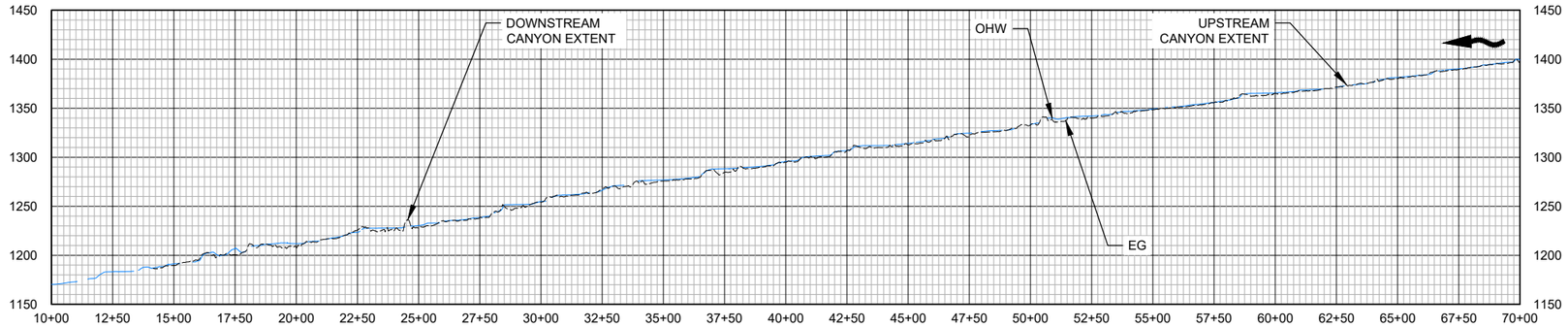
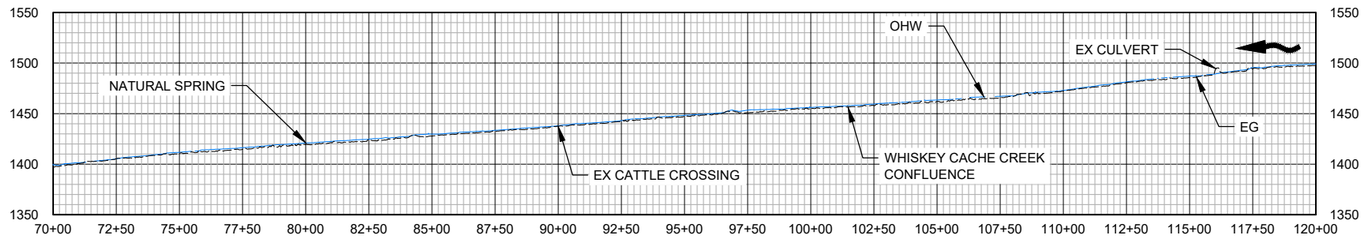
DRAFT FINAL DESIGN
FEBRUARY 2024



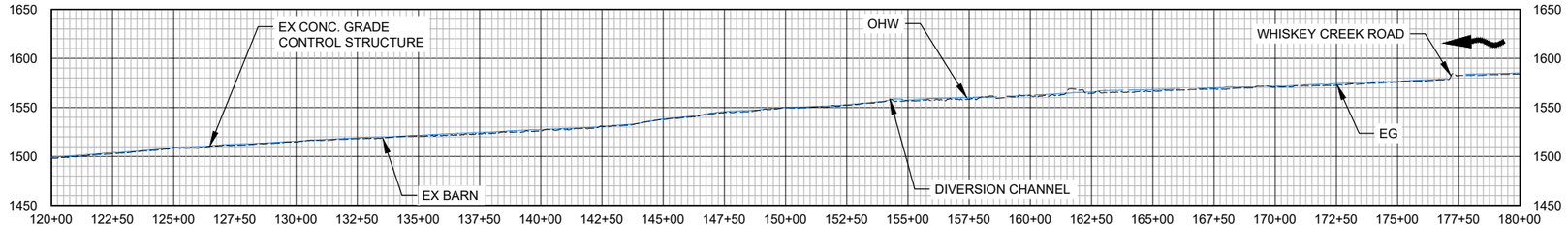
EXISTING ANTOINE CREEK PROFILE STA 10+00 - 70+00

HORIZ. SCALE: 1" = 300'
VERT. EXAGGERATION: 4X



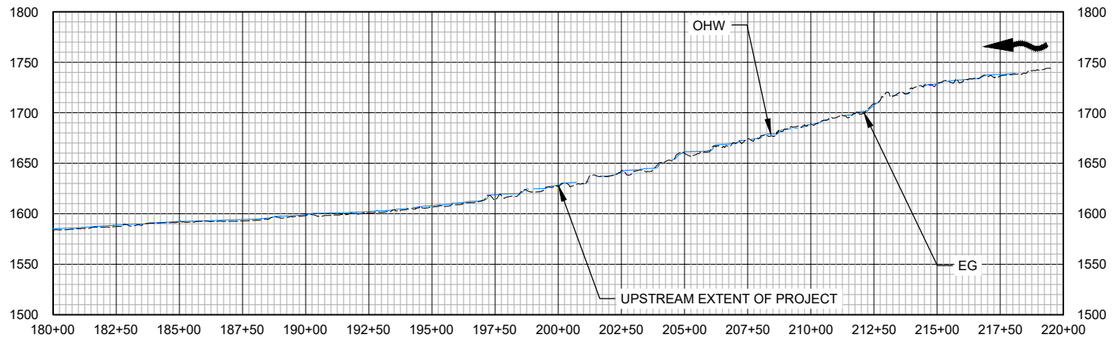
EXISTING ANTOINE CREEK PROFILE STA 70+00 - 120+00

HORIZ. SCALE: 1" = 300'
VERT. EXAGGERATION: 4X



EXISTING ANTOINE CREEK PROFILE STA 120+00 - 180+00

HORIZ. SCALE: 1" = 300'
VERT. EXAGGERATION: 4X



EXISTING ANTOINE CREEK PROFILE STA 180+00 - 220+00

HORIZ. SCALE: 1" = 300'
VERT. EXAGGERATION: 4X

NOTES:

1. ORDINARY HIGH WATER PROFILES APPROXIMATED BY EXISTING CONDITIONS HYDRAULIC MODEL WATER SURFACE ELEVATION CONTOURS GENERATED FOR THE 2-YEAR FLOW (12 CFS).

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ANTOINE CREEK
ENHANCEMENT PROJECT
OKANOGAN COUNTY, WA

EX CONDITIONS STREAM PROFILE

REVISION NUMBER

No.	Date	Revision

Date: 3/11/2024	Designed By: SR, LE
Drawn By: HC	Checked By: SR

SCALE: 0 1"

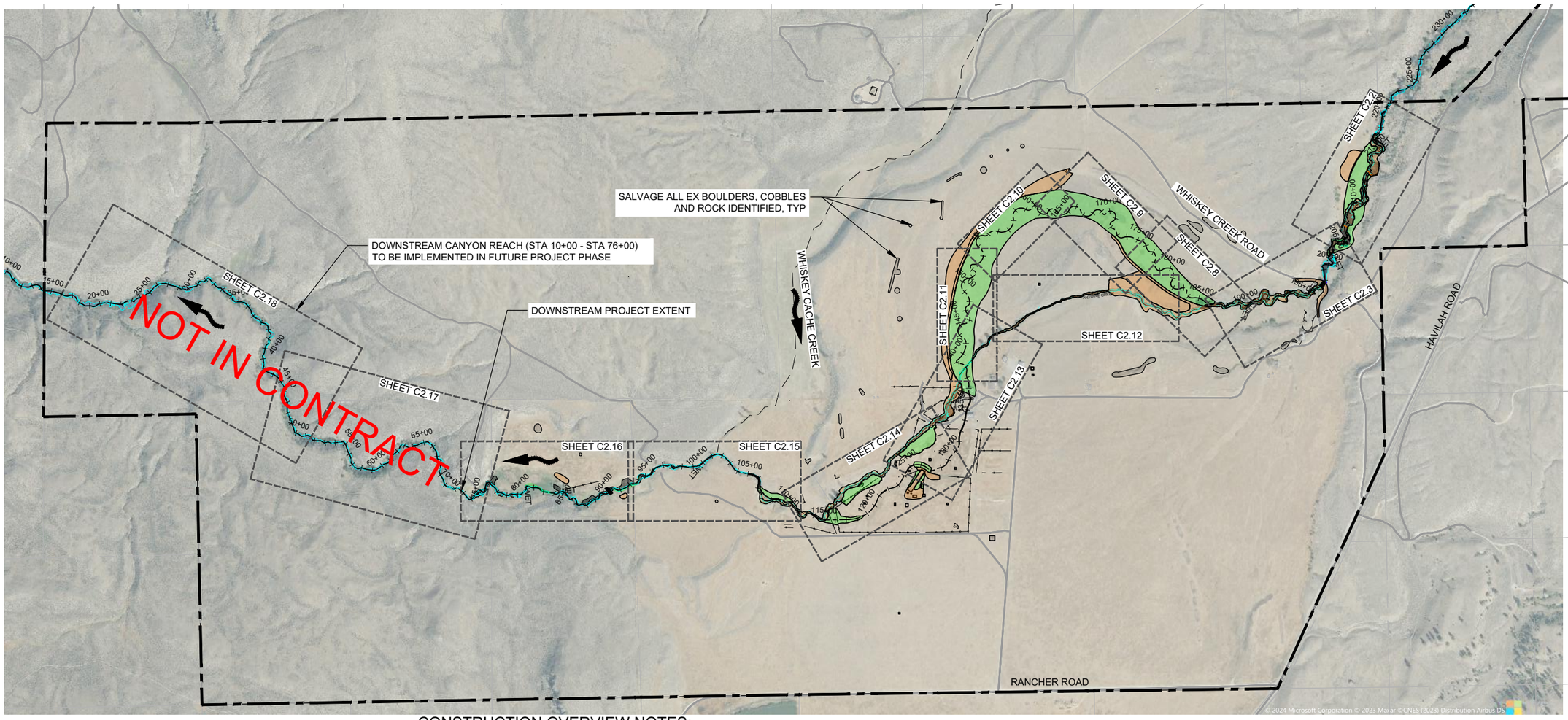
JOB NO. 20220046

SHEET NO. C1.3

08 OF 36

DWG: Z:\Shared\W2r\CAD\20220046-Antoine Creek\DWG\SHEETS\AC - C1.0 - EXISTING CONDITIONS.dwg USER: hdegg
DATE: Mar 11, 2024 3:25pm XREFS:X-TB-W2r-22x34 AC-XR-AERIAL AC-XR-HAWS AC-XR-BASEMAP WBLOCK

DRAFT FINAL DESIGN
FEBRUARY 2024



PROPOSED SITE OVERVIEW

SCALE: 1"=500"

GENERAL NOTES:

1. AERIAL IMAGERY COLLECTED BY TARA FIRMA UAV DRONE FLIGHT, APRIL 2023 AND CORRECTED SPATIALLY WITH GROUND CONTROL POINTS SURVEYED BY W2R.
2. ORDINARY HIGH WATER EXTENT APPROXIMATED BY EXISTING CONDITIONS HYDRAULIC MODEL INUNDATION EXTENTS FOR THE 12 CFS FLOW.
3. TAXLOT BOUNDARIES FROM OKANOGAN COUNTY GIS.
4. EXISTING CONDITIONS TOPOGRAPHY PROVIDED BY GEO TERRA, JULY-OCTOBER 2017 AND ACCESSED FROM THE WA DNR LIDAR PORTAL.
5. EXISTING WETLAND BOUNDARIES DETERMINED BY W2R WETLAND INVESTIGATION PERFORMED IN 2023.

CONSTRUCTION OVERVIEW NOTES:

1. ADD FLOODPLAIN WOOD AND ROUGHNESS ACROSS CHANNEL FILL AND FLOODPLAIN GRADING AREAS DENOTED AS A "FLOODPLAIN WOOD PLACEMENT AREA" AT A DENSITY OF 25 PER ACRE AS SHOWN ON THE PLAN AND PROFILE SHEETS (SHEETS 10 THROUGH 26) AND DIRECTED BY THE CAR. TREATMENTS SHALL INCLUDE A MIX OF:
   - 1.1. FLOODPLAIN WOOD
   - 1.2. SLASH PILES
   - 1.3. INDIVIDUAL HABITAT LOGS
2. FLOODPLAIN CUT AND CHANNEL FILL GRADING AREAS SHALL INCLUDE A LOW-FLOW CHANNEL WHERE SHOWN. THE CHANNEL SHALL BE EXCAVATED 3' WIDE, 6" DEEP AS SHOWN ON THE PLAN AND PROFILE SHEETS, REFER TO DETAIL 1 SHEET C3.1. THE LOW-FLOW CHANNEL SHALL BE CUT 6" BELOW THE TARGET ELEVATION OF THE FLOODPLAIN GRADING.
3. SALVAGE AND STOCKPILE GRAVELS, COBBLES AND OTHER COARSE ALLUVIUM ENCOUNTERED DURING FLOODPLAIN EXCAVATION FOR REUSE ON THE NEW FLOODPLAIN SURFACE AND LOW FLOW CHANNEL. THE CONTRACTOR SHALL OVEREXCAVATE AND SALVAGE COARSE MATERIAL WHERE LENSES OR DEPOSITS ARE FOUND FOR USE IN CHANNEL FILL AS DIRECTED BY THE CAR. THE CONTRACTOR SHALL ALSO SALVAGE EXISTING STREAMBED MATERIAL IN ANY LOCATION WHERE CHANNEL FILL IS PROPOSED PRIOR TO PLACING FILL IN THAT CHANNEL.
4. SALVAGED AND STOCKPILED GRAVELS AND COBBLES SHALL BE APPLIED IN THE FINAL LIFT OF CHANNEL FILL AND SHALL BE PRIORITIZED FOR PLACEMENT WITHIN THE LOW-FLOW CHANNEL AND AT SLOPE TRANSITIONS IDENTIFIED IN THE PLANS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR WORK AREA ISOLATION AND/OR STREAM DIVERSIONS. TEMPORARY STREAM DIVERSION ALIGNMENTS AND COFFER DAMS SHOWN ON THE PLAN AND PROFILE SHEETS ARE CONCEPTUAL ONLY. THE CONTRACTOR SHALL ASSESS CONDITIONS IN THE FIELD TO DETERMINE OPTIMAL WATER MANAGEMENT TECHNIQUES AND SEQUENCING.
6. PILES OF BOULDERS, COBBLES AND OTHER ROCK EXIST WITHIN THE ANTOINE CREEK FLOODPLAIN AND THE BROADER PROJECT AREA. THESE AREA HAVE BEEN IDENTIFIED ON THIS SHEET AND CALLED OUT. THE CONTRACTOR SHALL SALVAGE AND STOCKPILE THESE EXISTING ROCK PILES FOR USE IN CHANNEL FILL AND FLOODPLAIN GRADING AS DIRECTED BY THE CAR AND SHOWN IN THE PLANS.
7. AVOID DISTURBANCE TO AREAS OF EXISTING VEGETATION IDENTIFIED BY CAR. PRESERVE EXISTING TREES/VEGETATION IN EXCAVATION, FILL, HAULING AND STAGING AREAS. WHERE DISTURBANCE TO EXISTING VEGETATION IS UNAVOIDABLE, SALVAGE AND RE-USE FOR SITE RESTORATION AT DIRECTION OF CAR.
8. EFFORTS WERE MADE TO IDENTIFY EXTENTS OF EXISTING INFRASTRUCTURE WITHIN PROJECT AREA, HOWEVER, ADDITIONAL FEATURES MAY BE ENCOUNTERED DURING CLEARING AND GRADING ACTIVITIES. CONTRACTOR SHALL DEMO, HAUL AND DISPOSE OF ALL EXISTING INFRASTRUCTURE AND/OR NON-NATURAL DEBRIS ENCOUNTERED AS DIRECTED BY CAR.
9. PROPOSED INDIVIDUAL FLOODPLAIN ROUGHNESS TREATMENTS ARE NOT SHOWN FOR CLARITY BUT SHALL BE PLACED AT THE SPECIFIED DENSITIES AND TO THE LIMITS SHOWN ON PLAN. QUANTITIES ARE IN ADDITION TO INDIVIDUAL HABITAT STRUCTURES SHOWN ON PLANS.
10. ANY FENCE TO REMAIN REQUIRING REMOVAL FOR CONSTRUCTION ACTIVITIES SHALL BE REPLACED TO EXISTING CONDITION OR BETTER.

N

SCALE
500 0 250 500 1000
SCALE FEET

LEGEND

- TAX LOTS
- PROJECT OWNERSHIP BOUNDARY
- ROAD CENTERLINE
- WET — WETLANDS
- OHW — ORDINARY HIGH WATER
- FILL
- CUT
- BOULDER CLUSTER FOR SALVAGE

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OKANOGAN COUNTY, WA

PROPOSED CONDITIONS OVERVIEW

REVISION NUMBER

No.	Date	Revision

Date: 3/11/2024 | Designed By: SR, LE
Drawn By: HC | Checked By: SR

SCALE 0 1"

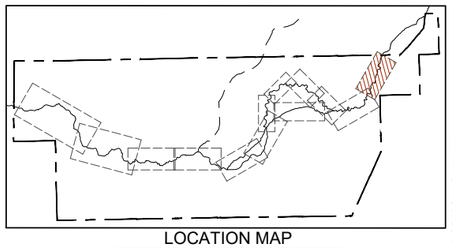
JOB NO. 20220046

SHEET NO. C2.1

09 OF 36

DWG: Z:\Shared\W2r\CAD\20220046-Antoine Creek\DWG\SHEETS\AC - PROP CONDITIONS OVERVIEW.dwg USER: hclegg
DATE: Mar 11, 2024 3:26pm XREFS:X-TB-W2r-22x34 AC-XR-BASEMAP WBLOCK AC-XR-DESIGN AC-XR-HAWS AC-XR-AERIAL

DRAFT FINAL DESIGN
FEBRUARY 2024



PROPOSED SITE PLAN: STA 206+00 - 223+00

SCALE: 1"=60"

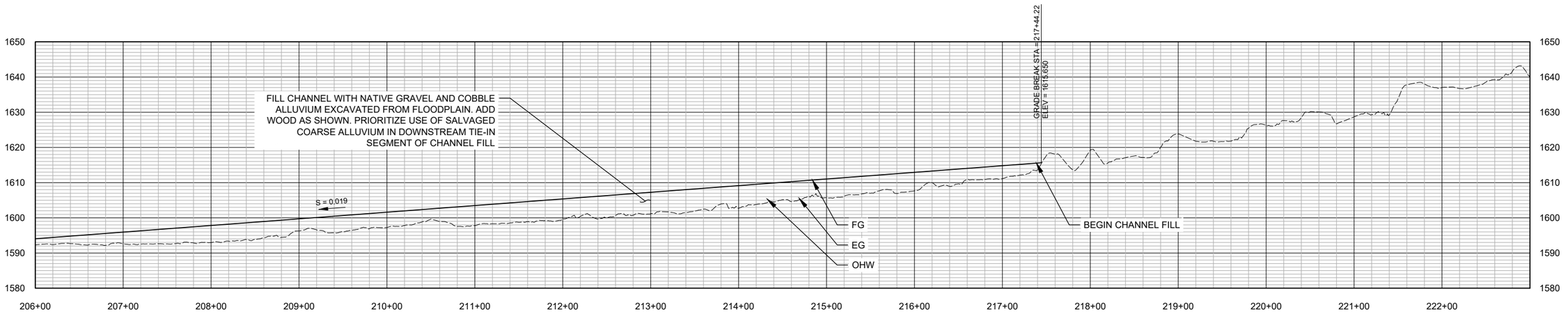
SCALE
60 0 30 60 120
SCALE FEET

NOTES:

1. THE CONTRACTOR MAY PLACE FINE SEDIMENT WITHIN THE OPTIONAL FINE SEDIMENT PLACEMENT ZONE SHOWN ON THIS SHEET AS APPROVED BY THE CAR. THE FINE SEDIMENT PLACEMENT ZONE SHALL ONLY BE USED IF EXCESS CUT MATERIAL IS AVAILABLE. FINE SEDIMENT SHALL BE SPREAD EVENLY IN A THIN LAYER OVER THE PLACEMENT AREA TO A DEPTH NOT TO EXCEED TWO FEET.

LEGEND

- EXISTING 2' CONTOUR LINES
- EXISTING 10' CONTOUR LINES
- TAX LOTS
- PROJECT OWNERSHIP BOUNDARY
- ROAD CENTERLINE
- WETLANDS
- OHW
- 1' CONTOURS LINES
- 5' CONTOURS LINES
- ACCESS ROUTE
- DIVERSION PIPE
- STAGING AREA
- FILL
- CUT
- FLOODPLAIN WOOD PLACEMENT AREA
- WHS TYPE 1 - 1 LOG SC JAM
- WHS TYPE 2 - 2 LOG SC JAM
- WHS TYPE 3 - 3 LOG SC JAM
- WHS TYPE 4 - 4 LOG SC JAM
- WHS TYPE 5 - FLOODPLAIN WOOD
- WHS TYPE 6 - WOOD CLUSTER
- WHS TYPE 7 - SLASH PILE
- WHS TYPE 8 - PALS
- WHS TYPE 9 - BDAS
- SINGLE HABITAT LOGS
- SINGLE KEYED LOG



PROPOSED ANTOINE CREEK PROFILE: STA 206+00 - 223+00

HORIZ. SCALE: 1" = 60'
VERT. EXAGGERATION: 4X

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ANTOINE CREEK ENHANCEMENT PROJECT

OKANOGAN COUNTY, WA

PLAN & PROFILE STA 206+00 - STA 223+00

REVISION NUMBER

No.	Date	Revision

Date	Designed By
3/11/2024	SR, LE
Drawn By	Checked By
LE, HC	SR

SCALE 0 1"

JOB NO. 20220046

SHEET NO. C2.2

10 OF 36

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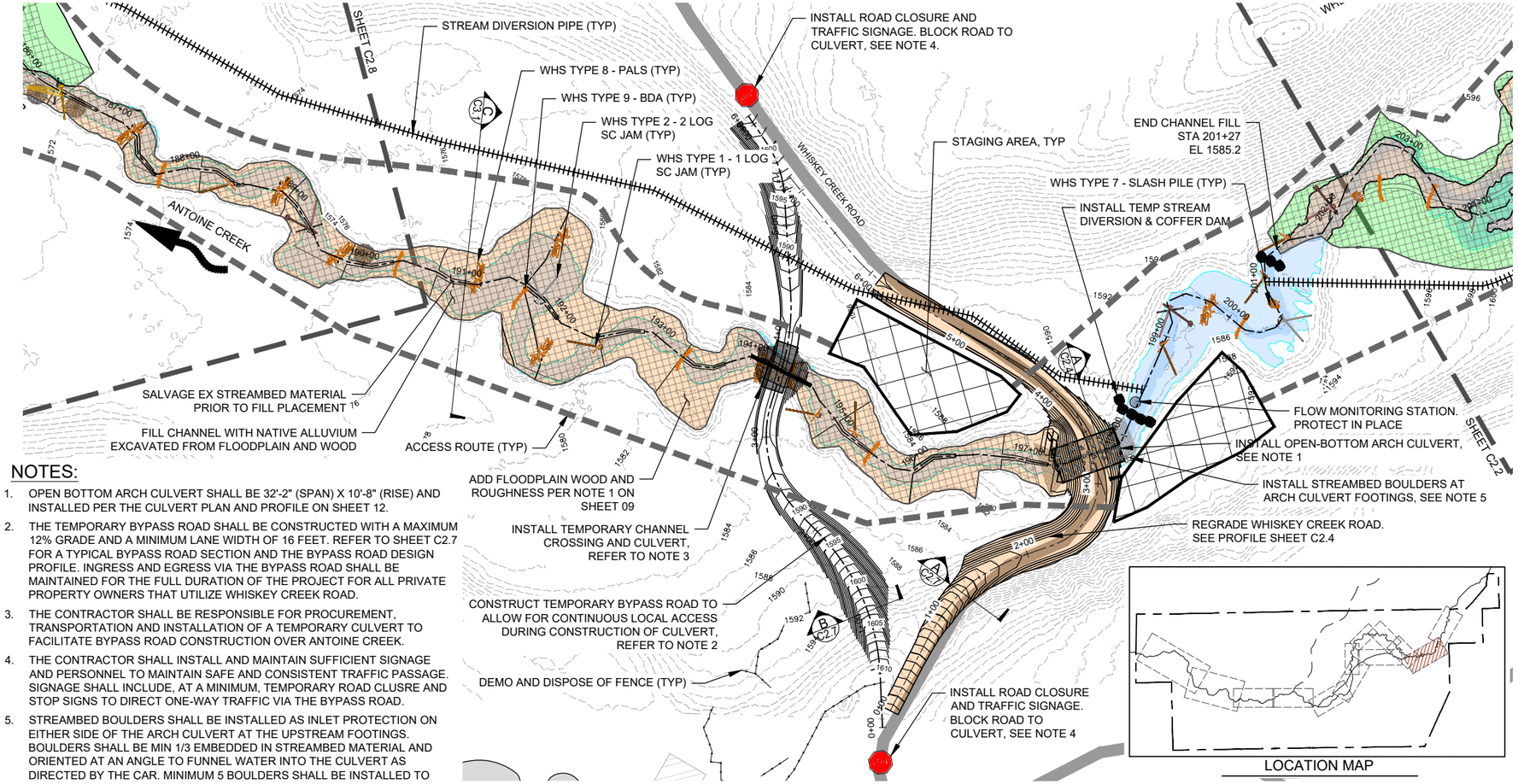
DRAFT FINAL DESIGN
FEBRUARY 2024



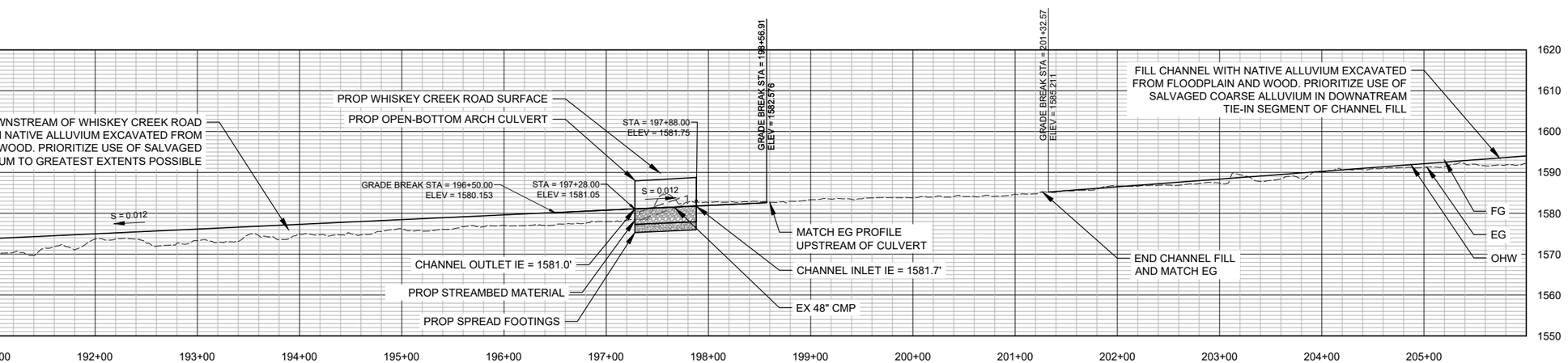
NOTES:

1. OPEN BOTTOM ARCH CULVERT SHALL BE 32'-2" (SPAN) X 10'-8" (RISE) AND INSTALLED PER THE CULVERT PLAN AND PROFILE ON SHEET 12.
2. THE TEMPORARY BYPASS ROAD SHALL BE CONSTRUCTED WITH A MAXIMUM 12% GRADE AND A MINIMUM LANE WIDTH OF 16 FEET. REFER TO SHEET C2.7 FOR A TYPICAL BYPASS ROAD SECTION AND THE BYPASS ROAD DESIGN PROFILE. INGRESS AND EGRESS VIA THE BYPASS ROAD SHALL BE MAINTAINED FOR THE FULL DURATION OF THE PROJECT FOR ALL PRIVATE PROPERTY OWNERS THAT UTILIZE WHISKEY CREEK ROAD.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROCUREMENT, TRANSPORTATION AND INSTALLATION OF A TEMPORARY CULVERT TO FACILITATE BYPASS ROAD CONSTRUCTION OVER ANTOINE CREEK.
4. THE CONTRACTOR SHALL INSTALL AND MAINTAIN SUFFICIENT SIGNAGE AND PERSONNEL TO MAINTAIN SAFE AND CONSISTENT TRAFFIC PASSAGE. SIGNAGE SHALL INCLUDE, AT A MINIMUM, TEMPORARY ROAD CLUSRE AND STOP SIGNS TO DIRECT ONE-WAY TRAFFIC VIA THE BYPASS ROAD.
5. STREAMBED BOULDERS SHALL BE INSTALLED AS INLET PROTECTION ON EITHER SIDE OF THE ARCH CULVERT AT THE UPSTREAM FOOTINGS. BOULDERS SHALL BE MIN 1/3 EMBEDDED IN STREAMBED MATERIAL AND ORIENTED AT AN ANGLE TO FUNNEL WATER INTO THE CULVERT AS DIRECTED BY THE CAR. MINIMUM 5 BOULDERS SHALL BE INSTALLED TO PROTECT EACH FOOTING.

PROPOSED SITE PLAN: STA 190+00 - 206+00

SCALE: 1"=60"

SCALE
60 0 30 60 120
SCALE FEET



PROPOSED ANTOINE CREEK PROFILE: STA 190+00 - 206+00

HORIZ. SCALE: 1" = 60'
VERT. EXAGGERATION: 4X

LEGEND

- EXISTING 2' CONTOUR LINES
- EXISTING 10' CONTOUR LINES
- TAX LOTS
- PROJECT OWNERSHIP BOUNDARY
- ROAD CENTERLINE
- WETLANDS
- OHW
- 1' CONTOURS LINES
- 5' CONTOURS LINES
- ACCESS ROUTE
- DIVERSION PIPE
- STAGING AREA
- FILL
- CUT
- FLOODPLAIN WOOD PLACEMENT AREA
- WHS TYPE 1 - 1 LOG SC JAM
- WHS TYPE 2 - 2 LOG SC JAM
- WHS TYPE 3 - 3 LOG SC JAM
- WHS TYPE 4 - 4 LOG SC JAM
- WHS TYPE 5 - FLOODPLAIN WOOD
- WHS TYPE 6 - WOOD CLUSTER
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- WHS TYPE 8 - PALS
- WHS TYPE 9 - BDAS
- SINGLE HABITAT LOGS
- SINGLE KEYED LOG

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PLAN & PROFILE STA
190+00 - STA 206+00

REVISION NUMBER

No.	Date	Revision

Date 3/11/2024	Designed By SR, LE
Drawn By LE, HC	Checked By SR

SCALE 0 1"

JOB NO. 20220046

SHEET NO. C2.3

11 OF 36

DWG: Z:\Shared\W2r\CAD\20220046-Antoine Creek\DWG\SHEETS\AC - PP UPPER REACH.dwg USER: hclegg
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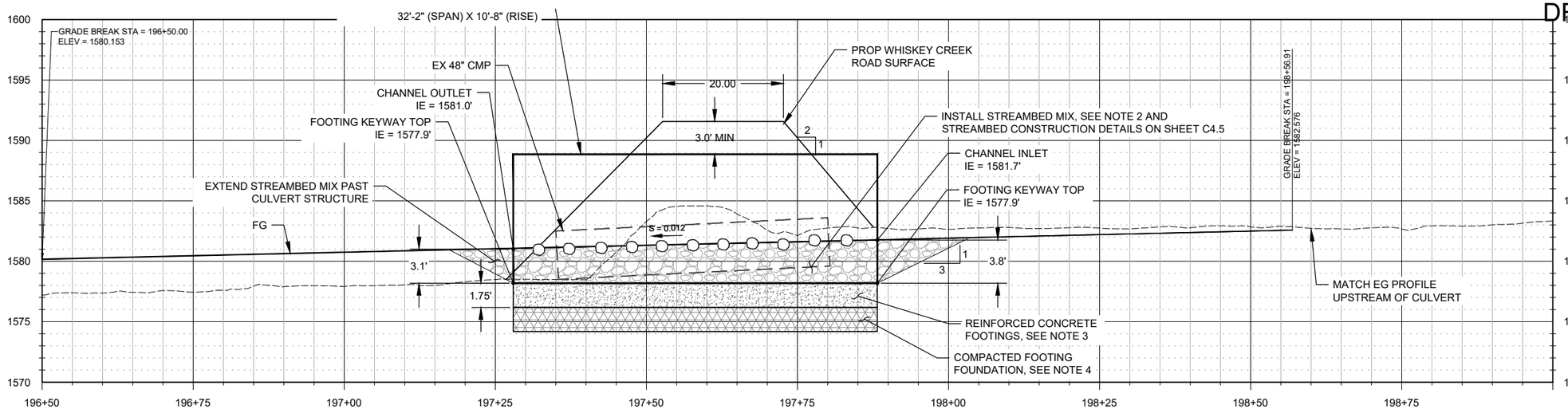
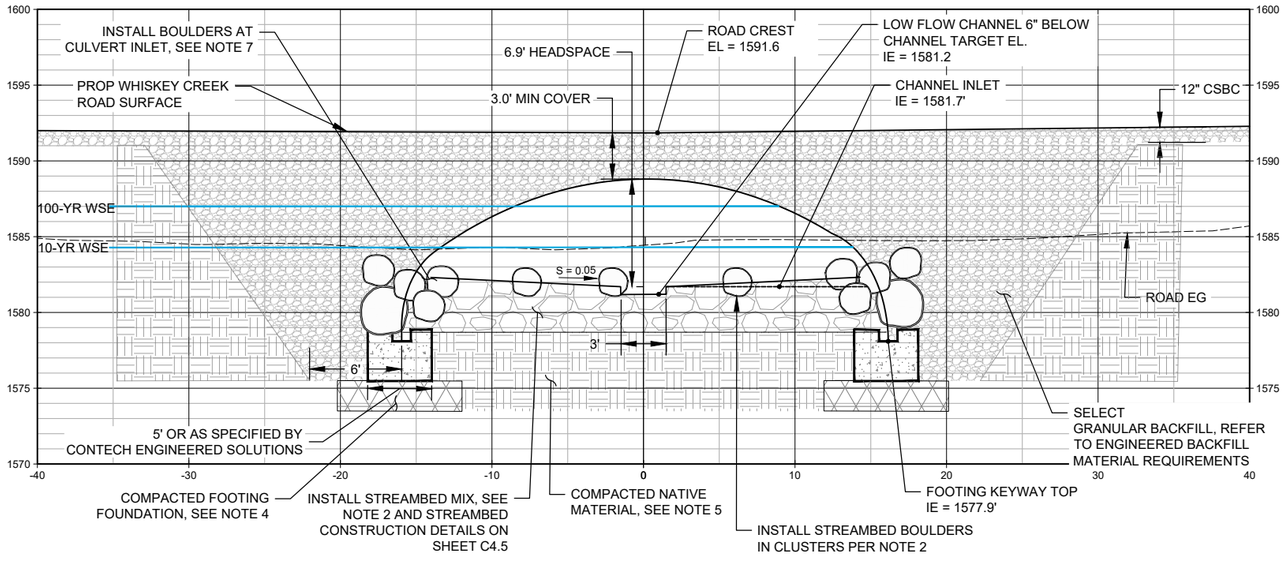
DRAFT FINAL DESIGN
FEBRUARY 2024



PROPOSED WHISKEY CREEK CULVERT PROFILE

HORIZ. SCALE: 1" = 10'
VERT. EXAGGERATION: 2X

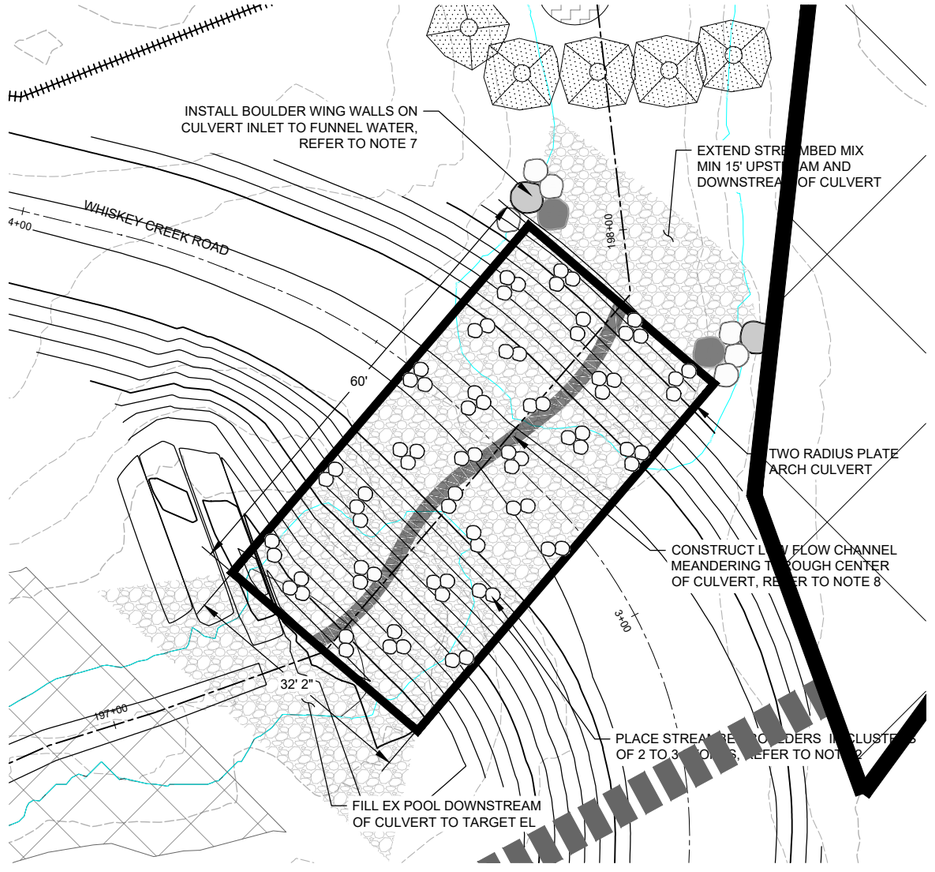


A WHISKEY CREEK CULVERT SECTION AT UPSTREAM INLET STA 197+88

SCALE: 1" = 5'

NOTES:

1. SEE CONTECH ENGINEERED SOLUTIONS' BRIDGECOR TWO RADIUS ARCH 32'-2" (SPAN) X 10'-8" (RISE) SHEETS C2.5 TO C2.6 FOR ADDITIONAL STRUCTURAL, ASSEMBLY AND BACKFILL DETAILS.
2. STREAMBED MIX SHALL BE INSTALLED IN 12" LIFTS WITH STREAMBED FINE SEDIMENT WASHED IN BETWEEN EACH LIFT. STREAMBED MIX SHALL BE INSTALLED TO THE MINIMUM THICKNESS SHOWN ON THIS SHEET AND TO THE GRADATION SPECIFIED IN SPEC SECTION 9-03. STREAMBED MIX SHALL BE INSPECTED AND APPROVED BY THE CAR PRIOR TO INSTALLATION. TYPE II STREAMBED BOULDERS18-24" DIAMETER SHALL BE EMBEDDED $\frac{1}{2}$ TO $\frac{2}{3}$ OF THEIR DIAMETER INTO STREAMBED MATERIAL AND PLACED IN CLUSTERS OF 2 TO 3 BOULDERS AS SHOWN ON THIS SHEET AND AS DIRECTED BY THE CAR. CONTRACTOR SHALL INSTALL MIN 100 BOULDERS WITHIN CULVERT.
3. REINFORCED CONCRETE FOOTINGS SHALL BE INSTALLED PER THE SPECIFICATIONS AND PLANS PREPARED BY CONTECH ENGINEERED SOLUTIONS PENDING GEOTECH FINDINGS.
4. COMPACTED FOOTING FOUNDATION SHALL CONSIST OF QUARRY SPALLS TO A MINIMUM THICKNESS OF 18". A 6" THICK LAYER OF COMPACTED CRUSHED SURFACING BASE COURSE SHALL BE PLACED ON TOP OF QUARRY SPALLS. COMPACT PER WSDOT STANDARD SPECIFICATION 9-03.9(3). PENDING GEOTECHNICAL FINDINGS THE FOOTING FOUNDATION MAY BE REVISED IF SIGNED AND STAMPED BY A CERTIFIED GEOTECHNICAL ENGINEER.
5. COMPACTED NATIVE MATERIAL SHALL BE PLACED UNDERNEATH STREAMBED MIX IN MAX 12" LIFTS COMPACTED PER WSDOT 9-03.9(3). NATIVE MATERIAL SHALL BE SALVAGED DURING EARTHWORK OPERATIONS AND APPROVED BY THE CAR PRIOR TO USE.
6. THE CONTRACTOR SHALL REFER TO THE BRIDGECOR SPECIFICATIONS AND DRAWINGS PROVIDED BY CONTECH ENGINEERED SOLUTIONS OR A COMPARABLE PRODUCT FOR CONSTRUCTION OF THE ARCH CULVERT AND REINFORCED CONCRETE FOOTINGS.
7. INSTALL TYPE II BOULDERS AT THE CULVERT INLET MIN 1/2 EMBEDDED IN STREAMBED MIX AND ORIENTED AT AN ANGLE TO FUNNEL WATER INTO THE CULVERT AS DIRECTED BY THE CAR.
8. THE LOW FLOW CHANNEL SHALL HAVE A 3' TOP WIDTH AND BE 6" DEEP. THE CONTRACTOR SHALL CONSTRUCT THE LOW FLOW CHANNEL TO MEANDER WITHIN THE CENTRAL 6 FEET OF THE ARCH AS DIRECTED BY THE CAR.
9. REFER TO STREAMBED CHANNEL CONSTRUCTION NOTES ON SHEET C4.5 AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR PLACEMENT OF STREAMBED MIX AND STREAMBED BOULDERS WITHIN THE FINISH GRADE CHANNEL.



PROPOSED WHISKEY CREEK CULVERT PLAN

SCALE: 1" = 10'

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OKANOGAN COUNTY, WA

WHISKEY CREEK CULVERT PROFILE AND SECTION

REVISION NUMBER

No.	Date	Revision

Date: 3/11/2024 | Designed By: LE
Drawn By: LE | Checked By: SR

SCALE: 0 1"

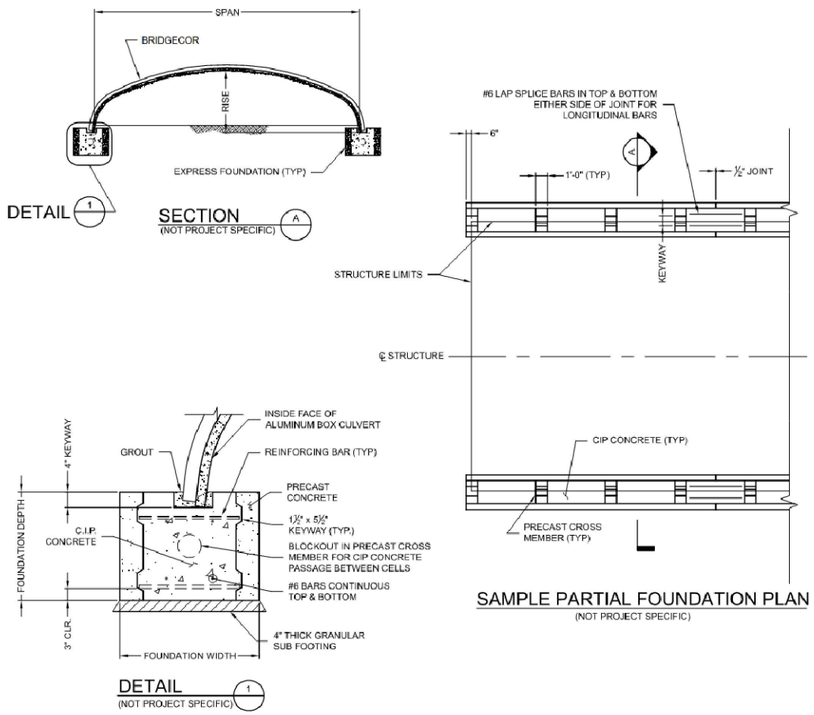
JOB NO. 20220046

SHEET NO. C2.4

12 OF 36

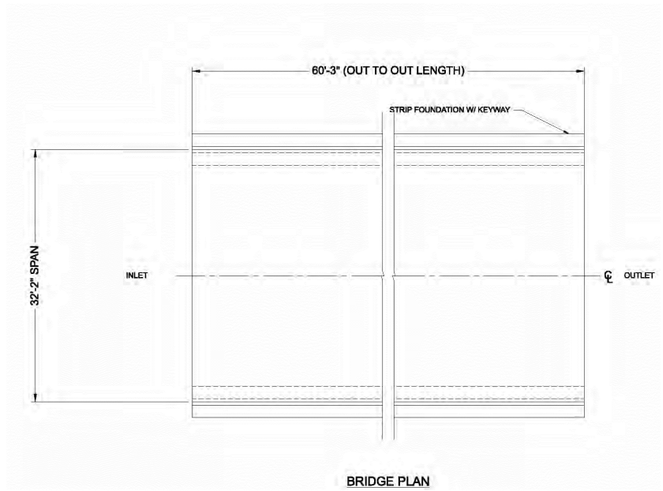
DWG: Z:\Shared\W2r\CAD\20220046-Antoine Creek\DWG\SHEET\SAC - PP UPPER REACH.dwg USER: hcleg
DATE: Mar 11, 2024 3:29pm XREFS:X-TB-W2r-22x34 AC-XR-BASEMAP WBLOCK AC-XR-DESIGN AC-XR-WHS AC-XR-ACCESS-STAGING-WATER-MANAGEMENT

DRAFT FINAL DESIGN
FEBRUARY 2024



PROPOSED OPEN-BOTTOM ARCH CULVERT - FOOTING DETAILS

NOT TO SCALE



PROPOSED OPEN-BOTTOM ARCH CULVERT - TYPICAL PLAN

NOT TO SCALE

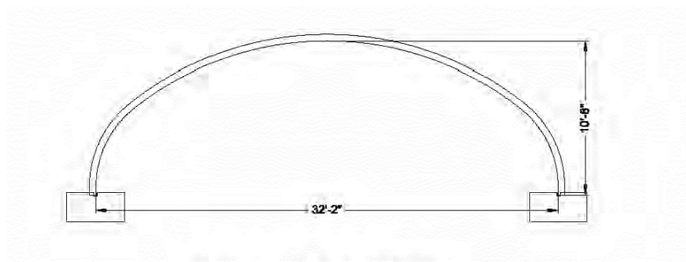
EXPRESS FOUNDATIONS

NOTES:

1. SAMPLE DRAWINGS AND DETAILS OF OPEN-BOTTOM ARCH CULVERT DETAILS ARE SHOWN FOR REFERENCE. SEE CONTECH ENGINEERED SOLUTIONS' BRIDGECOR TWO RADIUS ARCH 32'-2" (SPAN) X 10'-8" (RISE) FOR ADDITIONAL DETAILS.
2. PRIOR TO CONSTRUCTION, CONTRACTOR MUST VERIFY ALL ELEVATIONS SHOWN THROUGH THE ENGINEER.
3. ONLY CONTECH ENGINEERED SOLUTIONS LLC, THE BRIDGECOR APPROVED MANUFACTURER IN THE PROJECT STATE, MAY PROVIDE THE STRUCTURE DESIGNED IN ACCORDANCE WITH THESE PLANS.

PROPOSED OPEN-BOTTOM ARCH CULVERT - ISOMETRIC VIEW

NOT TO SCALE



PROPOSED OPEN-BOTTOM ARCH CULVERT - TYPICAL SECTION

NOT TO SCALE

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OKANOGAN COUNTY, WA

WHISKEY CREEK CULVERT DETAILS

REVISION NUMBER

No.	Date	Revision

Date: 3/11/2024	Designed By: SR, LE
Drawn By: LE	Checked By: SR

SCALE 0 1"

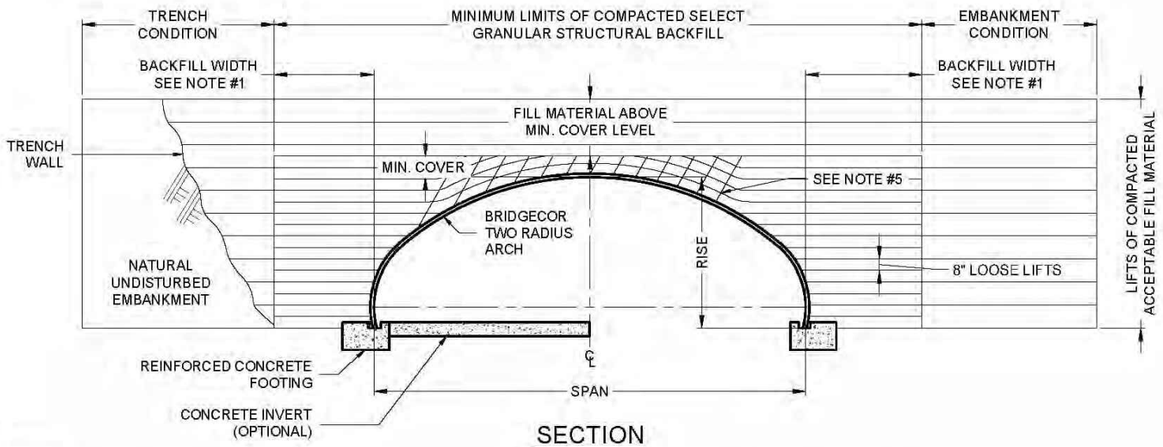
JOB NO. 20220046

SHEET NO. C2.5

13 OF 36

DWG: Z:\Shared\W2r\CAD\20220046-Antoine Creek\DWG\SHEETS\AC - PP UPPER REACH.dwg USER: hclegg
DATE: Mar 11, 2024 3:29pm XREFS:X-TB-W2r-22x34 AC-XR-BASEMAP-WBLOCK AC-XR-DESIGN AC-XR-WHS AC-XR-ACCESS-STAGING-WATER-MANAGEMENT

DRAFT FINAL DESIGN
FEBRUARY 2024



SECTION

SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

INITIAL LIFTS OVER THE CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH LIGHTWEIGHT TRACTOR (D-4 OR LIGHTER) EQUIPMENT.

NOTES:

1. MINIMUM SELECT GRANULAR STRUCTURAL BACKFILL WIDTH IS BASED ON AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12 AND/OR THE RESULTS OF THE PROJECT SPECIFIC FINITE ELEMENT ANALYSIS.
2. ALL SELECT GRANULAR STRUCTURAL BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
3. MONITORING OF THE TWO RADIUS ARCH STRUCTURE IS REQUIRED DURING THE BACKFILLING PROCESS. THE METHOD, FREQUENCY AND DURATION SHALL BE DETERMINED BASED ON THE SIZE AND SHAPE OF THE STRUCTURE.
4. PREVENT DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
5. PLACE SELECT GRANULAR STRUCTURAL BACKFILL IN RADIAL LIFTS AT APPROXIMATELY 75% OF THE RISE OF THE TWO RADIUS ARCH STRUCTURE.
6. BECAUSE OF THE FLEXING AND VIBRATION OF THE CROWN PLATES, THE FULL COMPACTION DENSITY LEVELS OFTEN CAN NOT BE ACHIEVED IN THE FIRST SEVERAL INCHES OF FILL OVER THE CROWN.

ADDITIONAL SELECT GRANULAR STRUCTURAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2-4, A-2-5 OR A-3 MODIFIED. RECYCLED CONCRETE/SLAG ARE NOT RECOMMENDED FOR STRUCTURAL BACKFILL MATERIAL (DEPENDING ON THE SIZE AND SHAPE OF THE STRUCTURE). SPECIFIC BACKFILLS MAY BE REQUIRED). SEE THE STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION ON THIS SHEET. BACKFILL MUST BE PLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 8" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION. IF THE PROPOSED BACKFILL IS NOT A WELL GRADED GRANULAR MATERIAL, A NON-WOVEN GEOTEXTILE FILTER FABRIC SHALL BE PLACED BETWEEN THE SELECT BACKFILL AND THE IN SITU MATERIAL.

DURING BACKFILL, ONLY LIGHTWEIGHT TRACKED VEHICLES (D-4 OR LIGHTER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE. THE ENGINEER AND CONTRACTOR ARE CAUTIONED THAT THE MINIMUM COVER MAY NEED TO BE INCREASED TO HANDLE TEMPORARY CONSTRUCTION VEHICLE LOADS (HEAVIER THAN D-4).

STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION, REFERENCE AASHTO M-145

GROUP CLASSIFICATION	A-1-a	A-1-b	A-2-4	A-2-5	A-3
Sieve Analysis Percent Passing					
No. 10 (2.000 mm)	50 max.	---	---	---	---
No. 40 (0.425 mm)	30 max.	50 max.	---	---	51 min.*
No. 200 (0.075 mm)	15 max.	25 max.	35 max.	35 max.	10 max.
Atterberg Limits for Fraction Passing No. 40 (0.425 mm)					
Liquid Limits	---	---	40 max.	41 min.	---
Plasticity Index	6 max.	6 max.	10 max.	10 max.	Non Plastic
Usual Materials	Stone Fragment, Gravel and Sand		Silty or Clayey Gravel and Sand		Coarse Sand

*Modified from AASHTO M-145.

Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 Materials should not be used.

If 95% Compaction per AASHTO T-180 is specified, the backfill material shall be a A-1-a.

Reference the most current version of ASTM D2487, Standard Practice for Classification of Soils for Engineering

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to the current ASTM/AASHTO edition unless otherwise noted.

1.1.1 ASTM A761 "Corrugated Steel Structural Plate, Zinc Coated for Field-Bolted Pipe, Pipe-Arches and Arches" (AASHTO Designation M-167).

1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12 Division I - Design, AASHTO LRFD Bridge Design Specifications Section 12.

1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction, AASHTO LRFD Bridge Construction Specifications - Section 26. ASTM A807, Standard Practice for Installing Corrugated Steel Structural Plate Pipe.

1.2 DEFINITIONS:

1.2.1 Owner - In these specifications the word "Owner" shall mean ##########

1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.

1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH ENGINEERED SOLUTIONS 800-338-1122 ##########.

1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.

1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.

1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

2.1 Any installation provided herein shall be endorsed by the Engineer; discrepancies herein are governed by the Engineer's plans and specifications.

2.2 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization cleaning and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.

2.3 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.

2.4 The construction shall be performed under the direction of the Engineer.

2.5 All aspects of the structure design and site layout including foundations, backfill, end treatments and necessary scour consideration shall be performed by the Engineer.

3.0 ASSEMBLY AND INSTALLATION

3.1 **Bolts and nuts shall conform to the requirements of ASTM A449. The two radius arch structure shall be assembled in accordance with the plate layout drawings provided by the Manufacturer and per the Manufacturer's recommendations.**

Bolts shall be tightened using an applied torque of between 100 and 300 ft.-lbs.

3.2 **The two radius arch structure shall be installed in accordance with the plans and specifications, the Manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction/AASHTO LRFD Bridge Construction Specifications - Section 26.**

3.3 **Trench excavation shall be made in** embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.

3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.

3.5 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloaded and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

3.6 **The structure shall be backfilled using clean well graded granular material that meets the requirements for soil classifications A-1, A-2-4, A-2-5 or A-3 modified per AASHTO M-145. See the structural plate backfill group classification table on this sheet.**

Backfill must be placed symmetrically on each side of the structure in 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180.

3.7 **If temporary construction vehicles are required to cross the structure, it is the Contractor's responsibility to contact the Engineer to determine the amount of additional minimum cover necessary to handle the specific loading condition.**

Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

3.8 **If a metal headwall and/or wingwall system is specified, the select granular structural backfill limits shall extend past the deadman anchor system. Contact the Engineer if stiff material or rock is encountered where the wingwalls and deadmen are to be installed.**

PROPOSED OPEN-BOTTOM ARCH CULVERT -CONTECH BRIDGECOR SPECIFICATIONS

NOT TO SCALE

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6686

COLVILLE CONFEDERATED TRIBES
P.O. BOX 150
NESPELEM, WA 99155
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COLVILLE CONFEDERATED TRIBES
ANTOINE CREEK
ENHANCEMENT PROJECT
OKANOGAN COUNTY, WA

WHISKEY CREEK
CULVERT DETAILS 2

REVISION NUMBER

No.	Date	Revision

Date: 3/11/2024 | Designed By: SR, LE
Drawn By: LE | Checked By: SR

SCALE: 0 1"

JOB NO. 20220046

SHEET NO. C2.6

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DWG: Z:\Shared\2r\CAD\20220046-Antoine Creek\DWG\SHEET\SAC - PP UPPER REACH.dwg USER: hclegg
DATE: Mar 11, 2024 3:29pm XREFS:X-TB-W2r-22x34 AC-XR-BASEMAP WBLOCK AC-XR-DESIGN AC-XR-WHS AC-XR-ACCESS-STAGING-WATER-MANAGEMENT

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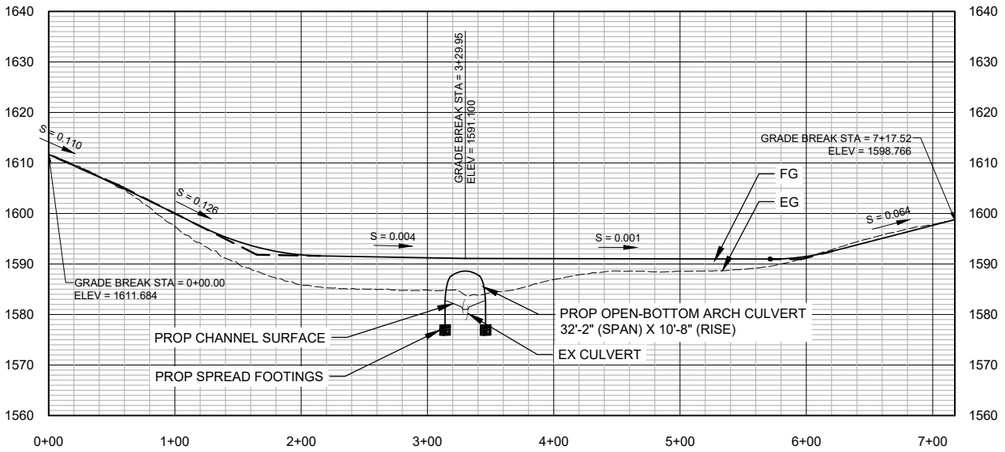
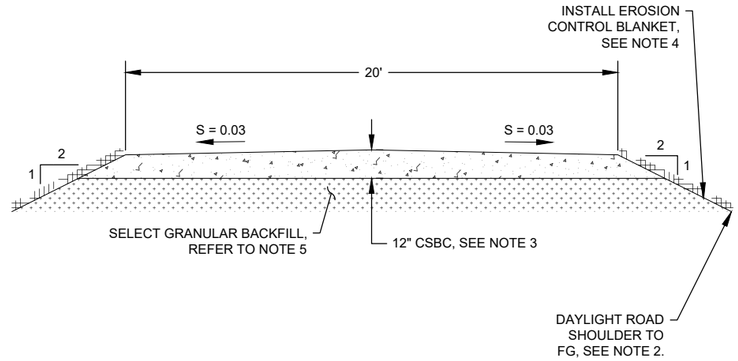
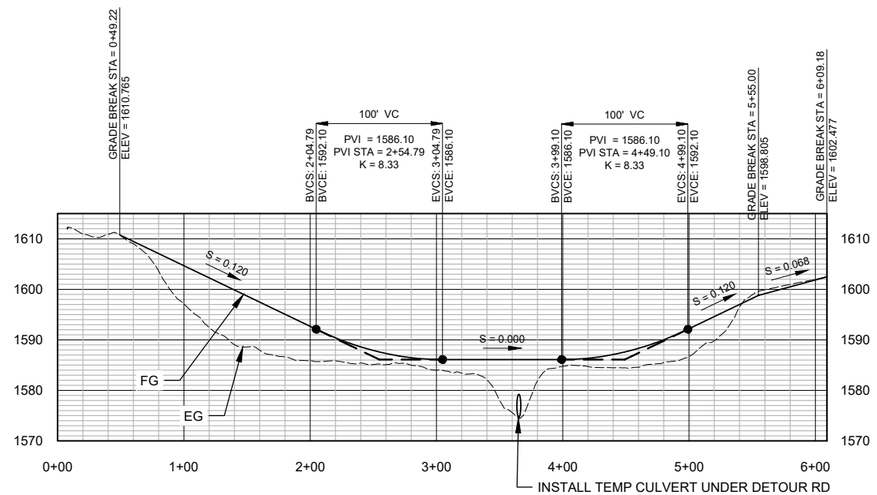


PROPOSED WHISKEY CREEK ROAD PROFILE

HORIZ. SCALE: 1" = 60'
VERT. EXAGGERATION: 4X

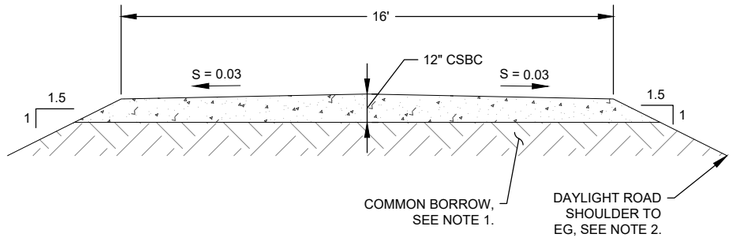


A — WHISKEY CREEK ROAD AT CULVERT CROSSING
SCALE: NTS



PROPOSED DETOUR ROAD PROFILE

HORIZ. SCALE: 1" = 60'
VERT. EXAGGERATION: 4X



B — TEMPORARY DETOUR ROAD TYPICAL SECTION
SCALE: NTS

NOTES:

1. TEMPORARY EMBANKMENT SHALL BE CONSTRUCTED OF MATERIAL MEETING THE REQUIREMENTS OF COMMON BORROW PER WSDOT STD. SPEC. 9-03.14(3). IF ONSITE MATERIALS ARE TO BE USED ORGANICS AND OTHER DELETERIOUS MATERIALS SHALL BE REMOVED, AND THE MATERIAL SHALL BE MOISTURE CONDITIONED TO IT'S OPTIMUM MOISTURE CONTENT AS REQUIRED TO ACHIEVE THE MINIMUM REQUIRED DEGREE OF COMPACTION.
2. ROAD SHOULDER TO TIE IN TO FG AT 1.5:1 SLOPE UNLESS A SHALLOWER SLOPE IS POSSIBLE.
3. CRUSHED SURFACING BASE COURSE (CSBC) SHALL BE 1 - ¾" MINUS AND SHALL MEET THE GRADATION REQUIREMENTS SPECIFIED IN WSDOT ____. CSBC SHALL BE INSTALLED TO A MINIMUM THICKNESS OF 12".
4. RE-VEGETATE WITH UPLAND SEEDING AND PLANTING MIX PER PLANS ON SHEET C6.1. INSTALL EROSION CONTROL BLANKET ON ROAD SHOULDER PER WSDOT STANDARD PLAN I-60.10-01. DO NOT INSTALL EROSION CONTROL BLANKET WHERE RIPRAP OR OTHER ROCK IS SPECIFIED.
5. BACKFILL MATERIAL SHOULD CONSIST OF A WELL-GRADED, ANGULAR GRANULAR SOIL WITH A MINIMUM PARTICLE SIZE OF 3 INCHES. REFER TO CONTECH ENGINEERED SOLUTION SPECIFICATION FOR ENGINEERED BACKFILL MATERIAL REQUIREMENTS.

STEVEN RODRIGUEZ — STATE OF WASHINGTON — 54824 — REGISTERED PROFESSIONAL ENGINEER
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ENHANCEMENT PROJECT
OKANOGAN COUNTY, WA

WHISKEY CREEK ROAD
SECTION AND PROFILE

REVISION NUMBER

No.	Date	Revision

Date	Designed By
3/11/2024	SR, LE
Drawn By	Checked By
LE	SR

SCALE
0 1"

JOB NO.
20220046

SHEET NO.
C2.7

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