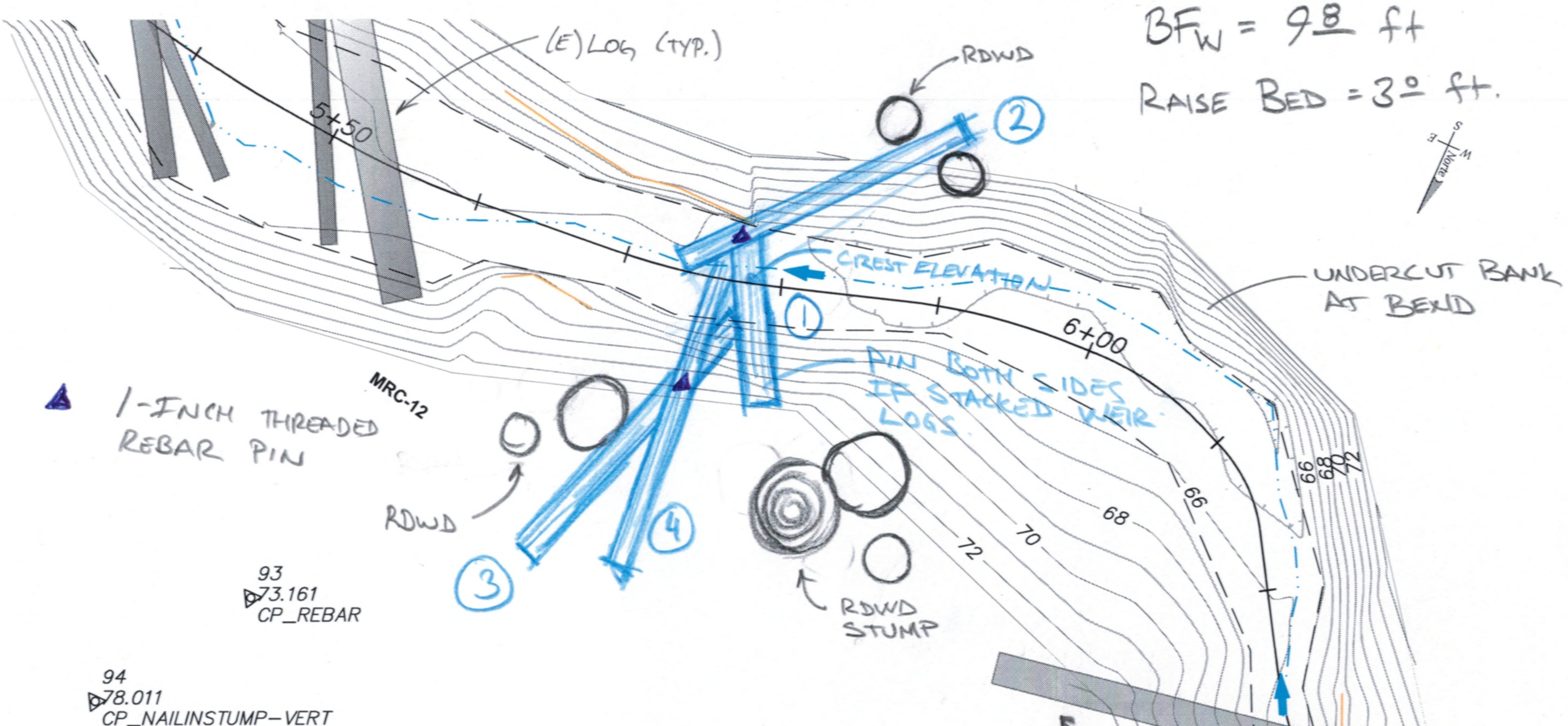
NEEFUS GULCH WOOD LOADING

DATE July, 2019

0 10 20 Feet

STX 9



1 10' x 36" (OR 2x18") WEIR LOG ACROSS CH BED.

2 20' x 18" BETWEEN RDWD ON LB. TOP INTO CH BED, OVER 1

3 22' x 18" KEY LOG FOR 1 AGAINST RDWD INTO CH BED.

4 24' x 18" OVER 3 KEY LOG FOR 1 TOE INTO R.B.

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NEEFUS GULCH WOOD LOADING

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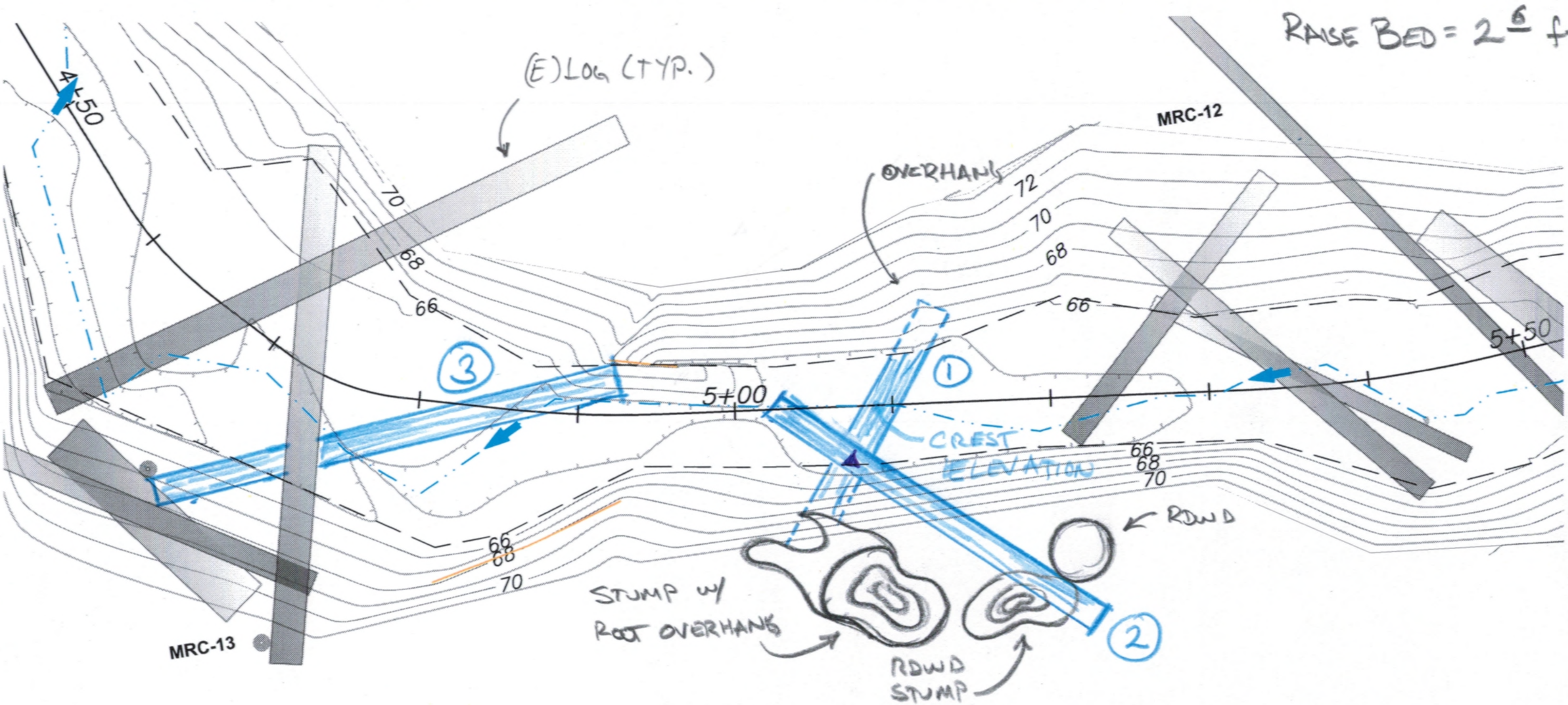
0 10 20 Feet

STX 10



1-INCH THREADED REBAR PIN

(1) 15' X 30"+ WEIR LOG ON CH BED WEDGE INTO OVERHANG AT TOE BOTH BANKS.

(2) 25'X18" ON STUMP AT RDWD L.B. TOP INTO CH BED OVER (1) (MAY NEED TO CUT BAY OVER (1))

(3) 30' X24" LAY ON CH BED, SLIDE UNDER (A) U/S OF PILE LOG.

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NEEFUS GULCH WOOD LOADING

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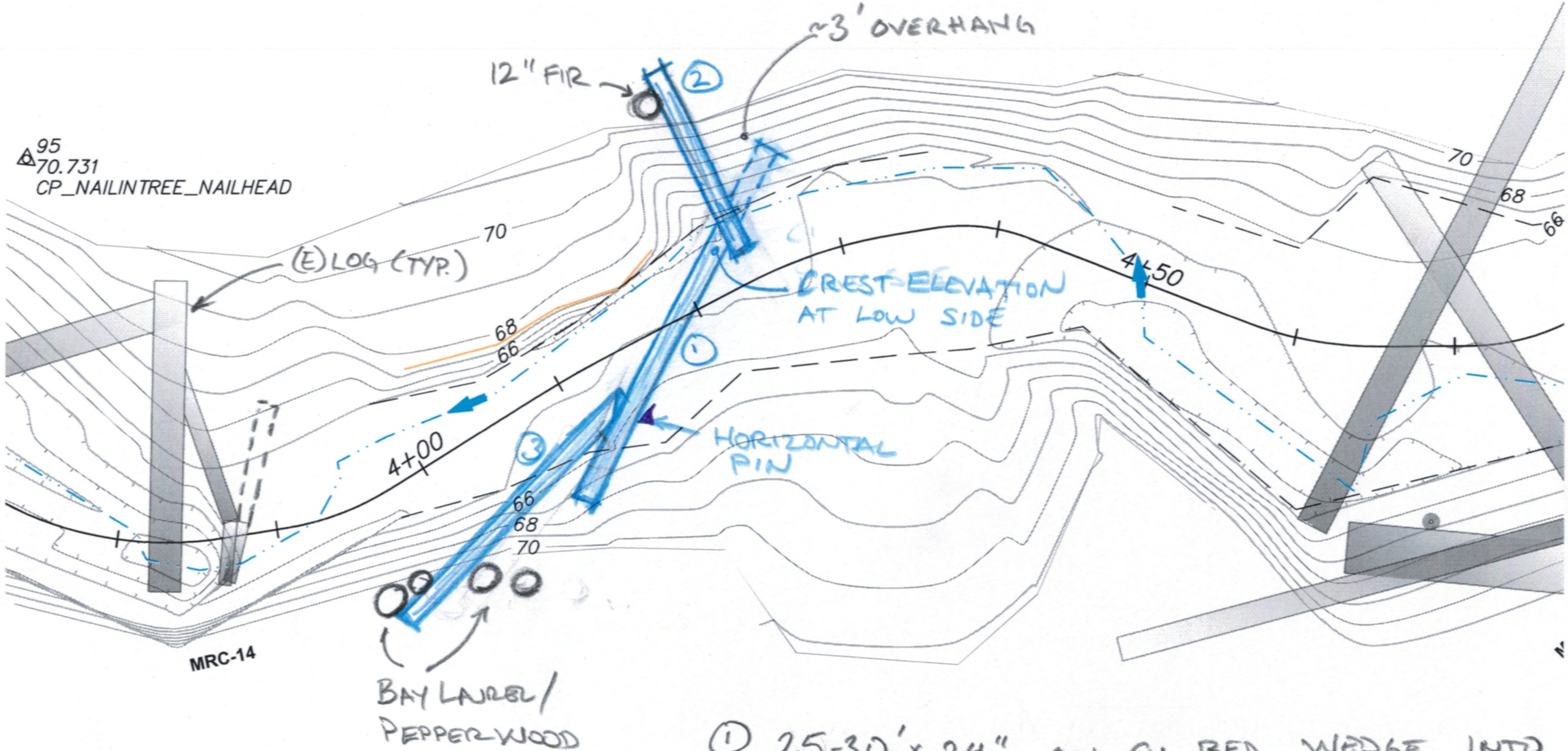
0 10 20 Feet

STX 11

RAISE BED = 1± ft



① 25-30' x 24" ON CH BED WEDGE INTO OVERHANG ON R.B. & L.B. TOE

▲ 1-INCH THREADED REBAR PIN

② 12' x 18" AGAINST FIR TOB RB (U/S) TOE INTO BED OVER ①

③ 20' x 18" IN CROTCH OF BAY ON L.B. TOE INTO CH D/S OF ①

S W E Norte

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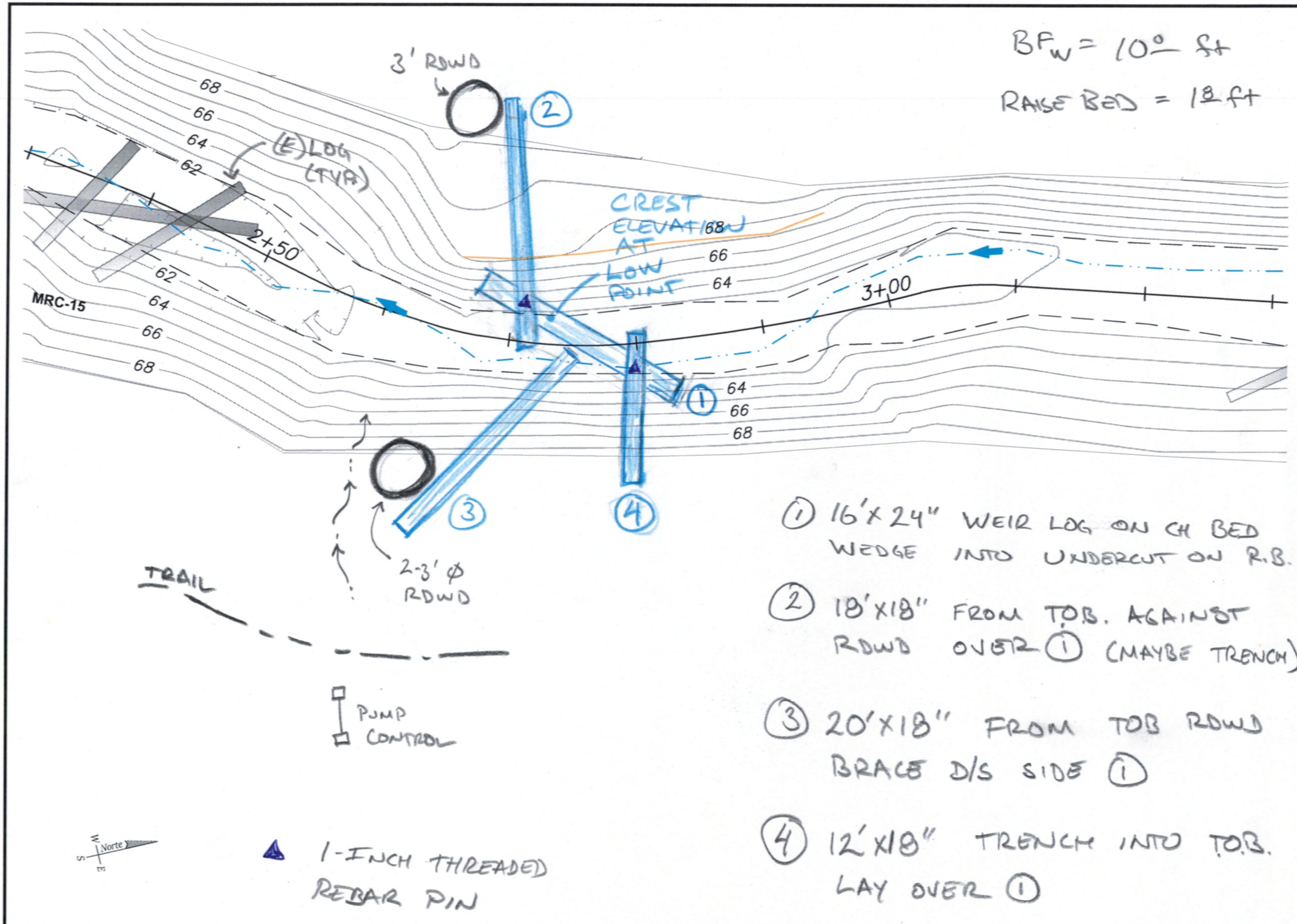

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NEEFUS GULCH WOOD LOADING

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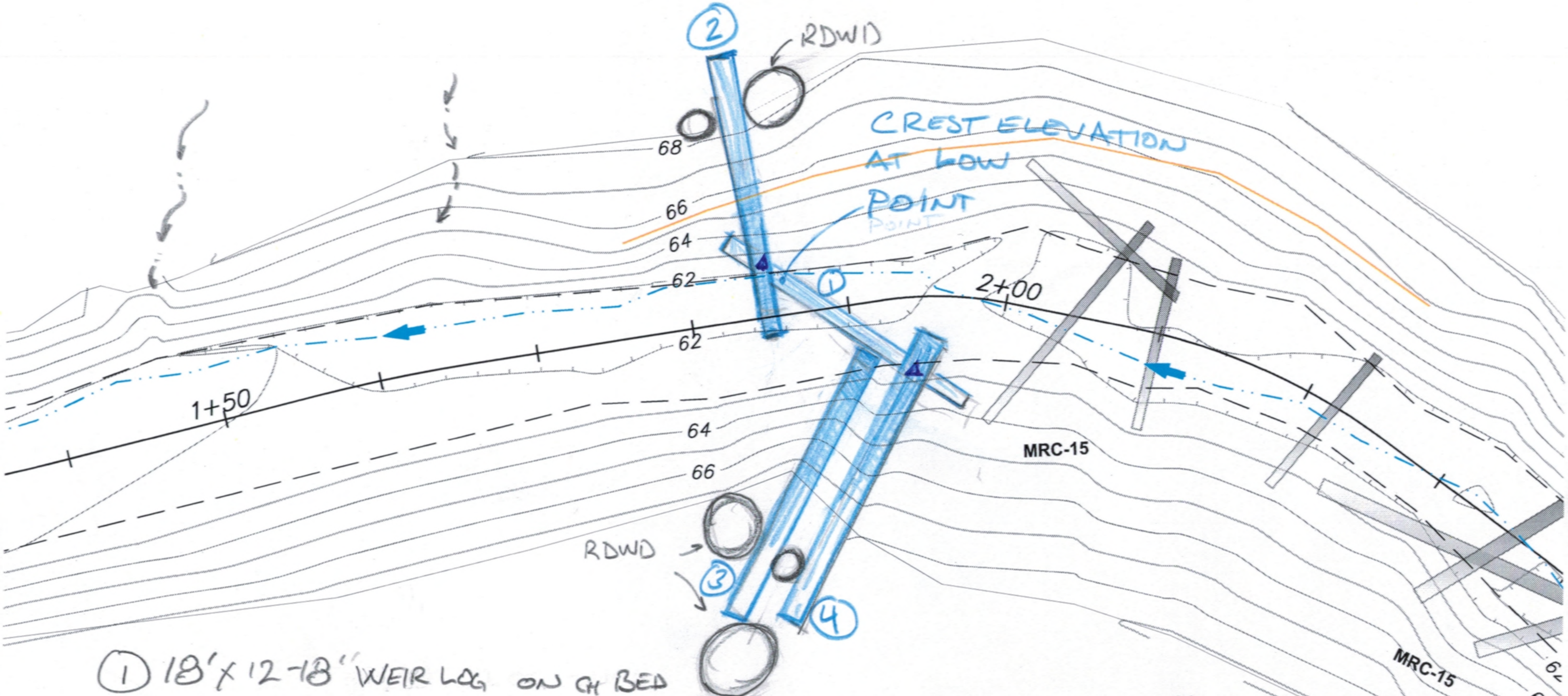
STX 13



① 18'x12-18" WEIR LOG ON CH BED LOW POINT ON L.B.

② 18'x18" ANCHOR BETWEEN RDWD ON BANK OVER ①

③ 20'x18" BETWEEN RDWD ON LB. D/S BRACE INTO ①

④ 20'x18" TRENCH INTO BANK LAY OVER ①

- $BF_W = 12^{\pm}$ ft
- RAISE BED $1^{\pm}$ ft.

1-INCH THREADED REBAR PIN

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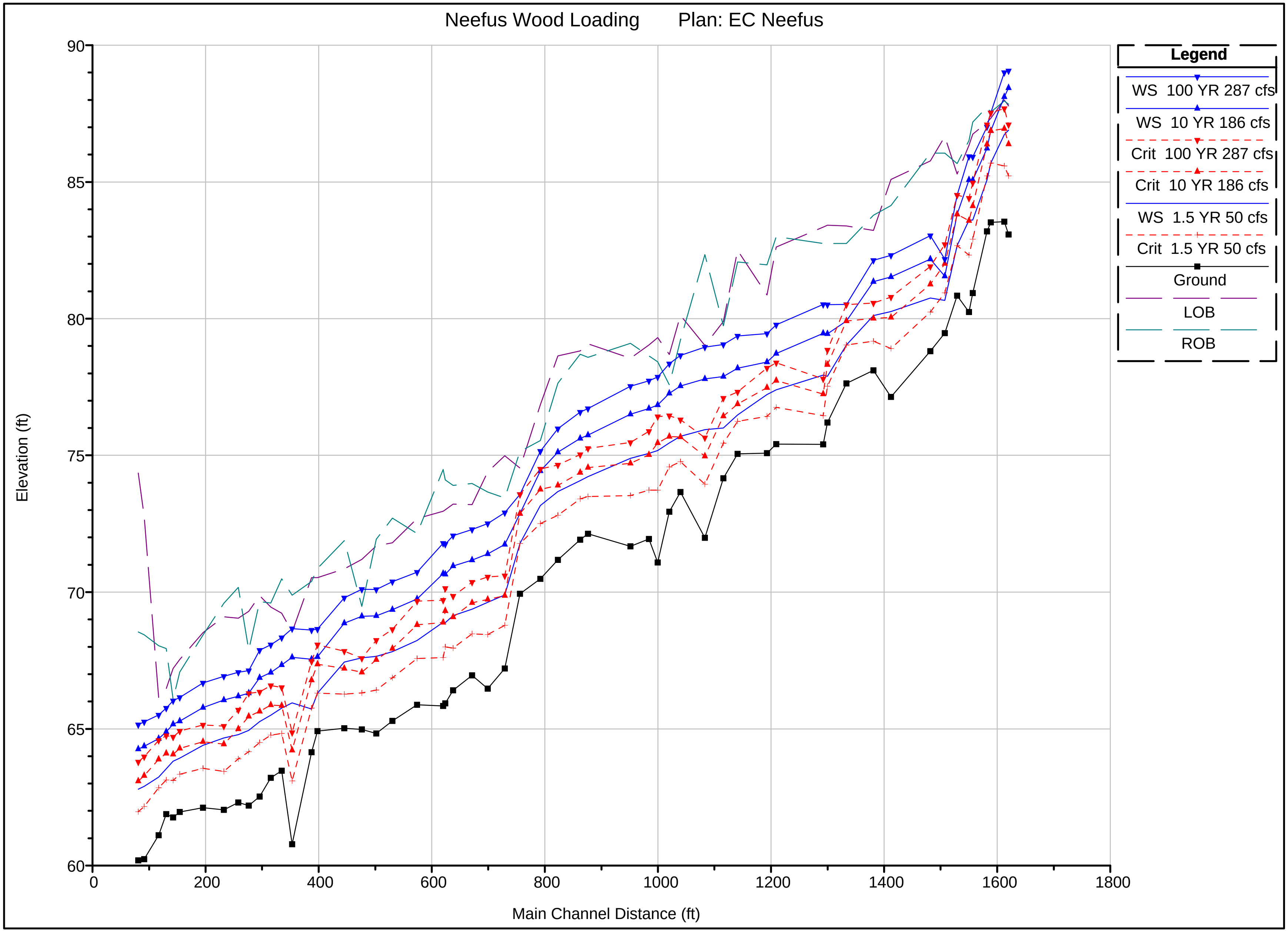
NEEFUS GULCH WOOD LOADING
DATE July, 2019

0 10 20 Feet

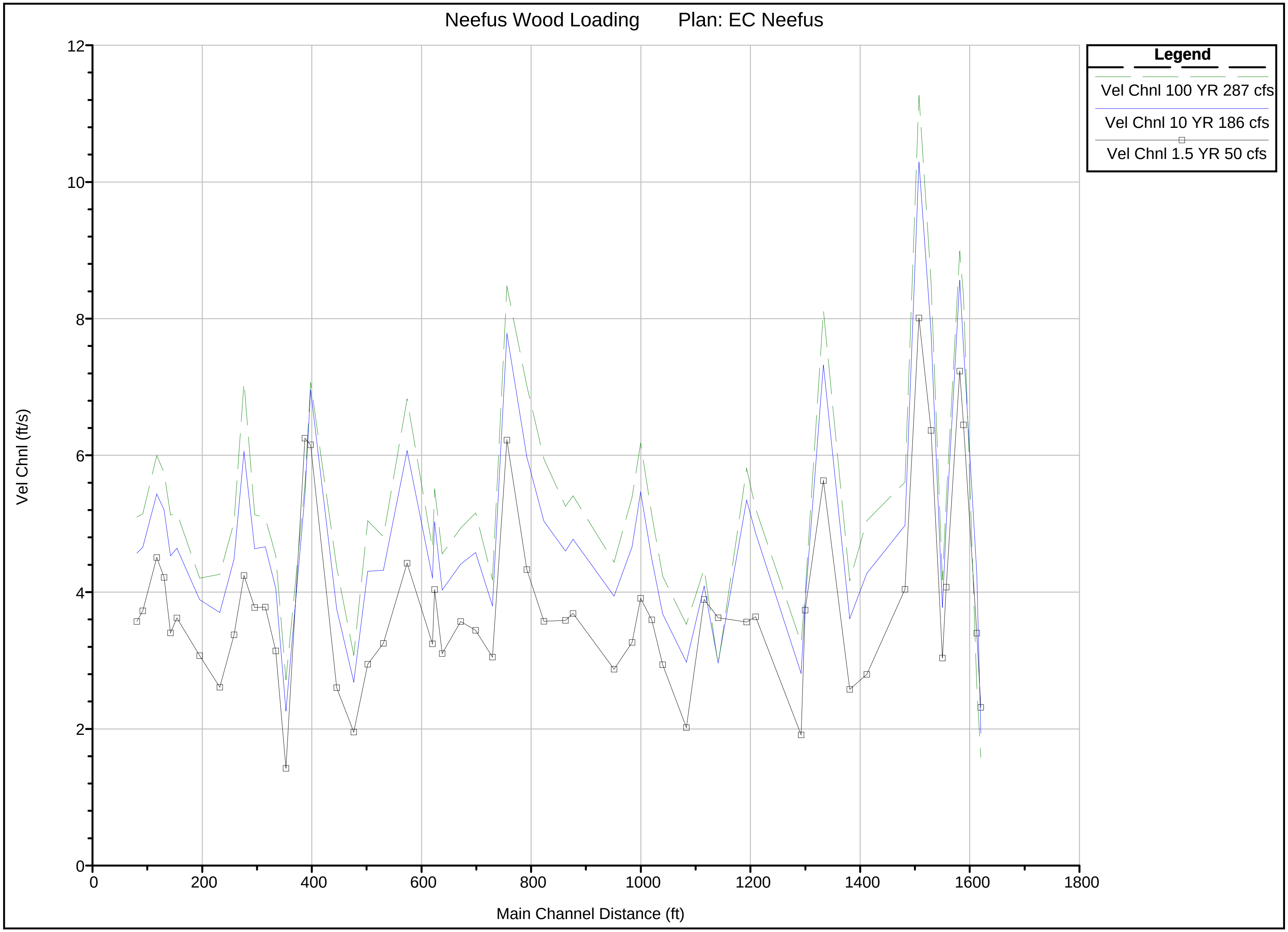
STX 14

ATTACHMENT 2

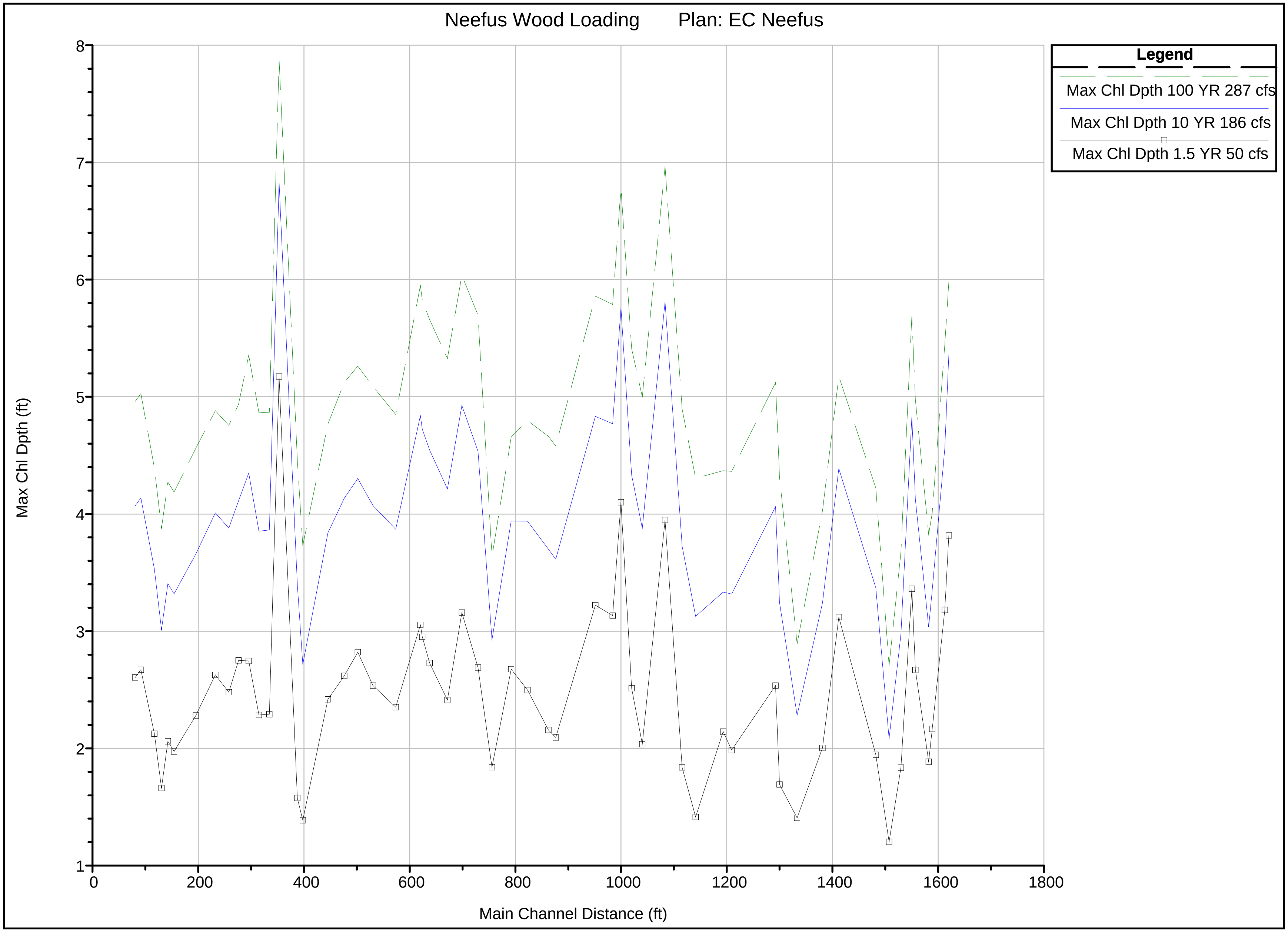
Existing Condition Hydraulic Analysis



Neefus Wood Loading Plan: EC Neefus
Elevation (ft)
90
85
80
75
70
65
60
0
200
400
600
800
1000
1200
1400
1600
1800
Main Channel Distance (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
LOB
ROB



Neefus Wood Loading Plan: EC Neefus
Legend
Vel Chnl 100 YR 287 cfs
Vel Chnl 10 YR 186 cfs
Vel Chnl 1.5 YR 50 cfs
Vel Chnl (ft/s)
Main Channel Distance (ft)
0
2
4
6
8
10
12
0
200
400
600
800
1000
1200
1400
1600
1800



Neefus Wood Loading Plan: EC Neefus
Legend
Max Chl Dpth 100 YR 287 cfs
Max Chl Dpth 10 YR 186 cfs
Max Chl Dpth 1.5 YR 50 cfs
Max Chl Dpth (ft)
Main Channel Distance (ft)
1
2
3
4
5
6
7
8
0
200
400
600
800
1000
1200
1400
1600
1800

HEC-RAS Plan: EC River: Neefus Gulch Reach: Wood Load CL

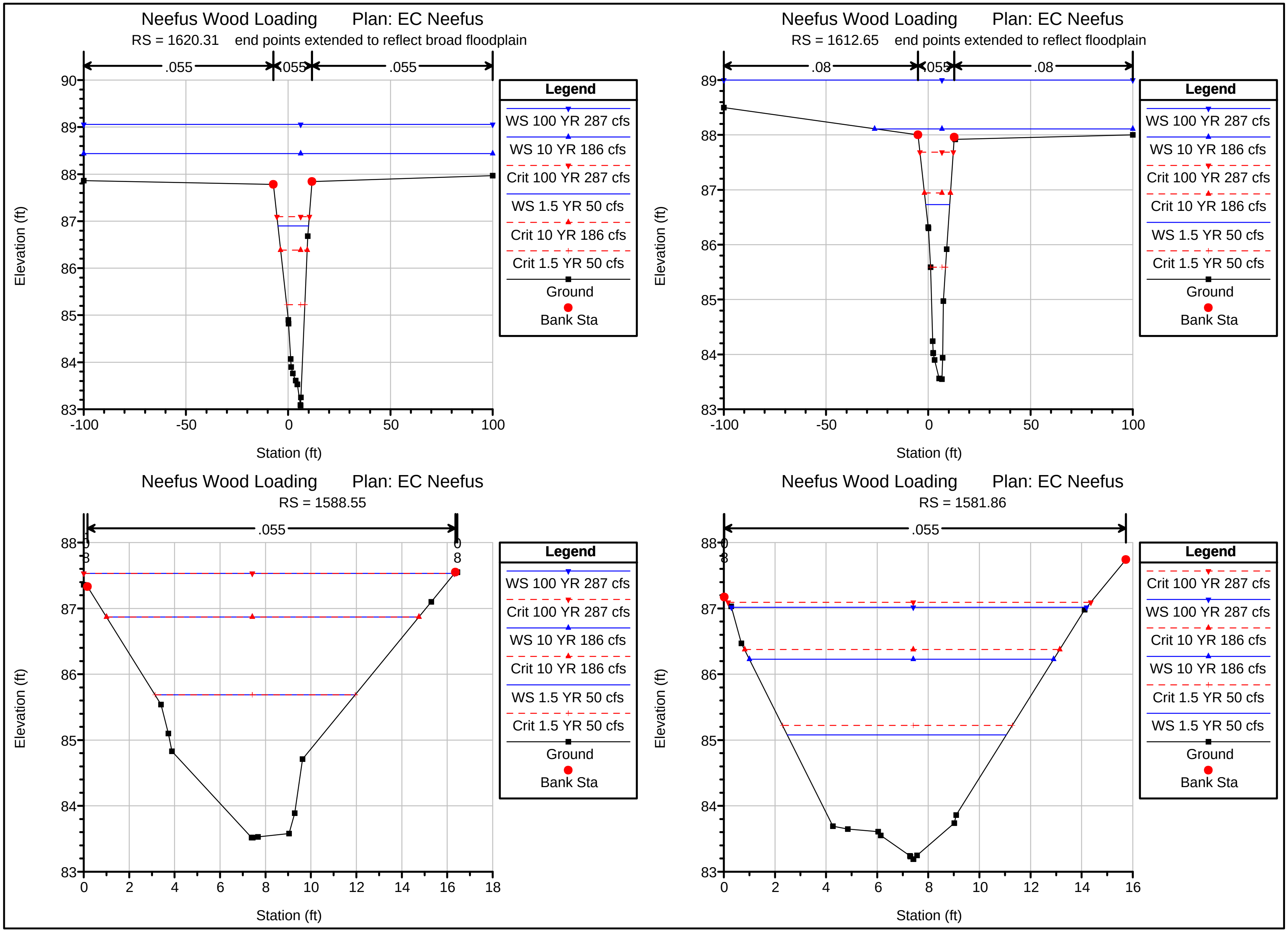
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Wood Load CL	1620.31	1.5 YR 50 cfs	72.00	83.08	86.90	85.22	86.98	0.003389	2.31	31.11	15.02	0.28
Wood Load CL	1620.31	10 YR 186 cfs	186.00	83.08	88.44	86.38	88.48	0.001375	1.94	163.11	200.00	0.19
Wood Load CL	1620.31	100 YR 287 cfs	287.00	83.08	89.06	87.10	89.08	0.000718	1.58	287.22	200.00	0.14
Wood Load CL	1612.65	1.5 YR 50 cfs	72.00	83.55	86.73	85.59	86.91	0.009251	3.40	21.19	11.69	0.44
Wood Load CL	1612.65	10 YR 186 cfs	186.00	83.55	88.11	86.94	88.38	0.009780	4.27	56.28	126.21	0.49
Wood Load CL	1612.65	100 YR 287 cfs	287.00	83.55	89.00	87.69	89.06	0.002385	2.61	219.43	200.00	0.25
Wood Load CL	1588.55	1.5 YR 50 cfs	72.00	83.52	85.69	85.69	86.33	0.051478	6.45	11.17	8.81	1.01
Wood Load CL	1588.55	10 YR 186 cfs	186.00	83.52	86.87	86.87	87.76	0.043968	7.58	24.54	13.76	1.00
Wood Load CL	1588.55	100 YR 287 cfs	287.00	83.52	87.53	87.53	88.61	0.041361	8.32	34.51	16.31	1.00
Wood Load CL	1581.86	1.5 YR 50 cfs	72.00	83.19	85.08	85.22	85.89	0.068455	7.23	9.96	8.57	1.18
Wood Load CL	1581.86	10 YR 186 cfs	186.00	83.19	86.23	86.38	87.37	0.054236	8.56	21.72	11.90	1.12
Wood Load CL	1581.86	100 YR 287 cfs	287.00	83.19	87.01	87.09	88.27	0.045028	8.99	31.92	13.89	1.05
Wood Load CL	1556.99	1.5 YR 50 cfs	72.00	80.94	83.61	82.90	83.87	0.014244	4.07	17.68	9.87	0.54
Wood Load CL	1556.99	10 YR 186 cfs	186.00	80.94	85.06	84.12	85.45	0.016116	4.99	37.27	18.00	0.61
Wood Load CL	1556.99	100 YR 287 cfs	287.00	80.94	85.91	84.97	86.35	0.013692	5.34	53.78	20.81	0.58
Wood Load CL	1550.11	1.5 YR 50 cfs	72.00	80.24	83.60	82.32	83.75	0.006674	3.04	23.71	12.28	0.39
Wood Load CL	1550.11	10 YR 186 cfs	186.00	80.24	85.07	83.58	85.29	0.007551	3.77	49.30	21.02	0.43
Wood Load CL	1550.11	100 YR 287 cfs	287.00	80.24	85.93	84.41	86.20	0.007114	4.18	68.68	24.02	0.44
Wood Load CL	1529.33	1.5 YR 50 cfs	72.00	80.84	82.67	82.67	83.30	0.048635	6.37	11.31	9.14	1.01
Wood Load CL	1529.33	10 YR 186 cfs	186.00	80.84	83.82	83.82	84.76	0.043471	7.81	23.83	12.82	1.01
Wood Load CL	1529.33	100 YR 287 cfs	287.00	80.84	84.52	84.52	85.65	0.041223	8.54	33.61	15.08	1.01
Wood Load CL	1507.17	1.5 YR 50 cfs	72.00	79.47	80.67	80.95	81.67	0.105013	8.01	8.99	9.37	1.44
Wood Load CL	1507.17	10 YR 186 cfs	186.00	79.47	81.55	82.01	83.20	0.092017	10.29	18.07	11.24	1.43
Wood Load CL	1507.17	100 YR 287 cfs	287.00	79.47	82.18	82.72	84.15	0.083207	11.27	25.47	12.56	1.39
Wood Load CL	1481.89	1.5 YR 50 cfs	72.00	78.81	80.75	80.24	81.01	0.015275	4.04	17.81	12.03	0.59
Wood Load CL	1481.89	10 YR 186 cfs	186.00	78.81	82.18	81.26	82.56	0.012523	4.98	37.38	15.28	0.56
Wood Load CL	1481.89	100 YR 287 cfs	287.00	78.81	83.03	81.91	83.52	0.012457	5.61	51.15	17.02	0.57
Wood Load CL	1412.05	1.5 YR 50 cfs	72.00	77.14	80.26	78.91	80.38	0.004928	2.80	25.75	12.27	0.34
Wood Load CL	1412.05	10 YR 186 cfs	186.00	77.14	81.53	80.05	81.81	0.008228	4.27	43.53	15.86	0.45
Wood Load CL	1412.05	100 YR 287 cfs	287.00	77.14	82.32	80.79	82.71	0.009667	5.04	56.91	18.14	0.50
Wood Load CL	1381.12	1.5 YR 50 cfs	72.00	78.11	80.11	79.17	80.22	0.005254	2.58	27.93	17.16	0.36
Wood Load CL	1381.12	10 YR 186 cfs	186.00	78.11	81.35	80.01	81.55	0.006136	3.61	51.50	20.93	0.41
Wood Load CL	1381.12	100 YR 287 cfs	287.00	78.11	82.14	80.57	82.41	0.006498	4.17	68.87	23.33	0.43
Wood Load CL	1333.13	1.5 YR 50 cfs	72.00	77.63	79.04	79.04	79.53	0.048497	5.63	12.79	13.25	1.01
Wood Load CL	1333.13	10 YR 186 cfs	186.00	77.63	79.91	79.91	80.75	0.042194	7.32	25.40	15.49	1.01
Wood Load CL	1333.13	100 YR 287 cfs	287.00	77.63	80.52	80.51	81.55	0.039300	8.13	35.32	17.22	1.00
Wood Load CL	1299.87	1.5 YR 50 cfs	72.00	76.20	77.89	77.53	78.11	0.016854	3.74	19.27	16.57	0.61
Wood Load CL	1299.87	10 YR 186 cfs	186.00	76.20	79.44	78.32	79.67	0.007533	3.85	48.26	20.79	0.45
Wood Load CL	1299.87	100 YR 287 cfs	287.00	76.20	80.51	78.85	80.76	0.005755	3.99	72.02	23.65	0.40
Wood Load CL	1292.17	1.5 YR 50 cfs	72.00	75.40	77.94	76.45	77.99	0.002138	1.91	37.68	17.48	0.23
Wood Load CL	1292.17	10 YR 186 cfs	186.00	75.40	79.46	77.24	79.58	0.002790	2.81	66.15	19.85	0.27
Wood Load CL	1292.17	100 YR 287 cfs	287.00	75.40	80.52	77.79	80.69	0.002966	3.26	88.09	21.57	0.28
Wood Load CL	1209.39	1.5 YR 50 cfs	72.00	75.41	77.40	76.75	77.60	0.011542	3.64	19.79	12.57	0.51
Wood Load CL	1209.39	10 YR 186 cfs	186.00	75.41	78.73	77.73	79.09	0.011666	4.86	38.25	15.08	0.54
Wood Load CL	1209.39	100 YR 287 cfs	287.00	75.41	79.77	78.38	80.20	0.010076	5.22	54.97	16.93	0.51
Wood Load CL	1192.96	1.5 YR 50 cfs	72.00	75.08	77.22	76.42	77.42	0.010109	3.56	20.21	11.29	0.47
Wood Load CL	1192.96	10 YR 186 cfs	186.00	75.08	78.41	77.48	78.86	0.014585	5.35	34.79	13.22	0.58
Wood Load CL	1192.96	100 YR 287 cfs	287.00	75.08	79.45	78.20	79.97	0.013238	5.81	49.38	14.91	0.56
Wood Load CL	1140.88	1.5 YR 50 cfs	72.00	75.06	76.47	76.24	76.68	0.021522	3.62	19.87	22.27	0.68
Wood Load CL	1140.88	10 YR 186 cfs	186.00	75.06	78.19	76.88	78.32	0.004366	2.97	62.68	27.77	0.35
Wood Load CL	1140.88	100 YR 287 cfs	287.00	75.06	79.37	77.32	79.50	0.002892	2.94	97.71	31.84	0.30
Wood Load CL	1115.69	1.5 YR 50 cfs	72.00	74.16	76.00	75.45	76.23	0.014256	3.89	18.50	12.28	0.56
Wood Load CL	1115.69	10 YR 186 cfs	186.00	74.16	77.89	76.44	78.15	0.007391	4.09	45.51	16.34	0.43
Wood Load CL	1115.69	100 YR 287 cfs	287.00	74.16	79.06	77.10	79.35	0.006299	4.34	66.10	18.86	0.41
Wood Load CL	1083.08	1.5 YR 50 cfs	72.00	71.99	75.94	73.95	76.00	0.002151	2.02	35.64	13.21	0.22
Wood Load CL	1083.08	10 YR 186 cfs	186.00	71.99	77.80	74.97	77.94	0.003000	2.98	62.46	15.59	0.26
Wood Load CL	1083.08	100 YR 287 cfs	287.00	71.99	78.96	75.65	79.15	0.003476	3.53	81.33	17.06	0.28
Wood Load CL	1040	1.5 YR 50 cfs	72.00	73.66	75.70	74.77	75.83	0.006502	2.94	24.52	13.32	0.38
Wood Load CL	1040	10 YR 186 cfs	186.00	73.66	77.54	75.67	77.75	0.005308	3.68	50.51	14.92	0.35
Wood Load CL	1040	100 YR 287 cfs	287.00	73.66	78.66	76.30	78.94	0.005549	4.23	67.80	15.89	0.36
Wood Load CL	1020	1.5 YR 50 cfs	72.00	72.94	75.45	74.58	75.65	0.009579	3.59	20.03	10.51	0.46

HEC-RAS Plan: EC River: Neefus Gulch Reach: Wood Load CL (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Wood Load CL	1020	10 YR 186 cfs	186.00	72.94	77.27	75.69	77.58	0.008481	4.49	41.47	13.05	0.44
Wood Load CL	1020	100 YR 287 cfs	287.00	72.94	78.35	76.45	78.76	0.008812	5.13	55.94	13.70	0.45
Wood Load CL	999.78	1.5 YR 50 cfs	72.00	71.08	75.18	73.73	75.42	0.013017	3.91	18.41	7.78	0.45
Wood Load CL	999.78	10 YR 186 cfs	186.00	71.08	76.84	75.46	77.30	0.017076	5.46	34.04	11.07	0.55
Wood Load CL	999.78	100 YR 287 cfs	287.00	71.08	77.87	76.42	78.46	0.017733	6.18	46.45	13.10	0.58
Wood Load CL	984.2	1.5 YR 50 cfs	72.00	71.94	75.07	73.73	75.24	0.006929	3.26	22.06	9.59	0.38
Wood Load CL	984.2	10 YR 186 cfs	186.00	71.94	76.71	75.03	77.05	0.009426	4.66	39.90	12.21	0.45
Wood Load CL	984.2	100 YR 287 cfs	287.00	71.94	77.73	75.88	78.18	0.010518	5.39	53.24	14.04	0.49
Wood Load CL	951.36	1.5 YR 50 cfs	72.00	71.67	74.89	73.53	75.02	0.005375	2.87	25.06	11.89	0.35
Wood Load CL	951.36	10 YR 186 cfs	186.00	71.67	76.50	74.71	76.74	0.006511	3.94	47.18	15.66	0.40
Wood Load CL	951.36	100 YR 287 cfs	287.00	71.67	77.53	75.47	77.83	0.006749	4.44	64.66	18.43	0.42
Wood Load CL	876.34	1.5 YR 50 cfs	72.00	72.13	74.22	73.50	74.43	0.011074	3.69	19.52	11.44	0.50
Wood Load CL	876.34	10 YR 186 cfs	186.00	72.13	75.75	74.56	76.10	0.010469	4.77	38.97	13.94	0.50
Wood Load CL	876.34	100 YR 287 cfs	287.00	72.13	76.71	75.25	77.16	0.010575	5.41	53.07	15.30	0.51
Wood Load CL	862.55	1.5 YR 50 cfs	72.00	71.92	74.08	73.41	74.28	0.010912	3.59	20.06	12.26	0.49
Wood Load CL	862.55	10 YR 186 cfs	186.00	71.92	75.62	74.37	75.95	0.009568	4.60	40.44	14.15	0.48
Wood Load CL	862.55	100 YR 287 cfs	287.00	71.92	76.58	75.03	77.01	0.009820	5.25	54.62	15.32	0.49
Wood Load CL	823.13	1.5 YR 50 cfs	72.00	71.18	73.68	72.81	73.88	0.009495	3.57	20.16	10.63	0.46
Wood Load CL	823.13	10 YR 186 cfs	186.00	71.18	75.12	73.91	75.51	0.011675	5.04	36.93	12.63	0.52
Wood Load CL	823.13	100 YR 287 cfs	287.00	71.18	75.98	74.65	76.53	0.013397	5.95	48.25	13.81	0.56
Wood Load CL	791.97	1.5 YR 50 cfs	72.00	70.49	73.17	72.50	73.46	0.017422	4.33	16.63	9.84	0.59
Wood Load CL	791.97	10 YR 186 cfs	186.00	70.49	74.43	73.76	74.98	0.021289	5.98	31.12	12.85	0.68
Wood Load CL	791.97	100 YR 287 cfs	287.00	70.49	75.15	74.50	75.91	0.024119	7.02	40.90	14.39	0.73
Wood Load CL	755.86	1.5 YR 50 cfs	72.00	69.94	71.78	71.78	72.38	0.048387	6.22	11.57	9.80	1.01
Wood Load CL	755.86	10 YR 186 cfs	186.00	69.94	72.87	72.87	73.81	0.043230	7.78	23.90	12.89	1.01
Wood Load CL	755.86	100 YR 287 cfs	287.00	69.94	73.57	73.57	74.69	0.041164	8.47	33.87	15.44	1.01
Wood Load CL	729.31	1.5 YR 50 cfs	72.00	67.21	69.90	68.79	70.04	0.006504	3.05	23.61	11.90	0.38
Wood Load CL	729.31	10 YR 186 cfs	186.00	67.21	71.75	69.87	71.97	0.005862	3.80	48.94	15.63	0.38
Wood Load CL	729.31	100 YR 287 cfs	287.00	67.21	72.91	70.59	73.18	0.005648	4.18	68.58	18.22	0.38
Wood Load CL	698.89	1.5 YR 50 cfs	72.00	66.47	69.63	68.45	69.81	0.008018	3.44	20.92	9.69	0.41
Wood Load CL	698.89	10 YR 186 cfs	186.00	66.47	71.40	69.74	71.72	0.008940	4.58	40.63	12.60	0.45
Wood Load CL	698.89	100 YR 287 cfs	287.00	66.47	72.51	70.55	72.92	0.009213	5.16	55.64	14.43	0.46
Wood Load CL	671.36	1.5 YR 50 cfs	72.00	66.96	69.37	68.47	69.57	0.009370	3.57	20.17	10.66	0.46
Wood Load CL	671.36	10 YR 186 cfs	186.00	66.96	71.17	69.61	71.48	0.008133	4.41	42.17	13.57	0.44
Wood Load CL	671.36	100 YR 287 cfs	287.00	66.96	72.29	70.36	72.67	0.008066	4.94	58.14	15.12	0.44
Wood Load CL	637.62	1.5 YR 50 cfs	72.00	66.41	69.14	67.96	69.29	0.006368	3.10	23.22	11.08	0.38
Wood Load CL	637.62	10 YR 186 cfs	186.00	66.41	70.96	69.09	71.21	0.006453	4.03	46.14	14.15	0.39
Wood Load CL	637.62	100 YR 287 cfs	287.00	66.41	72.07	69.85	72.39	0.006653	4.56	62.94	16.03	0.41
Wood Load CL	623.81	1.5 YR 50 cfs	72.00	65.93	68.88	67.99	69.14	0.012501	4.04	17.83	9.08	0.51
Wood Load CL	623.81	10 YR 186 cfs	186.00	65.93	70.65	69.31	71.05	0.011971	5.03	36.97	12.54	0.52
Wood Load CL	623.81	100 YR 287 cfs	287.00	65.93	71.76	70.14	72.23	0.011610	5.51	52.07	14.98	0.52
Wood Load CL	620.24	1.5 YR 50 cfs	72.00	65.84	68.89	67.60	69.06	0.007215	3.25	22.19	10.23	0.39
Wood Load CL	620.24	10 YR 186 cfs	186.00	65.84	70.68	68.89	70.95	0.007850	4.21	44.20	14.45	0.42
Wood Load CL	620.24	100 YR 287 cfs	287.00	65.84	71.79	69.71	72.12	0.007938	4.63	61.94	17.76	0.44
Wood Load CL	573.83	1.5 YR 50 cfs	72.00	65.88	68.23	67.57	68.54	0.016140	4.42	16.28	8.56	0.57
Wood Load CL	573.83	10 YR 186 cfs	186.00	65.88	69.75	68.81	70.32	0.019228	6.07	30.66	10.65	0.63
Wood Load CL	573.83	100 YR 287 cfs	287.00	65.88	70.73	69.67	71.45	0.020019	6.82	42.07	12.59	0.66
Wood Load CL	530.49	1.5 YR 50 cfs	72.00	65.29	67.83	66.87	67.99	0.007923	3.25	22.14	11.98	0.42
Wood Load CL	530.49	10 YR 186 cfs	186.00	65.29	69.36	67.94	69.65	0.008452	4.32	43.05	15.25	0.45
Wood Load CL	530.49	100 YR 287 cfs	287.00	65.29	70.38	68.64	70.74	0.008314	4.81	59.66	17.41	0.46
Wood Load CL	501.93	1.5 YR 50 cfs	72.00	64.83	67.65	66.42	67.79	0.005612	2.95	24.45	11.66	0.36
Wood Load CL	501.93	10 YR 186 cfs	186.00	64.83	69.13	67.53	69.42	0.007616	4.31	43.20	13.66	0.43
Wood Load CL	501.93	100 YR 287 cfs	287.00	64.83	70.09	68.24	70.49	0.008543	5.04	56.90	14.95	0.46
Wood Load CL	476.39	1.5 YR 50 cfs	72.00	64.98	67.60	66.31	67.66	0.002455	1.95	36.90	19.53	0.25
Wood Load CL	476.39	10 YR 186 cfs	186.00	64.98	69.11	67.06	69.23	0.002639	2.68	69.29	23.23	0.27
Wood Load CL	476.39	100 YR 287 cfs	287.00	64.98	70.10	67.58	70.25	0.002689	3.08	93.25	25.03	0.28
Wood Load CL	445.45	1.5 YR 50 cfs	72.00	65.02	67.44	66.27	67.54	0.004502	2.60	27.66	14.13	0.33
Wood Load CL	445.45	10 YR 186 cfs	186.00	65.02	68.86	67.20	69.08	0.005721	3.75	49.56	16.67	0.38
Wood Load CL	445.45	100 YR 287 cfs	287.00	65.02	69.79	67.84	70.08	0.006194	4.36	65.82	18.34	0.41
Wood Load CL	397.93	1.5 YR 50 cfs	72.00	64.92	66.31	66.31	66.89	0.049306	6.16	11.70	9.98	1.00
Wood Load CL	397.93	10 YR 186 cfs	186.00	64.92	67.64	67.37	68.39	0.030857	6.96	26.73	12.64	0.84

HEC-RAS Plan: EC River: Neefus Gulch Reach: Wood Load CL (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Wood Load CL	397.93	100 YR 287 cfs	287.00	64.92	68.65	68.07	69.43	0.023420	7.07	40.60	14.88	0.75
Wood Load CL	387.4	1.5 YR 50 cfs	72.00	64.15	65.73	65.76	66.33	0.056379	6.25	11.51	10.54	1.05
Wood Load CL	387.4	10 YR 186 cfs	186.00	64.15	67.55	66.78	68.00	0.017043	5.42	34.33	14.69	0.62
Wood Load CL	387.4	100 YR 287 cfs	287.00	64.15	68.61	67.47	69.09	0.013753	5.57	51.55	17.75	0.58
Wood Load CL	352.87	1.5 YR 50 cfs	72.00	60.78	65.95	63.09	65.98	0.000829	1.42	50.64	17.20	0.15
Wood Load CL	352.87	10 YR 186 cfs	186.00	60.78	67.61	64.21	67.69	0.001466	2.26	82.38	21.02	0.20
Wood Load CL	352.87	100 YR 287 cfs	287.00	60.78	68.66	64.86	68.77	0.001778	2.72	105.62	23.27	0.22
Wood Load CL	334.43	1.5 YR 50 cfs	72.00	63.47	65.76	64.83	65.91	0.007319	3.14	22.94	12.83	0.41
Wood Load CL	334.43	10 YR 186 cfs	186.00	63.47	67.33	65.84	67.59	0.007073	4.06	45.85	16.30	0.43
Wood Load CL	334.43	100 YR 287 cfs	287.00	63.47	68.34	66.51	68.66	0.006973	4.53	63.31	18.52	0.43
Wood Load CL	315.1	1.5 YR 50 cfs	72.00	63.21	65.49	64.77	65.72	0.011755	3.78	19.05	11.36	0.51
Wood Load CL	315.1	10 YR 186 cfs	186.00	63.21	67.06	65.87	67.40	0.010333	4.66	39.89	15.20	0.51
Wood Load CL	315.1	100 YR 287 cfs	287.00	63.21	68.07	66.58	68.47	0.009627	5.08	56.46	17.66	0.50
Wood Load CL	295.72	1.5 YR 50 cfs	72.00	62.52	65.27	64.50	65.49	0.011722	3.77	19.08	11.28	0.51
Wood Load CL	295.72	10 YR 186 cfs	186.00	62.52	66.87	65.64	67.20	0.009912	4.63	40.14	14.71	0.49
Wood Load CL	295.72	100 YR 287 cfs	287.00	62.52	67.87	66.35	68.28	0.009530	5.13	55.91	16.69	0.49
Wood Load CL	276.21	1.5 YR 50 cfs	72.00	62.19	64.94	64.17	65.22	0.014095	4.24	16.97	8.90	0.54
Wood Load CL	276.21	10 YR 186 cfs	186.00	62.19	66.30	65.46	66.87	0.018872	6.05	30.73	11.25	0.65
Wood Load CL	276.21	100 YR 287 cfs	287.00	62.19	67.13	66.29	67.90	0.021333	7.08	40.56	12.62	0.70
Wood Load CL	257.93	1.5 YR 50 cfs	72.00	62.31	64.79	63.90	64.97	0.008831	3.37	21.33	12.33	0.45
Wood Load CL	257.93	10 YR 186 cfs	186.00	62.31	66.19	65.00	66.50	0.009684	4.48	41.51	16.51	0.50
Wood Load CL	257.93	100 YR 287 cfs	287.00	62.31	67.07	65.69	67.46	0.009801	5.02	57.15	19.23	0.51
Wood Load CL	232.27	1.5 YR 50 cfs	72.00	62.04	64.67	63.44	64.77	0.004544	2.61	27.59	14.42	0.33
Wood Load CL	232.27	10 YR 186 cfs	186.00	62.04	66.05	64.44	66.26	0.005842	3.70	50.27	18.39	0.39
Wood Load CL	232.27	100 YR 287 cfs	287.00	62.04	66.92	65.10	67.20	0.006296	4.26	67.38	20.93	0.42
Wood Load CL	195.53	1.5 YR 50 cfs	72.00	62.12	64.40	63.55	64.55	0.007695	3.07	23.44	14.79	0.43
Wood Load CL	195.53	10 YR 186 cfs	186.00	62.12	65.78	64.53	66.01	0.007489	3.89	47.82	20.55	0.45
Wood Load CL	195.53	100 YR 287 cfs	287.00	62.12	66.68	65.15	66.96	0.007002	4.21	68.25	24.80	0.45
Wood Load CL	154.11	1.5 YR 50 cfs	72.00	61.96	63.93	63.34	64.14	0.011962	3.62	19.87	13.33	0.52
Wood Load CL	154.11	10 YR 186 cfs	186.00	61.96	65.28	64.29	65.61	0.010886	4.64	40.06	16.68	0.53
Wood Load CL	154.11	100 YR 287 cfs	287.00	61.96	66.15	64.92	66.56	0.010567	5.16	55.65	19.17	0.53
Wood Load CL	142.42	1.5 YR 50 cfs	72.00	61.76	63.82	63.11	64.00	0.009680	3.40	21.15	13.27	0.48
Wood Load CL	142.42	10 YR 186 cfs	186.00	61.76	65.17	64.06	65.48	0.009810	4.53	41.05	16.28	0.50
Wood Load CL	142.42	100 YR 287 cfs	287.00	61.76	66.03	64.70	66.44	0.009883	5.13	55.98	18.22	0.52
Wood Load CL	130.57	1.5 YR 50 cfs	72.00	61.88	63.54	63.13	63.82	0.017877	4.22	17.08	12.27	0.63
Wood Load CL	130.57	10 YR 186 cfs	186.00	61.88	64.89	64.10	65.31	0.014484	5.20	35.76	15.39	0.60
Wood Load CL	130.57	100 YR 287 cfs	287.00	61.88	65.76	64.75	66.27	0.013661	5.75	49.93	17.41	0.60
Wood Load CL	117.19	1.5 YR 50 cfs	72.00	61.11	63.23	62.85	63.55	0.020692	4.50	15.98	11.30	0.67
Wood Load CL	117.19	10 YR 186 cfs	186.00	61.11	64.64	63.89	65.10	0.016261	5.43	34.23	14.69	0.63
Wood Load CL	117.19	100 YR 287 cfs	287.00	61.11	65.50	64.58	66.06	0.015441	6.00	47.84	16.78	0.63
Wood Load CL	91.6	1.5 YR 50 cfs	72.00	60.23	62.90	62.16	63.12	0.011365	3.72	19.33	11.78	0.51
Wood Load CL	91.6	10 YR 186 cfs	186.00	60.23	64.37	63.28	64.70	0.010701	4.65	39.96	16.37	0.52
Wood Load CL	91.6	100 YR 287 cfs	287.00	60.23	65.26	63.98	65.67	0.010426	5.15	55.78	19.16	0.53
Wood Load CL	80.78	1.5 YR 50 cfs	72.00	60.19	62.79	61.97	62.99	0.010017	3.57	20.17	11.84	0.48
Wood Load CL	80.78	10 YR 186 cfs	186.00	60.19	64.26	63.09	64.58	0.010018	4.57	40.71	16.18	0.51
Wood Load CL	80.78	100 YR 287 cfs	287.00	60.19	65.15	63.79	65.55	0.010008	5.10	56.28	18.82	0.52


Neefus Wood Loading Plan: EC Neefus
RS = 1620.31 end points extended to reflect broad floodplain
.055
.055
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1612.65 end points extended to reflect floodplain
.08
.055
.08
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1588.55
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1581.86
.055
Elevation (ft)
Station (ft)
Legend
Crit 100 YR 287 cfs
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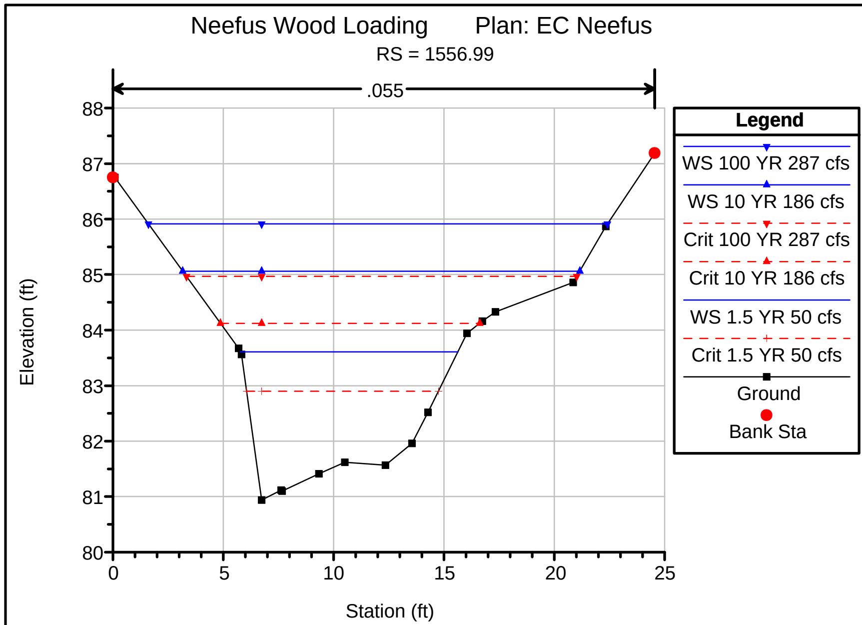
Crit 1.5 YR 50 cfs
WS 1.5 YR 50 cfs
Ground
Bank Sta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RS = 1556.99
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Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
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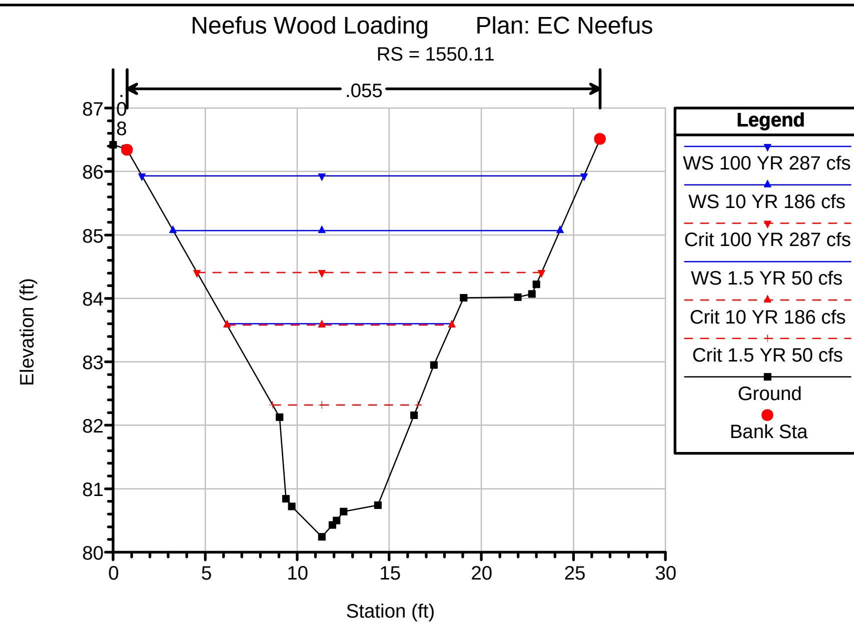
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta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RS = 1550.11
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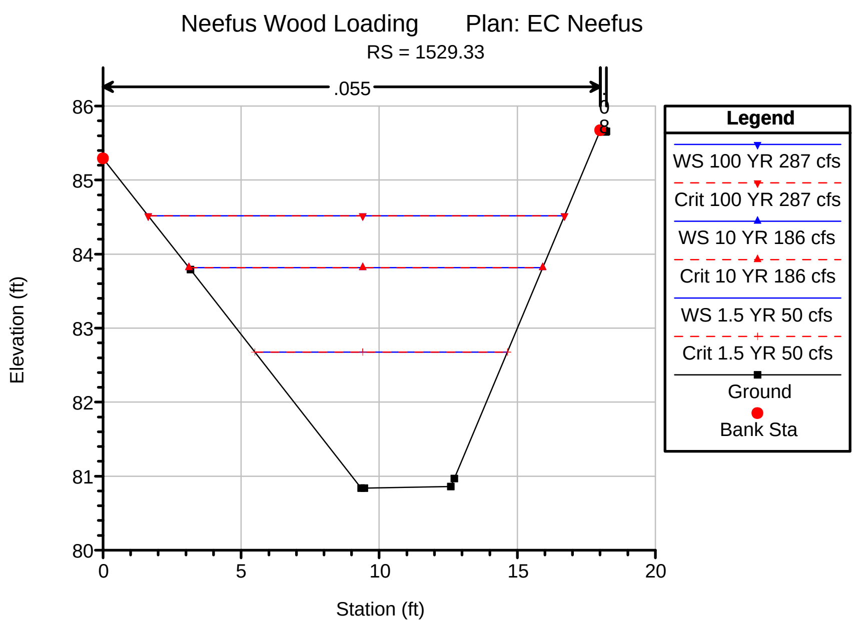
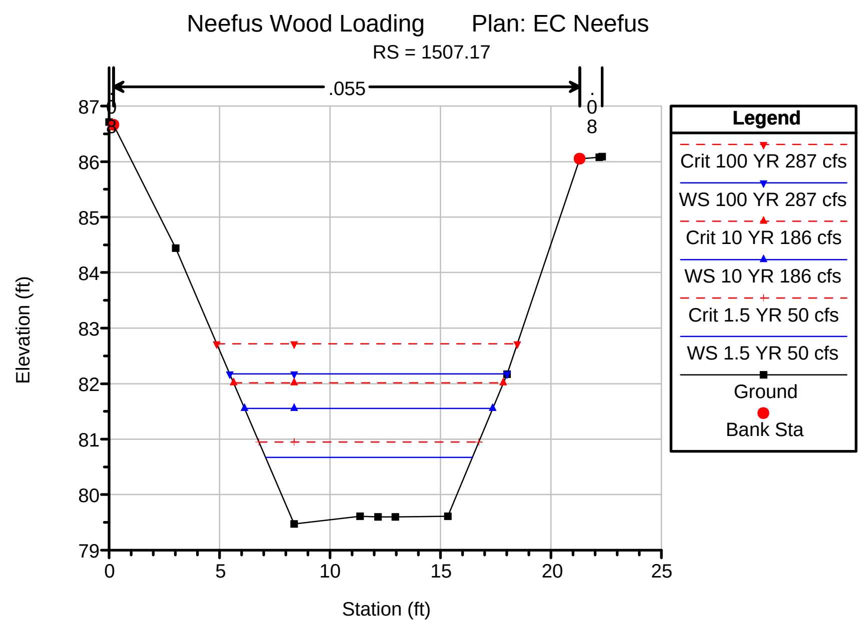
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta


Neefus Wood Loading Plan: EC Neefus
RS = 1529.33
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta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RS = 1507.17
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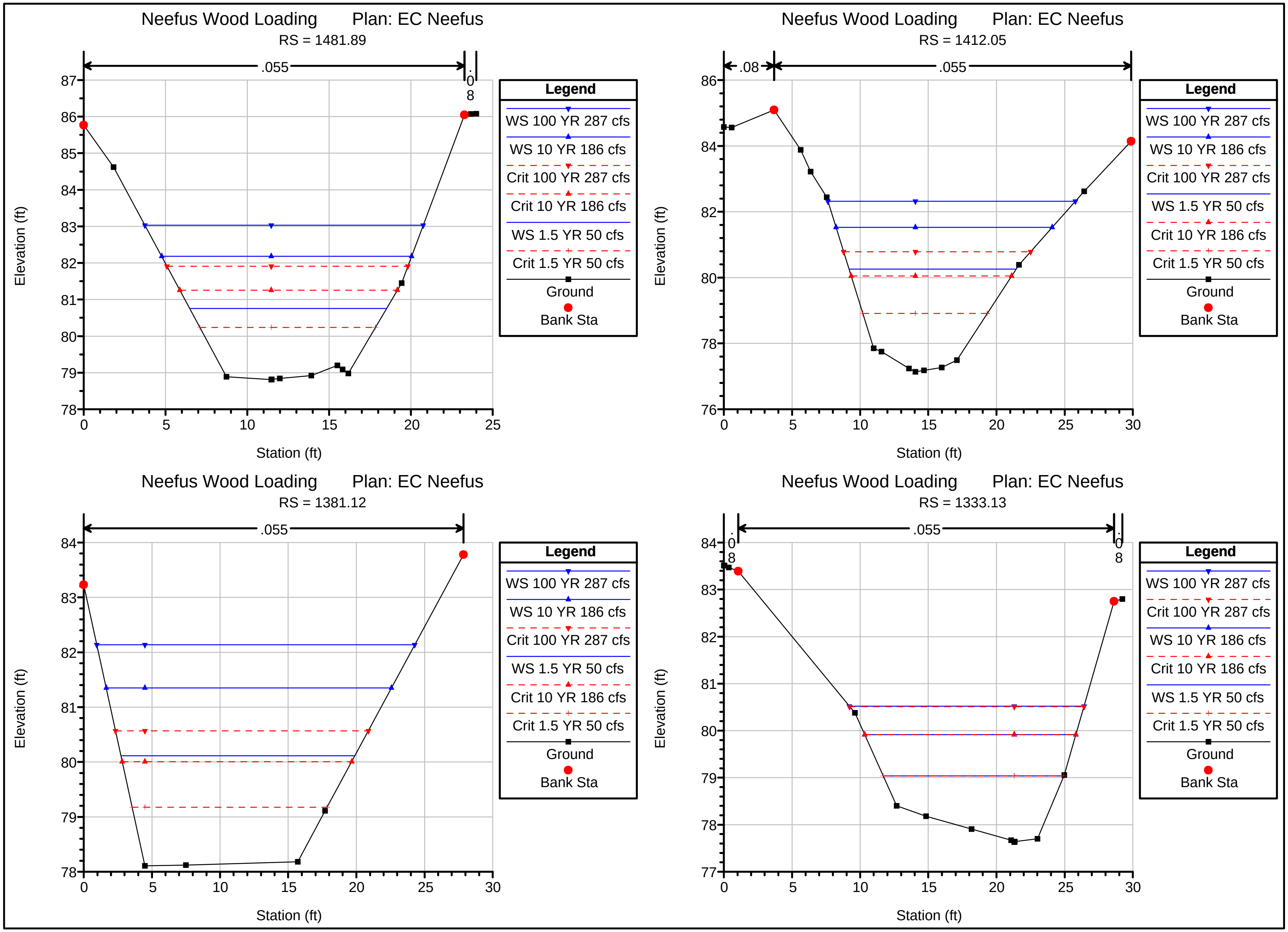
Elevation (ft)
Station (ft)
Legend
Crit 100 YR 287 cfs
WS 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 10 YR 186 cfs
Crit 1.5 YR 50 cfs
WS 1.5 YR 50 cfs
Ground
Bank Sta



Neefus Wood Loading Plan: EC Neefus
RS = 1481.89
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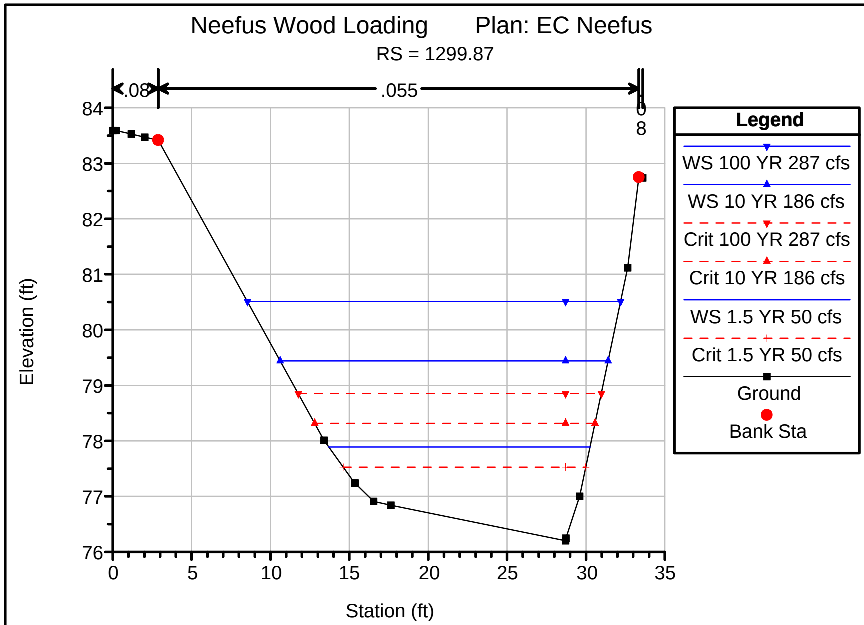
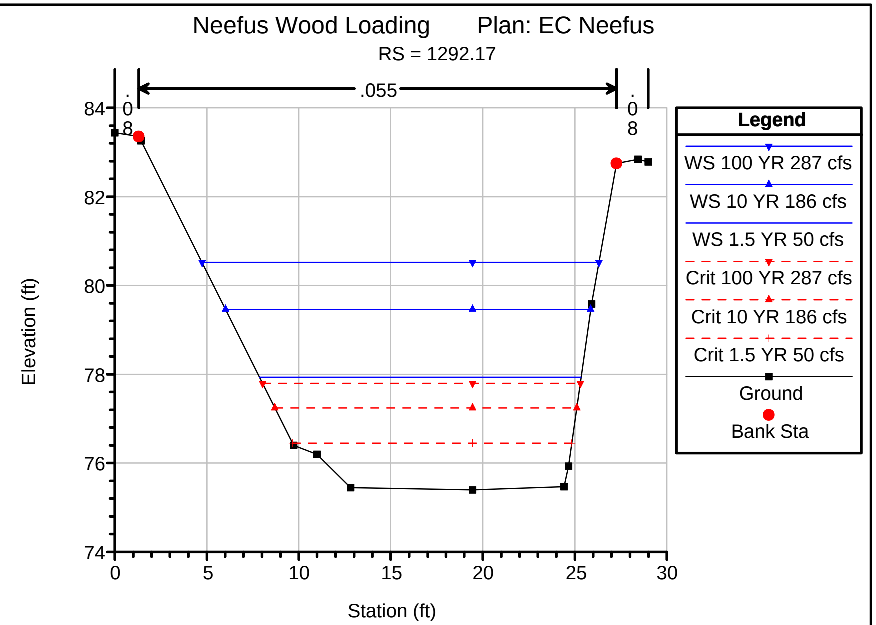
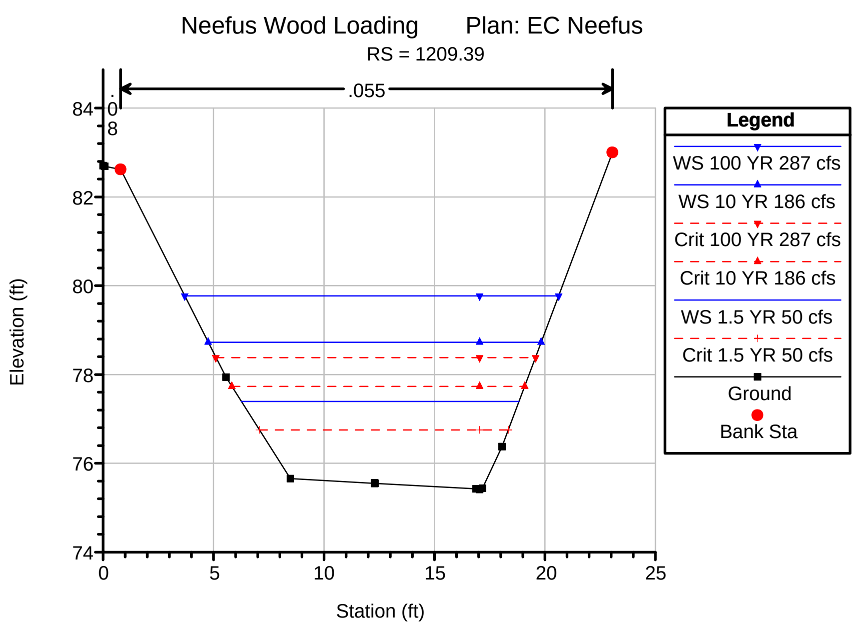
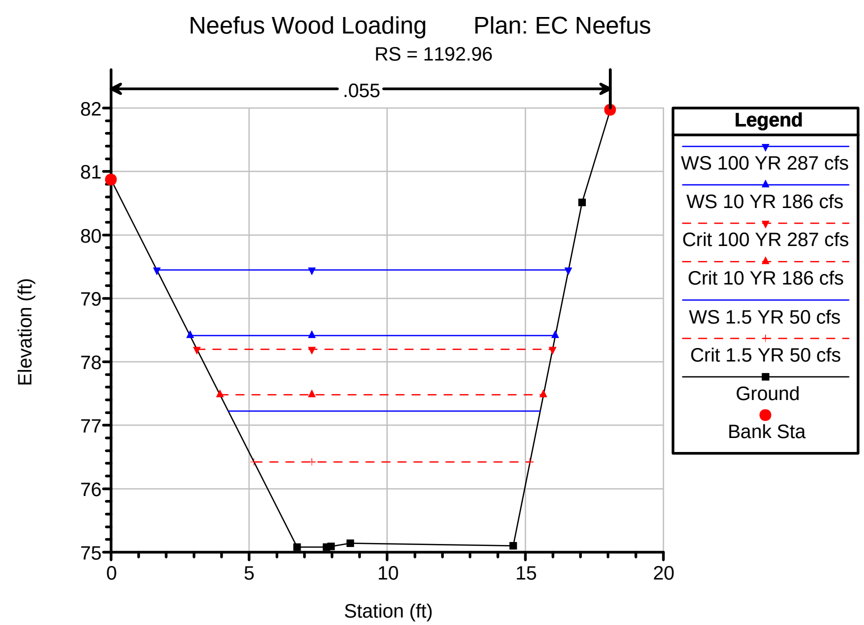
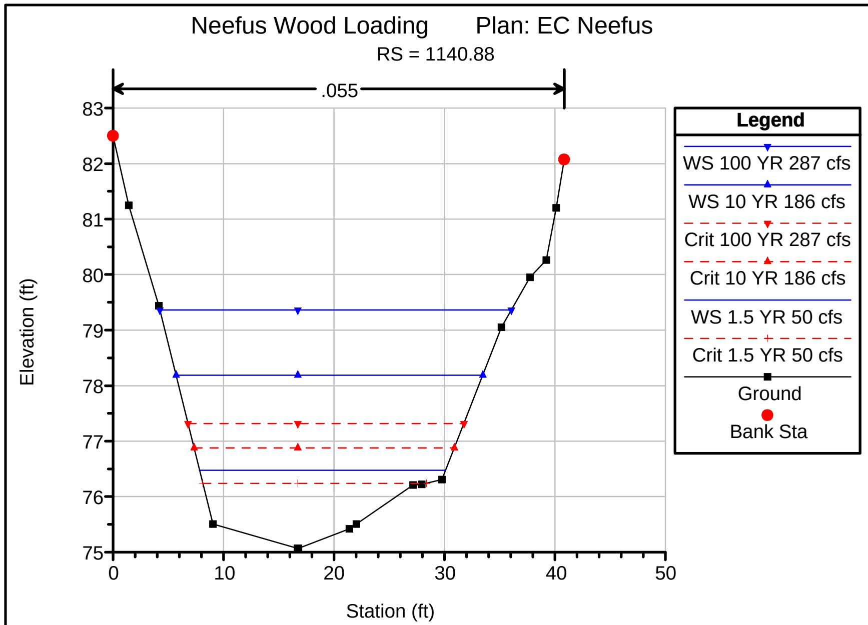
.08
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1412.05
.08
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1381.12
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 1333.13
.08
.055
.08
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

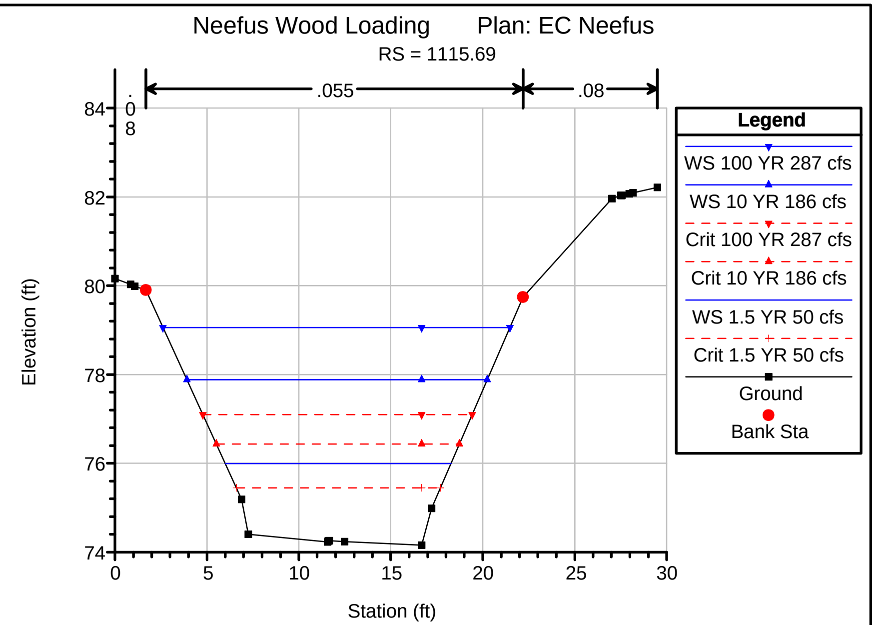

Neefus Wood Loading Plan: EC Neefus
RS = 1299.87
.08
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

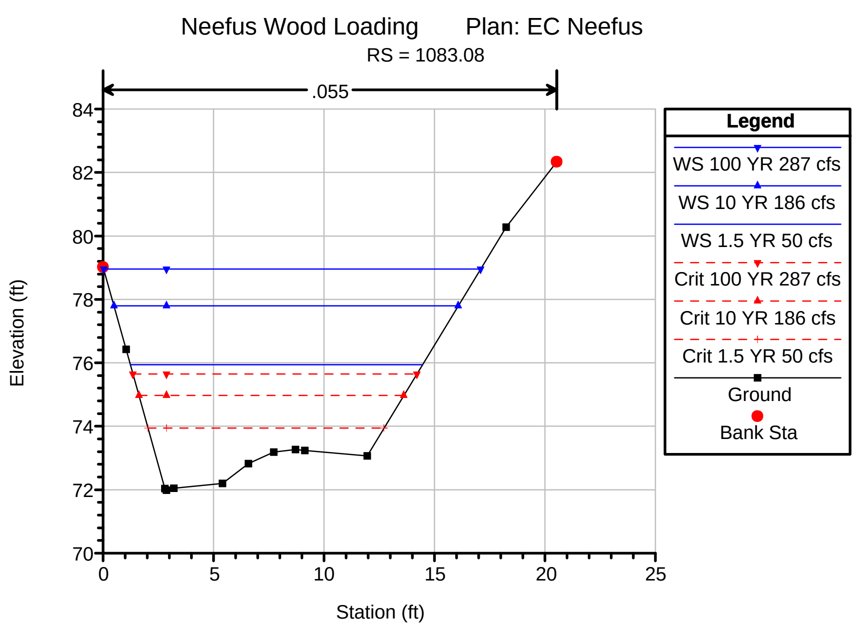

Neefus Wood Loading Plan: EC Neefus
RS = 1292.17
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

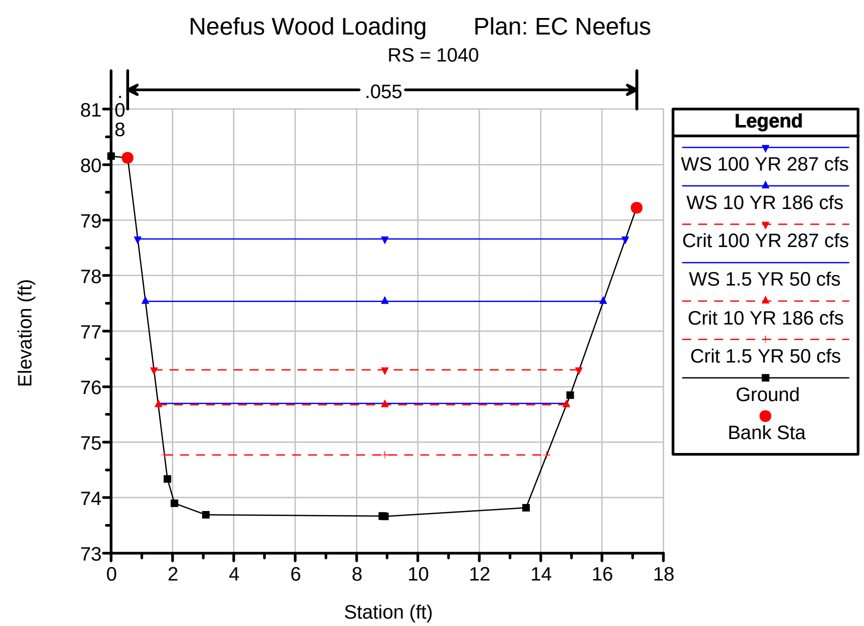

Neefus Wood Loading Plan: EC Neefus
RS = 1209.39
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

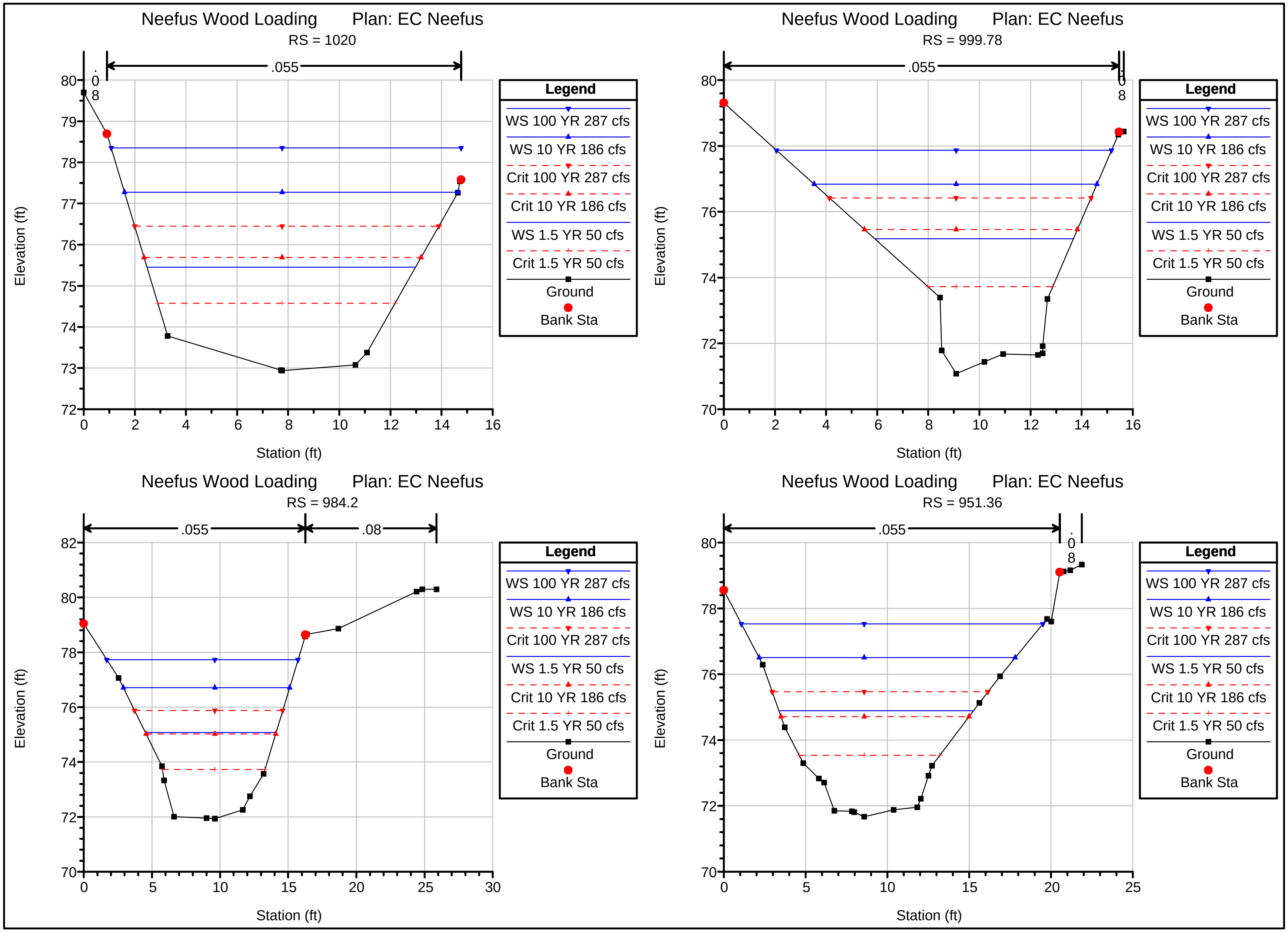

Neefus Wood Loading Plan: EC Neefus
RS = 1192.96
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

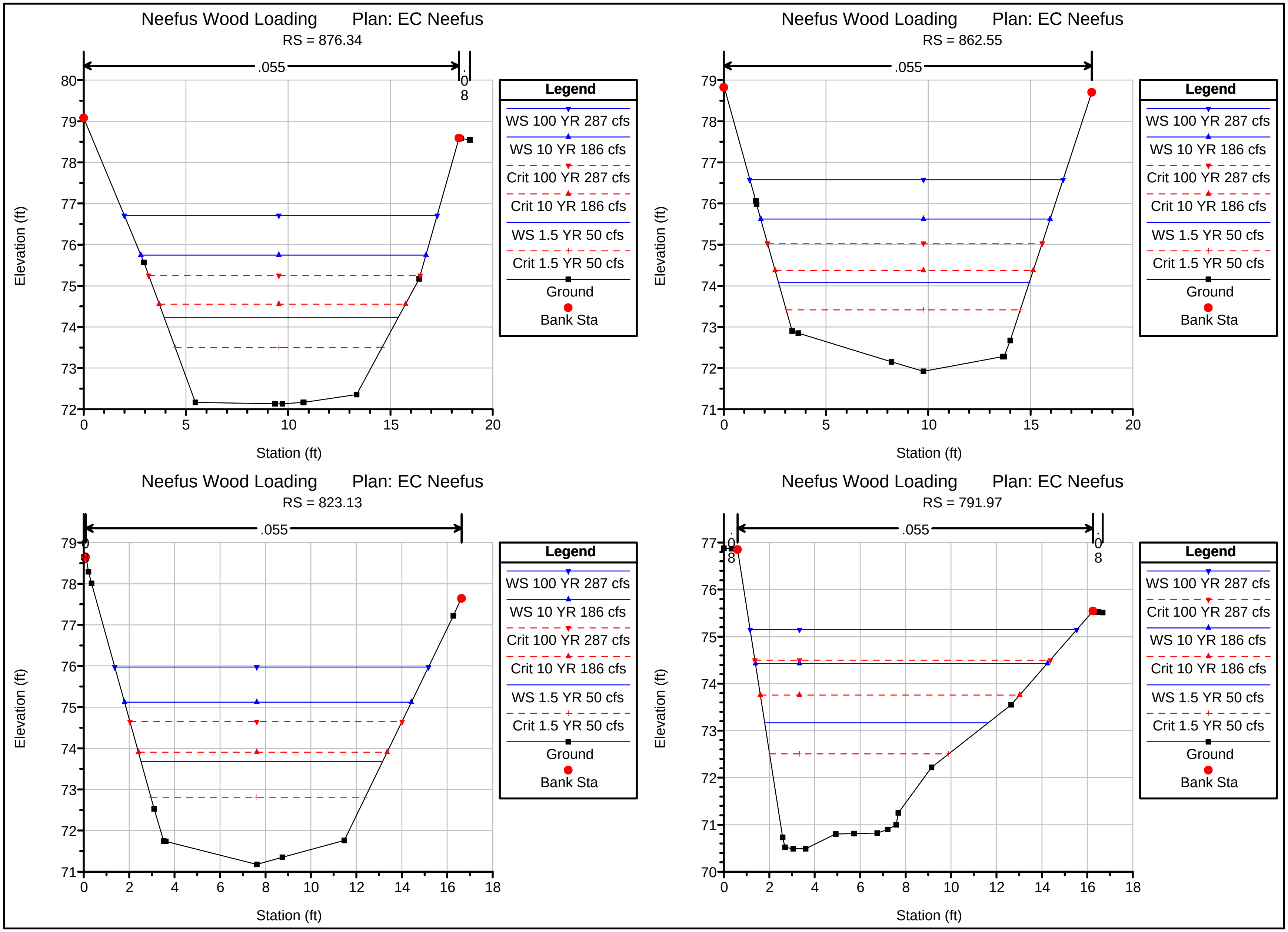

Neefus Wood Loading Plan: EC Neefus
RS = 1140.88
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

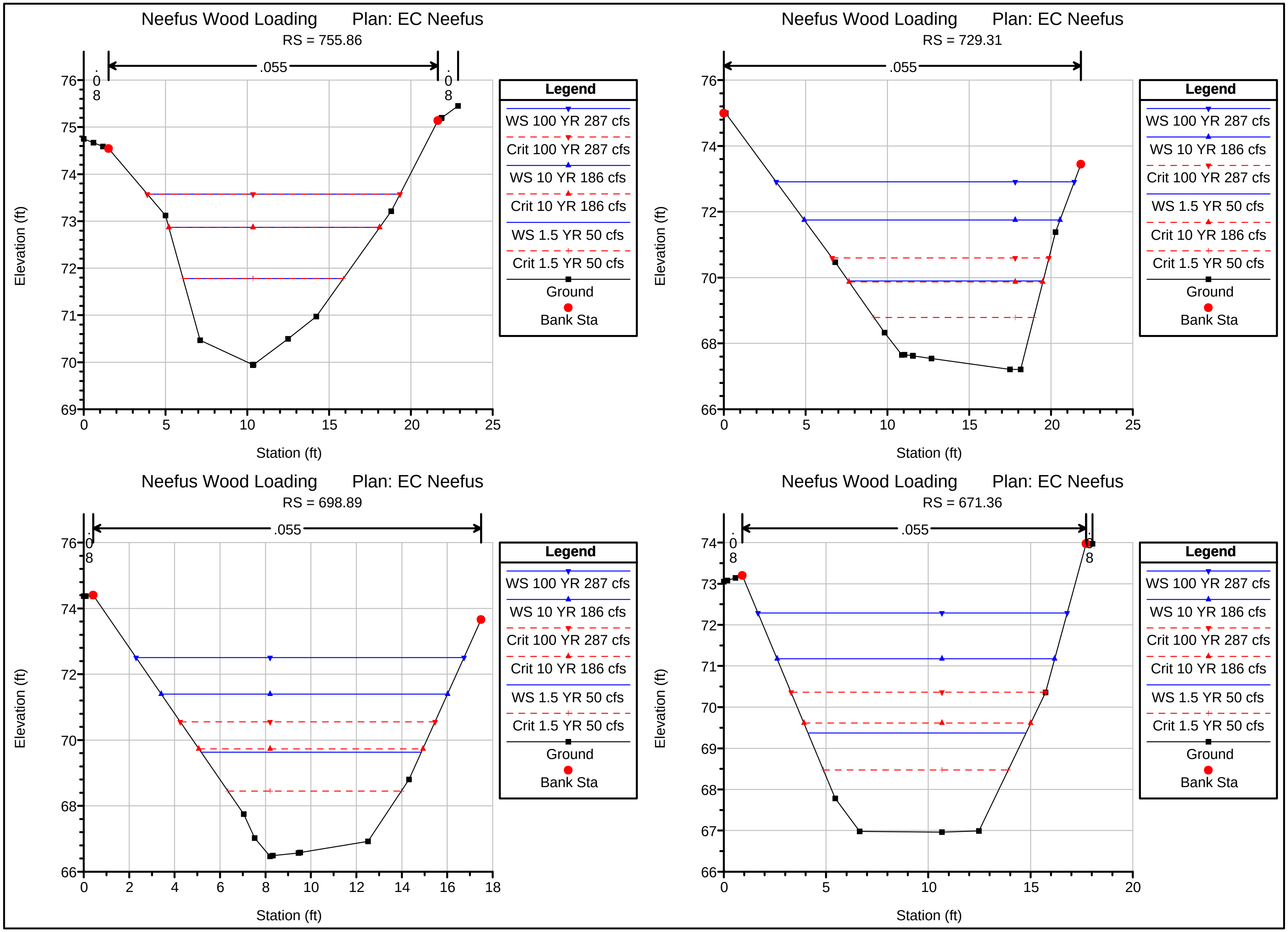

Neefus Wood Loading Plan: EC Neefus
RS = 1115.69
.08
.055
.08
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta


Neefus Wood Loading Plan: EC Neefus
RS = 1083.08
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

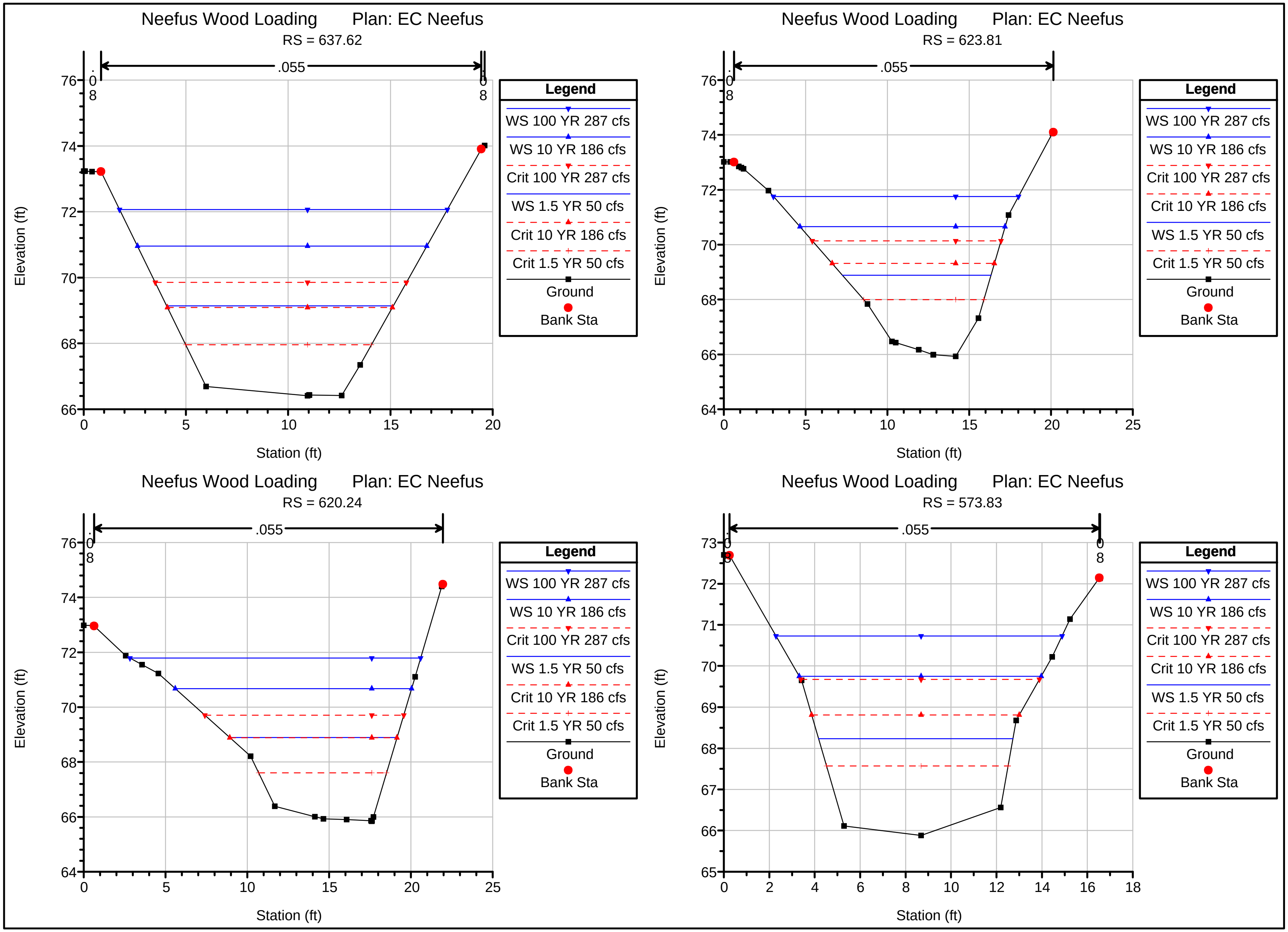

Neefus Wood Loading Plan: EC Neefus
RS = 1040
.08
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

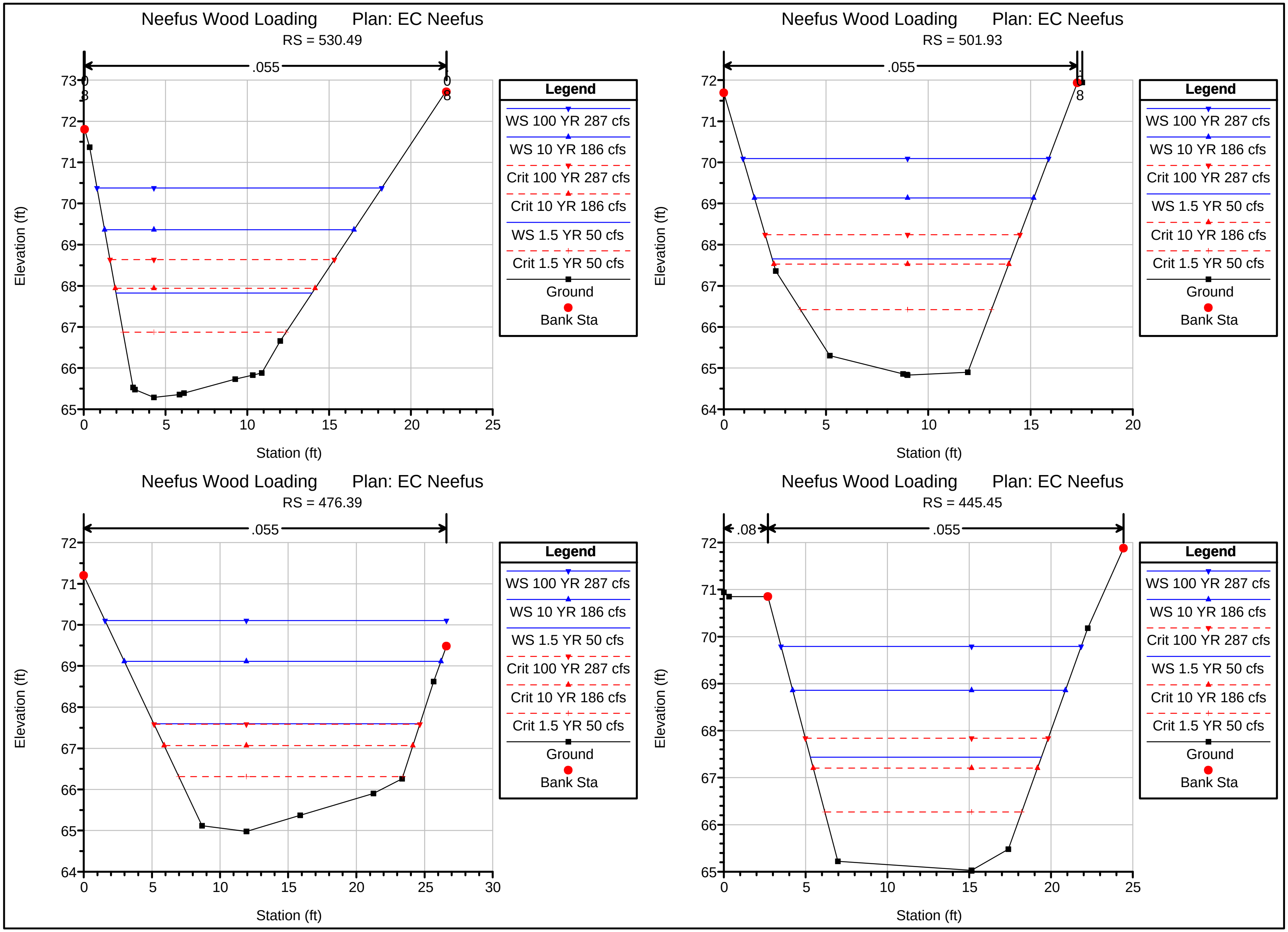

Neefus Wood Loading Plan: EC Neefus
RS = 1020
.055
.08
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 999.78
.055
.08
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 984.2
.055
.08
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 951.36
.055
.08
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)

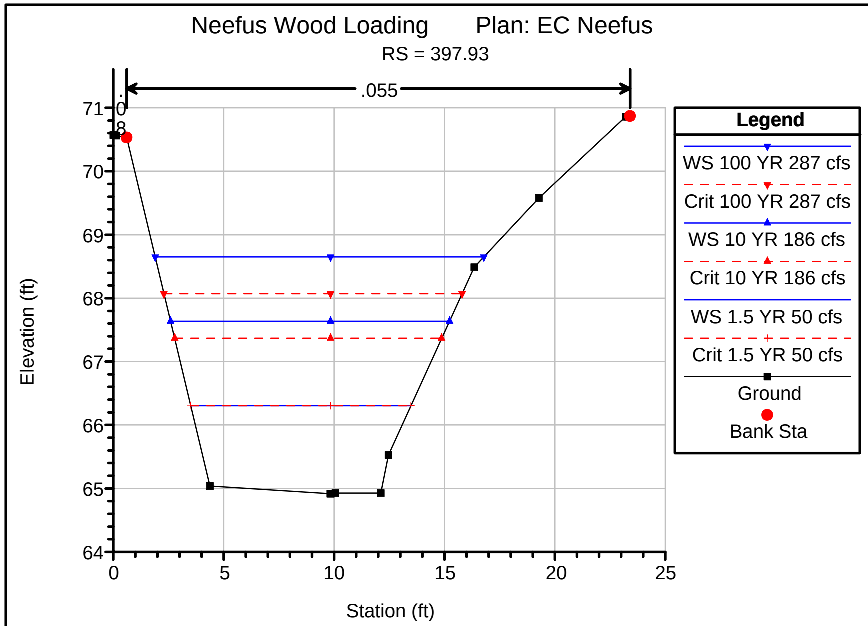

Neefus Wood Loading Plan: EC Neefus
RS = 876.34
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 862.55
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 823.13
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 791.97
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

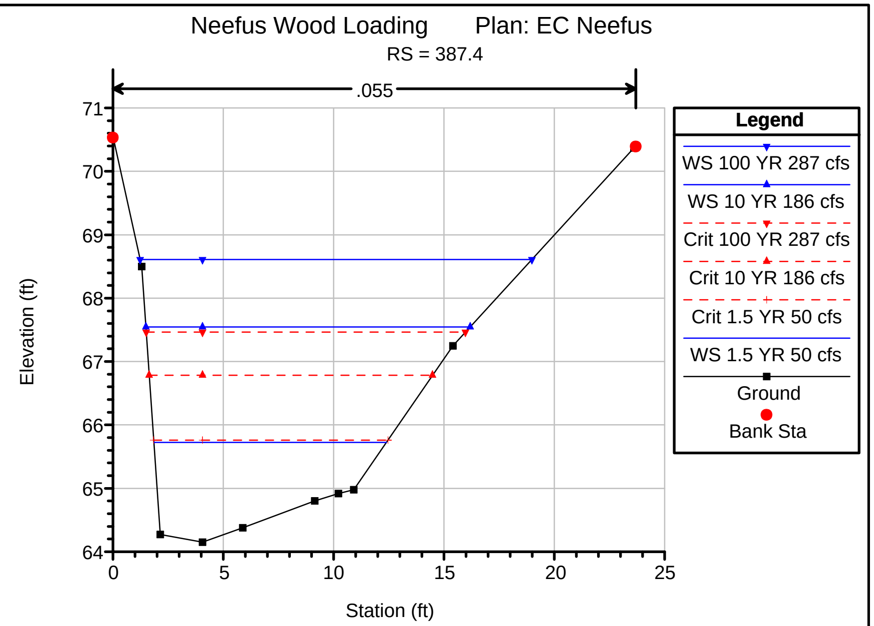


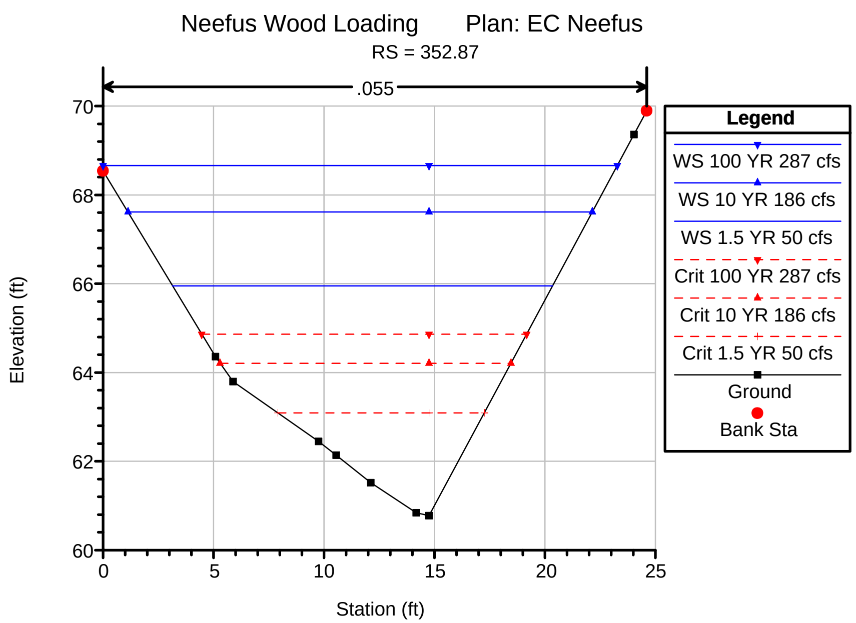
Neefus Wood Loading Plan: EC Neefus
RS = 755.86
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 729.31
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 698.89
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 671.36
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

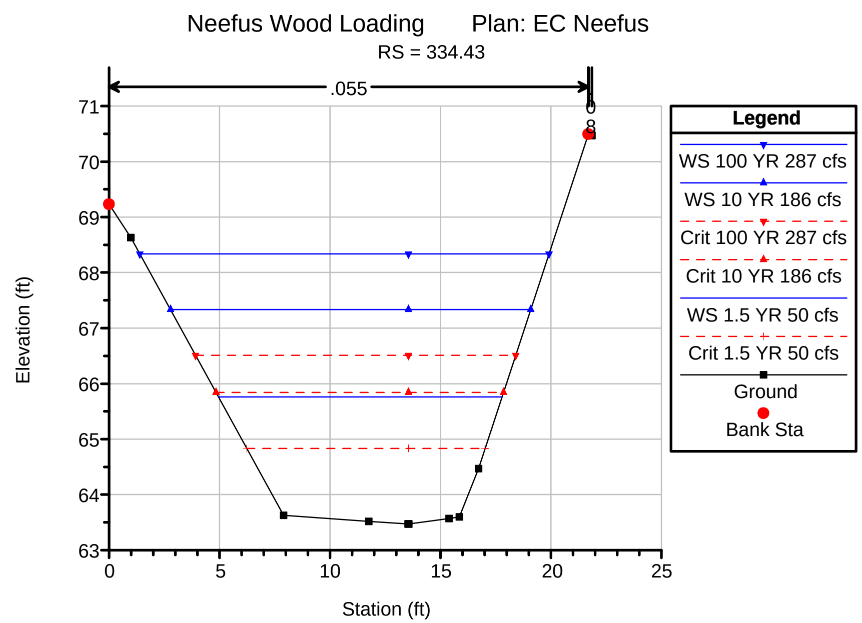

Neefus Wood Loading Plan: EC Neefus
RS = 637.62
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 623.81
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 620.24
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 573.83
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

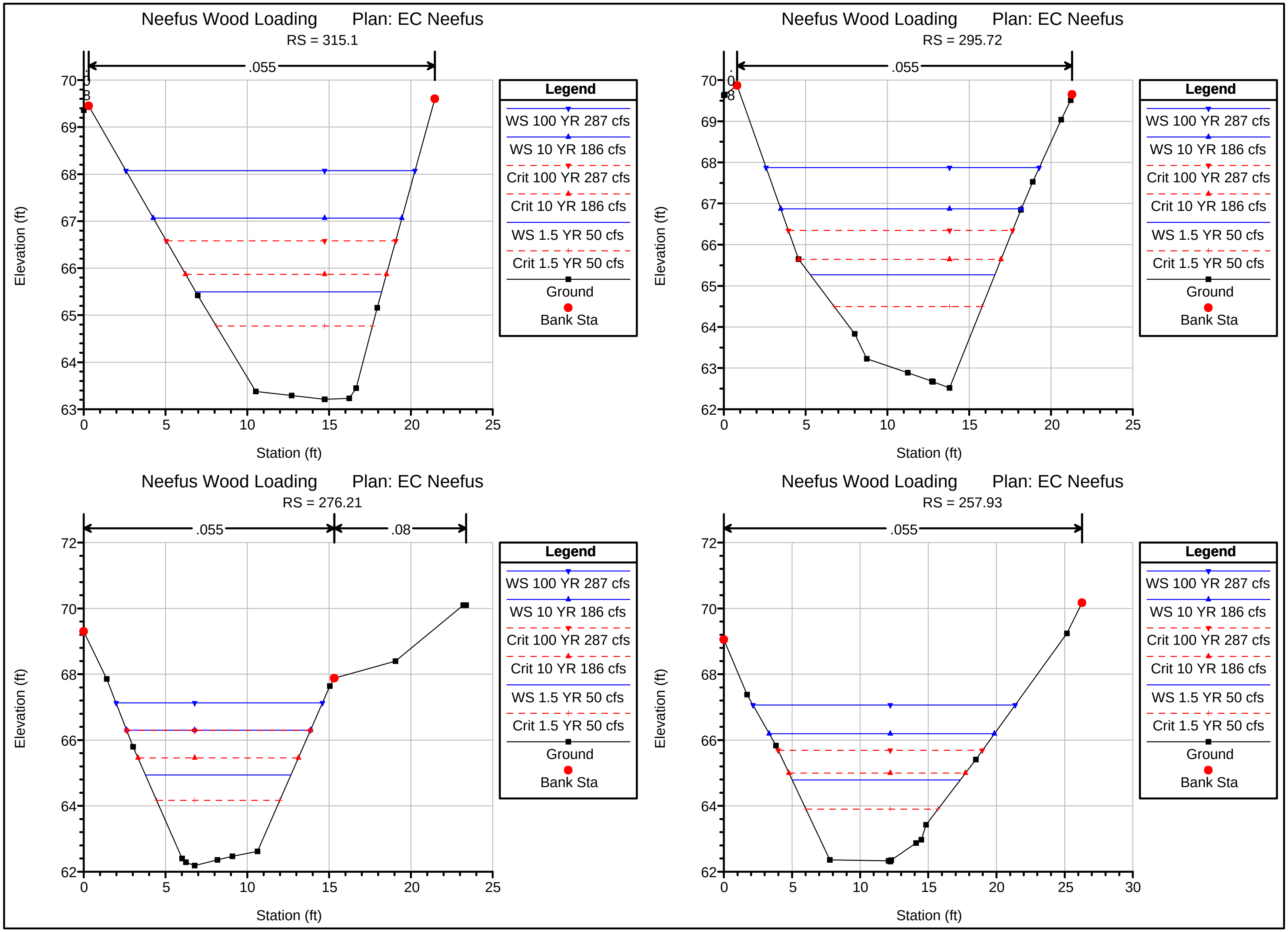

Neefus Wood Loading Plan: EC Neefus
RS = 530.49
.055
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 501.93
.055
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 476.39
.055
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 445.45
.08
.055
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


Neefus Wood Loading Plan: EC Neefus
RS = 397.93
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
Crit 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta

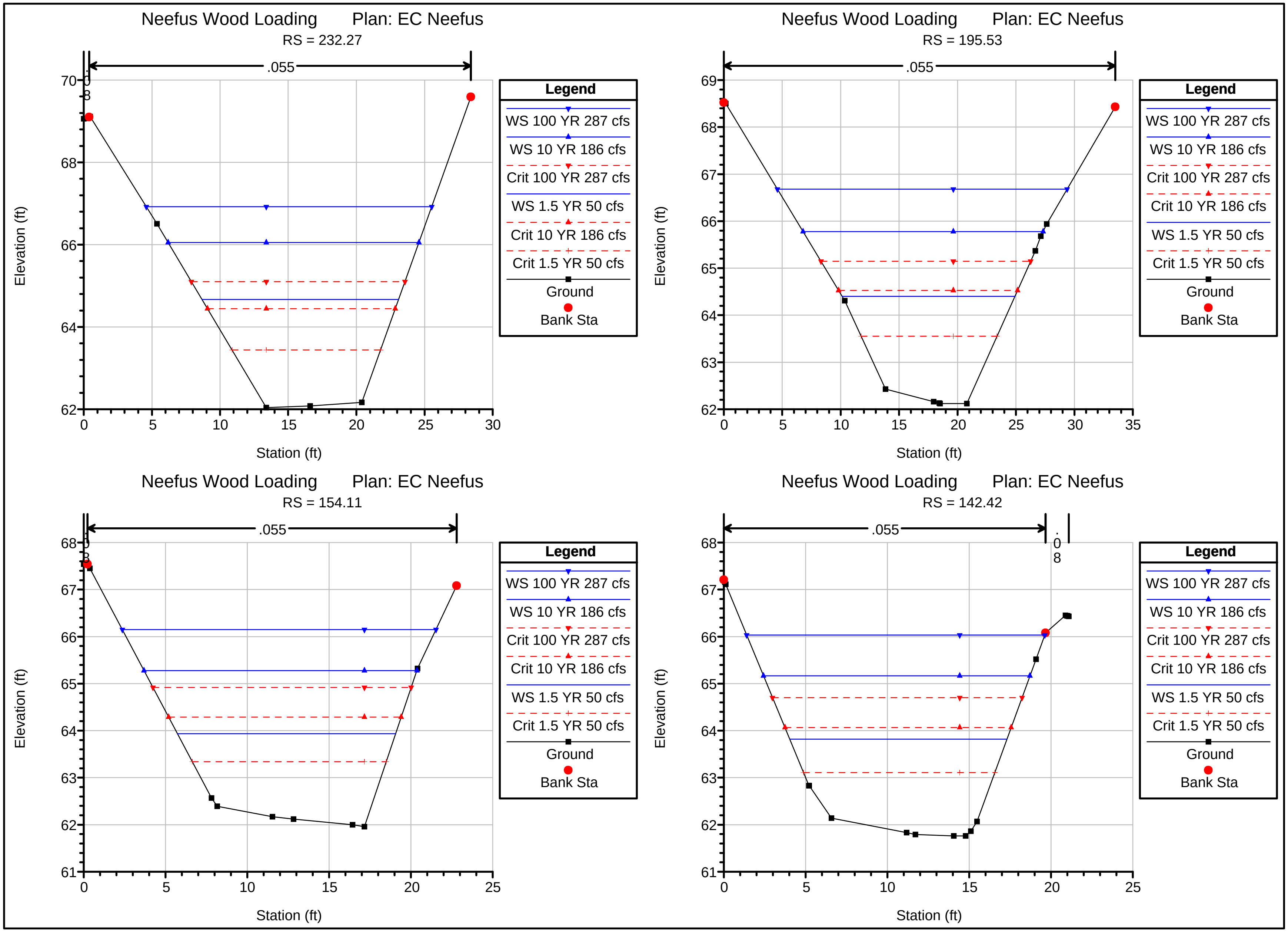

Neefus Wood Loading Plan: EC Neefus
RS = 387.4
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
WS 1.5 YR 50 cfs
Ground
Bank Sta

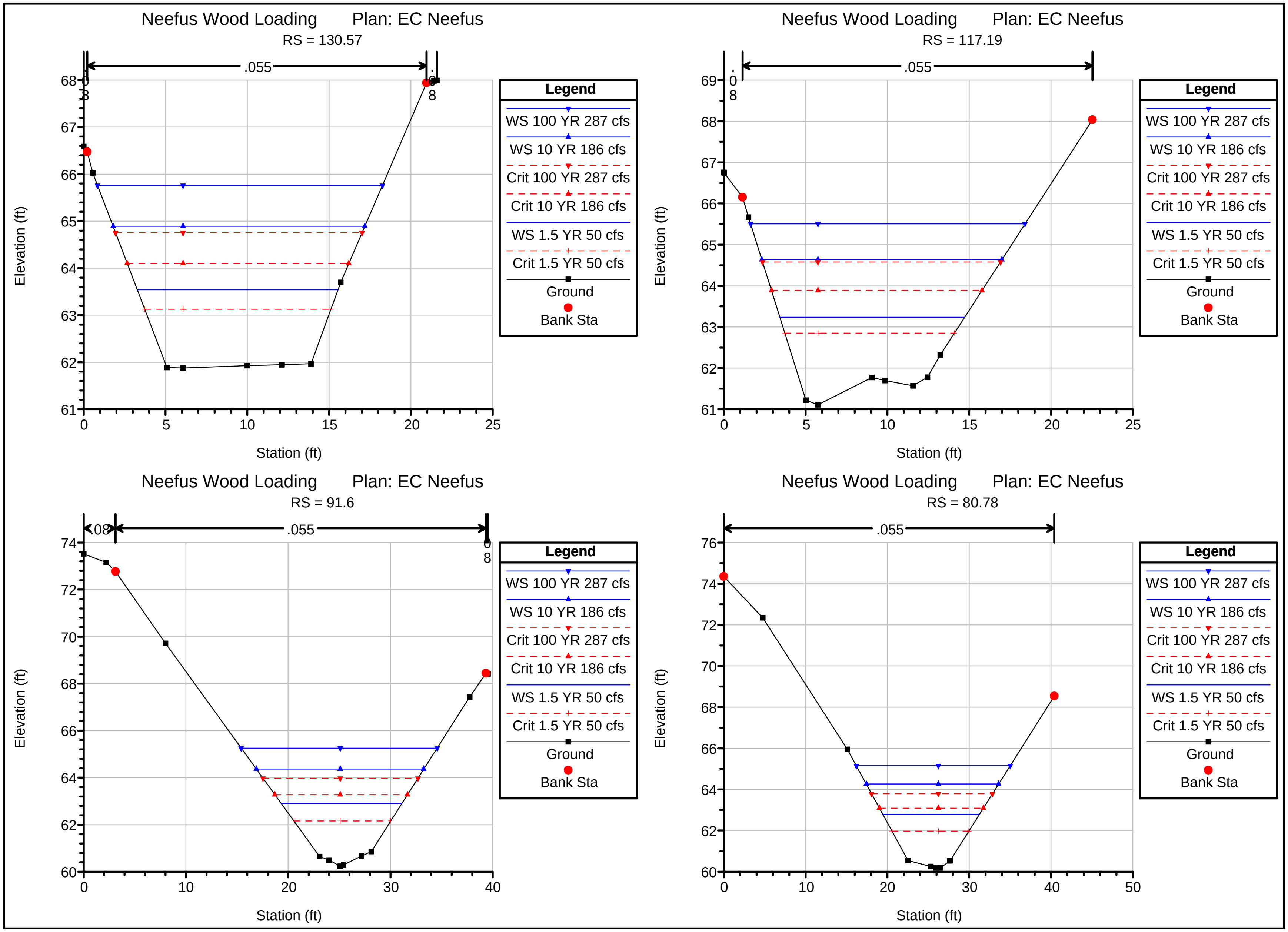

Neefus Wood Loading Plan: EC Neefus
RS = 352.87
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta


Neefus Wood Loading Plan: EC Neefus
RS = 334.43
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta



Neefus Wood Loading Plan: EC Neefus
RS = 315.1
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 295.72
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 276.21
.055
.08
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 257.93
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta


Neefus Wood Loading Plan: EC Neefus
RS = 232.27
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
WS 1.5 YR 50 cfs
Crit 10 YR 186 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 195.53
Neefus Wood Loading Plan: EC Neefus
RS = 154.11
Neefus Wood Loading Plan: EC Neefus
RS = 142.42



Neefus Wood Loading Plan: EC Neefus
RS = 130.57
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR 287 cfs
WS 10 YR 186 cfs
Crit 100 YR 287 cfs
Crit 10 YR 186 cfs
WS 1.5 YR 50 cfs
Crit 1.5 YR 50 cfs
Ground
Bank Sta
Neefus Wood Loading Plan: EC Neefus
RS = 117.19
.055
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 91.6
.08
.055
Elevation (ft)
Station (ft)
Neefus Wood Loading Plan: EC Neefus
RS = 80.78
.055
Elevation (ft)
Station (ft)