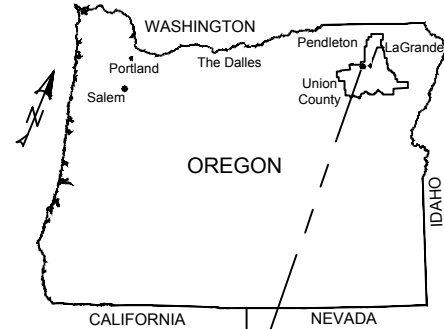


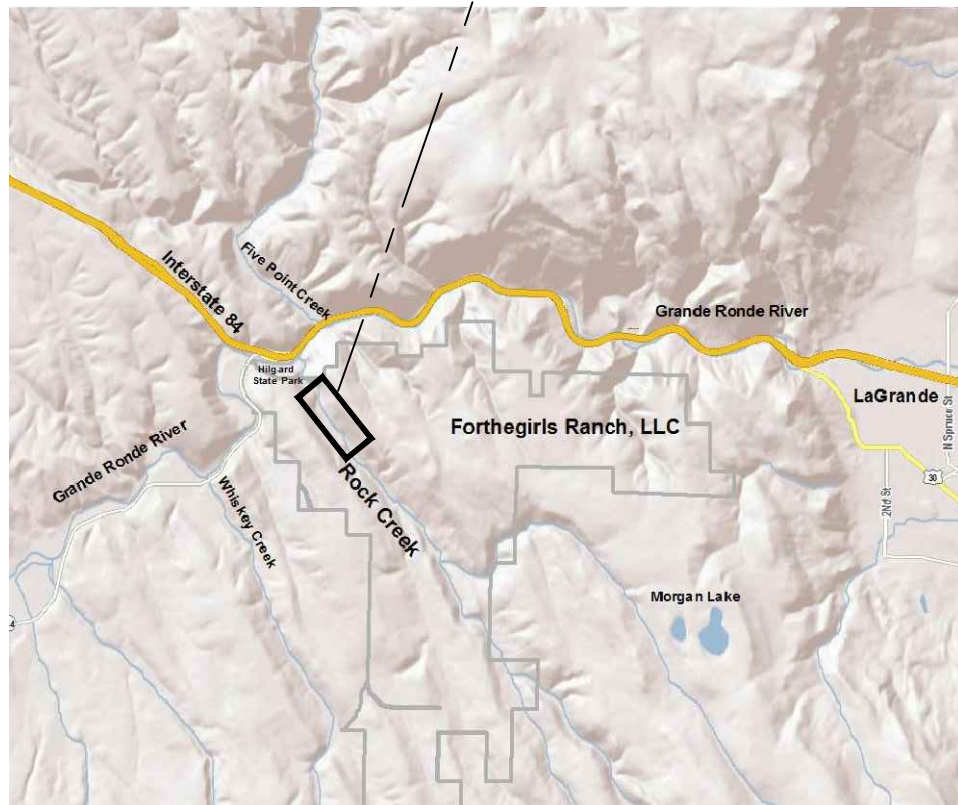
**PREPARED FOR:**  
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 GARY BURKE, CHAIRMAN  
 CTUIR BOARD OF TRUSTEES  
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 208.866.8735



LOCATION MAP



**SITE SUMMARY**

Township 3 South, Range 37 East  
 SECTIONS: SW  $\frac{1}{4}$ , Section 5, NE/NE  $\frac{1}{4}$ , Section 6  
 0451956.46N, 1181311.34 W  
 USGS Quadrangle: Hilgard, OR 45118  
 Project Area Elevation  
 3,007 to 3,075 Feet Above Mean Sea Level  
 UNION COUNTY, OREGON  
 WATERSHED (HUC 12) ROCK CREEK  
 #170601040306

# GRANDE RONDE SUBBASIN FISH HABITAT ENHANCEMENT ROCK CREEK STREAM & FLOODPLAIN RESTORATION PROJECT

## Construction Drawings



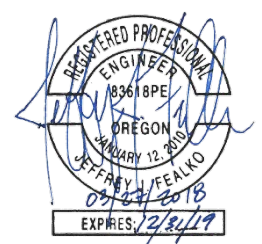
**PROJECT DESCRIPTION**

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Grande Ronde Basin Fish Habitat Program and basin partners seek to restore fish habitat and floodplain process and function to benefit fishery resources on lower Rock Creek in the Upper Grande Ronde River Basin. Targeted fish populations include ESA listed Snake River spring-summer Chinook salmon and summer steelhead. The project area is important spawning and rearing habitat for summer steelhead and juvenile rearing habitat for Chinook. The proposed project includes stream channel realignment, drawbottom road/levee decommissioning, floodplain grading, alcove development and re-activation of historic channel swales, installation of large wood habitat complexity, riparian restoration, removal of an undersized bridge, and habitat protection along the 1 mile project reach. Project objectives include diversifying existing homogenous, plane bed aquatic and riverine habitat observed in the existing channelized condition to a diverse plan form with appropriate dimension, pattern, profile, and floodplain connectivity naturally exhibited in unconfined alluvial floodplains, including increased groundwater and hyporheic functions. Targeted life requisites for salmonid spawning and rearing habitat include: summer water temperature/cold water refuge, depth, velocity, cover, sediment, and riparian/wetland. Habitat and geomorphic features and processes enhanced to improve spawning and rearing suitability include: decreased channel slope, velocity, and width to depth ratio, increased diversity of pool, riffle, run habitat types, large pools, off channel habitat, including side channels and alcoves, and improved diversity of sediment size and storage/sorting of suitable spawning gravel.

Project construction is scheduled to begin during Spring 2018 with project completion during the ODFW In-Water Work Window, July 1 - October 15, 2018. The Project was designed in accordance with BPA Habitat Improvement Program, Programmatic Biological Opinion (HIP III).

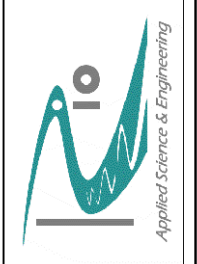
The proposed project is phase 3 of a larger habitat restoration project initiated by the CTUIR in 2014 within the privately owned FORTHEGIRLS RANCH, LLC along upper Rock Creek, Little Rock, Graves, Little Graves, and Sheep Creek. The Project is protected under a CTUIR-BPA Riparian Conservation Easement encompassing approximately 12 miles of stream in the Rock Creek watershed habitat. The majority of project streams will be enrolled in the FSA CREP Program..

| SHEET | TITLE  |
|-------|--|
| 1     | COVER SHEET  |
| 2     | GENERAL NOTES  |
| 3     | QUANTITIES   |
| 4     | TERMS AND CONDITIONS 1                               |
| 5     | TERMS AND CONDITIONS 2                               |
| 6     | TERMS AND CONDITIONS 3                               |
| 7     | EXISTING CONDITIONS                                  |
| 8     | PROPOSED CONDITIONS                                  |
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| 16    | PLAN AND PROFILE 35+50 to 40+50                      |
| 17    | PLAN AND PROFILE 40+50 to 45+50                      |
| 18    | PLAN AND PROFILE 45+50 to 50+50                      |
| 19    | PLAN AND PROFILE 50+50 to 55+50                      |
| 20    | PLAN AND PROFILE 55+50 to 60+50                      |
| 21    | PLAN AND PROFILE 60+50 to 66+50                      |
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| 24    | MAIN CHANNEL SECTIONS 26+15 to 28+98                 |
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| 26    | MAIN CHANNEL SECTIONS 34+90 to 38+18                 |
| 27    | MAIN CHANNEL SECTIONS 38+28 to 43+28                 |
| 28    | MAIN CHANNEL SECTIONS 45+67 to 49+58                 |
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Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

COVER SHEET  
 Rock Creek Stream & Floodplain Restoration



COVER SHEET

**GENERAL CONTRACTOR REQUIREMENTS**

- Contractor shall attend a Mandatory Pre-Bid Site Meeting.
- Work shown on these plans will be performed for the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), herein referred to as "Contracting Agency." Contact information for Contracting Agency's representative is included on these construction drawings. Contracting Agency's representative (or other persons assigned by Contracting Agency to act as Contracting Agency's representative) are herein referred to as the "Contracting Officer."
- The Contractor shall conduct stream enhancement construction in accordance with the plans stamped "Approved for Construction." These plans will be provided to the Contractor by the Contracting Agency prior to construction. Work shall not be done without the current set of approved construction plans.
- The enhancement designs depicted herein are approximate and are intended to express the overall design intent of the project. These designs may need to be adjusted in the field during construction in order to meet the specific site conditions and intended function. Adjustments are to be authorized by the Contracting Officer.
- The Contractor shall pursue work in a continuous and diligent manner to ensure timely completion of the project per construction subcontract.
- The Contractor shall be responsible for the general safety during construction, and all work shall conform to pertinent safety regulations and codes. The Contractor shall be solely and completely responsible for compliance with all applicable provisions of OSHA and OAR Chapter 437, in the construction practices for all employees directly engaged in the construction of this project.
- All material and workmanship furnished on or for this project must meet the minimum requirements of project permits, approving agencies, specifications as set forth herein, or whichever is more restrictive.
- Contractor shall be responsible for obtaining, at Contractor's expense, all construction permits as required by local, state and federal agencies. Contractor shall provide all material, labor, and equipment required to comply with all applicable permit conditions and requirements.
- Prior to commencement of work, Contractor shall provide the Contracting Agency with a detailed construction schedule and work plan for approval. The Contractor shall not begin any construction work until the construction schedule and work plan is approved by the Contracting Officer.
- Contractor shall confirm the access point, route(s), and locations of temporary staging and storage areas with the Contracting Officer prior to transporting materials and equipment to the project site.
- Project design drawings and specifications represent the construction documents. Any deviations from these drawings and associated specifications without written approval from the Contracting Officer may result in this project not meeting specifications and may affect the terms and conditions of the construction contract.
- All existing conditions are to be verified in the field prior to construction and any adjustments to the drawings shall be made as directed by the Contracting Officer.
- Excavation, grading, and trenching shall be the responsibility of the contractor performing the work. The design drawings are not intended to provide means or methods of construction.
- All excess materials and excavation to be placed at location identified by the Contracting Officer with coordination with the Contractor.

**EXISTING DATA AND COORDINATE SYSTEM**

- Elevations and distances shown are in feet and decimals.
- Horizontal datum is US State Plane Coordinate System, Oregon North Zone, NAD 83, International Feet. The vertical datum is NAVD 88, feet.
- Topographic mapping along Rock Creek is based on surveys performed with ground survey equipment. Topographic mapping outside of the stream banks is based on ground survey and LIDAR imaging. The geometry of the stream at the time of construction could be different than shown on these plans due to channel evolution.

**HIP III CONSERVATION MEASURES**

- The Contractor will comply with the General Aquatic Conservation Measures and Terms & Conditions contained in Bonneville Power Administrations (BPA) Habitat Improvement Program (HIP) III that requires the utmost care is taken when construction activity is taking place in or near the waterway. See Terms and Conditions Sheets 4-6.
- All work within the actively flowing Rock Creek channel shall occur only within designated in-water work window (July 1 – October 15).
- Anytime work occurs within the actively flowing channel, the Contractor shall monitor in-stream turbidity once per hour at a location 100 feet downstream of the construction activity using turbidity monitoring equipment provided by the Contracting Officer.
- In-stream turbidity shall be limited to levels listed in permits and specifications, and the Contractor shall modify work procedures if necessary to comply with specifications. The Contracting Officer will assist the Contractor during initial measurements to ensure testing equipment is used correctly. The Contractor will be responsible for all measurements and maintain a log that documents date, time, and turbidity level of all measurements taken.
- The Contractor shall install and maintain appropriate sediment control devices throughout the project site, including the construction staging area and stockpile area. Temporary construction and permanent erosion control measures shall be designed, constructed and maintained in accordance with all applicable local, state and federal regulations.
- Discharges entering active streams on site shall satisfy all state and federal standards and project permit requirements for contaminants and turbidity.
- Dewatering of work areas shall be performed to the extent that at large wood material (LWM) structures standing water is no deeper than the diameter of the log(s) on the lowest layer of the structure so that the Contracting Officer can easily verify the finished channel bed elevation.
- Discharge from dewatering activities shall be routed to floodplain areas to allow the removal of fine sediments or other contaminants prior to re-entering Rock Creek. All pumps used in the active channel for dewatering activities shall have screened intakes that meet ODFW and NOAA Fisheries juvenile fish screening criteria.

**FISH RESUCE**

- Fish exclusion shall be conducted in the project area prior to any dewatering activities or construction within or directly connected to the existing channel of Rock Creek. Fish exclusion shall be conducted by the Contracting Agency.
- The Contractor shall notify the Contracting Officer a minimum of 5 working days in advance of in-channel work and work area isolation to coordinate fish removal. The Contracting Agency will be responsible for all fish removal and handling.

**SITE AND RESOURCE PROTECTION**

- Protect all trees and land areas marked for protection. Construction shall minimize disturbance and damage to riparian vegetation and maximize reuse of existing vegetation in the project area.
- Existing shrubs and sod along channel construction alignment and work areas in the floodplain will be salvaged and reinstalled following channel construction along stream banks.

**CULTURAL RESOURCES INADVERTENT DISCOVERY**

- If construction work comes into contact with any of the following cultural resources:
  - Native American cultural artifacts (flakes, arrowheads, stone tools, bone tools, pottery, etc.)
  - Historic era artifacts (building foundations, homesteads, mining camps, etc)
  - Human skeletal remains and bone fragments
 Ground disturbing construction in the area must immediately discontinue. Do not touch or move the objects and maintain the confidentiality of the site. Follow procedures listed in the BPA Inadvertent Discovery Procedure and await further direction from BPA's Cultural Resource Staff.

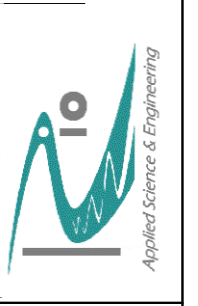
**UTILITIES**

- The CTUIR makes no representation as to the existence or non-existence of utilities. It is the responsibility of Contractor to comply with the provisions of ORS 757.541 to 757.571. Contractor will be liable for any damage resulting from disruption of service caused by construction activities. The telephone number for utility locates is 1-800-424-5555.



Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist; JF, Engineer

**GENERAL NOTES**  
 Rock Creek Stream & Floodplain Restoration



**GENERAL NOTES**

| SUMMARY OF QUANTITIES                           |          |      |
|---|----------|------|
| Project Feature                                 | Quantity | Unit |
| <b>Main Channel Construction</b>                |          |      |
| New Channel Length                              | 4308     | feet |
| Channel Excavation Volume                       | 8197     | CY   |
| Existing Channel Fill                           | 6301     | CY   |
| <b>Side Channel Construction</b>                |          |      |
| Side Channel Length                             | 462      | feet |
| Side Channel Cut                                | 10       | CY   |
| Side Channel Fill (existing channel)            | 579      | CY   |
| <b>Alcove Construction</b>                      |          |      |
| Alcove Length                                   | 1389     | feet |
| Alcove Excavation Volume                        | 487      | CY   |
| <b>Riffle Construction</b>                      |          |      |
| Riffle Quantity                                 | 28       | each |
| Riffle Construction Material                    | 3401     | CY   |
| Riffle Boulders (Sm. 10-18 in. dia.)            | 485      | each |
| Riffle Boulders (Lg. 18-24 in. dia.)            | 214      | each |
| <b>Road Obliteration</b>                        | 5248     | feet |
| <b>Levee Removal</b>                            |          |      |
| Levee removal length                            | 1833     | feet |
| Levee removal volume                            | 1599     | CY   |
| <b>Large Wood Habitat Features</b>              |          |      |
| Type 1 - Large Wood Pool Structure              |          |      |
| # Structures                                    | 36       | each |
| Key member w/RW, 16-18" dbh+, 35' L             | 108      | each |
| Whole Tree w/RW, 16" dbh, 45' L                 | 36       | each |
| Large Log, 16" dbh, 25' L                       | 36       | each |
| Racking Logs/tops, 8-12" dbh, 20" L             | 360      | each |
| Type 2 - Large Wood Whole Tree Pool Structure   |          |      |
| # Structures                                    | 11       | each |
| Key member WT with RW, 16" dbh+, 45" L          | 55       | each |
| Large Log, 16" dbh+, 30' L                      | 22       | each |
| Racking Logs/tops, 8-12" dbh, 20" L             | 110      | each |
| Type 3 - Large Wood Deflector Structure         |          |      |
| # Structures                                    | 2        | each |
| Key member WT with RW, 16" dbh+, 45" L          | 8        | each |
| Racking Logs/tops, 8-12" dbh, 20" L             | 20       | each |
| Type 4 - Large Wood Apex Structure              |          |      |
| # Structures                                    | 4        | each |
| Key member WT with RW, 16" dbh+, 35" L          | 12       | each |
| Racking Logs/tops, 8-12" dbh, 20" L             | 20       | each |
| Type 5 - Floodplain Wood, Whole Tree            |          |      |
| # Structures                                    | 115      | each |
| Whole tree with RW, 16" dbh+, 45' L             | 115      | each |
| Type 6 - Floodplain Roughness (2 pc structure), |          |      |
| # Structures                                    | 124      | each |
| Tree top, 12" dbh, 30" L, w/ or w/o RW          | 124      | each |
| Pinning Log, 8-12" dbh, 20' L                   | 124      | each |
| Willow/Brush Mattress                           |          |      |
| Streambank Length treated                       | 1928     | feet |
| # Live Willow Cuttings                          | 1928     | each |

| PROJECT FEATURE EARTHWORK CUT/FILL VOLUMES & LOCATION DETAILS |  |               |          |                         |              |              |      |        |
|---|--|---------------|----------|-------------------------|--------------|--------------|------|--------|
| Feature   | Description                            | Station Range |          | Area (ft <sup>2</sup> ) | Area (Acres) | Volumes (CY) |      |        |
|   |  |               |          |                         |              | Cut          | Fill | Net    |
| Levee 1   | Existing Left Bank                     | 13+12         | to 14+68 | 3447                    | 0.08         | 78           | 1    | 77 C   |
| Levee 2   | Existing Left Bank                     | 18+65         | to 19+77 | 2991                    | 0.07         | 229          | 0    | 229 C  |
| Levee 3   | Existing Left Bank                     | 25+32         | to 28+21 | 4814                    | 0.11         | 231          | 12   | 219 C  |
| Levee 4   | Existing Left Bank                     | 30+58         | to 33+52 | 3399                    | 0.08         | 107          | 0    | 107 C  |
| Levee 5   | Existing Left Bank                     | 40+76         | to 46+09 | 1651                    | 0.04         | 9            | 2    | 7 C    |
| Levee 6   | Existing Left Bank                     | 43+45         | to 45+28 | 3384                    | 0.08         | 92           | 0    | 92 C   |
| Levee 7   | Existing Left Bank                     | 66+00         | to 75+77 | 32431                   | 0.74         | 853          | 3    | 850 C  |
| Alcove 1  | Proposed Left Bank Through Levee 1     | 14+00         | to 14+64 | 2882                    | 0.07         | 151          | 1    | 150 C  |
| Alcove 2  | Proposed Left Bank                     | 22+86         | to 22+96 | 1429                    | 0.03         | 49           | 1    | 48 C   |
| Alcove 3  | Proposed Left Bank Formed From Fill 2  | 28+04         | to 30+19 | 3246                    | 0.07         | NA           | NA   | NA     |
| Alcove 4  | Proposed Left Bank                     | 31+60         | to 31+84 | 1159                    | 0.03         | 65           | 0    | 65 C   |
| Alcove 5  | Proposed Right Bank Formed From Fill 3 | 35+29         | to 36+73 | 3250                    | 0.07         | NA           | NA   | NA     |
| Alcove 6  | Proposed Left Bank                     | 40+09         | to 40+59 | 2652                    | 0.06         | 161          | 0    | 161 C  |
| Alcove 7  | Proposed Right Bank Formed From Fill 5 | 45+94         | to 47+86 | 1899                    | 0.04         | NA           | NA   | NA     |
| Alcove 8  | Proposed Left Bank Formed From Fill 6  | 51+20         | to 51+52 | 1731                    | 0.04         | NA           | NA   | NA     |
| Alcove 9  | Proposed Right Bank Formed From Fill 7 | 59+22         | to 62+13 | 2993                    | 0.07         | NA           | NA   | NA     |
| Alcove 10   | Proposed Left Bank                     | 60+59         | to 61+05 | 1427                    | 0.03         | 61           | 0    | 61 C   |
| Side Channel 1  | Proposed Right Channel Split           | 55+00         | to 58+00 | 8656                    | 0.20         | 5            | 414  | 409 F  |
| Side Channel 2  | Proposed Right Channel Split           | 67+76         | to 70+97 | 5378                    | 0.12         | 5            | 165  | 160 F  |
| Main Channel 1  | Major Segment Both Banks               | 25+86         | to 33+46 | 8155                    | 0.19         | 655          | 20   | 635 C  |
| Main Channel 2  | Major Segment Both Banks               | 34+64         | to 43+54 | 10140                   | 0.23         | 548          | 31   | 517 C  |
| Main Channel 3  | Major Segment Both Banks               | 45+49         | to 53+71 | 40314                   | 0.93         | 2465         | 121  | 2344 C |
| Main Channel 4  | Major Segment on Left Bank             | 54+99         | to 66+76 | 26326                   | 0.60         | 1552         | 146  | 1406 C |
| Main Channel 5  | Meander on Left Bank                   | 67+70         | to 71+26 | 28468                   | 0.65         | 1710         | 145  | 1565 C |
| Main Channel 6  | Short Meander on Left Bank             | 72+90         | to 74+70 | 22834                   | 0.52         | 1267         | 153  | 1114 C |
| Channel Fill 1  | Short Proposed Right Bank Fill         | 26+73         | to 28+35 | 2106                    | 0.05         | 2            | 120  | 118 F  |
| Channel Fill 2  | Proposed Left Bank Fill w/Alcove 3     | 28+07         | to 33+13 | 15244                   | 0.35         | 2            | 858  | 856 F  |
| Channel Fill 3  | Proposed Right Bank Fill w/Alcove 5    | 34+94         | to 41+20 | 19502                   | 0.45         | 0            | 1324 | 1324 F |
| Channel Fill 4  | Proposed Left Bank Fill                | 40+70         | to 43+52 | 8834                    | 0.20         | 0            | 550  | 550 F  |
| Channel Fill 5  | Proposed Right Bank Fill w/Alcove 7    | 45+61         | to 51+62 | 18671                   | 0.43         | 1            | 1282 | 1281 F |
| Channel Fill 6  | Proposed Left Bank Fill w/Alcove 8     | 51+16         | to 53+67 | 8591                    | 0.20         | 3            | 559  | 556 F  |
| Channel Fill 7  | Proposed Right Bank Fill w/Alcove 9    | 59+02         | to 66+44 | 19314                   | 0.44         | 1            | 1285 | 1284 F |
| Channel Fill 8  | Proposed Right Bank Fill               | 72+56         | to 74+45 | 4674                    | 0.11         | 0            | 323  | 323 F  |
| Total Project As Individual Pieces                            |  |               |          | 321992                  | 7.39         | 10902        | 7516 | 2786 C |

| Streambank Bioengineering - Willow/Brush Mattress |                    |               |
|---|--------------------|---------------|
| Station   | Streambank (LB/RB) | Length (Feet) |
| 25+50   | RB                 | 62            |
| 26+75   | RB                 | 25            |
| 29+25   | RB                 | 35            |
| 31+00   | RB                 | 65            |
| 32+00   | RB                 | 54            |
| 33+50   | LB                 | 65            |
| 35+25   | RB                 | 20            |
| 37+00   | RB                 | 47            |
| 37+00   | LB                 | 51            |
| 38+25   | LB                 | 34            |
| 39+25   | RB                 | 65            |
| 42+50   | RB                 | 77            |
| 43+75   | LB                 | 40            |
| 47+25   | LB                 | 30            |
| 50+50   | LB                 | 53            |
| 51+25   | RB                 | 83            |
| 53+75   | LB                 | 51            |
| 54+50   | RB                 | 46            |
| 55+25   | RB                 | 30            |
| 57+00   | LB                 | 42            |
| 58+00   | RB                 | 77            |
| 61+00   | LB                 | 47            |
| 63+00   | RB                 | 30            |
| 64+75   | LB                 | 60            |
| 66+75   | RB                 | 26            |
| 0+00 SC 1   | RB                 | 180           |
| 1+25 SC 1   | RB                 | 37            |
| 0+50 SC 2   | RB                 | 175           |
| 70+50   | LB                 | 192           |
| 71+50   | RB                 | 97            |
| 75+50   | LB                 | 32            |
| TOTAL   |                    | 1928          |

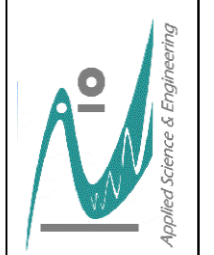
| SUMMARY LARGE WOOD STRUCTURES            | QUANTITY |
|--|----------|
| Type 1 - Lg Pool Structure               | 36       |
| Type 2 - Whole Tree Large Pool Structure | 11       |
| Type 3 - Deflector                       | 2        |
| Type 4 - APEX                            | 4        |
| Type 5 - Floodplain wood - Whole Tree    | 115      |
| Type 6 - Floodplain Roughness            | 124      |

| SUMMARY LARGE WOOD MATERIAL   | QUANTITY |
|---|----------|
| Key Log, 16-18" DBH+ w/RW, 35' L  | 120      |
| Whole Tree, 16" DBH+, w/RW, 45' L+  | 214      |
| Large Log 16" DBH+, 30' L, no RW  | 58       |
| Floodplain Whole Tree Tree with Branches, 30' L, 12" DBH                    | 124      |
| Racking Logs & tree tops, 8-12" DBH, w or w/o RW, 20' L                     | 634      |
| <i>*RW - Rootwad, *DBH - Diameter at Breast Height, Inches, *L - Length</i> |          |



Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
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QUANTITIES  
 Rock Creek Stream & Floodplain Restoration



QUANTITIES

**GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS**

The activities covered under the HIP III are intended to protect and restore fish and wildlife habitat with long-term benefits to ESA-listed species; however, construction activities may have short-term adverse effects on ESA-listed species and associated critical habitat. To avoid and minimize these short-term adverse effects, BPA has developed the following general Conservation Measures in coordination with USFWS and NMFS. These measures will be implemented on all projects covered under the HIP III.

**PROJECT DESIGN AND SITE PREPARATION**

1. State and federal permits. All applicable regulatory permits and authorizations will be obtained prior to project implementation. These permits and authorizations include, but are not limited to, the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), state and federal Section 404 of the Clean Water Act (CWA) permits, and Section 401 water quality certifications.
2. Timing of in-water work. Formal recommendations published by state agencies such as the Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), Idaho Department of Fish and Game (IDFG), and Montana Fish Wildlife and Parks (MFWP) or informal recommendations from the appropriate state Fishery Biologist in regard to the timing of in-water work will be followed.
  - a. Bull trout - Utilizing state-recommended in-water work windows will decrease potential effects to bull trout, but this alone may not be sufficient to protect local bull trout populations. This is especially true if work will occur in spawning and rearing areas because eggs, alevin, and fry are present nearly year round. Some project locations may not have designated in-water work windows for bull trout, or if they do, they may differ from the inwater work windows for salmon and steelhead. If this is the case, or if the proposed work is to occur within bull trout spawning and rearing habitats, the project sponsor will contact the appropriate USFWS field office to ensure that all reasonable implementation measures are considered and an appropriate in-water work window is being used to minimize project effects.
  - b. Lamprey - the project sponsor and/or their contractors will avoid working instream or river channels that contain Pacific lamprey from March 1 to August 1 in low- to mid-elevation reaches (<5,000 feet), the project sponsor will avoid working instream or river channels from March 1 to August 1. If either timeframe is incompatible with other objectives, the area will be surveyed for nests and lamprey presence, and avoided if possible. If lamprey are known to exist, the project sponsor will utilize dewatering and salvage best management practices (BMPs) outlined in USFWS 2010 .
  - c. Exceptions to ODFW, WDFW, MFWP, or IDFG in-water work windows will be requested through the Variance Process. Work area isolation and fish salvage activities are considered incidental to construction related activities and shall occur during state-recommended in-water work windows.
3. Contaminants. The project sponsor will complete a site assessment with the following elements to identify the type, quantity, and extent of any potential contamination for any action that involves excavation of more than 20 cubic yards of material:
  - a. A review of available records, such as former site use, building plans, and records of any prior contamination events;
  - b. A site visit to inspect the areas used for various industrial processes and the condition of the property;
  - c. Interviews with knowledgeable people, such as site owners, operators, and occupants, neighbors, or local government officials; and
  - d. A summary, stored with the project file that includes an assessment of the likelihood that contaminants are present at the site, based on items 4(a) through 4(c).
4. Site layout and flagging. Prior to construction, the project area will be clearly flagged to identify the following:
  - a. Sensitive resource areas, such as areas below ordinary high water (OHW), spawning areas, springs, and wetlands;
  - b. Equipment entry and exit points;
  - c. Road and stream crossing alignments;
  - d. Staging, storage, and stockpile areas; and
  - e. No-herbicide-application areas and buffers.
5. Temporary access roads and paths.
  - a. Existing access roads and paths will be preferentially used whenever possible, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance, soil compaction, and impacts to vegetation.
  - b. Temporary access roads and paths will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. If slopes are steeper than 30%, the road will be designed by a civil engineer with experience in steep road design.
  - c. The removal of riparian vegetation during construction of temporary access roads will be

- minimized. When temporary vegetation removal is required, vegetation will be cut at ground level (not grubbed) and re-used when possible.
- d. At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated. Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the road surface and associated ditches, pulling the fill material onto the running surface, and reshaping to match the original contour.
  - e. Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window.
6. Temporary stream crossings.
    - a. Existing stream crossings will be preferentially used whenever reasonable, and the number of temporary stream crossings will be minimized.
    - b. Temporary bridges and culverts will be installed to allow for equipment and vehicle crossing over perennial streams during construction. Treated wood shall not be used on temporary bridge crossings or in locations in contact with or over water.
    - c. Equipment and vehicles will cross streams in the wet only where:
      - i. streambed is bedrock; or
      - ii. or off-site logs are placed in the stream and used as a crossing.
    - d. Vehicles and machinery will cross streams at right angles to the main channel wherever possible.
    - e. The location of the temporary crossing will avoid areas that may increase the risk of channel re-routing or avulsion.
    - f. Impacts to potential spawning habitat (i.e., pool tailouts) and pools will be avoided to the maximum extent possible.
    - g. No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. The appropriate state fish and wildlife agency will be contacted for specific timing information.
    - h. After project completion, temporary stream crossings will be obliterated, and the stream channel and banks restored.
  7. Staging, storage, and stockpile areas.
    - a. Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural waterbody or wetland, or on an adjacent established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
    - b. Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within the 100-year floodplain.
    - c. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
    - d. Any material not used in restoration, and not native to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.
  8. Equipment. Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment (e.g., minimally-sized, low pressure tires; minimal hard-turn paths for tracked vehicles; temporary mats or plates within wet areas or on sensitive soils). All vehicles and other mechanized equipment will be:
    - a. Stored, fueled, and maintained in a vehicle staging area located 150 feet or more from any natural water body or wetland or on an adjacent, established road area;
    - b. Refueled in a vehicle staging area located 150 feet or more from a natural waterbody or wetland, or in an isolated hard zone, such as a paved parking lot or adjacent, established road (this measure applies only to gas-powered equipment with tanks larger than 5 gallons);
    - c. Biodegradable lubricants and fluids shall be used on equipment operating in and adjacent to the stream channel and live water.
    - d. Inspected daily for fluid leaks before leaving the vehicle staging area for operation within 150 feet of any natural water body or wetland; and
    - e. Thoroughly cleaned before operation below ordinary high water (OHW), and as often as necessary during operation, to remain grease free.
  9. Erosion control. Erosion control best management practices (BMPs) will be prepared and carried out, commensurate in scope with the action, that may include the following:
    - a. Temporary erosion control BMPs.
      - i. Temporary erosion control BMPs will be in place before any significant alteration of the action site and appropriately installed downslope of project activity within the riparian buffer area until site rehabilitation is complete.
      - ii. If there is a potential for eroded sediment to enter the stream, sediment barriers will be installed and maintained for the duration of project implementation.
      - iii. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.

- iv. Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed-free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
  - v. Sediment will be removed from erosion control BMP once it has reached 1/3 of the exposed height of the BMP.
  - vi. Once the site is stabilized following construction, temporary erosion control BMPs will be removed.
- b. Emergency erosion control BMPs. The following materials for emergency erosion control will be available at the work site:
    - i. A supply of sediment control materials; and
    - ii. An oil-absorbing floating boom whenever surface water is present.
10. Dust abatement. The project sponsor will determine the appropriate dust control measures by considering soil type, equipment usage, prevailing wind direction, and the effects caused by other erosion and sediment control measures. In addition, the following criteria will be followed:
    - a. Work will be sequenced and scheduled to reduce exposed bare soil subject to wind erosion.
    - b. Dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or ligninsulfonate) will not be applied within 25 feet of a natural waterbody or wetland and will be applied so as to minimize the likelihood that they will enter streams. Applications of ligninsulfonate will be limited to a maximum rate of 0.5 gallons per square yard of road surface, assuming a 50:50 (ligninsulfonate to water) solution.
    - c. Application of dust abatement chemicals will be avoided during or just before wet weather and at stream crossings or other areas that could result in unfiltered delivery of the dust abatement chemicals to a waterbody (typically these would be areas within 25 feet of a natural waterbody or wetland; distances may be greater where vegetation is sparse or slopes are steep).
    - d. Spill containment equipment will be available during application of dust abatement chemicals.
    - e. Petroleum-based products will not be used for dust abatement.
  11. Spill prevention, control, and counter measures. The use of mechanized machinery increases the risk for accidental spills of fuel, lubricants, hydraulic fluid, or other contaminants into the riparian zone or directly into the water. Additionally, uncured concrete and form materials adjacent to the active stream channel may result in accidental discharge into the water. These contaminants can degrade habitat and injure or kill benthic invertebrates and ESA-listed species. The project sponsor will adhere to the following measures:
    - a. A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site.
    - b. Written procedures for notifying environmental response agencies will be posted at the work site.
    - c. Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site.
    - d. Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.
    - e. Any waste liquids generated at the staging areas will be temporarily stored under an impervious cover, such as a tarpaulin, until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.
  12. Invasive species control. The following measures will be followed to avoid introduction of invasive plants and noxious weeds into project areas:
    - a. Prior to entering the site, all vehicles and equipment will be power-washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface.
    - b. Watercraft, waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species.
    - c. Wading boots with felt soles are not to be used due to their propensity for aiding in the transfer of invasive species.

Date Mar 2018

Designed JF, AC

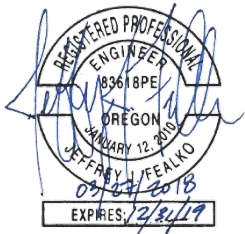
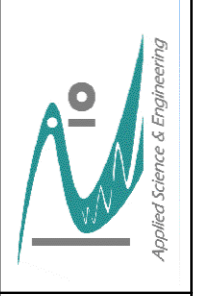
Drawn AC, JF

Checked JF

Approved AC, JF, BPA

Title AC, Biologist, JF, Engineer

**HIP III TERMS & CONDITIONS 1**  
**Rock Creek Stream & Floodplain Restoration**



**HIP III TERMS & CONDITIONS**

**WORK AREA ISOLATION AND FISH SALVAGE**

Any work area within the wetted channel will be isolated from the active stream whenever ESA listed fish are reasonably certain to be present, or if the work area is less than 300-feet upstream from known spawning habitats. Work area isolation & fish salvage activities are considered incidental to construction-related activities and shall occur during the state-recommended in-water work windows. When work area isolation is required, design plans will include all isolation elements, fish release areas, and, when a pump is used to dewater the isolation area and fish are present, a fish screen that meets NMFS's fish screen criteria (NMFS 2011, or most current). Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress and death of species present.

- National Marine Fisheries Service. 2011. Anadromous Salmonid Passage Facility Design. Northwest Region. Available online at:

<http://www.nwr.noaa.gov/salmon-hydropower/ferc/upload/fish-passage-design.pdf>

For salvage operations in known bull trout spawning and rearing habitat, electrofishing shall only occur from May 1 to July 31. No electrofishing will occur in any bull trout occupied habitat after August 15. Bull trout are very temperature sensitive and generally should not be electrofished or otherwise handled when temperatures exceed 15 degrees Celsius. Salvage activities should take place during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress to fish species present.

Salvage operations will follow the ordering, methodologies, and conservation measures specified below in Steps 1 through 6. Steps 1 and 2 will be implemented for all projects where work area isolation is necessary according to conditions above. Electrofishing (Step 3) can be implemented to ensure all fish have been removed following Steps 1 and 2, or when other means of fish capture may not be feasible or effective. Dewatering and rewatering (Steps 4 and 5) will be implemented unless wetted instream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species. Dewatering will not be conducted in areas known to be occupied by lamprey, unless lampreys are salvaged using guidance set forth in USFWS 2010

- U.S. Fish and Wildlife Service. 2010. Best Management Practices to Minimize Adverse Effects to Pacific Lamprey. Available online at: <http://www.fws.gov/pacific/fisheries/sphabcon/lamprey/pdf>

1. Isolate.
  - a. Block nets will be installed at upstream and downstream locations and maintained in a secured position to exclude fish from entering the project area.
  - b. Block nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. Block nets may be left in place for the duration of the project to exclude fish.
  - c. If block nets remain in place more than one day, the nets will be monitored at least daily to ensure they are secured to the banks and free of organic accumulation. If the project is within bull trout spawning and rearing habitat, the block nets must be checked every 4 hours for fish impingement on the net. Less frequent intervals must be approved through a variance request.
  - d. Nets will be monitored hourly anytime there is instream disturbance.
2. Salvage. As described below, fish trapped within the isolated work area will be captured to minimize the risk of injury, then released at a safe site:
  - a. Remove as many fish as possible prior to dewatering.
  - b. During dewatering, any remaining fish will be collected by hand or dip nets.
  - c. Seines with a mesh size to ensure capture of the residing ESA-listed fish will be used.
  - d. Minnow traps will be left in place overnight and used in conjunction with seining.
  - e. If buckets are used to transport fish:
    - i. The time fish are in a transport bucket will be limited, and will be released as quickly as possible;
    - ii. The number of fish within a bucket will be limited based on size, and fish will be of relatively comparable size to minimize predation;
    - iii. Aerators for buckets will be used or the bucket water will be frequently changed with

cold clear water at 15 minute or more frequent intervals.

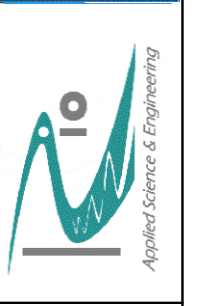
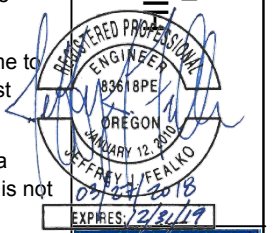
- iv. Buckets will be kept in shaded areas or will be covered by a canopy in exposed areas.
  - v. Dead fish will not be stored in transport buckets but will be left on the streambank to avoid mortality counting errors.
- f. As rapidly as possible (especially for temperature-sensitive bull trout), fish will be released in an area that provides adequate cover and flow refuge. Upstream release is generally preferred, but fish released downstream will be sufficiently outside of the influence of construction.
  - g. Salvage will be supervised by a qualified fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all fish.
3. Electrofishing. Electrofishing will be used only after other salvage methods have been employed or when other means of fish capture are determined to not be feasible or effective. If electrofishing will be used to capture fish for salvage, the salvage operation will be led by an experienced fisheries biologist and the following guidelines will be followed: the NMFS's electrofishing guidelines (NMFS 2000).
    - a. Initial Site Surveys and Equipment Settings
      - i. In order to avoid contact with spawning adults or active redds, researchers must conduct a careful visual survey of the area to be sampled before beginning electrofishing.
      - ii. Prior to the start of sampling at a new location, water temperature and conductivity measurements shall be taken to evaluate electrofisher settings and adjustments. No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. In addition, studies by NMFS scientists indicate that no electrofishing should occur in California coastal basins when conductivity is above 350 µS/cm.
      - iii. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.
      - iv. Equipment must be in good working condition and operators should go through the manufacturer's pre-season checks, adhere to all provisions, and record major maintenance work in a logbook.
      - v. Each electrofishing session must start with all settings (voltage, pulse width, and pulse rate) set to the minimums needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured, and generally not allowed to exceed conductivity-based maxima. Only direct current (DC) or pulsed direct current (PDC) should be used.
        - If conductivity is less than 100 MS, voltage ranges from 900 to 1100 will be used.
        - For conductivity ranges between 100 to 300 MS, voltage ranges will be 500 to 800.
        - For conductivity greater than 300 MS, voltage will be less than 400.
    - b. Electrofishing Technique
      - i. Sampling should begin using straight DC. The power needs to remain on until the fish is netted when using straight DC. If fish capture is unsuccessful with initial low voltage, gradually increase voltage settings with straight DC.
      - ii. If fish capture is not successful with the use of straight DC, then set the electrofisher to lower voltages with PDC. If fish capture is unsuccessful with low voltages, increase pulse width, voltage, and pulse frequency (duration, amplitude, and frequency).
      - iii. Electrofishing should be performed in a manner that minimizes harm to the fish. Stream segments should be sampled systematically, moving the anode continuously in a herringbone pattern (where feasible) through the water. Care should be taken when fishing in areas with high fish concentrations, structure (e.g., wood, undercut banks) and in shallow waters where most backpack electrofishing for juvenile salmonids occurs. Voltage gradients may be high when electrodes are in shallow water where boundary layers (water surface and substrate) tend to intensify the electrical field.
      - iv. Do not electrofish in one location for an extended period (e.g., undercut banks) and regularly check block nets for immobilized fish.
      - v. Fish should not make contact with the anode. The zone of potential injury for fish is 0.5 m from the anode.
      - vi. Electrofishing crews should be generally observant of the condition of the fish and change or terminate sampling when experiencing problems with fish recovery time,

banding, injury, mortality, or other indications of fish stress.

- vii. Netters should not allow the fish to remain in the electrical field any longer than necessary by removing stunned fish from the water immediately after netting.
- c. Sample Processing and Recordkeeping
    - i. Fish should be processed as soon as possible after capture to minimize stress. This may require a larger crew size.
    - ii. All sampling procedures must have a protocol for protecting held fish. Samplers must be aware of the conditions in the containers holding fish; air pumps, water transfers, etc., should be used as necessary to maintain safe conditions. Also, large fish should be kept separate from smaller prey-sized fish to avoid predation during containment.
    - iii. Use of an approved anesthetic can reduce fish stress and is recommended, particularly if additional handling of fish is required (e.g., length and weight measurements, scale samples, fin clips, tagging).
    - iv. Fish should be handled properly (e.g., wetting measuring boards, not overcrowding fish in buckets, etc.).
    - v. Fish should be observed for general condition and injuries (e.g., increased recovery time, dark bands, visually observable spinal injuries). Each fish should be completely revived before releasing at the location of capture. A plan for achieving efficient return to appropriate habitat should be developed before each sampling session. Also, every attempt should be made to process and release ESA-listed specimens first.
    - vi. Pertinent water quality (e.g., conductivity and temperature) and sampling notes (e.g., shocker settings, fish condition/injuries/mortalities) should be recorded in a logbook to improve technique and help train new operators. It is important to note that records of injuries or mortalities pertain to the entire electrofishing survey, including the fish sample work-up.
    - vii. The anode will not intentionally contact fish.
    - viii. Electrofishing shall not be conducted when the water conditions are turbid and visibility is poor. This condition may be experienced when the sampler cannot see the stream bottom in one foot of water.
    - ix. If mortality or obvious injury (defined as dark bands on the body, spinal deformations, de-scaling of 25% or more of body, and torpidity or inability to maintain upright attitude after sufficient recovery time) occurs during electrofishing, operations will be immediately discontinued, machine settings, water temperature, and conductivity checked, and procedures adjusted or electrofishing postponed in order to reduce mortality.
  4. Dewater. Dewatering, when necessary, will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area and will be limited to the shortest linear extent practicable.
    - a. Diversion around the construction site may be accomplished with a cofferdam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch. Where gravity feed is not possible, a pump may be used, but must be operated in such a way as to avoid repetitive dewatering and rewatering of the site. Impoundment behind the cofferdam must occur slowly through the transition, while constant flow is delivered to the downstream reaches.
    - b. All pumps will have fish screens to avoid juvenile fish impingement or entrainment, and will be operated in accordance with NMFS's current fish screen criteria (NMFS 2011, or most recent version). If the pumping rate exceeds 3 cubic feet per second (cfs), a NMFS Hydro fish passage review will be necessary.
    - c. Dissipation of flow energy at the bypass outflow will be provided to prevent damage to riparian vegetation and/or stream channel.
    - d. Safe re-entry of fish into the stream channel will be provided, preferably into pool habitat with cover, if the diversion allows for downstream fish passage.
    - e. Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil or to filter through vegetation prior to reentering the stream channel.
  5. Salvage Notice. Monitoring and recording of fish presence, handling, and mortality must occur for the duration of the isolation, salvage, electrofishing, dewatering, and rewatering operations. Once operations are completed, a salvage report will document procedures used, any fish injuries or deaths (including numbers of fish affected), and causes of any deaths.

|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**HIP III TERMS & CONDITIONS 2**  
Rock Creek Stream & Floodplain Restoration



**HIP III TERMS & CONDITIONS 2**

**CONSTRUCTION AND POST-CONSTRUCTION CONSERVATION MEASURES**

1. Fish passage. Fish passage will be provided for any adult or juvenile fish likely to be present in the project area during construction, unless passage did not exist before construction, or the stream is naturally impassable at the time of construction. If the provision of temporary fish passage during construction will increase negative effects on ESA-listed species or their habitat, a variance can be requested from the NMFS Branch Chief and the USFWS Field Office Supervisor. Pertinent information, such as the species affected, length of stream reach affected, proposed time for the passage barrier, and alternatives considered will be included in the variance request.
2. Construction and discharge water. a) Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. b) Diversions will not exceed 10% of the available flow. c) All construction discharge water will be collected and treated using the best available technology suitable for site conditions. d) Treatments to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present will be provided.
3. Minimize time and extent of disturbance. Earthwork (including drilling, excavation, dredging, filling and compacting) in which mechanized equipment is utilized instream channels, riparian areas, and wetlands will be completed as quickly as possible. Mechanized equipment will be used instreams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic and riparian ecosystem relative to other alternatives. To the extent feasible, mechanized equipment will work from the top of the bank, unless work from another location would result in less habitat disturbance.
4. Cessation of work. Project operations will cease under the following conditions: a) High flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage; b) When allowable water quality impacts, as defined by the state CWA section 401 water quality certification or HIP III Turbidity Monitoring Protocol, have been exceeded; or c) When "incidental take" limitations have been reached or exceeded.
5. Site restoration. When construction is complete: a) All streambanks, soils, and vegetation will be cleaned up and restored as necessary using stockpiled large wood, topsoil, and native channel material. b) All project-related waste will be removed. c) All temporary access roads, crossings, and staging areas will be obliterated. When necessary for revegetation and infiltration of water, compacted areas of soil will be loosened. All disturbed areas will be rehabilitated in a manner that results in similar or improved conditions relative to pre-project conditions. This will be achieved through redistribution of stockpiled materials, seeding, and/or planting with local native seed mixes or plants.
6. Revegetation. Long-term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation using the following criteria: a) Planting and seeding will occur prior to or at the beginning of the first growing season after construction. b) An appropriate mix of species that will achieve establishment, shade, and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site will be used. c) Vegetation, such as willow, sedge and rush mats, will be salvaged from disturbed or abandoned floodplains, stream channels, or wetlands. d) Invasive species will not be used. e) Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. f) Surface fertilizer will not be applied within 50 feet of any stream channel, waterbody, or wetland. g) Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons. h) Re-establishment of vegetation in disturbed areas will achieve at least 70% of pre-project conditions within 3 years. i) Invasive plants will be removed or controlled until native plant species are well-established (typically 3 years post-construction).
7. Site access. The project sponsor will retain the right of reasonable access to the site in order to monitor the success of the project over its life.
8. Implementation monitoring. Project sponsor staff or their designated representative will provide implementation monitoring by filling out the Project Completion Form (PCF) to ensure compliance with the applicable BiOp, including: a) General conservation measures are adequately followed. b) Effects to listed species are not greater than predicted and incidental take limitations are not exceeded. c) Turbidity monitoring shall be conducted in accordance with the HIP III turbidity monitoring protocol and recorded in the PCF.

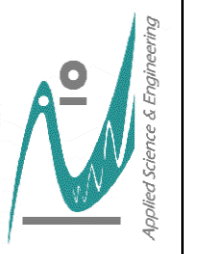
9. CWA section 401 water quality certification. The project sponsor or designated representative will complete and record water quality observations to ensure that in-water work is not degrading water quality. During construction, CWA section 401 water quality certification provisions provided by the Oregon Department of Environmental Quality, Washington Department of Ecology, or Idaho Department of Environmental Quality will be followed.

**STAGED REWATERING PLAN**

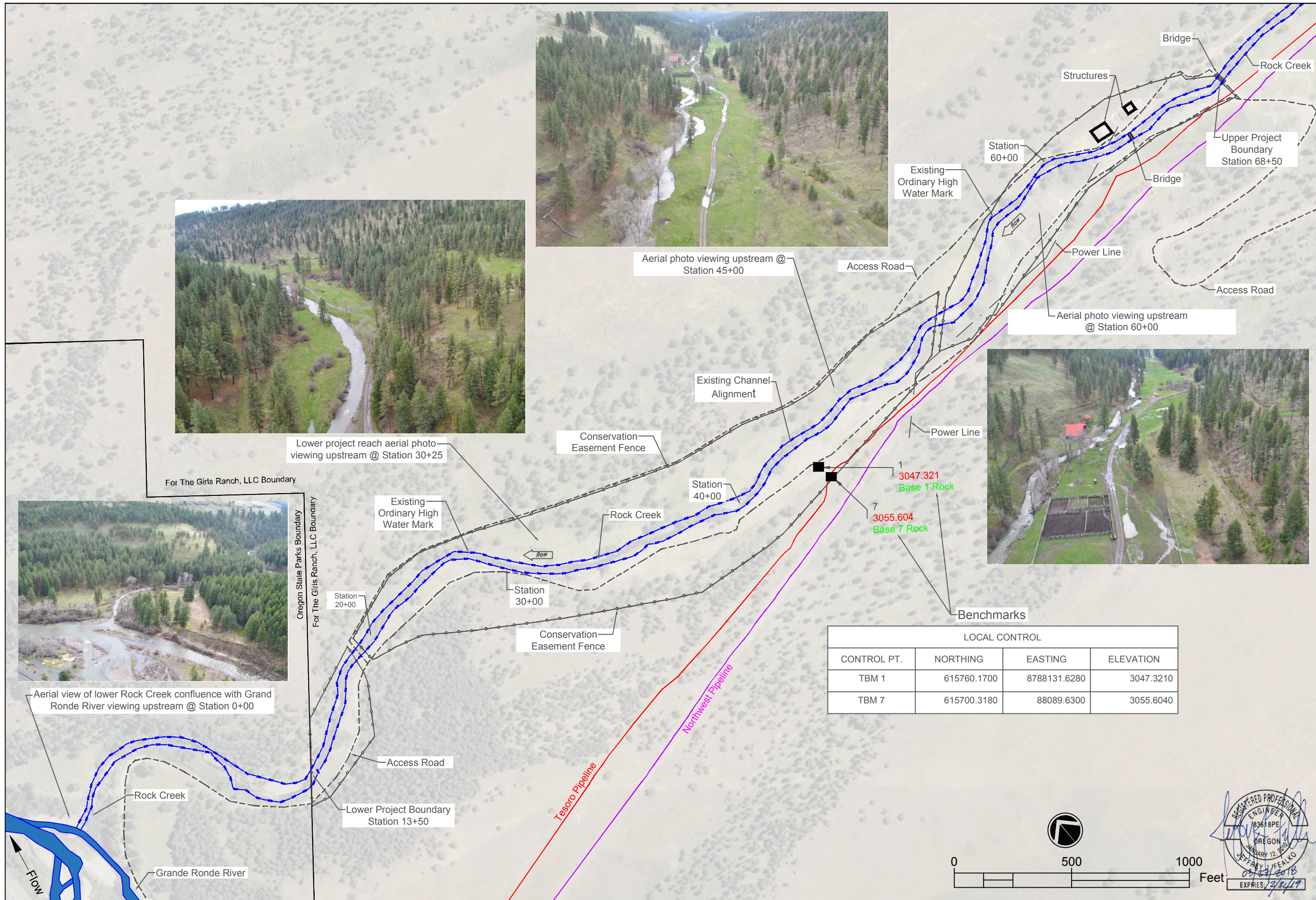
1. When appropriate, the project sponsor shall implement a staged rewating plan for projects that involve introducing streamflow into recently excavated channels under the
  - 2a) Improve Secondary Channel and Wetland Habitat Activity category or 2f) Channel Reconstruction categories.
    - a. Pre-wash the newly-excavated channel before rewating. Turbid wash water will be detained and pumped to the floodplain, rather than discharging to fish-bearing waters.
    - b. Prepare new channel for water by installing seine at upstream end to prevent fish from moving downstream into new channel until 2/3 of total streamflow is available in that channel. Starting in the early morning, introduce 1/3 of the flow into the new channel over a period of 1-2 hours.
    - c. Perform monitoring according to HIP III Turbidity Monitoring Protocol.
      - i. If turbidity exceeds 10% of background, modify the activity to reduce turbidity. In this case, this may mean decreasing the amount of flow entering the new channel and/or correcting any other issues causing turbidity (e.g., correct a bank that is sloughing, install or correct a BMP, etc.).
      - ii. Monitor every 2 hours as long as the instream activity is occurring.
      - iii. If exceedances occur for more than 2 monitoring intervals in a row (4 hours), then the activity must stop until turbidity reaches background levels. This means that the contractor may have to plug off water supply to the new meander until turbidity is within acceptable levels.
      - iv. Once turbidity is within 10% of background levels, move on to the next re-watering stage.
    - d. Prepare to introduce the second 1/3 of the flow (up to a total of 2/3) to the new channel by installing seine at upstream end of old channel in order to prevent fish from moving into a partially-dewatered channel. Introduce the second 1/3 of the flow over the next 1-2 hours. Salvage fish from the old channel at this time, so that the old channel is fish-free before dropping below 1/3 of the flow. Note: the fish will be temporarily blocked from moving downstream into either channel until 2/3 of the flow has been transitioned to the new channel. This blockage to downstream fish passage is expected to persist for roughly 12 to 14 hours, but fish will still be able to volitionally move out of the channel in the downstream direction. Perform monitoring as in #3 above.
    - e. After the second 1/3 of flow is introduced over 2 hours, and turbidity is within 10% of the background level, remove seine nets from the new channel, and allow fish to move downstream back into the channel.
    - f. Introduce the final 1/3 of flow. Once 100% of the flow is in the new channel, install plug to block flow into the old channel and remove seines from the old channel.

Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist; JF, Engineer

**HIP III TERMS & CONDITIONS 3**  
 Rock Creek Stream & Floodplain Restoration



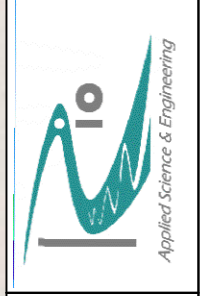
HIP III  
 TERMS &  
 CONDITIONS 3



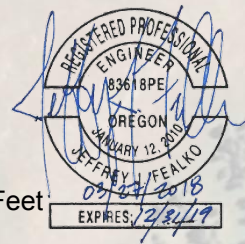
| LOCAL CONTROL |             |              |           |
|---------------|-------------|--------------|-----------|
| CONTROL PT.   | NORTHING    | EASTING      | ELEVATION |
| TBM 1         | 615760.1700 | 8788131.6280 | 3047.3210 |
| TBM 7         | 615700.3180 | 88089.6300   | 3055.6040 |

Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

**EXISTING CONDITIONS, OWNERSHIP  
 & SURVEY CONTROL**  
 Rock Creek Stream & Floodplain Restoration



EXISTING CONDITIONS

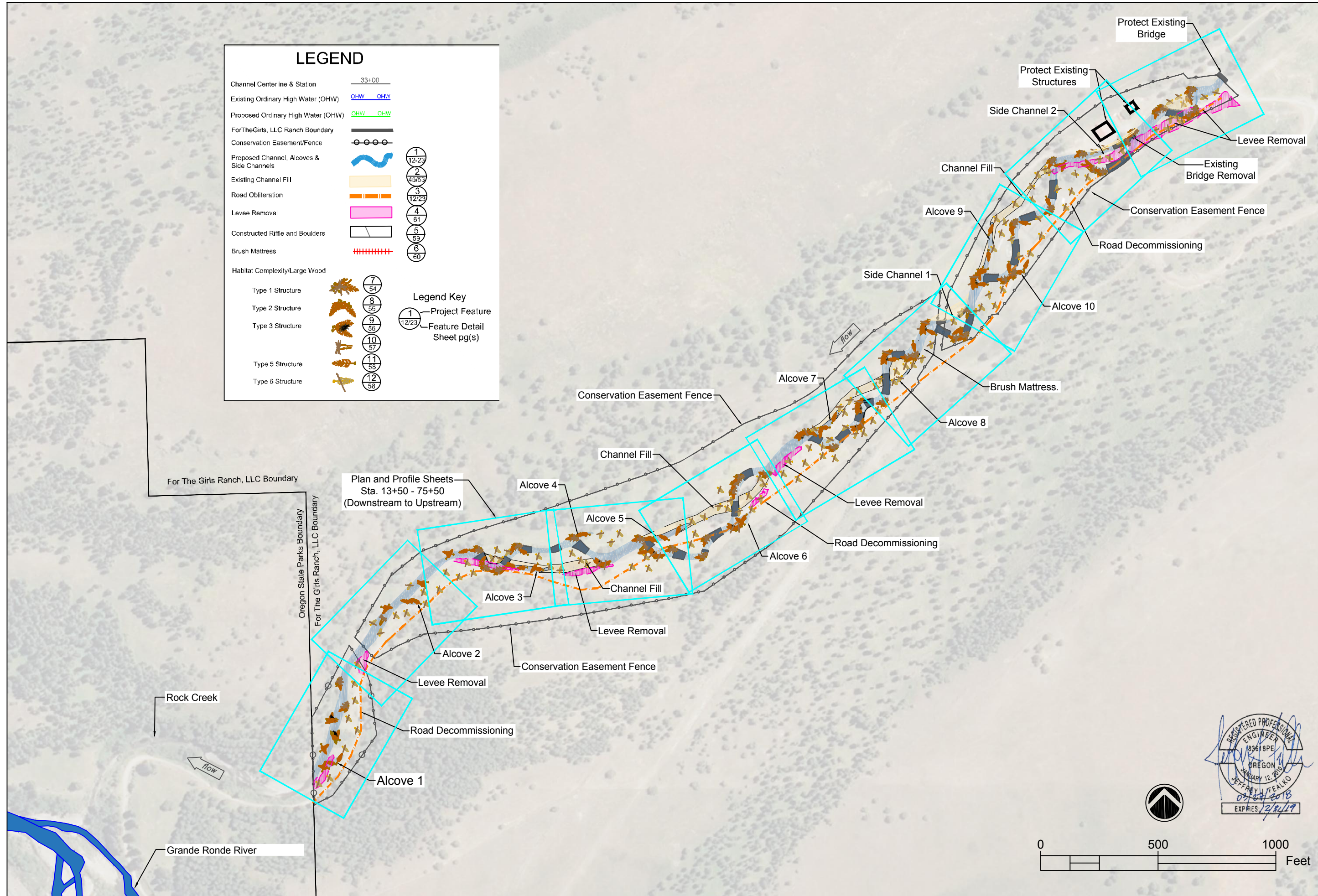


# LEGEND

|   |       |            |
|---|-------|------------|
| Channel Centerline & Station              | 33+00 |            |
| Existing Ordinary High Water (OHW)        | OHW   | OHW        |
| Proposed Ordinary High Water (OHW)        | OHW   | OHW        |
| ForTheGirls, LLC Ranch Boundary           |       |            |
| Conservation Easement/Fence               |       |            |
| Proposed Channel, Alcoves & Side Channels |       | 1<br>12/23 |
| Existing Channel Fill                     |       | 2<br>45/53 |
| Road Obliteration                         |       | 3<br>12/23 |
| Levee Removal                             |       | 4<br>61    |
| Constructed Riffle and Boulders           |       | 5<br>59    |
| Brush Mattress                            |       | 6<br>60    |
| Habitat Complexity/Large Wood             |       |            |
| Type 1 Structure                          |       | 7<br>54    |
| Type 2 Structure                          |       | 8<br>55    |
| Type 3 Structure                          |       | 9<br>56    |
| Type 5 Structure                          |       | 10<br>57   |
| Type 6 Structure                          |       | 11<br>58   |
|   |       | 12<br>58   |

**Legend Key**

|       |                            |
|-------|----------------------------|
| 1     | Project Feature            |
| 12/23 | Feature Detail Sheet pg(s) |



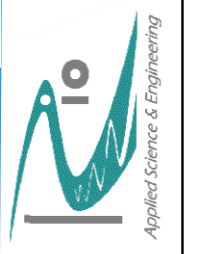
Plan and Profile Sheets  
Sta. 13+50 - 75+50  
(Downstream to Upstream)



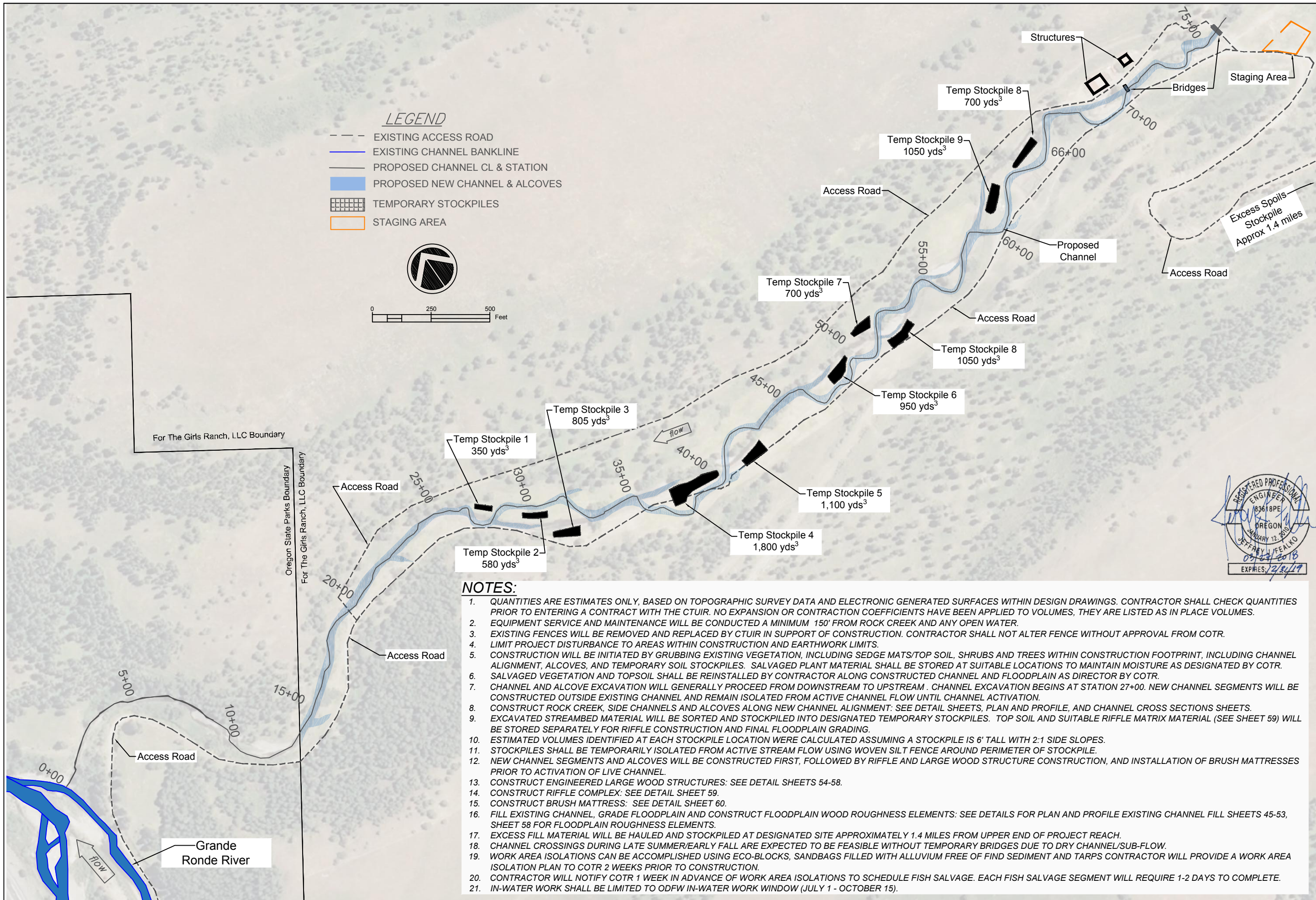
|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

## PROPOSED CONDITIONS

### Rock Creek Stream & Floodplain Restoration



PROPOSED CONDITIONS



**LEGEND**

- - - EXISTING ACCESS ROAD
- EXISTING CHANNEL BANKLINE
- PROPOSED CHANNEL CL & STATION
- PROPOSED NEW CHANNEL & ALCOVES
- TEMPORARY STOCKPILES
- STAGING AREA

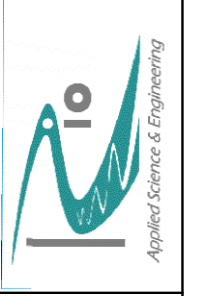


**NOTES:**

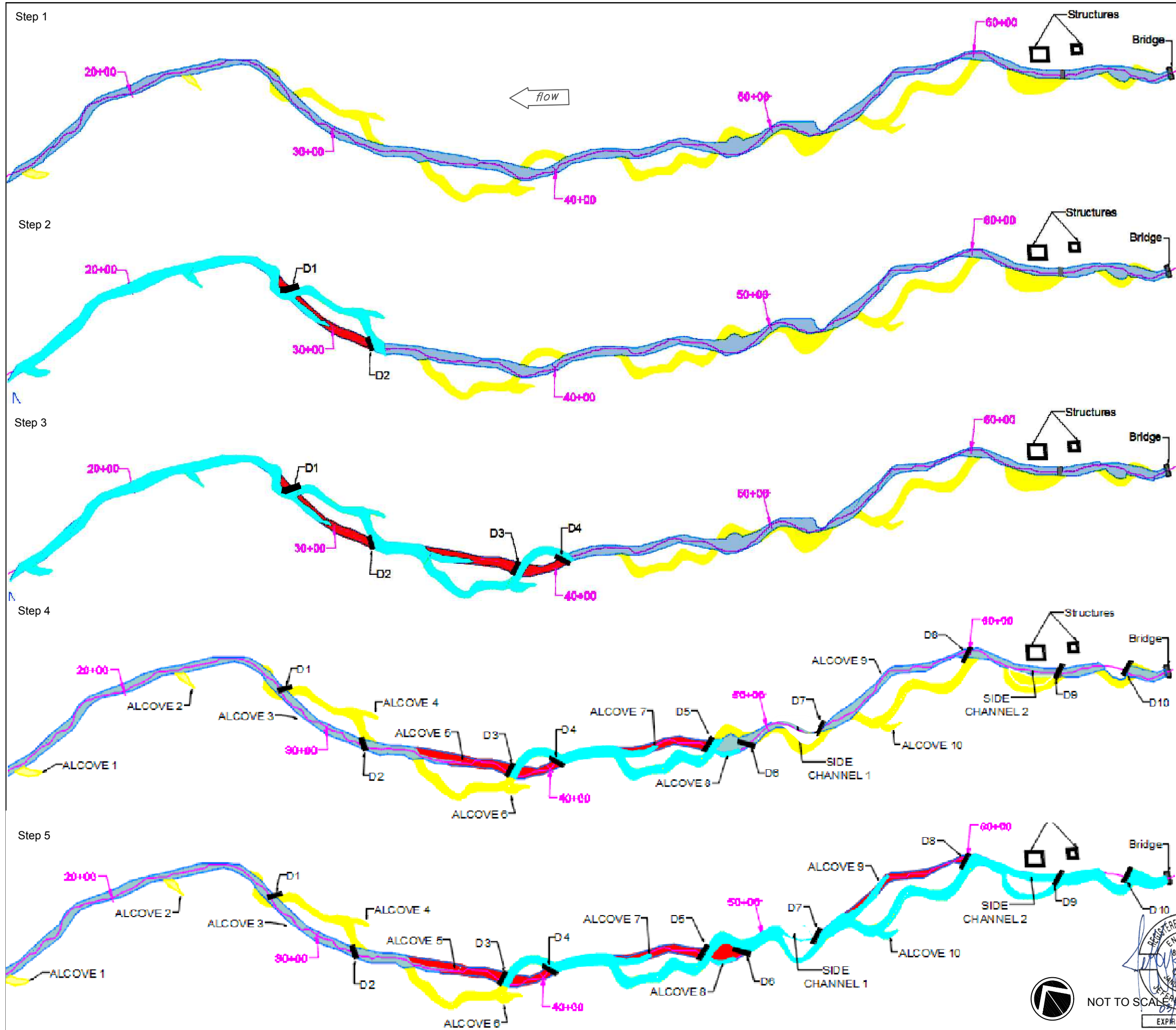
1. QUANTITIES ARE ESTIMATES ONLY, BASED ON TOPOGRAPHIC SURVEY DATA AND ELECTRONIC GENERATED SURFACES WITHIN DESIGN DRAWINGS. CONTRACTOR SHALL CHECK QUANTITIES PRIOR TO ENTERING A CONTRACT WITH THE CTUIR. NO EXPANSION OR CONTRACTION COEFFICIENTS HAVE BEEN APPLIED TO VOLUMES, THEY ARE LISTED AS IN PLACE VOLUMES.
2. EQUIPMENT SERVICE AND MAINTENANCE WILL BE CONDUCTED A MINIMUM 150' FROM ROCK CREEK AND ANY OPEN WATER.
3. EXISTING FENCES WILL BE REMOVED AND REPLACED BY CTUIR IN SUPPORT OF CONSTRUCTION. CONTRACTOR SHALL NOT ALTER FENCE WITHOUT APPROVAL FROM COTR.
4. LIMIT PROJECT DISTURBANCE TO AREAS WITHIN CONSTRUCTION AND EARTHWORK LIMITS.
5. CONSTRUCTION WILL BE INITIATED BY GRUBBING EXISTING VEGETATION, INCLUDING SEDGE MATS/TOP SOIL, SHRUBS AND TREES WITHIN CONSTRUCTION FOOTPRINT, INCLUDING CHANNEL ALIGNMENT, ALCOVES, AND TEMPORARY SOIL STOCKPILES. SALVAGED PLANT MATERIAL SHALL BE STORED AT SUITABLE LOCATIONS TO MAINTAIN MOISTURE AS DESIGNATED BY COTR.
6. SALVAGED VEGETATION AND TOPSOIL SHALL BE REINSTALLED BY CONTRACTOR ALONG CONSTRUCTED CHANNEL AND FLOODPLAIN AS DIRECTOR BY COTR.
7. CHANNEL AND ALCOVE EXCAVATION WILL GENERALLY PROCEED FROM DOWNSTREAM TO UPSTREAM. CHANNEL EXCAVATION BEGINS AT STATION 27+00. NEW CHANNEL SEGMENTS WILL BE CONSTRUCTED OUTSIDE EXISTING CHANNEL AND REMAIN ISOLATED FROM ACTIVE CHANNEL FLOW UNTIL CHANNEL ACTIVATION.
8. CONSTRUCT ROCK CREEK, SIDE CHANNELS AND ALCOVES ALONG NEW CHANNEL ALIGNMENT: SEE DETAIL SHEETS, PLAN AND PROFILE, AND CHANNEL CROSS SECTIONS SHEETS.
9. EXCAVATED STREAMBED MATERIAL WILL BE SORTED AND STOCKPILED INTO DESIGNATED TEMPORARY STOCKPILES. TOP SOIL AND SUITABLE RIFFLE MATRIX MATERIAL (SEE SHEET 59) WILL BE STORED SEPARATELY FOR RIFFLE CONSTRUCTION AND FINAL FLOODPLAIN GRADING.
10. ESTIMATED VOLUMES IDENTIFIED AT EACH STOCKPILE LOCATION WERE CALCULATED ASSUMING A STOCKPILE IS 6' TALL WITH 2:1 SIDE SLOPES.
11. STOCKPILES SHALL BE TEMPORARILY ISOLATED FROM ACTIVE STREAM FLOW USING WOVEN SILT FENCE AROUND PERIMETER OF STOCKPILE.
12. NEW CHANNEL SEGMENTS AND ALCOVES WILL BE CONSTRUCTED FIRST, FOLLOWED BY RIFFLE AND LARGE WOOD STRUCTURE CONSTRUCTION, AND INSTALLATION OF BRUSH MATTRESSES PRIOR TO ACTIVATION OF LIVE CHANNEL.
13. CONSTRUCT ENGINEERED LARGE WOOD STRUCTURES: SEE DETAIL SHEETS 54-58.
14. CONSTRUCT RIFFLE COMPLEX: SEE DETAIL SHEET 59.
15. CONSTRUCT BRUSH MATTRESS: SEE DETAIL SHEET 60.
16. FILL EXISTING CHANNEL, GRADE FLOODPLAIN AND CONSTRUCT FLOODPLAIN WOOD ROUGHNESS ELEMENTS: SEE DETAILS FOR PLAN AND PROFILE EXISTING CHANNEL FILL SHEETS 45-53, SHEET 58 FOR FLOODPLAIN ROUGHNESS ELEMENTS.
17. EXCESS FILL MATERIAL WILL BE HAULED AND STOCKPILED AT DESIGNATED SITE APPROXIMATELY 1.4 MILES FROM UPPER END OF PROJECT REACH.
18. CHANNEL CROSSINGS DURING LATE SUMMER/EARLY FALL ARE EXPECTED TO BE FEASIBLE WITHOUT TEMPORARY BRIDGES DUE TO DRY CHANNEL/SUB-FLOW.
19. WORK AREA ISOLATIONS CAN BE ACCOMPLISHED USING ECO-BLOCKS, SANDBAGS FILLED WITH ALLUVIUM FREE OF FINE SEDIMENT AND TARPS CONTRACTOR WILL PROVIDE A WORK AREA ISOLATION PLAN TO COTR 2 WEEKS PRIOR TO CONSTRUCTION.
20. CONTRACTOR WILL NOTIFY COTR 1 WEEK IN ADVANCE OF WORK AREA ISOLATIONS TO SCHEDULE FISH SALVAGE. EACH FISH SALVAGE SEGMENT WILL REQUIRE 1-2 DAYS TO COMPLETE.
21. IN-WATER WORK SHALL BE LIMITED TO ODFW IN-WATER WORK WINDOW (JULY 1 - OCTOBER 15).

|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**ACCESS & STAGING**  
Rock Creek Stream & Floodplain Restoration



**ACCESS & STAGING**



**Step 1:**

1. See Sheet 11 for detailed notes: Initiate channel construction following installation of erosion and sediment control plan by salvaging riparian vegetation and grubbing sedge/rush and soil material along new channel and alcove alignments. Separate and store material in designated stockpile locations for future use.
2. Construct new channel segments and alcoves outside OHW in the "dry", beginning at lower project reach and continuing upstream (Alcove 1, station 14+00, Alcove 2, station 22+00, and Main Channel at station 26+50). Separate riffle matrix material and sand gravel and store in temporary stockpiles.
3. Following completion of new channel excavation and grading, proceed with installation of large wood structures, riffles and installation of brush mattresses (streambank bioengineering) along newly constructed channel segments, alcoves, and side channels.

**Step 2:**

1. Following completion of final grading and installation of wood, riffles, and brush mattress, install diversion structures D1 and D2 (ecoblocks, clean sand bags, etc) and water and sediment control measures (pumps, discharge pipe, etc..) in preparation for channel segment activation (In-water work, July 1-Oct 15).
2. Coordinate with CTUIR CO & fish salvage crew in preparations for channel activation. Salvage crew to install block nets, evaluate work area isolation, and prepare to conduct early morning fish salvage operations during channel diversion.
3. Remove earthen plug to new channel segment and initiate channel activation following fish removal and at the direction of CTUIR CO and fish crew lead. Monitor turbidity discharge during channel activation and implement BMP's to comply with permit requirements and minimize impacts to aquatic resources and water quality per contract specifications and permit requirements.
4. Complete channel segment activation and initiate backfill in existing channel segment following completion of fish removal. Backfill will not proceed until CTUIR CO and fish salvage lead authorize activity. Segment includes backfill and shaping of Alcoves 3 & 4.

**Step 3:**

1. Similar to step 2 process.
2. Includes activation and reclamation of two channel segments.
3. D3 and D4 can be constructed in tandem.
4. Fish salvage operations may require 2 days to complete due size of work area isolation.
5. Alcove 5 will be constructed along existing channel segment and graded during channel reclamation following new channel activation.

**Step 4:**

1. Includes diversion structures 5, 6, & 7.
2. Section can be divided into two distinct isolations/channel activation sections.
3. Fish salvage operations which are expected to require 2-3 days to complete.
4. Alcoves 7 and 8 and Side Channel 1 will be constructed and graded during channel backfill activities.

**Step 5:**

1. Includes diversion structures 8, 9, & 10.
2. Section can be divided into individual isolations/channel activation sections.
3. Includes removal of small bridge at D9 location.
4. Fish salvage operations which are expected to require 2-3 days to complete.
5. Section includes Alcove 10. Side Channel 2 will be constructed and graded during channel backfill activities.
6. Complete installation of large wood structure, floodplain wood, road decommissioning, and site clean up per specifications.

**LEGEND**

- EXISTING CHANNEL ALIGNMENT
- EXISTING CHANNEL CL & STATION
- CHANNEL/ALCOVE CONST- DRY
- CHANNEL FILL
- ACTIVATED CHANNEL
- CHANNEL DIVERSION STRUCTURE

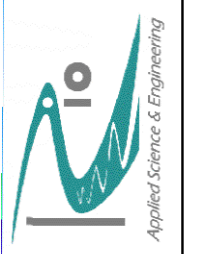
REGISTERED PROFESSIONAL ENGINEER  
 83618PE  
 OREGON  
 JEFFREY J. FEALDO  
 02/24/2018  
 EXPIRES: 12/31/19



NOT TO SCALE

|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**SEQUENCING & WORK AREA ISOLATION**  
 Rock Creek Stream & Floodplain Restoration



**SEQUENCING & WORK AREA ISOLATION**

**CONSTRUCTION SEQUENCING PLAN**

WORK IN THE RIVER BELOW THE ORDINARY HIGH WATER MARK (OHWM) SHALL ONLY OCCUR DURING THE ALLOWABLE IN-WATER WORK WINDOW (July 1 to October 15). WORK IN THE FLOODPLAIN AND LANDWARD OF THE ORDINARY HIGH WATER MARK (OHWM) MAY OCCUR ANY TIME OF THE YEAR AS WEATHER, SITE CONDITIONS AND PERMITS ALLOW.

CONSTRUCTION OF PROJECT OUTSIDE OF THE OHWM SHALL BE LARGELY COMPLETED PRIOR TO THE IN-WATER WORK WINDOW. PRE-IN-WATER WINDOW WORK INCLUDES CONSTRUCTION OF CHANNEL SEGMENTS AND ALCOVES, INSTALLATION OF LARGE WOOD STRUCTURES, RIFFLES, AND BRUSH MATTRESSES IN NEW CHANNEL SEGMENTS. IN CHANNEL WOOD PLACEMENT WILL OCCUR DURING THE DESIGNED IN-WATER WORK WINDOW.

FOLLOWING COMPLETION OF NEW CHANNEL CONSTRUCTION AND ACTIVATION, INSTALLATION OF PROJECT FEATURES IN EXISTING CHANNEL SEGMENTS, DRAW BOTTOM ROAD DECOMMISSIONING, FLOODPLAIN WOOD PLACEMENT AND SITE CLEAN UP WILL BE COMPLETED, FOLLOWED BY DEMOBILIZATION FROM WORK SITE.

CONSTRUCTION SHALL OCCUR IN THE FOLLOWING GENERAL STEPS, WHICH CORRESPOND TO THE CONSTRUCTION AND CHANNEL DIVERSION/ACTIVATION SEQUENCE SHOWN ON SHEET 10. REFER TO DESIGN SHEETS FOR SPECIFICS REGARDING THE CONSTRUCTION OF THE PROPOSED IMPROVEMENTS.

**CHANNEL AND ALCOVE CONSTRUCTION**

**1. GENERAL SITE PREPARATION**

- a. MARK THE LIMITS OF CUT AND FILL AREAS.
- b. ESTABLISH LIMITS OF EXCAVATION/FILL, STOCKPILE AREAS, STAGING AREAS, HAUL ROADS AND SIGNAGE.
- c. INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH HIP III CONSERVATION MEASURES. SEE EROSION CONTROL PLAN IN CONSTRUCTION SUBCONTRACT SPECIFICATIONS.
- d. SALVAGE RIPARIAN VEGETATION AND GRUB SEDGE/RUSH PLANT COMMUNITIES ALONG NEW CHANNEL ALIGNMENT. SEDGE/RUSH SOD WILL BE GRUBBED TO A MINIMUM DEPTH OF 8" TO CAPTURE ROOT MASS OF SOD. SORT AND STOCKPILE MATERIAL AT DESIGNATED SITES FOR FUTURE USE.

**2. EXCAVATE AND GRADE NEW CHANNEL ALIGNMENT AND ALCOVES OUTSIDE OF OHWM**

**STEP 1, SHEET 10:**

- a. EXCAVATE CHANNEL AND ALCOVES WITHIN LIMITS OF DRY (NO SURFACE WATER) AREA (SEE SHEETS 12 THROUGH 31).
- b. PRESERVE EXISTING VEGETATION WHERE PRACTICAL TO MAXIMIZE RIPARIAN INTEGRITY.
- c. TEMPORARILY STOCKPILE SUITABLE TOPSOIL AND CHANNEL BED MATERIAL IN SPECIFIED LOCATIONS. STOCKPILED MATERIAL WILL BE USED IN CHANNEL CONSTRUCTION AND DRESSING OF FINAL GRADE FOR PLANTING PREPARATION. NO STOCKPILED MATERIAL IN TEMPORARY STOCKPILE AREAS SHALL REMAIN ON-SITE AFTER PROJECT IS COMPLETED. ALL EXCESS MATERIAL SHALL BE HAULED TO A LONG TERM DISPOSAL SITE ON THE PROPERTY AND AS DESIGNATED BY THE CO.
- d. INSTALL LARGE WOOD STRUCTURES (SEE DESIGN SHEETS 39 THROUGH 44).
- e. INSTALL CONSTRUCTED RIFFLES (SEE DESIGN SHEET 43).
- f. INSTALL BRUSH MATTRESSES (SEE DESIGN SHEET 44).

**3. CONSTRUCTED CHANNEL ACTIVATION**

**STEP 2, SHEET 9:**

- a. INSTALL WORK ZONE ISOLATION STRUCTURES D1 AND D2 AT STATIONS 28+25 NAD 32+75 RESPECTIVELY AND REMOVE PLUG AT THE UPSTREAM END OF CHANNEL STATIONS 28+25 AND 32+75.
- b. BEGIN METERING WATER INTO REACH AT STATION DIVERSION STRUCTURES, INITIATE FISH SALVAGE AND CONTINUE TO INCREASE FLOW FOLLOWING FISH REMOVAL ACTIVITIES UNTIL ENTIRE FLOW IS DIVERTED. FOLLOW HIP III GUIDELINES ON ACTIVATION OF CHANNELS ON SHEET 6.
- c. WHEN FISH SALVAGE IS COMPLETE IN REACH, COMPLETE DIVERSION STRUCTURE AND FILL THE EXISTING CHANNEL FROM STATION 33+00 DOWNSTREAM TO 27+00. SEE SHEETS 28 AND 29.
- d. REMOVE WORK AREA ISOLATIONS FOLLOWING COMPLETION OF CHANNEL BACKFILL.

**STEP 3, SHEET 9:**

- a. INSTALL WORK ZONE ISOLATION STRUCTURES D3 AND D4 (STATIONS 41+00 AND 43+25 RESPECTIVELY) AND REMOVE PLUGS AT THE DOWNSTREAM END OF STATIONS.
- b. WHEN FISH SALVAGE IS COMPLETE IN REACH, COMPLETE DIVERSION STRUCTURE AND FILL THE EXISTING CHANNEL BETWEEN STATIONS 43+25 AND 35+00 (SEE SHEETS 46 & 47).
- c. CONSTRUCT ALCOVE 5 DURING CHANNEL BACKFILL (SEE SHEET 25).
- d. REMOVE WORK AREA ISOLATIONS FOLLOWING COMPLETION OF CHANNEL BACKFILL.

**STEP 4, SHEET 9:**

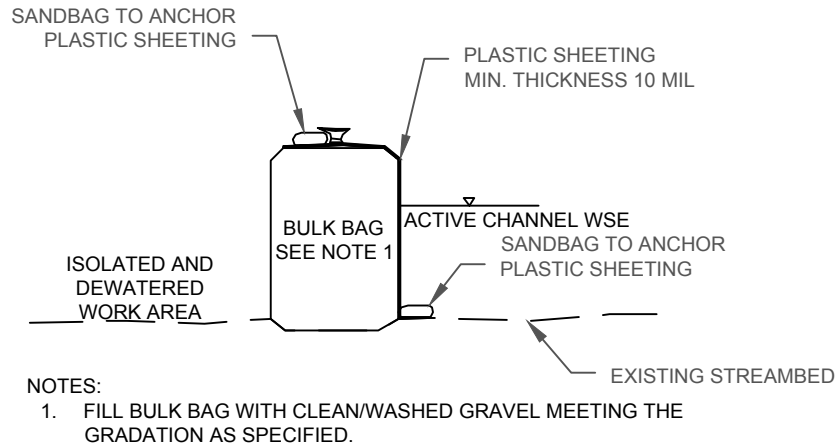
- a. INSTALL WORK ZONE ISOLATION STRUCTURES D5, 6, & 7 AT STATIONS 51+75, 53+40, AND 57+75 RESPECTIVELY AND REMOVE PLUGS AT THE DOWNSTREAM END OF STATIONS.
- b. BEGIN METERING WATER INTO REACH AT STATION DIVERSION STRUCTURES, INITIATE FISH SALVAGE AND CONTINUE TO INCREASE FLOW FOLLOWING FISH REMOVAL ACTIVITIES UNTIL ENTIRE FLOW IS DIVERTED. FOLLOW HIP III GUIDELINES ON ACTIVATION OF CHANNELS ON SHEET 6.
- c. WHEN FISH SALVAGE IS COMPLETE IN REACH, COMPLETE DIVERSION STRUCTURE AND FILL THE EXISTING CHANNEL BETWEEN STATIONS 53+40 DOWNSTREAM TO STATION 46+00.
- d. CONSTRUCT ALCOVES 7 & 8 DURING CHANNEL BACKFILL (SEE SHEET 26).
- e. CONSTRUCT SIDE CHANNEL 1 DURING CHANNEL BACKFILL (SEE SHEET 21).

**STEP 5: SHEET 9:**

- a. INSTALL WORK ZONE ISOLATION STRUCTURES D8, 9, & 10 AT STATIONS 60+00, 71+00, AND 74+50 RESPECTIVELY AND REMOVE EARTHEN PLUGS AT DOWNSTREAM EXTENT OF ACTIVATION REACH.
- b. BEGIN METERING WATER INTO REACH AT STATION DIVERSION STRUCTURES, INITIATE FISH SALVAGE AND CONTINUE TO INCREASE FLOW FOLLOWING FISH REMOVAL ACTIVITIES UNTIL ENTIRE FLOW IS DIVERTED. FOLLOW HIP III GUIDELINES ON ACTIVATION OF CHANNELS ON SHEET 6.
- c. WHEN FISH SALVAGE IS COMPLETE IN REACH, COMPLETE DIVERSION STRUCTURE AND FILL THE EXISTING CHANNEL BETWEEN STATIONS 60+00 DOWNSTREAM TO STATION 59+10 (SEE SHEETS 33 TO 35).
- d. CONSTRUCT ALCOVE 9 AT STATION 59+10 DURING CHANNEL BACKFILL. (SEE SHEET 26).
- e. CONSTRUCT SIDE CHANNEL 2 DURING CHANNEL BACKFILL (SEE SHEET 22).

**EXISTING CHANNEL LARGE WOOD STRUCTURE CONSTRUCTION**

- a. WORK WITHIN THE EXISTING SEGMENTS OF THE ROCK CREEK CHANNEL ARE EXPECTED TO REQUIRE LIMITED WORK AREA ISOLATION & FISH SALVAGE DUE TO LOW FLOW CONDITIONS DURING SUMMER BASEFLOW PERIOD.
- b. INDIVIDUAL WOOD STRUCTURE SITES WILL BE EVALUATED FOR WORK AREA ISOLATION AND FISH REMOVAL NEEDS. WORK ZONE ISOLATIONS MAY INCLUDE A COMBINATION OF ECOBLOCKS, SANDBAGS, SEDIMENT BOOMS AND BLOCK NETS.
- c. WORK AREA ISOLATIONS AND BLOCK NETS WILL BE INSTALLED PRIOR TO FISH SALVAGE OPERATIONS AND FISH REMOVED FROM WORK AREAS AS NECESSARY TO MINIMIZE ADVERSE IMPACTS TO FISHERY RESOURCES.
- d. SEDIMENT CONTAINMENT AND TURBIDITY REQUIREMENTS APPLY SIMILARLY TO ACTIVITIES IDENTIFIED IN NOTES ABOVE FOR CHANNEL CONSTRUCTION AND ACTIVATION.



**COFFERDAM TYPICAL DETAIL**

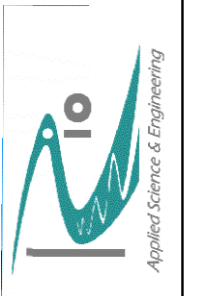
NTS

**GENERAL EROSION AND SEDIMENT CONTROL NOTES:**

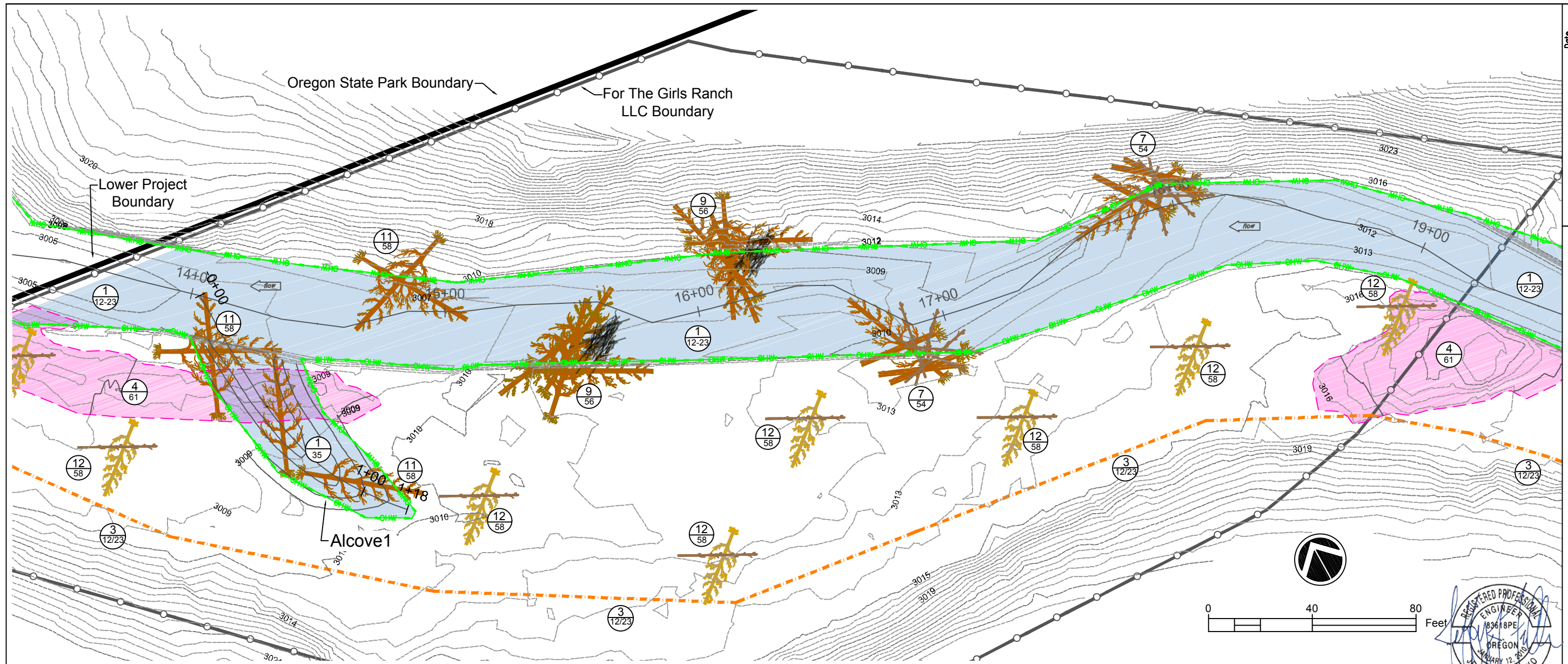
- 1. THE IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES AND BEST MANAGEMENT PRACTICES INCLUDING CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED.
- 2. THE COFFER DAM DETAIL SHOWN ON THIS SHEET IS AN EXAMPLE OF ACCEPTABLE METHODS TO USE DURING CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR DEVELOPING AND SUBMITTING A COFFERDAM PLAN TO INCLUDE SUFFICIENT DETAIL OF MEANS AND METHODS SATISFYINGLY MEETING THE PROJECT SPECIFICATIONS AND PERMIT REQUIREMENTS. COFFERDAMS MAY CONSIST OF OTHER METHODS INCLUDING (AND NOT LIMITED TO) SECLUSION FENCING, SAND BAGS, BULK BAGS, SUPER SACKS, SHEET PILE, INFLATABLE BLADDERS. COFFERDAMS SHALL INCLUDE PLASTIC LINER OR FINE MESH SILT FENCE TO REDUCE TURBIDITY AND FINES FROM ENTERING THE FREE FLOWING PORTION OF LIVE WATER.
- 3. ALL PUMP INTAKES SHALL BE SCREENED FOR FISH PROTECTION AS REQUIRED BY ODFW, NOAA.
- 4. DEWATERING PUMP DISCHARGE FROM WITHIN COFFERDAMMED WORK AREAS SHALL BE RELEASED ONTO FLOODPLAIN AREAS AWAY FROM WETLANDS AND CONSTRUCTION ACTIVITIES. DISCHARGE SHALL NOT CAUSE EROSION OF TOPSOIL AND SHALL SHEET FLOW OVER THE FLOODPLAIN BEFORE ENTERING ROCK CREEK DOWNSTREAM OF THE WORK AREA. ALL RETURN FLOWS MUST MEET PERMIT REQUIREMENTS FOR TURBIDITY.

|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**SEQUENCING & WORK AREA ISOLATION NOTES**  
Rock Creek Stream & Floodplain Restoration

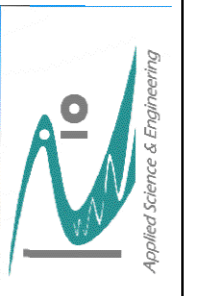


SEQUENCING & WORK AREA ISOLATION NOTES



Date: Mar. 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 13+50 TO 19+50**  
 Rock Creek Stream & Floodplain Restoration



PLAN & PROFILE  
 13+50 to 19+50  
 Sheet 12 of 66

**LEGEND**

|   |  |         |
|---|--|---------|
| Channel Centerline & Station              |  | 33+00   |
| Existing Ordinary High Water (OHW)        |  | OHW OHW |
| Proposed Ordinary High Water (OHW)        |  | OHW OHW |
| ForTheGirls, LLC Ranch Boundary           |  |         |
| Conservation Easement/Fence               |  |         |
| Proposed Channel, Alcoves & Side Channels |  |         |
| Existing Channel Fill                     |  |         |
| Road Obliteration                         |  |         |
| Levee Removal                             |  |         |
| Constructed Riffle and Boulders           |  |         |
| Brush Mattress                            |  |         |

|                               |  |          |
|-------------------------------|--|----------|
| Habitat Complexity/Large Wood |  |          |
| Type 1 Structure              |  | 7<br>54  |
| Type 2 Structure              |  | 8<br>55  |
| Type 3 Structure              |  | 9<br>56  |
| Type 4 Structure              |  | 10<br>57 |
| Type 5 Structure              |  | 11<br>58 |
| Type 6 Structure              |  | 12<br>58 |

|  |       |                            |
|--|-------|----------------------------|
|  | 1     | Project Feature            |
|  | 12/23 | Feature Detail Sheet pg(s) |

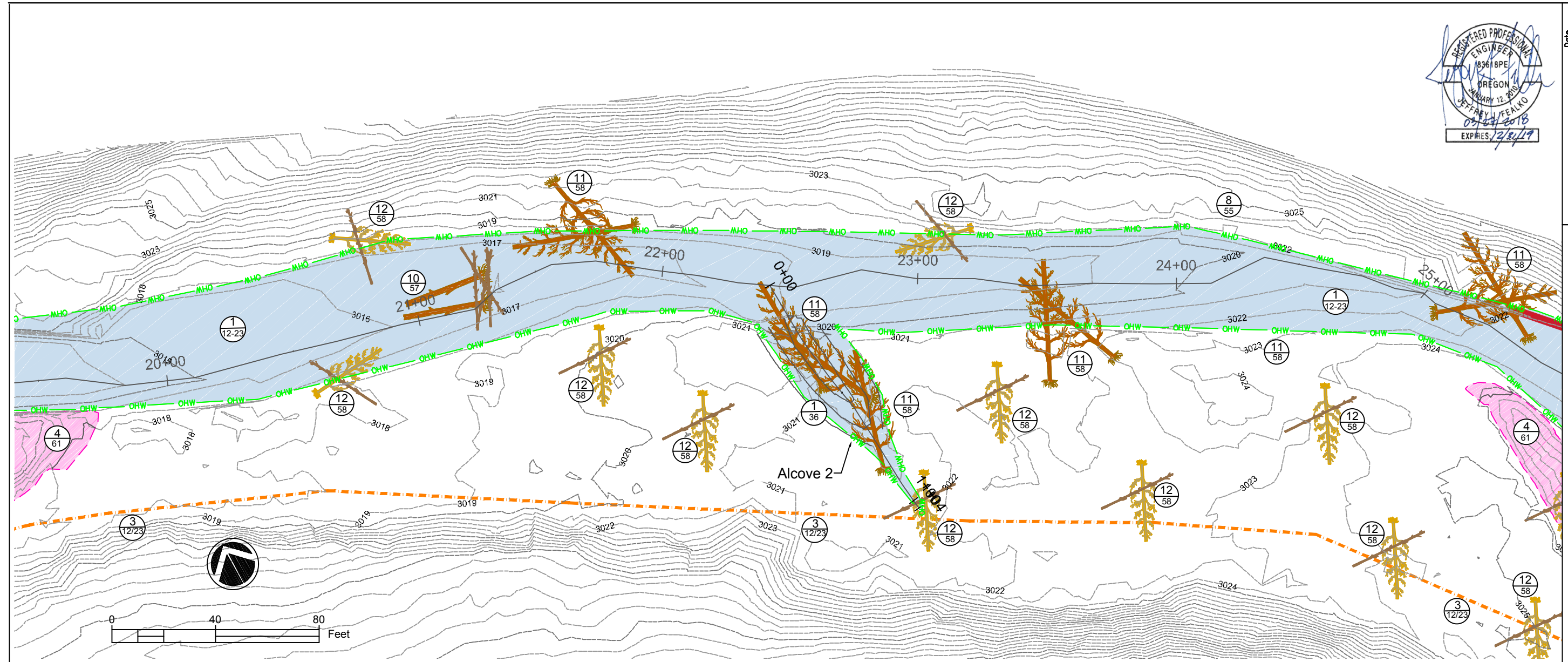
**NOTES:**

1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK AS SHOWN ON THE DRAWINGS.
2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.
4. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
5. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, AND PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
6. CHANNEL AND ALCOVE EXCAVATION WILL GENERALLY PROCEED IN A DOWNSTREAM TO UPSTREAM DIRECTION.
7. NEW CHANNEL EXCAVATION BEGINS AT STATION 27+00. NEW CHANNEL SEGMENTS WILL BE CONSTRUCTED OUTSIDE EXISTING CHANNEL AND REMAIN ISOLATED FROM ACTIVE CHANNEL FLOW UNTIL CHANNEL ACTIVATION.
8. EXCAVATED STREAMBED MATERIAL WILL BE SORTED AND STOCKPILED INTO DESIGNATED TEMPORARY STOCKPILES. TOP SOIL AND SUITABLE RIFFLE MATRIX MATERIAL (SEE SHEET 59) WILL BE STORED SEPARATELY FOR RIFFLE CONSTRUCTION AND FINAL FLOODPLAIN GRADING.
9. NEW CHANNEL SEGMENTS AND ALCOVES WILL BE CONSTRUCTED FIRST, FOLLOWED BY RIFFLE AND LARGE WOOD STRUCTURE CONSTRUCTION, AND INSTALLATION OF BRUSH MATTRESSES PRIOR TO ACTIVATION OF LIVE CHANNEL.
10. GLIDES SHALL BE MECHANICALLY LIFTED AND UN-COMPACTED (RIPPED) A MINIMUM DEPTH OF 18 INCHES.
11. IF HAUL ROUTES ARE LOCATED ALONG EXCAVATED NEW CHANNEL SEGMENTS, HAUL ROUTES SHALL BE MECHANICALLY LIFTED/RIPPED AND UN-COMPACTED A MINIMUM DEPTH OF 18 INCHES.
12. LEVEE REMOVAL INCLUDES GRADING AND CONTOURING TO EXISTING FLOODPLAIN ELEVATIONS. EXCAVATED MATERIAL WILL BE HAULED TO TEMPORARY STOCKPILES AND/OR CHANNEL FILL LOCATIONS. SEE DETAIL SHEET 61.
13. ROAD DECOMMISSIONING WILL BE COMPLETED FOLLOWING CHANNEL AND ALCOVE CONSTRUCTION AS PART OF CHANNEL FILL AND FLOODPLAIN ROUGHNESS INSTALLATION. EXISTING ROAD WILL BE RIPPED, GRADED AND BLENDED TO SURROUNDING FLOODPLAIN ELEVATIONS. ROAD BASE MATERIAL WILL BE TRANSPORTED TO CHANNEL FILL LOCATIONS.
14. CONSTRUCT ENGINEERED LARGE WOOD STRUCTURES: SEE DETAIL SHEETS 54-58.
15. CONSTRUCT RIFFLE COMPLEX: SEE DETAIL SHEET 56.
16. CONSTRUCT BRUSH MATTRESS: SEE DETAIL SHEET 60.





Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer



### LEGEND

|   |  |       |       |
|---|--|-------|-------|
| Channel Centerline & Station              |  | 33+00 |       |
| Existing Ordinary High Water (OHW)        |  | OHW   | OHW   |
| Proposed Ordinary High Water (OHW)        |  | OHW   | OHW   |
| ForTheGirls, LLC Ranch Boundary           |  |       |       |
| Conservation Easement/Fence               |  |       |       |
| Proposed Channel, Alcoves & Side Channels |  |       |       |
| Existing Channel Fill                     |  |       |       |
| Road Obliteration                         |  |       |       |
| Levee Removal                             |  |       |       |
| Constructed Riffle and Boulders           |  |       |       |
| Brush Mattress                            |  |       |       |
|   |  | 1     | 12-23 |
|   |  | 2     | 45/53 |
|   |  | 3     | 12/23 |
|   |  | 4     | 61    |
|   |  | 5     | 59    |
|   |  | 6     | 60    |

|                               |  |    |    |
|-------------------------------|--|----|----|
| Habitat Complexity/Large Wood |  |    |    |
| Type 1 Structure              |  | 7  | 54 |
| Type 2 Structure              |  | 8  | 55 |
| Type 3 Structure              |  | 9  | 56 |
| Type 4 Structure              |  | 10 | 57 |
| Type 5 Structure              |  | 11 | 58 |
| Type 6 Structure              |  | 12 | 58 |

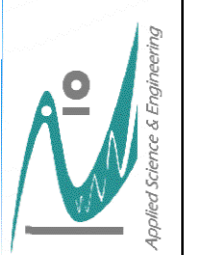
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|-------|-----------------|--|
|       | Legend Key      |  |
| 1     | Project Feature |  |
| 12/23 | Feature Detail  |  |
|       | Sheet pg(s)     |  |

### NOTES:

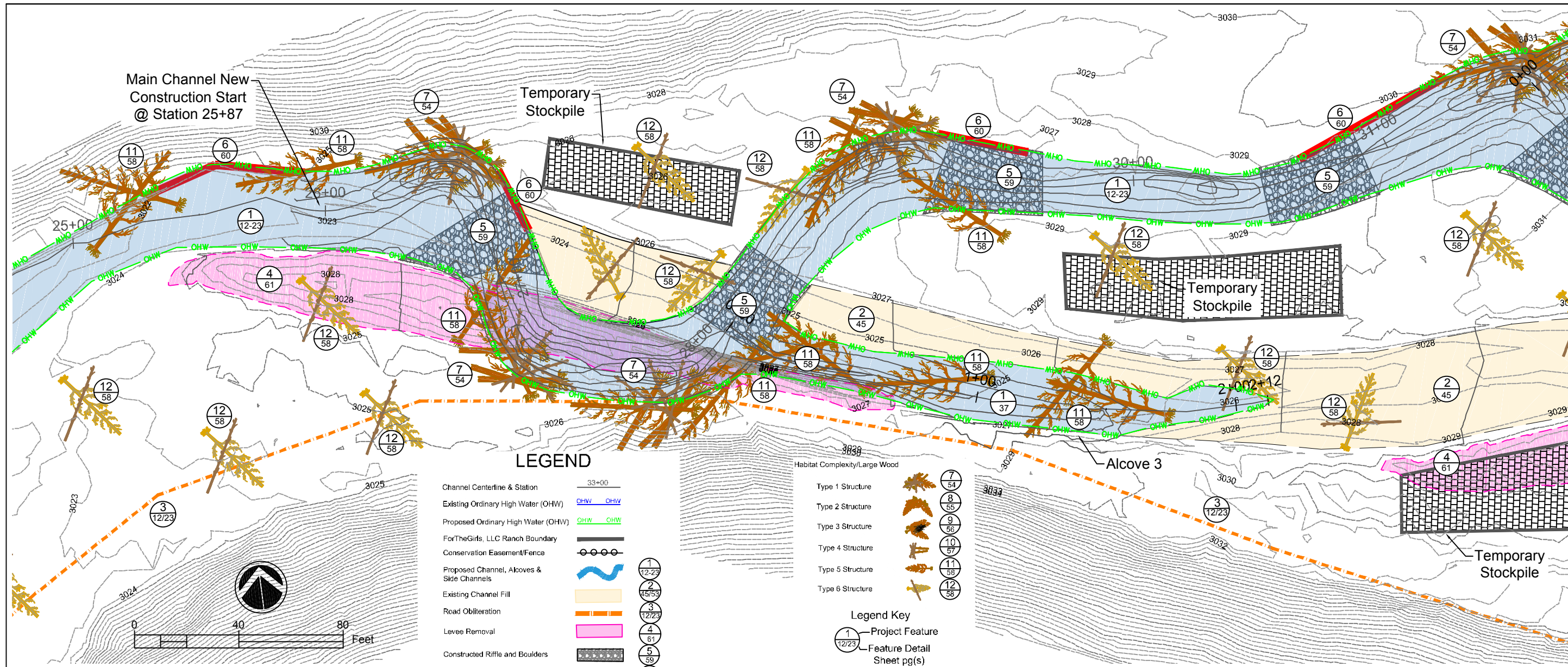
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15. CONSTRUCT RIFFLE COMPLEX: SEE DETAIL SHEET 56.
16. CONSTRUCT BRUSH MATTRESS: SEE DETAIL SHEET 60.

## PLAN & PROFILE STATIONS 19+50 TO 25+50

### Rock Creek Stream & Floodplain Restoration



PLAN & PROFILE  
 19+50 to 25+50



### LEGEND

|   |         |
|---|---------|
| Channel Centerline & Station              | 33+00   |
| Existing Ordinary High Water (OHW)        | OHW OHW |
| Proposed Ordinary High Water (OHW)        | OHW OHW |
| ForTheGirls, LLC Ranch Boundary           | -----   |
| Conservation Easement/Fence               | o-o-o-o |
| Proposed Channel, Alcoves & Side Channels | ~ ~ ~ ~ |
| Existing Channel Fill                     | -----   |
| Road Obliteration                         | -----   |
| Levee Removal                             | -----   |
| Constructed Riffle and Boulders           | -----   |
| Brush Mattress                            | -----   |

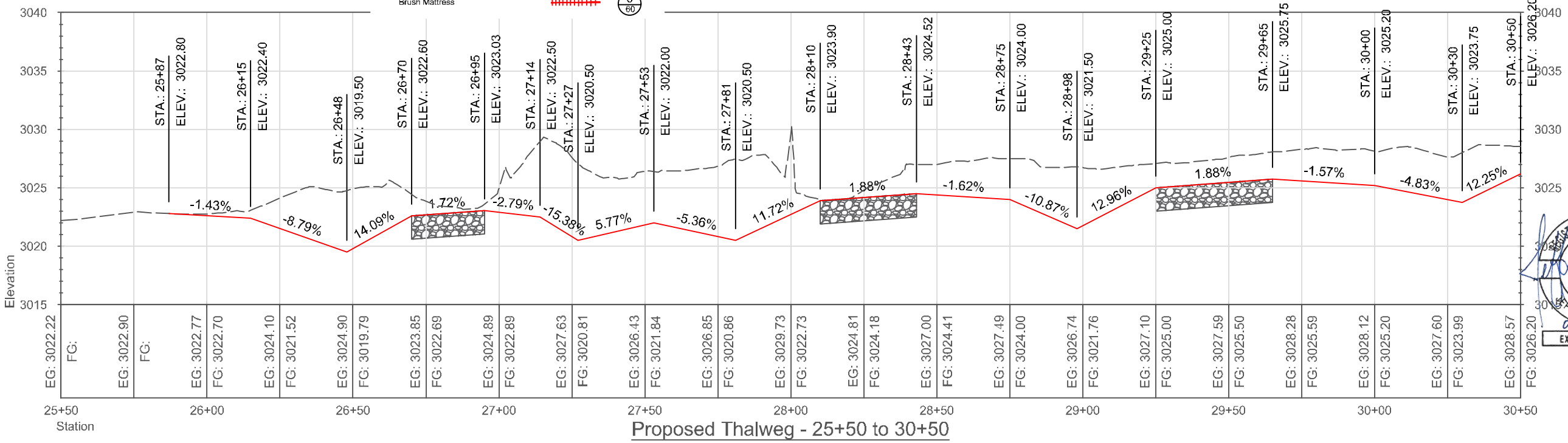
  

|                               |       |
|-------------------------------|-------|
| Habitat Complexity/Large Wood | 7/54  |
| Type 1 Structure              | 8/55  |
| Type 2 Structure              | 9/56  |
| Type 3 Structure              | 10/57 |
| Type 4 Structure              | 11/58 |
| Type 5 Structure              | 12/58 |
| Type 6 Structure              | 12/58 |

**Legend Key**

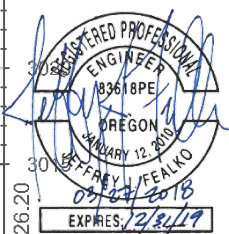
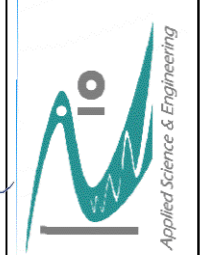
- 1/12-23 Project Feature
- 1/12-23 Feature Detail Sheet pg(s)



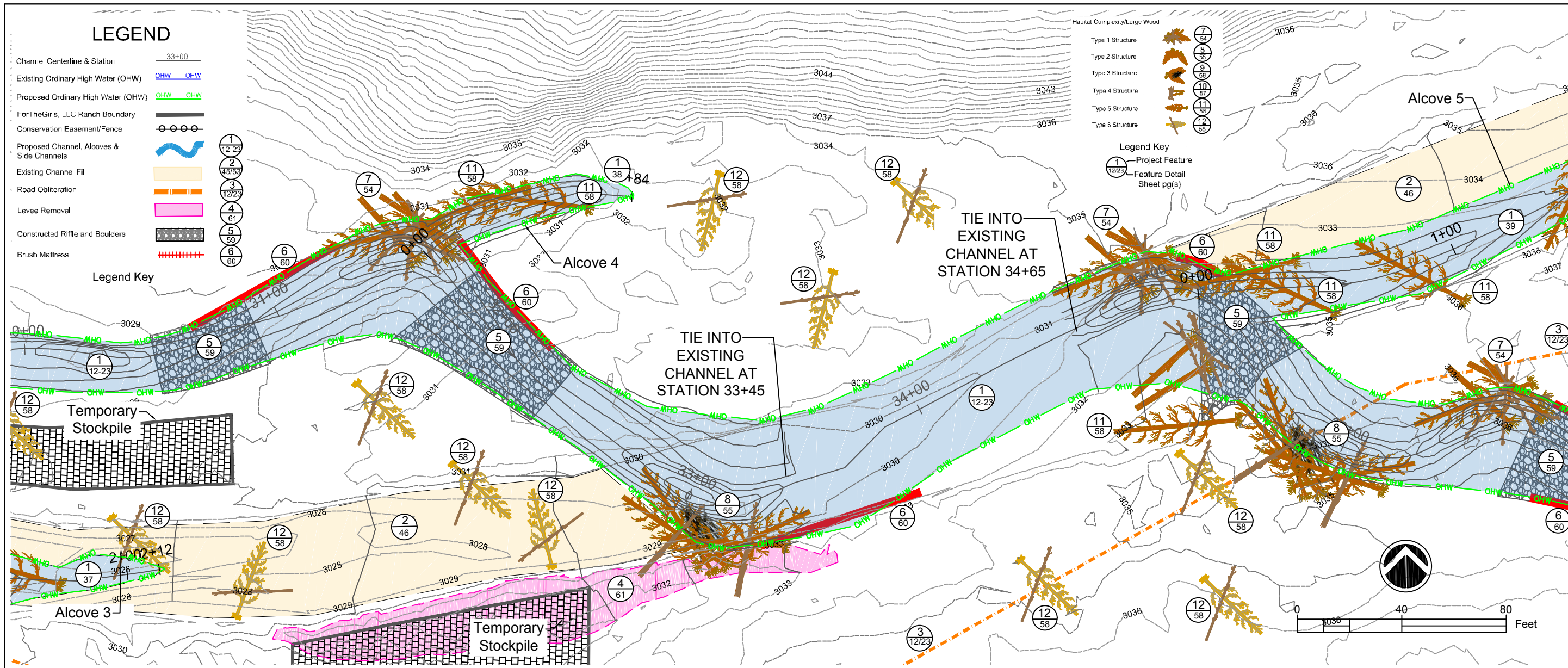
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

## PLAN & PROFILE STATIONS 25+50 to 30+50

### Rock Creek Stream & Floodplain Restoration

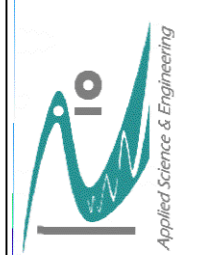


**PLAN & PROFILE**  
 25+50 to 30+50

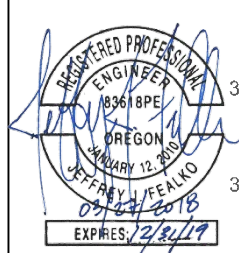
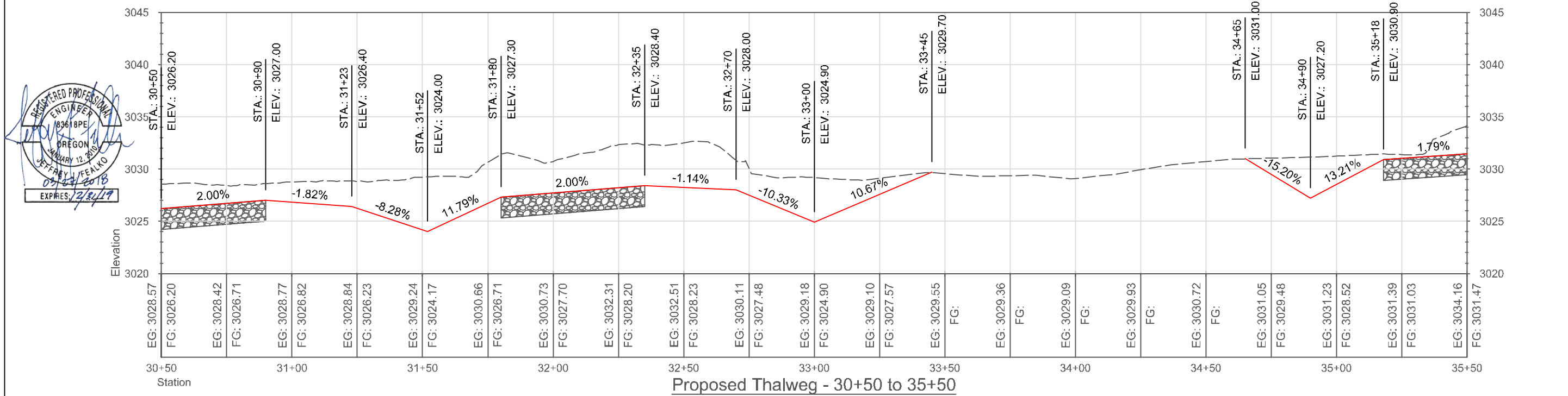


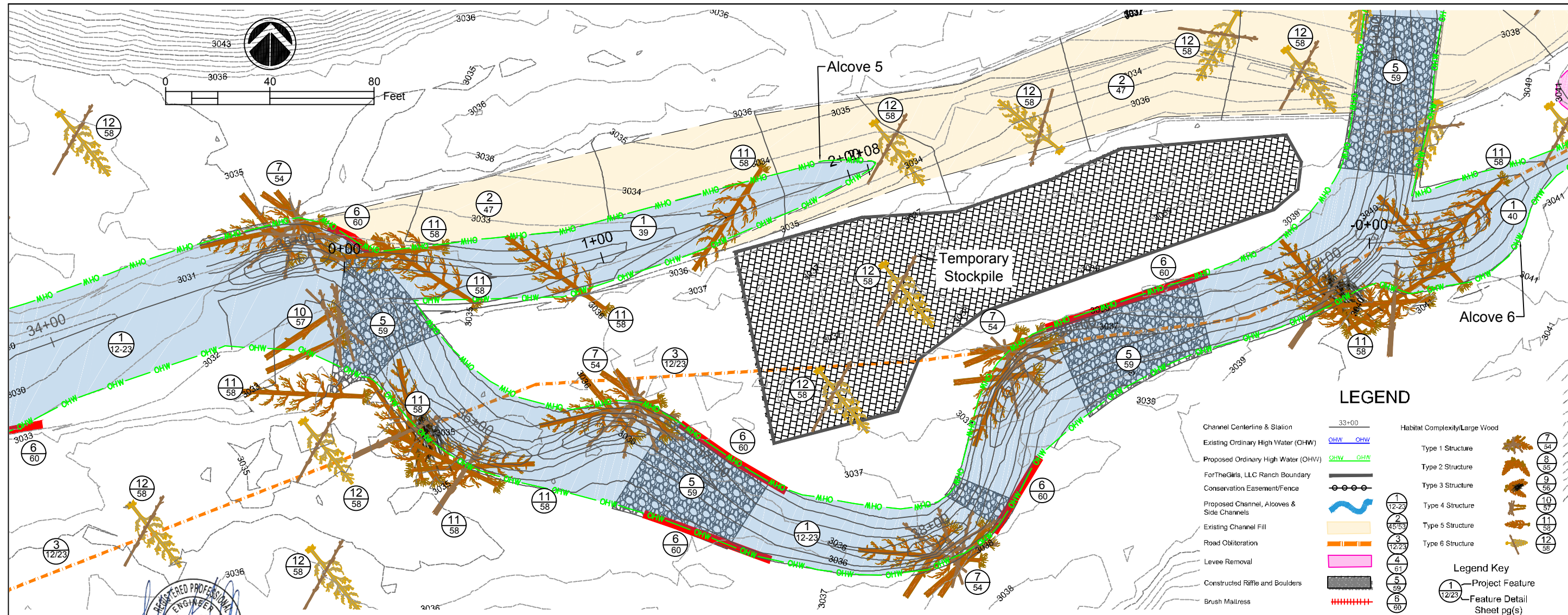
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BBA  
 Title: AC, Biologist, JF, Engineer

**PLAN & PROFILE STATIONS 30+50 to 35+50**  
 Rock Creek Stream & Floodplain Restoration



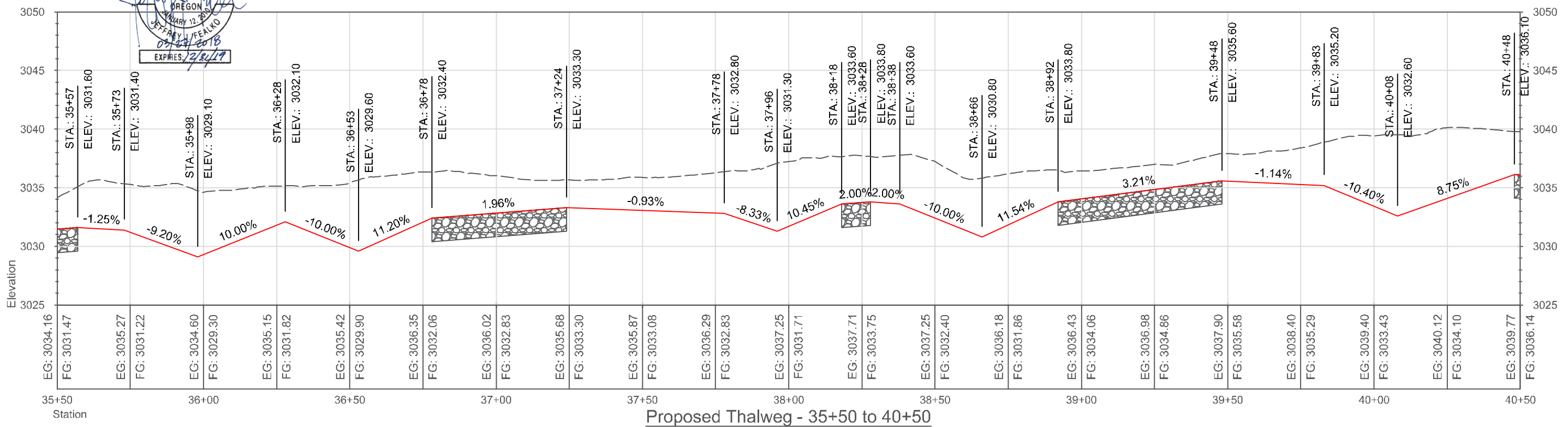
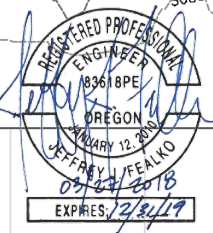
**PLAN & PROFILE**  
 30+50 to 35+50





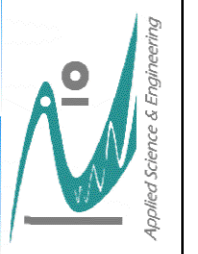
**LEGEND**

- Channel Centerline & Station
  - Existing Ordinary High Water (OHW)
  - Proposed Ordinary High Water (OHW)
  - ForTheGirls, LLC Ranch Boundary
  - Conservation Easement/Fence
  - Proposed Channel, Alcoves & Side Channels
  - Existing Channel Fill
  - Road Obliteration
  - Levee Removal
  - Constructed Riffle and Boulders
  - Brush Mattress
- 
- Habitat Complexity/Large Wood
  - Type 1 Structure
  - Type 2 Structure
  - Type 3 Structure
  - Type 4 Structure
  - Type 5 Structure
  - Type 6 Structure
- 
- Legend Key**
- 1 - Project Feature
  - 12/23 - Feature Detail Sheet pg(s)

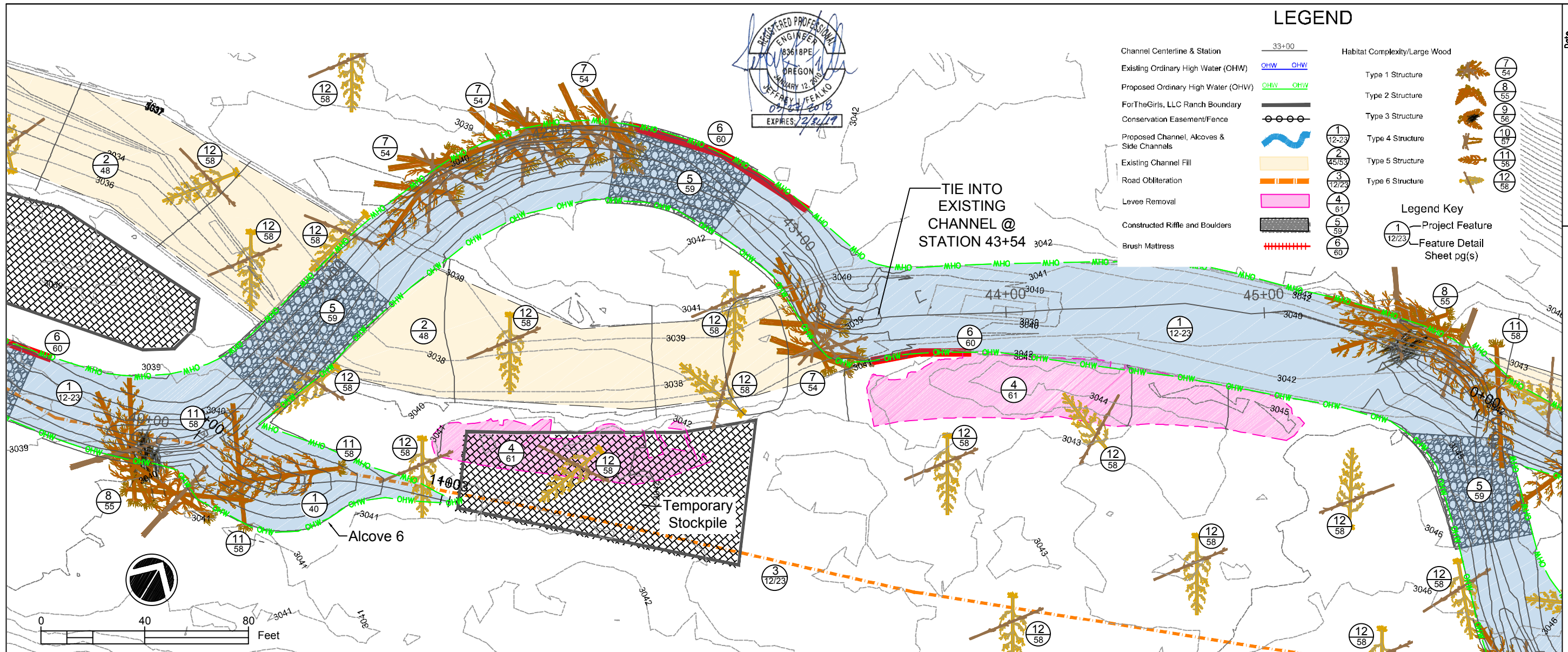


Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 35+50 TO 40+50**  
 Rock Creek Stream & Floodplain Restoration



**PLAN & PROFILE**  
 35+50 to 40+50

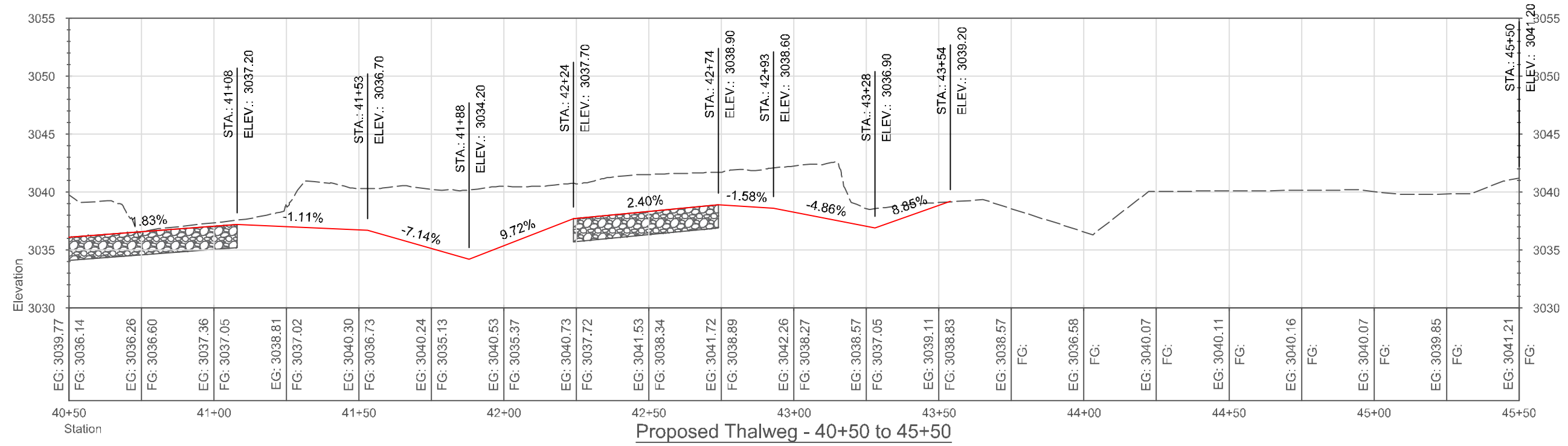
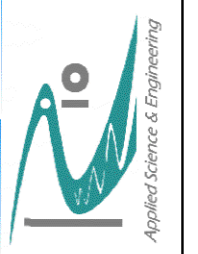


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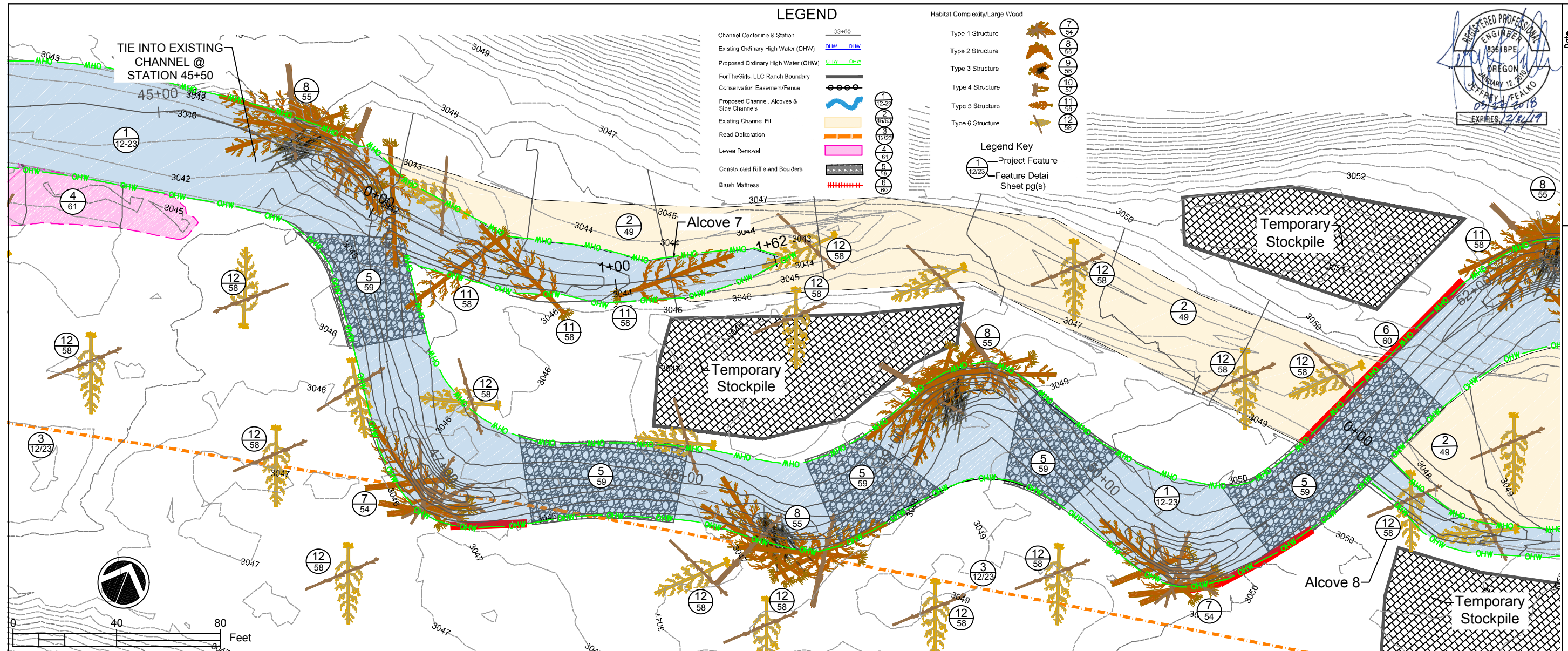
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  - ForTheGirls, LLC Ranch Boundary: [Symbol]
  - Conservation Easement/Fence: [Symbol]
  - Proposed Channel, Alcoves & Side Channels: [Symbol]
  - Existing Channel Fill: [Symbol]
  - Road Obliteration: [Symbol]
  - Levee Removal: [Symbol]
  - Constructed Riffle and Boulders: [Symbol]
  - Brush Mattress: [Symbol]
- 
- Habitat Complexity/Large Wood
  - Type 1 Structure: [Symbol]
  - Type 2 Structure: [Symbol]
  - Type 3 Structure: [Symbol]
  - Type 4 Structure: [Symbol]
  - Type 5 Structure: [Symbol]
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- 
- Legend Key
  - 1 - Project Feature
  - 12/23 - Feature Detail Sheet pg(s)

Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 40+50 TO 45+50**  
 Rock Creek Stream & Floodplain Restoration



**PLAN & PROFILE**  
 40+50 to 45+50



**LEGEND**

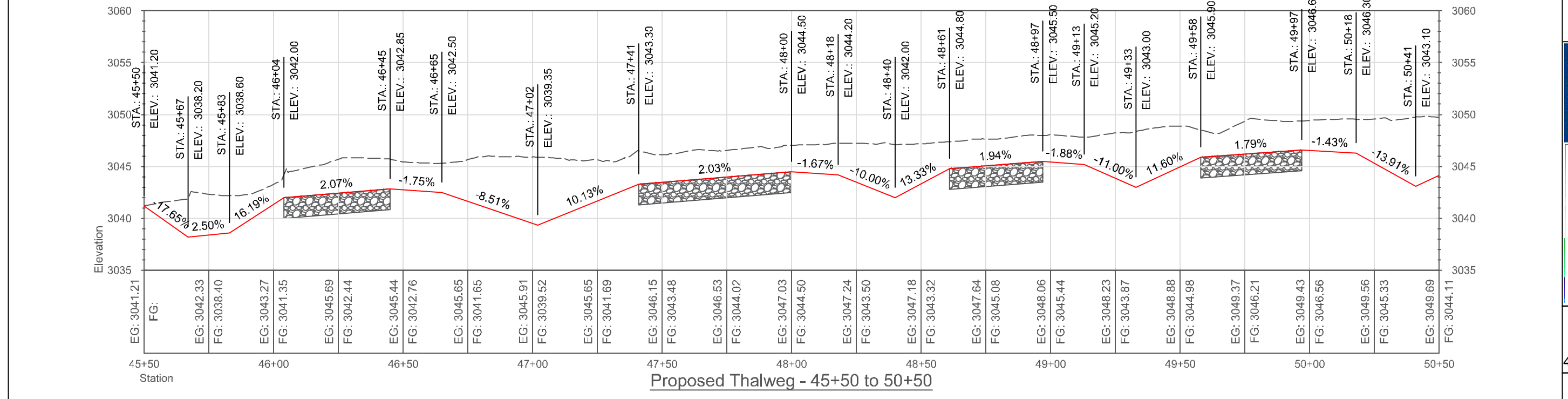
- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW
- Proposed Ordinary High Water (OHW) OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Rillle and Boulders
- Brush Mattress

- Habitat Complexity/Large Wood
- Type 1 Structure
  - Type 2 Structure
  - Type 3 Structure
  - Type 4 Structure
  - Type 5 Structure
  - Type 6 Structure

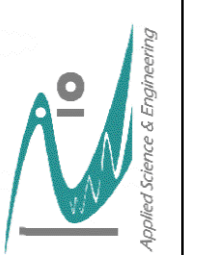
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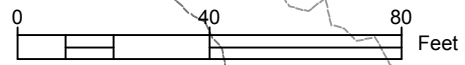
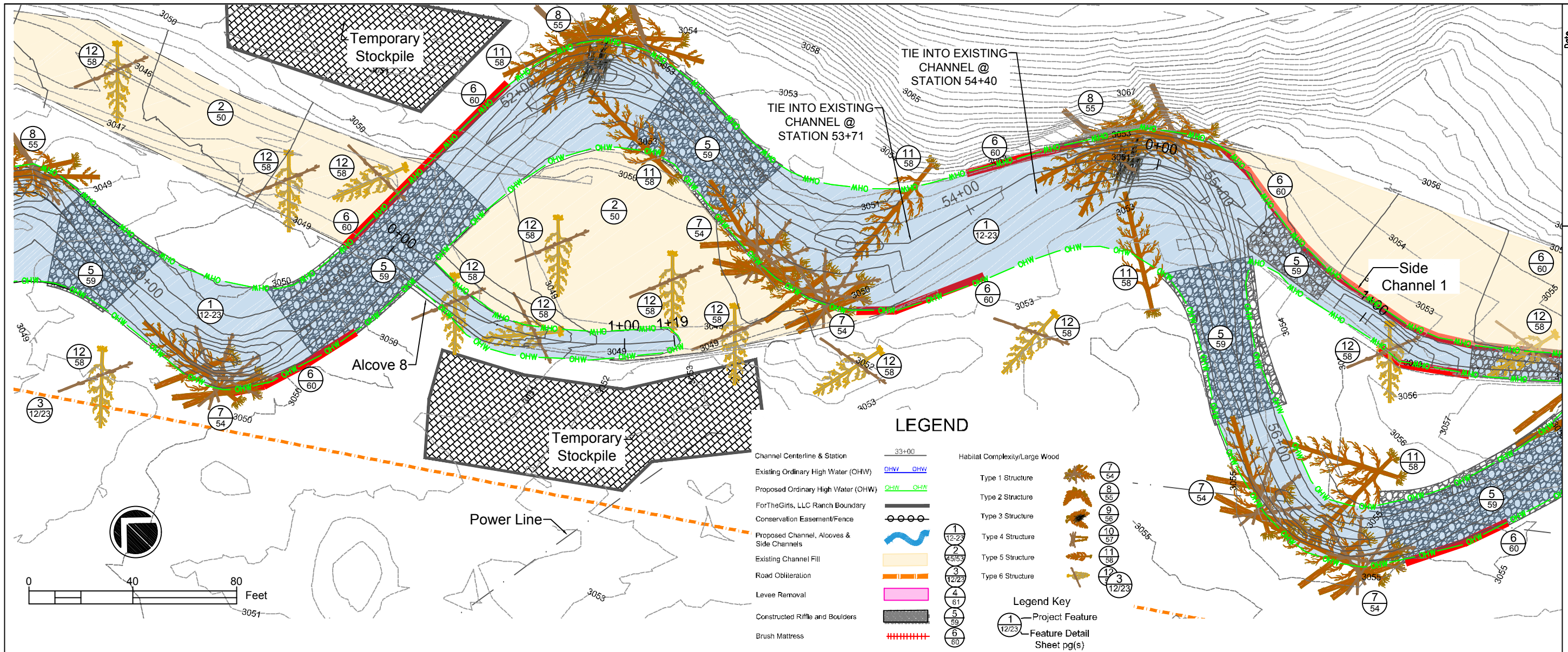
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer



**PLAN & PROFILE STATIONS 45+50 TO 50+50**  
 Rock Creek Stream & Floodplain Restoration



**PLAN & PROFILE**  
 45+50 to 50+50

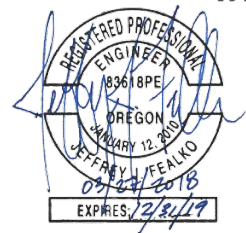
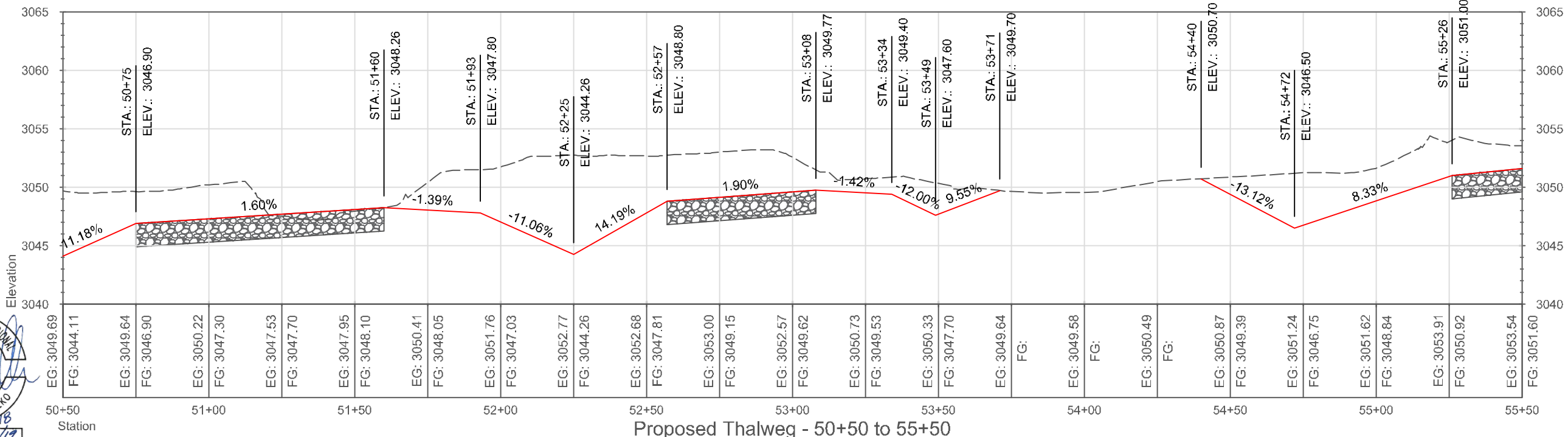


**LEGEND**

- Channel Centerline & Station
- Existing Ordinary High Water (OHW)
- Proposed Ordinary High Water (OHW)
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

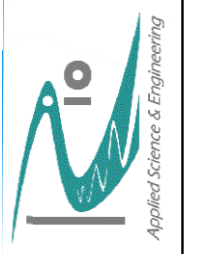
- Habitat Complexity/Large Wood
- Type 1 Structure
- Type 2 Structure
- Type 3 Structure
- Type 4 Structure
- Type 5 Structure
- Type 6 Structure

- Legend Key**
- Project Feature
  - Feature Detail Sheet pg(s)



Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 50+50 to 55+50**  
 Rock Creek Stream & Floodplain Restoration



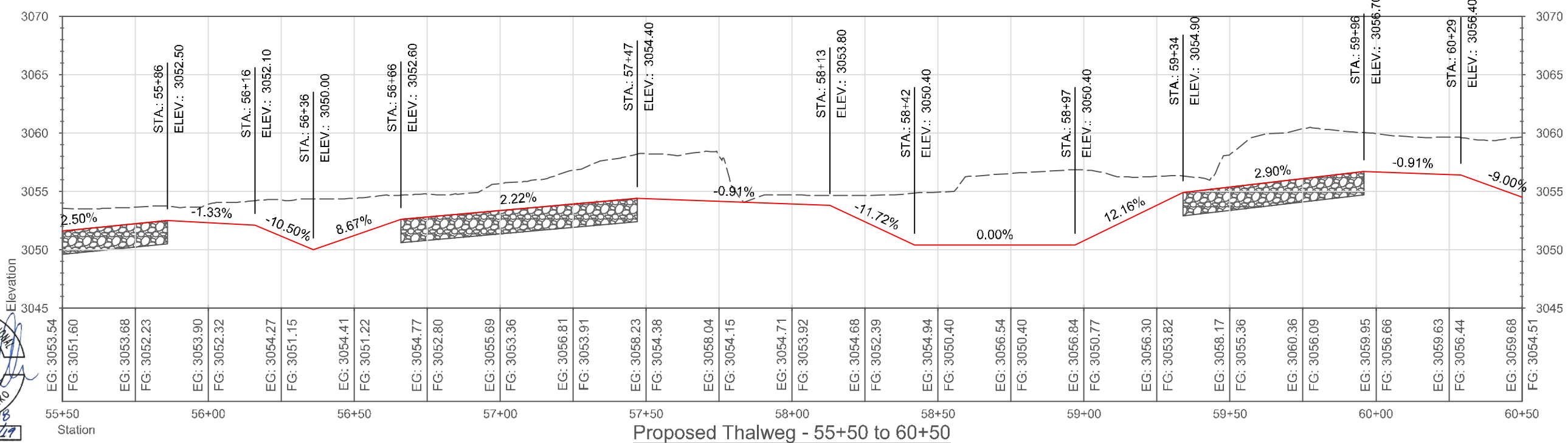
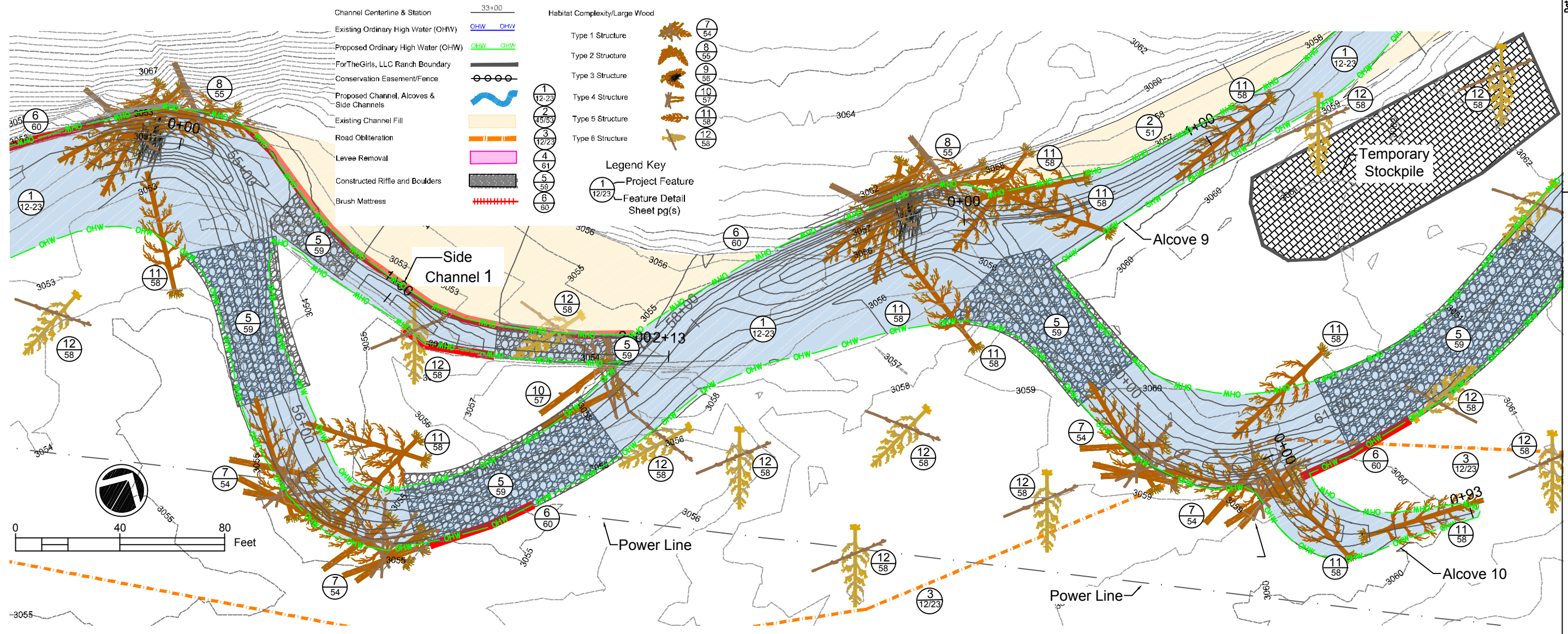
**PLAN & PROFILE**  
 50+50 to 55+50

### LEGEND

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
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- Constructed Riffle and Boulders
- Brush Mattress

- Habitat Complexity/Large Wood
- Type 1 Structure
- Type 2 Structure
- Type 3 Structure
- Type 4 Structure
- Type 5 Structure
- Type 6 Structure

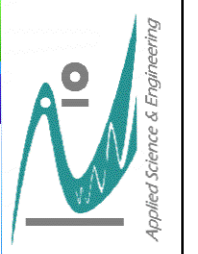
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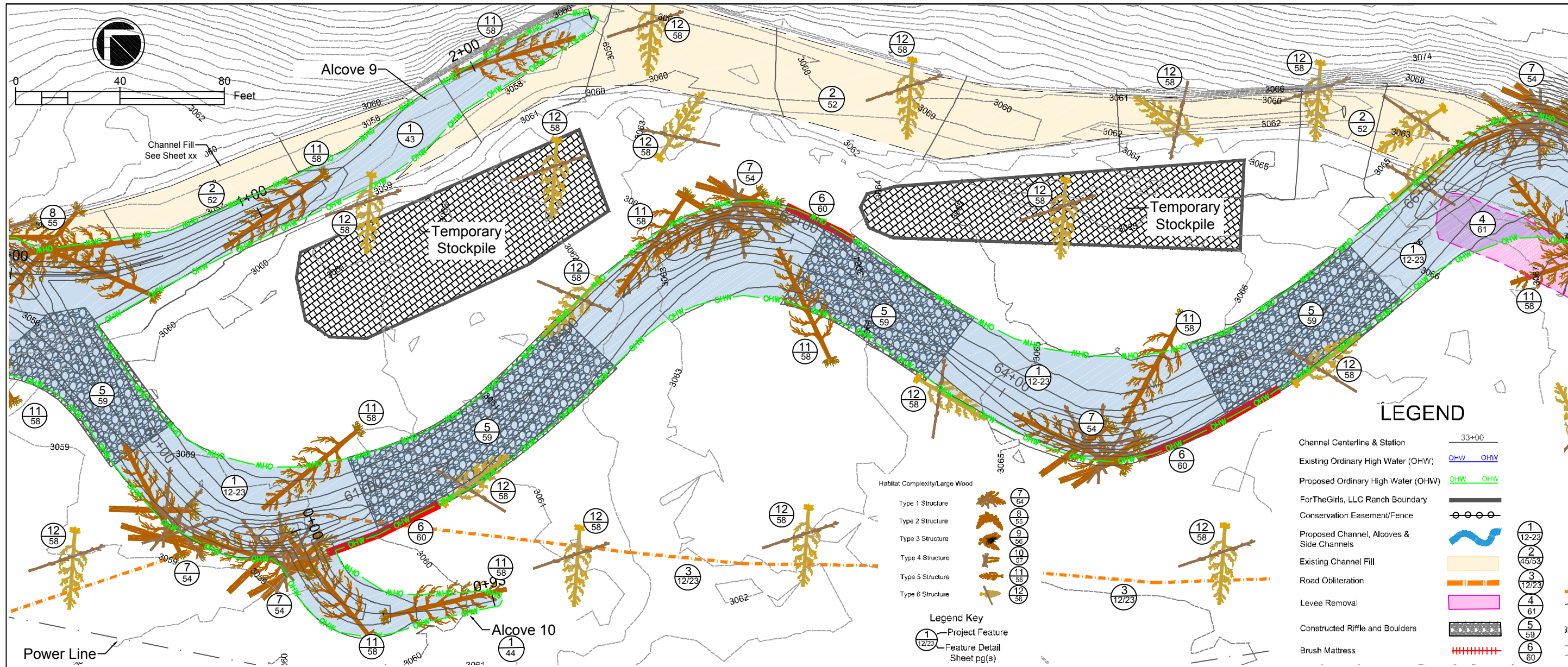
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

## PLAN & PROFILE STATIONS 55+50 to 60+50

### Rock Creek Stream & Floodplain Restoration



PLAN & PROFILE  
 55+50 to 60+50

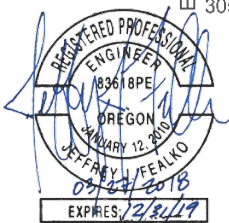
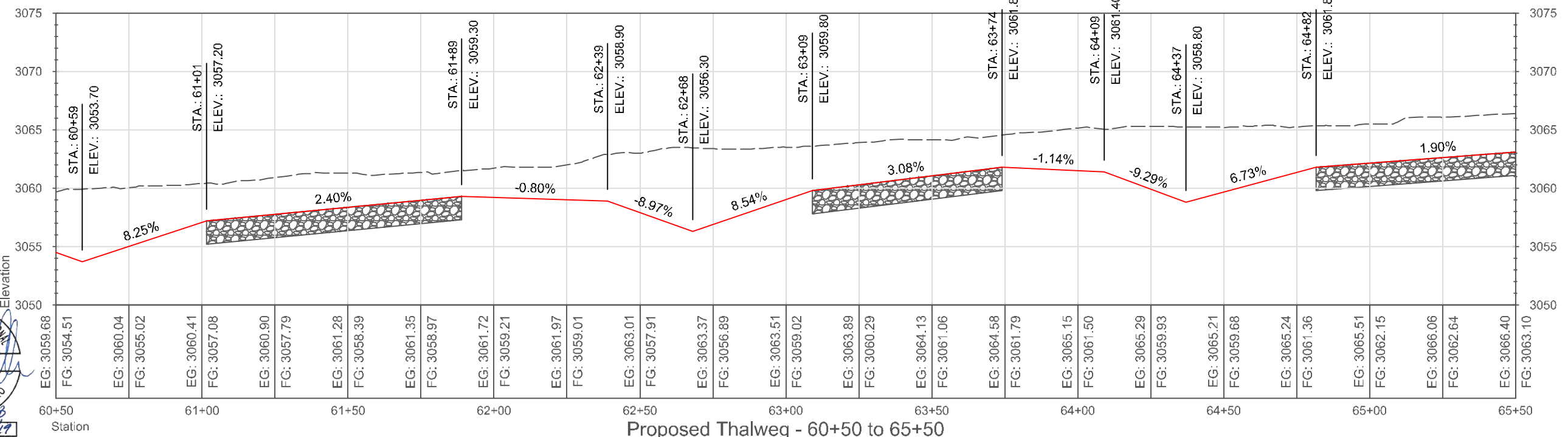


**LEGEND**

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

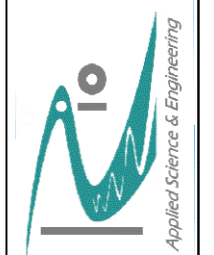
- Habitat Complexity/Large Wood
- Type 1 Structure
  - Type 2 Structure
  - Type 3 Structure
  - Type 4 Structure
  - Type 5 Structure
  - Type 6 Structure

- Legend Key
- 1 - Project Feature
  - 12/23 - Feature Detail Sheet pg(s)

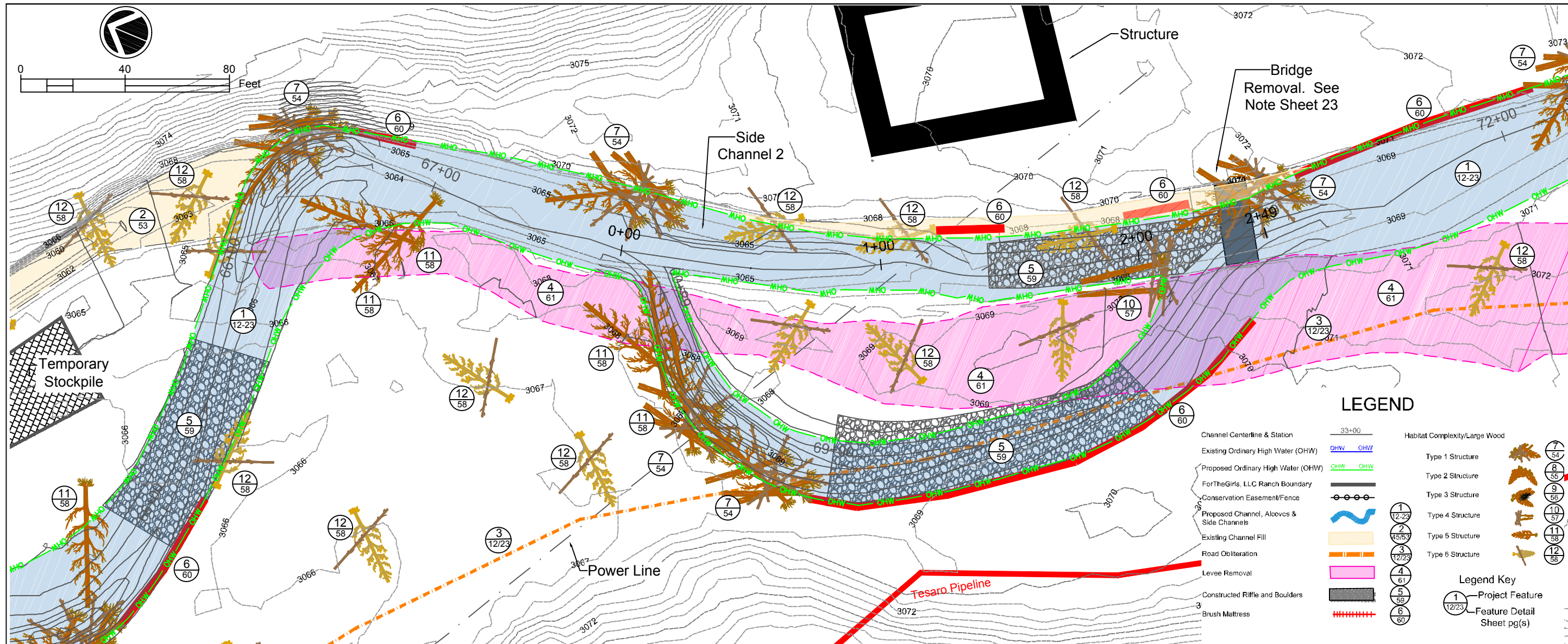


Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 60+50 to 65+50**  
 Rock Creek Stream & Floodplain Restoration

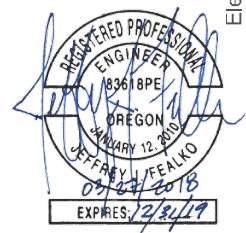
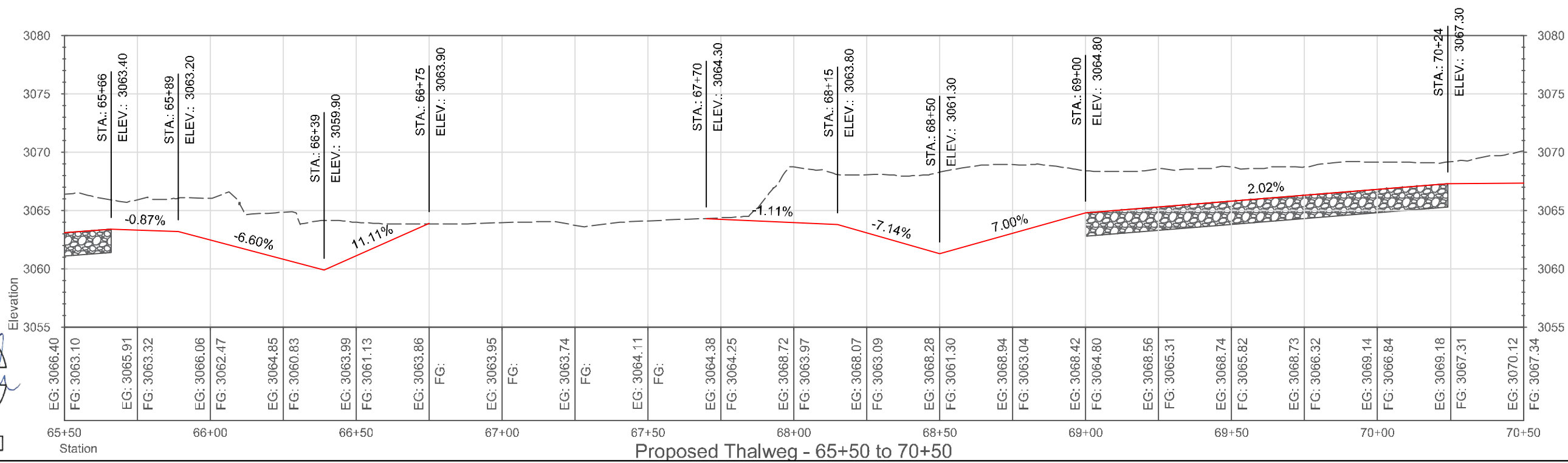


**PLAN & PROFILE**  
 60+60 to 65+50



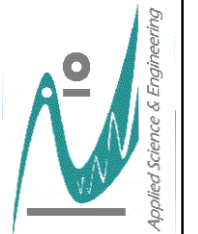
**LEGEND**

- Channel Centerline & Station 33+00
  - Existing Ordinary High Water (OHW) OHW OHW
  - Proposed Ordinary High Water (OHW) OHW OHW
  - ForTheGirls, LLC Ranch Boundary
  - Conservation Easement/Fence
  - Proposed Channel, Alcoves & Side Channels
  - Existing Channel Fill
  - Road Obliteration
  - Levee Removal
  - Constructed Riffle and Boulders
  - Brush Mattress
- 
- Habitat Complexity/Large Wood
  - Type 1 Structure
  - Type 2 Structure
  - Type 3 Structure
  - Type 4 Structure
  - Type 5 Structure
  - Type 6 Structure
- 
- Legend Key**
- 1 12/23 Project Feature
  - 1 12/23 Feature Detail Sheet pg(s)

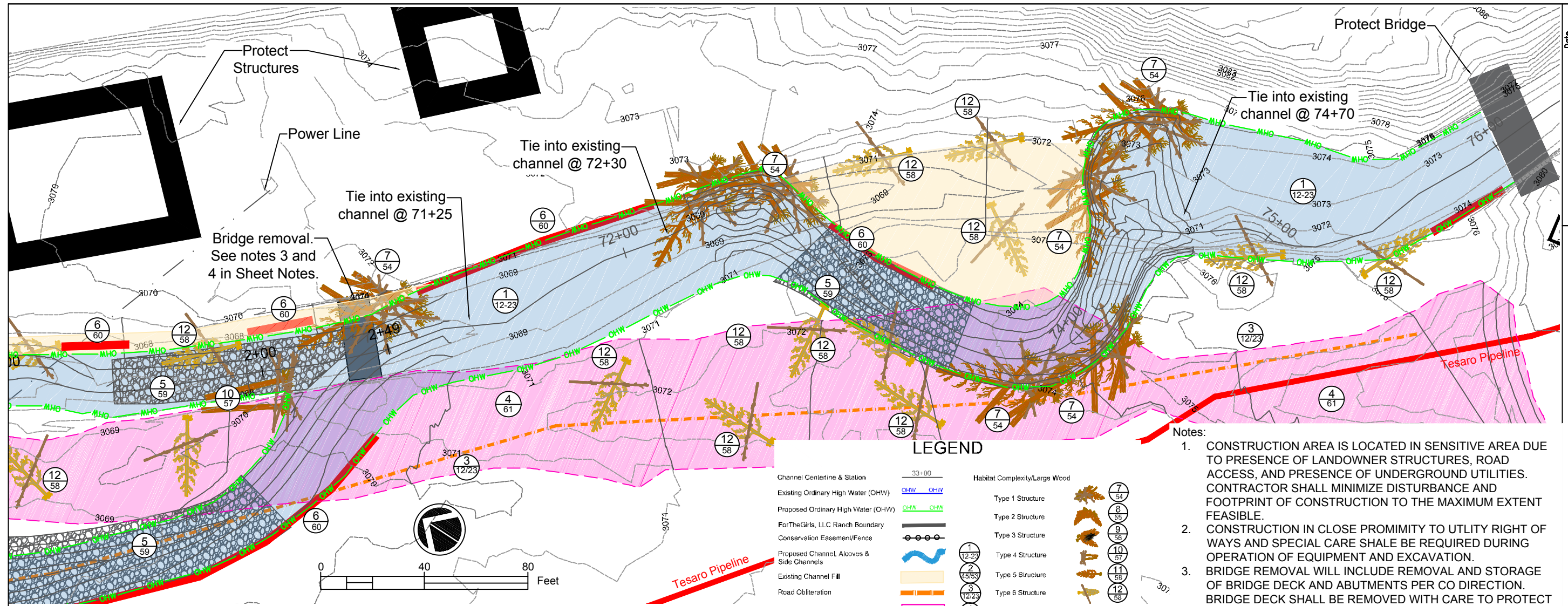


Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**PLAN & PROFILE STATIONS 66+50 TO 70+50**  
 Rock Creek Stream & Floodplain Restoration



**PLAN & PROFILE**  
 66+50 to 70+50

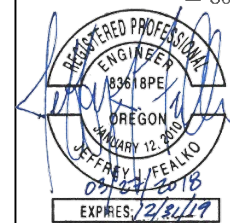
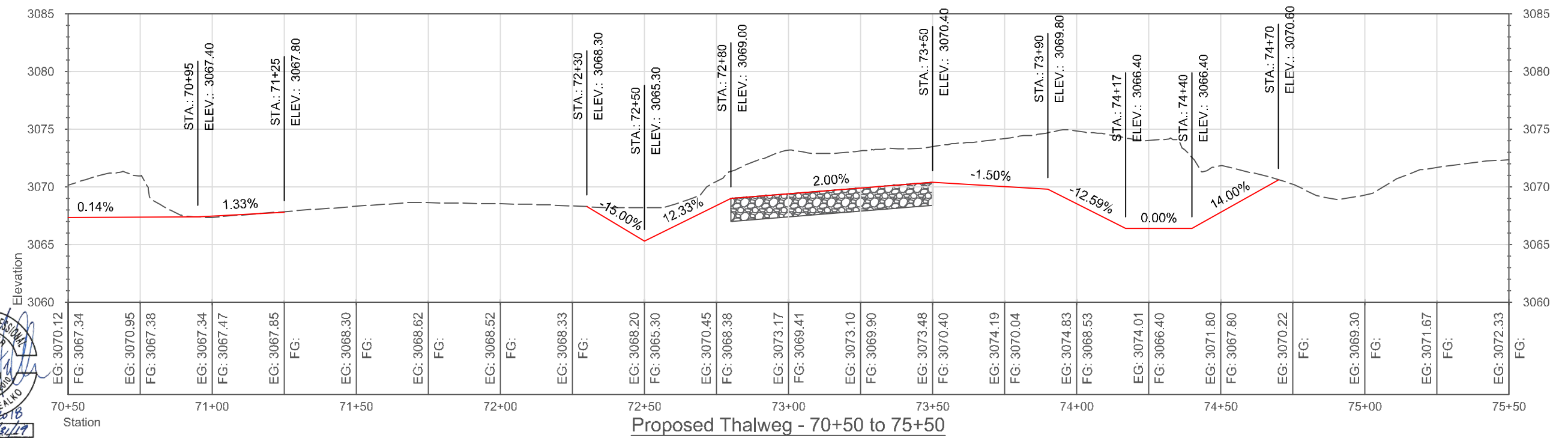


**LEGEND**

|   |         |                               |         |
|---|---------|-------------------------------|---------|
| Channel Centerline & Station              | 33+00   | Habitat Complexity/Large Wood | 7 54    |
| Existing Ordinary High Water (OHW)        | OHW OHW | Type 1 Structure              | 12 58   |
| Proposed Ordinary High Water (OHW)        | OHW OHW | Type 2 Structure              | 6 60    |
| ForTheGirls, LLC Ranch Boundary           | —       | Type 3 Structure              | 12 23   |
| Conservation Easement/Fence               | —       | Type 4 Structure              | 5 59    |
| Proposed Channel, Alooves & Side Channels | —       | Type 5 Structure              | 7 54    |
| Existing Channel Fill                     | —       | Type 6 Structure              | 12 58   |
| Road Obliteration                         | —       | Legend Key                    | 1 12/23 |
| Levee Removal                             | —       | Project Feature               | 1 12/23 |
| Constructed Riffle and Boulders           | —       | Feature Detail Sheet pg(s)    | 1 12/23 |
| Brush Mattress                            | —       |                               |         |

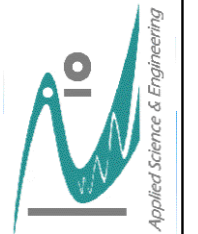
**Notes:**

1. CONSTRUCTION AREA IS LOCATED IN SENSITIVE AREA DUE TO PRESENCE OF LANDOWNER STRUCTURES, ROAD ACCESS, AND PRESENCE OF UNDERGROUND UTILITIES. CONTRACTOR SHALL MINIMIZE DISTURBANCE AND FOOTPRINT OF CONSTRUCTION TO THE MAXIMUM EXTENT FEASIBLE.
2. CONSTRUCTION IN CLOSE PROMINITY TO UTILITY RIGHT OF WAYS AND SPECIAL CARE SHALL BE REQUIRED DURING OPERATION OF EQUIPMENT AND EXCAVATION.
3. BRIDGE REMOVAL WILL INCLUDE REMOVAL AND STORAGE OF BRIDGE DECK AND ABUTMENTS PER CO DIRECTION. BRIDGE DECK SHALL BE REMOVED WITH CARE TO PROTECT STRUCTURE FOR FUTURE USE.
4. STEAMBANK LINES AT BRIDGE REMOVAL SITE WILL BE RE-ESTABLISHED DURING MAIN CHANNEL AND SIDE CHANNEL GRADING PER SPECIFICATIONS AND DRAWINGS.

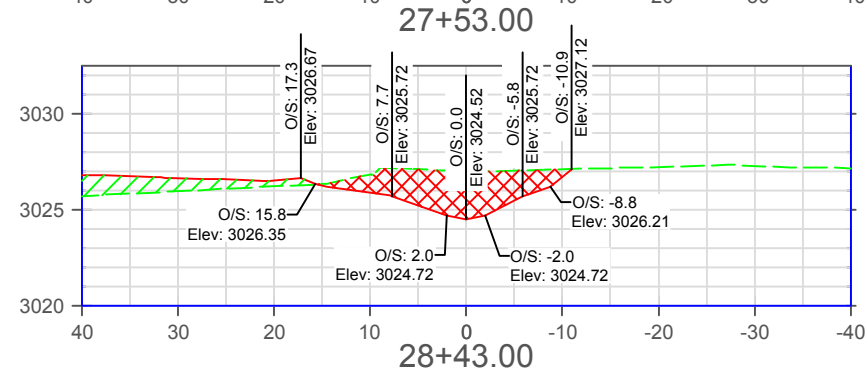
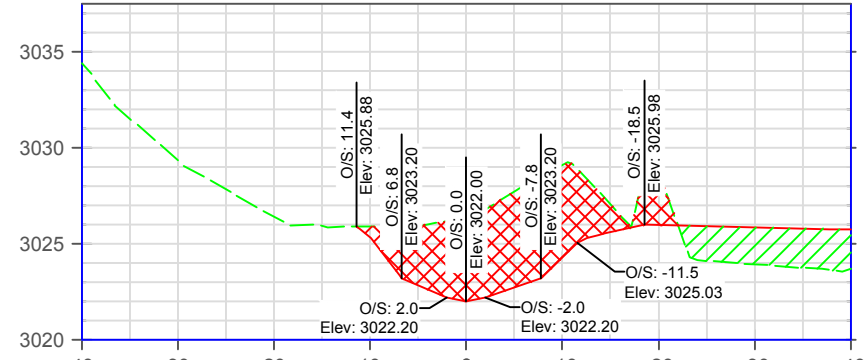
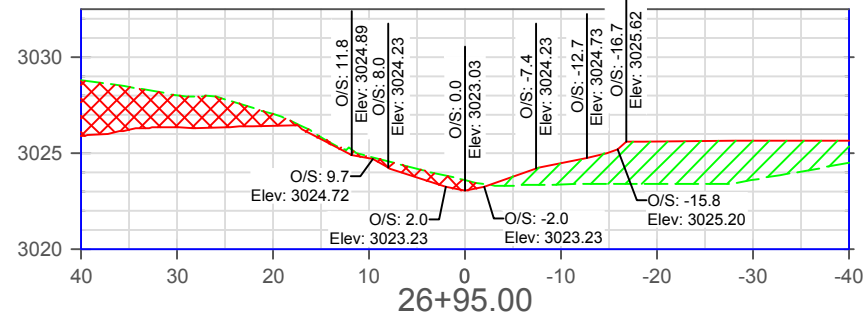
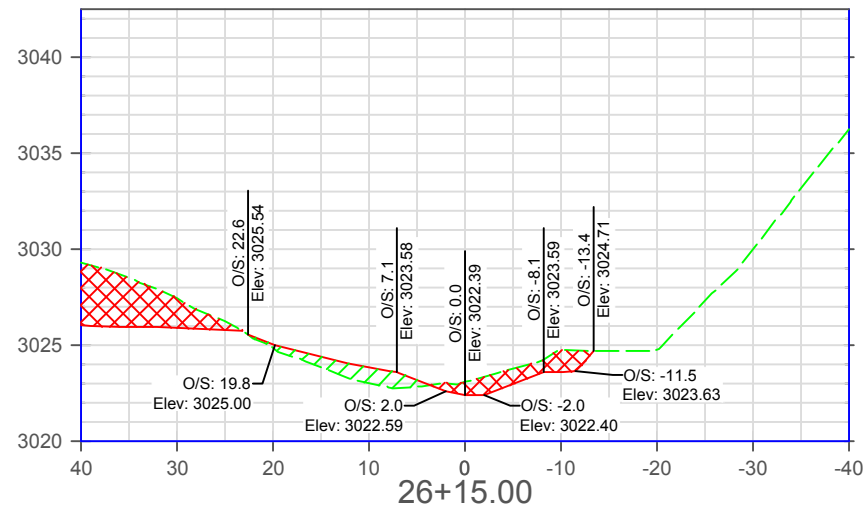


|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**PLAN & PROFILE STATIONS 70+50 TO 75+50**  
Rock Creek Stream & Floodplain Restoration

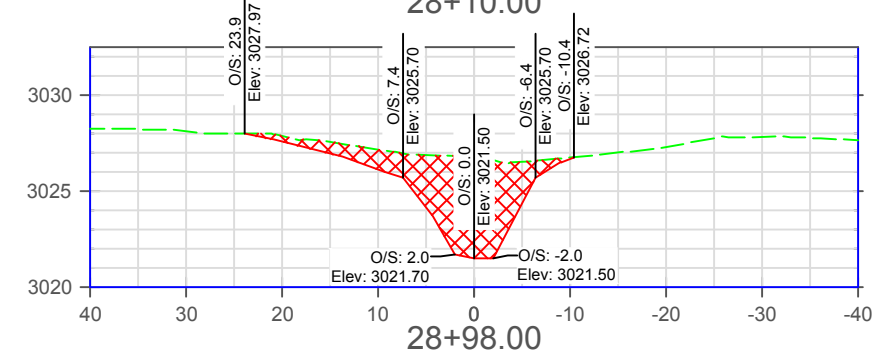
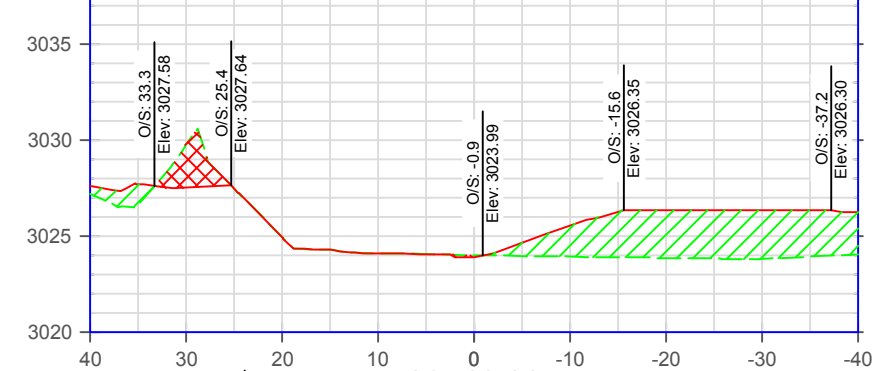
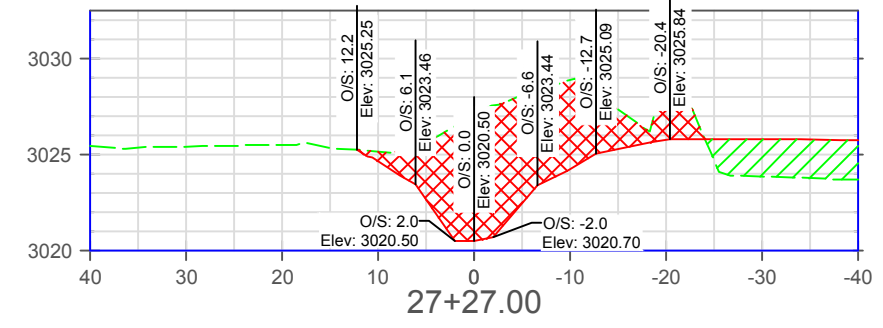
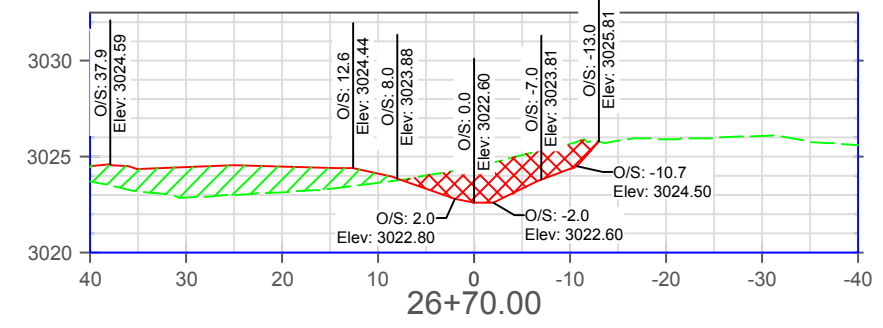
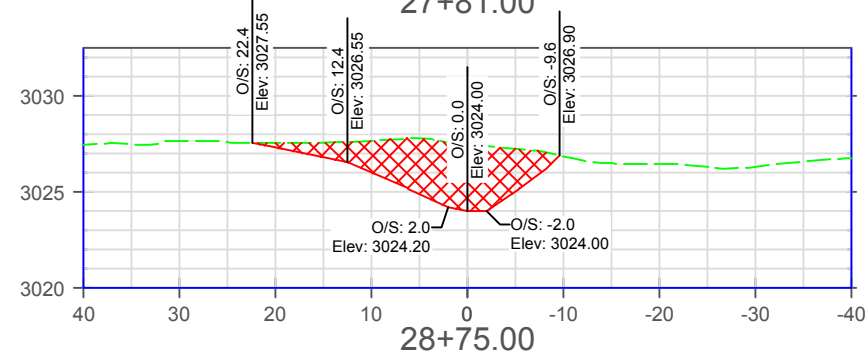
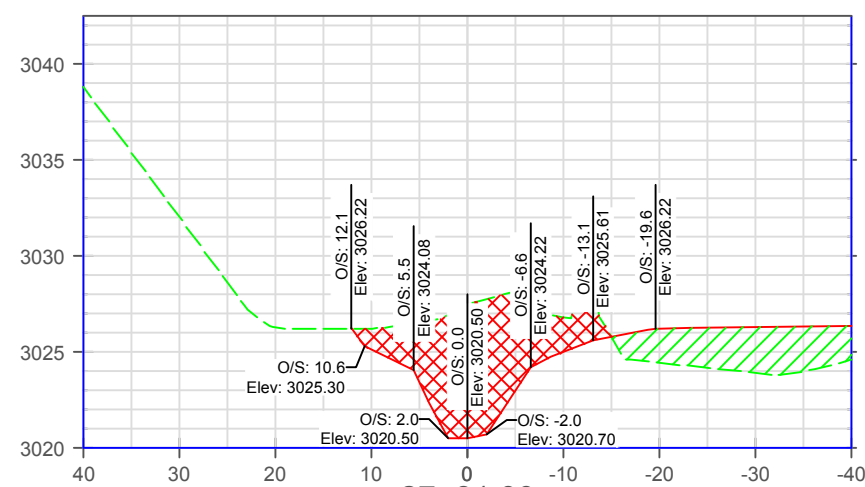
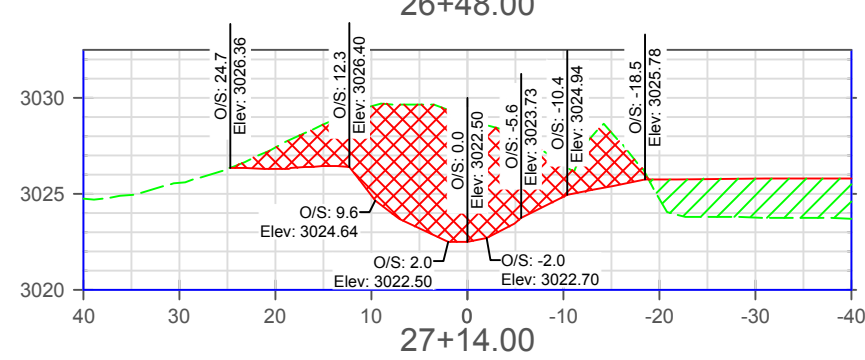
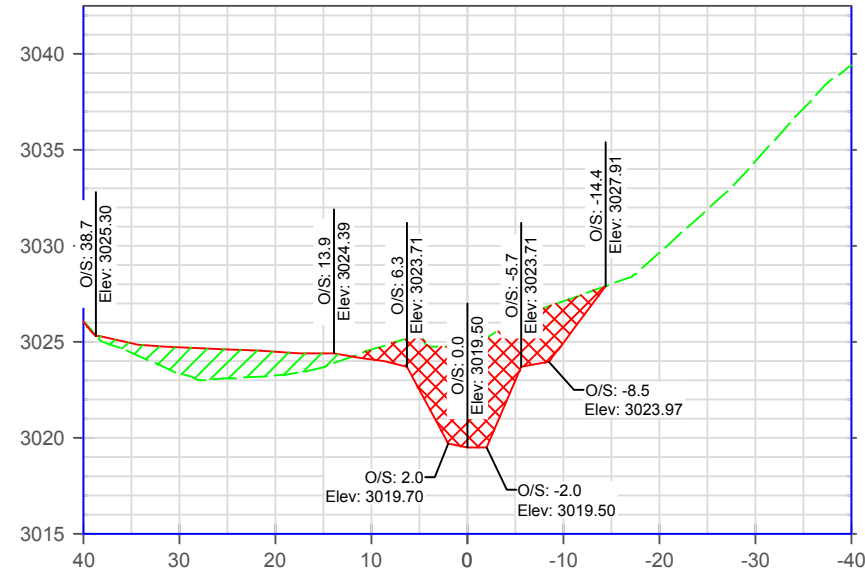


**PLAN & PROFILE**  
70+50 to 75+50



LEGEND

- Channel Cut ---
- Proposed Ground ---
- Channel Cut ▨
- Channel Fill ▨

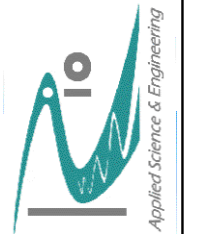


NOTES:

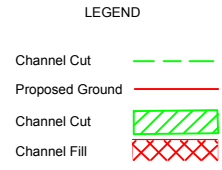
1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
3. CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.
4. THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.
5. CONSTRUCTED CHANNEL SHALL TRANSITION SMOOTHLY BETWEEN CROSS SECTIONAL GEOMETRIES SHOWN WITHIN THESE CROSS SECTIONS.
6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.

|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

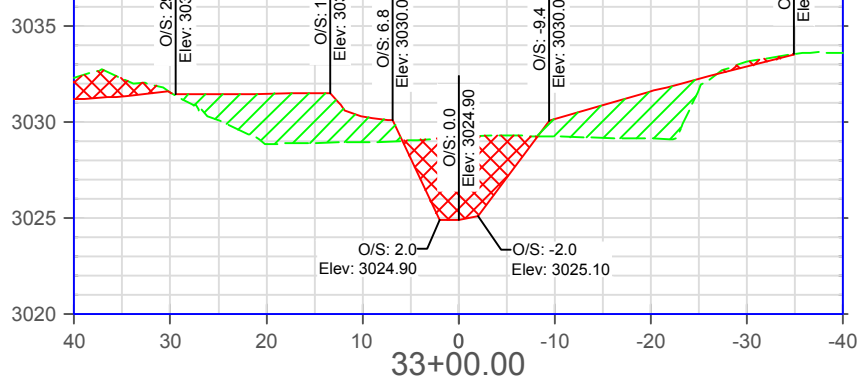
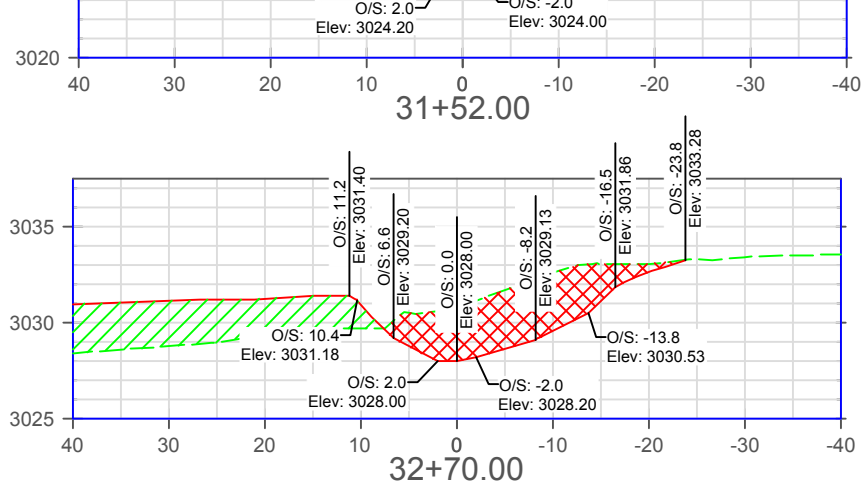
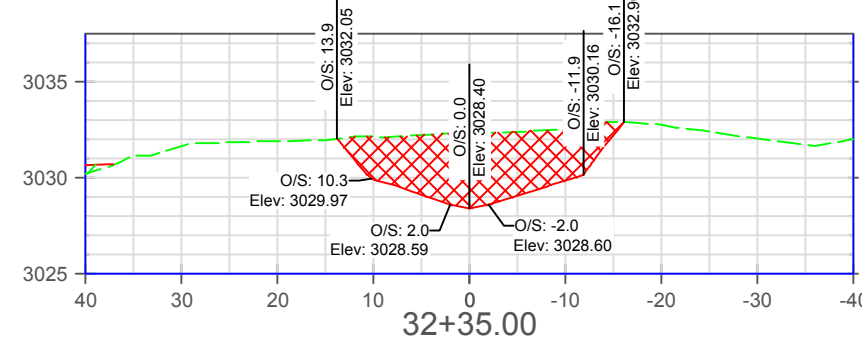
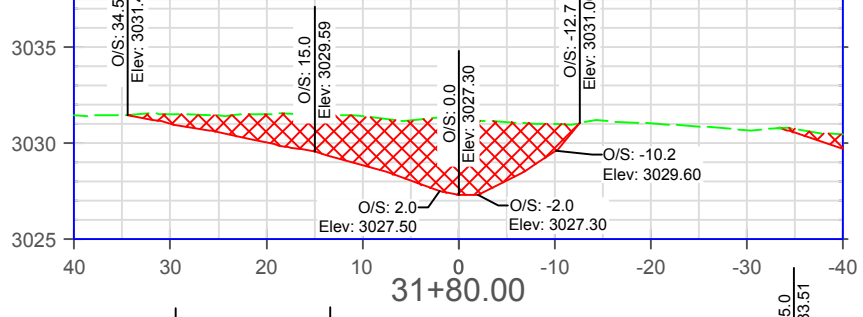
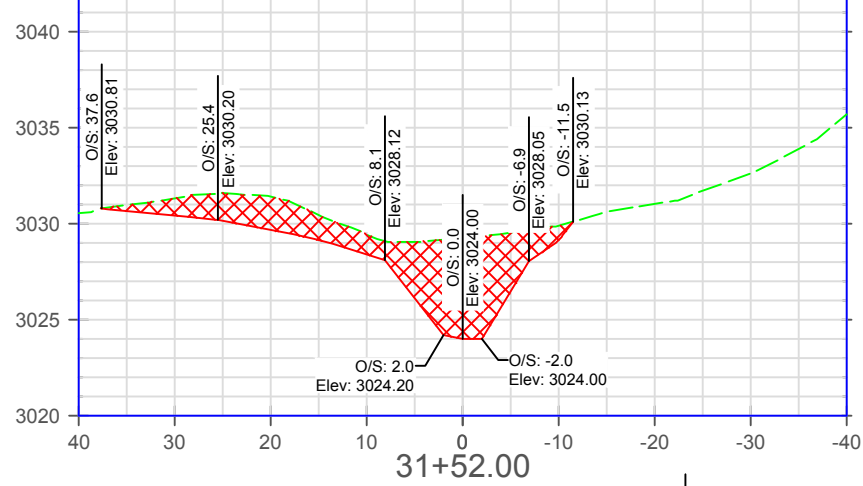
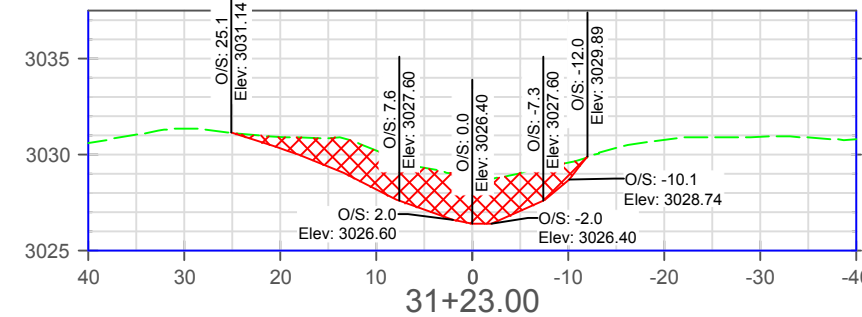
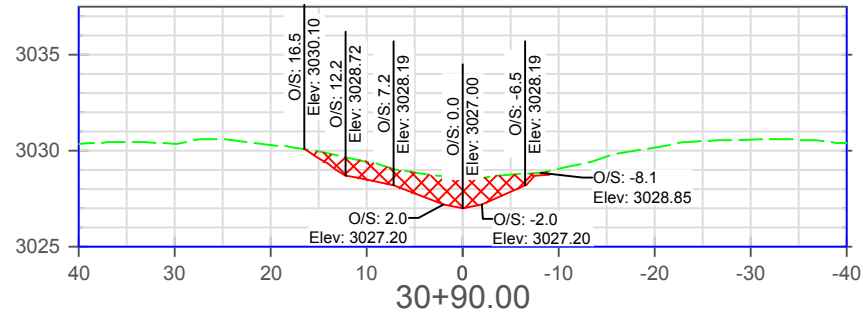
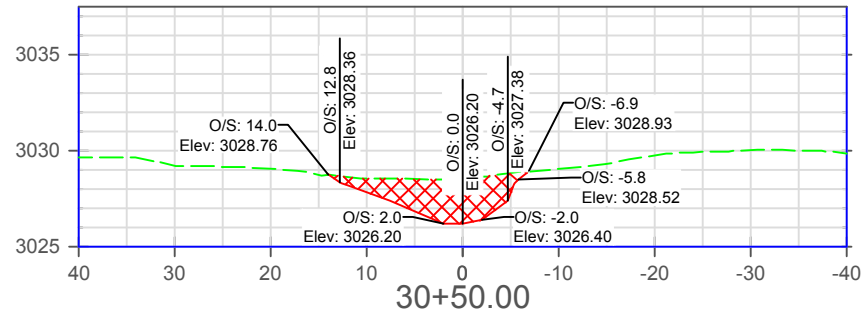
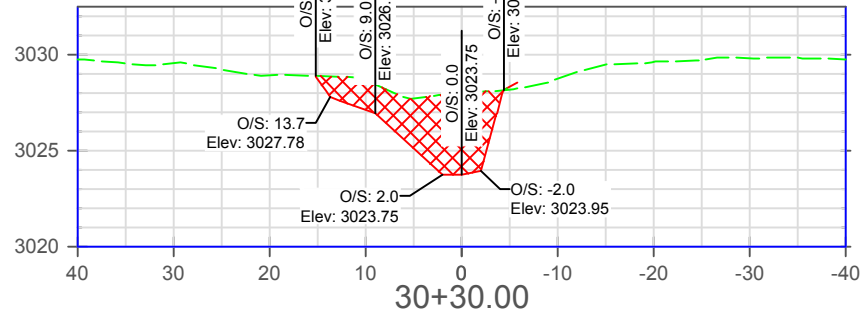
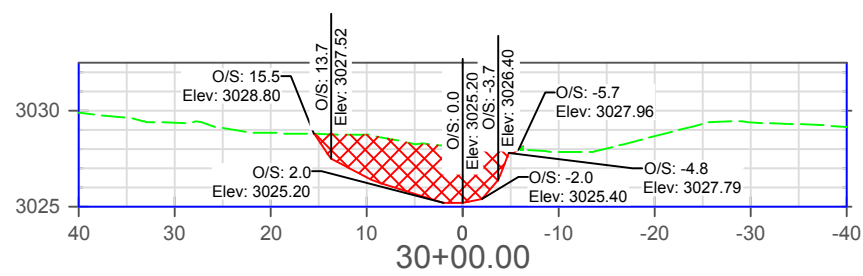
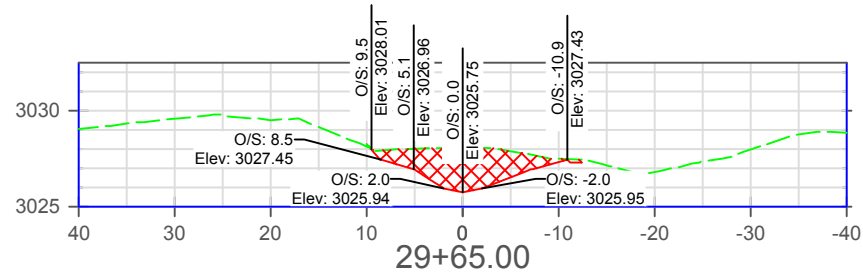
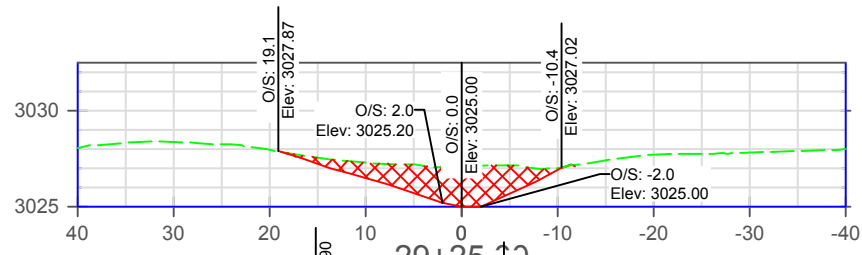
MAIN CHANNEL SECTIONS 26+15 TO 28+98  
Rock Creek Stream & Floodplain Restoration



MC Sections  
26+15 to 28+98

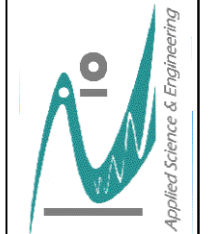


- NOTES:
1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
  2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
  3. CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.
  4. THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.
  5. CONSTRUCTED CHANNEL SHALL TRANSITION SMOOTHLY BETWEEN CROSS SECTIONAL GEOMETRIES SHOWN WITHIN THESE CROSS SECTIONS.
  6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.



|          |             |         |                             |
|----------|-------------|---------|-----------------------------|
| Designed | JF, AC      | Date    | Mar 2018                    |
| Drawn    | AC, JF      | Checked | JF                          |
| Approved | AC, JF, BPA | Title   | AC, Biologist, JF, Engineer |

**MAIN CHANNEL SECTIONS 29+25 TO 33+00**  
Rock Creek Stream & Floodplain Restoration

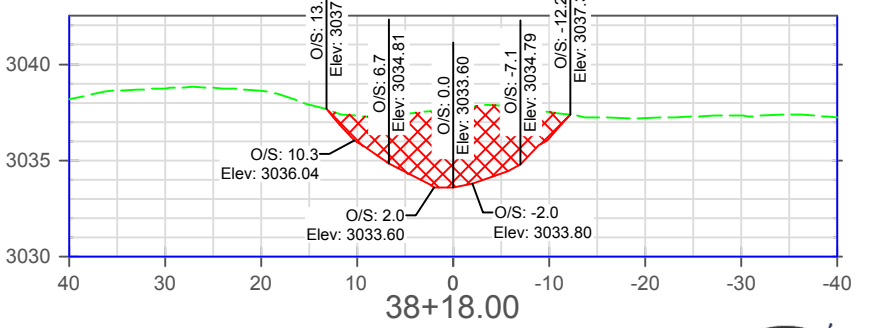
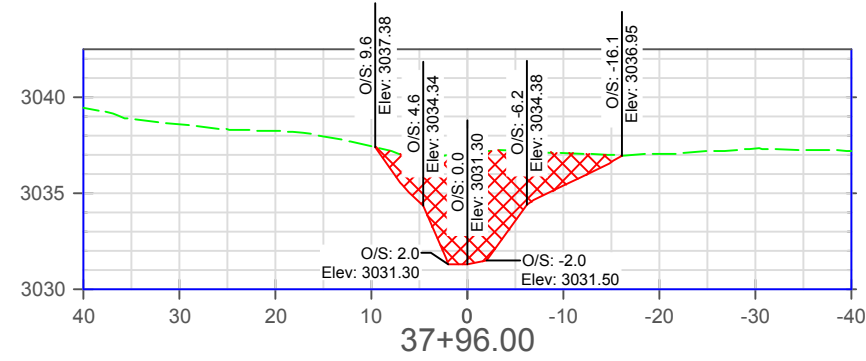
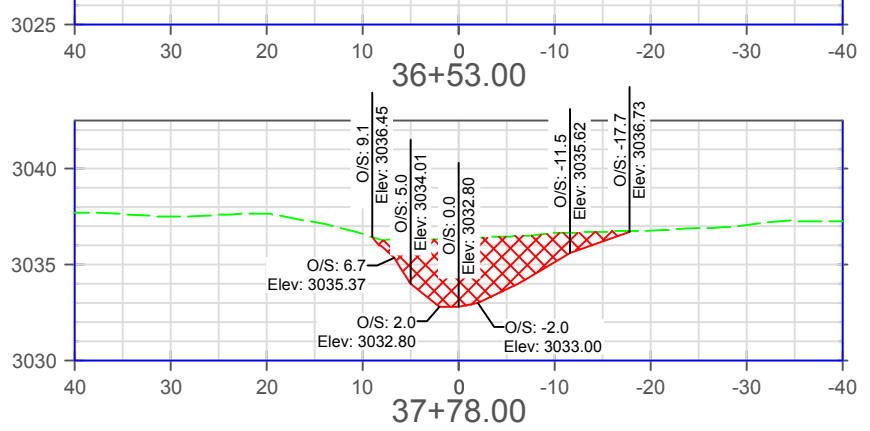
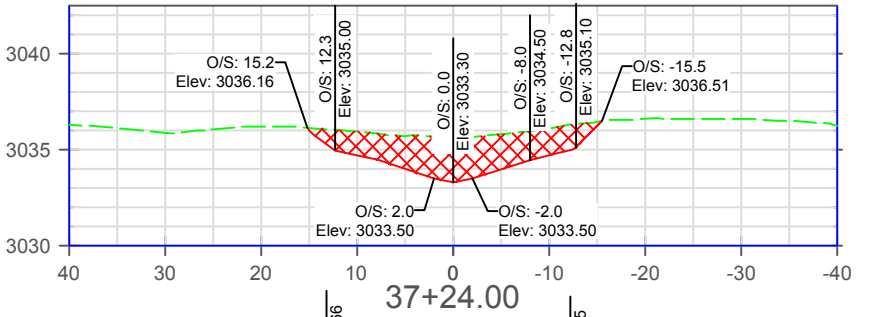
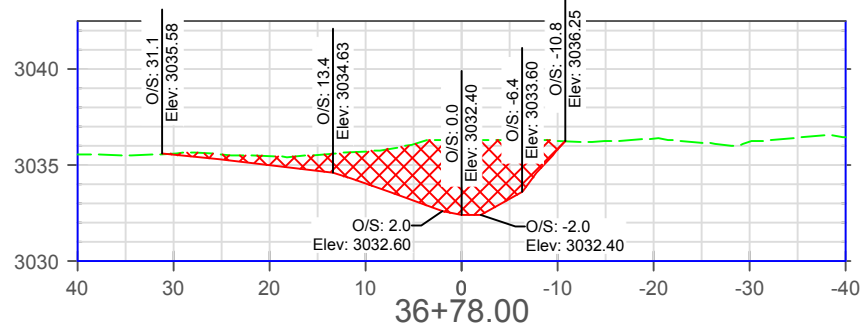
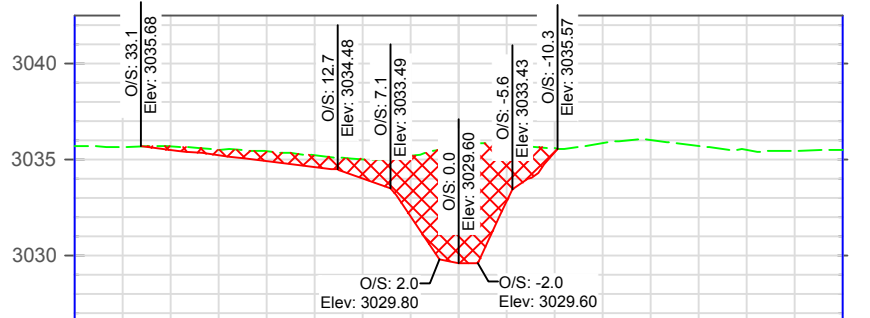
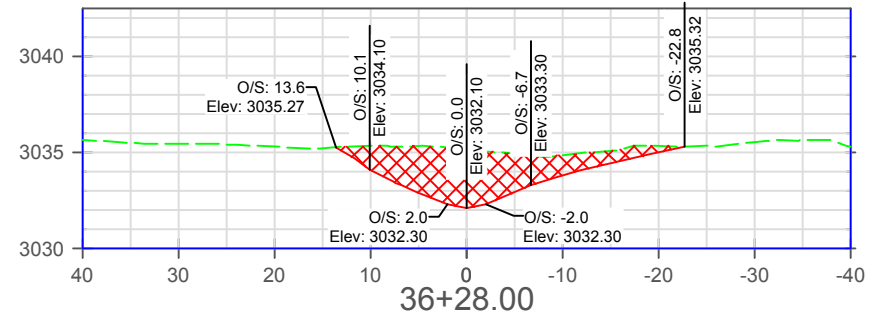
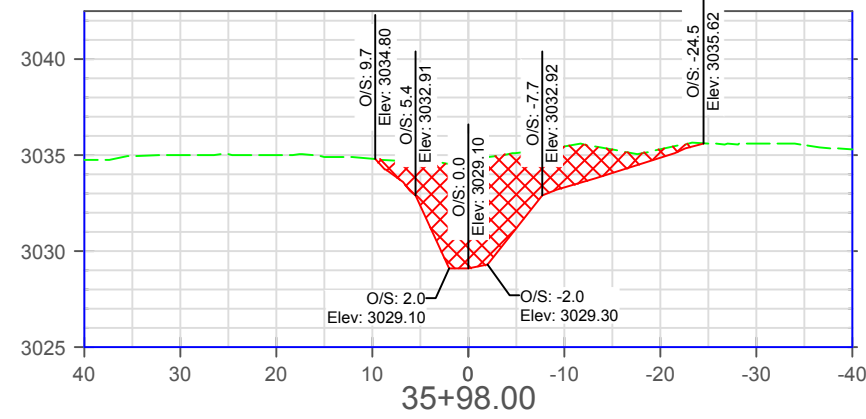
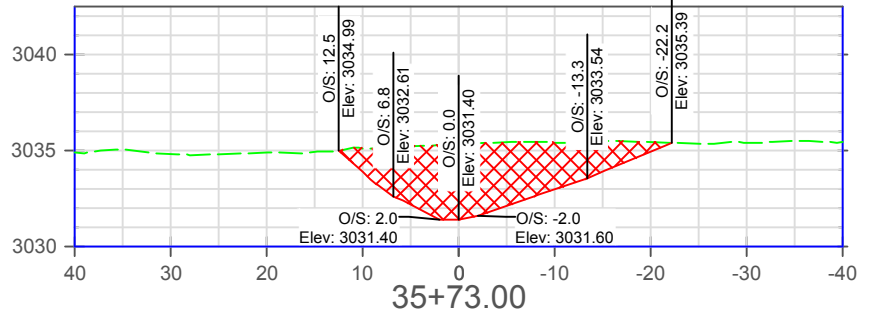
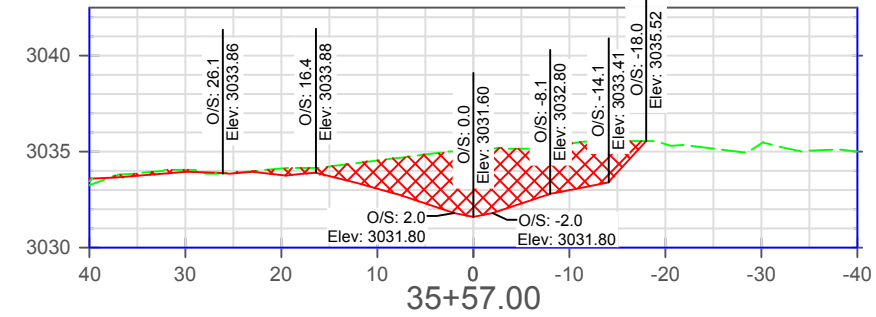
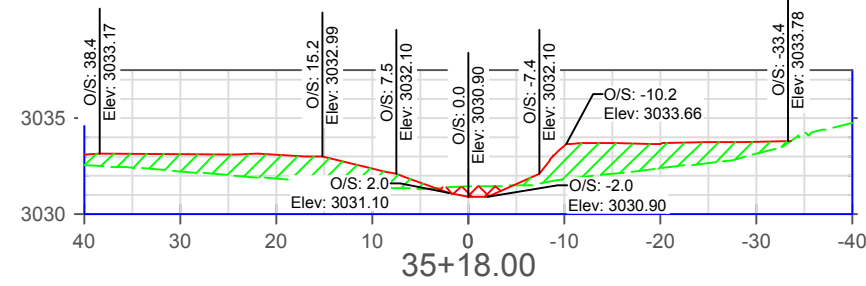
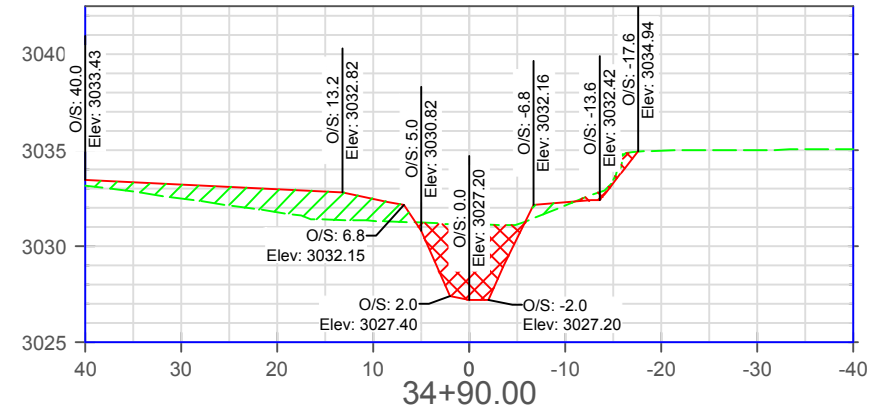


LEGEND

- Channel Cut ---
- Proposed Ground ---
- Channel Cut ▨
- Channel Fill ▩

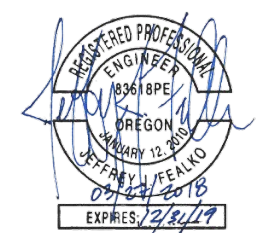
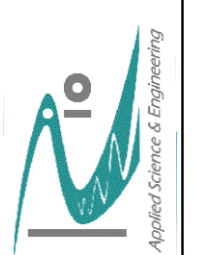
NOTES:

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2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
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6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.

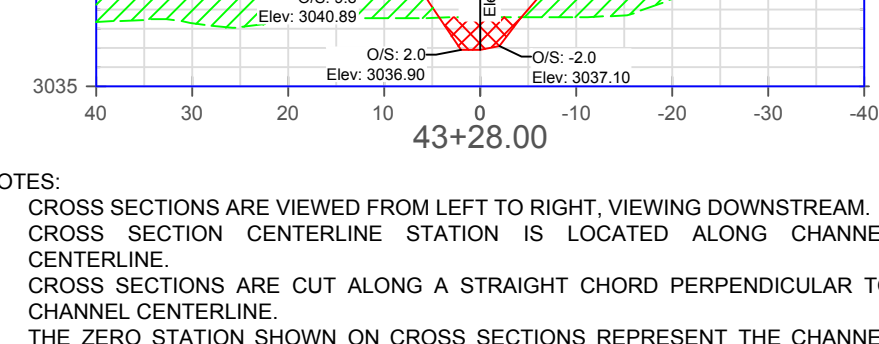
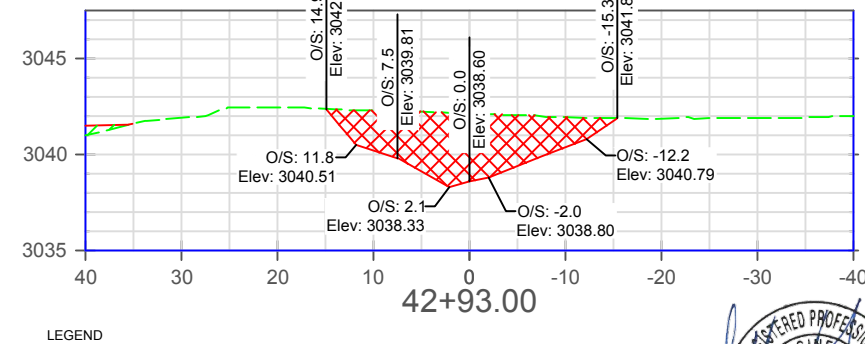
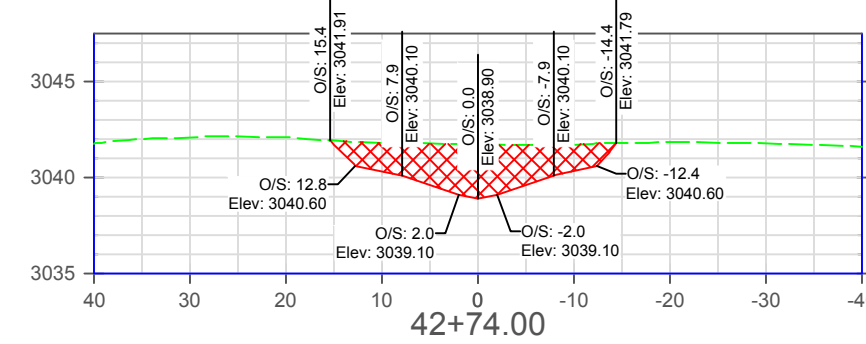
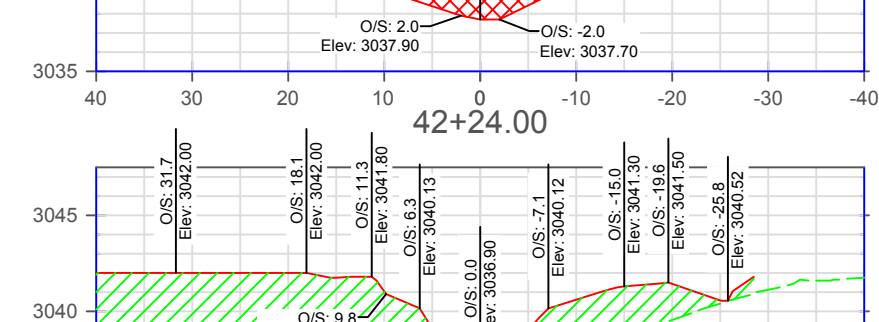
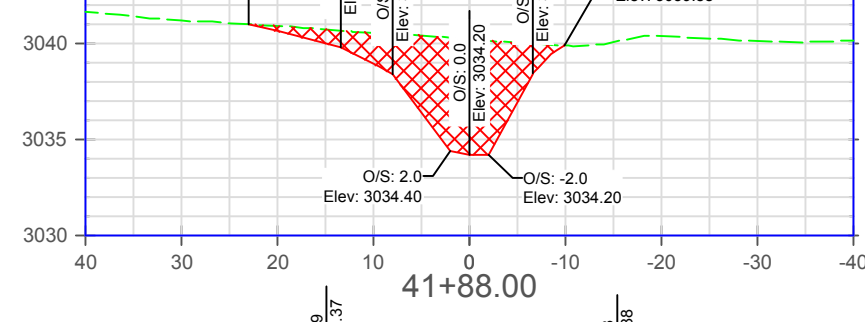
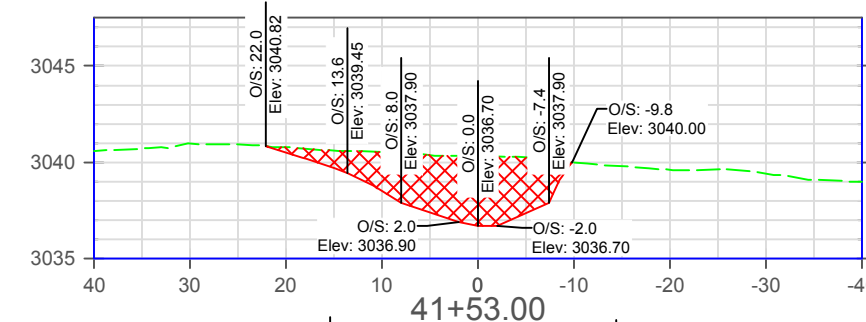
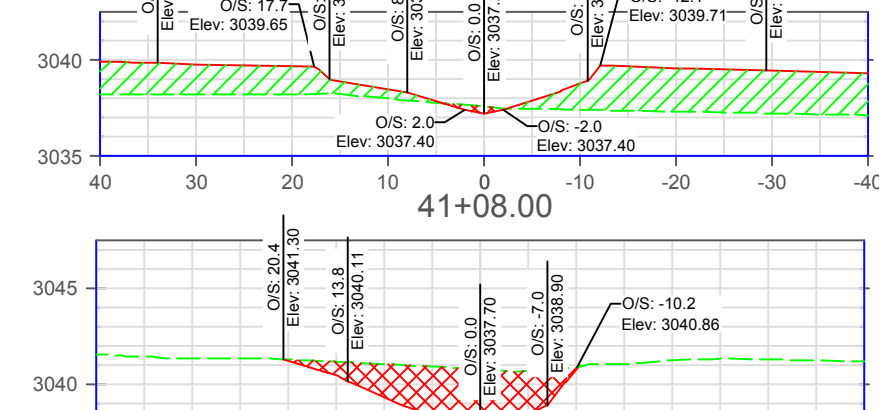
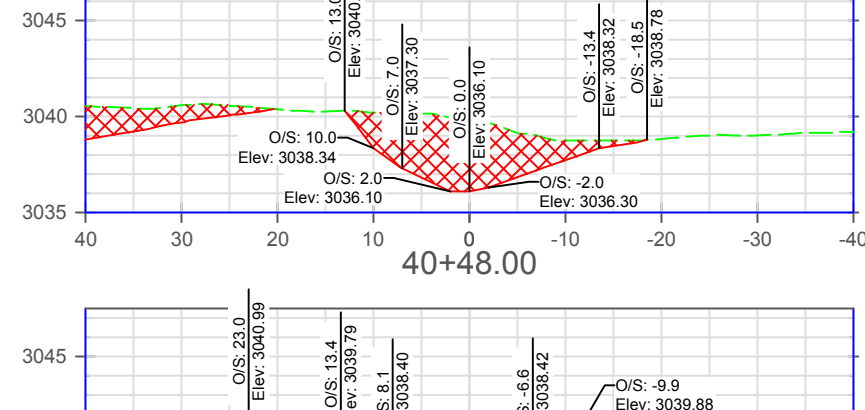
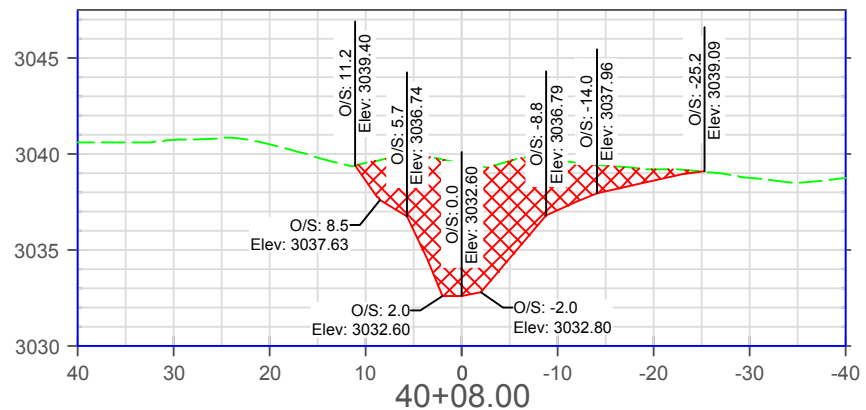
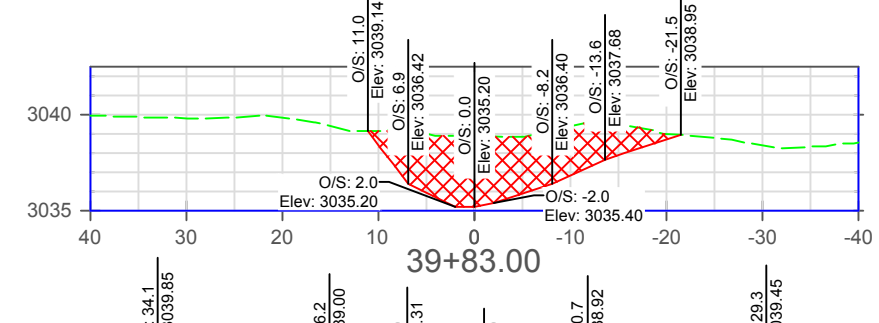
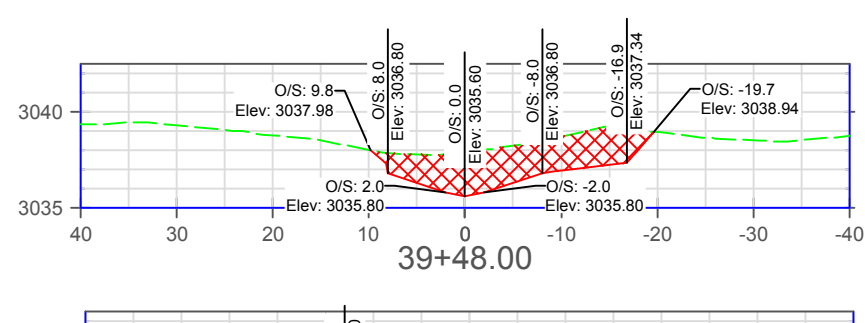
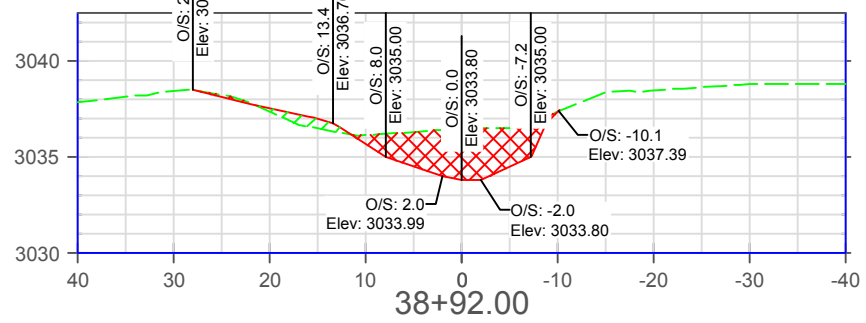
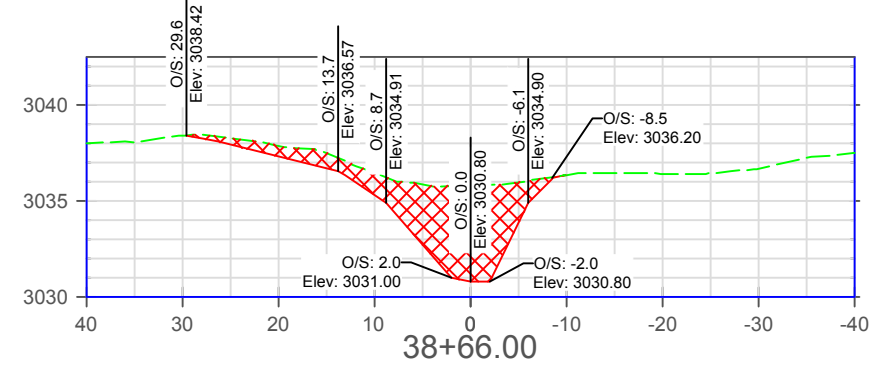
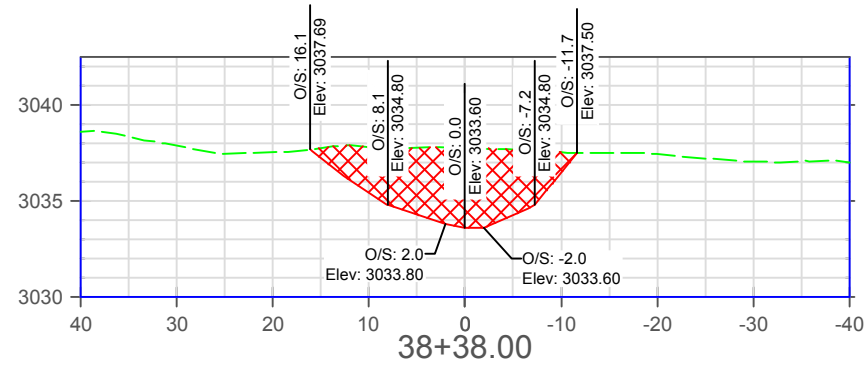
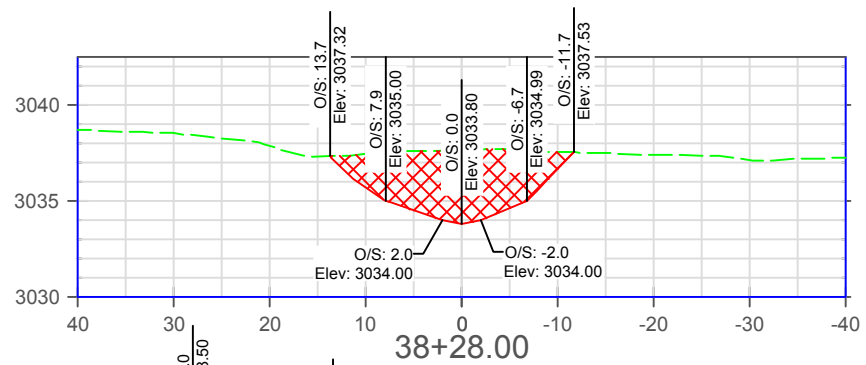


|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

MAIN CHANNEL SECTIONS 34+90 TO 38+18  
Rock Creek Stream & Floodplain Restoration



MC Sections 34+90 to 38+16

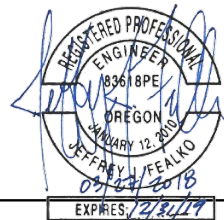


LEGEND

- Channel Cut
- Proposed Ground
- Channel Cut
- Channel Fill

NOTES:



1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
3. CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.
4. THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.
5. CONSTRUCTED CHANNEL SHALL TRANSITION SMOOTHLY BETWEEN CROSS SECTIONAL GEOMETRIES SHOWN WITHIN THESE CROSS SECTIONS.
6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.



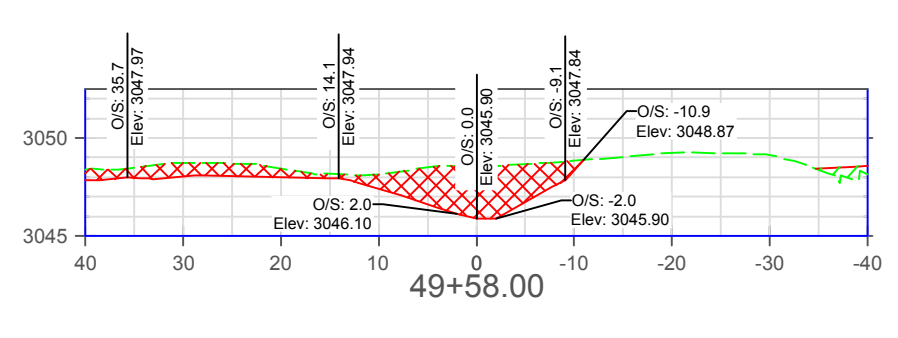
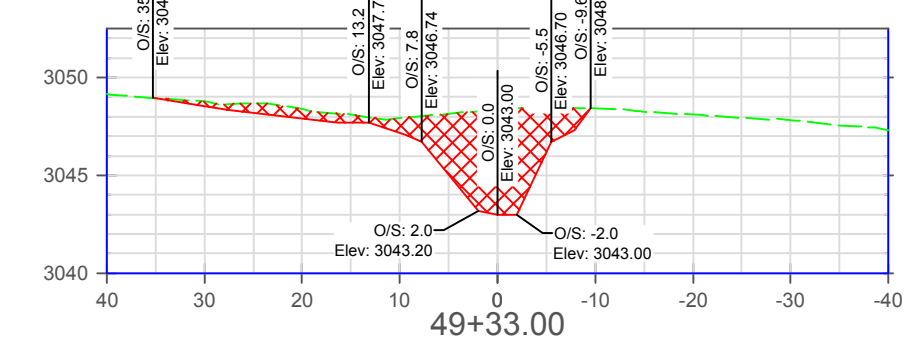
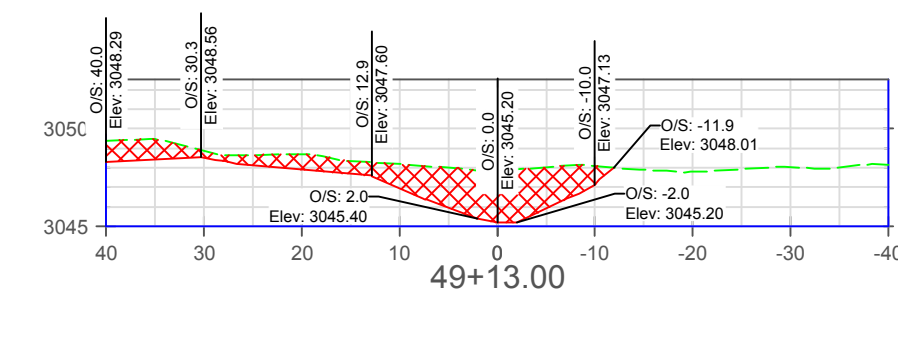
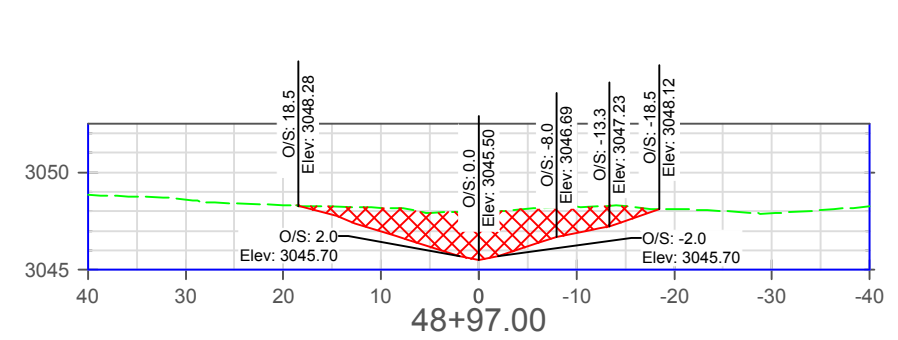
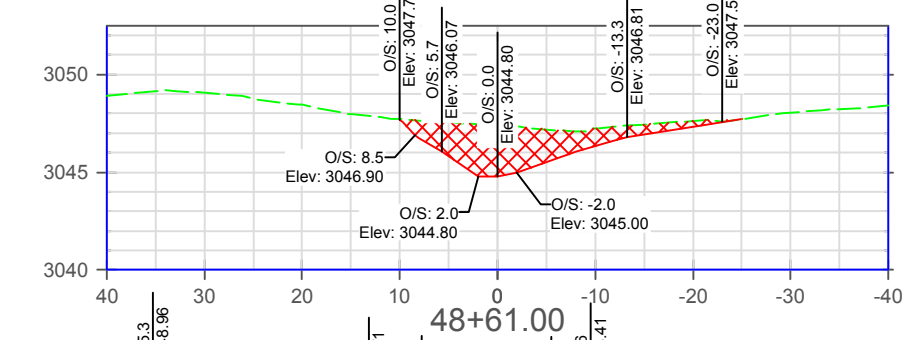
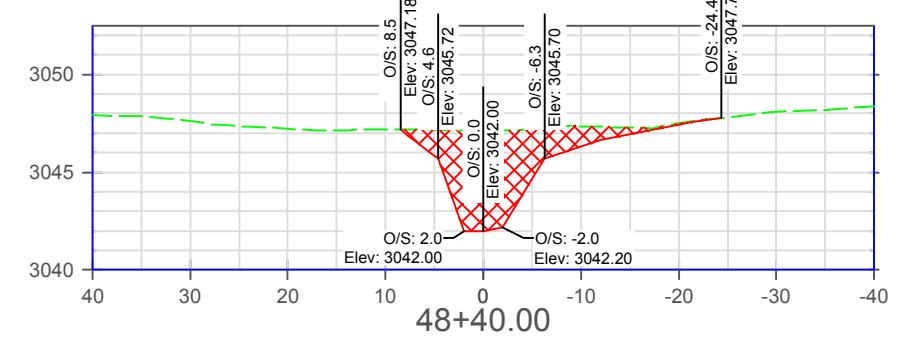
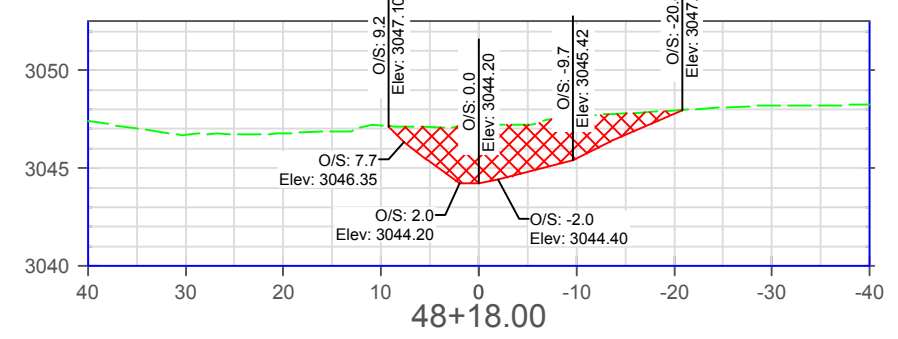
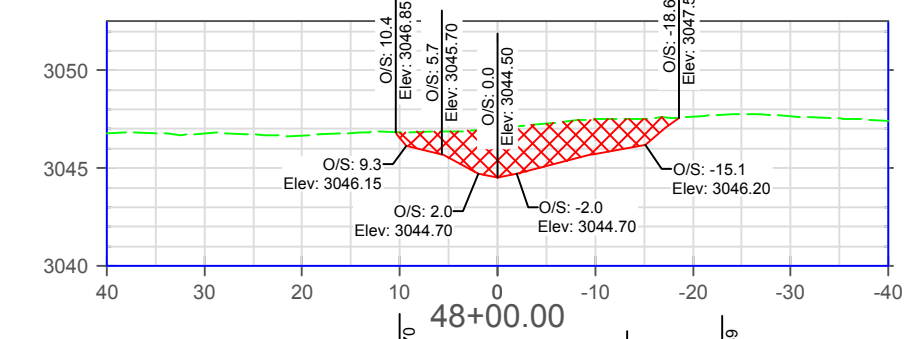
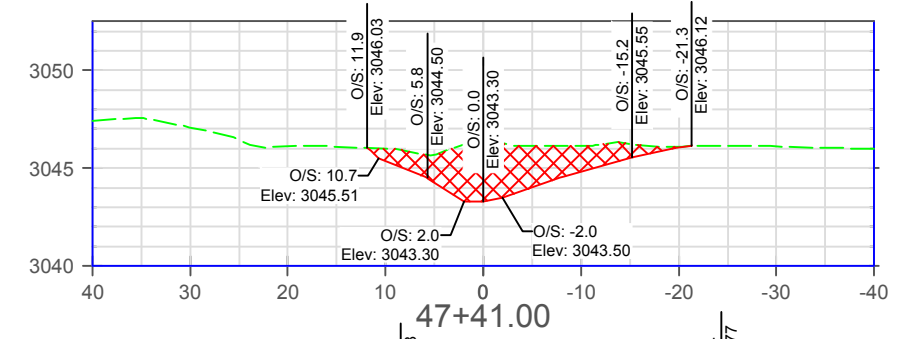
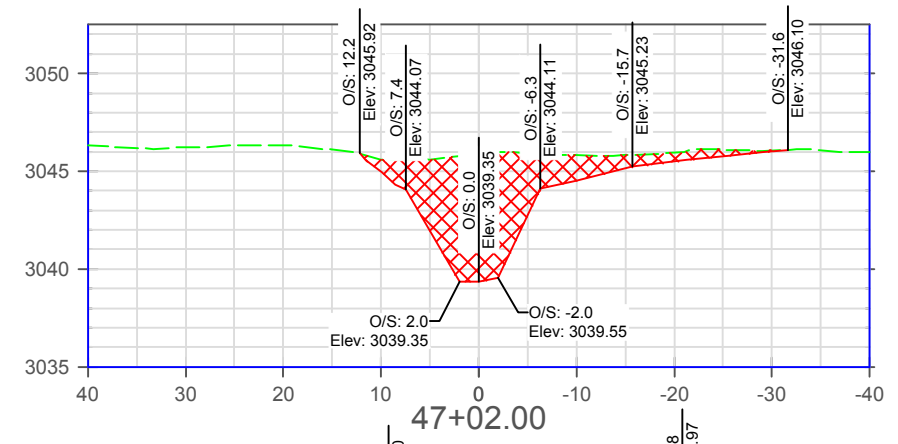
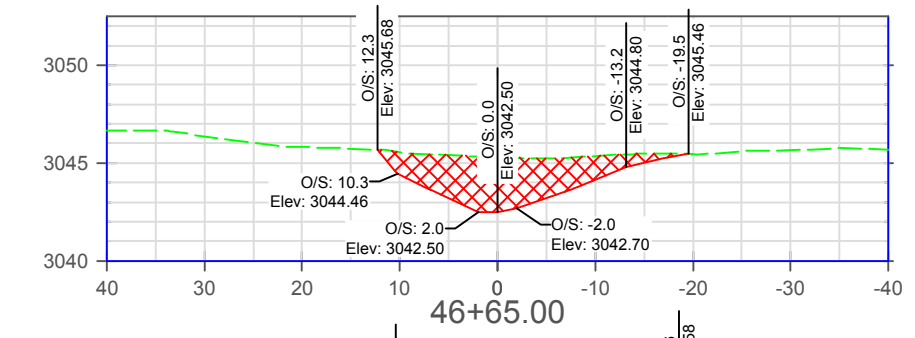
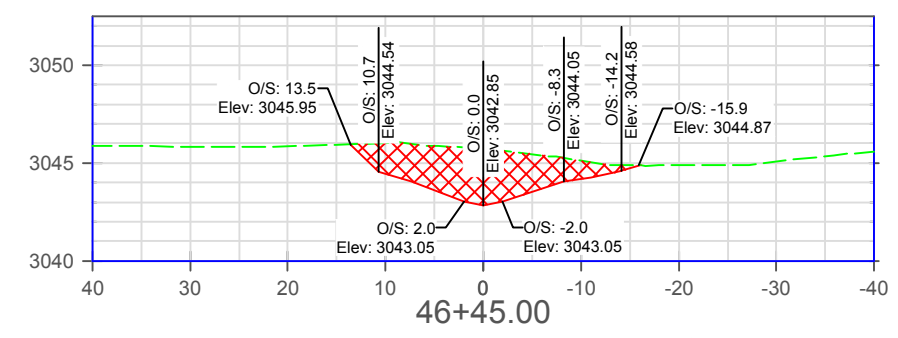
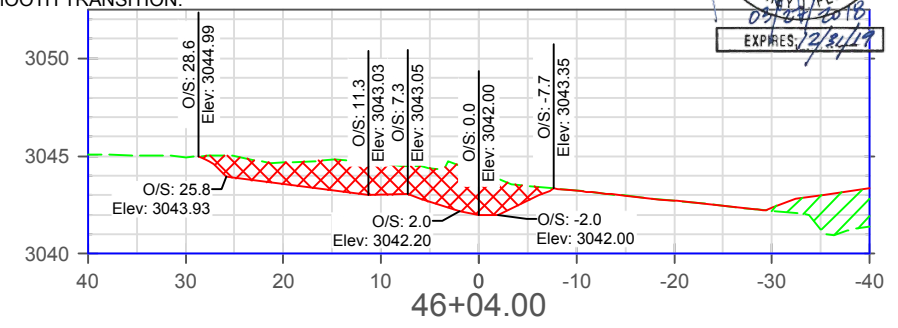
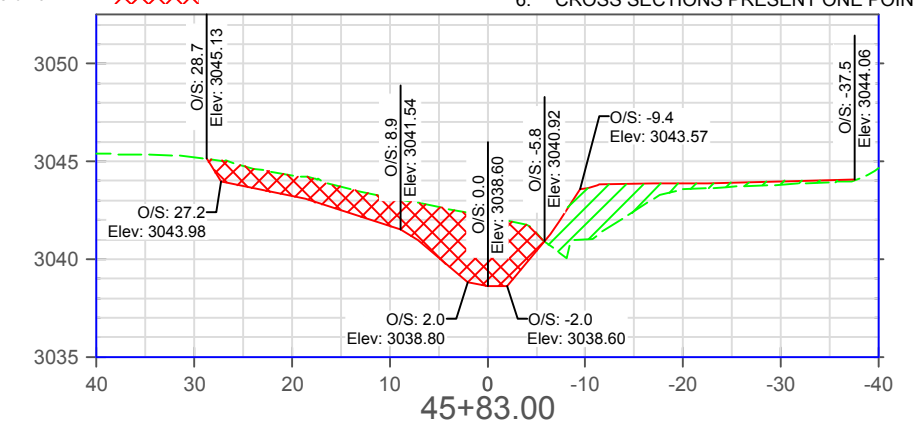
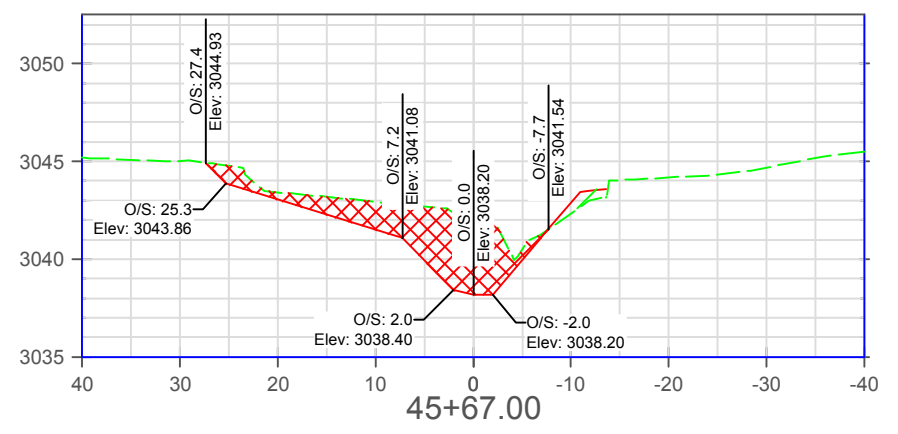
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|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**MAIN CHANNEL SECTIONS 38+28 TO 43+28**  
 Rock Creek Stream & Floodplain Restoration



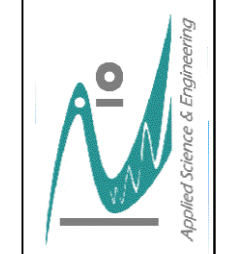
LEGEND  
 Channel Cut ---  
 Proposed Ground ---  
 Channel Cut   
 Channel Fill 

NOTES:  
 1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.  
 2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.  
 3. CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.  
 4. THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.  
 5. CONSTRUCTED CHANNEL SHALL TRANSITION SMOOTHLY BETWEEN CROSS SECTIONAL GEOMETRIES SHOWN WITHIN THESE CROSS SECTIONS.  
 6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.



Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist, JF, Engineer

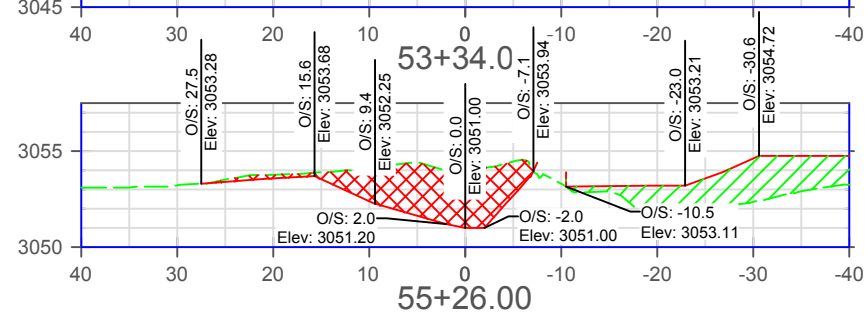
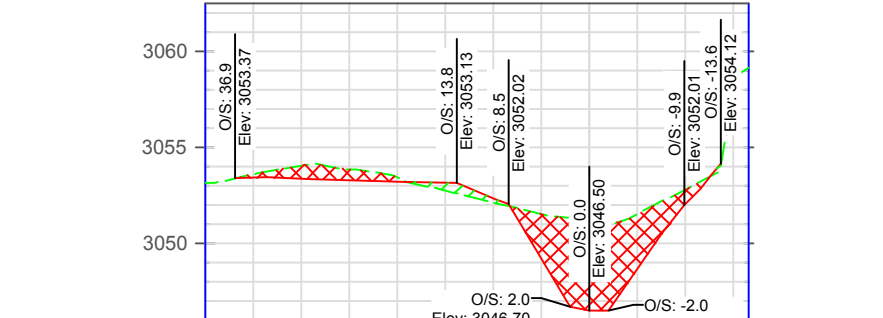
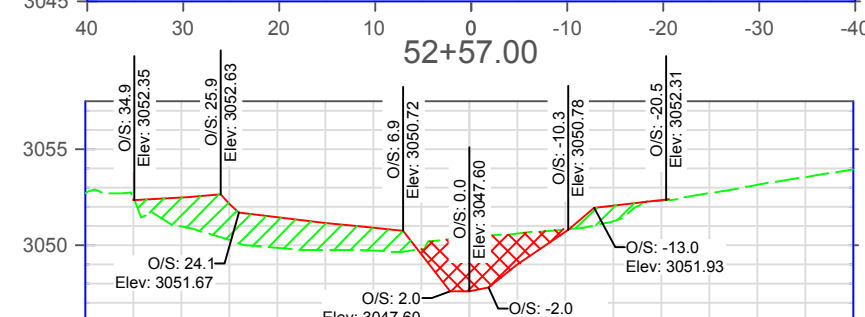
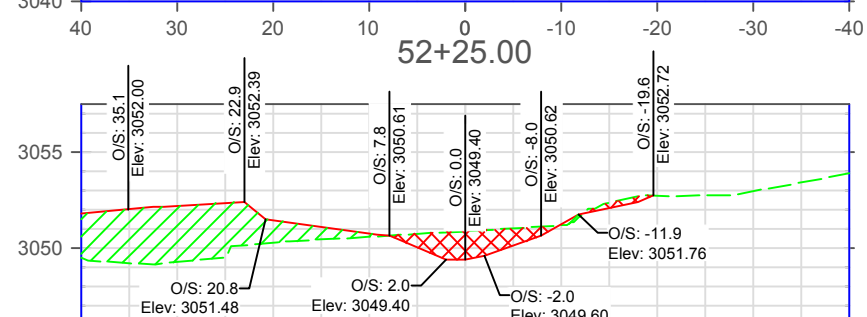
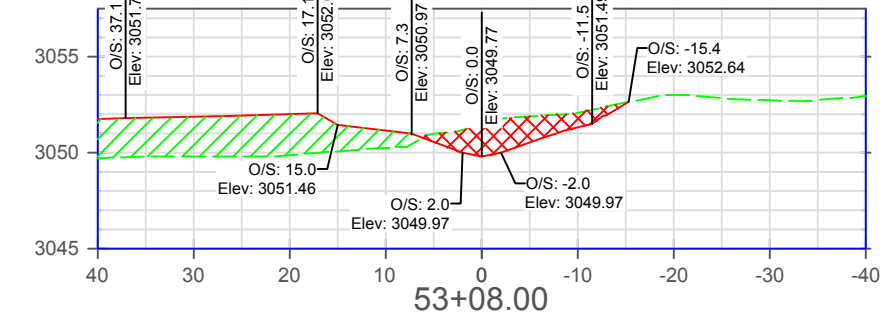
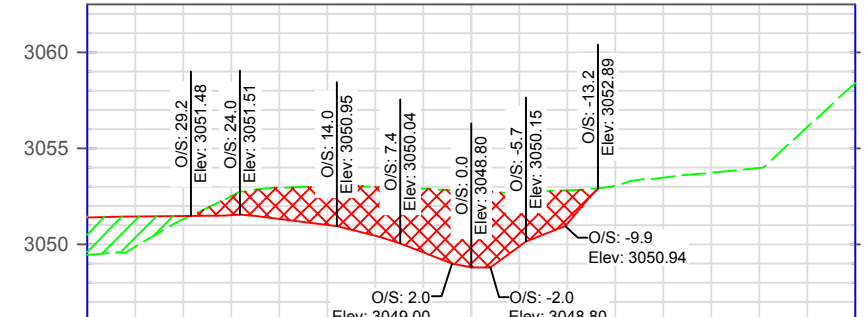
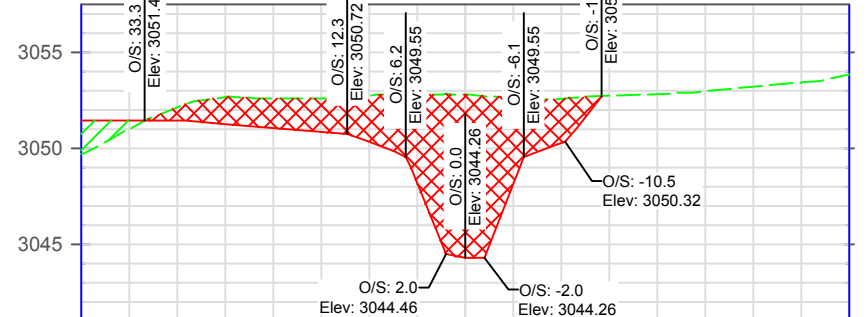
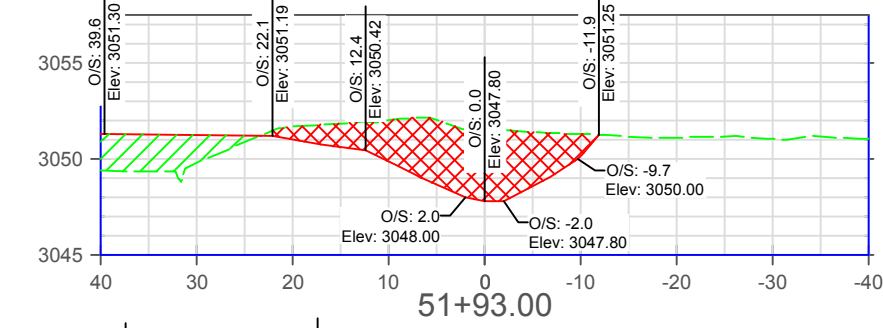
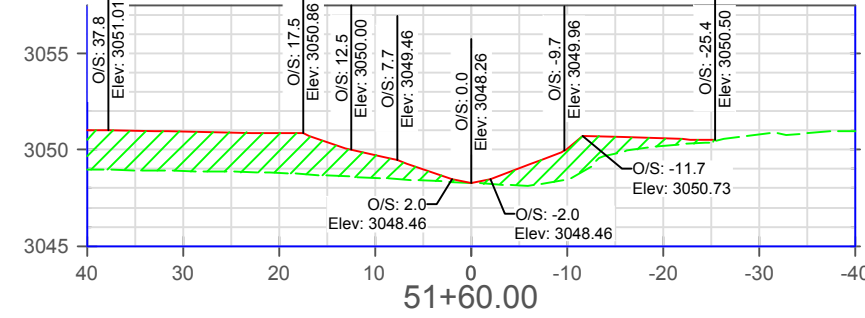
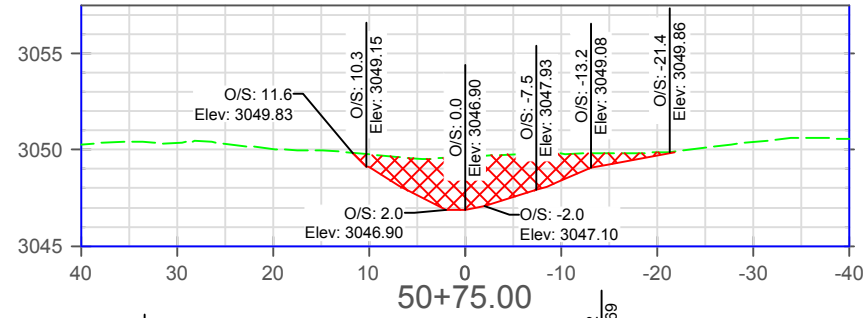
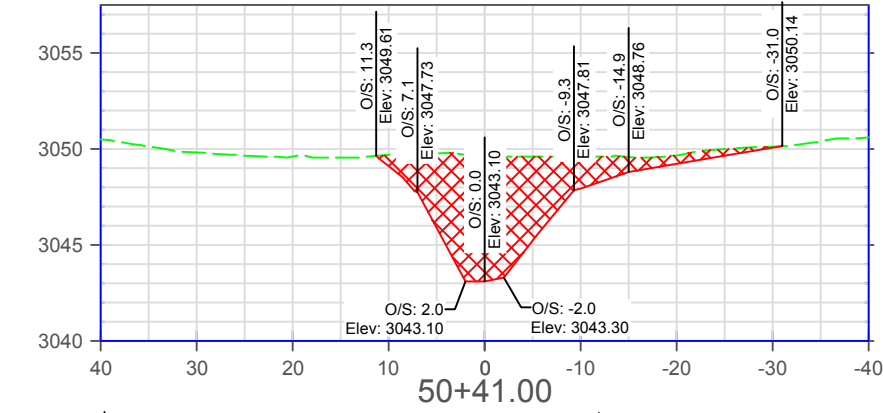
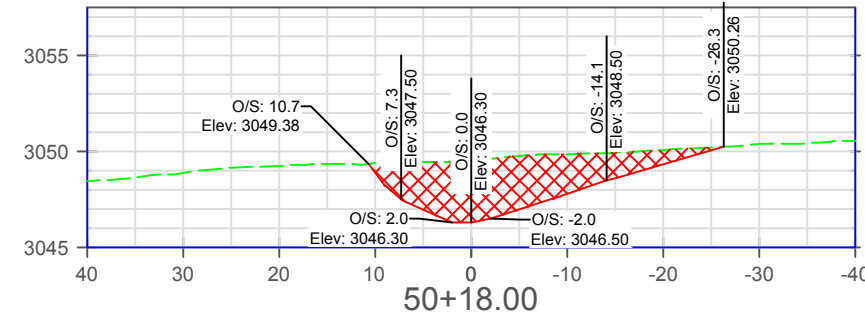
MAIN CHANNEL SECTIONS 45+67 TO 49+58  
 Rock Creek Stream & Floodplain Restoration



MC Sections  
 45+67 to 49+58

LEGEND

- Channel Cut ---
- Proposed Ground ---
- Channel Cut ▨
- Channel Fill ▩

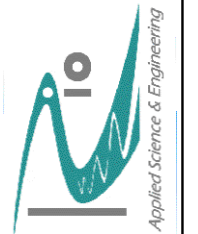


- NOTES:
1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
  2. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
  3. CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.
  4. THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.
  5. CONSTRUCTED CHANNEL SHALL TRANSITION SMOOTHLY BETWEEN CROSS SECTIONAL GEOMETRIES SHOWN WITHIN THESE CROSS SECTIONS.
  6. CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.

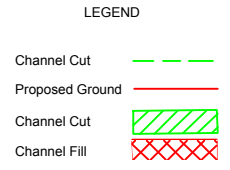


|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

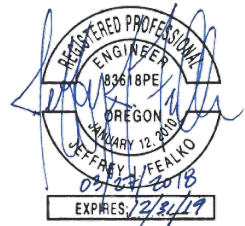
MAIN CHANNEL SECTIONS 49+97 TO 55+26  
Rock Creek Stream & Floodplain Restoration



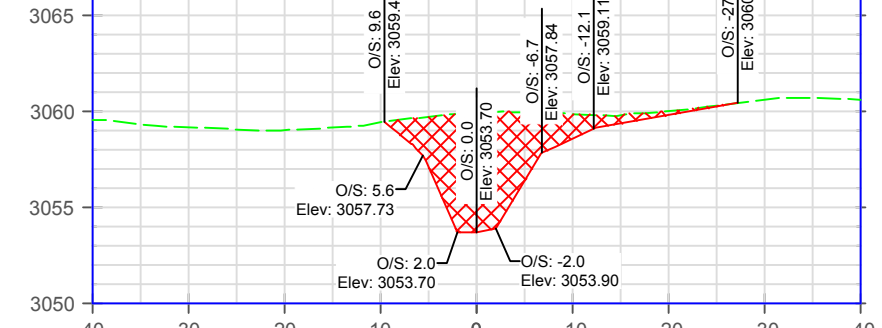
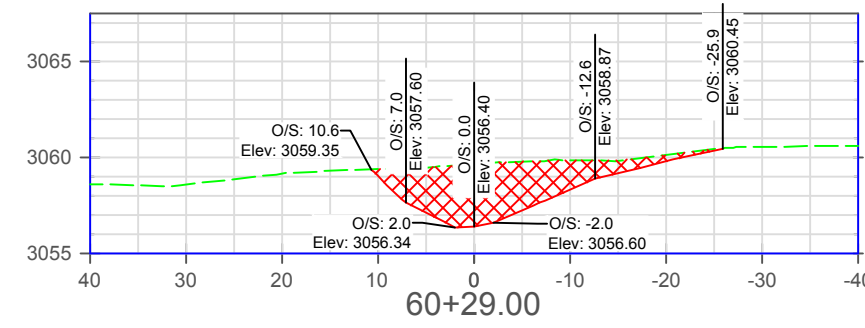
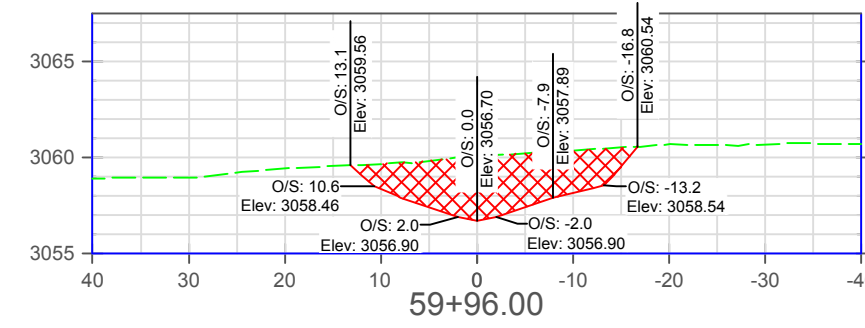
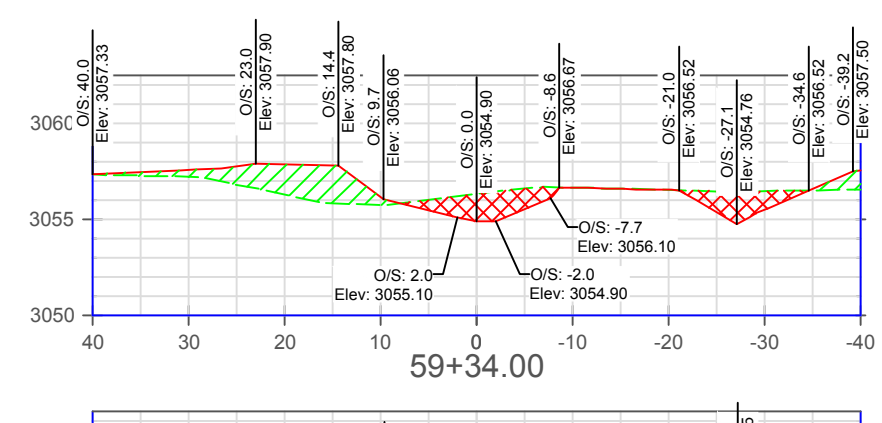
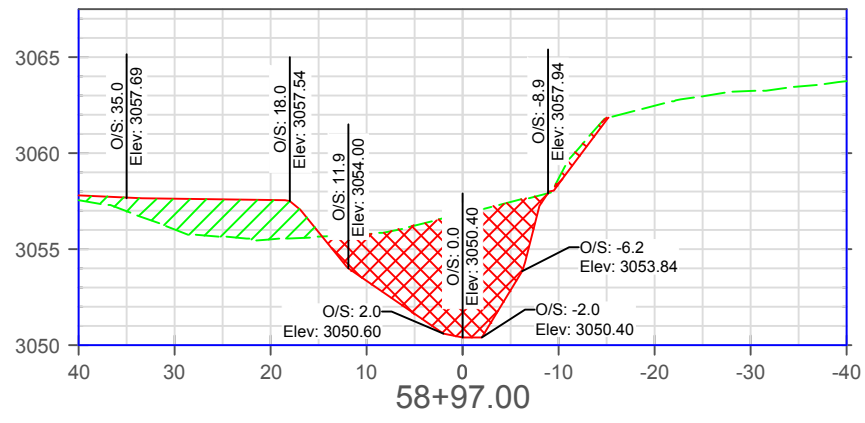
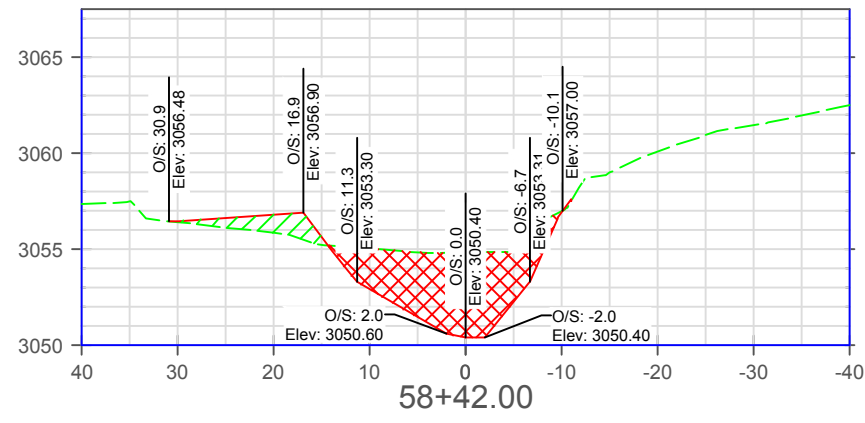
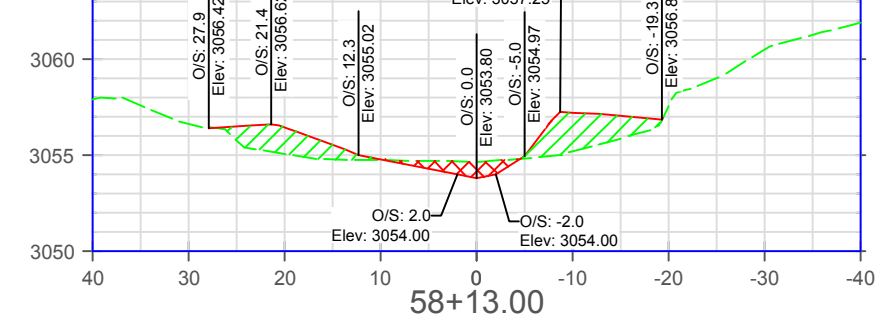
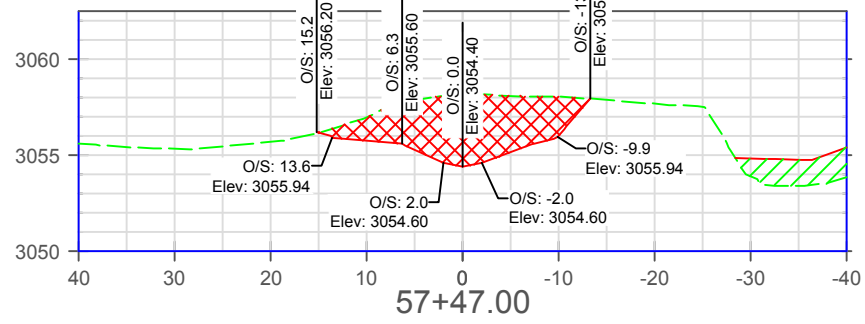
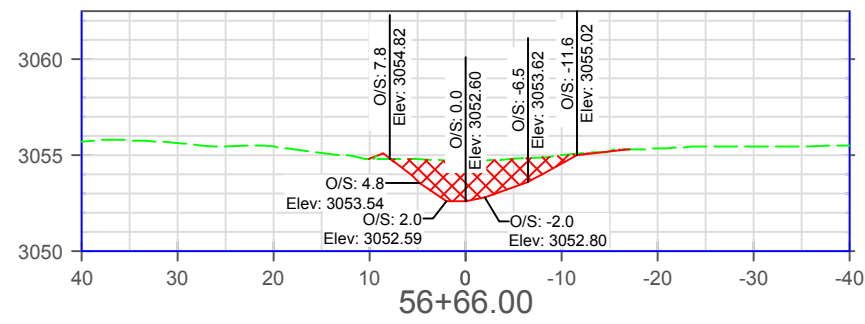
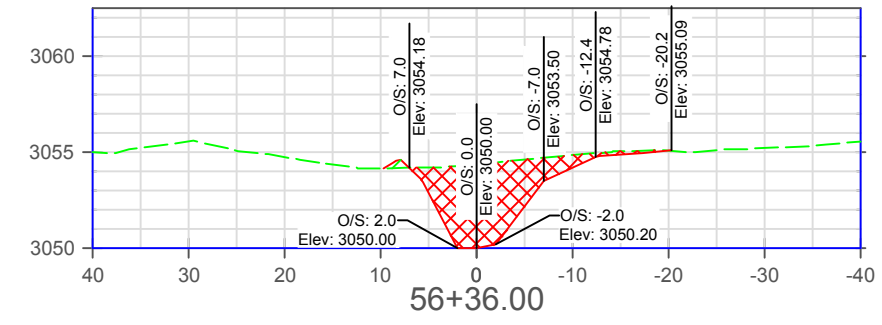
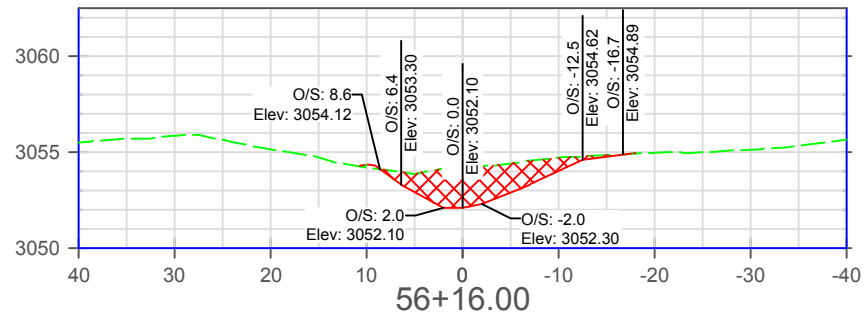
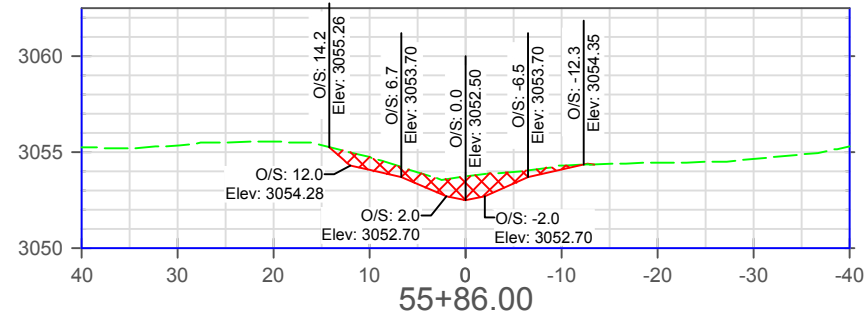
MC Sections  
49+97 to 55+26



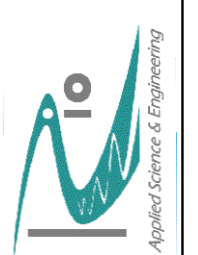
- NOTES:
- CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
  - CROSS SECTION CENTERLINE STATION IS LOCATED ALONG CHANNEL CENTERLINE.
  - CROSS SECTIONS ARE CUT ALONG A STRAIGHT CHORD PERPENDICULAR TO CHANNEL CENTERLINE.
  - THE ZERO STATION SHOWN ON CROSS SECTIONS REPRESENT THE CHANNEL CENTERLINE LOCATION.
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  - CROSS SECTIONS PRESENT ONE POINT IN A SMOOTH TRANSITION.



|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist, JF, Engineer |



**MAIN CHANNEL SECTIONS 55+86 TO 60+59**  
 Rock Creek Stream & Floodplain Restoration



LEGEND

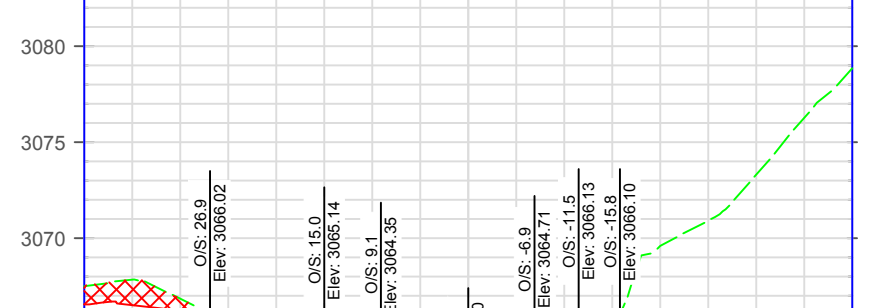
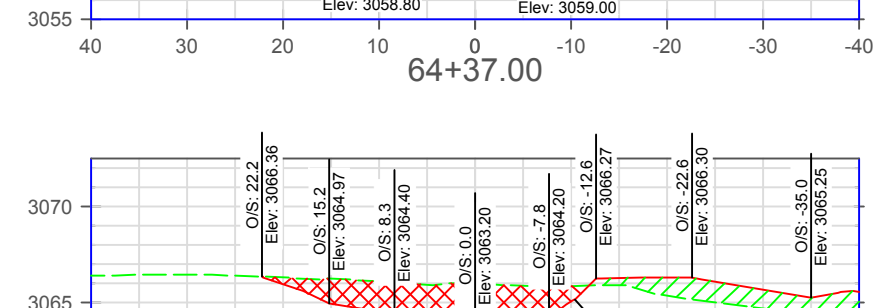
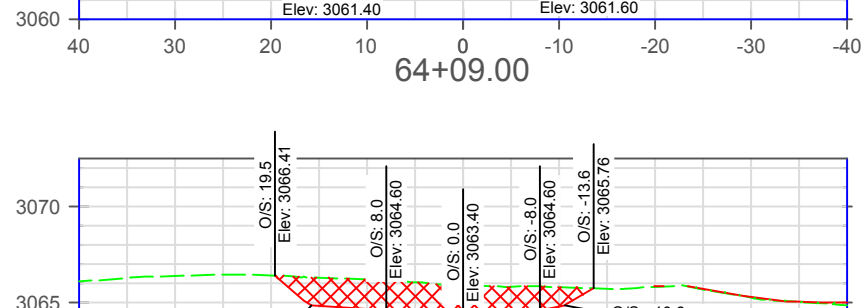
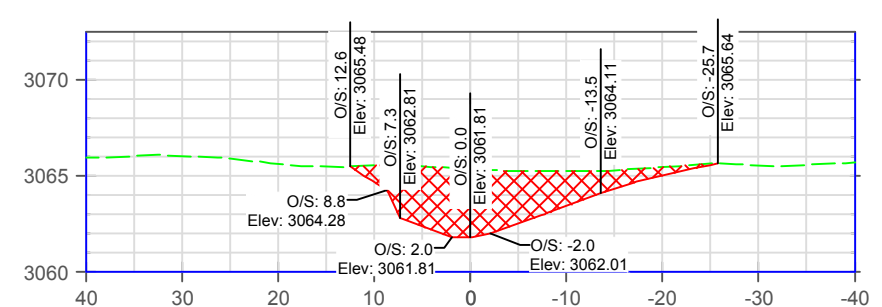
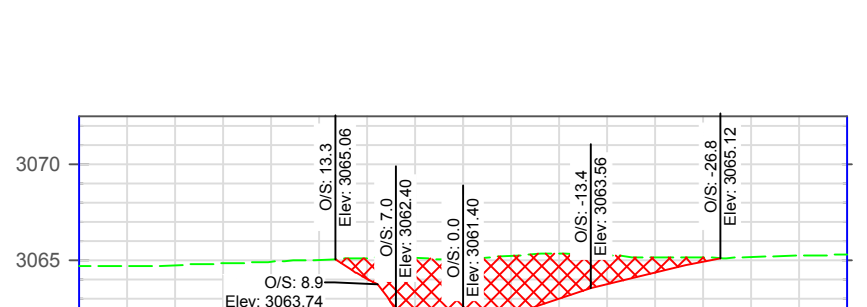
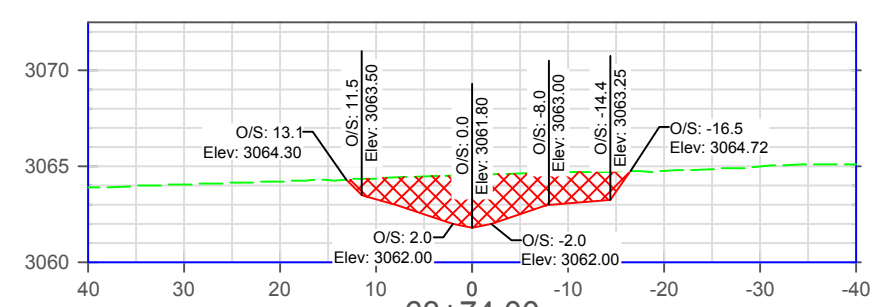
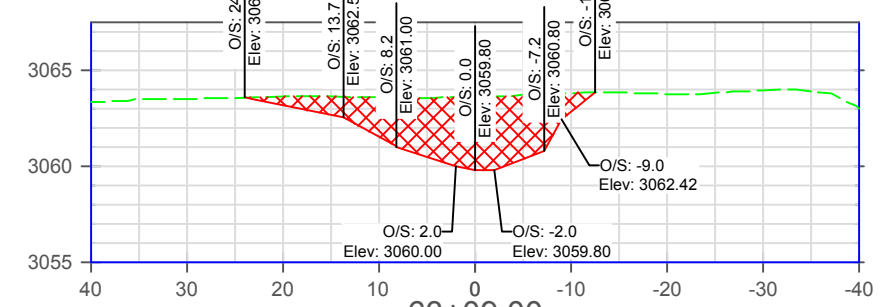
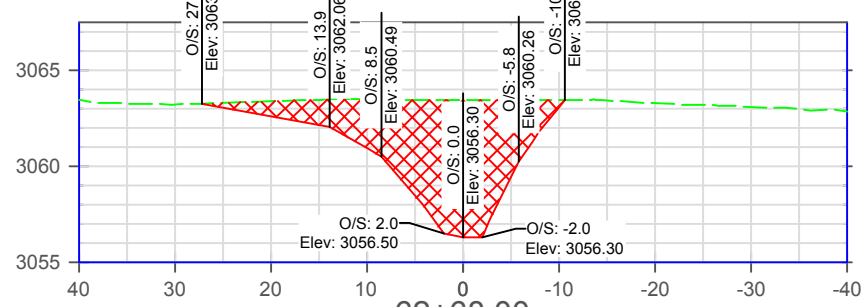
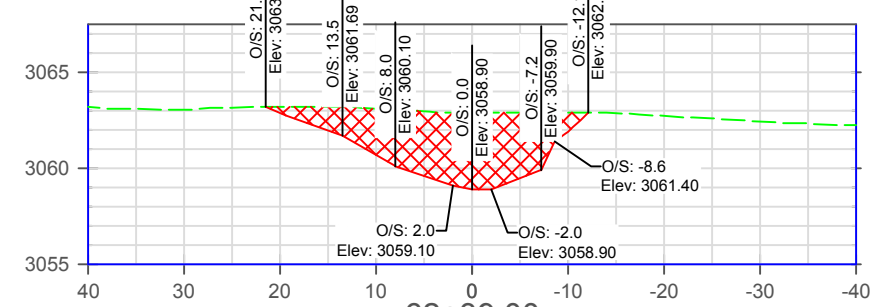
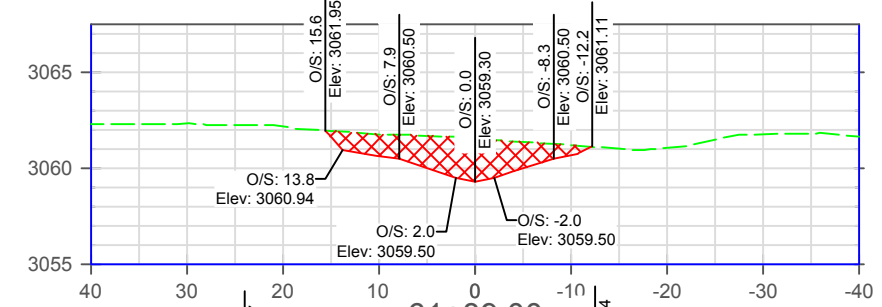
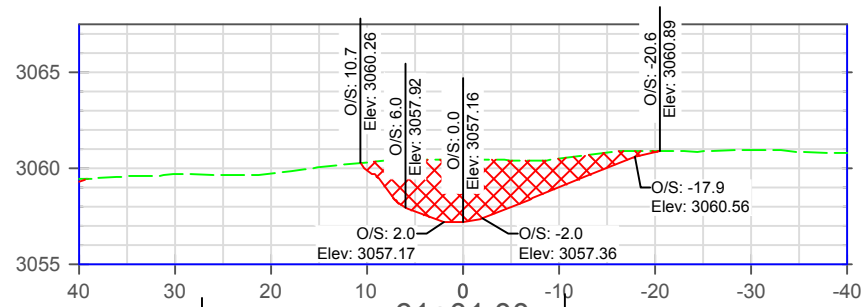
- Channel Cut
- Proposed Ground
- Channel Cut
- Channel Fill

NOTES:

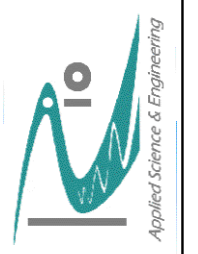
1. CROSS SECTIONS ARE VIEWED FROM LEFT TO RIGHT, VIEWING DOWNSTREAM.
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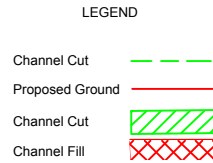
Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist, JF, Engineer



**MAIN CHANNEL SECTIONS 61+01 TO 66+39**  
 Rock Creek Stream & Floodplain Restoration



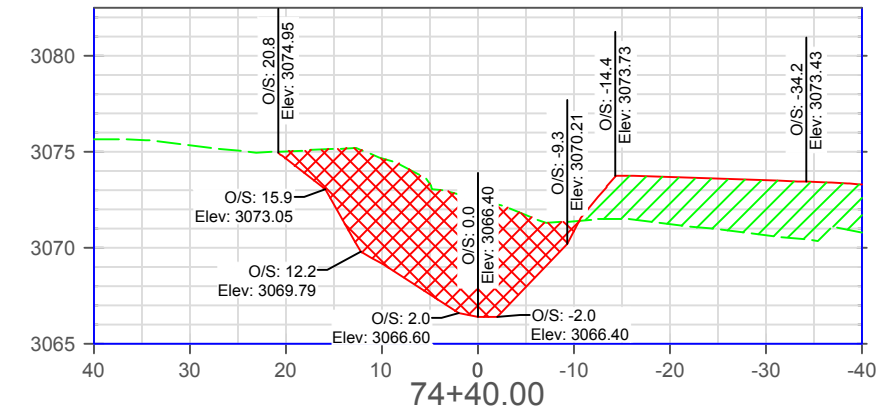
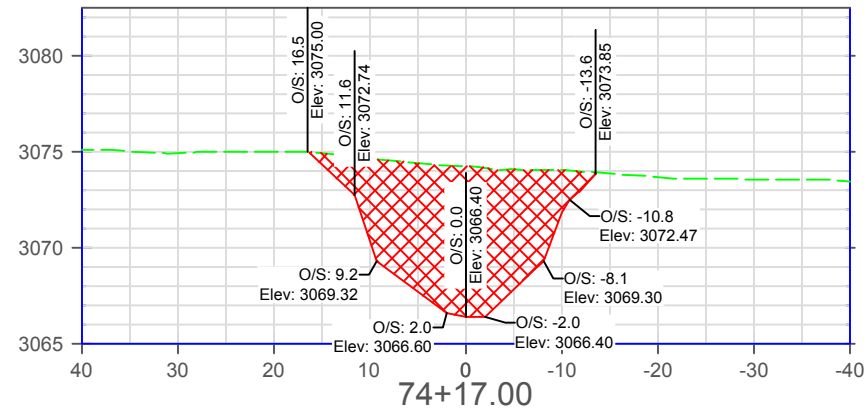
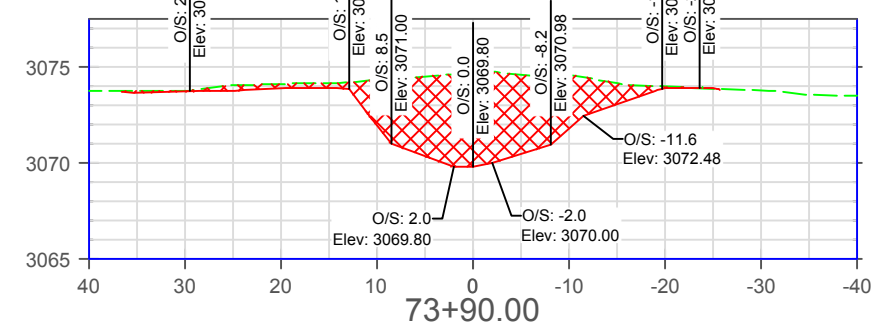
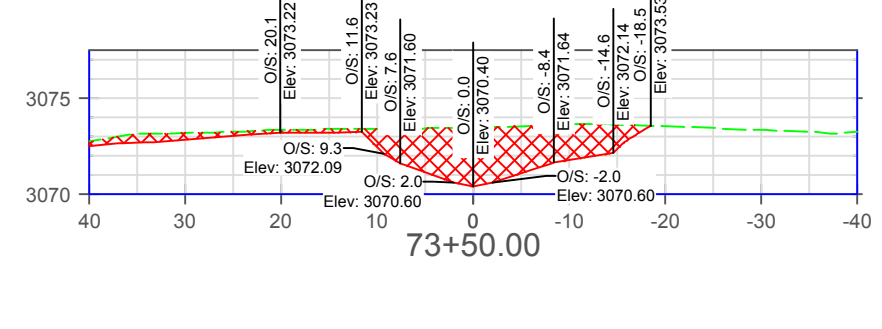
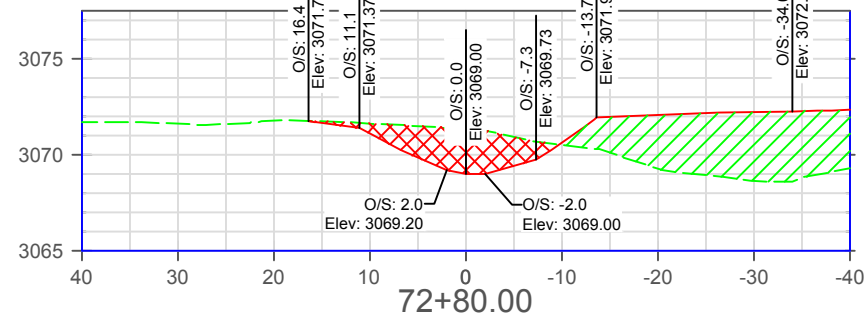
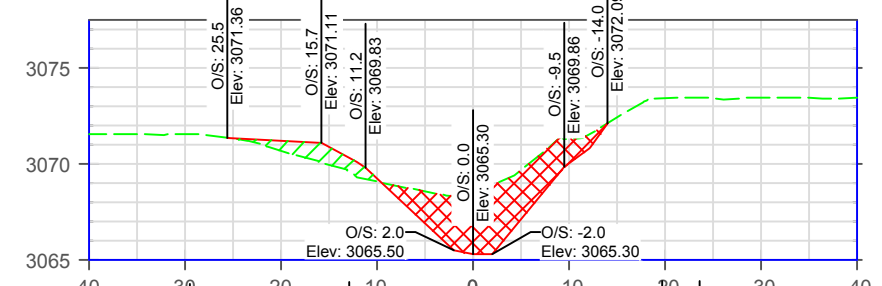
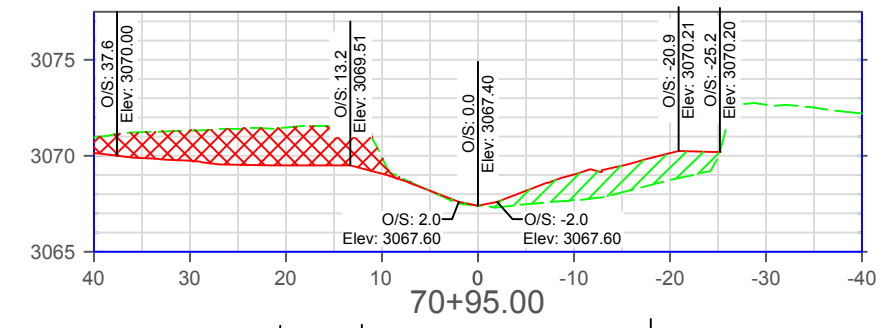
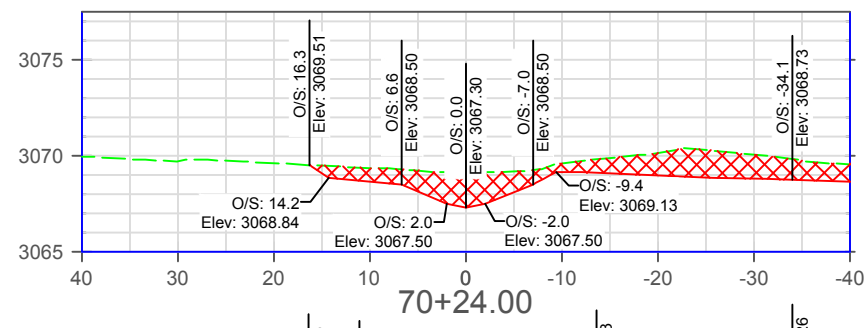
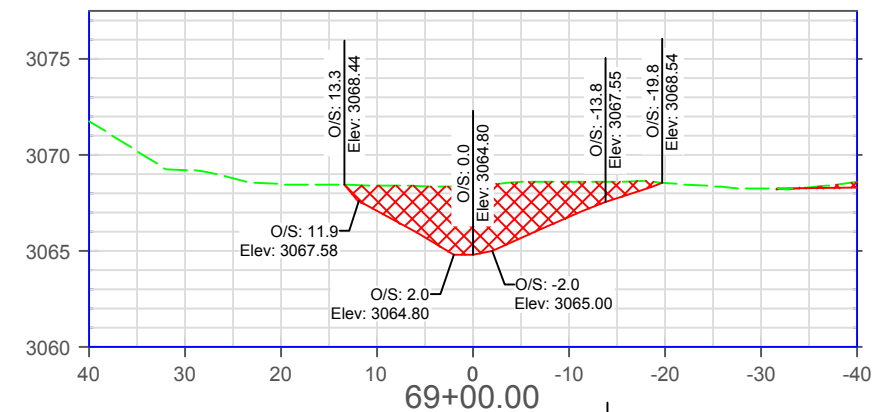
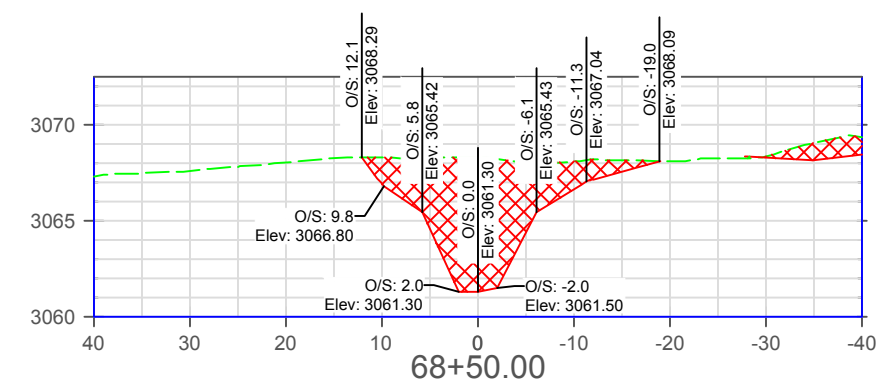
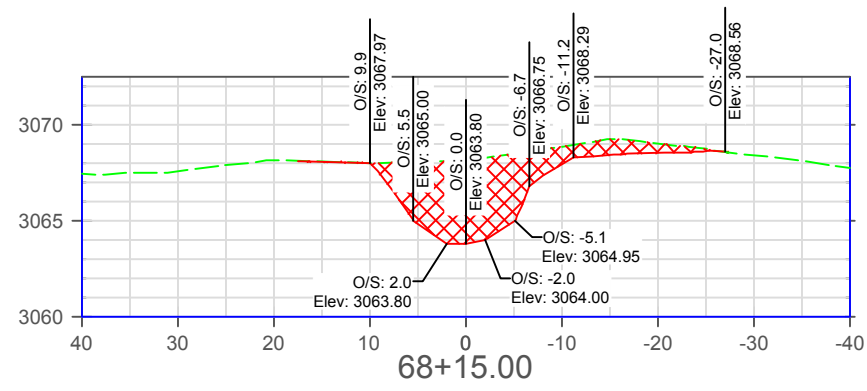
MC Sections  
 61+01 to 66+39



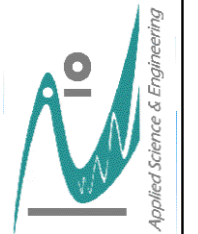
- NOTES:
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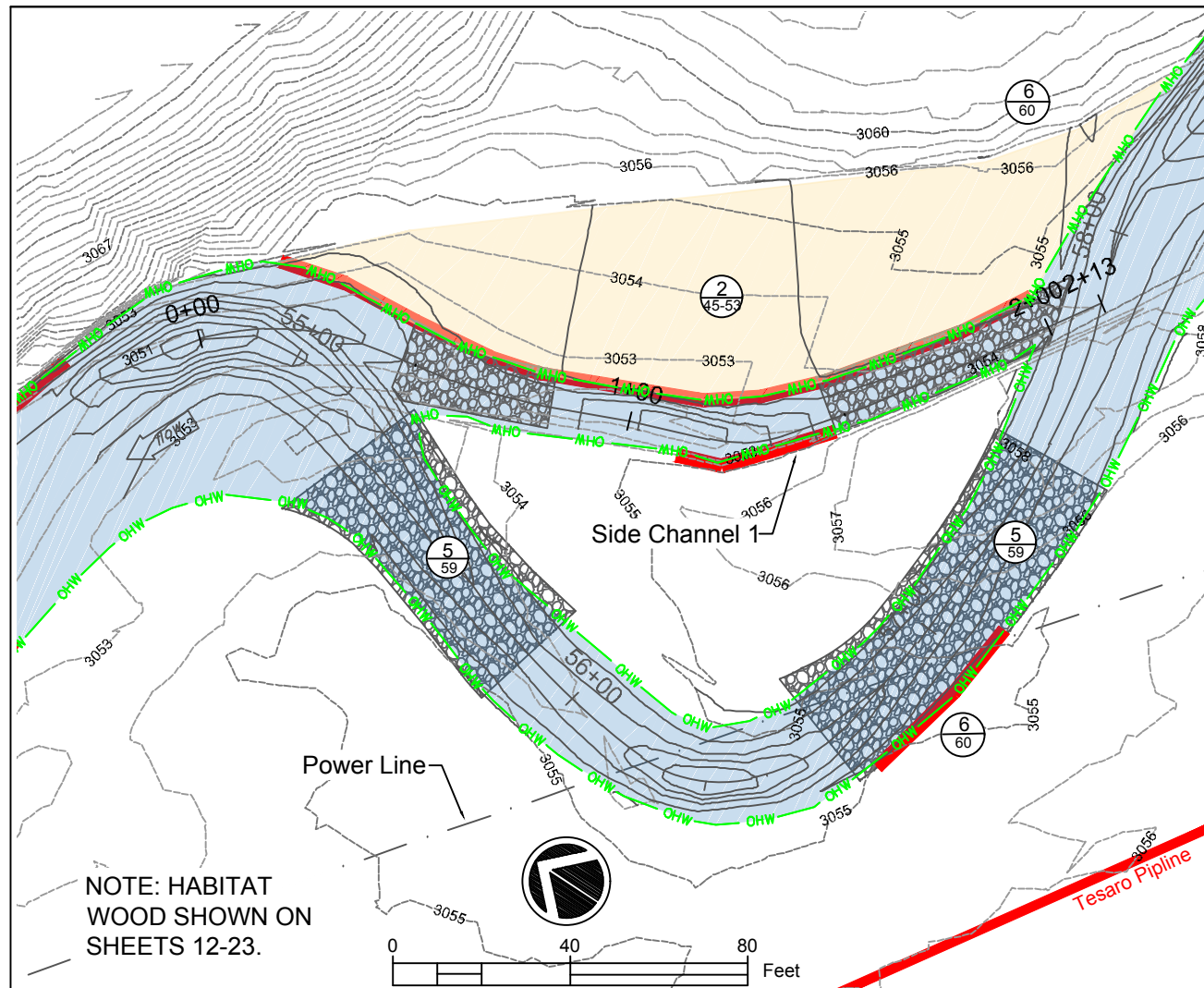


Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist, JF, Engineer



MAIN CHANNEL SECTIONS 68+15 TO 73+90  
 Rock Creek Stream & Floodplain Restoration

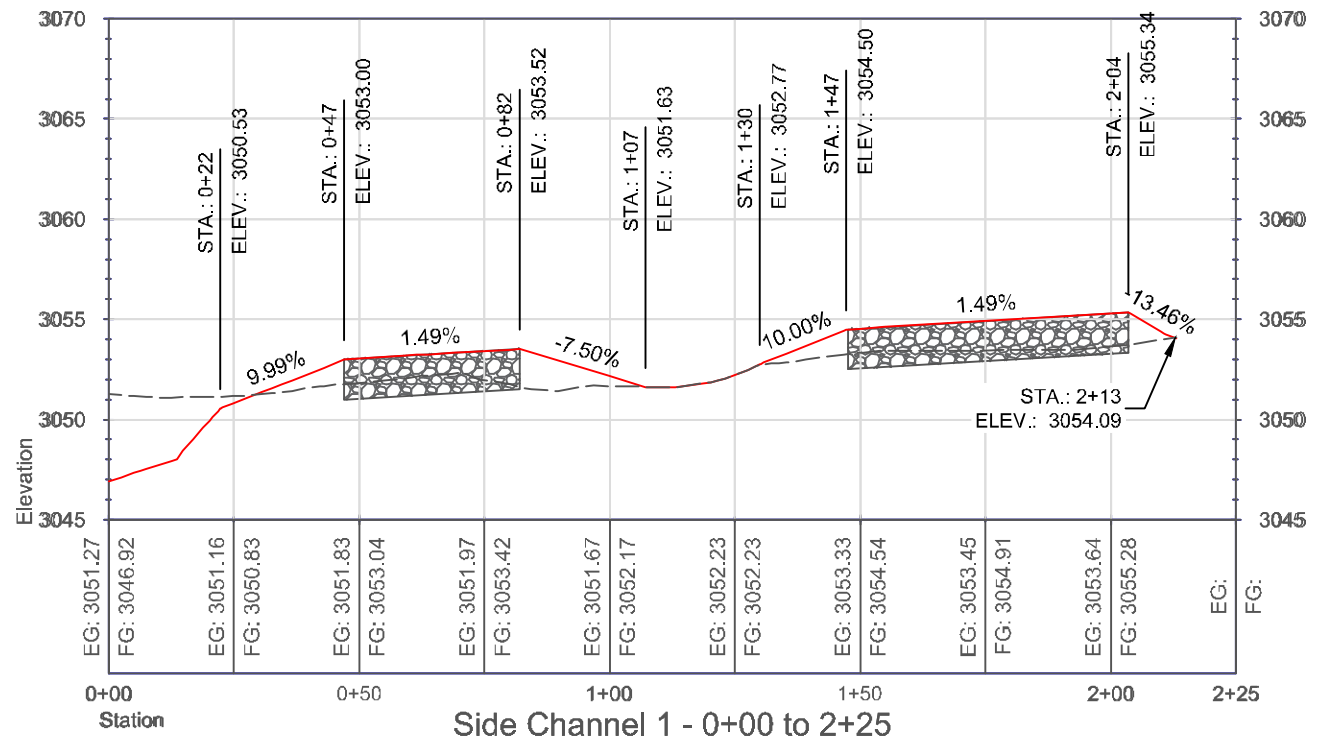




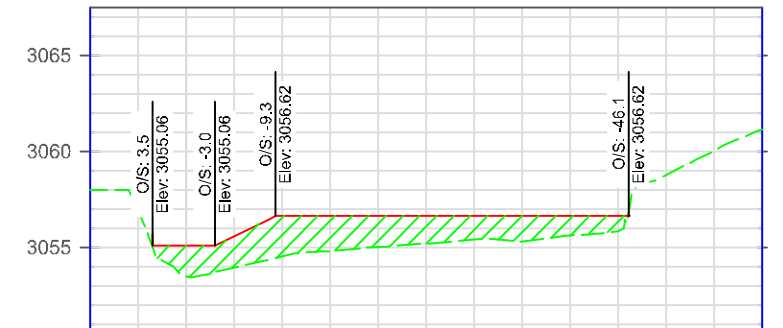
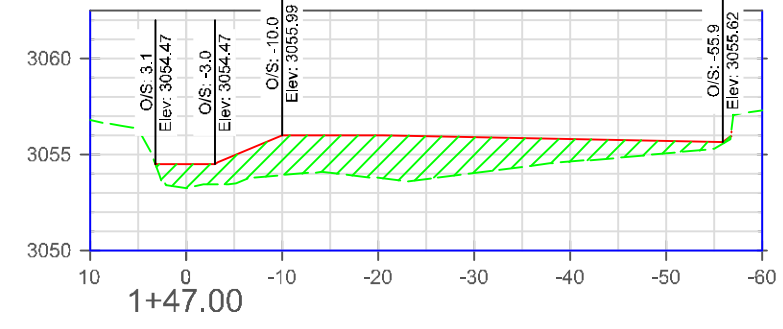
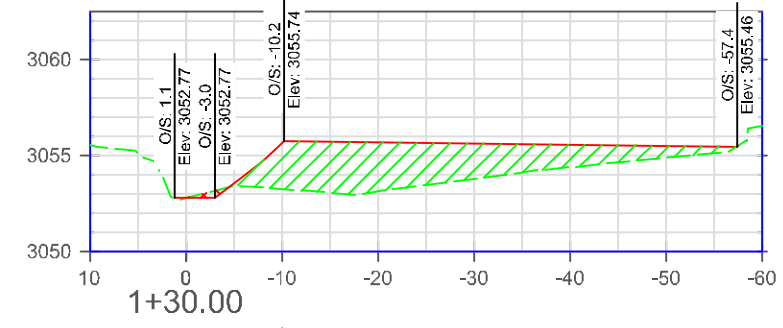
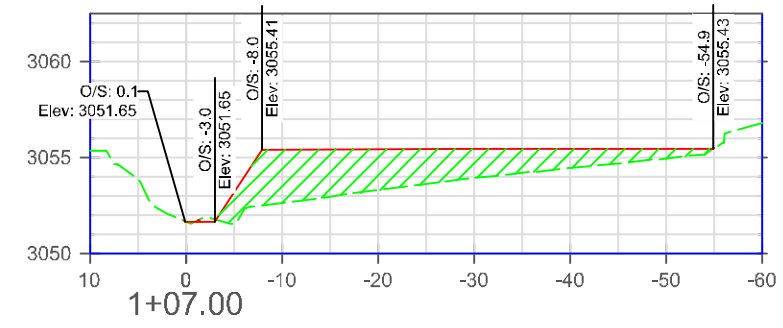
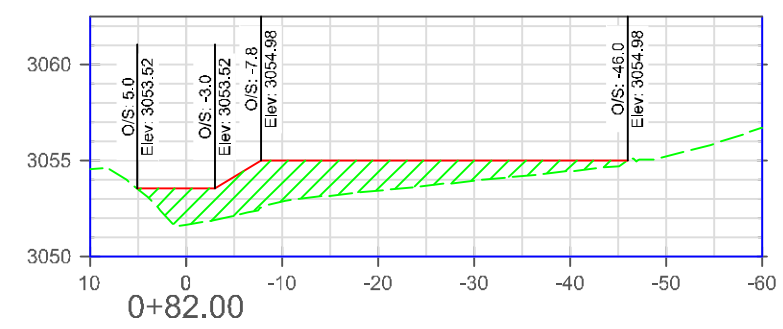
NOTE: HABITAT WOOD SHOWN ON SHEETS 12-23.



Existing Ground ---  
Proposed Ground ---



Side Channel 1 - 0+00 to 2+25



Channel Cut ---  
Proposed Ground ---  
Channel Cut ▨  
Channel Fill ▨

### LEGEND

- Channel Centerline & Station --- 33+00
- Existing Ordinary High Water (OHW) --- OHW
- Proposed Ordinary High Water (OHW) --- OHW
- ForTheGirls, LLC Ranch Boundary ---
- Conservation Easement/Fence ○
- Proposed Channel, Alcoves & Side Channels ~
- Existing Channel Fill ▨
- Road Obliteration ---
- Levee Removal ---
- Constructed Riffle and Boulders ▨
- Brush Mattress ▨

Legend Key  
1 Project Feature  
12/23 Feature Detail Sheet pg(s)

### NOTES:

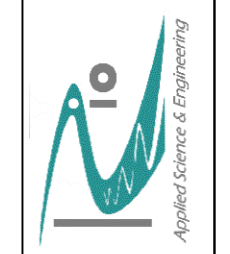
1. SIDE CHANNELS CONSIST OF SEGMENTS OF THE EXISTING ROCK CREEK CHANNEL.
2. SIDE CHANNELS SHALL BE ACTIVATED FOLLOWING THE ACTIVATION OF THE CONSTRUCTED NEW CHANNEL AND INSTALLATION OF LARGE WOOD TREATMENTS, FILL AND BANK TREATMENTS WITHIN THE SIDE CHANNELS.
3. FILL SHALL BE BACKFILLED IN 1-FT MAXIMUM LIFTS AND COMPACTED TO 85% OF MAXIMUM DENSITY VIA MECHANICAL MEANS.
4. CROSS SECTIONS ARE SHOWN THROUGHOUT THE SIDE CHANNEL ALIGNMENT.
5. CROSS SECTIONS ARE LOOKING IN A DOWNSTREAM DIRECTION.
6. SIDE CHANNEL RIFFLES SHALL BE CONSTRUCTED PER THE RIFFLE DETAIL AND RIFFLE MATERIAL ON SHEET 59.



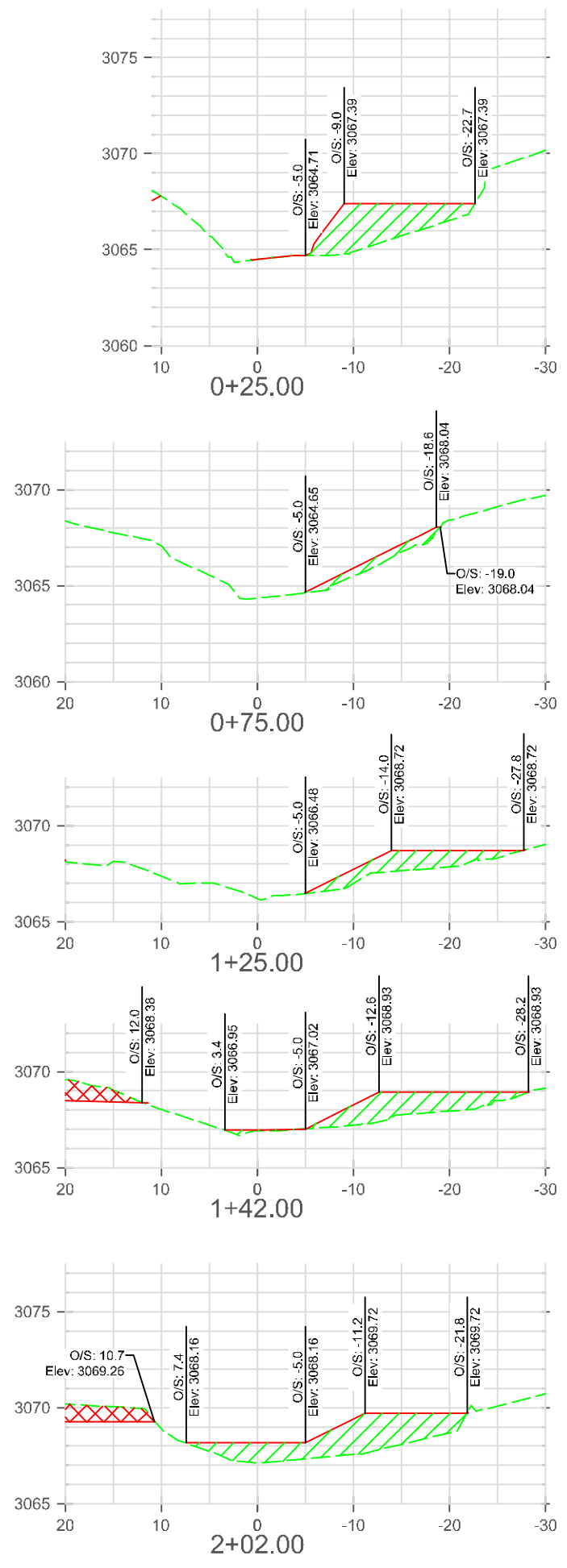
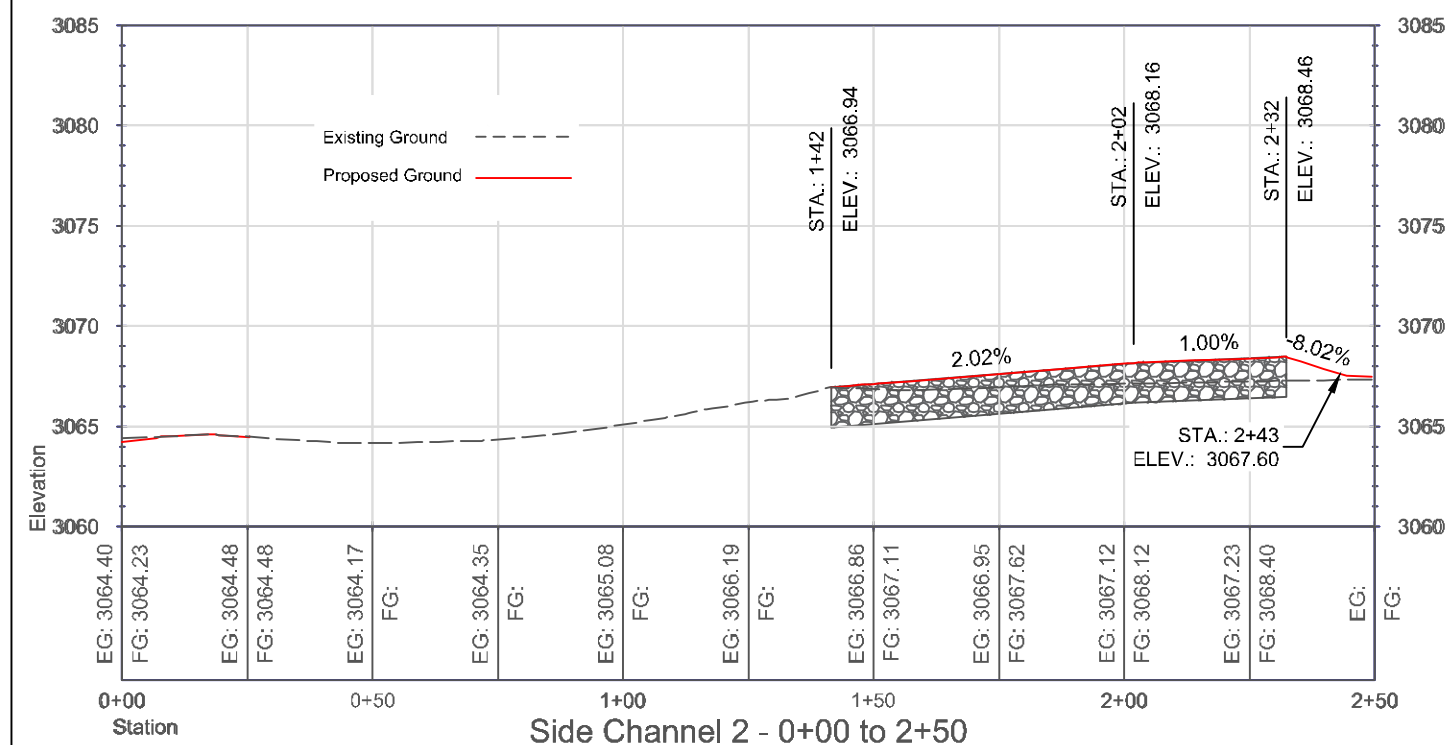
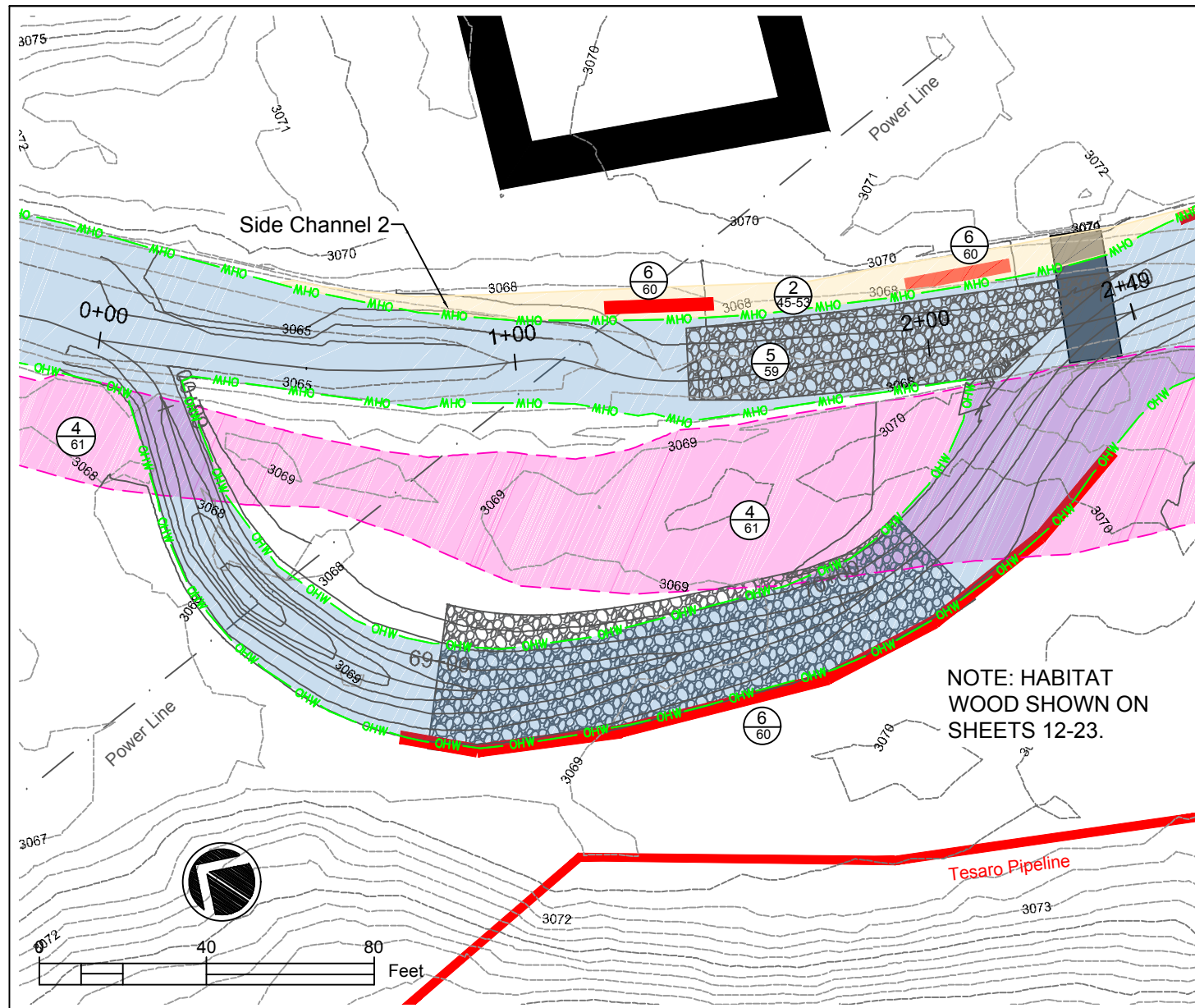
Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist; JF, Engineer

## SIDE CHANNEL 1

Rock Creek Stream & Floodplain Restoration



## SIDE CHANNEL 1



### LEGEND

Channel Centerline & Station 33+00

Existing Ordinary High Water (OHW) OHW OHW

Proposed Ordinary High Water (OHW) OHW OHW

ForTheGirls, LLC Ranch Boundary

Conservation Easement/Fence

Proposed Channel, Alcoves & Side Channels

Existing Channel Fill

Road Obliteration

Levee Removal

Constructed Riffle and Boulders

Brush Mattress

Legend Key

1 12/23 Project Feature

12/23 Feature Detail Sheet pg(s)

1 12-23

2 45/53

3 12/23

4 61

5 59

6 60

Channel Cut

Proposed Ground

Channel Cut

Channel Fill

REGISTERED PROFESSIONAL ENGINEER  
JEFFREY FEALDO  
183618PE  
OREGON  
JANUARY 12, 2010  
07/04/2018  
EXPIRES: 12/31/19

- NOTES:
- SIDE CHANNELS CONSIST OF SEGMENTS OF THE EXISTING ROCK CREEK CHANNEL.
  - SIDE CHANNELS SHALL BE ACTIVATED FOLLOWING THE ACTIVATION OF THE CONSTRUCTED NEW CHANNEL AND INSTALLATION OF LARGE WOOD TREATMENTS, FILL AND BANK TREATMENTS WITHIN THE SIDE CHANNELS.
  - FILL SHALL BE BACKFILLED IN 1-FT MAXIMUM LIFTS AND COMPACTED TO 85% OF MAXIMUM DENSITY VIA MECHANICAL MEANS.
  - CROSS SECTIONS ARE SHOWN THROUGHOUT THE SIDE CHANNEL ALIGNMENT.
  - CROSS SECTIONS ARE LOOKING IN A DOWNSTREAM DIRECTION.
  - SIDE CHANNEL RIFFLES SHALL BE CONSTRUCTED PER THE RIFFLE DETAIL AND RIFFLE MATERIAL ON SHEET 59.

Date Mar 2018

Designed JF, AC

Drawn AC, JF

Checked JF

Approved AC, JF, BPA

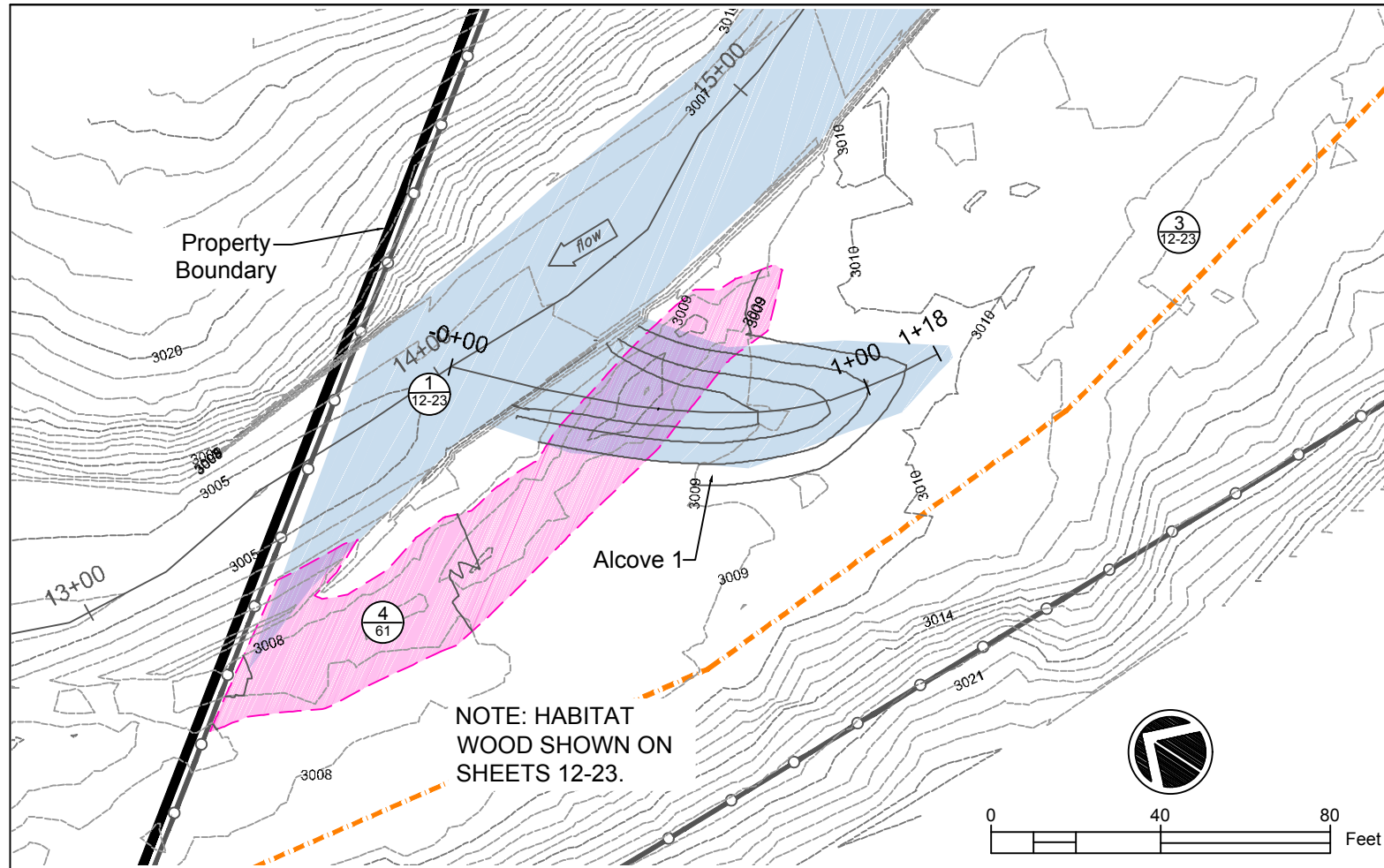
Title AC, Biologist, JF, Engineer

## SIDE CHANNEL 2

### Rock Creek Stream & Floodplain Restoration

SIDE CHANNEL 2

Sheet 34 of 66



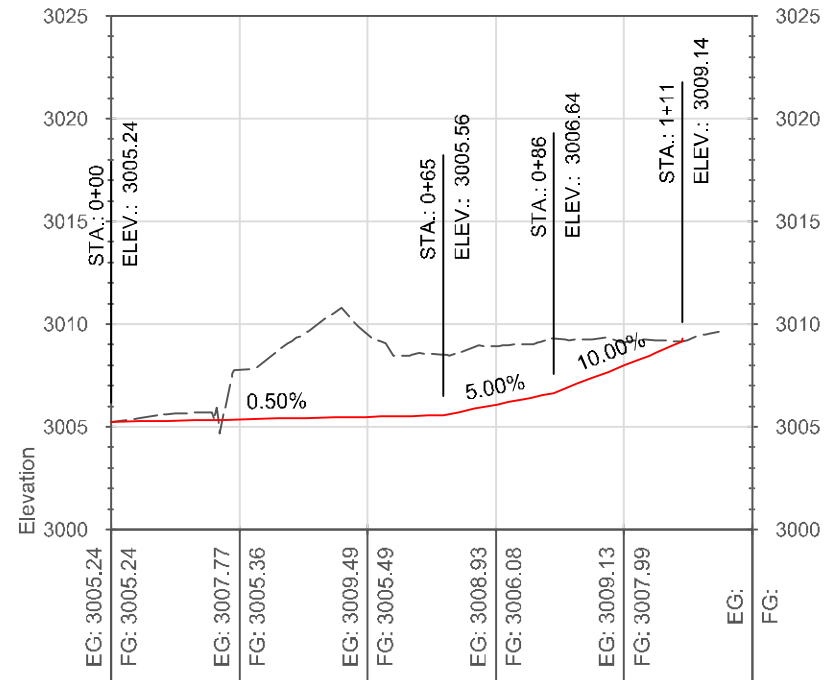
### LEGEND

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

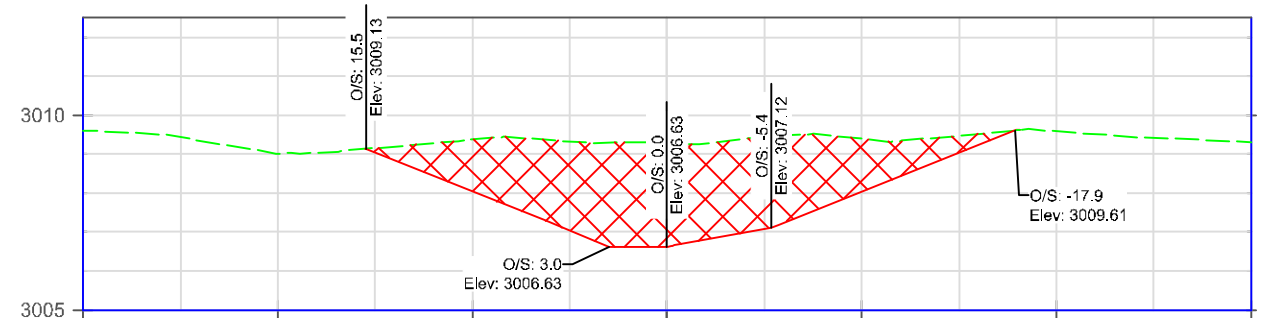
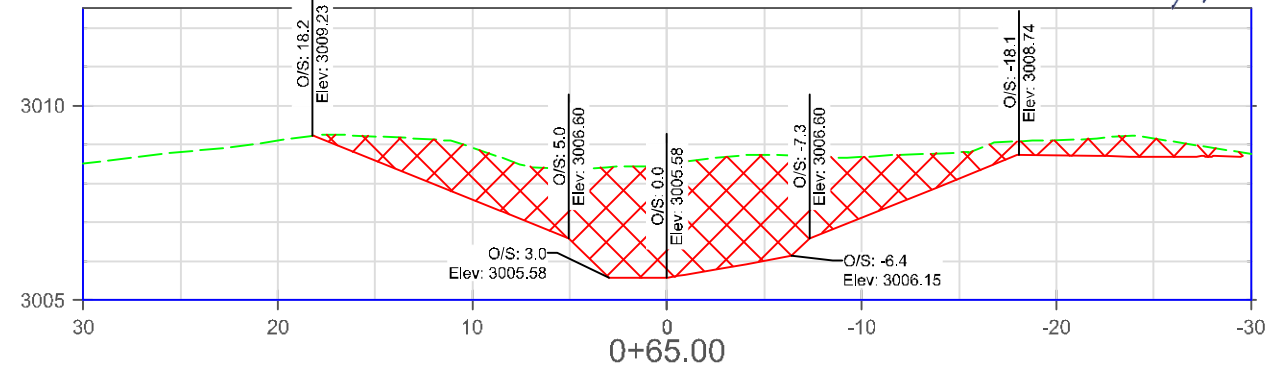
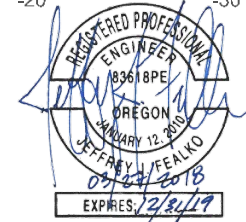
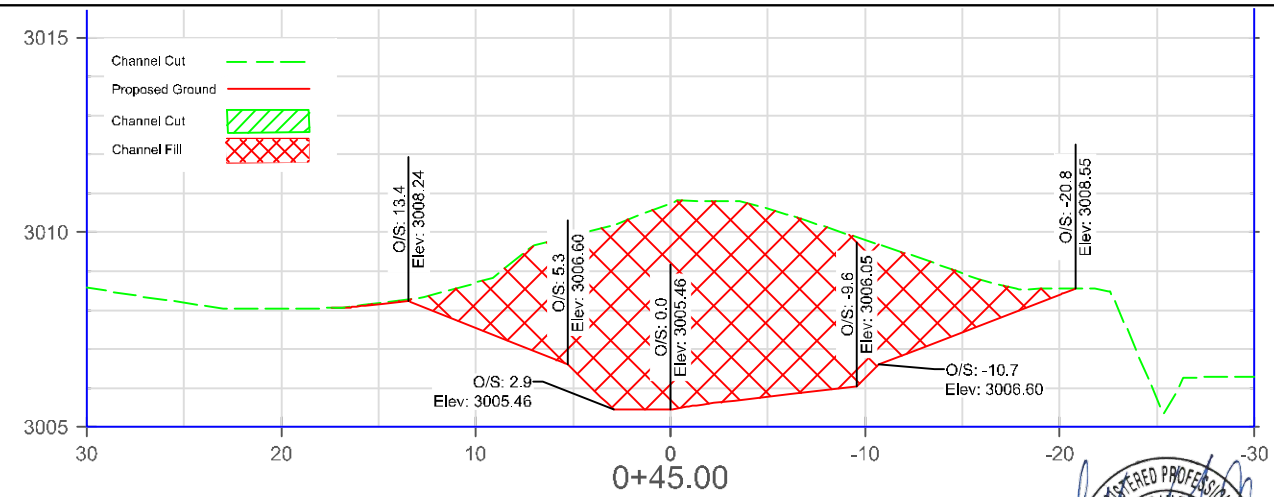
### Legend Key

- 1 - Project Feature
- 12/23 - Feature Detail Sheet pg(s)

- 1 12-23
- 2 45/53
- 3 12/23
- 4 61
- 5 59
- 6 60



- Existing Ground - - - - -
- Proposed Ground - - - - -



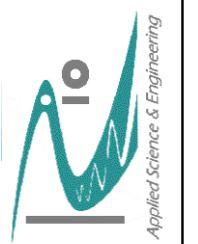
### NOTES:

1. ALCOVE IS CONSTRUCTED ADJACENT TO THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE ISOLATED FROM MAIN CHANNEL FLOW PRIOR TO EXCAVATION.
3. ALCOVE IS CONSTRUCTED THROUGH EXCAVATION ONLY AND DOES NOT REQUIRE COMPACTION OF INSITU MATERIAL UNLESS DISTURBED FOR LARGE WOOD OR BANK TREATMENT INSTALLATION.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL.
5. CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT..

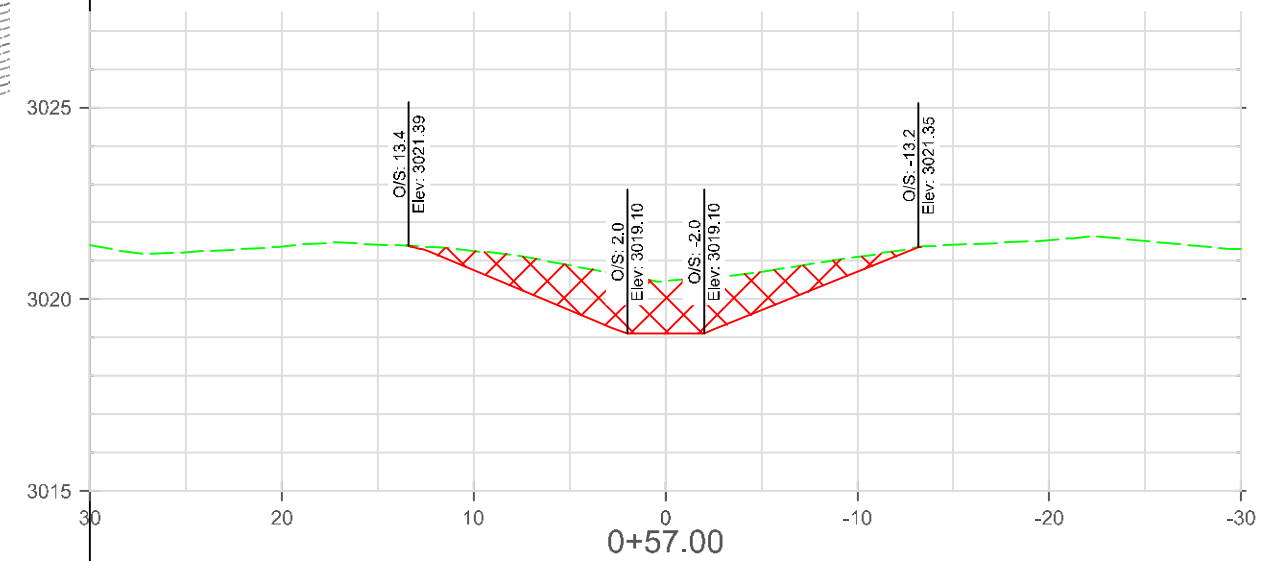
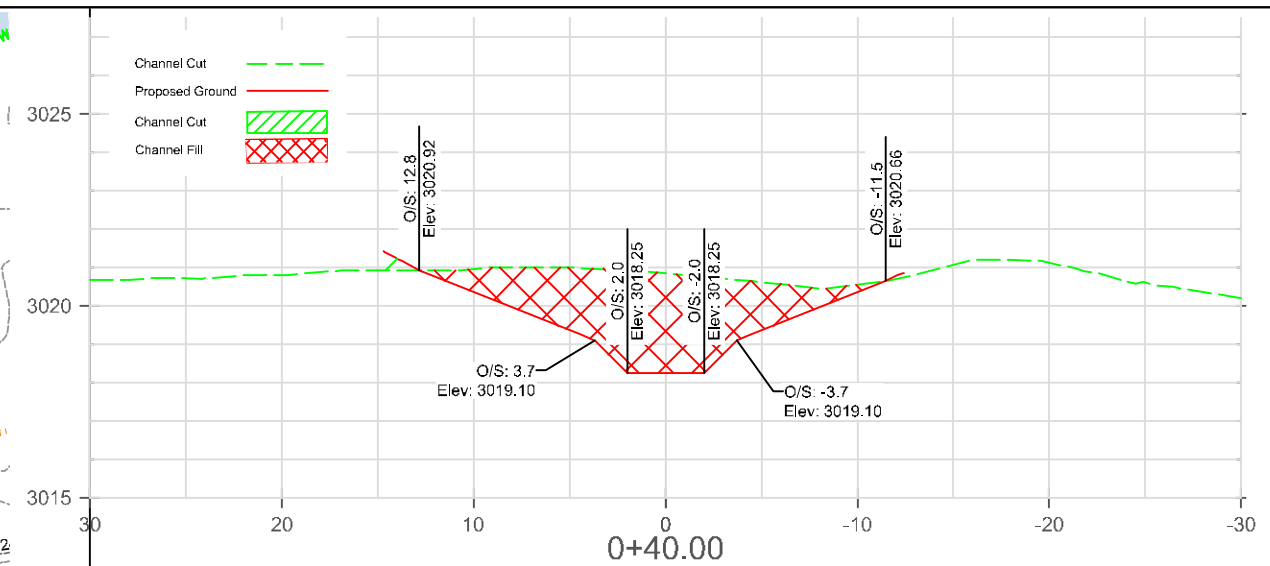
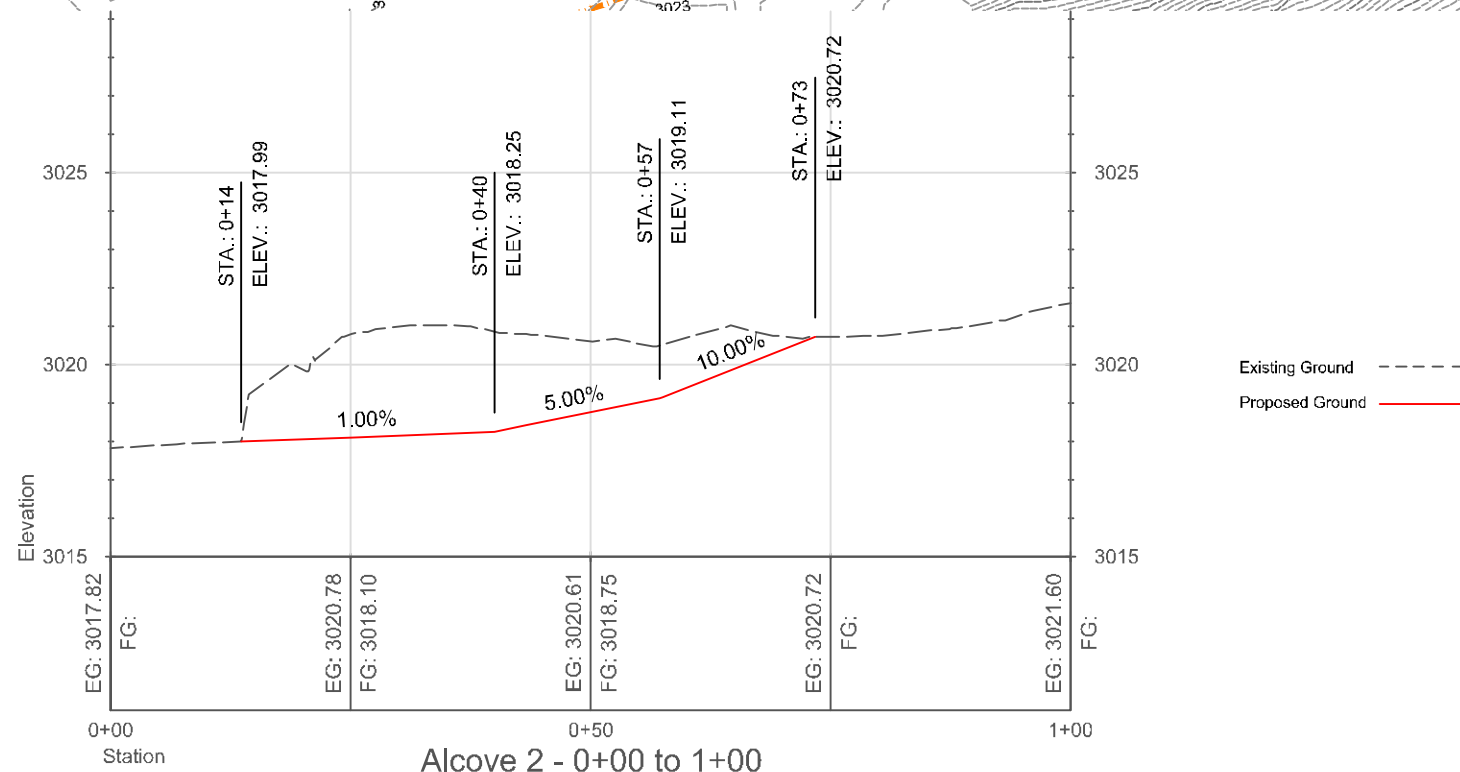
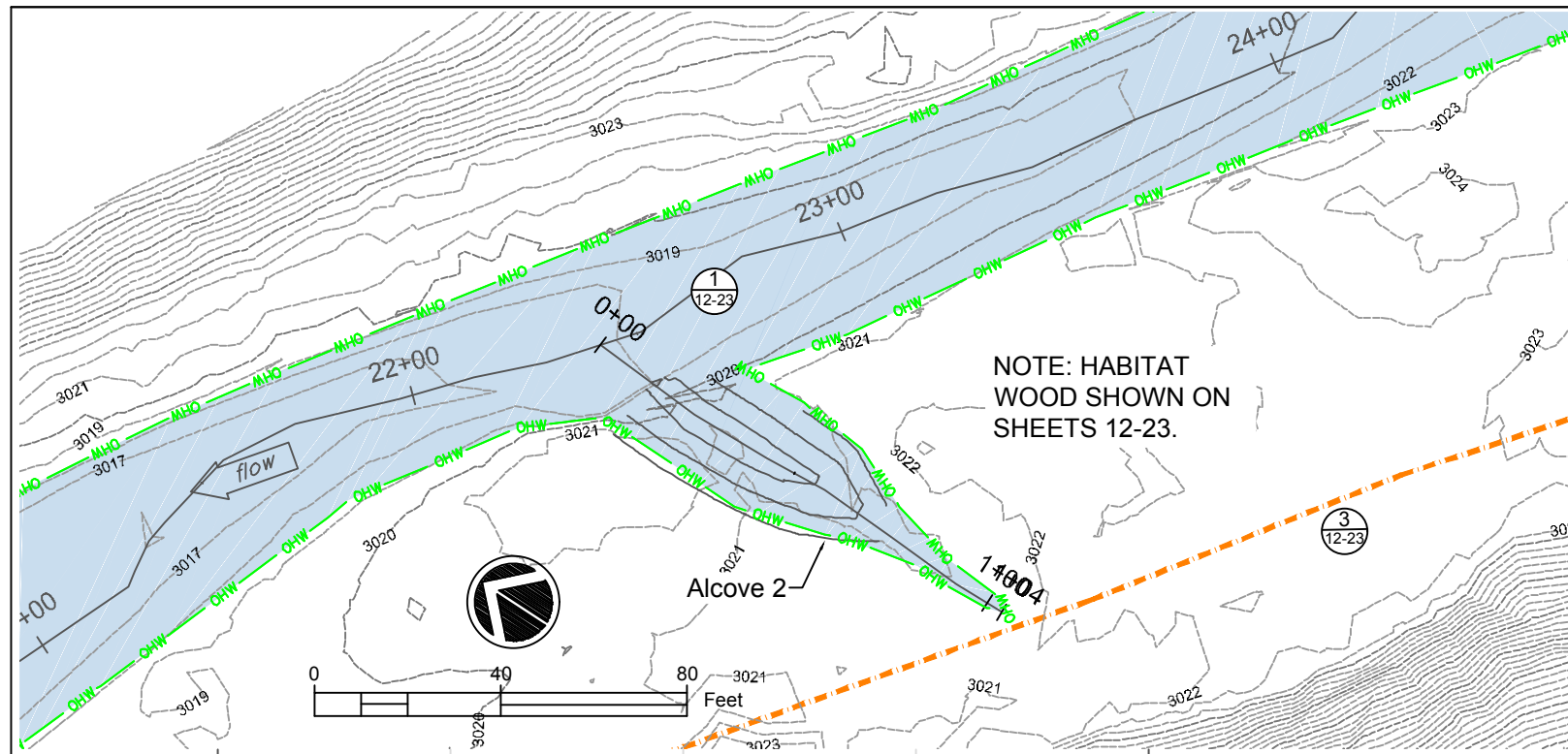
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

## ALCOVE 1

### Rock Creek Stream & Floodplain Restoration



ALCOVE 1



**LEGEND**

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary —————
- Conservation Easement/Fence ○-○-○-○
- Proposed Channel, Alcoves & Side Channels ~
- Existing Channel Fill ■
- Road Obliteration - - - - -
- Levee Removal ■
- Constructed Riffle and Boulders ■
- Brush Mattress +++++

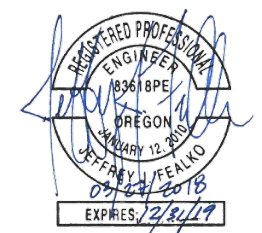
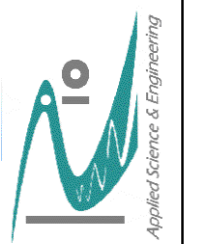
- Legend Key**
- 1 — Project Feature
  - 12/23 — Feature Detail Sheet pg(s)

**NOTES:**

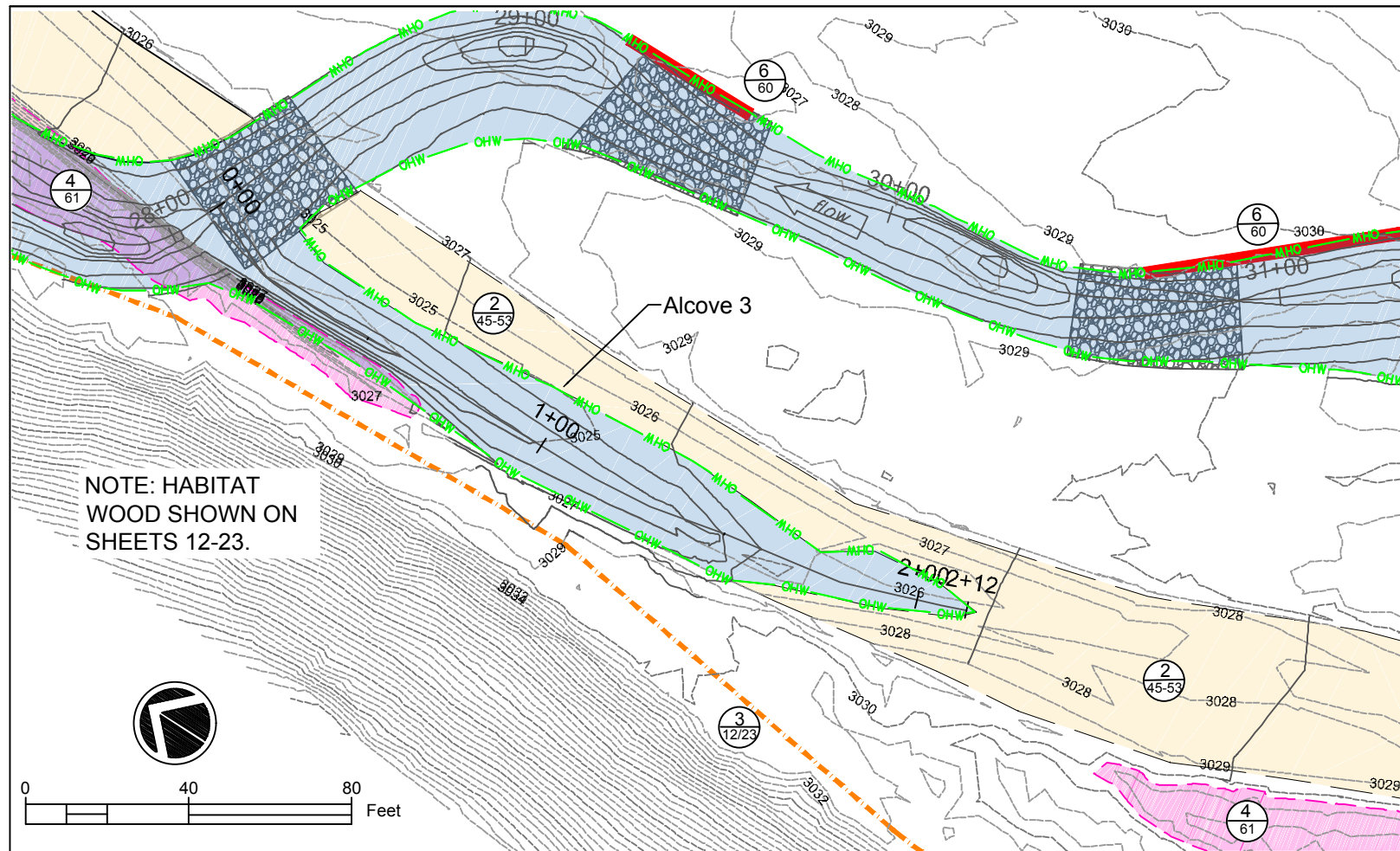
1. ALCOVE IS CONSTRUCTED ADJACENT TO THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE ISOLATED FROM MAIN CHANNEL FLOW PRIOR TO EXCAVATION.
3. ALCOVE IS CONSTRUCTED THROUGH EXCAVATION ONLY AND DOES NOT REQUIRE COMPACTION OF INSITU MATERIAL UNLESS DISTURBED FOR LARGE WOOD OR BANK TREATMENT INSTALLATION.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL.
5. CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT.

Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist, JF, Engineer

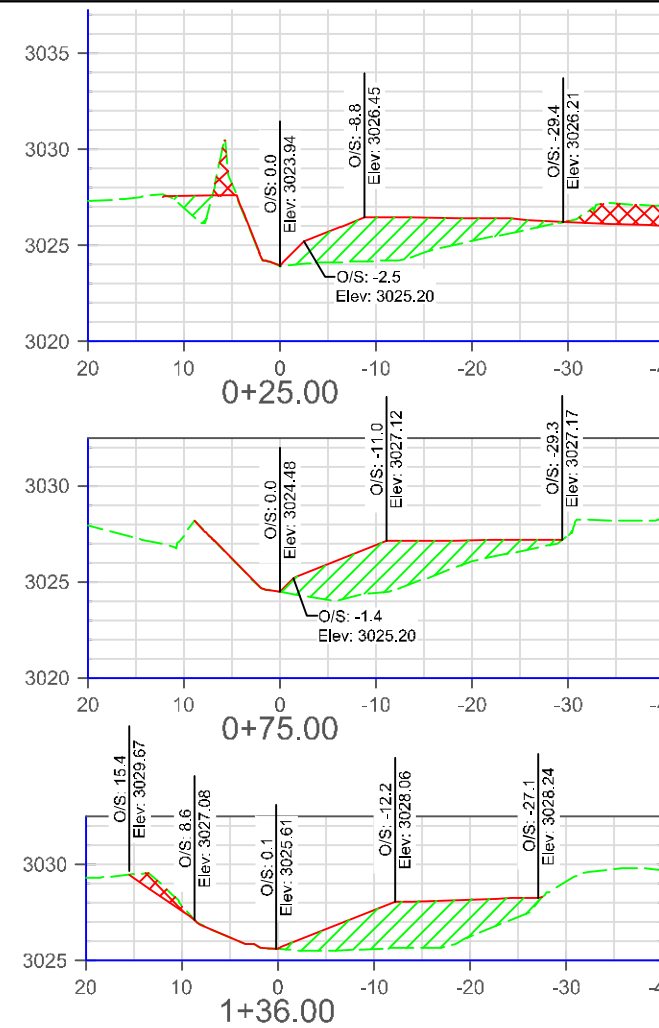
**ALCOVE 2**  
 Rock Creek Stream & Floodplain Restoration



**ALCOVE 2**



NOTE: HABITAT WOOD SHOWN ON SHEETS 12-23.

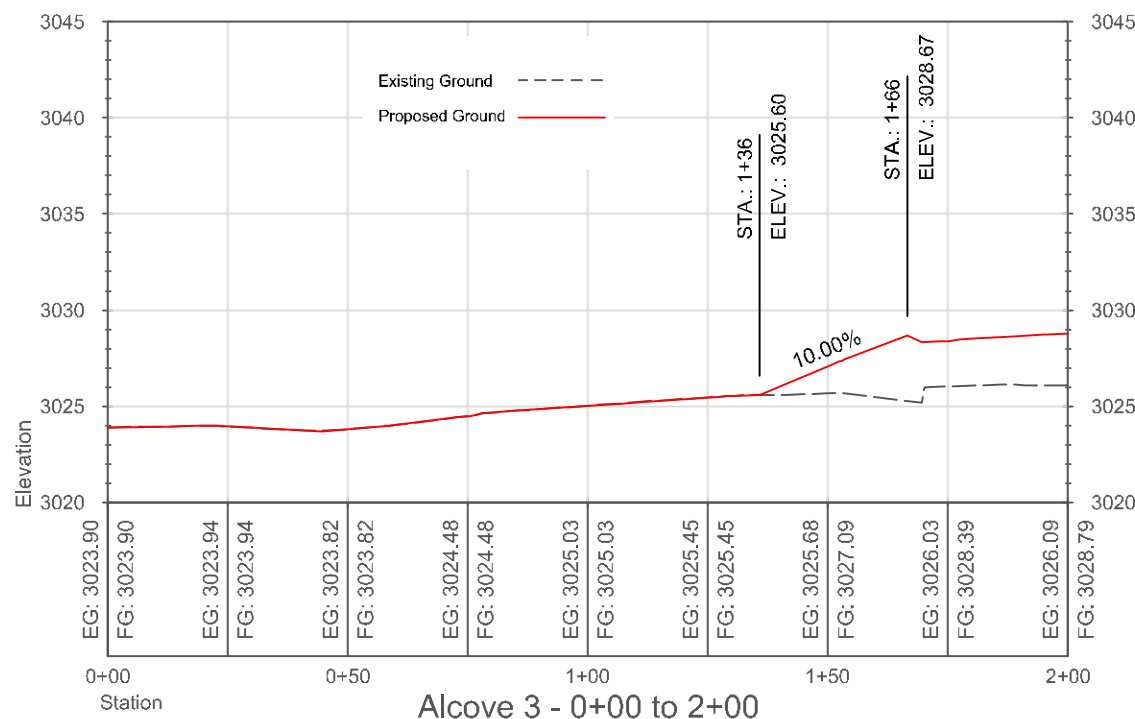


### LEGEND

- Channel Centerline & Station — 33+00
- Existing Ordinary High Water (OHW) — OHW
- Proposed Ordinary High Water (OHW) — OHW
- ForTheGirls, LLC Ranch Boundary —
- Conservation Easement/Fence —
- Proposed Channel, Alcoves & Side Channels —
- Existing Channel Fill
- Road Obliteration —
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress +++++

- Legend Key
- 1 Project Feature
  - 12/23 Feature Detail Sheet pg(s)

- Channel Cut ---
- Proposed Ground ---
- Channel Cut
- Channel Fill



### NOTES:

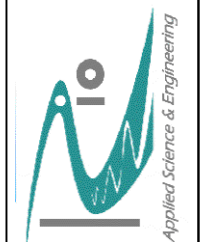
1. ALCOVE IS CONSTRUCTED WITHIN THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE ISOLATED FROM THE NEWLY CONSTRUCTED MAIN CHANNEL FLOW PRIOR TO BACKFILL AND COMPACTION.
3. ALCOVE IS CONSTRUCTED THROUGH THE PLACEMENT OF FILL ALONG ONE SIDE AND THE NATURAL EXISTING BANK ON ONE SIDE. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE TO BANK THAT WILL REMAIN. FILL SHALL BE COMPACTED IN MAXIMUM 1-FT LIFTS BY MECHANICAL MEANS TO 85% RELATIVE DENSITY.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL.
5. CHANNEL CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT



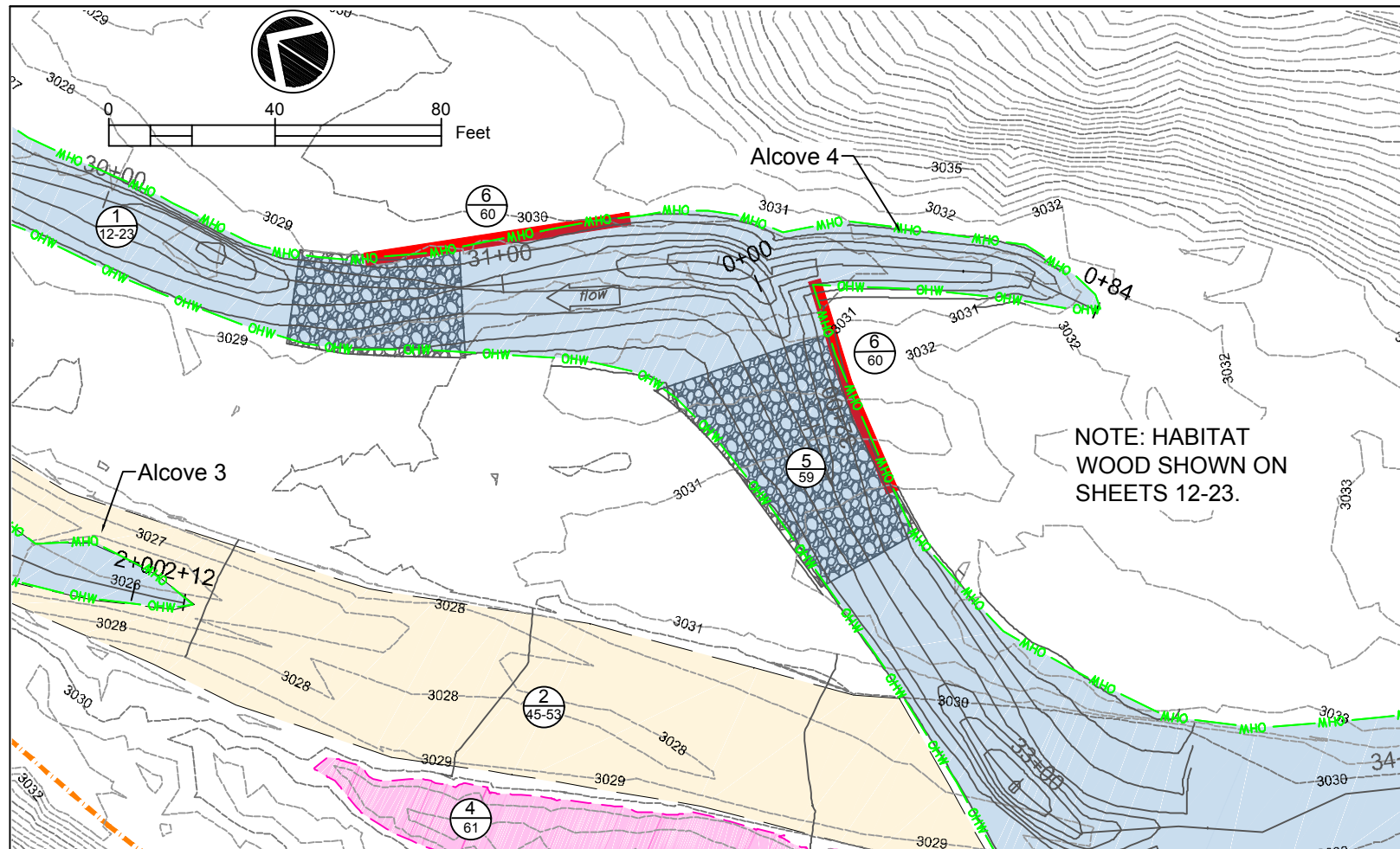
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

## ALCOVE 3

### Rock Creek Stream & Floodplain Restoration



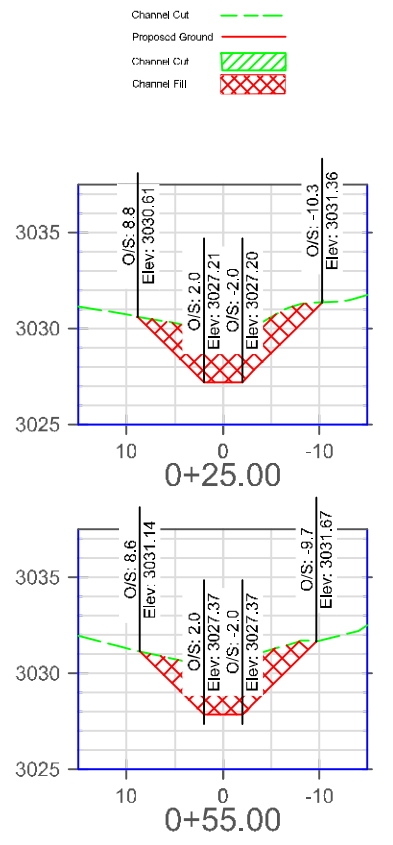
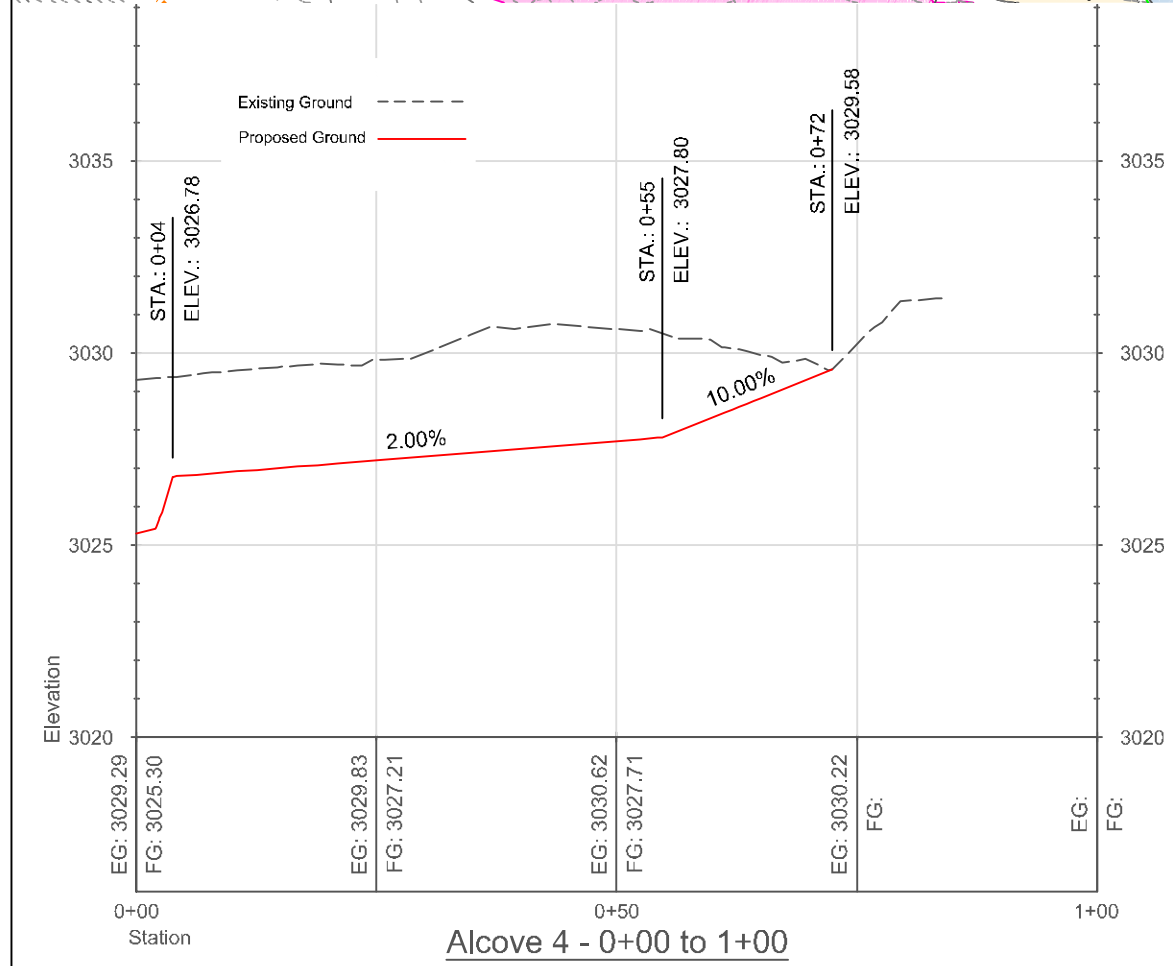
ALCOVE 3



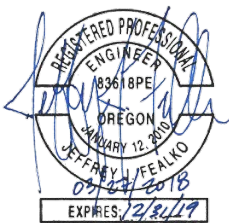
NOTE: HABITAT WOOD SHOWN ON SHEETS 12-23.

### LEGEND

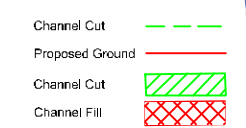
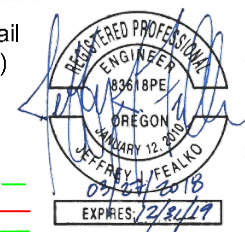
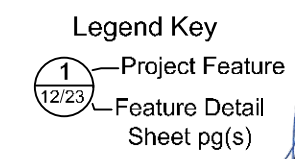
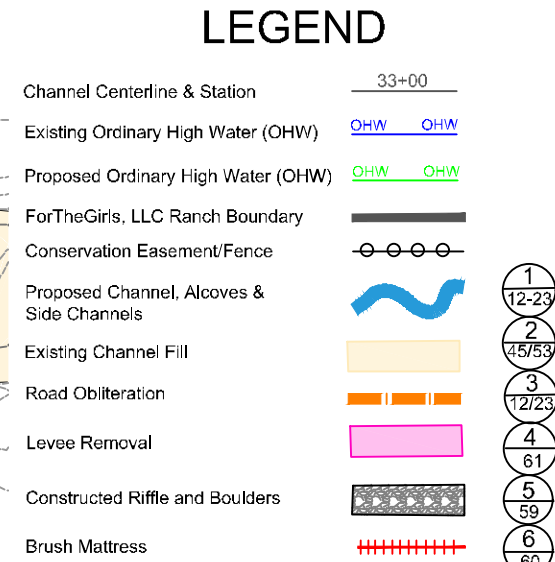
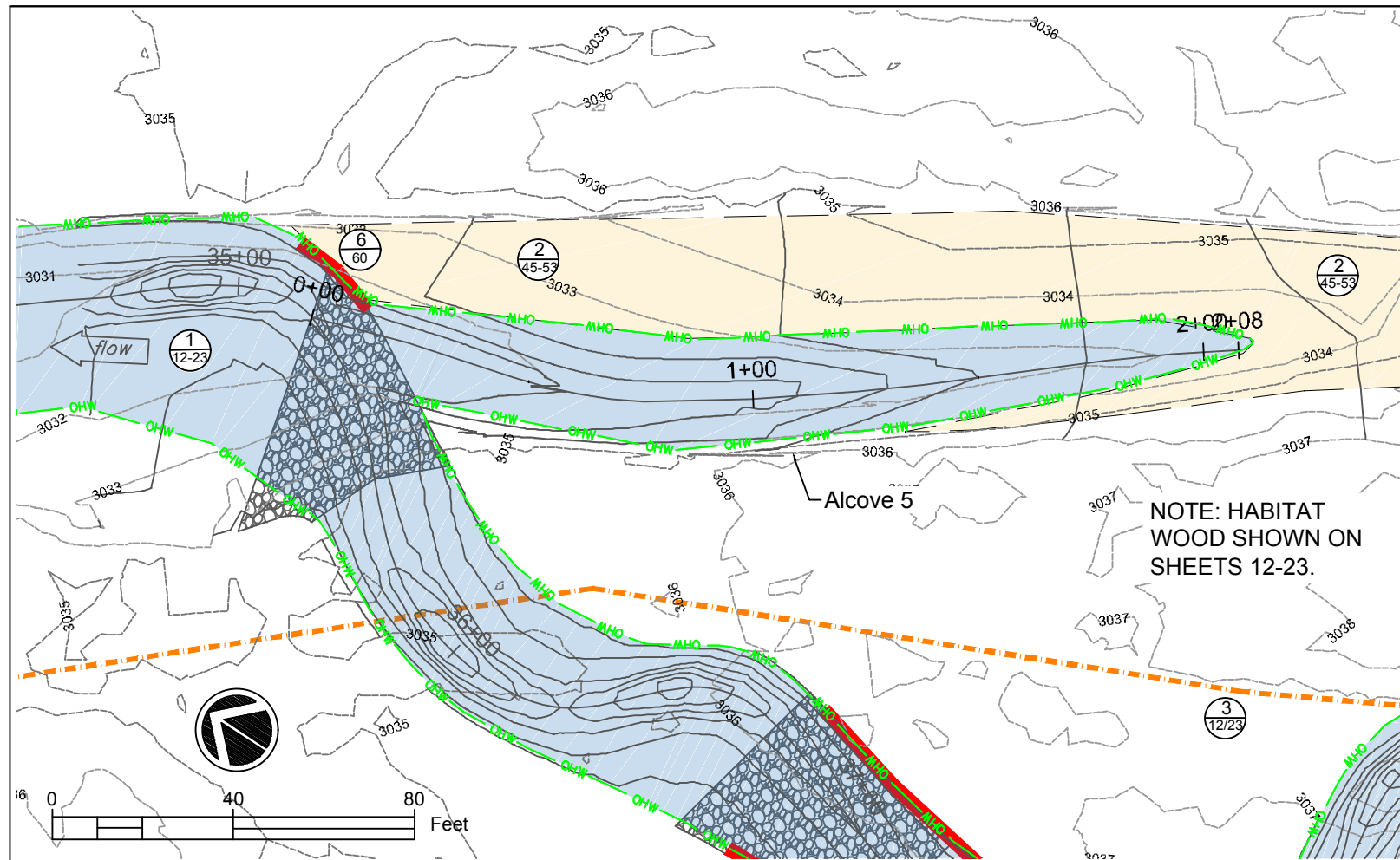
- Channel Centerline & Station 33+00
  - Existing Ordinary High Water (OHW) OHW OHW
  - Proposed Ordinary High Water (OHW) OHW OHW
  - ForTheGirls, LLC Ranch Boundary
  - Conservation Easement/Fence
  - Proposed Channel, Alcoves & Side Channels
  - Existing Channel Fill
  - Road Obliteration
  - Levee Removal
  - Constructed Riffle and Boulders
  - Brush Matting
- Legend Key**
- 1 - Project Feature
  - 12/23 - Feature Detail Sheet pg(s)



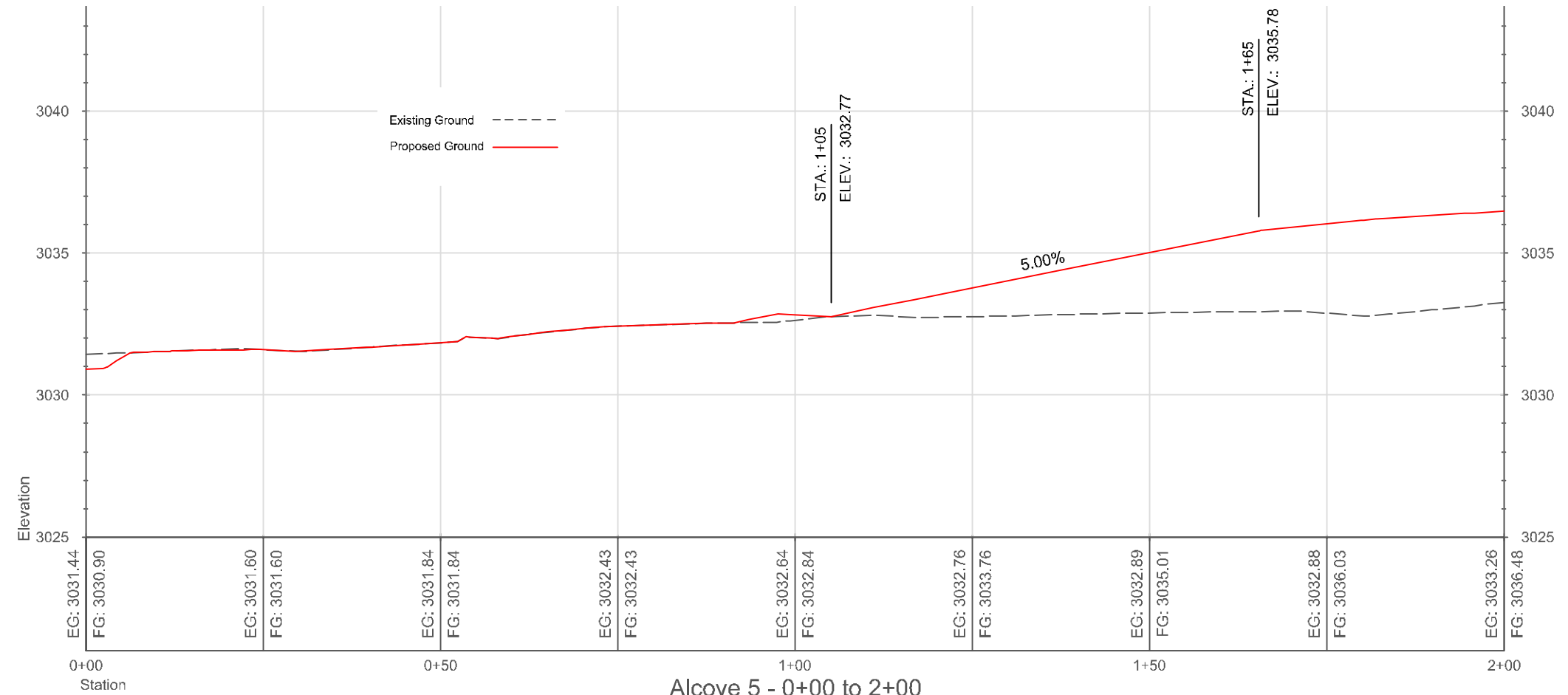
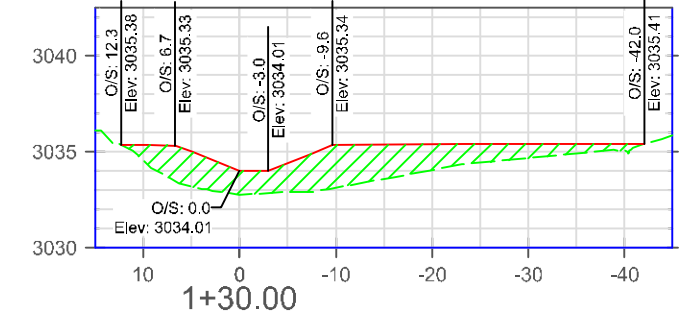
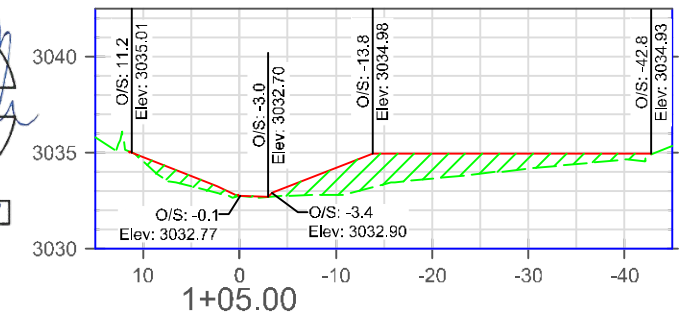
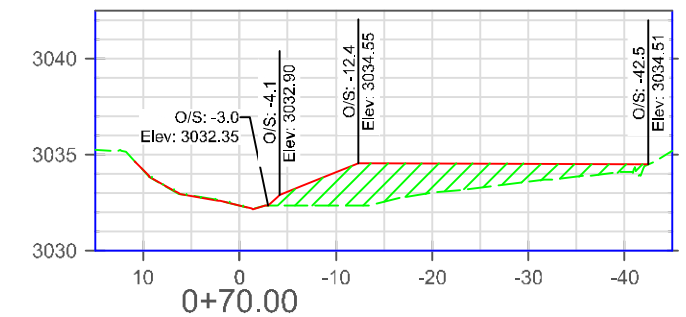
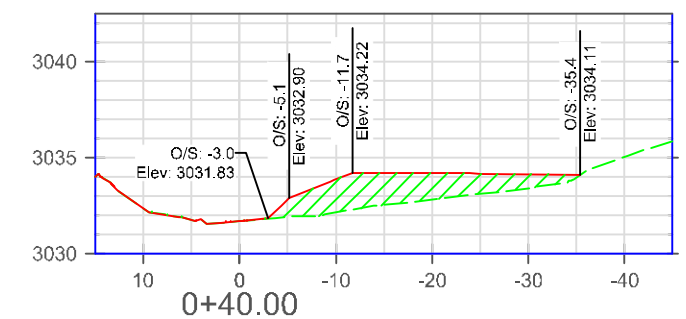
- NOTES:**
- ALCOVE IS CONSTRUCTED ADJACENT TO THE PROPOSED ROCK CREEK CHANNEL, BUT AWAY FROM THE EXISTING ROCK CREEK CHANNEL.
  - ALCOVE SHALL BE CONSTRUCTED IN THE DRY SIMULTANEOUSLY WITH THE NEW ROCK CREEK CHANNEL PRIOR TO ACTIVATION.
  - ALCOVE IS CONSTRUCTED THROUGH EXCAVATION ONLY AND DOES NOT REQUIRE COMPACTION OF INSITU MATERIAL UNLESS DISTURBED FOR LARGE WOOD OR BANK TREATMENT INSTALLATION.
  - ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CONSTRUCTED CHANNEL.
  - CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
  - CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
  - CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT.



|   |   |
|---|---|
| Date<br>Mar 2018  | Designed: JF, AC<br>Drawn: AC, JF<br>Checked: JF<br>Approved: AC, JF, BPA<br>Title: AC, Biologist; JF, Engineer |
| <h2 style="margin: 0;">ALCOVE 4</h2> <p style="margin: 0;">Rock Creek Stream &amp; Floodplain Restoration</p> |   |
|   |   |
| <h3 style="margin: 0;">ALCOVE 4</h3>  |   |
| Sheet 38 of 66  |   |



NOTE: HABITAT WOOD SHOWN ON SHEETS 12-23.

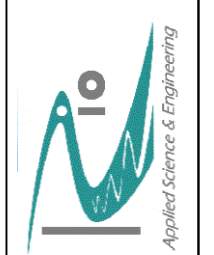


- ### NOTES:
- ALCOVE IS CONSTRUCTED WITHIN THE EXISTING ROCK CREEK CHANNEL.
  - ALCOVE SHALL BE ISOLATED FROM THE NEWLY CONSTRUCTED MAIN CHANNEL FLOW PRIOR TO BACKFILL AND COMPACTION.
  - ALCOVE IS CONSTRUCTED THROUGH THE PLACEMENT OF FILL ALONG ONE SIDE AND THE NATURAL EXISTING BANK ON ONE SIDE. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE TO BANK THAT WILL REMAIN. FILL SHALL BE COMPACTED IN MAXIMUM 1-FT LIFTS BY MECHANICAL MEANS TO 85% RELATIVE DENSITY.
  - ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL. CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
  - CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
  - CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT

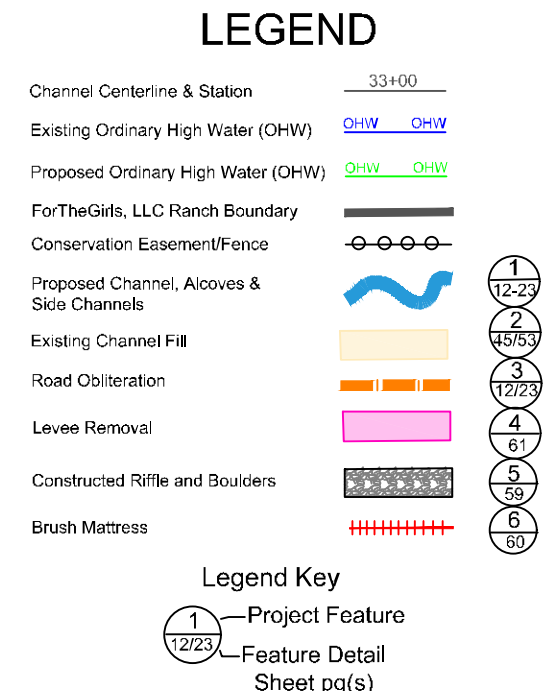
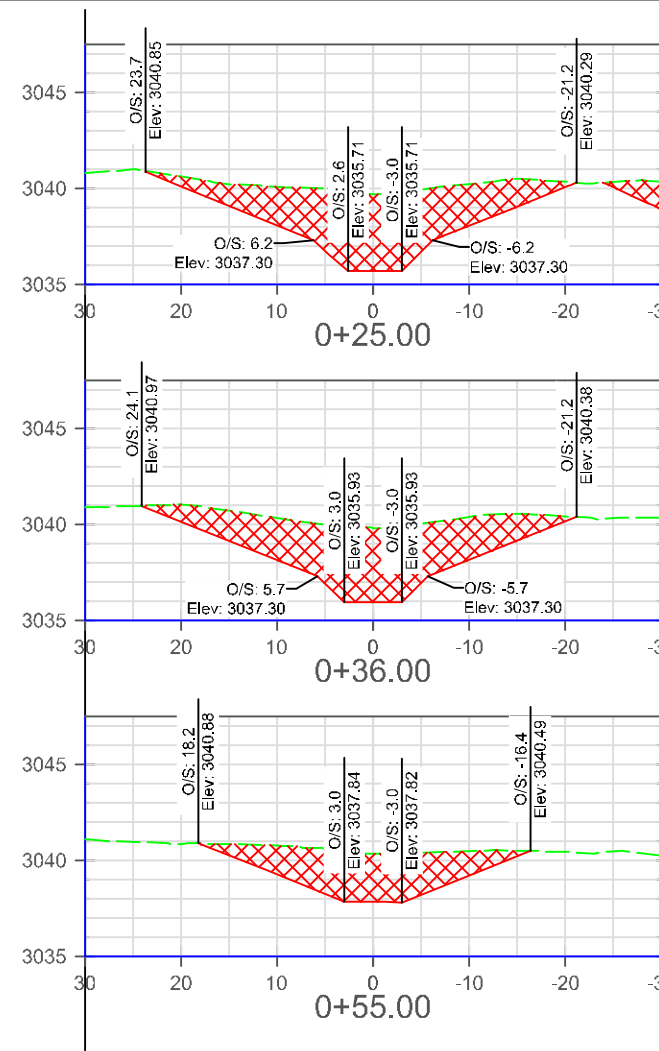
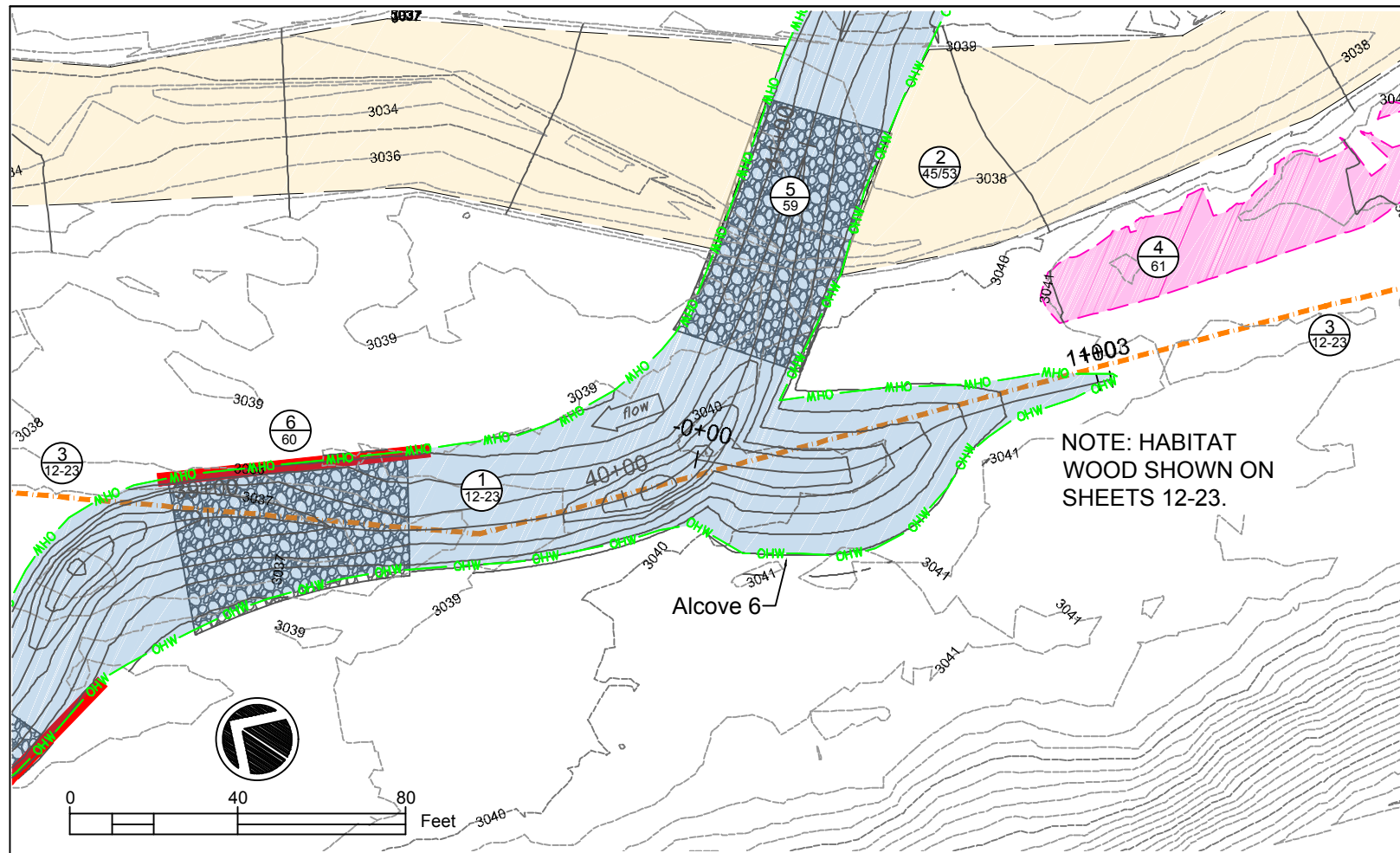
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

## ALCOVE 5

### Rock Creek Stream & Floodplain Restoration



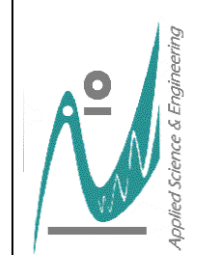
ALCOVE 5



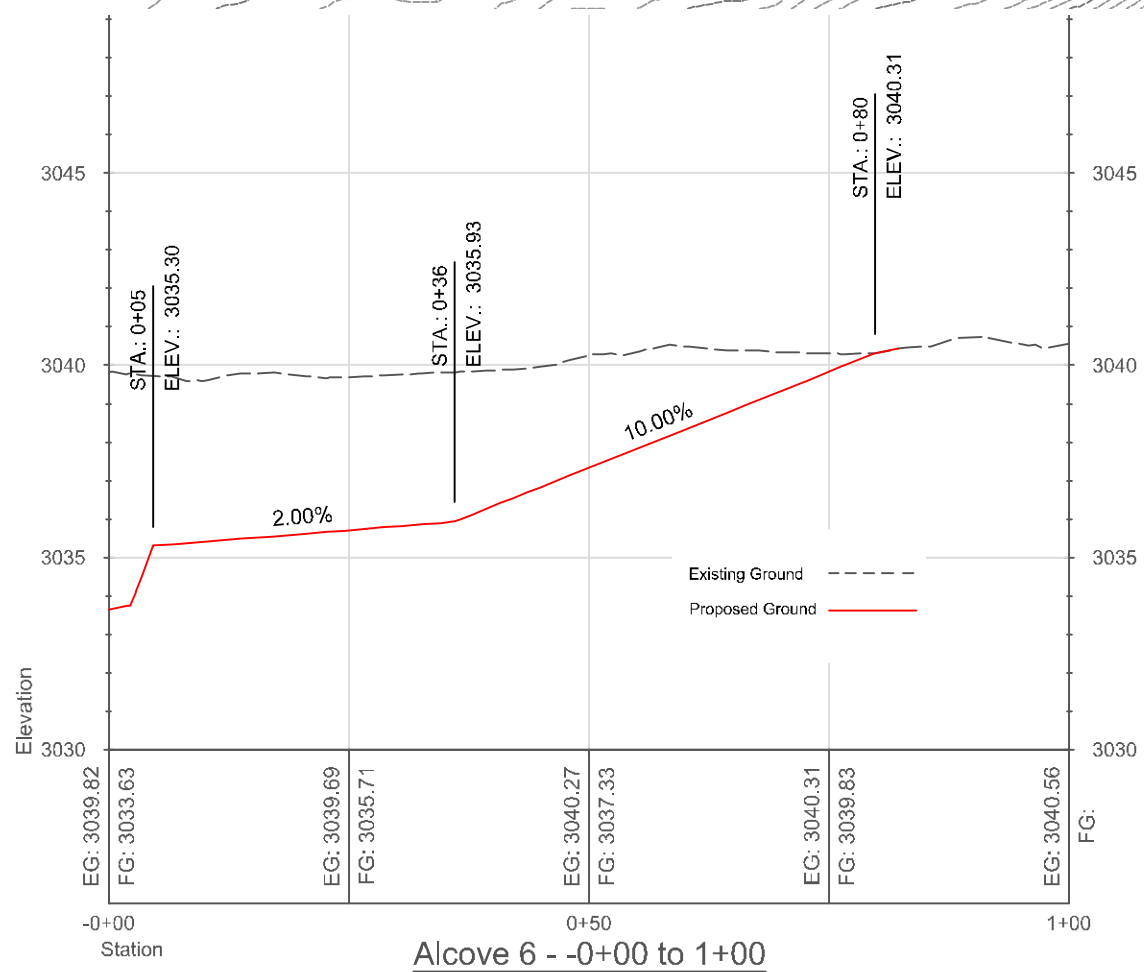
Date: Mar 2018

Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**ALCOVE 6**  
 Rock Creek Stream & Floodplain Restoration

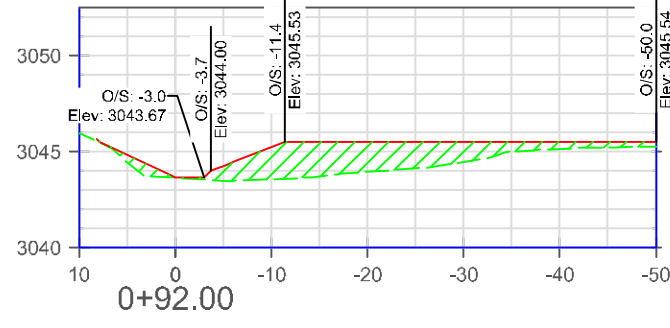
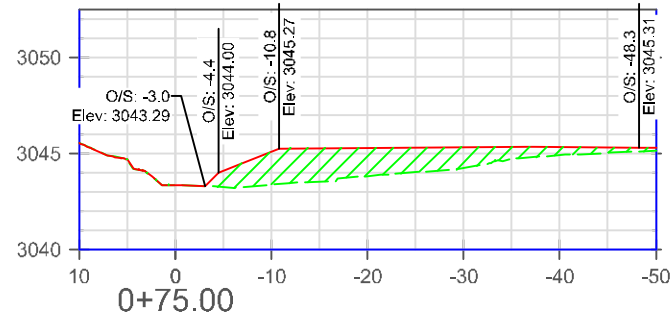
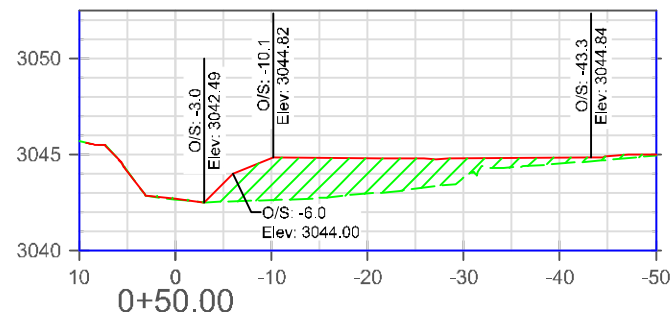
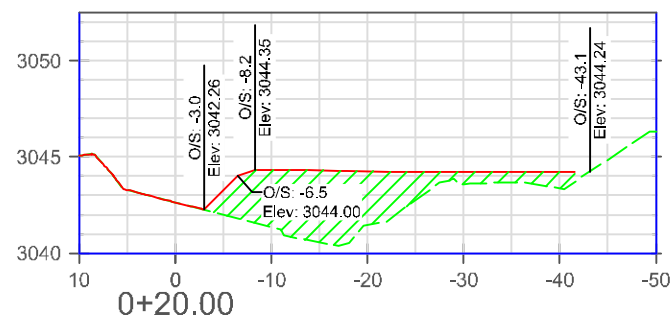
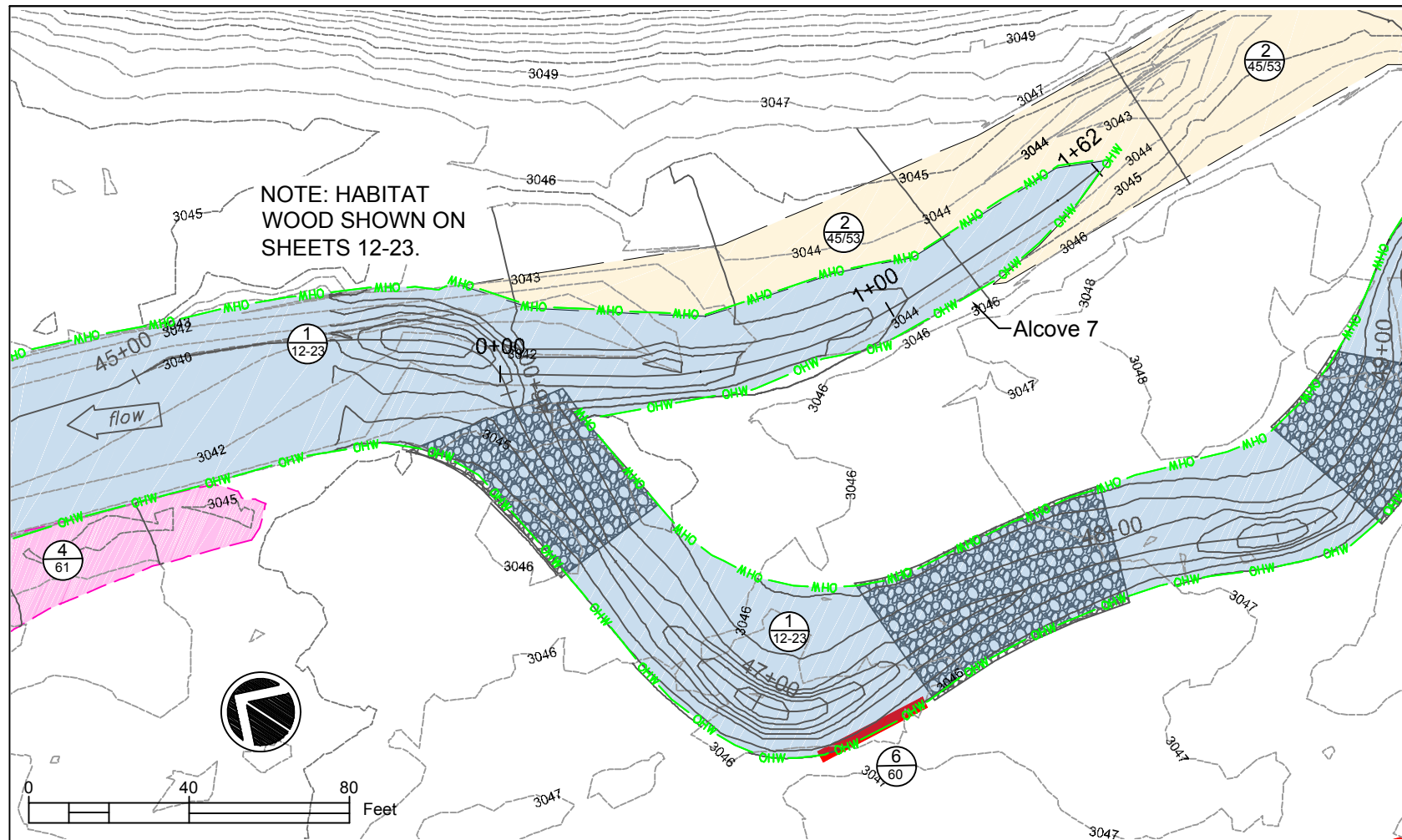


ALCOVE 6



- NOTES:**
- ALCOVE IS CONSTRUCTED ADJACENT TO THE PROPOSED ROCK CREEK CHANNEL, BUT AWAY FROM THE EXISTING ROCK CREEK CHANNEL.
  - ALCOVE SHALL BE CONSTRUCTED IN THE DRY SIMULTANEOUSLY WITH THE NEW ROCK CREEK CHANNEL PRIOR TO ACTIVATION.
  - ALCOVE IS CONSTRUCTED THROUGH EXCAVATION ONLY AND DOES NOT REQUIRE COMPACTION OF INSITU MATERIAL UNLESS DISTURBED FOR LARGE WOOD OR BANK TREATMENT INSTALLATION.
  - ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CONSTRUCTED CHANNEL.
  - CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
  - CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
  - CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT.

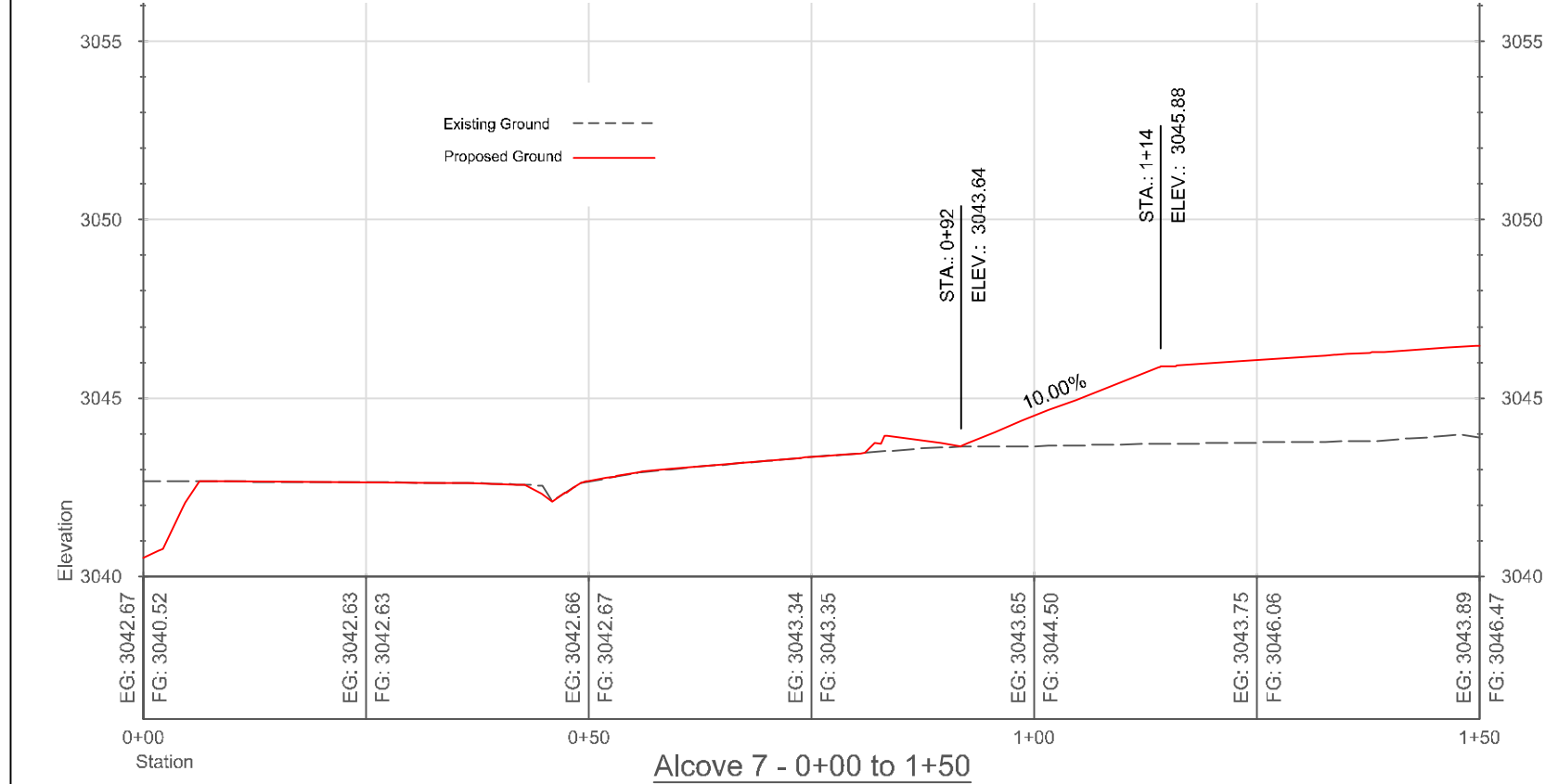




**LEGEND**

- Channel Centerline & Station — 33+00
- Existing Ordinary High Water (OHW) — OHW
- Proposed Ordinary High Water (OHW) — OHW
- ForTheGirls, LLC Ranch Boundary —
- Conservation Easement/Fence — ○ ○ ○ ○
- Proposed Channel, Alcoves & Side Channels — ~~~~~
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress + + + + +

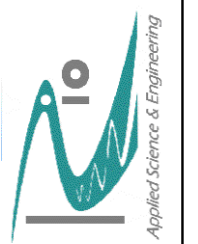
**Legend Key**  
 ① Project Feature  
 ①/12/23 Feature Detail Sheet pg(s)



Alcove 7 - 0+00 to 1+50

**NOTES:**

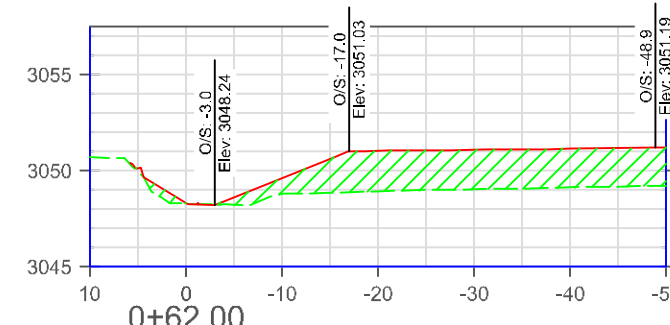
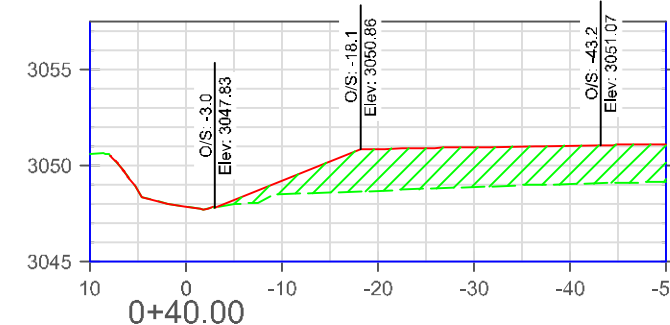
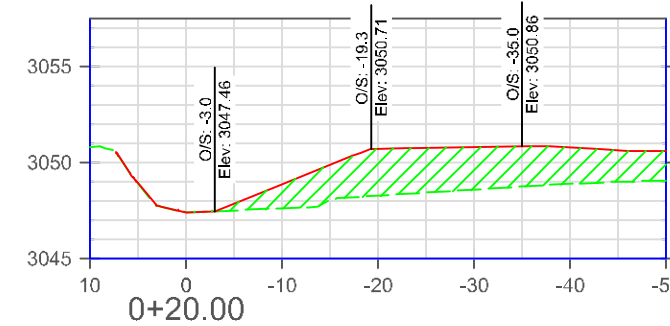
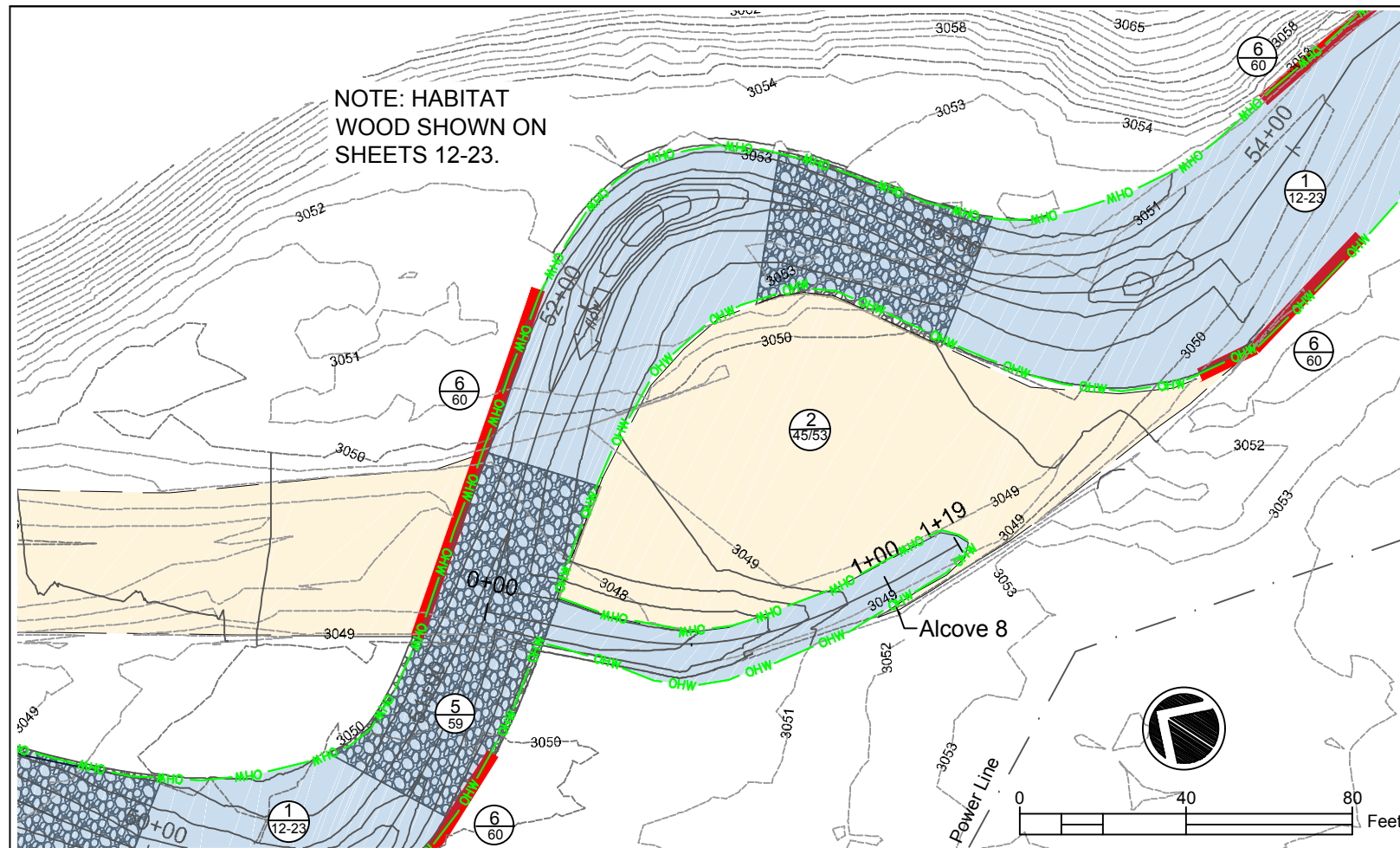
1. ALCOVE IS CONSTRUCTED WITHIN THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE ISOLATED FROM THE NEWLY CONSTRUCTED MAIN CHANNEL FLOW PRIOR TO BACKFILL AND COMPACTION.
3. ALCOVE IS CONSTRUCTED THROUGH THE PLACEMENT OF FILL ALONG ONE SIDE AND THE NATURAL EXISTING BANK ON ONE SIDE. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE TO BANK THAT WILL REMAIN. FILL SHALL BE COMPACTED IN MAXIMUM 1-FT LIFTS BY MECHANICAL MEANS TO 85% RELATIVE DENSITY.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL.
5. CHANNEL CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT



**Date** Mar 2018  
**Designed** JF, AC  
**Drawn** AC, JF  
**Checked** JF  
**Approved** AC, JF, BPA  
**Title** AC, Biologist, JF, Engineer

**ALCOVE 7**  
 Rock Creek Stream & Floodplain Restoration

ALCOVE 7

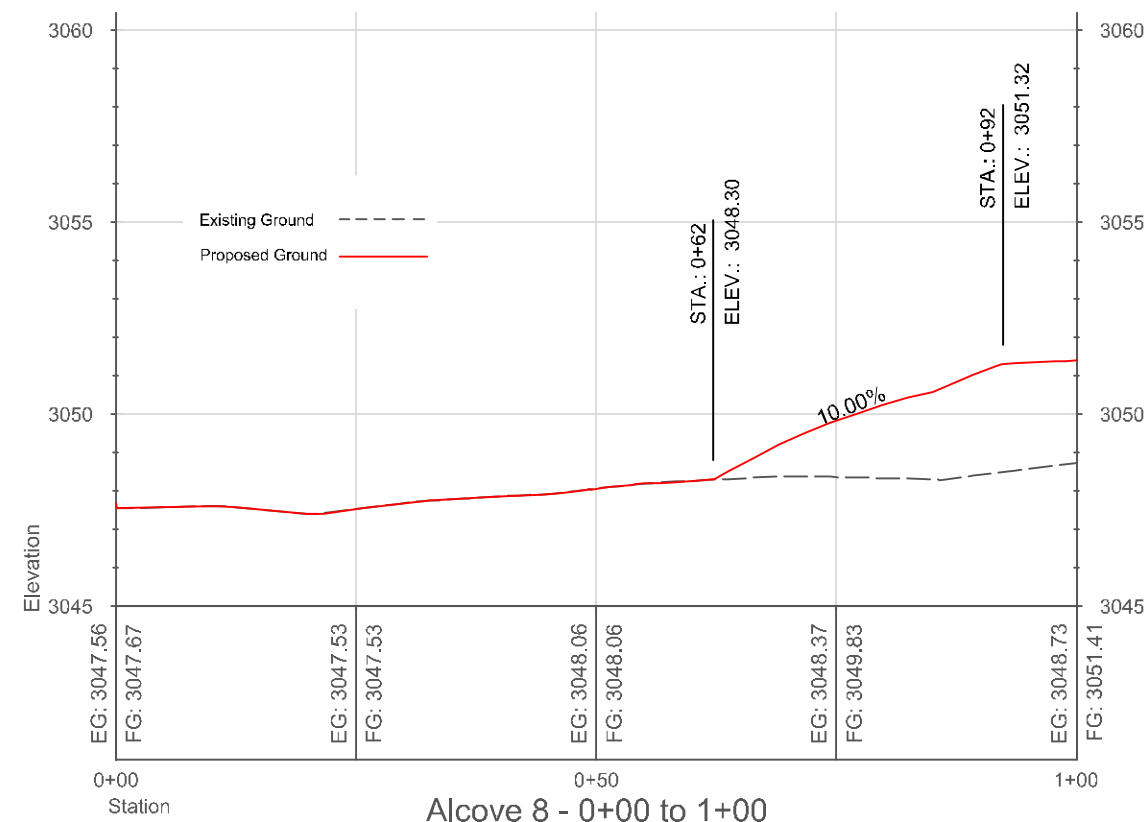


### LEGEND

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

- #### Legend Key
- 1 Project Feature
  - 12/23 Feature Detail Sheet pg(s)

- Channel Cut
- Proposed Ground
- Channel Cut
- Channel Fill



Alcove 8 - 0+00 to 1+00

### NOTES:

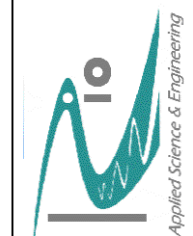
1. ALCOVE IS CONSTRUCTED WITHIN THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE ISOLATED FROM THE NEWLY CONSTRUCTED MAIN CHANNEL FLOW PRIOR TO BACKFILL AND COMPACTION.
3. ALCOVE IS CONSTRUCTED THROUGH THE PLACEMENT OF FILL ALONG ONE SIDE AND THE NATURAL EXISTING BANK ON ONE SIDE. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE TO BANK THAT WILL REMAIN. FILL SHALL BE COMPACTED IN MAXIMUM 1-FT LIFTS BY MECHANICAL MEANS TO 85% RELATIVE DENSITY.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CHANNEL. CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
5. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
6. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT



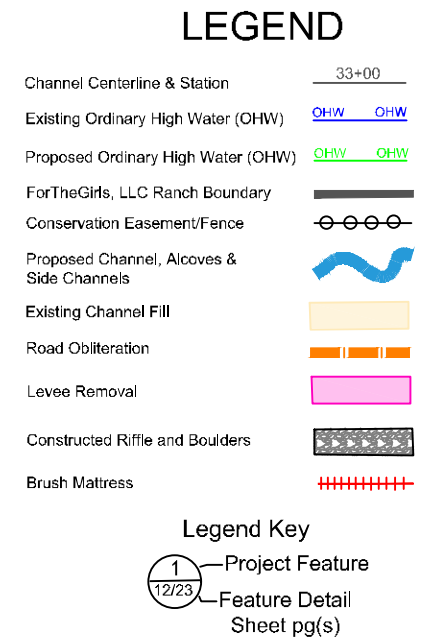
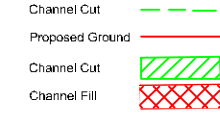
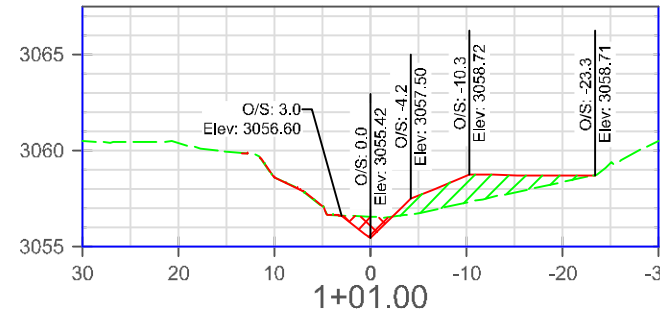
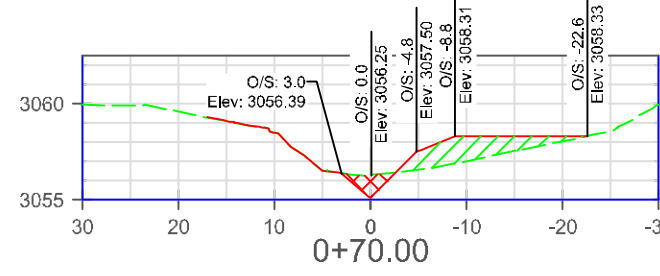
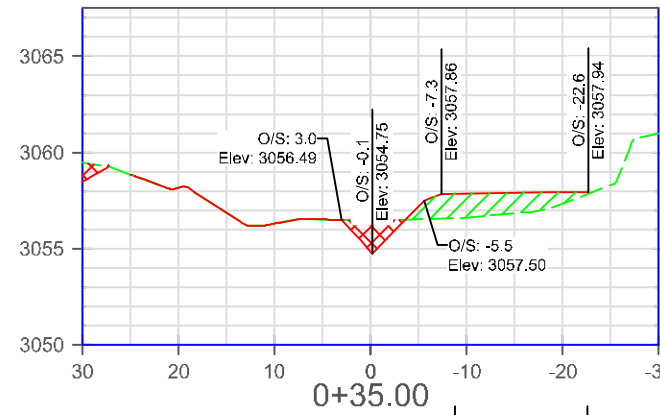
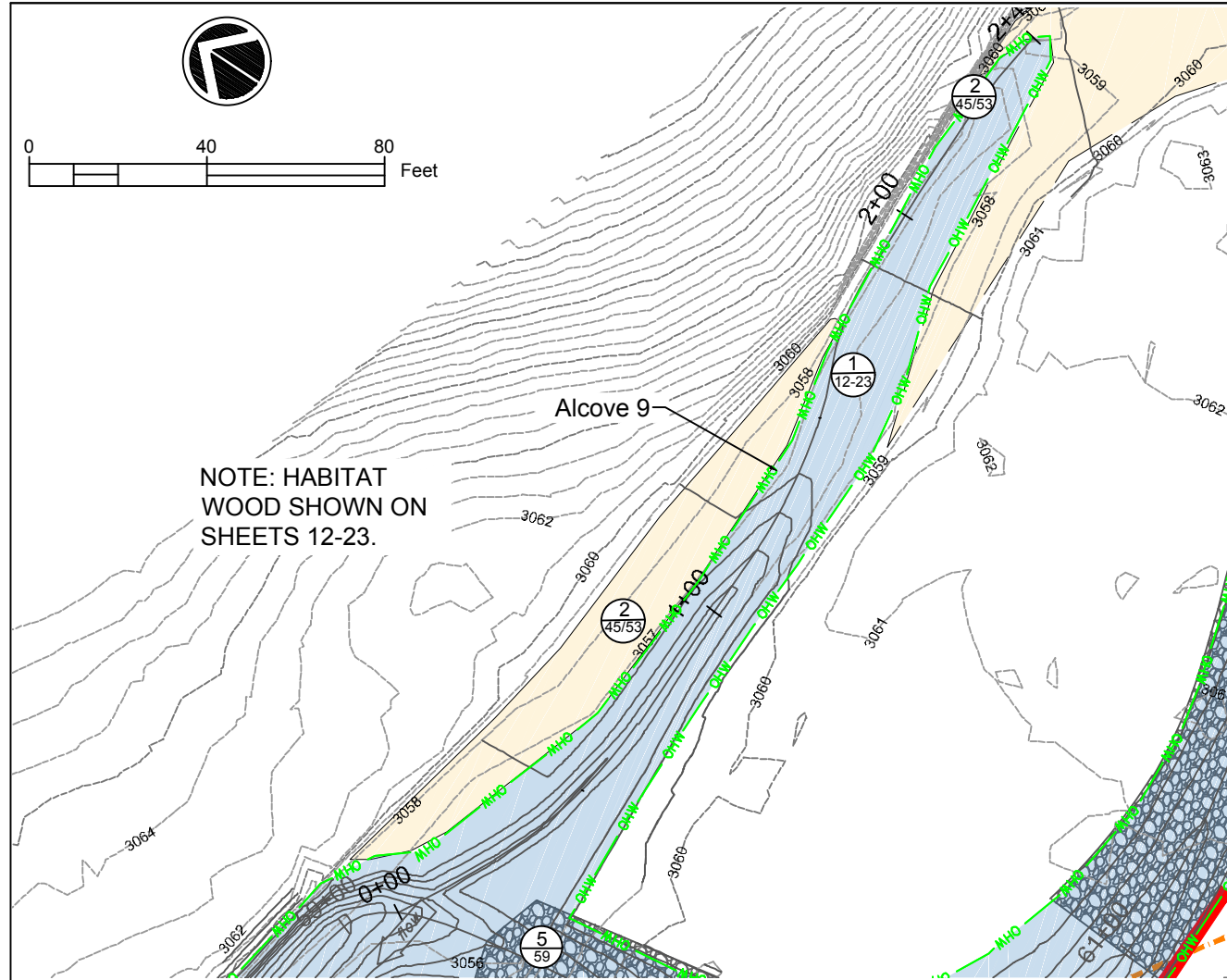
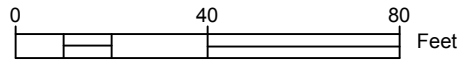
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|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

## ALCOVE 8

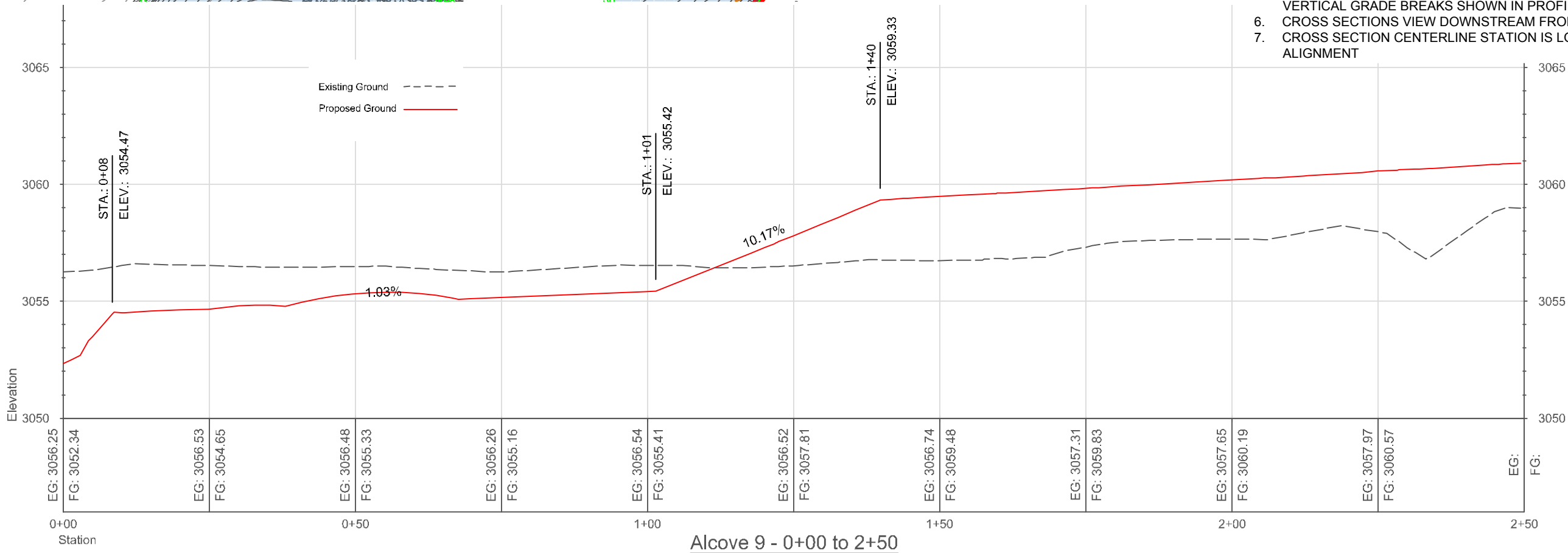
Rock Creek Stream & Floodplain Restoration



ALCOVE 8



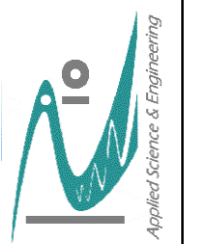
- NOTES:**
1. ALCOVE IS CONSTRUCTED WITHIN THE EXISTING ROCK CREEK CHANNEL.
  2. ALCOVE SHALL BE ISOLATED FROM THE NEWLY CONSTRUCTED MAIN CHANNEL FLOW PRIOR TO BACKFILL AND COMPACTION.
  3. ALCOVE IS CONSTRUCTED THROUGH THE PLACEMENT OF FILL ALONG ONE SIDE AND THE NATURAL EXISTING BANK ON ONE SIDE. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE TO BANK THAT WILL REMAIN. FILL SHALL BE COMPACTED IN MAXIMUM 1-FT LIFTS BY MECHANICAL MEANS TO 85% RELATIVE DENSITY.
  4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT
  5. CHANNEL CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
  6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
  7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT



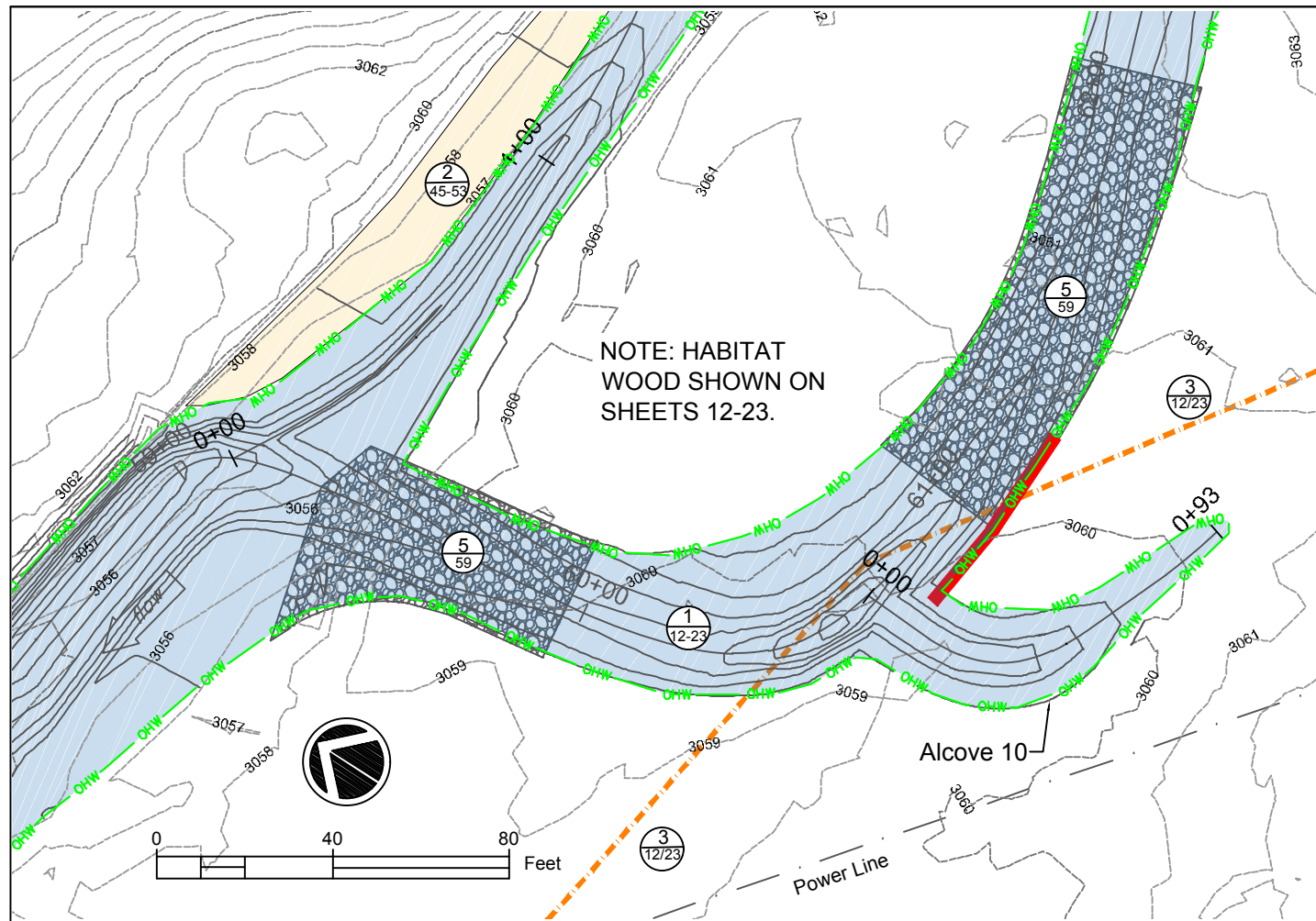
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| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist, JF, Engineer |      |          |

## ALCOVE 9

### Rock Creek Stream & Floodplain Restoration



ALCOVE 9



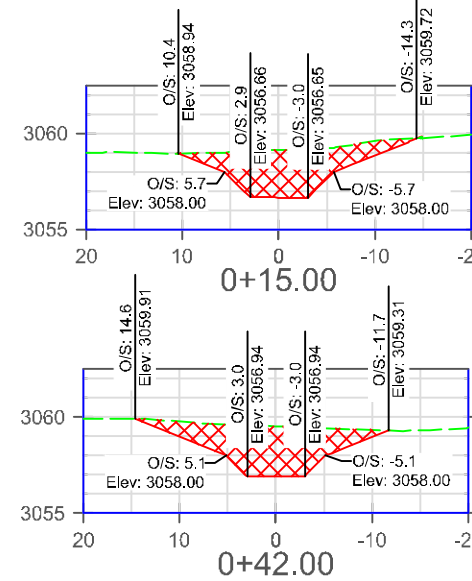
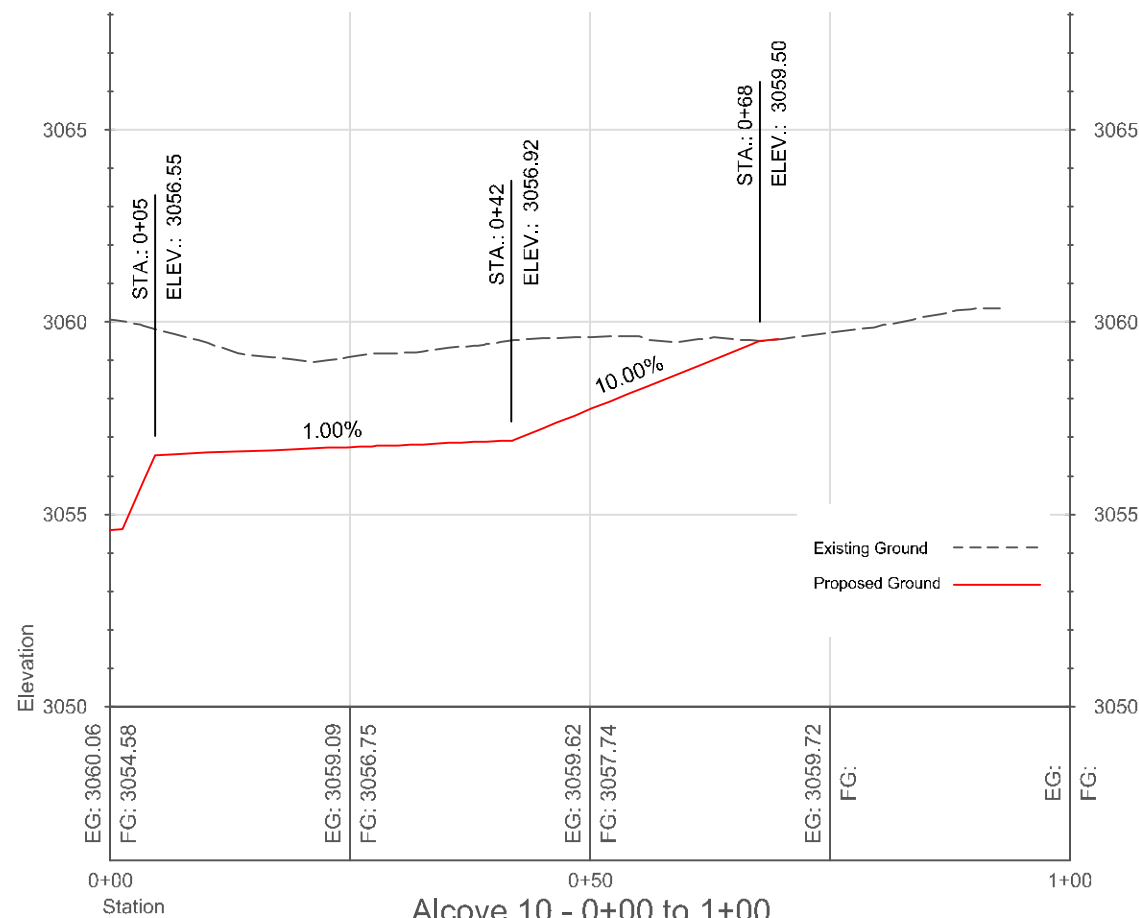
### LEGEND

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary —————
- Conservation Easement/Fence ○-○-○-○
- Proposed Channel, Alcoves & Side Channels ~~~~~
- Existing Channel Fill ■
- Road Obliteration ———
- Levee Removal ■
- Constructed Riffle and Boulders ■
- Brush Mattress +++++

- Legend Key**
- ① — Project Feature
  - ①/12/23 — Feature Detail Sheet pg(s)

### NOTES:

1. ALCOVE IS CONSTRUCTED ADJACENT TO THE PROPOSED ROCK CREEK CHANNEL, BUT AWAY FROM THE EXISTING ROCK CREEK CHANNEL.
2. ALCOVE SHALL BE CONSTRUCTED IN THE DRY SIMULTANEOUSLY WITH THE NEW ROCK CREEK CHANNEL PRIOR TO ACTIVATION.
3. ALCOVE IS CONSTRUCTED THROUGH EXCAVATION ONLY AND DOES NOT REQUIRE COMPACTION OF INSITU MATERIAL UNLESS DISTURBED FOR LARGE WOOD OR BANK TREATMENT INSTALLATION.
4. ALCOVE SHALL BE ACTIVATED FOLLOWING THE INSTALLATION OF LARGE WOOD AND BANK TREATMENTS WITHIN THE ALCOVE AND ADJACENT CONSTRUCTED CHANNEL.
5. CROSS SECTIONS ARE SHOWN AT MAJOR STATIONS OR AT VERTICAL GRADE BREAKS SHOWN IN PROFILE VIEW.
6. CROSS SECTIONS VIEW DOWNSTREAM FROM LEFT TO RIGHT.
7. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THALWEG ALIGNMENT.



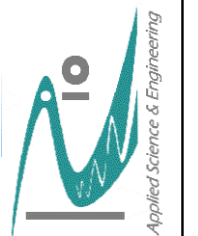
- Channel Cut - - - - -
- Proposed Ground —————
- Channel Cut ▨▨▨▨▨
- Channel Fill ▩▩▩▩▩



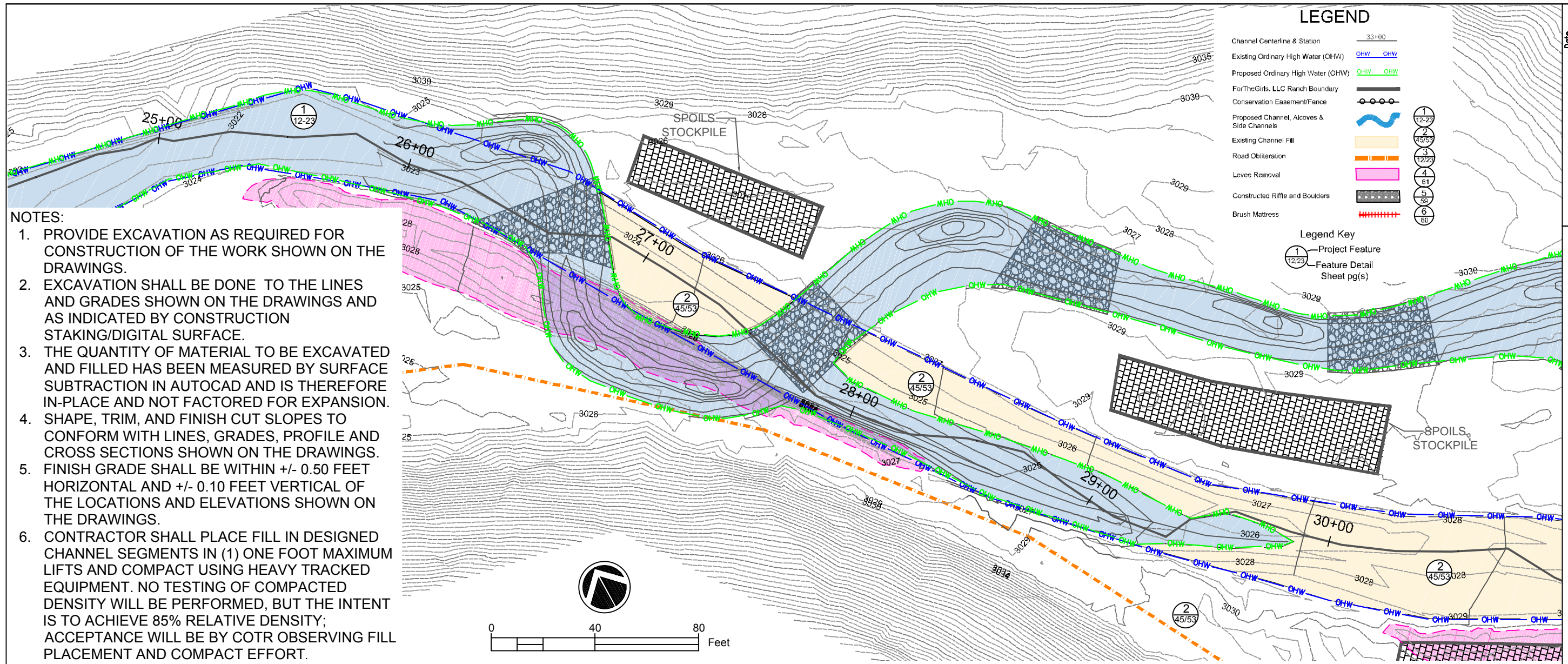
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| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist, JF, Engineer |      |          |

## ALCOVE 10

### Rock Creek Stream & Floodplain Restoration



ALCOVE 10



**LEGEND**

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW OHW
- Proposed Ordinary High Water (OHW) OHW OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

**Legend Key**

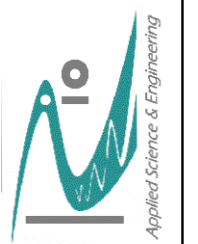
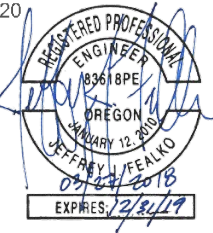
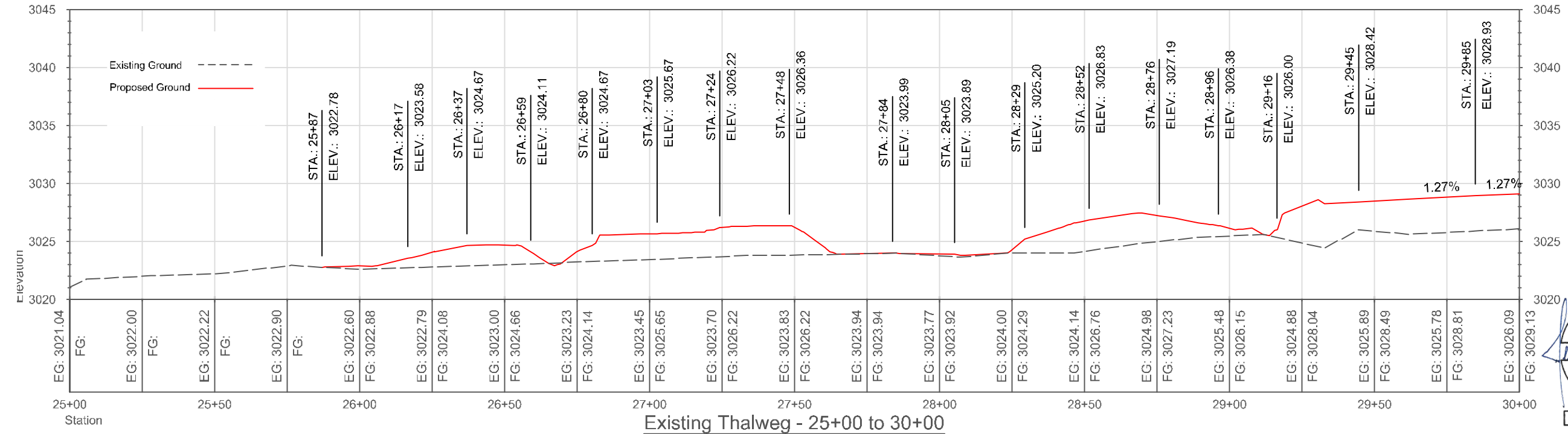
- 1 Project Feature
- 12/23 Feature Detail Sheet pg(s)

**NOTES:**

1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.
4. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
5. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
6. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.

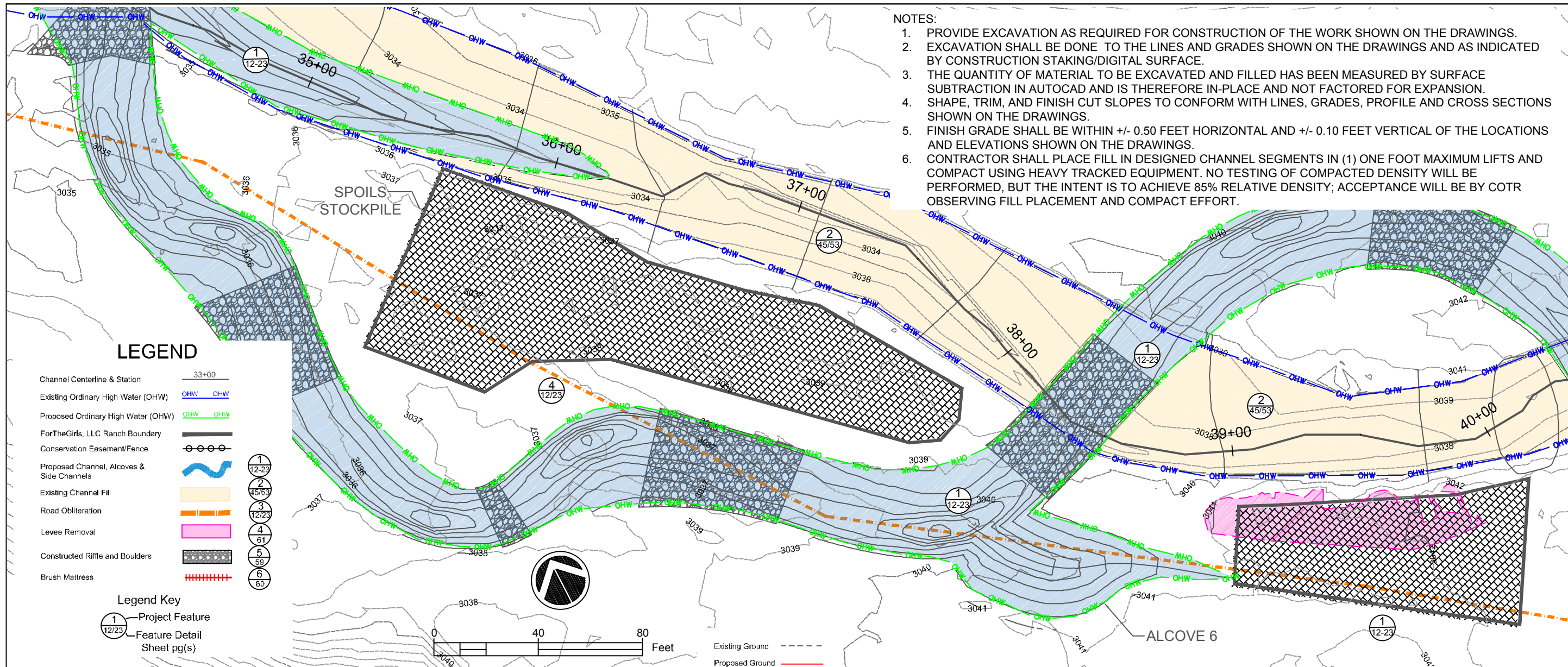
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| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**EXISTING CHANNEL FILL  
PLAN & PROFILE STATIONS 25+00 TO 30+00**  
Rock Creek Stream & Floodplain Restoration



EXISTING CHANNEL FILL  
PLAN & PROFILE  
25+00 TO 30+00



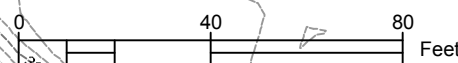


- NOTES:
1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
  2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
  3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.
  4. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
  5. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
  6. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.

**LEGEND**

- Channel Centerline & Station 33+00
- Existing Ordinary High Water (OHW) OHW
- Proposed Ordinary High Water (OHW) OHW
- ForTheGirls, LLC Ranch Boundary
- Conservation Easement/Fence
- Proposed Channel, Alcoves & Side Channels
- Existing Channel Fill
- Road Obliteration
- Levee Removal
- Constructed Riffle and Boulders
- Brush Mattress

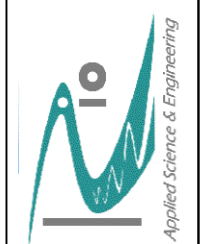
- Legend Key
- 1 Project Feature
  - 12/23 Feature Detail Sheet pg(s)



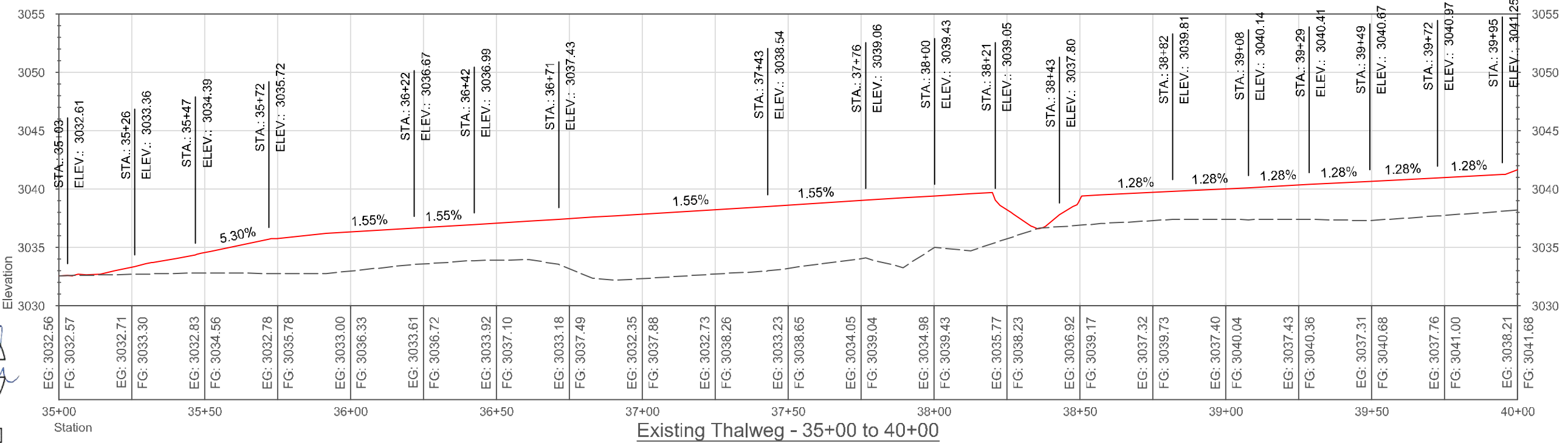
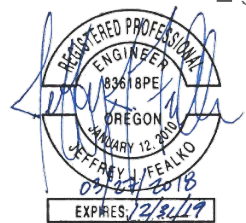
Existing Ground  
Proposed Ground

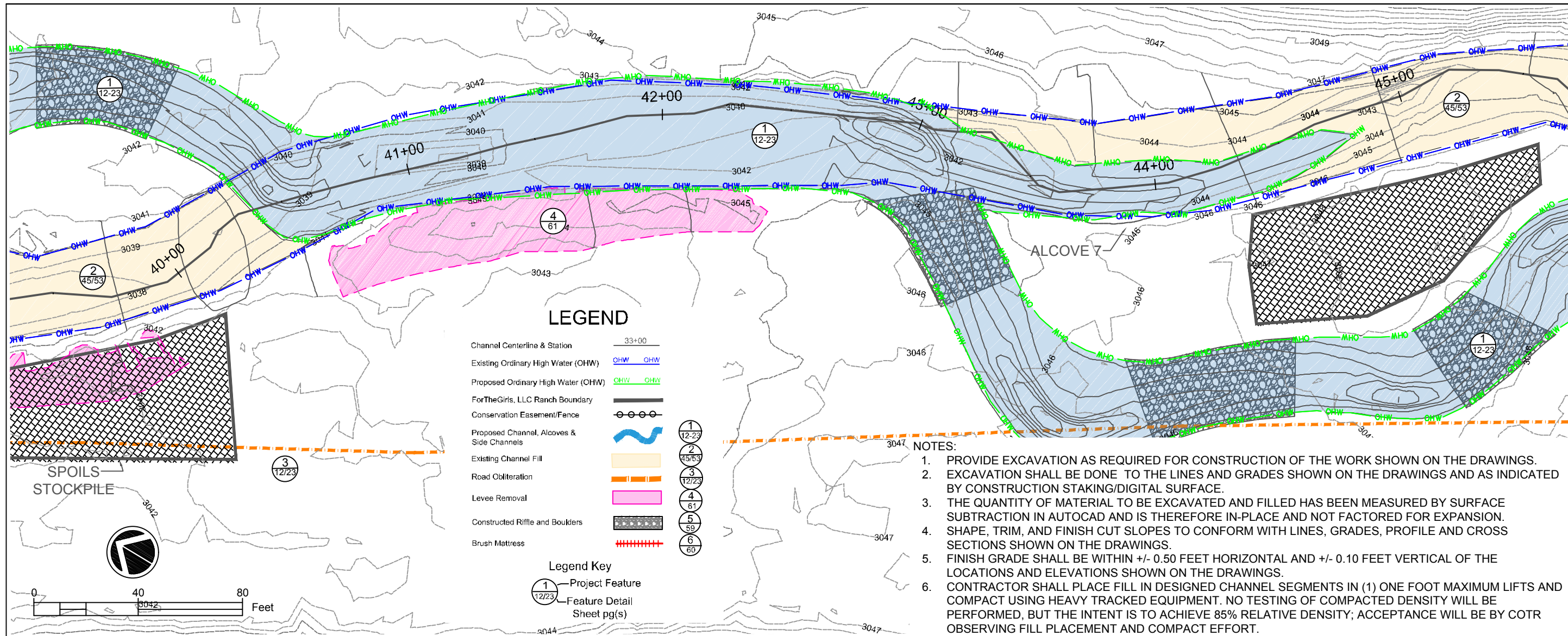
Date Mar 2018  
 Designed JF.AC  
 Drawn AC.JE  
 Checked JF  
 Approved AC.JF.BPA  
 Title AC\_Biologist: JF\_Engineer

**EXISTING CHANNEL FILL  
 PLAN & PROFILE STATIONS 35+00 TO 40+00**  
 Rock Creek Stream & Floodplain Restoration



EXISTING CHANNEL FILL  
 PLAN & PROFILE  
 35+00 TO 40+00





### LEGEND

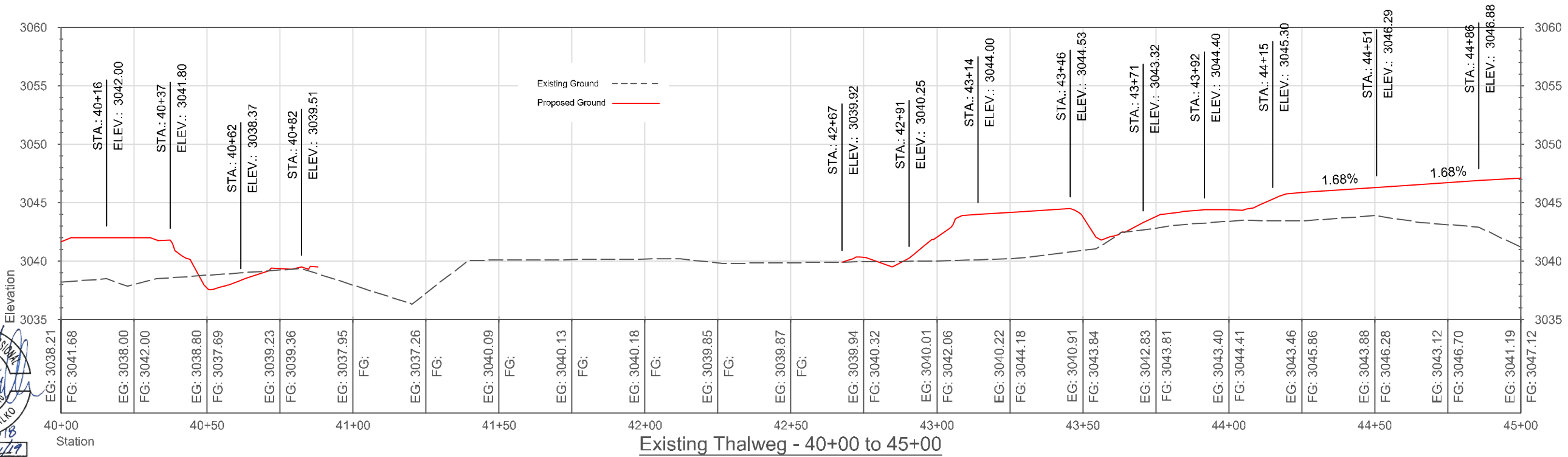
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|---|---------|
| Channel Centerline & Station              | 33+00   |
| Existing Ordinary High Water (OHW)        | OHW OHW |
| Proposed Ordinary High Water (OHW)        | OHW OHW |
| ForTheGirls, LLC Ranch Boundary           | —       |
| Conservation Easement/Fence               | —       |
| Proposed Channel, Alcoves & Side Channels | —       |
| Existing Channel Fill                     | —       |
| Road Obliteration                         | —       |
| Levee Removal                             | —       |
| Constructed Riffle and Boulders           | —       |
| Brush Mattress                            | —       |

#### Legend Key

|       |                            |
|-------|----------------------------|
| 1     | Project Feature            |
| 12/23 | Feature Detail Sheet pg(s) |

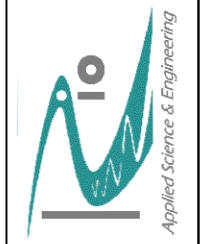
- #### NOTES:
1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
  2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
  3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
  4. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
  5. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.



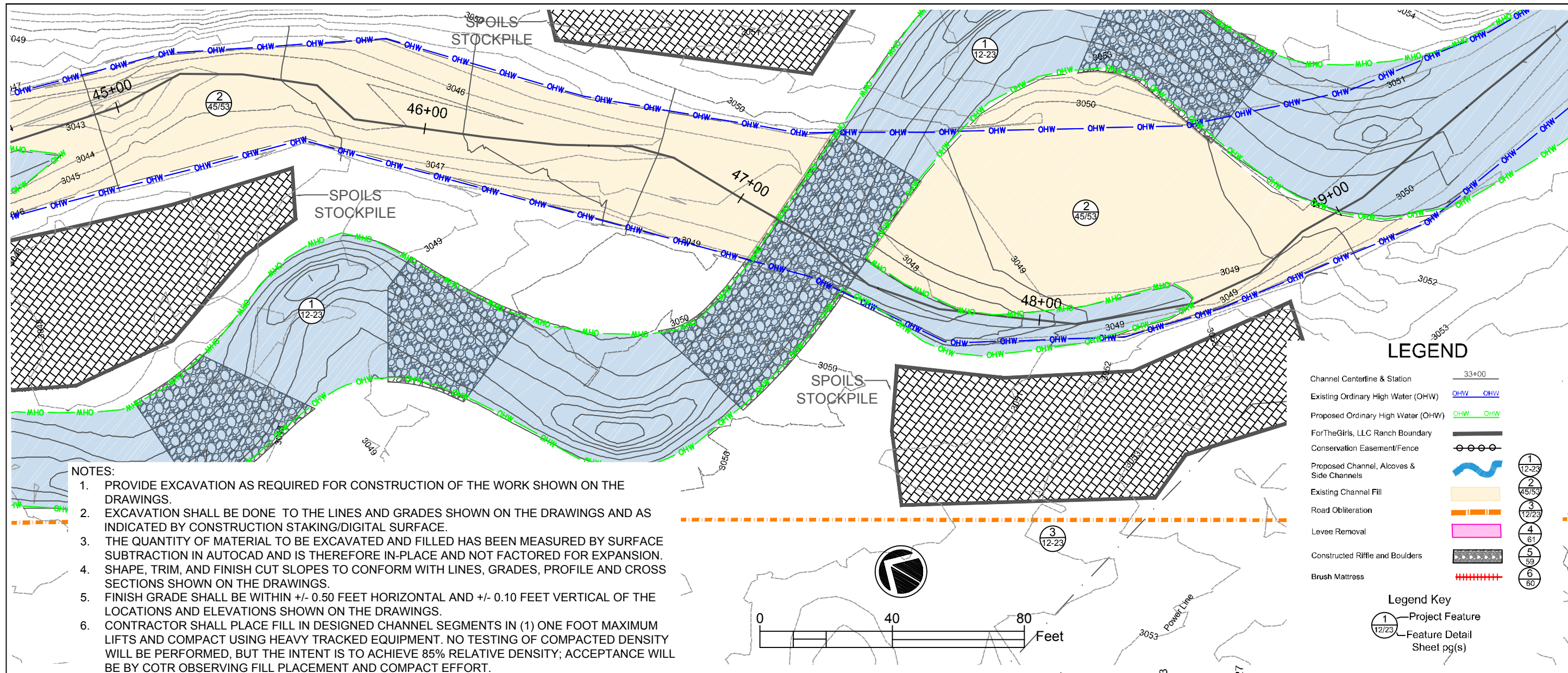
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|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist, JF, Engineer |

## EXISTING CHANNEL FILL PLAN & PROFILE STATIONS 40+00 TO 45+00

Rock Creek Stream & Floodplain Restoration

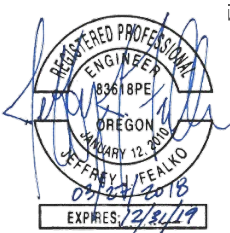
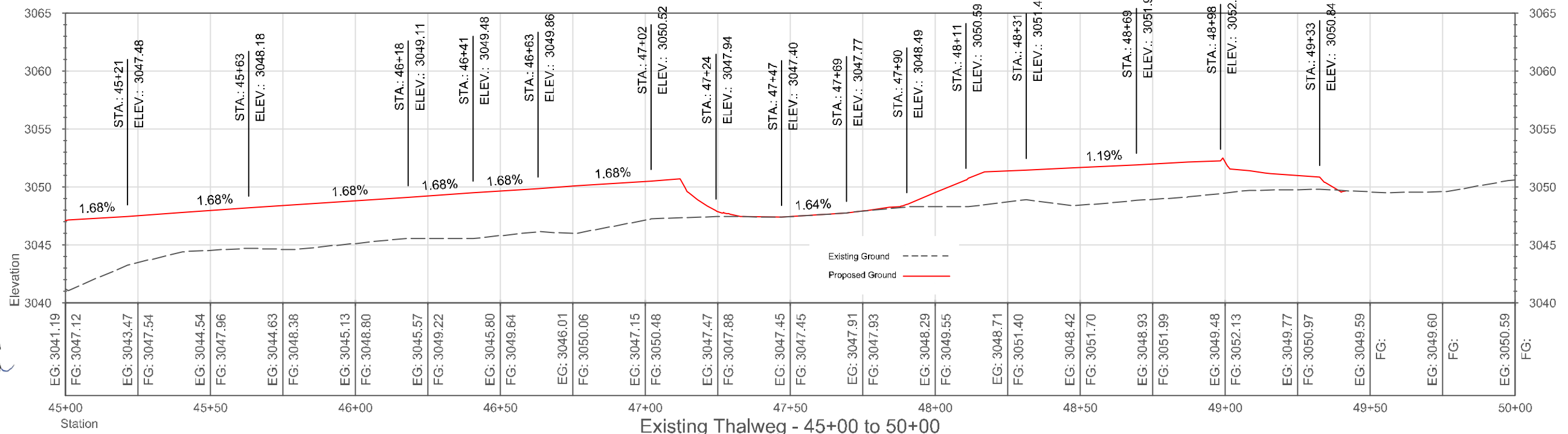


EXISTING CHANNEL FILL  
PLAN & PROFILE  
40+00 TO 45+00



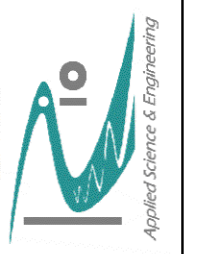
**NOTES:**

1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
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|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

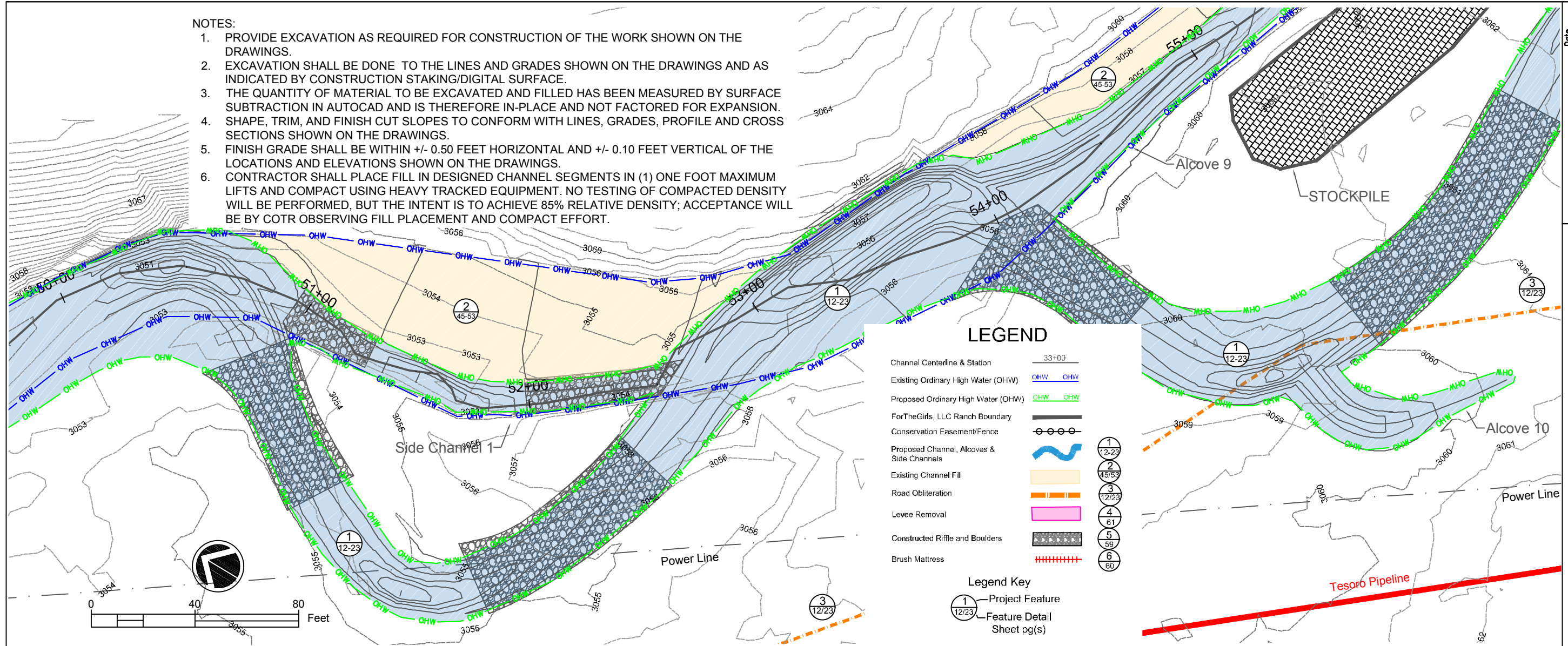
**EXISTING CHANNEL FILL  
PLAN & PROFILE STATIONS 45+00 TO 50+00**  
Rock Creek Stream & Floodplain Restoration



EXISTING CHANNEL FILL  
PLAN & PROFILE  
45+00 TO 50+00

**NOTES:**

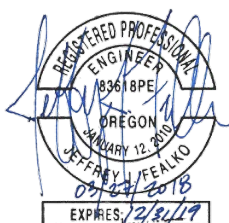
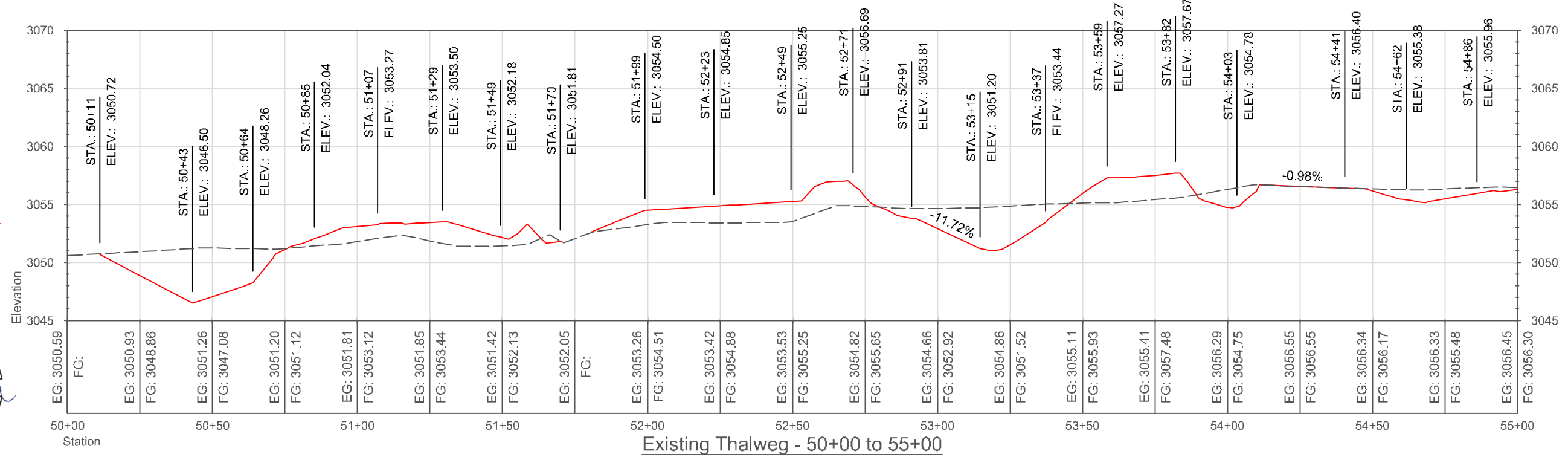
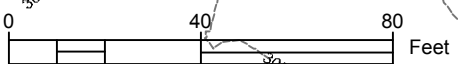
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2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
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4. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
5. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
6. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.



**LEGEND**

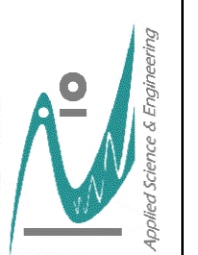
- Channel Centerline & Station: 33+00
- Existing Ordinary High Water (OHW): OHW
- Proposed Ordinary High Water (OHW): OHW
- ForTheGirls, LLC Ranch Boundary: ---
- Conservation Easement/Fence: ---
- Proposed Channel, Alcoves & Side Channels: ---
- Existing Channel Fill: ---
- Road Obliteration: ---
- Levee Removal: ---
- Constructed Riffle and Boulders: ---
- Brush Mattress: ---

- Legend Key**
- 1 - Project Feature
  - 12/23 - Feature Detail Sheet pg(s)

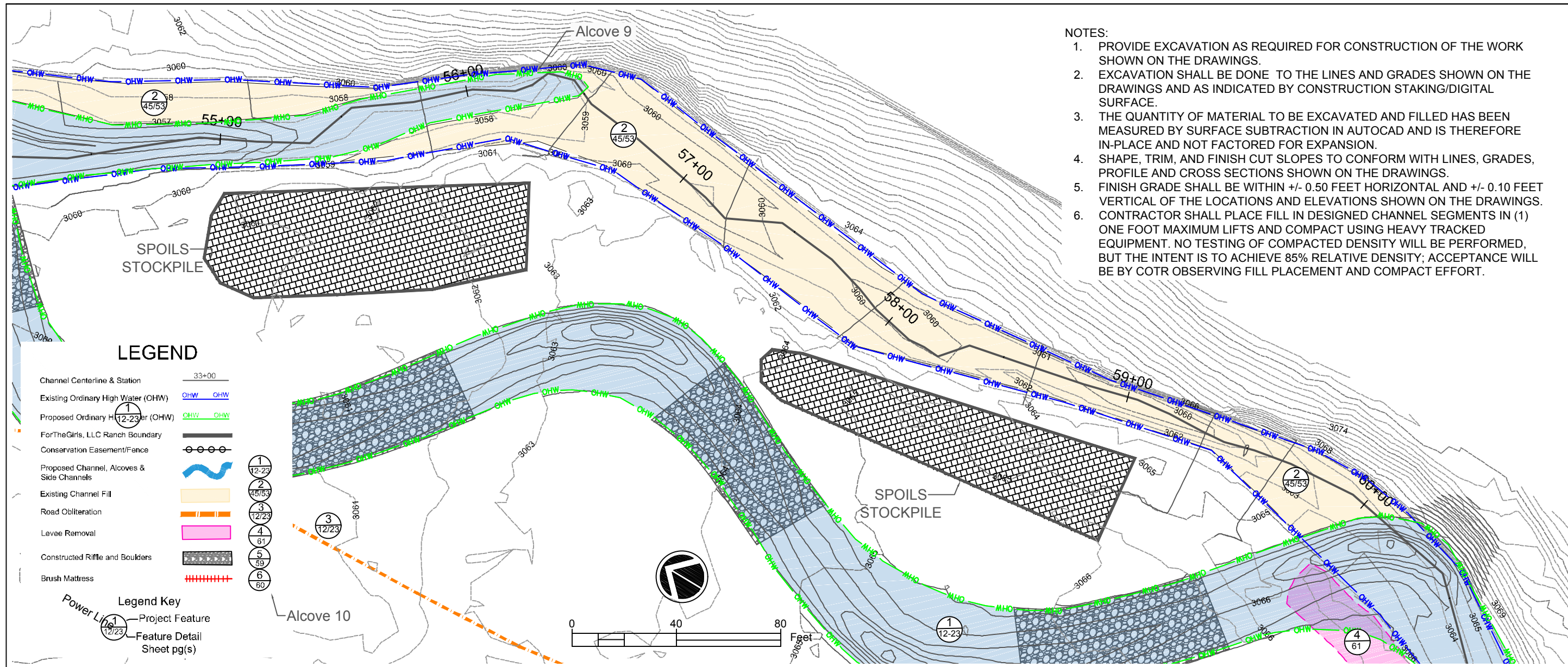


Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

**EXISTING CHANNEL FILL  
 PLAN & PROFILE STATIONS 50+00 TO 55+00**  
 Rock Creek Stream & Floodplain Restoration



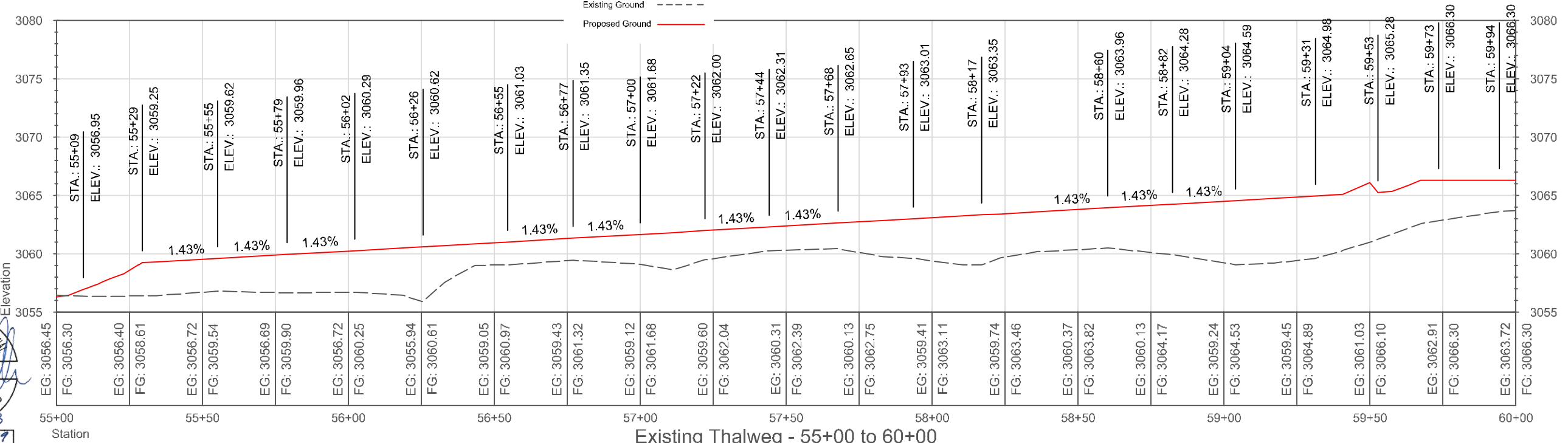
EXISTING CHANNEL FILL  
 PLAN & PROFILE  
 50+00 TO 55+00



- NOTES:
1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
  2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
  3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.
  4. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
  5. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
  6. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.

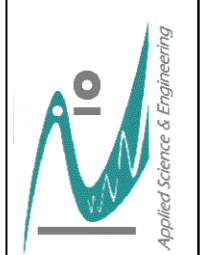
**LEGEND**

- Channel Centerline & Station 33+00
  - Existing Ordinary High Water (OHW) OHW
  - Proposed Ordinary High Water (OHW) OHW
  - ForTheGirls, LLC Ranch Boundary
  - Conservation Easement/Fence
  - Proposed Channel, Alcoves & Side Channels
  - Existing Channel Fill
  - Road Obliteration
  - Levee Removal
  - Constructed Riffle and Boulders
  - Brush Mattress
- Legend Key**
- Project Feature
  - Feature Detail Sheet pg(s)

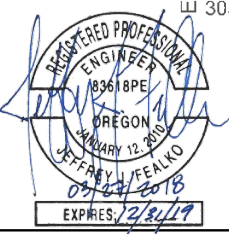


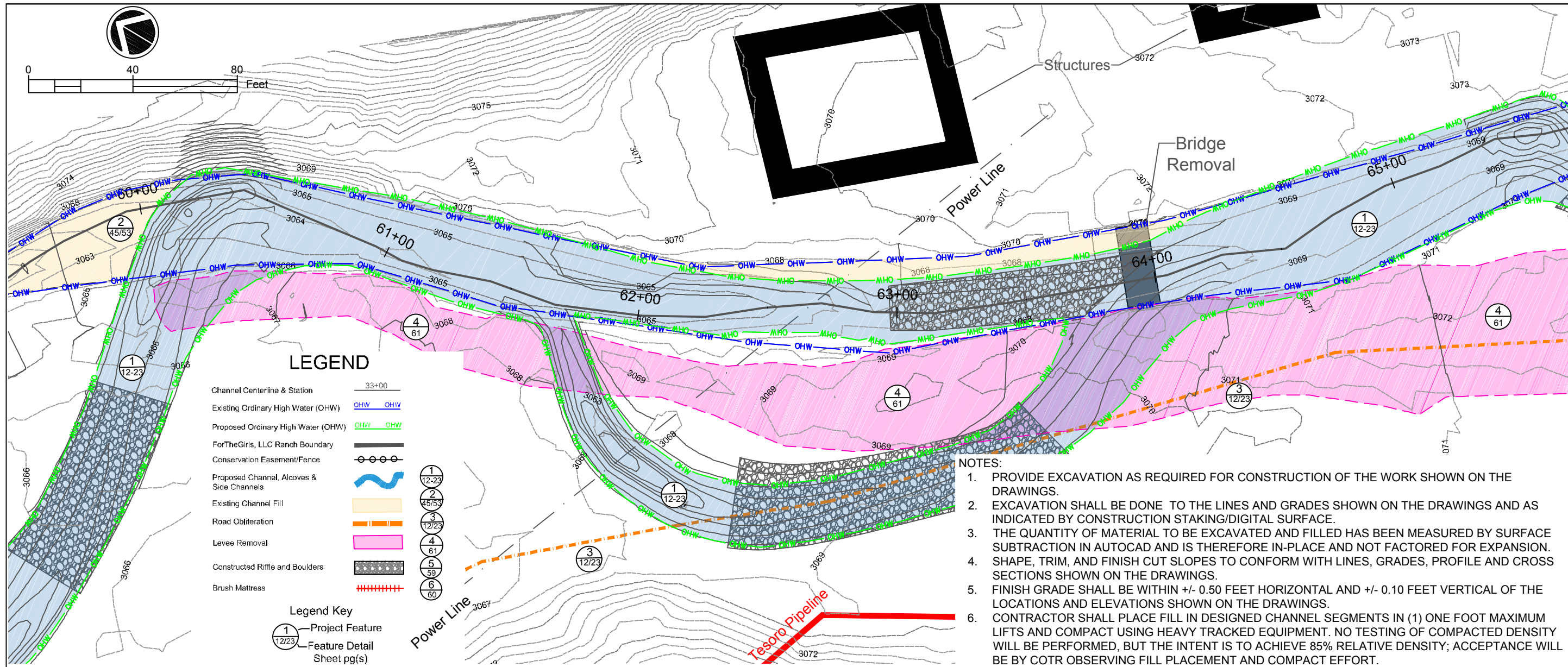
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

**EXISTING CHANNEL FILL  
 PLAN & PROFILE STATIONS 55+00 TO 60+00**  
 Rock Creek Stream & Floodplain Restoration



EXISTING CHANNEL FILL  
 PLAN & PROFILE  
 55+00 TO 60+00





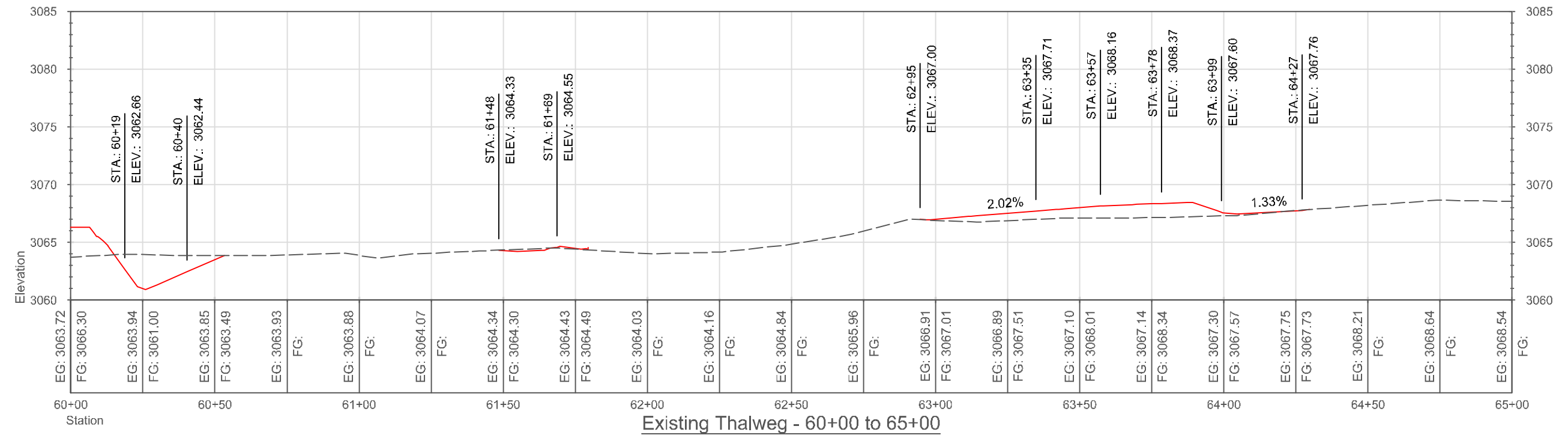
### LEGEND

- Channel Centerline & Station: 33+00
- Existing Ordinary High Water (OHW): OHW OHW
- Proposed Ordinary High Water (OHW): OHW OHW
- ForTheGirls, LLC Ranch Boundary: ———
- Conservation Easement/Fence: ○○○○
- Proposed Channel, Alcoves & Side Channels: ~~~~~
- Existing Channel Fill: [Yellow Box]
- Road Obliteration: [Orange Box]
- Levee Removal: [Pink Box]
- Constructed Riffle and Boulders: [Grey Box]
- Brush Mattress: [Red Box]

### Legend Key

- 1 (12/23) — Project Feature
- 1 (12/23) — Feature Detail Sheet pg(s)

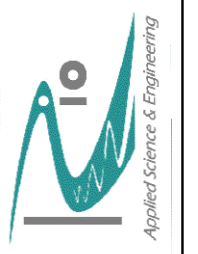
- ### NOTES:
1. PROVIDE EXCAVATION AS REQUIRED FOR CONSTRUCTION OF THE WORK SHOWN ON THE DRAWINGS.
  2. EXCAVATION SHALL BE DONE TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS INDICATED BY CONSTRUCTION STAKING/DIGITAL SURFACE.
  3. THE QUANTITY OF MATERIAL TO BE EXCAVATED AND FILLED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.
  4. SHAPE, TRIM, AND FINISH CUT SLOPES TO CONFORM WITH LINES, GRADES, PROFILE AND CROSS SECTIONS SHOWN ON THE DRAWINGS.
  5. FINISH GRADE SHALL BE WITHIN +/- 0.50 FEET HORIZONTAL AND +/- 0.10 FEET VERTICAL OF THE LOCATIONS AND ELEVATIONS SHOWN ON THE DRAWINGS.
  6. CONTRACTOR SHALL PLACE FILL IN DESIGNED CHANNEL SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT.



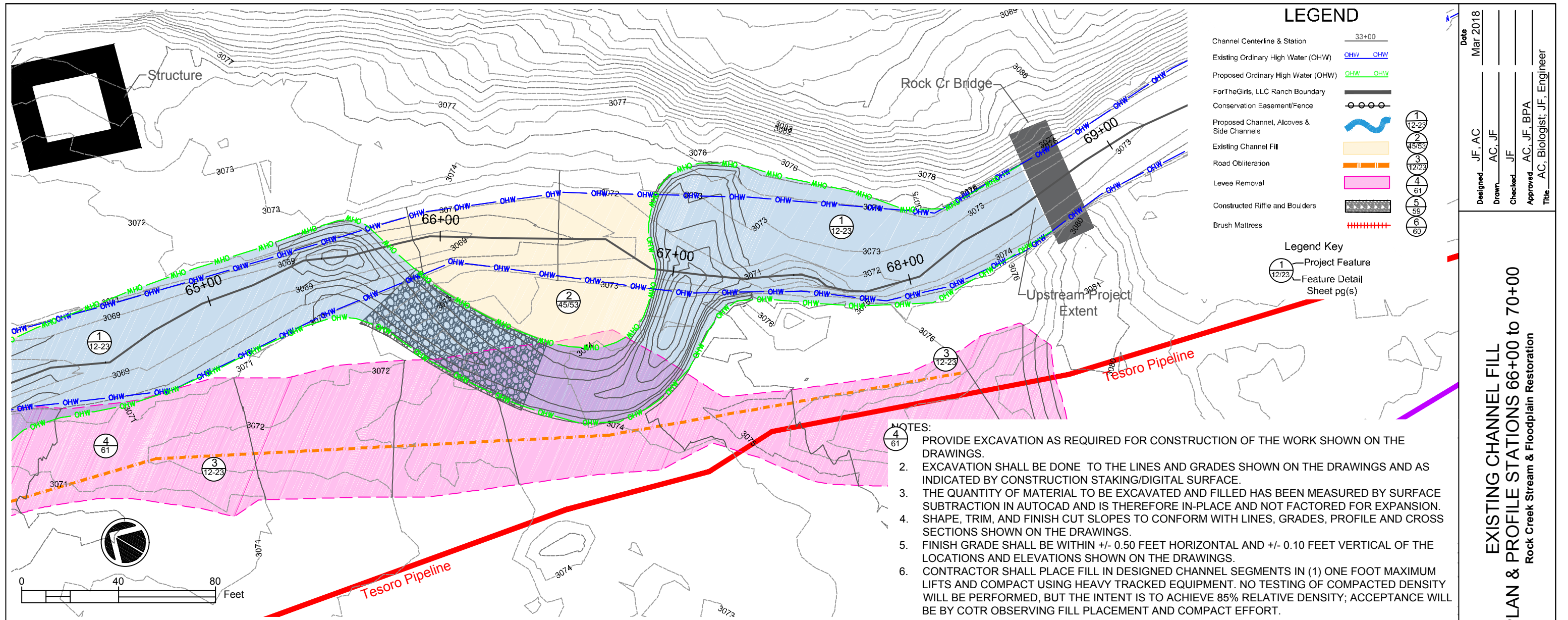
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

## EXISTING CHANNEL FILL PLAN & PROFILE STATIONS 60+00 TO 66+00

Rock Creek Stream & Floodplain Restoration



EXISTING CHANNEL FILL  
 PLAN & PROFILE  
 60+00 TO 65+00



Date: Mar 2018

Designed: JF, AC

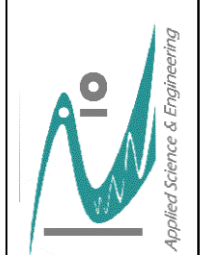
Drawn: AC, JF

Checked: JF

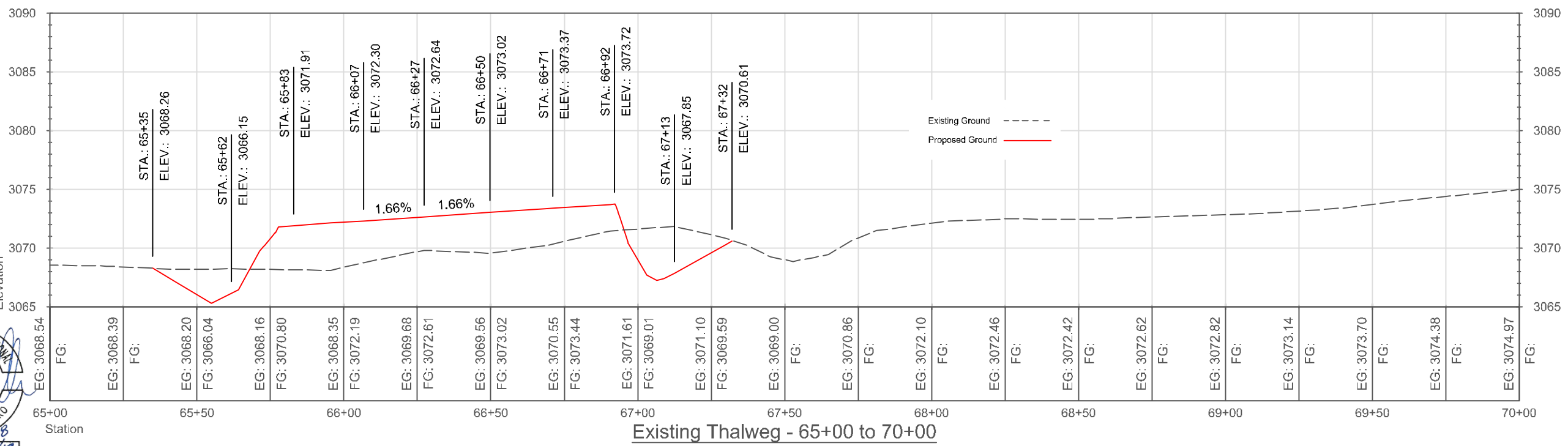
Approved: AC, JF, BPA

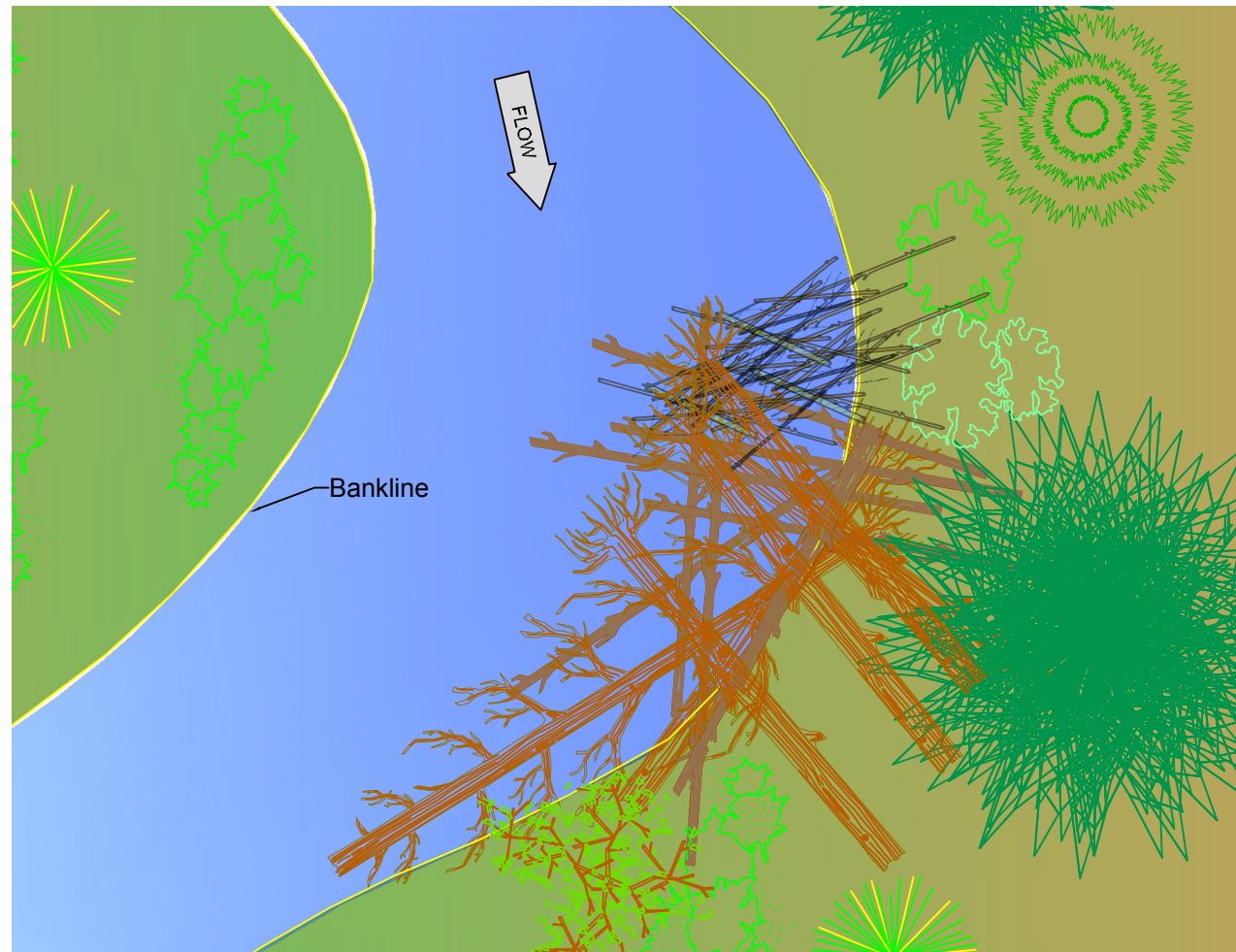
Title: AC, Biologist, JF, Engineer

**EXISTING CHANNEL FILL  
PLAN & PROFILE STATIONS 66+00 TO 70+00**  
Rock Creek Stream & Floodplain Restoration

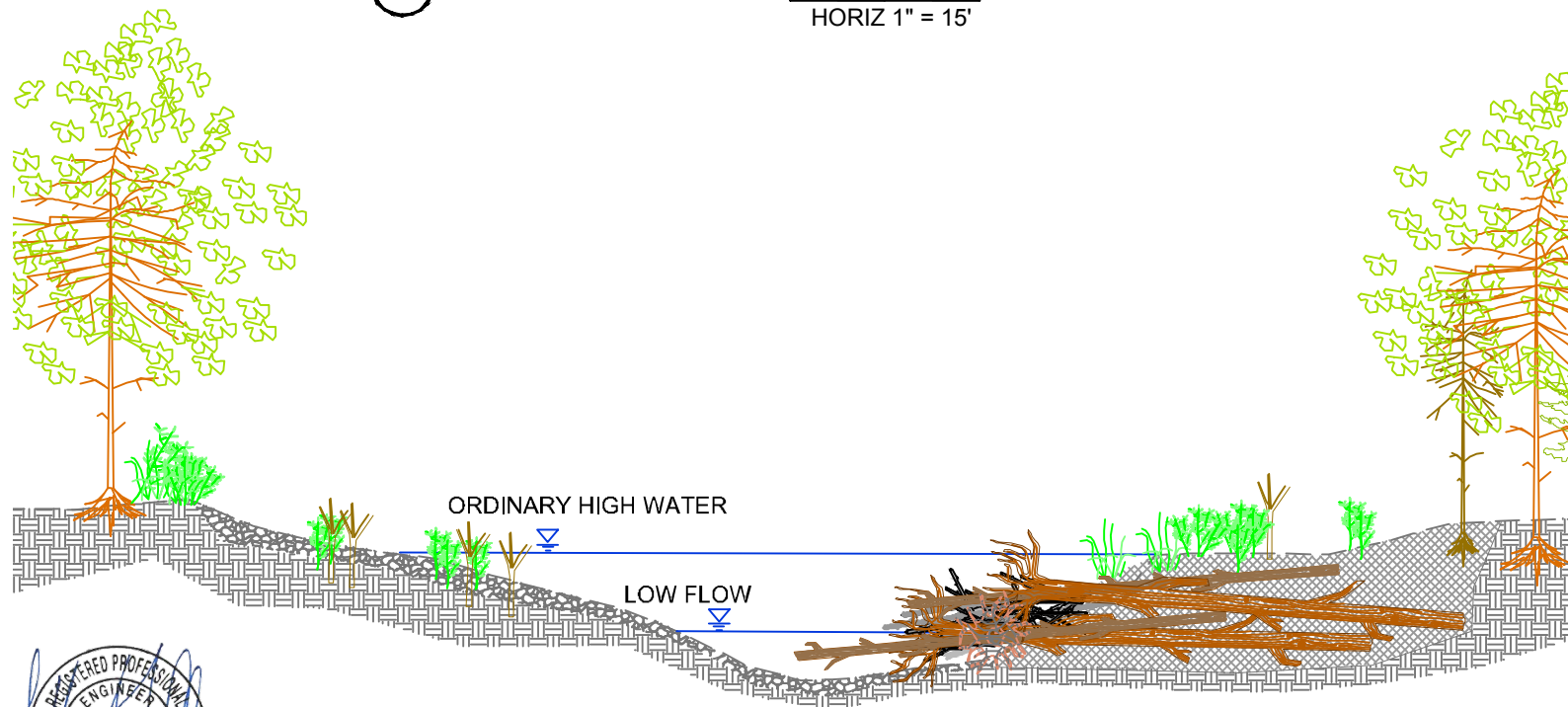


EXISTING CHANNEL FILL  
PLAN & PROFILE  
65+00 TO 70+00

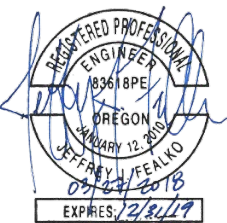




**1 PLAN VIEW**  
HORIZ 1" = 15'

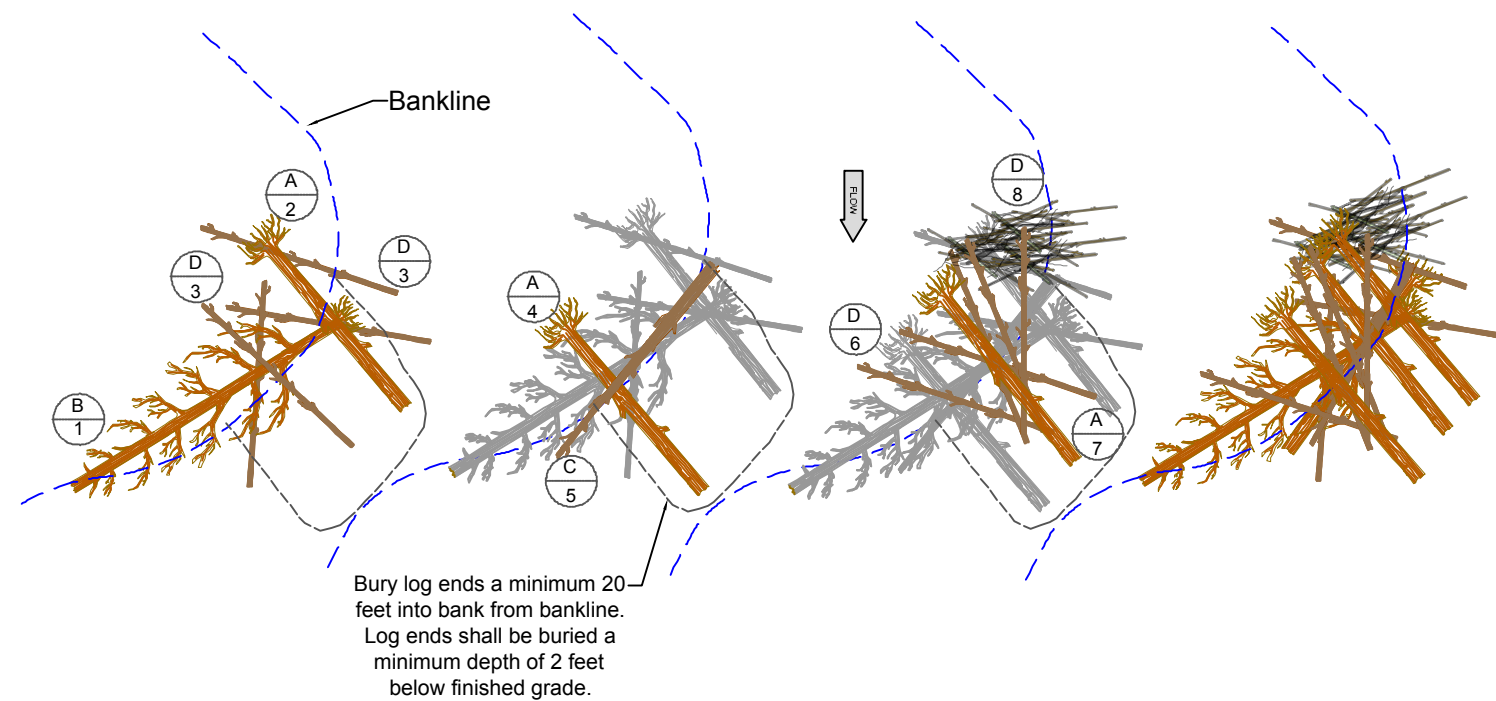


**2 SECTION VIEW**  
HORIZ 1" = 15'



### BIOLOGICAL OBJECTIVES - DESIGN INTENT

- PURPOSE OF TYPE 1 LARGE WOOD STRUCTURE IS TO CREATE AND MAINTAIN HYDRAULIC CONDITIONS THAT MAINTAIN DEEP POOL HABITAT, COMPLEXITY AND DIVERSITY.
- PROVIDE TEMPORARY STREAMBANK PROTECTION BY REDIRECTING FLOW AND SHEAR STRESS FROM NEAR BANK AND STABLE BANK CONDITION FOR ESTABLISHING RIPARIAN VEGETATION.
- PROVIDES OVERHEAD COVER, VELOCITY REFUGE, AND ORGANIC NUTRIENTS THAT SUPPORT FOOD WEB PROCESSES AND ALL LIFE STAGES OF JUVENILE AND ADULT SALMONID (REARING, HOLDING)



**3 ASSEMBLY DETAIL**  
HORIZ 1" = 30'

### PROJECT ELEMENT NOTES

1. WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
2. LOCATION OF WOOD STRUCTURE SHALL BE STAKED AT EACH LOCATION BY CO.
3. CHANNEL GRADING SHALL BE COMPLETED PRIOR TO CONSTRUCTING LARGE WOOD STRUCTURE.
4. CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
5. WOOD STRUCTURE SHALL BE CONSTRUCTED IN LAYERS WITH RACKING AND SLASH MATERIAL WOVEN BELOW AND BETWEEN KEY STRUCTURE MEMBERS AS DIRECTED BY CO.
6. FOUNDATION OF WOOD STRUCTURE SHALL BE EXCAVATED TO THE DESIGNED CONSTRUCTED POOL DEPTH AT INDIVIDUAL STRUCTURE LOCATIONS. EXCAVATION SHALL SEPARATE SURFACE ORGANIC SOIL LAYER FROM UNDERLYING GRAVEL
7. BACKFILL STRUCTURE USING GRAVEL AND SOIL EXCAVATED FROM STRUCTURE FOUNDATION. STRUCTURE BACKFILL WILL PLACE COARSE FILL MATERIAL FOLLOWED BY SOIL.
8. BACKFILL OF STRUCTURE SHALL BE COMPLETED IN COMPACTED LIFTS OF 1 FOOT MAXIMUM LIFTS USING TRACK-HOE BUCKET TO ENSURE SPACES BETWEEN AND UNDER LOGS ARE BACK-FILLED TO AVOID VOIDS.

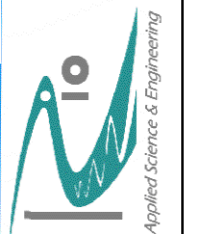
#### MATERIAL SCHEDULE

| Key | ITEM            | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N)      |
|-----|-----------------|----------|-----------|-------------|--------------------|
| A   | KEY MEMBER      | 3        | 16-18+    | ~ 35        | YES - 3' DIA. MIN. |
| B   | WHOLE TREE      | 1        | 16+       | ~ 45        | YES                |
| C   | LARGE LOG       | 1        | 16+       | ~ 30        | NO                 |
| D   | SMALL (RACKING) | 10       | 8-12      | ~ 20        | OPTIONAL           |

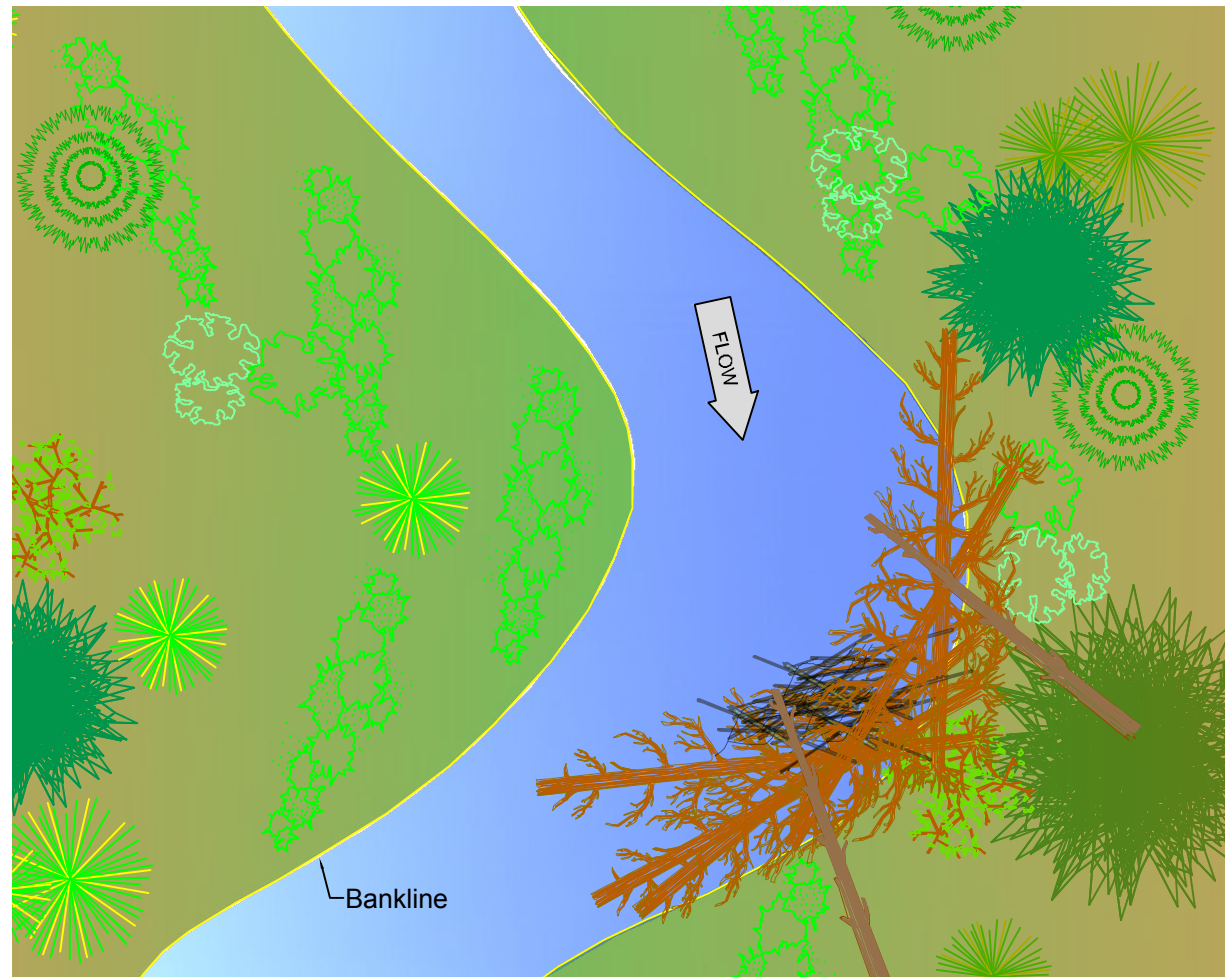
|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

### TYPE 1 STRUCTURE LARGE WOOD STRUCTURE DETAIL

Rock Creek Stream & Floodplain Restoration

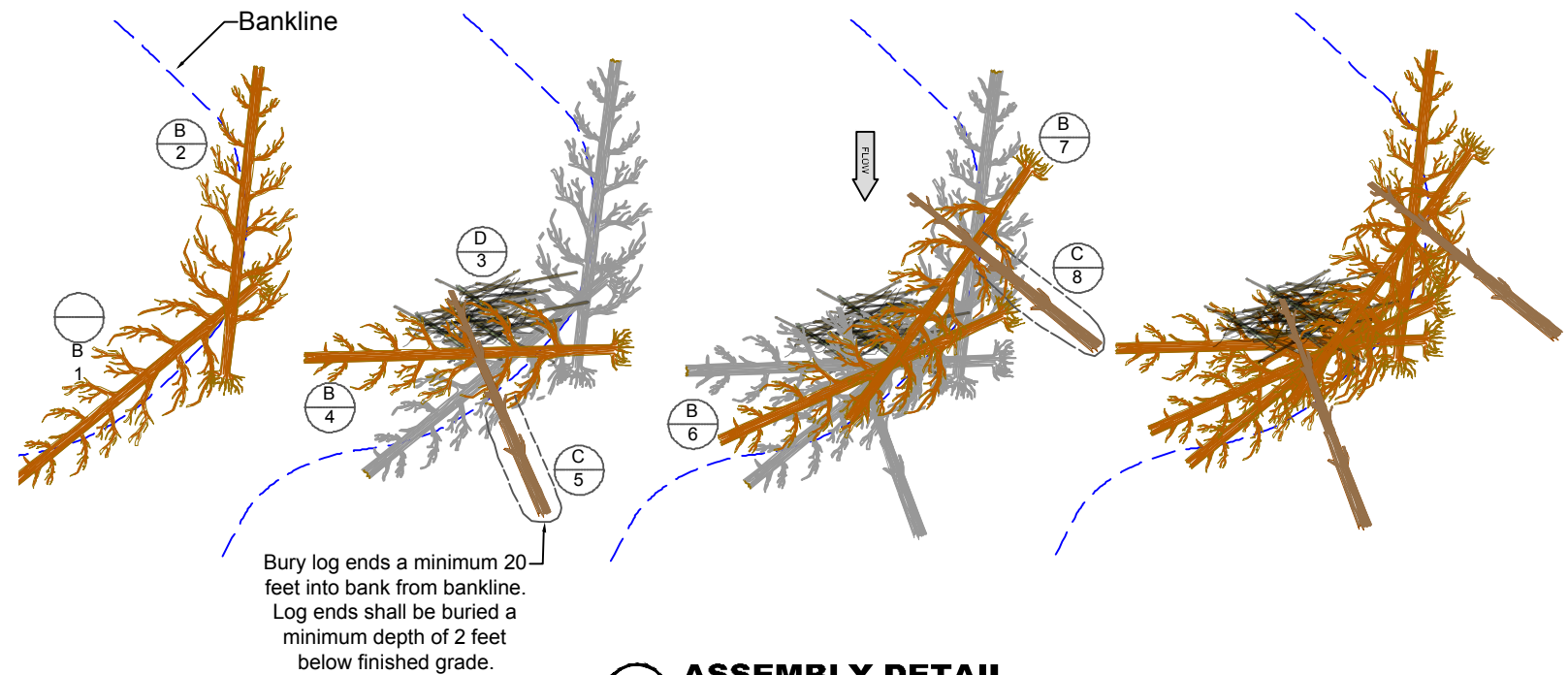


### TYPE 1 LARGE WOOD STRUCTURE DETAIL



**1 PLAN VIEW**  
 HORIZ 1" = 20'

- ### BIOLOGICAL OBJECTIVES - DESIGN INTENT
- PURPOSE OF WHOLE TREE LOG JAM IS TO CREATE AND MAINTAIN HYDRAULIC CONDITIONS THAT MAINTAIN DEEP POOL HABITAT, COMPLEXITY AND DIVERSITY.
  - WHOLE TREE STRUCTURE IS DESIGNED TO MIMIC NATURAL WOOD ACCUMULATION IN POOL HABITAT THAT DEVELOPS FROM MATURE TREES FALLING INTO RIVER AND FORMING INTO LOG JAM BY HYDRAULICS AND ANNUAL ACCUMULATION OF WOOD MATERIAL.
  - PROVIDE TEMPORARY STREAMBANK PROTECTION BY REDIRECTING FLOW AND SHEAR AWAY FROM NEAR BANK AND STABLE BANK CONDITION FOR ESTABLISHING RIPARIAN VEGETATION.
  - PROVIDES OVERHEAD COVER, VELOCITY REFUGE, AND ORGANIC NUTRIENTS THAT SUPPORT FOOD WEB PROCESSES AND ALL LIFE STAGES OF JUVENILE AND ADULT SALMONID (REARING, HOLDING)



**3 ASSEMBLY DETAIL**  
 HORIZ 1" = 30'



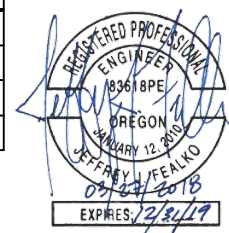
**2 SECTION VIEW**  
 HORIZ 1" = 15'

### PROJECT ELEMENT NOTES

1. WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
2. LOCATION OF WOOD STRUCTURE SHALL BE STAKED AT EACH LOCATION BY CO.
3. CHANNEL GRADING SHALL BE COMPLETED PRIOR TO CONSTRUCTING LARGE WOOD STRUCTURE.
4. CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
5. WOOD STRUCTURE SHALL BE CONSTRUCTED IN LAYERS WITH RACKING AND SLASH MATERIAL WOVEN BELOW AND BETWEEN KEY STRUCTURE MEMBERS AS DIRECTED BY CO.
6. FOUNDATION OF WOOD STRUCTURE SHALL BE EXCAVATED TO THE DESIGNED CONSTRUCTED POOL DEPTH AT INDIVIDUAL STRUCTURE LOCATIONS. EXCAVATION SHALL SEPARATE SURFACE ORGANIC SOIL LAYER FROM UNDERLYING GRAVEL
7. BACKFILL STRUCTURE USING GRAVEL AND SOIL EXCAVATED FROM STRUCTURE FOUNDATION. STRUCTURE BACKFILL WILL PLACE COARSE FILL MATERIAL FOLLOWED BY SOIL.
8. BACKFILL OF STRUCTURE SHALL BE COMPLETED IN COMPACTED LIFTS OF 1 FOOT MAXIMUM LIFTS USING TRACK-HOE BUCKET TO ENSURE SPACES BETWEEN AND UNDER LOGS ARE BACK-FILLED TO AVOID VOIDS.

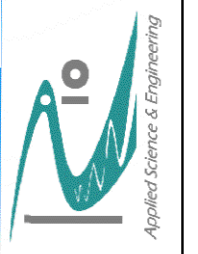
### MATERIAL SCHEDULE

| Key | ITEM            | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N)      |
|-----|-----------------|----------|-----------|-------------|--------------------|
| A   | KEY MEMBER      | 0        | 16-18     | ~ 35        | YES - 3' DIA. MIN. |
| B   | WHOLE TREE      | 5        | 16        | ~ 45        | YES                |
| C   | LARGE LOG       | 2        | 16        | ~ 30        | NO                 |
| D   | SMALL (RACKING) | 10       | 8-12      | ~ 20        | OPTIONAL           |

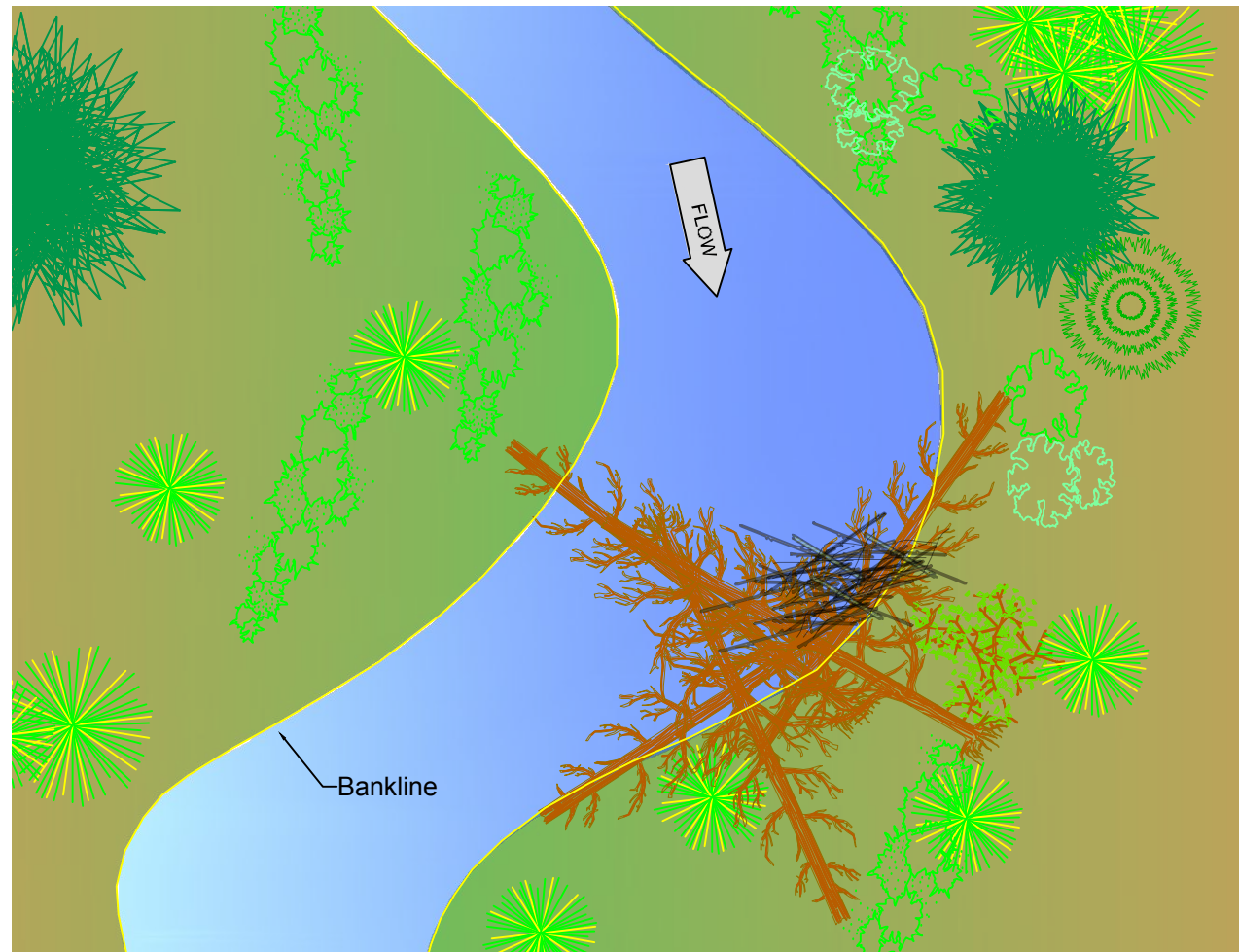


Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

**TYPE 2 STRUCTURE  
 LARGE WOOD STRUCTURE DETAIL**  
 Rock Creek Stream & Floodplain Restoration

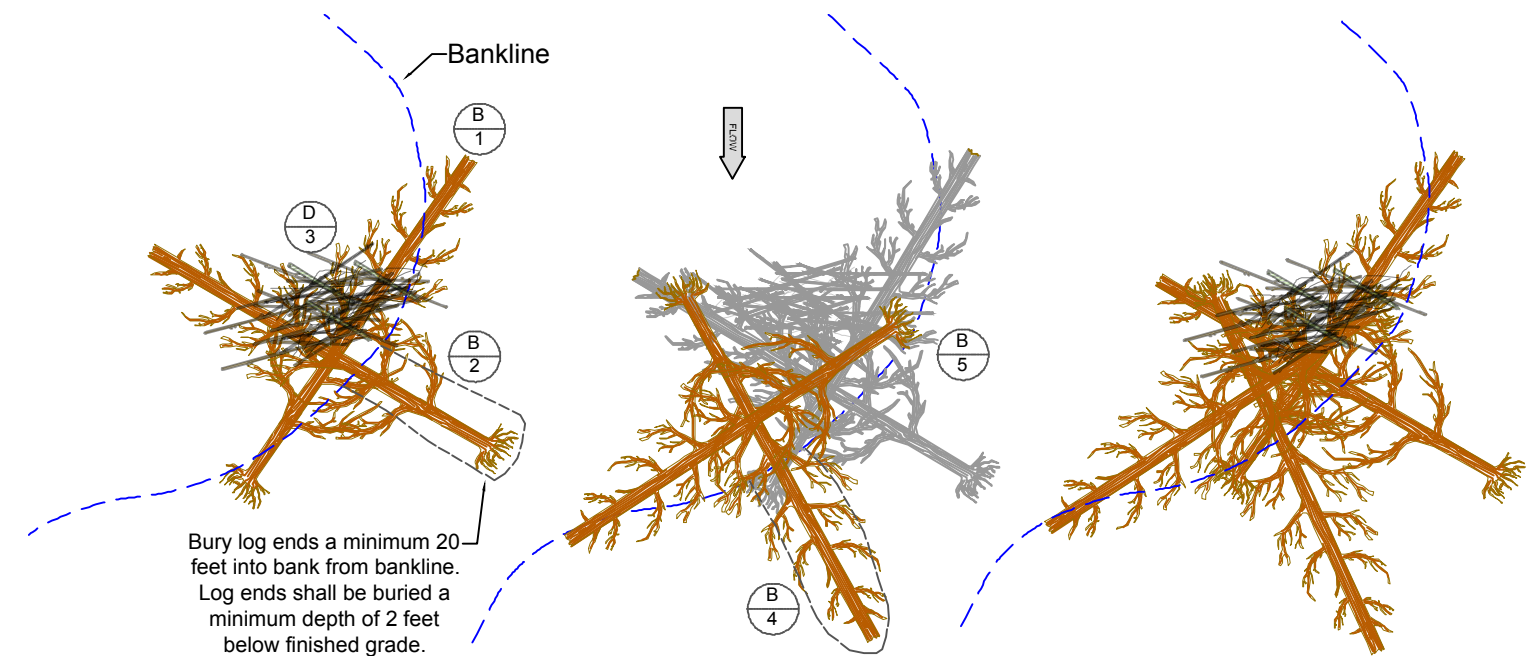


TYPE 2  
 LARGE WOOD  
 STRUCTURE  
 DETAIL

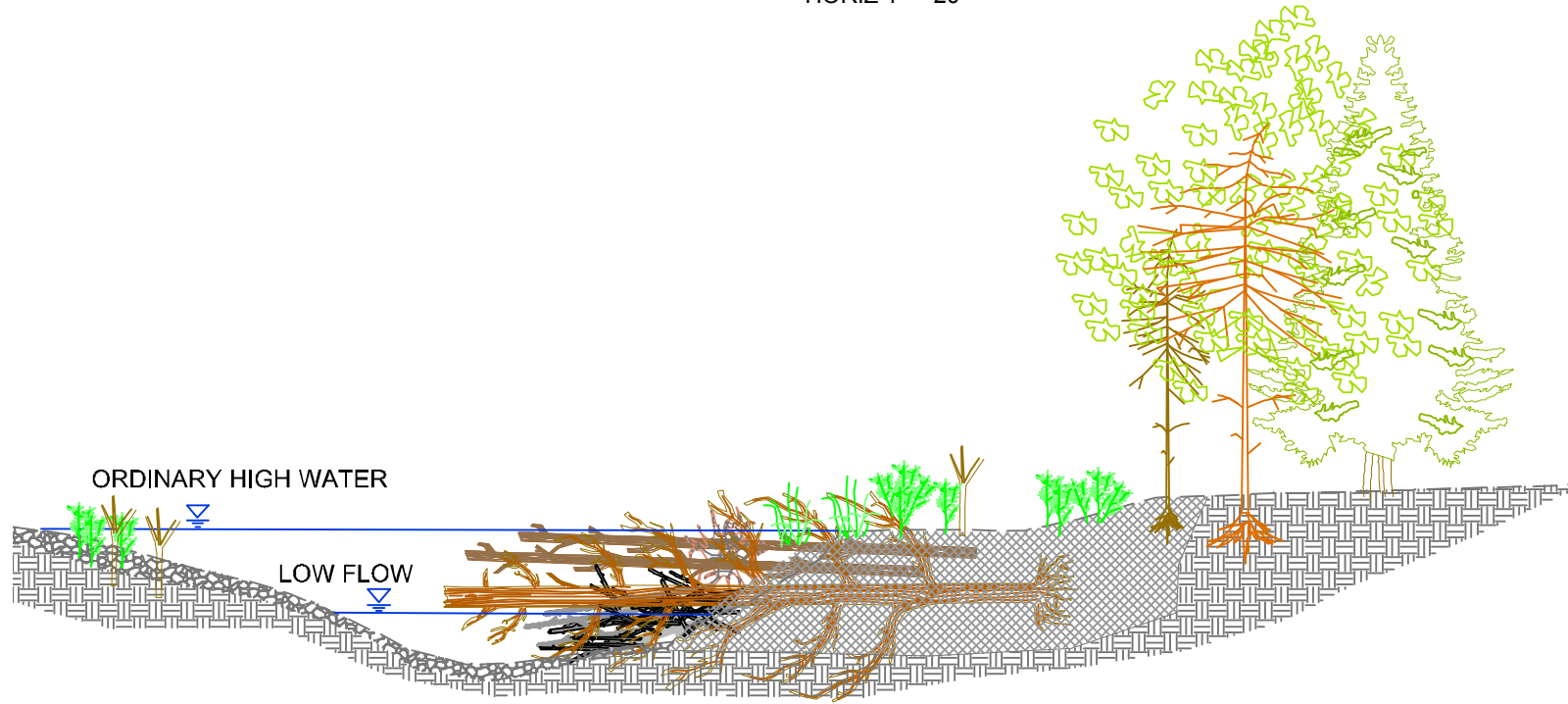


**1 PLAN VIEW**  
 HORIZ 1" = 20'

- ### BIOLOGICAL OBJECTIVES - DESIGN INTENT
- PURPOSE OF DEFLECTOR STRUCTURE IS TO CREATE AND MAINTAIN HYDRAULIC CONDITIONS THAT MAINTAIN POOL HABITAT, COMPLEXITY AND DIVERSITY.
  - DEFLECTOR DESIGNED FOR SMALLER POOLS. STRUCTURE MIMICS NATURAL WOOD ACCUMULATION IN POOL HABITAT THAT DEVELOPS FROM MATURE TREES FALLING INTO RIVER AND FORMING INTO LOG JAM BY HYDRAULICS AND ANNUAL ACCUMULATION OF WOOD MATERIAL.
  - PROVIDES STREAMBANK PROTECTION BY REDIRECTING FLOW AND SHEAR AWAY FROM NEAR BANK. PROMOTES STABLE BANK CONDITION FOR ESTABLISHING RIPARIAN VEGETATION.
  - PROVIDES OVERHEAD COVER, VELOCITY REFUGE, AND ORGANIC NUTRIENTS THAT SUPPORT FOOD WEB PROCESSES AND ALL LIFE STAGES OF JUVENILE AND ADULT SALMONID (REARING, HOLDING)



**3 ASSEMBLY DETAIL**  
 HORIZ 1" = 25'



**2 SECTION VIEW**  
 HORIZ 1" = 15'

### PROJECT ELEMENT NOTES

1. WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
2. LOCATION OF WOOD STRUCTURE SHALL BE STAKED AT EACH LOCATION BY CO.
3. CHANNEL GRADING SHALL BE COMPLETED PRIOR TO CONSTRUCTING LARGE WOOD STRUCTURE.
4. CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
5. WOOD STRUCTURE SHALL BE CONSTRUCTED IN LAYERS WITH RACKING AND SLASH MATERIAL WOVEN BELOW AND BETWEEN KEY STRUCTURE MEMBERS AS DIRECTED BY CO.
6. FOUNDATION OF WOOD STRUCTURE SHALL BE EXCAVATED TO THE DESIGNED CONSTRUCTED POOL DEPTH AT INDIVIDUAL STRUCTURE LOCATIONS. EXCAVATION SHALL SEPARATE SURFACE ORGANIC SOIL LAYER FROM UNDERLYING GRAVEL
7. BACKFILL STRUCTURE USING GRAVEL AND SOIL EXCAVATED FROM STRUCTURE FOUNDATION. STRUCTURE BACKFILL WILL PLACE COARSE FILL MATERIAL FOLLOWED BY SOIL.
8. BACKFILL OF STRUCTURE SHALL BE COMPLETED IN COMPACTED LIFTS OF 1 FOOT MAXIMUM LIFTS USING TRACK-HOE BUCKET TO ENSURE SPACES BETWEEN AND UNDER LOGS ARE BACK-FILLED TO AVOID VOIDS.

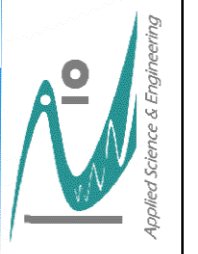
#### MATERIAL SCHEDULE

| Key | ITEM            | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N)      |
|-----|-----------------|----------|-----------|-------------|--------------------|
| A   | KEY MEMBER      | 0        | 16-18     | ~ 35        | YES - 3' DIA. MIN. |
| B   | WHOLE TREE      | 4        | 16        | ~ 45        | YES                |
| C   | LARGE LOG       | 0        | 16        | ~ 30        | NO                 |
| D   | SMALL (RACKING) | 10       | 8-12      | ~ 20        | OPTIONAL           |

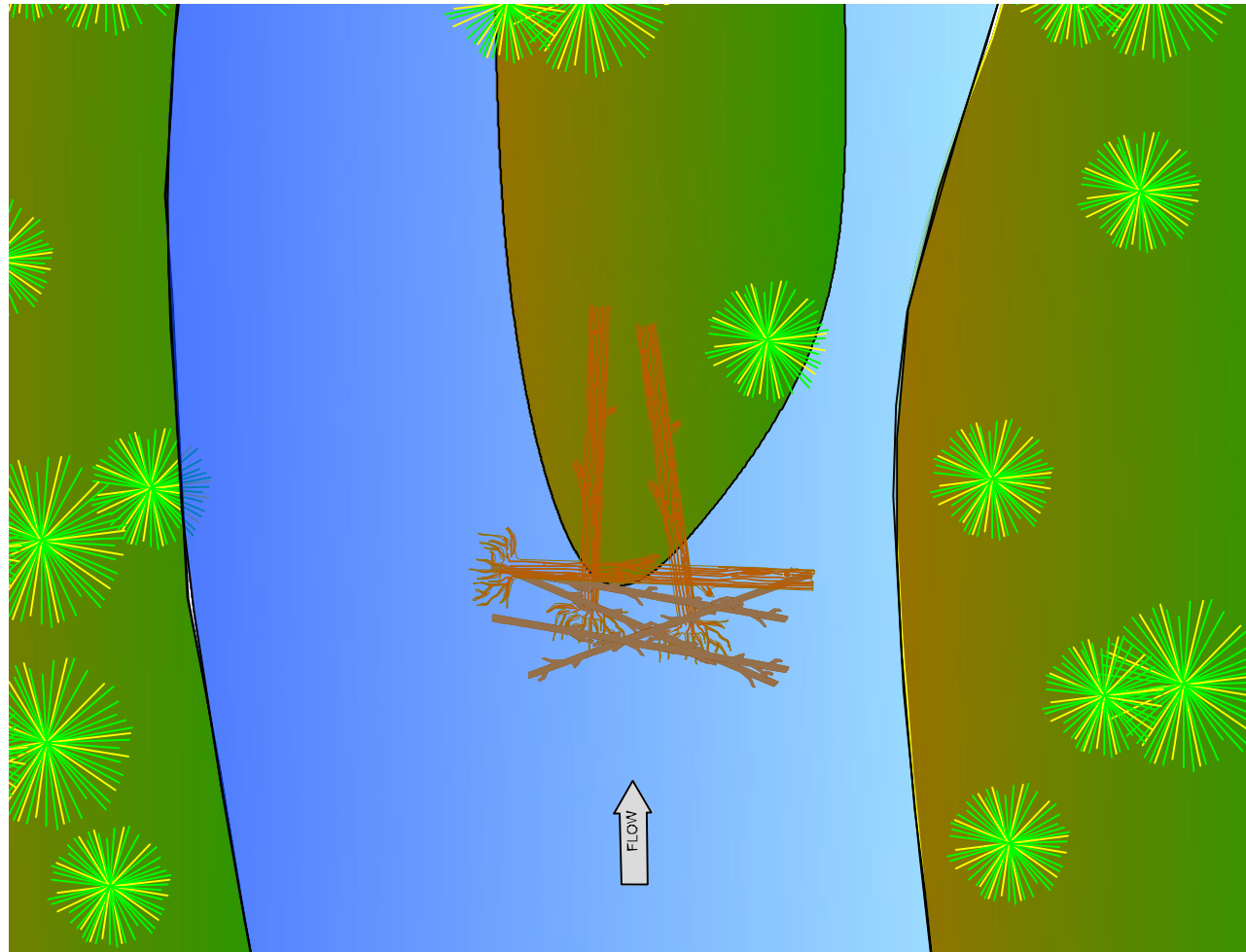
Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist; JF, Engineer

## TYPE 3 STRUCTURE LARGE WOOD STRUCTURE DETAIL

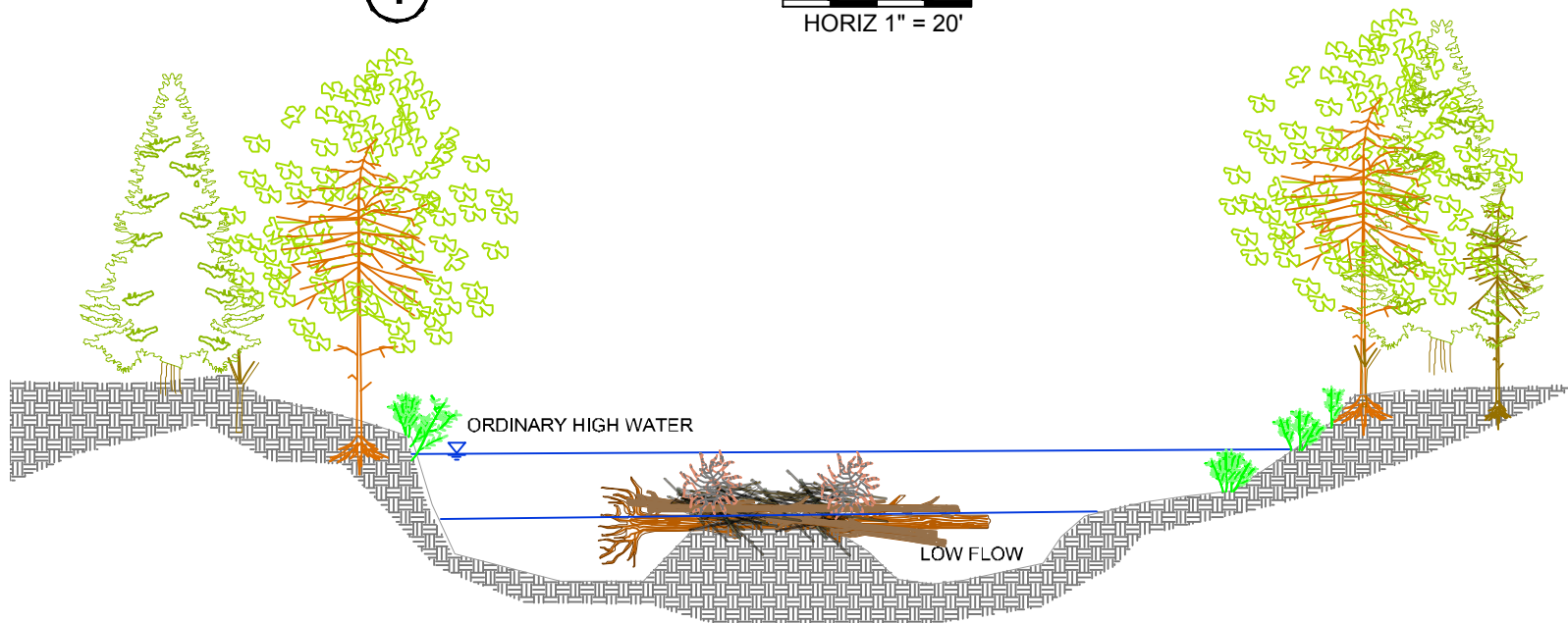
Rock Creek Stream & Floodplain Restoration



TYPE 3  
 LARGE WOOD  
 STRUCTURE  
 DETAIL



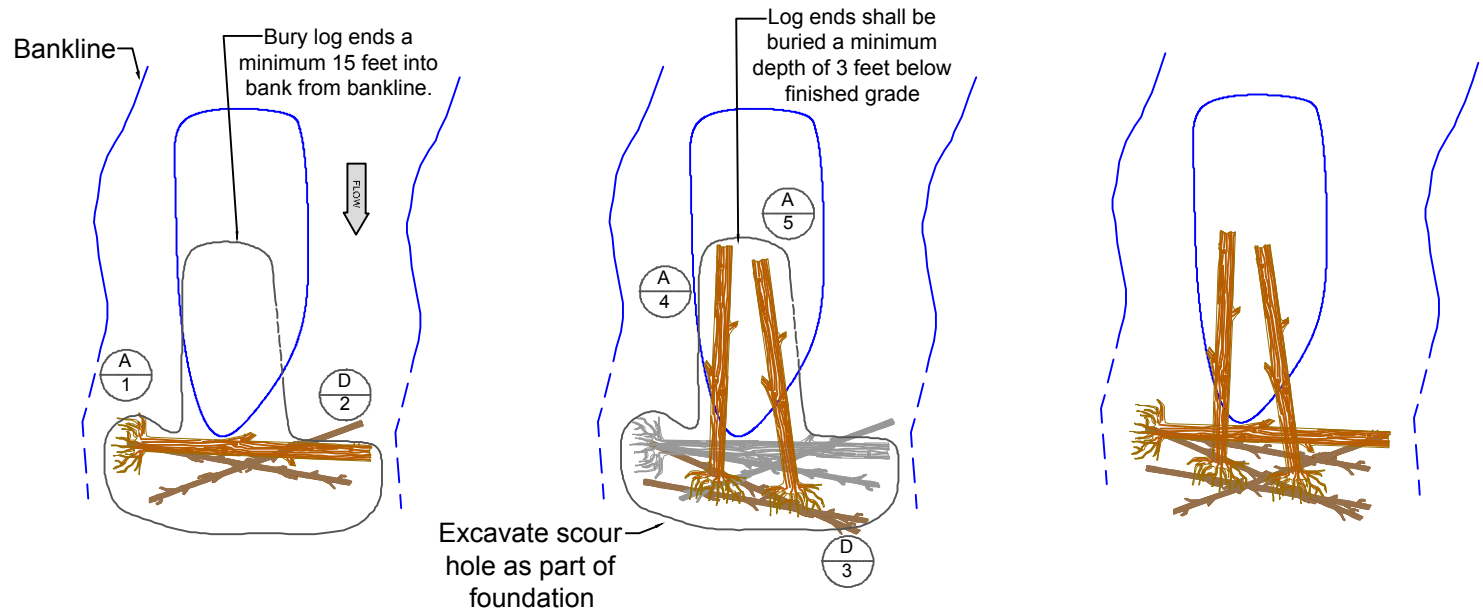
**1 PLAN VIEW**  
 HORIZ 1" = 20'



**2 SECTION VIEW**  
 HORIZ 1" = 20'

**BIOLOGICAL OBJECTIVES - DESIGN INTENT**

- PURPOSE OF APEX LARGE STRUCTURE IS TO CREATE AND MAINTAIN HYDRAULIC CONDITIONS THAT MAINTAIN SIDE CHANNEL HABITAT, IMPROVE MAIN CHANNEL WIDTH TO DEPTH, AND PROVIDE HABITAT COMPLEXITY AND DIVERSITY.
- APEX IS DESIGNED TO MINIC NATURAL LOG JAM FORMATIONS THAT DEVELOP ON UPSTREAM PORTIONS OF ISLANDS AND ASSIST IN PARTIONING STREAMFLOW BETWEEN MAIN CHANNEL AND SIDE CHANNEL HABITAT.
- PROVIDE ISLAND STABILITY BY PROMOTING SEDIMENT DEPOSITION AND RIPARIAN VEGETATION COLONIZATION.
- PROVIDES OVERHEAD COVER, VELOCITY REFUGE, AND ORGANIC NUTRIENTS THAT SUPPORT FOOD WEB PROCESSES AND ALL LIFE STAGES OF JUVENILE AND ADULT SALMONID (REARING, HOLDING)



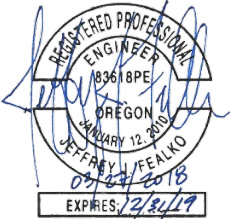
**3 ASSEMBLY DETAIL**  
 HORIZ 1" = 15'

**PROJECT ELEMENT NOTES**

1. WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
2. LOCATION OF WOOD STRUCTURE SHALL BE STAKED AT EACH LOCATION BY CO.
3. CHANNEL GRADING SHALL BE COMPLETED PRIOR TO CONSTRUCTING LARGE WOOD STRUCTURE.
4. CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
5. WOOD STRUCTURE SHALL BE CONSTRUCTED IN LAYERS WITH RACKING AND SLASH MATERIAL WOVEN BELOW AND BETWEEN KEY STRUCTURE MEMBERS AS DIRECTED BY CO.
6. FOUNDATION OF WOOD STRUCTURE SHALL BE EXCAVATED TO THE DESIGNED CONSTRUCTED CHANNEL DEPTH AT INDIVIDUAL STRUCTURE LOCATIONS. EXCAVATION SHALL SEPARATE SURFACE ORGANIC SOIL LAYER FROM UNDERLYING GRAVEL.
7. BACKFILL STRUCTURE USING GRAVEL AND SOIL EXCAVATED FROM STRUCTURE FOUNDATION. STRUCTURE BACKFILL WILL PLACE COARSE FILL MATERIAL FOLLOWED BY SOIL. BACKFILL OF STRUCTURE SHALL BE COMPLETED IN COMPACTED LIFTS OF 1 FOOT MAXIMUM LIFTS USING TRACK-HOE BUCKET TO ENSURE SPACES BETWEEN AND UNDER LOGS ARE BACK-FILLED TO AVOID VOIDS.

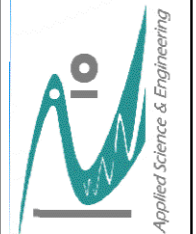
**MATERIAL SCHEDULE**

| Key | ITEM            | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N)      |
|-----|-----------------|----------|-----------|-------------|--------------------|
| A   | KEY MEMBER      | 3        | 16-18     | ~ 25        | YES - 3' DIA. MIN. |
| B   | WHOLE TREE      | 0        | 16        | ~ 45        | YES                |
| C   | LARGE LOG       | 0        | 16        | ~ 30        | NO                 |
| D   | SMALL (RACKING) | 5        | 8-12      | ~ 20        | OPTIONAL           |



|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**TYPE 4 STRUCTURE  
 LARGE WOOD STRUCTURE DETAIL**  
 Rock Creek Stream & Floodplain Restoration

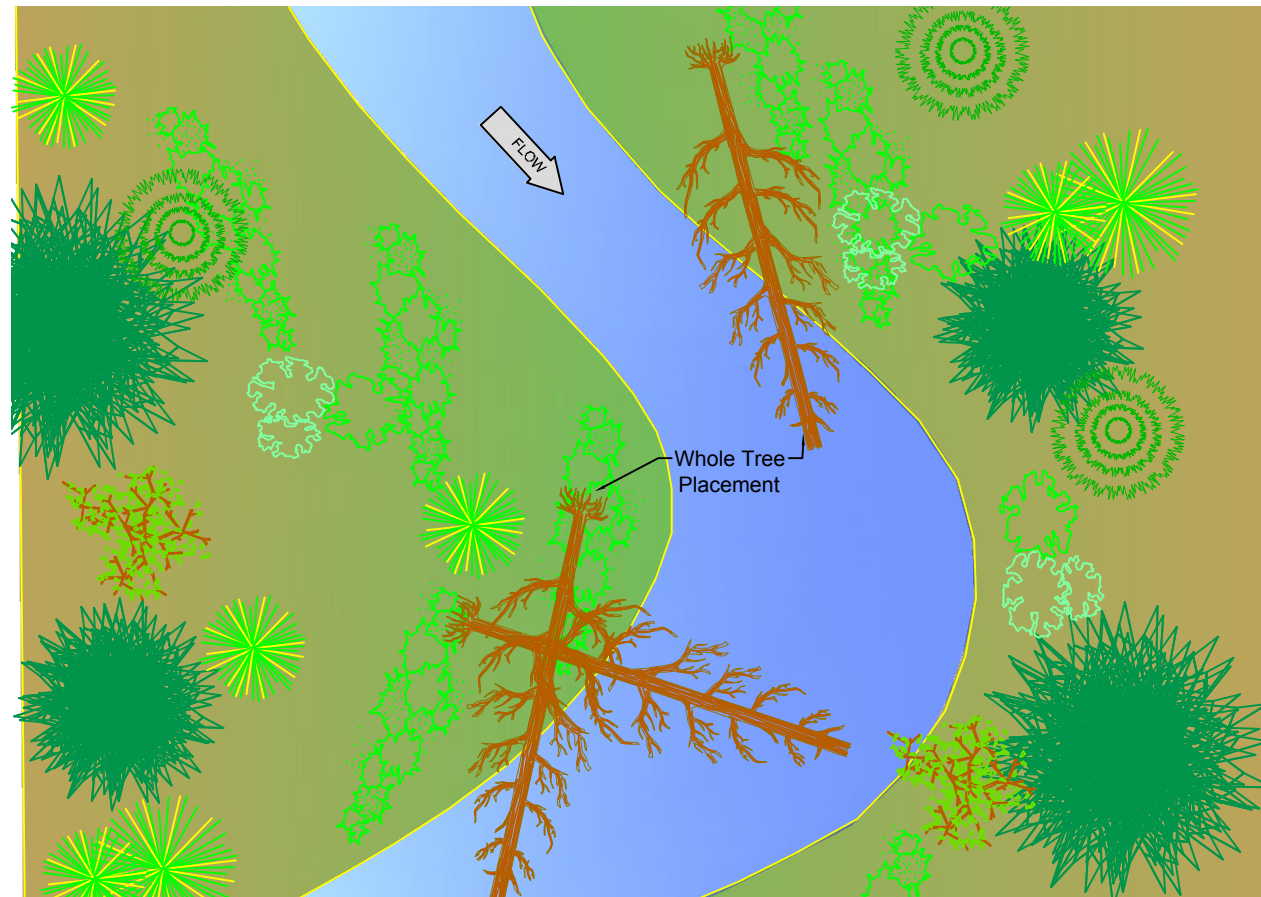


**TYPE 4  
 LARGE WOOD  
 STRUCTURE  
 DETAIL**

## BIOLOGICAL OBJECTIVES - DESIGN INTENT

- PURPOSE OF WHOLE TREE IS TO PROVIDE OVERHEAD COVER AND COMPLEXITY IN MAIN CHANNEL, SIDE CHANNELS, AND ALCOVE HABITATS.
- WHOLE TREE PLACEMENT MIMICS NATURAL WOOD RECRUITMENT TO FLOODPLAIN AND STREAM CHANNELS, PROVIDING COVER, ROUGHNESS, AND NUTRIENTS TO AQUATIC ENVIRONMENTS.
- FLOODPLAIN AND CHANNEL ROUGHNESS PROMOTES SEDIMENT SORTING, DEPOSITION AND RIPARIAN/WETLAND VEGETATION COLONIZATION.
- PROVIDES OVERHEAD COVER, VELOCITY REFUGE, AND ORGANIC NUTRIENTS THAT SUPPORT FOOD WEB PROCESSES AND ALL LIFE STAGES OF JUVENILE AND ADULT SALMONID (REARING, HOLDING)

### Type 5 Whole Tree



**1 PLAN VIEW**  
HORIZ 1" = 25'

### PROJECT ELEMENT NOTES

- WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
- LOCATION OF WHOLE TREE PLACEMENT SHALL BE STAKED AT EACH LOCATION BY CO.
- CHANNEL AND FLOODPLAIN GRADING SHALL BE COMPLETED PRIOR TO INSTALLING WHOLE TREES.
- CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
- WHOLE TREE PLACEMENT WILL BE DIRECTED BY CO.
- WHOLE TREES WILL BE PLACED INDIVIDUALLY OR IN GROUPS AS DIRECTED BY CO.
- ROOTWAD SHALL BE SLIGHTLY EXCAVATED IN STREAMBANK/FLOODPLAIN SO LOG BOLE CONTACTS GROUND SURFACE

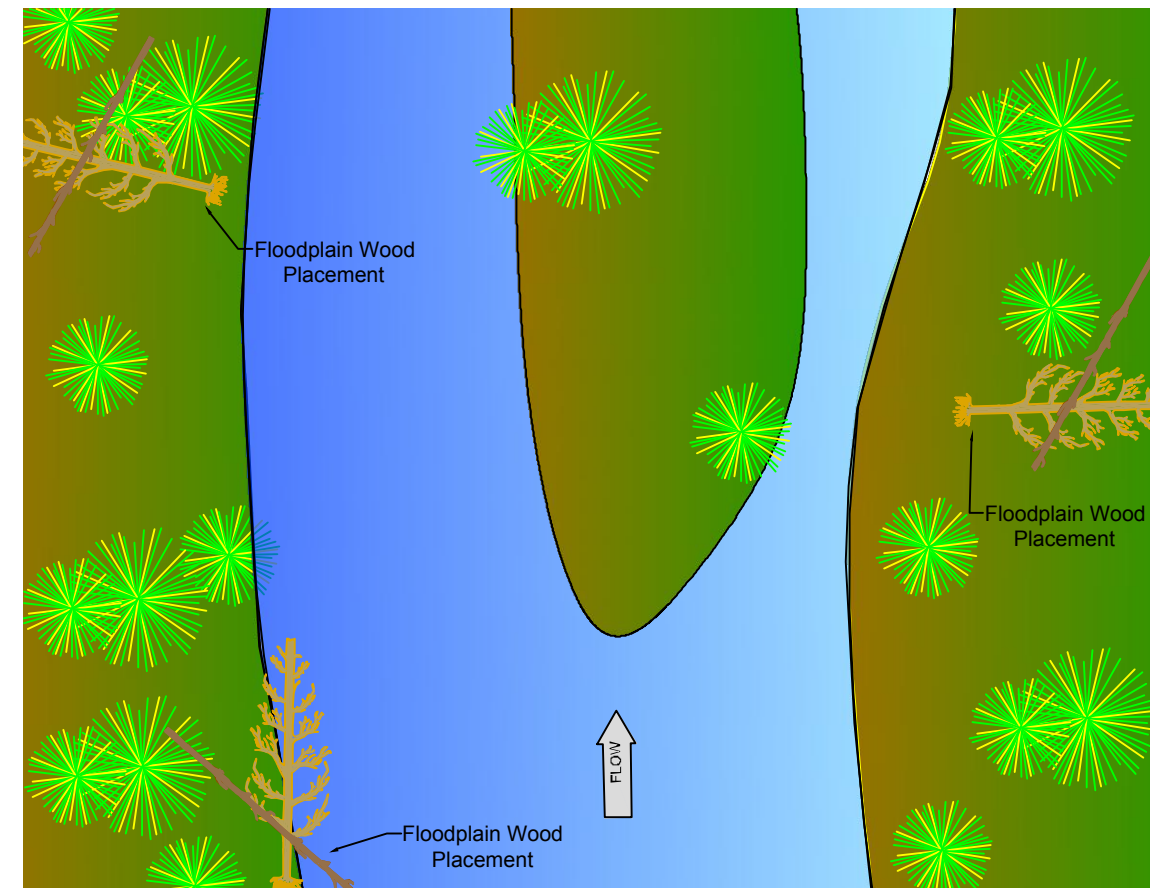
MATERIAL SCHEDULE

| ITEM       | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N) |
|------------|----------|-----------|-------------|---------------|
| WHOLE TREE | 1        | 16        | ~ 45+       | YES           |

## BIOLOGICAL OBJECTIVES - DESIGN INTENT

- PURPOSE OF FLOODPLAIN WOODY MATERIAL IS TO PROVIDE ROUGHNESS, SLOW WATER VELOCITY DURING HIGH WATER EVENTS, AND PROMOTE FINE SEDIMENT DEPOSITION AND RIPARIAN PLANT COMMUNITY COLONIZATION.
- FLOODPLAIN WOOD IS DESIGNED TO MIMIC NATURAL ACCUMULATIONS OF WOODY MATERIAL ON FLOODPLAIN AND GEOMORPHIC AND ECOLOGICAL PROCESSES AND FUNCTIONS THAT CONTRIBUTE TO FLOODPLAIN STABILITY AND ACCESSIONAL DEVELOPMENT OF RIPARIAN AND WETLAND VEGETATION.

### Type 6 Floodplain Roughness



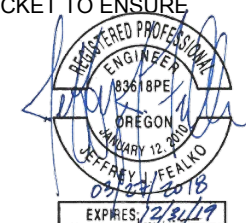
**1 PLAN VIEW**  
HORIZ 1" = 25'

### PROJECT ELEMENT NOTES

- WOOD MATERIAL SHALL COME FROM FIR, PINE, OR SPRUCE TREES.
- LOCATION OF WOOD STRUCTURE SHALL BE STAKED AT EACH LOCATION BY CO.
- CHANNEL AND FLOODPLAIN GRADING SHALL BE COMPLETED PRIOR TO CONSTRUCTING LARGE WOOD STRUCTURE.
- CUT ENDS ON ALL EXPOSED LOGS TO BE BROKEN AND PROVIDE A ROUGHENED APPEARANCE.
- FLOODPLAIN ROUGHNESS CONSISTS OF A TREE TOP AND SMALL LOG. SMALL LOG WILL BE USED AS A PINNING MEMBER WHICH IS TRENCHED INTO FLOODPLAIN.
- PINNING LOG WILL BE PLACED OVER TOP OF TREETOP MEMBER WITHIN 4 FEET OF LARGEST END OF TREE TOP
- FOUNDATION FOR PINNING LOG WILL BE EXCAVATED A MINIMUM DEPTH OF 3 FT. BELOW FINISHED GRADE. EXCAVATION SHALL SEPARATE SURFACE ORGANIC SOIL LAYER FROM UNDERLYING GRAVEL.
- BACKFILL STRUCTURE USING GRAVEL AND SOIL EXCAVATED FROM STRUCTURE FOUNDATION. STRUCTURE BACKFILL WILL PLACE COARSE FILL MATERIAL FOLLOWED BY SOIL. BACKFILL OF STRUCTURE SHALL BE COMPLETED IN COMPACTED LIFTS OF 1 FOOT MAXIMUM LIFTS USING TRACK-HOE BUCKET TO ENSURE SPACES BETWEEN AND UNDER LOGS ARE BACK-FILLED TO AVOID VOIDS.

MATERIAL SCHEDULE

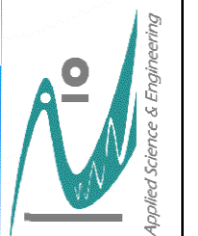
| ITEM        | QUANTITY | DIA. (IN) | LENGTH (FT) | ROOTWAD (Y/N) |
|-------------|----------|-----------|-------------|---------------|
| KEY MEMBER  | 1        | 12        | ~ 30        | OPTIONAL      |
| PINNING LOG | 1        | 8-12      | ~ 20        | OPTIONAL      |



|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

## TYPE 5 & 6 STRUCTURES LARGE WOOD STRUCTURE DETAILS

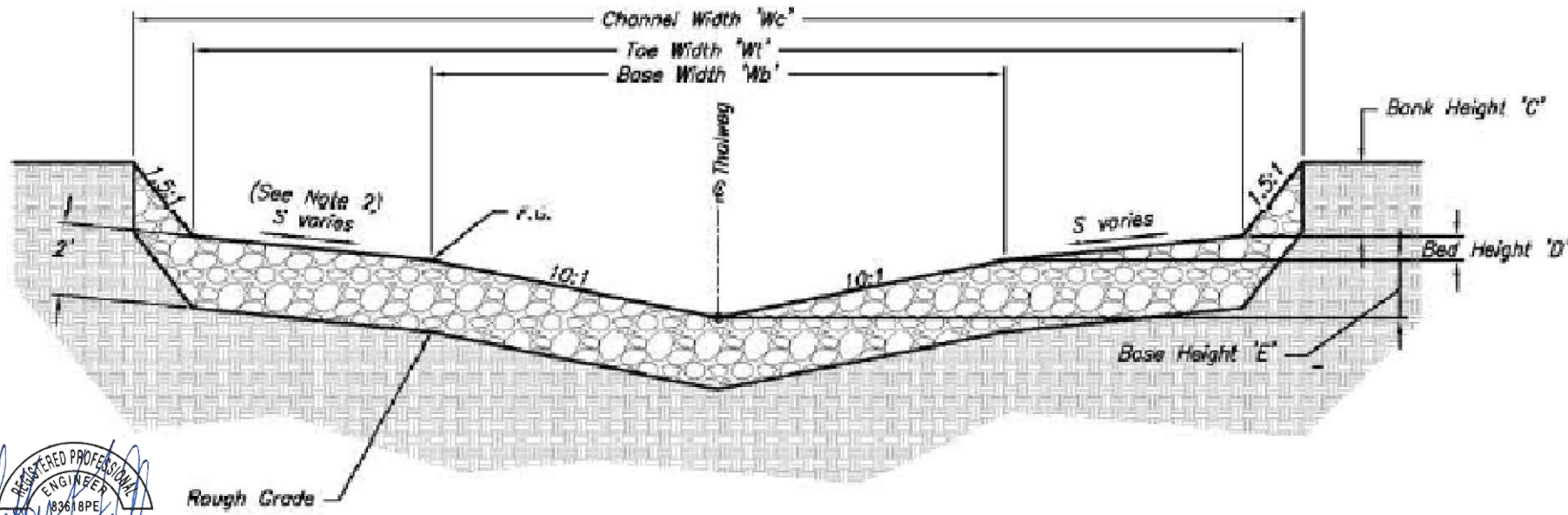
Rock Creek Stream & Floodplain Restoration



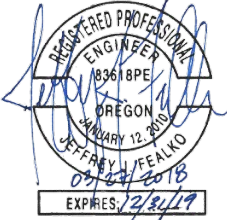
## TYPE 5 & 6 LARGE WOOD STRUCTURE DETAILS

## RIFFLE OVERVIEW

Riffle features are intended to mimic a natural stream channel. Riffles are to be constructed to be stable and to provide hydraulic roughness and fish resting areas through small pocket pool development. Riffles are to be constructed such that low flows remain on the surface.



**TYPICAL RIFFLE CREST CROSS SECTION**  
NOT TO SCALE



### CONSTRUCTED RIFFLE DETAILS

| CHANNEL      | STA.    | ELEVATION (ft) | SLOPE (ft/ft) | AREA (ft <sup>2</sup> ) | RIFFLE VOLUME (CY) | SMALL BOULDERS (EA) | LARGE BOULDERS (EA) | Volume of Riffle Type A Material (CY) | Volume of Riffle Type B Material (CY) |
|--------------|---------|----------------|---------------|-------------------------|--------------------|---------------------|---------------------|---------------------------------------|---------------------------------------|
| MAIN CHANNEL | 2695    | 3023.03        | 0.0172        | 1012                    | 75                 | 8                   | 4                   | 75                                    | 0                                     |
|              | 2843    | 3024.52        | 0.0188        | 990                     | 74                 | 7                   | 4                   | 74                                    | 0                                     |
|              | 2965    | 3025.75        | 0.0188        | 1082                    | 81                 | 17                  | 8                   | 0                                     | 81                                    |
|              | 3090    | 3027.00        | 0.0200        | 996                     | 74                 | 16                  | 7                   | 0                                     | 74                                    |
|              | 3235    | 3028.40        | 0.0200        | 1844                    | 137                | 13                  | 6                   | 137                                   | 0                                     |
|              | 3557    | 3031.60        | 0.0179        | 1294                    | 96                 | 9                   | 4                   | 96                                    | 0                                     |
|              | 3724    | 3033.30        | 0.0196        | 1627                    | 121                | 12                  | 6                   | 121                                   | 0                                     |
|              | 2828    | 3033.80        | 0.0200        | 255                     | 19                 | 5                   | 3                   | 19                                    | 0                                     |
|              | 3948    | 3035.60        | 0.0321        | 1806                    | 134                | 29                  | 13                  | 134                                   | 0                                     |
|              | 4108    | 3037.20        | 0.0183        | 1869                    | 139                | 13                  | 6                   | 139                                   | 0                                     |
|              | 4274    | 3038.90        | 0.0240        | 1480                    | 110                | 24                  | 11                  | 0                                     | 110                                   |
|              | 4645    | 3042.85        | 0.0207        | 1329                    | 99                 | 21                  | 10                  | 0                                     | 99                                    |
|              | 4800    | 3044.50        | 0.0203        | 1821                    | 135                | 13                  | 6                   | 135                                   | 0                                     |
|              | 4897    | 3045.50        | 0.0194        | 1227                    | 91                 | 9                   | 4                   | 91                                    | 0                                     |
|              | 4997    | 3046.60        | 0.0179        | 1133                    | 84                 | 8                   | 4                   | 84                                    | 0                                     |
|              | 5160    | 3048.26        | 0.0160        | 2575                    | 191                | 18                  | 8                   | 191                                   | 0                                     |
|              | 5308    | 3049.77        | 0.0190        | 1592                    | 118                | 12                  | 5                   | 118                                   | 0                                     |
| 5568         | 3052.50 | 0.0250         | 1686          | 125                     | 27                 | 12                  | 125                 | 0                                     |                                       |
| 5747         | 3054.40 | 0.0222         | 2171          | 161                     | 16                 | 7                   | 161                 | 0                                     |                                       |
| 5996         | 3056.70 | 0.0290         | 1940          | 144                     | 31                 | 14                  | 0                   | 144                                   |                                       |
| 6189         | 3059.30 | 0.0240         | 3089          | 229                     | 22                 | 10                  | 229                 | 0                                     |                                       |
| 6374         | 3061.80 | 0.0308         | 2007          | 149                     | 32                 | 14                  | 0                   | 149                                   |                                       |
| 6566         | 3063.40 | 0.0190         | 2403          | 178                     | 17                 | 8                   | 178                 | 0                                     |                                       |
| 7024         | 3067.30 | 0.0202         | 3600          | 267                     | 25                 | 12                  | 267                 | 0                                     |                                       |
| 7350         | 3070.40 | 0.0200         | 2014          | 150                     | 32                 | 14                  | 0                   | 150                                   |                                       |
| SC-1         | 82      | 3053.52        | 0.0149        | 500                     | 38                 | 5                   | 3                   | 38                                    | 0                                     |
| SC-1         | 204     | 3055.34        | 0.0149        | 702                     | 52                 | 11                  | 5                   | 0                                     | 52                                    |
| SC-2         | 232     | 3068.46        | 0.0202        | 1744                    | 130                | 13                  | 6                   | 130                                   | 0                                     |
| <b>TOTAL</b> |         |                |               | <b>45788</b>            | <b>3401</b>        | <b>465</b>          | <b>214</b>          | <b>2542</b>                           | <b>859</b>                            |

#### RIFFLE MATRIX A SPECIFICATION

| Percent Passing | Size Class (inches) |
|-----------------|---------------------|
| D100            | 10 - 12             |
| D84             | 6 - 8               |
| D50             | 3 - 5               |
| D16             | 0.25 - 2            |
| D10             | <0.15               |

#### RIFFLE MATRIX B SPECIFICATION

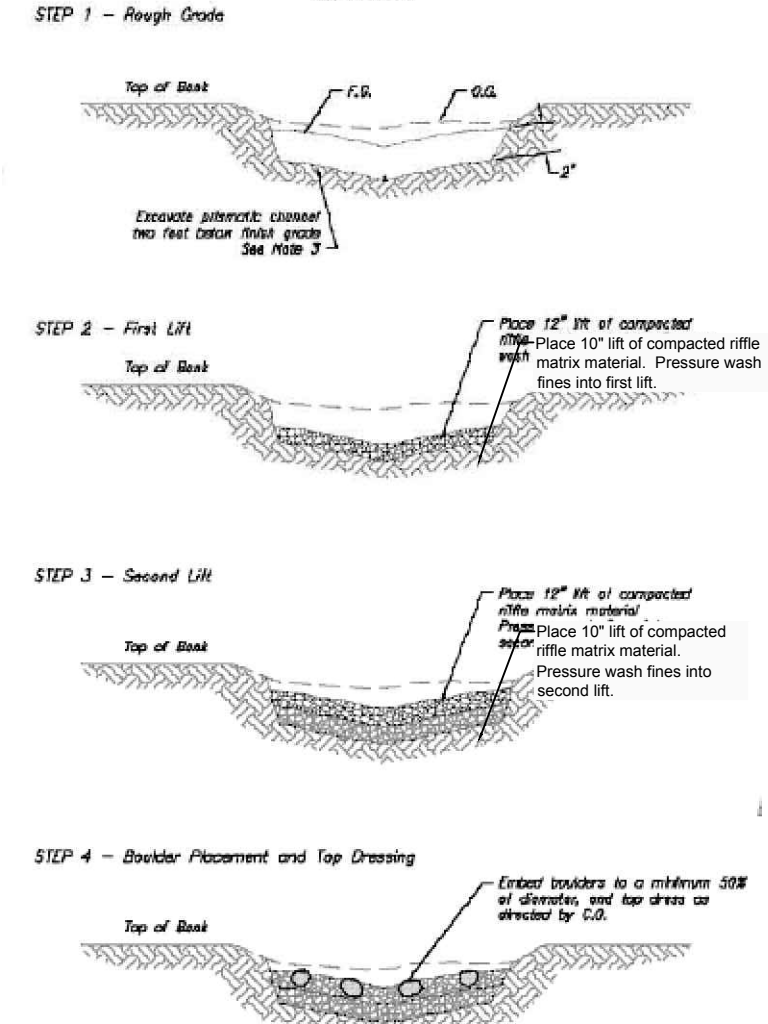
| Percent Passing | Size Class (inches) |
|-----------------|---------------------|
| D100            | 10 - 12             |
| D84             | 8 - 10              |
| D50             | 5 - 7               |
| D16             | 0.25 - 2            |
| D10             | <0.15               |

#### RIFFLE BOULDER SPECIFICATION

| Boulder Size | Size Class (inches) |
|--------------|---------------------|
| Small        | 10 - 18             |
| Large        | 18 - 24             |

#### RIFFLE CONSTRUCTION STEPS

NOT TO SCALE

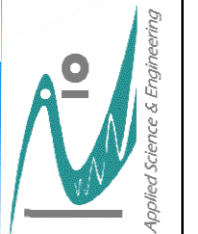


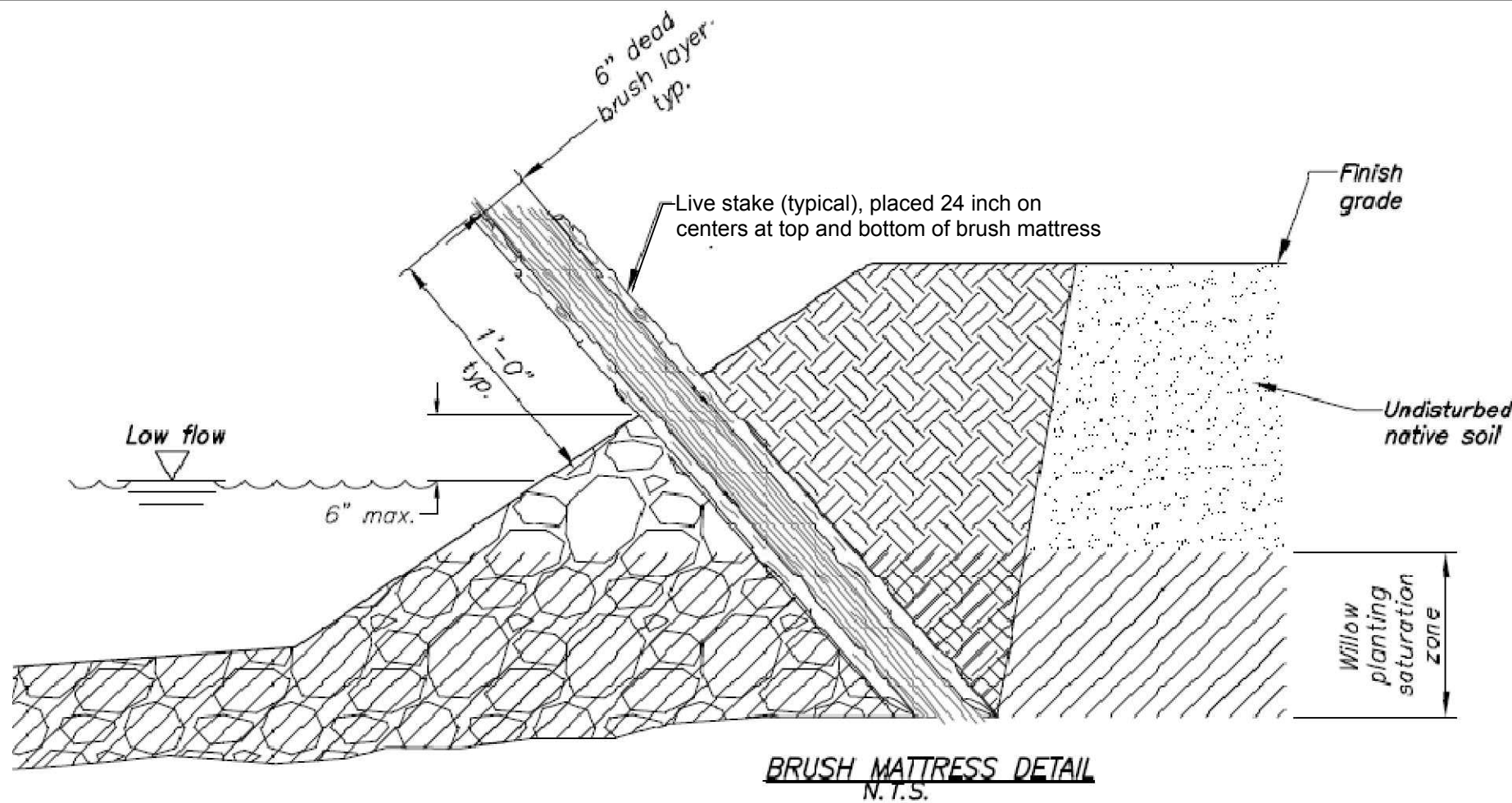
#### RIFFLE NOTES:

- Riffles that do not meet gravel specifications in situ will be over excavated by 20 inches and replaced with specified riffle material.
- Treat existing channel segments by removing organics and creating a prismatic working surface following thalweg and design contours on grading sheets.
- As required, import well-mixed riffle matrix material. Compact material in 10 inch lifts using tracked excavator. Add fines on surface and wash into each lift with nozzle until water ponds on surface and approved by CO.
- Place Boulders as directed by CO. Boulders shall be embedded into stream bottom a minimum 50%. Back-fill around boulders will be compacted with track-hoe bucket as directed by CO.
- The upstream 40 feet of each riffle shall be constructed a minimum 0.3 feet above design elevations for settlement of placed material.
- The completed riffle surfaces will be top dressed with a 3-6 inch layer of loose placed, clean gravels in the D100 to D50 size range. This material will be tracked in with no more than 2 passes with a tracked excavator to slightly seat to layer of riffle material.
- Percent passing size class is based on nominal diameter of rock.
- Nominal diameter shall be measured as the intermediate axis where small and large axis shall not be more than 3 times less than or greater than the nominal diameter.
- Acceptable riffle material may be created from levees planned for removal and/or stockpiled material.
- The CO will work with Contractor to identify riffles requiring over excavation, identification of suitable fill material, and placement of boulders.

Date: Mar 2018  
 Designed: JF, AC  
 Drawn: AC, JF  
 Checked: JF  
 Approved: AC, JF, BPA  
 Title: AC, Biologist, JF, Engineer

**RIFFLE CONSTRUCTION & HABITAT BOULDERS**  
 Rock Creek Stream & Floodplain Restoration





**BRUSH MATTRESS DETAIL**  
N.T.S.

**BRUSH MATTRESS MATERIAL SCHEDULE (PER 10 FT LENGTH)**

| ITEM             | DESCRIPTION                                  | QUANTITY |
|------------------|--|----------|
| Live Cuttings    | 4' long, live willow cutting                 | 20       |
| Dead Brush Layer | 6" thick layer of dead brush when compressed | ~0.8 CY  |

**Notes:**

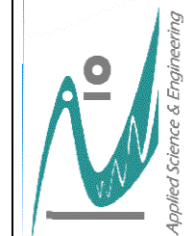
- BRUSH MATTRESS SHALL BE COMPOSED OF A 6 INCH LAYER OF DEAD BRANCHES OF NATIVE SPECIES BETWEEN TWO LAYERS OF LIVE CUTTINGS. LIVE CUTTINGS WILL BE SUPPLIED BY CO.
- A TRENCH SHALL BE EXCAVATED AT LOCATION IDENTIFIED IN THESE PLAN SO THE BOTTOM OF THE BRUSH MATTRESS IS WITHIN THE SATURATION ZONE.
- LIVE CUTTINGS WILL SHALL BE PLACED EVERY 24 INCHES ALONG THE LENGTH OF THE TRENCH. LIVE CUTTINGS SHALL BE INSTALLED WITH BUDS ORIENTED UPWARD.
- DEAD BRANCHES SHALL BE PLACED UNIFORMLY ALONG THE TRENCH TO A COMPRESSED DEPTH OF 6 INCHES.
- A TOP LAYER OF LIVE CUTTINGS WILL BE PLACED EVERY 24 INCHES ALONG THE LENGTH OF THE BRUSH MATTRESS.
- SOIL SHALL BE BACKFILLED WITH 6 INCH LIFTS. THE FIRST LIFT SHALL BE WASHED INTO BRUSH MAT WITH WATER TO ELIMINATE VOIDS. SUPPLEMENTAL LIFTS SHALL BE COMPACTED.
- THE EXACT LOCATION OF EACH OCCURENCE OF BRUSH MATTRESS SHALL BE STAKED BY CONTRACTOR AND APPROVE BY CO PRIOR TO CONSTRUCTING PARTICULAR OCCURENCE.
- ROUGH GRADING OF CHANNEL SHALL BE COMPLETED PRIOR TO CONSTRUCTING BRUSH MATTRESSES.



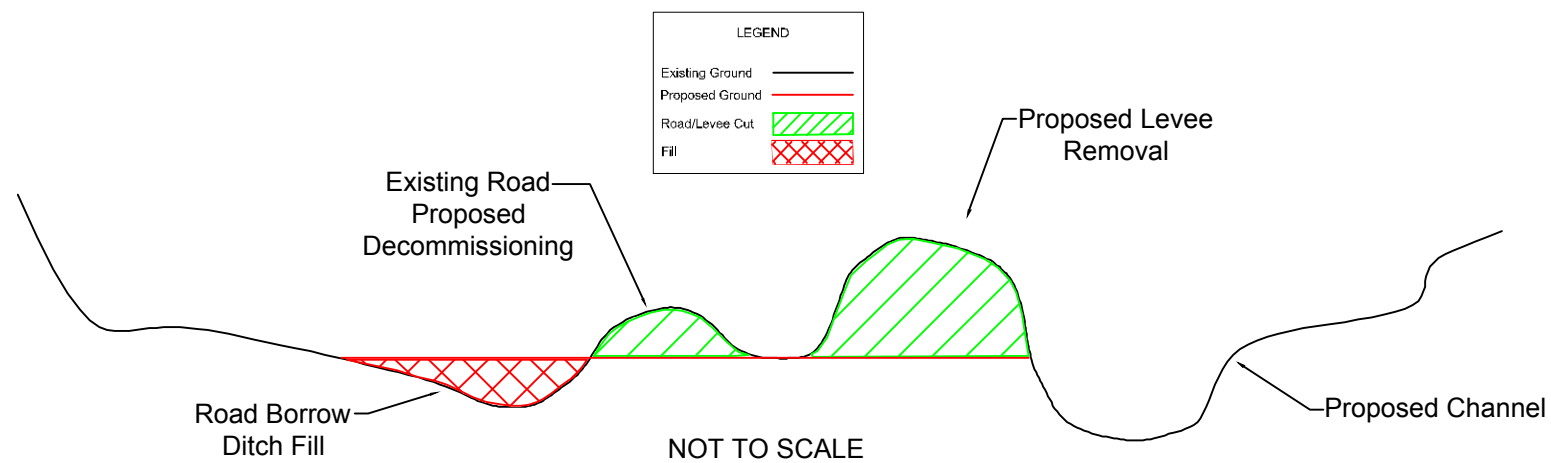
| Streambank Bioengineering - Willow/Brush Mattress |                    |               |
|---|--------------------|---------------|
| Station   | Streambank (LB/RB) | Length (Feet) |
| 25+50   | RB                 | 62            |
| 26+75   | RB                 | 25            |
| 29+25   | RB                 | 35            |
| 31+00   | RB                 | 65            |
| 32+00   | RB                 | 54            |
| 33+50   | LB                 | 65            |
| 35+25   | RB                 | 20            |
| 37+00   | RB                 | 47            |
| 37+00   | LB                 | 51            |
| 38+25   | LB                 | 34            |
| 39+25   | RB                 | 65            |
| 42+50   | RB                 | 77            |
| 43+75   | LB                 | 40            |
| 47+25   | LB                 | 30            |
| 50+50   | LB                 | 53            |
| 51+25   | RB                 | 83            |
| 53+75   | LB                 | 51            |
| 54+50   | RB                 | 46            |
| 55+25   | RB                 | 30            |
| 57+00   | LB                 | 42            |
| 58+00   | RB                 | 77            |
| 61+00   | LB                 | 47            |
| 63+00   | RB                 | 30            |
| 64+75   | LB                 | 60            |
| 66+75   | RB                 | 26            |
| 0+00 SC 1   | RB                 | 180           |
| 1+25 SC 1   | RB                 | 37            |
| 0+50 SC 2   | RB                 | 175           |
| 70+50   | LB                 | 192           |
| 71+50   | RB                 | 97            |
| 75+50   | LB                 | 32            |
| <b>TOTAL</b>                                      |                    | <b>1928</b>   |

Date Mar 2018  
 Designed JF, AC  
 Drawn AC, JF  
 Checked JF  
 Approved AC, JF, BPA  
 Title AC, Biologist; JF, Engineer

**Brush Mattress DETAIL**  
Rock Creek Stream & Floodplain Restoration



**BRUSH MATTRESS DETAIL**

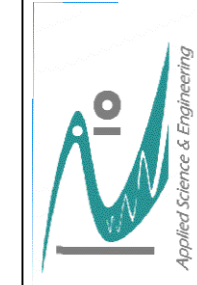


**NOTES:**

1. LEVEE REMOVAL AND ROAD DECOMMISSIONING LOCATIONS ARE ILLUSTRATED IN SHEETS 12 THROUGH 23.
2. LEVEE REMOVAL INCLUDES EXCAVATION, LOADING, AND HAULING LEVEE MATERIAL TO CHANNEL FILL LOCATIONS ILLUSTRATE ON SHEETS 45 THROUGH 53.
3. LEVEE SITES WILL BE GRADED AND BLENDED TO SURROUNDING TOPOGRAPHY AND ELEVATIONS AT DIRECTION OF CO.
4. ROAD DECOMMISSIONING INCLUDES EXCAVATION AND GRADING TO MATCH SURROUNDING TOPOGRAPHY AND ELEVATIONS AT DIRECTION OF CO.
5. BORROW DITCH ADJACENT TO ROAD PRISM WILL BE BACKFILLED WITH ROAD CUT MATERIAL AND BLENDED TO SURROUNDING TOPOGRAPHY AND ELEVATIONS AT DIRECTION OF CO.
6. EXCESS ROAD MATERIAL WILL BE HAULED TO DESIGNATED CHANNEL FILL LOCATIONS.
7. ROAD SEGMENTS THAT DO NOT REQUIRE MATERIAL REMOVAL WILL BE DECOMPACTED/RIPPED USING DOZER MOUNTED RIPPER TO A DEPTH OF 2 FEET.
8. CONTRACTOR SHALL PLACE FILL IN DESIGNED BORROW DITCH SEGMENTS IN (1) ONE FOOT MAXIMUM LIFTS AND COMPACT USING HEAVY TRACKED EQUIPMENT. NO TESTING OF COMPACTED DENSITY WILL BE PERFORMED, BUT THE INTENT IS TO ACHIEVE 85% RELATIVE DENSITY; ACCEPTANCE WILL BE BY COTR OBSERVING FILL PLACEMENT AND COMPACT EFFORT
4. THE QUANTITY OF MATERIAL TO BE EXCAVATED HAS BEEN MEASURED BY SURFACE SUBTRACTION IN AUTOCAD AND IS THEREFORE IN-PLACE AND NOT FACTORED FOR EXPANSION.

|          |                             |      |          |
|----------|-----------------------------|------|----------|
| Designed | JF, AC                      | Date | Mar 2018 |
| Drawn    | AC, JF                      |      |          |
| Checked  | JF                          |      |          |
| Approved | AC, JF, BPA                 |      |          |
| Title    | AC, Biologist; JF, Engineer |      |          |

**LEVEE AND ROAD REMOVAL GRADING DETAIL**  
Rock Creek Stream & Floodplain Restoration



LEVEE & ROAD REMOVAL GRADING DETAIL

**USE OF SITE**

**CONTRACTORS USE OF PREMISES**

- A. Prior to performing work, the Contractor shall become thoroughly familiar with the project site, project site conditions, and all portions of the work.
- B. Contractor must coordinate all work and access to the site with the Contracting Officer. The Contracting Officer will be responsible for coordination with the property owner.
- C. Contractor must coordinate timing of fish salvage with the Contracting Officer. The Contracting Officer will be responsible for conducting the fish salvage.
- D. The Contractor is responsible for maintaining public safety in and around the project site and will provide any safety precautions such as temporary fencing or other methods at the Contractor's discretion where deemed necessary. The Contractor shall be solely and completely responsible for compliance with all applicable OSHA and NRS chapter 618 standards, in the construction practices for all employees directly engaged in the construction of this project.
- E. The Contractor is responsible for the security of property at the project site and will provide reasonable protection to prevent damage or loss to equipment, materials, and supplies incorporated in the project and to the property owner.
- F. The Contractor shall only access the project site as shown on the drawings. Alternate gate access points shall not be used, unless authorized by the Contracting Officer.
- G. Contractor shall only use designated access routes and stream crossing locations as indicated on the drawings.
- H. The Contractor shall cause notice to be given to the state of Oregon underground utility center and to any underground utility facilities who are not members of the registered protection service. The Contractor must take all reasonable measures to protect existing utilities and all notices shall be given at least 72 hours prior to the start of construction. All work performed adjacent to utilities shall be in accordance with procedures outlined by the utility company. The Contractor shall immediately report any damage to utilities to the sponsor and the utility company.
- I. The Contractor shall be responsible for any damage incurred to any utility lines at no cost or obligation to the sponsor or the property owner.
- J. Movement of construction equipment over pipes, bridges, utilities or infrastructure during construction shall be at the Contractor's risk. The Contractor shall be responsible for any damage incurred to infrastructure at no cost or obligation to the sponsor or the property owner.
- K. Contractor is expected to keep a neat and tidy construction site, free of accumulated waste materials and trash.
- L. Contractor shall take all measures necessary to minimize damage to existing vegetation during construction activities.
- M. The Contractor shall only remove trees and shrubs that are absolutely necessary for the execution of the work and shall make all efforts to minimize tree removal. In the event that a tree or shrub outside the immediate work areas must be removed or damaged, the Contractor shall obtain prior approval from the Contracting Officer. Any tree or shrub unnecessarily removed from the work site shall be replaced by a new tree or shrub of equal or greater value at the sole expense of the Contractor as approved by the Contracting Officer.
- N. The Contractor shall remove all temporary equipment and facilities upon completion of work under this contract.

**EQUIPMENT**

- A. Contractor is required to pressure wash and remove all dirt, grease, oil, fuel, vegetation and weed seeds before bringing equipment on site to limit introduction of noxious weeds, aquatic invasives and pollutants to the site.
- B. Complete vehicle and equipment staging, cleaning, maintenance, refueling, and fuel storage in the designated construction staging and material storage area a minimum of 150' away from any natural water body.
- C. Inspect all vehicles and equipment operated within 150 feet of live water daily for fluid leaks before leaving the construction staging and material storage area. Repair any leaks detected in the construction staging and material storage area before resuming operation. Document inspections in a record that is available for review on request by the Contracting Officer and regulatory agencies.
- D. Use of equipment in flowing water is limited by applicable permits. Equipment must be thoroughly cleaned before entering the water. Contractor is responsible for compliance with applicable regulations for in-water equipment use.
- E. Hydraulics fluids - all equipment that are doing work in active stream channels, or permanent water bodies during project construction must use hydraulic oil that meets or exceeds environmentally acceptable lubricants by the u.s. epa (2011); e.g., mineral oil, polyglycol, vegetable oil, synthetic ester; mobil® biodegradable hydraulic oils, total® hydraulic fluid, terresolve technologies ltd.® biobased biodegradable lubricants, cougar lubrication® 2xt bio engine oil, series 4300 synthetic bio-degradable hydraulic oil, 8060-2 synthetic bio-degradable grease no. 2, etc. Or meet stringent acute aquatic toxicity (1-50), which is inherently biodegradable. This does not include trucks, dozers, front end loaders, etc., that are operated on the flood plain or involved in the construction of new channels prior to adding water flow or filling abandoned channels after de-watering. All products shall be api certified and the vendor shall furnish documentation of the certification upon request. Products must meet the performance and warranty requirements of the manufacturers listed in the specifications.
- F. Absorbent pads to soak up leaks and a fuel spill response kit (including rag pads and booms) of appropriate size for the equipment used shall be on site at all times and readily available throughout the construction period.

**HOURS OF WORK**

- A. The normal work hours shall be 7:00 am to 7:00 pm, Monday through Friday. No work shall be performed outside the normal work hours, or on Saturdays, Sundays, or holidays unless authorized by the Contracting Officer. The Contractor shall request work hour variations in writing via email and obtain written approval from the Contracting Officer prior to working outside normal work hours.

**IN-STREAM WORK**

- A. In-stream work is allowed as specified in the permit documents.
- B. Hip III turbidity criteria shall be strictly adhered to while completing all instream work. Cofferdams, flow diversion structures and bypass channels shall be installed at all locations indicated on the drawings or at locations shown on the submitted and approved Cofferdam and Flow Diversion Plan. Some aspects of the project may not require the use of a cofferdam to complete the work.
- C. Dewatering within cofferdams shall be performed to the extent necessary to construct the project as shown on these plans, as determined by the

Contractor. Dewatering shall be performed as necessary by the Contractor to maintain a work area at the location of large wood structure construction activities such that water is no deeper than the diameter of the log(s) on the lowest layer of the structure, and at the location of channel construction activities such that water is shallow enough to allow the Contracting Officer to easily inspect finished elevations of the work. Discharge from dewatering within specific work areas shall be routed to the floodplain areas to allow the removal of fine sediments or other contaminants prior to reentering the active channel. All pumps used by the Contractor for dewatering shall have screened intakes that meet Oregon Department of Fish and Wildlife specifications and National Marine Fisheries Service anadromous salmonid passage facility design criteria (NMFS, 2011).

**TURBIDITY MONITORING**

- A. Turbidity monitoring is required as part of this project and shall be completed by the Contractor in accordance with hip III conservation measures. The Contractor shall comply with all requirements for turbidity as set forth in the permit documents and follow the protocols outlined below.
  - a) Take a background turbidity sample using a recently-calibrated turbidity meter in accordance with manufacturer's instructions, or measure turbidity with a visual turbidity observation. Turbidity should be measured every 2 hours while in-water work is being implemented or more often if sediment disturbance varies greatly. Turbidity does not need to be monitored when working in the dewatered sections unless a visible plume is evident. The background samples should be taken at a relatively undisturbed location approximately 100 feet upstream from the project area. Record the observation, location (latitude/longitude), and time before monitoring at the downstream point, known as the measurement compliance point.
  - b) Take a second sample, immediately after each upstream sample, at the measurement compliance point, approximately 100 feet downstream from the project area. Record the downstream observation, location, and time.
  - c) Compare the upstream and downstream samples. If observed or measured turbidity downstream is more than upstream observation or measurement (> 10%), the activity must be modified to reduce turbidity. If visual estimates are used, an obvious difference between upstream and downstream observations shall bear the assumption of a (> 10%) difference (figure 1). Mark "yes" or "no" on your datasheet. Continue to monitor every 2 hours as long as instream activity continues.
  - d) If exceedances occur for more than two consecutive monitoring intervals (after 4 hours), the activity must stop until the turbidity level returns to background, and the EC lead must be notified within 48 hours. The EC lead shall document the reasons for the exceedance and corrective measures taken then notify the local NMFS branch chief and/or USFWS field supervisor and seek recommendations.
  - e) If at any time, monitoring, inspections, or observations show that the turbidity controls are ineffective, immediately mobilize work crews to repair, replace, or reinforce controls as necessary.
  - f) Any exceedance of the turbidity standard must be reported to the DEQ regional office within 24 hours. Copies of turbidity monitoring records or logs must be available to DEQ upon request. The log must include background measurements (in NTUs); down-current measurements, comparison of background and down-current monitoring as a numeric value (in NTUs), and latitude/longitude, time and date for each sampling event. Monitoring records or logs must describe all exceedances and subsequent actions taken to correct the violations, including monitoring and the effectiveness of the action(s) taken.

**TEMPORARY UTILITIES**

**TEMPORARY ELECTRIC**

- A. Electric power is not available at the site.
- B. If temporary power is necessary to operate pumps, Contractor shall provide all generators, and other electrical equipment and facilities for obtaining and distributing power on the site.
- C. All generators shall be placed outside of the ordinary high water line with appropriate spill prevention and containment measures.

**TEMPORARY WATER**

- A. Potable water is not available to the Contractor at the site. The Contractor shall be responsible for supplying potable water for all employees at the site.
- B. The Contractor may use water from Rock Creek for dust control, if a temporary water right is obtained for dust abatement. Otherwise Contractor shall truck water to the site.

**TEMPORARY SANITATION FACILITIES**

- A. Contractor shall provide and maintain temporary sanitation facilities (e.g., "port-a-potties") for use by the construction and observation crews for the duration of the construction and revegetation activities.

**TEMPORARY FIRST AID FACILITIES**

- A. Contractor shall provide first aid equipment and supplies onsite for employees.
- B. Contractor shall have an emergency action plan and instruct employees what to do in case of a workplace injury.
- C. Contractor shall review the plan with each employee and have the plan available onsite at all times.

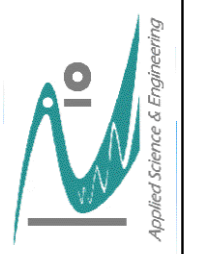
**TEMPORARY FIRE PROTECTION**

- A. The Contractor shall conduct operations in a manner that is fire-safe for the work area and adjacent areas. Proper fire extinguishers shall be installed on all equipment and maintained by the Contractor. The premise shall be maintained clear of rubbish, debris, or other material constituting a potential fire hazard.
- B. Where significant or continued noncompliance with fire safety is noted, the Contracting Officer reserves the right to stop the work at no extra cost due to extension of time pending remedial action. Furthermore, the Contractor shall be responsible for, and reimburse the sponsor as appropriate, any fines or penalties levied by the fire department.



|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**TECHNICAL SPECIFICATION - 1**  
Rock Creek Stream & Floodplain Restoration



TECHNICAL SPECIFICATIONS  
1

**TEMPORARY UTILITIES CONTINUED**

**TEMPORARY FUEL STORAGE**

- A. All stationary temporary fuel storage shall be located in construction staging areas or otherwise approved locations a minimum of 150 feet away from any wetlands or ordinary high water lines.
- B. Fuel storage vessels shall be inspected prior to site delivery for leaks or damage. Leaky storage tanks will not be permitted on site.
- C. Secondary containment will be required for all on site fuel storage vessels. Secondary containment structures will provide storage capacity in the amount of 110% of the volume of the largest primary container stored within.
- D. At the conclusion of project construction, any leaked fuel or contaminated rainwater within the secondary containment structure will be properly collected and legally disposed of at an offsite location.

**TEMPORARY ENVIRONMENTAL CONTROLS**

**REGULATORY REQUIREMENTS**

- A. Contractor shall be responsible for compliance with all federal, state, and local laws and regulations and shall be expected to maintain copies of all required permits on site for inspection and review.
- B. Contractor shall conform to most stringent requirement in cases of conflict between specifications and regulatory requirements.
- C. Contracting Officer may stop any construction activity in violation of federal, state, or local laws and additional expenses resulting from work stoppage will be responsibility of Contractor.
- D. Contractor will be responsible for producing implementing, adhering to, and maintaining a construction stormwater general permit in accordance with the regulations and guidelines set forth and subject to approval by the state of Oregon.

**DUST CONTROL**

- A. Contractor shall provide all labor, equipment, and materials to control dust on all access roads several times per day to prevent dust nuisance or damage to persons, property, or activities, including, but not limited to crops, orchards, cultivated fields, wildlife habitats, dwellings and residences, agricultural activities, recreational activities, traffic, and similar conditions.
- B. Contractor shall be responsible for damages resulting from dust originating from Contractor operations.

**AIR POLLUTION CONTROL**

- A. Utilize reasonably available methods and devices to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants.
- B. Do not operate equipment and vehicles that show excessive exhaust gas emissions until corrective repairs or adjustments reduce such emissions to acceptable levels.

**NOISE CONTROL**

- A. Do not exceed 80 decibels (daytime), as measured at noise-sensitive areas such as residences and schools during the hours of 7:00 a.m. to 7:00 p.m. do not exceed noise levels of 66 decibels (nighttime) during the hours of 7:00 p.m. to 7:00 a.m.
- B. Provide specialty mufflers for continuously running generators, pumps, and other stationary equipment to meet the decibel requirements above.
- C. Compression brakes are not allowed.
- D. Perform operations producing high-intensity impact noise only weekdays during the hours of 7:00 a.m. to 7:00 p.m.

**WATER POLLUTION CONTROL**

- A. Perform construction activities by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. Such pollutants and wastes include, but are not restricted to refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

**SURVEYING**

- A. The Contracting Agency shall provide all surveying tasks necessary for construction. This includes but is not limited to: locate survey control and reference points, establish horizontal and vertical control, place grading stakes, identify and stake the channel centerline, identify all major and minor work components, and periodically verify locations and elevations of all construction items.
- B. Contractor shall be responsible for reporting any elevation or horizontal discrepancies to the Contracting Officer for clarification. Minor adjustments to suit field conditions are anticipated, and it shall be the responsibility of the engineer to make decisions regarding these adjustments.
- C. Topographic survey is provided by the sponsor and shown on the drawings. An electronic version of the topographic survey information, in AutoCAD format, is available to the Contractor upon request. The drawings reflect lidar and survey data collected but do not include all utilities, surface features, structures, and other items that may be encountered at the project site. It is the Contractor's responsibility to check existing conditions prior to bidding or commencing work.
- D. Control points identified on the drawings shall be used for all ties to spatial and elevation data listed in the drawings.
- E. All dimensions on the drawings are in units of feet and decimals, unless otherwise specified.

**FINAL SITE REVIEW**

**GENERAL**

- A. Throughout the progress of the work, maintain an accurate record of changes in the contract documents.
- B. Prior to commencing demobilization, the Contractor shall review all construction elements with the Contracting Officer, who will give approval or provide a written list final items to be corrected.
- C. Final site review approval is contingent on the successful completion of: construction of design elements, cleaning of the site, removal of all construction access roads, ruts and staging areas, restoration of areas disturbed by construction activities, and other tasks as outlined in these specifications and on the drawings.

**RECORD DOCUMENTS**

- A. Contractor's set: secure from the Contracting Agency one complete set of contract documents for use as the Contractor's set of record documents. Label immediately as "record documents-Contractor's set." Use this set to record all changes in the work as they occur on a daily basis.
- B. Maintain the Contractor's set of record documents protected from deterioration and from loss and damage until completion of the work. In the event of loss or

damage use whatever means necessary to again secure and record the data.

**FINAL CLEANUP**

- A. Complete the following cleanup tasks before requesting inspection for completion for the entire project or a portion of the project.
  - a) Clean the project site and grounds in areas disturbed by construction activities of rubbish, waste materials, litter, and foreign substances. Remove all waste from the property, do not burn, bury, or otherwise dispose of trash on the project site.
  - b) Remove construction equipment, tools, machinery, and surplus material from the site. Where extra materials of value remain after completion, coordinate with the Contracting Officer on where to leave them on the project site.
  - c) Prepare all areas disturbed by construction activities that are above ordinary high water for seeding specifications outlined in this document.
  - d) Leftover woody material, wood and other native organics may be broken and broadcast over the restored area as approved by the Contracting Officer.
  - e) Contracting Officer shall provide final approval of site cleanup prior to demobilization.

**SITE CLEARING**

**DEFINITIONS**

- A. Debris: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2\_inch diameter to a depth of 6 inches below subgrade.
- D. Project Limits: Areas, as shown or specified, within which Work is to be performed.

**SCHEDULING AND SEQUENCING**

- A. Prepare Site only after adequate erosion and sediment controls are in place.
- B. Identify/mark the limits of clearing and obtain Contracting Officer approval prior to clearing any vegetation.

**GENERAL**

- A. Do not remove, injure, or damage vegetation that is not designated for removal.

**LIMITS**

- A. As shown on the Drawings, typically not beyond the top of cut slopes.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

**CLEARING**

- A. Locate and clearly mark the clearing limits and trees to be preserved per the Drawings.
- B. After clearing limits have been approved by the Contracting Officer, remove vegetation and other debris within the clearing limits.
- C. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- D. Save removed trees for incorporation into habitat structures as directed by the Contracting Officer.
- E. Cut stumps not designated for grubbing flush with ground surface.
- F. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

**GRUBBING**

- A. Grub areas within limits shown on the Drawings and areas identified by the Contracting Officer.
- B. Grubbing may occur concurrently with channel and floodplain excavation, provided stumps and large roots are removed from the excavated soil and disposed properly.

**DISPOSAL**

- A. Dispose of debris at a legal offsite location or at an onsite location approved by the Contracting Officer. Burning of debris onsite will not be allowed.
- B. Suitable woody material may be used as racking material or slash at the approval of the Contracting Officer.

**GRADING**

**WORK INCLUDED**

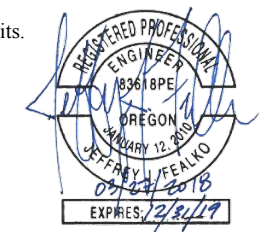
- A. Placement of excavated material and grading of slopes and pads to provide clean lines and positive drainage in the upland spoils area adjacent to Rock Creek and the Kirby livestock paddock and barn as shown on the Drawings.

**PROJECT CONDITIONS**

- A. Coordinate grading operations with the Contracting Officer prior to starting any fence and/or paddock removal or salvage.
- B. Preserve and protect all fencing not identified for salvage.
- C. The Contractor is responsible for repairing all damaged fence and paddock material to the satisfaction of the utility owner at no additional cost to the Contracting Agency.

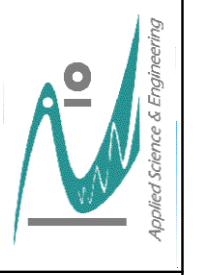
**GENERAL**

- A. Finish Grading:
  - f) Finish grading shall be within ±0.50 feet Horizontal and ±0.10 feet Vertical of the locations and elevations shown on the Drawings and construction stakes.
  - g) Shall be flush with adjacent surfaces unless otherwise indicated.
  - h) Shall be inspected and approved by the Contracting Officer prior to seeding or other activity that would hinder adjustments to the finish grading.
- B. Material shall be placed in twelve (12) inch maximum lifts and compacted to approximately 85 percent relative compaction. No testing of compacted density will be performed; acceptance will be by the Contracting Officer observing fill placement and compaction effort.
- C. Material placed at the spoil areas shown on the Drawings shall be capped with sand and fines for the last twelve (12) inch lift, with no gravel or cobbles protruding above the finished surface.
- D. Material placed at the spoils sites shall be free of debris. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Site Clearing.



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| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**TECHNICAL SPECIFICATION - 2**  
Rock Creek Stream & Floodplain Restoration



**EXCAVATION AND FILL**

**WORK INCLUDED**

- A. Excavation, rough grading, and final grading of main channel, side channels and alcoves.
- B. Placement of fill for stabilized livestock crossing.
- C. Construction of riffles.
- D. Placement of boulder clusters.

**REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - a) ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft<sup>2</sup>).
  - b) ASTM D 2922 - Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods.

**DEFINITIONS**

- A. Vegetation: Trees, shrubs, brush, stumps, exposed roots, down timber, branches, grass, and weeds.
- B. Debris: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- C. Overexcavation: Excavation beyond specified lines to remove unsuitable foundation material.
- D. Additional Excavation: Excavation performed for the convenience, fault, or operation of the Contractor beyond specified or directed excavation lines.
- E. Relative Compaction: Is the ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined by ASTM D1557.
- F. Optimum Moisture Content: Shall be determined in accordance with ASTM D1557 to determine maximum dry density for relative compaction. Determine field moisture content on basis of fraction passing 3/4-inch sieve.
- G. Lift: Loose (uncompacted) layer of material
- H. Well-Graded:
  - a) A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
  - b) Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
  - c) Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

**PROJECT CONDITIONS**

- A. Preserve and protect vegetation designated for preservation as shown on the Drawings.
- B. The Contractor shall obtain underground utility locates a minimum of 48 hours before any ground disturbing activities in the vicinity.
- C. The Contractor is responsible for repairing all damaged utilities to the satisfaction of the utility owner at no additional cost to the Contracting Agency.

**WEATHER LIMITATIONS**

- A. Material excavated when frozen or when air temperature is less than 32 degrees F shall not be used as fill or backfill until material completely thaws. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

**PRODUCTS**

- A. Backfill Over Large Wood Structures
  - a) Backfill material over the large wood material structures shall be the native soils (gravels and cobbles) taken from the excavation required to place the logs.
  - b) The material shall be free of debris or foreign materials.
- B. Riffle Material
  - a) Riffle material shall be naturally occurring and rounded stone that is competent and free of seams, cracks, or other defects. If rounded naturally occurring stone is not available the Contractor can request a variance from the Contracting Officer to utilize subangular processed stone that is competent and free of seams, cracks, or other defects.
  - b) Riffle cobbles and gravels shall be generally spherical in shape.
  - c) Riffle material shall meet the size requirements listed below:

**RIFFLE MATRIX A**

- D<sub>100</sub> (inches): 10 - 12
- D<sub>84</sub> (inches): 6 - 8
- D<sub>50</sub> (inches): 3 - 5
- D<sub>16</sub> (inches): 0.25 - 2
- D<sub>10</sub> (inches): < 0.15

**RIFFLE MATRIX B**

- D<sub>100</sub> (inches): 10 - 12
- D<sub>84</sub> (inches): 8 - 10
- D<sub>50</sub> (inches): 5 - 7
- D<sub>16</sub> (inches): 0.25 - 2
- D<sub>10</sub> (inches): < 0.15

- d) Size shall be determined as the average measurement of the intermediate axis. The longest axis length shall not be more than three times the shortest axis length.
- e) Riffle material not meeting the size requirements of this section shall be replaced at no additional cost to the Contracting Agency.
- C. Boulders
  - a) Boulders shall be naturally occurring and rounded stone that is competent and free of seams, cracks, or other defects. If rounded naturally occurring stone is not available the Contractor can request a variance from the Contracting Officer to utilize subangular processed stone that is

- competent and free of seams, cracks, or other defects.
- b) Boulders shall be generally spherical in shape.
- c) Boulders shall meet the size requirements listed below:
  - Diameter of Small Boulders (inches): 10 - 18
  - Diameter of Large Boulders (inches): 18 - 24
- d) Size shall be determined as the average measurement of the intermediate axis. The longest axis length shall not be more than three times the shortest axis length.
- e) Boulders not meeting the size requirements of this section shall be replaced at no additional cost to the Contracting Agency.

**GENERAL**

- A. Prior to performing work included in this Section, the Contractor shall become thoroughly familiar with the Project Site, Project Site conditions, and all portions of the Work falling within this Section.
- B. Carefully maintain survey control points, staking, and other reference points. If disturbed, or destroyed, notify the Contracting Officer.
- C. Protect persons and property from damage and discomfort caused by dust. Water access roads as necessary to quell dust.

**EXCAVATION**

- A. Provide excavation as required for construction of the Work shown on the Drawings.
- B. Excavation shall be done to the lines and grades shown on the Drawings and as indicated by construction staking provided by the Contracting Agency.
- C. Excavated soil shall be used as fill placed at locations requiring fill to create spoils areas, as backfill for habitat structures, or shall be spoiled at onsite locations identified by the Contracting Officer.
- D. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown on the Drawings.
- E. Finish Grading:
  - a) Finish grading shall be within ±0.50 feet Horizontal and ±0.10 feet Vertical of the locations and elevations shown on the Drawings and construction stakes.
  - b) Shall be flush with adjacent surfaces unless otherwise indicated.
  - c) Shall be inspected and approved by the Contracting Officer prior to seeding or other activity that would hinder adjustments to the finish grading.
  - d) Compaction of finished surface is not required where the finished surface is achieved through only excavation.

**RIFFLE CONSTRUCTION**

- A. If existing in-situ material does not meet specified riffle matrix as determined by the Contracting Officer riffles shall be constructed per the Drawings, specifically the riffle construction detail and construction sequencing sheet, utilizing the specified riffle material as previously defined in this section and shown in the Drawings.
- B. Riffles shall be over excavated to a depth of 20 inches below finished grade to allow for placement of riffle material in two (2) 10 inch lifts.
- C. Each lift shall include the top placement of finer material that is pressure washed into the riffle surface to compact material.
- D. The upper 40 feet of each riffle shall be constructed 0.3 feet higher than design grades for natural settlement of placed material.

**BOULDER PLACEMENT**

- A. Boulders shall be placed at the locations as directed by the Contracting Officer per the Drawings and specifically the riffle construction detail and construction sequencing sheet.

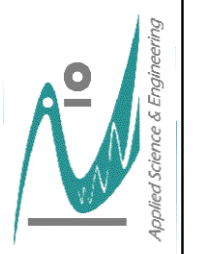
**FILL AREAS**

- A. Areas requiring fill placed to obtain finished grade shall be placed as shown on the Drawings or as directed by the Contracting Officer.
  - a) The Contractor shall place fill in maximum one (1) foot thick lifts and compact using mechanical compaction equipment to 85% relative density.
  - b) Soil placed for fill shall be at or near optimum moisture content.
  - c) Soil selected for use as fill shall be well graded and shall include the largest grain size material available from nearby excavations.
- B. Placement of fill over large wood structures
  - a) The Contractor shall compact backfill over large wood material structures using mechanical equipment such as the bucket of an excavator or a vibratory compactor. Jetting, sluicing or water settling will not be permitted
  - b) Backfill shall be carefully placed over logs as indicated on the Drawings. Material shall be placed in maximum of 12-inch thick lifts and compacted thoroughly. No testing of compacted density will be performed; acceptance will be by the Contracting Officer observing fill placement and compaction effort. The intent of compaction will be to achieve approximately 85% relative density.
- C. Excess excavated soils shall be transported and placed in the spoils area as shown on the Drawings or as directed by the Contracting Officer.
- D. Finish Grading:
  - a) Finish grading shall be within ±0.50 feet Horizontal and ±0.10 feet Vertical of the locations and elevations shown on the Drawings and construction stakes.
  - b) Shall be flush with adjacent surfaces unless otherwise indicated.
  - c) Shall be inspected and approved by the Contracting Officer prior to seeding or other activity that would hinder adjustments to the finish grading.
  - d) Compaction of finished surface is required in fill areas per definition above.



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| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**TECHNICAL SPECIFICATION - 3**  
Rock Creek Stream & Floodplain Restoration



**COFFERDAMS AND DEWATERING**

Work includes but is not limited to:

- A. Installation and removal of temporary cofferdams
- B. Pumping of surface water from within temporary cofferdams
- C. Handling discharge of pumped surface water

**GENERAL**

- A. No groundwater information is available at the site. The Contractor shall make his/her own investigations and shall determine the extent and difficulty of removal of water from excavations.
- B. All work locations within Rock Creek will require installation and removal of temporary cofferdams.
- C. Cofferdams: This work consists of constructing, maintaining, and removal of cofferdams at locations indicated on the Drawings to isolate the work area from surface waters directly connected to Rock Creek.
- D. Dewatering: This work consists of installing and maintaining a temporary dewatering system to remove water from within cofferdams and excavations separated from Rock Creek.
- E. Dewatering within cofferdams and areas isolated from the surface water of Rock Creek shall be performed to the extent necessary, as determined by the Contractor, to construct the project as shown on the Drawings. If the Contractor attempts to construct a portion of the project without dewatering the isolated work area, and is unable to construct the item as shown on the Drawings to the satisfaction of the Contracting Officer, the Contractor shall receive no additional compensation for removing the unacceptable work and replacing it with a correctly constructed item, and shall receive no additional compensation for dewatering performed at that location during subsequent attempts to construct the item.
- F. Discharge from dewatering within the work area shall be routed to floodplain upland areas so as to allow the removal of fine sediments and other contaminants as the discharge sheet flows across the floodplain prior to reentering Rock Creek.
- G. All pumps used by the Contractor for dewatering shall have screened intakes that meet ODFW specifications and NOAA juvenile fish screening criteria.
- H. Fish Removal: All work related to removing fish shall be performed by the Contracting Agency at no cost to the Contractor. The Contractor shall coordinate with the Contracting Agency for fish removal and shall notify the Contracting Officer a minimum of 5 working days prior to requiring fish removal services.

**REQUIREMENTS**

- A. Design temporary dewatering systems.
- B. Install temporary cofferdams required to separate surface water of Rock Creek from construction activities.
- C. The elevation of the top of the cofferdams shall be a minimum of (1) one foot higher than the water surface elevation in the creek on the day that the cofferdam is constructed.
- D. Furnish, install, and operate all necessary pumping and other equipment for removal of water from the work areas.

**SUBMITTALS**

Submit a cofferdam plan and dewatering plan in accordance the following:

- A. Cofferdam Plan:
  - a) The method for constructing a cofferdam shown on Sheet 29 of the Drawings is one acceptable method. The Contractor may use this method or propose a different method that provides equal or better isolation of the work area from the flow. If a different method is proposed, Contractor shall submit drawings showing details of proposed methods for providing temporary isolation of surface water during construction activities at each location requiring isolation. Detailed and unique drawings shall be provided for each separate work area requiring cofferdam installation. Contracting Officer must review and approve alternate cofferdam methods prior to them being used on the project site. Review and approval of the Cofferdam Plan shall not relieve the Contractor from full responsibility for the adequacy of cofferdam work if the proposed plan is not successful at properly isolating the work area.
- B. Dewatering Plan:
  - a) Show proposed method for removal of water from excavations and within cofferdams that require dewatering as determined by the Contractor to complete construction. Include details related to pump intake location, pump capacity, and pump discharge location.
  - c. Review and approval of the Dewatering Plan shall not relieve the Contractor from full responsibility for the adequacy of dewatering work if the proposed plan is not successful at dewatering the site.

**PRODUCTS**

- A. Contactor shall supply all necessary materials to construct and maintain cofferdam and dewatering systems. These materials shall match materials and equipment identified on the submitted and approved Cofferdam Plan and Dewatering Plan.
- B. Cofferdams
  - a) Provide materials for cofferdams and install cofferdams as indicated in the Dewatering Plan or an approved alternative dewatering plan.
  - b) Modify cofferdams as necessary during construction of work items to maintain a constant separation of the work area from surface water of Rock Creek.
  - c) Remove cofferdam after all work of the specific work item has been completed and approved by the Contracting Officer.
- C. Dewatering
  - a) Provide, maintain, and operate necessary pumps and other equipment for removal of water from excavations and within cofferdams to the extent necessary to construction the items of work as shown on the Drawings.
  - b) Monitor and control discharge in accordance with all permits and required best management practices associated specifically with the HIP III programmatic.

**LARGE WOOD HABITAT Structures**

**GENERAL**

- A. Install logs to construct habitat structures at locations shown on the Drawings.
- B. Excavate scour pools and place structure backfill as shown on the Drawings.
- C. Install racking material and slash as directed by the Contracting Officer.

**PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Logs shall be stored in areas indicated on the Drawings as Temporary Storage and Staging Areas, or other locations approved by the Contracting Officer.
- B. Logs with rootwads shall be moved onsite a minimum number of times to prevent damage to rootwads.
- C. Logs with rootwads shall be handled, when moved, in a manner that preserves rootwad structure and roots intact. When moving logs with rootwads, the Contractor shall avoid grabbing the rootwad end of the logs to manipulate them.
- D. Full trees with branches and tree tops with branches shall be handled with care to minimize damage to branches; transportation, handling, and placement with specialized equipment is recommended. The Contracting Officer may reject and require replacement of any tree tops or full trees that have lost significant amounts of branches.

**PRODUCTS**

- A. Logs
  - a) Logs to be used for construction of habitat structures will be provided by the Contracting Agency.
  - b) Logs with rootwads that were acceptable at the time of delivery but were damaged by the Contractor during storage or handling on the project site through final placement may be rejected by the Contracting Officer. Rejected logs shall be removed from the structure and replaced with acceptable logs by the Contractor at no cost to the Contracting Agency.
- B. Racking Material
  - a) Racking to be used for construction of habitat structures will be provided by the Contracting Agency.
- C. Slash
  - a) Slash to be used for construction of habitat structures will be provided by the Contracting Agency.
- D. Habitat Structure Backfill
  - a) Backfill for habitat structures shall be native material previously excavated from the project site for excavation of the side channel, alcoves, scour pools, or placement of logs.
  - b) Backfill shall be free of debris.

**EXECUTION**

- A. All logs shall be placed as shown on the Drawings. Each type of structure has specific methods of construction and layout of logs in the various layers. The Contractor shall pay careful attention to the sizes of logs and orientation shown on the Drawings.
- B. Where shown on the Drawings, or as directed by the Contracting Officer, excavate scour pools near habitat structures.
- C. Place structure backfill at the locations shown on the Drawings and to the elevations shown on the Drawings unless otherwise directed by the Contracting Officer. Structure backfill shall be carefully placed over logs as indicated on the Drawings. Material shall be placed in 12-inch maximum lifts and compacted to approximately 85 percent relative compaction. No testing of compacted density will be performed; acceptance will be by the Contracting Officer observing fill placement and compaction effort.
- D. See Cofferdams and Dewatering within these specifications regarding cofferdams that will be used during construction of all LWD structures.

**BRUSH MATTRESS**

**GENERAL**

- A. Work includes but is not limited to: acquisition, delivery, storage, and installation of live stakes; and the harvest of dead brush for installation of brush mattress.

**DELIVERY, STORAGE, AND HANDLING**

- A. The Contractor shall be responsible for storage and handling of plant materials at the Site. The Contractor shall notify the Contracting Officer seven (7) working days in advance of delivery of plants to the Site.
- B. Live stakes and live cuttings for brush mattress shall be planted within eight (8) hours of cutting or shall be soaked in water for twenty-four (24) to seventy-two (72) hours prior to planting. Stakes or cuttings that develop roots shall not be used.
- C. Protect live stakes, and live cuttings, from freezing, sun, drying winds, and/or mechanical damage. Water as necessary until planted.
- D. Plants temporarily stored shall be subject to inspection and approval by the Contracting Officer prior to planting. Immediately remove rejected plant material from the site.

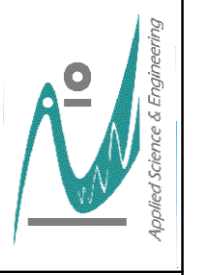
**SEQUENCING AND SCHEDULING**

- A. Installation of brush mattress and harvest and installation of willow clumps shall occur while equipment for earthwork is mobilized.



|          |                             |
|----------|-----------------------------|
| Date     | Mar 2018                    |
| Designed | JF, AC                      |
| Drawn    | AC, JF                      |
| Checked  | JF                          |
| Approved | AC, JF, BPA                 |
| Title    | AC, Biologist; JF, Engineer |

**TECHNICAL SPECIFICATIONS - 4**  
Rock Creek Stream & Floodplain Restoration



**BRUSH MATTRESS CONTINUED**

**PRODUCTS**

**A. Brush Mattress**

- a) Brush mattress shall be composed of dead branches of native non-invasive plants and live cuttings of *Salix exigua* (Coyote willow), *Salix prolixa* (Mackenzie willow), and *Populus balsamifera* (Black cottonwood).
- b) Live cuttings installed in Brush Mattress shall be 1/2 to 2 inches in diameter and a minimum of 4 feet long. Side branches may be left intact. The material shall be free of disease, rot, or insect infestation.
- c) Dead branches shall have a maximum diameter of 6 inches and a minimum diameter of 1/2 an inch. Leaves and side branches shall be left intact.
- d) Brush mattress requires four live cuttings per lineal foot for construction. Dead branches shall be of sufficient volume to achieve the thickness shown in the Drawings once compacted.

**EXECUTION**

A. Installation of brush mattress will be best achieved with the assistance of a backhoe or similar equipment.

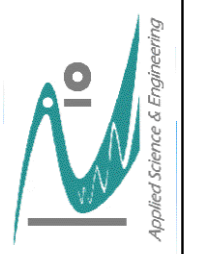
B. Locations of brush mattresses shall be approved by Contracting Officer prior to installation.

C. Installing Brush Mattress:

- a) Brush mattress shall be constructed as shown on the Drawings.
- b) Brush mattress shall be placed into a trench excavated at the ordinary high water elevation or as identified by the Contracting Officer to three (3) feet below finish grade. Live cuttings shall be placed every 6 inches for the entire length of the trench. Live cuttings shall be installed with buds oriented upward.
- c) Dead branches shall be placed uniformly along the trench on top of the live cuttings to a compressed depth of 6 inches.
- d) A top layer of live cuttings shall be placed every 6 inches along the length of the brush mattress. Live cuttings shall be installed with buds oriented upward.
- e) Soil shall be backfilled in six (6) inch lifts. The first lift shall be washed into the brush mattress with water to eliminate voids and ensure soil contact to live stakes. Supplemental lifts shall be compacted.
- f) Water for plant installation is not available to the Contractor at the site. The Contractor shall be responsible for supplying water from a source other than Rock Creek for plant installation.

Date \_\_\_\_\_  
Designed AC, JF  
Drawn AC, JF  
Checked JF  
Approved AC, BPA  
Title CTUJR Grande Ronde Fish Habitat Biologist

**TECHNICAL SPECIFICATIONS - 5**  
**Rock Creek Stream & Floodplain Restoration**



TECHNICAL SPECIFICATIONS  
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