

SITE C CLEAN ENERGY PROJECT

Component Application Package – Halfway River Temporary Access Bridges Revised Design for Crossing 19.7A

Notice of Work

For Canadian Navigable Waters Act

July 8, 2020

Submitted to:

Transport Canada
Navigation Protection Program
Suite 1100 - 1166 W Pender Street
Vancouver, BC V6E 2R9

Submitted by:

BC Hydro and Power Authority
Site C Clean Energy Project
9th Floor – 1111 West Georgia Street.
Vancouver BC V6E 4M3

**Site C Clean Energy Project – Halfway River Temporary Access Bridges
Revised Design for Crossing 19.7A**

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1 INTRODUCTION

The Canadian Navigable Waters Act (*CNWA*) came into force on August 28, 2019. The *CNWA* includes a Schedule of navigable waters requiring regulatory approval for works that risk a substantial interference with navigation. Works required for construction and operation of the Site C Clean Energy Project (the Project) that occur on, over, under or through navigable waterways, as defined by the *CNWA*, must be permitted.

The Halfway River is a Peace River tributary near Hudson's Hope, BC and is not named in the *CNWA* schedule of navigable waters. As such, this application is being submitted as a Notice of Work for the construction of five (5) temporary bridge and causeway crossings over Halfway River. These five crossings replace the design for one bridge crossing at 19.7A that was submitted in a previous Notice of Work (Registry #1493).

2 HALFWAY RIVER TEMPORARY CROSSINGS – RESERVOIR CLEARING

Site C Reservoir clearing in forest areas of the lower Halfway River catchment requires machine access to both banks of the river. The available road networks do not provide access to areas that require clearing ahead of reservoir filling, hence new roads and access routes are proposed. Within this new road network, six (6) mainstem bridge crossings are required, each being accessed using constructed causeway approaches. These mainstem crossings are shown in the overview map in Attachment A.

This Notice of Work application is specifically for the final upstream mainstem crossing which includes a combination of five (5) structures over the Halfway River. This multi-crossing design replaces the one crossing at 19.7A, that was submitted in a previous Notice of Work (Registry #1493) and incorporates the access that was originally planned as a non-obstructive causeway along the northern bank of the river. The previous design at crossing 19.7A was for a causeway and bridge with a causeway length of 105m, and a bridge length of 36.576 m.

A map showing the revised multi-crossing locations at 19.7A is provided in Attachment A. The crossings span portions of the Halfway River that are Crown Land and are within the Occupant Licence to Cut (OLTC 19) area held by BC Hydro. The dimensions and approximate location of each crossing at site 19.7A are provided in Table 1.

**Site C Clean Energy Project – Halfway River Temporary Access Bridges
Revised Design for Crossing 19.7A**

Table 1. Location, dimensions and land descriptions for revised Halfway River crossings at 19.7A

| Halfway River Mainstem Crossing 19.7A Bridge ID | Bridge Length (m) | Latitude | Longitude | Land Description of River Crossing |
|---|----------------------------------|-----------|-------------|--|
| 1 | 30.480 | 56.242011 | -121.547452 | Theoretical Unsurveyed Crown land North 1/2 of Section 34 Township 83 Range 23 West of The 6th Meridian Peace River District; and Crown Foreshore, bed of the Halfway River and the Halfway River located within the North 1/2 of Section 34 Township 83 Range 23 West of The 6th Meridian Peace River District. |
| 2 | 24.385 | 56.241527 | -121.547467 | |
| 3 | 24.385 | 56.241127 | -121.548261 | |
| 4 | 18.288 | 56.239539 | -121.552287 | |
| 5 | 60.960 (2 x 30.480 m bridges) | 56.241587 | -121.546293 | |

The approximate causeways lengths are as follows:

- Northern bank of river to Bridge 1: 11 m
- Bridge 1 to Bridge 2: 47 m
- Bridge 2 to Bridge 3: 42 m
- Bridge 3 to Bridge 4: 290 m
- Bridge 4: No causeway
- Between Bridge 1 and Bridge 5: 52 m

2.1 REVISED DESIGN OF MULTI-CROSSING 19.7A

Two options for this crossing location are provided to address high and low flow river conditions. The general arrangement, dimensions and specifications for each of the five bridges under both conditions, is provided in the drawing package in Attachment B. Each bridge has been designed by an engineering professional. Each crossing would have the capacity to pass the daily average flow estimated for the seasonal (September - April), 1 in 10-year return period (124 m³/s).

Under high flow, non-frozen conditions, the causeways and bridge approaches would be constructed from local river bed materials and supplemented with imported granular material and riprap rock. Five bridge crossings using six spans (two spans combined into a single structure and supported with a lock block pier) are planned for managing higher river flows.

Under low flow and/or frozen conditions, a combination of snow and granular material may be used to develop the access and approaches. Two bridge crossings (Bridges 1 & 5) using three spans (two spans combined into a single structure and supported with a lock block pier) in combination with three sets of 2-800 mm steel culverts (in place of high flow bridges) are planned for low river conditions. Where no flow

Site C Clean Energy Project – Halfway River Temporary Access Bridges Revised Design for Crossing 19.7A

exists (western backchannel), under frozen conditions the planned culverts may be reduced in size and number.

A centre pier to support the two-bridge span configuration (Bridge 5), over the widest section of the channel, would be constructed out of concrete lock blocks. During higher flows, a riprap base may be required to provide a platform, outside of the river flow, for the lock blocks. The riprap base will be capped with granular material to ensure the platform is level and can be compacted to provide stability for the structures.

Riprap specifications have been developed using the estimated flows level and associated scour potential. The granular material requirements and riprap specifications for each crossing are summarized in the IFC drawings in Attachment B.

2.2 CONSTRUCTION SEQUENCE AND SCHEDULE

The contractor is expected to begin constructing the Hwy 29 temporary access crossings in early September, starting at the downstream end (Site ID 19.3A) and moving upstream after each crossing is built. Construction of the multi-crossing at 19.7A is planned to begin late November 2020.

Minor changes to location and bridge sizing may be required in order to field fit each crossing to site conditions that exist during construction. These changes may be required due to the dynamic changes in gravel bar and channel locations that occur frequently in this drainage.

Decommission of the crossings will involve bridge deck, abutment and pier removal such that navigation access can be reinstated by May 1, 2021. Causeway materials will remain in place, unless minor openings are required for fish migration. The future Site C reservoir would cover the causeway materials after reservoir filling is completed in 2024, and each causeway would be shown in the future reservoir maps.

3 PUBLIC BOATER ACCESS

Construction of temporary crossings in the Halfway River channel is expected to block boater access to lower portions of the Halfway River between September 1, 2020 and April 30, 2021. A map showing the river blockage extent has been included in Attachment A.

Crossings would be removed in April 2021 and boating access would be reinstated on or before May 1, 2021. The Halfway River boat launch would remain open during this period.

Communication to boaters ahead of river closures would be done in accordance with the Site C Boater Communication Protocol (Site C [Construction Safety Management Plan](#), Section 5.3.4.2). Signs that are visible to boaters would be placed upstream of the crossing location to alert them to the upcoming blockage and potential hazard. Downstream of the crossing, the river would be signed to alert approaching boaters.

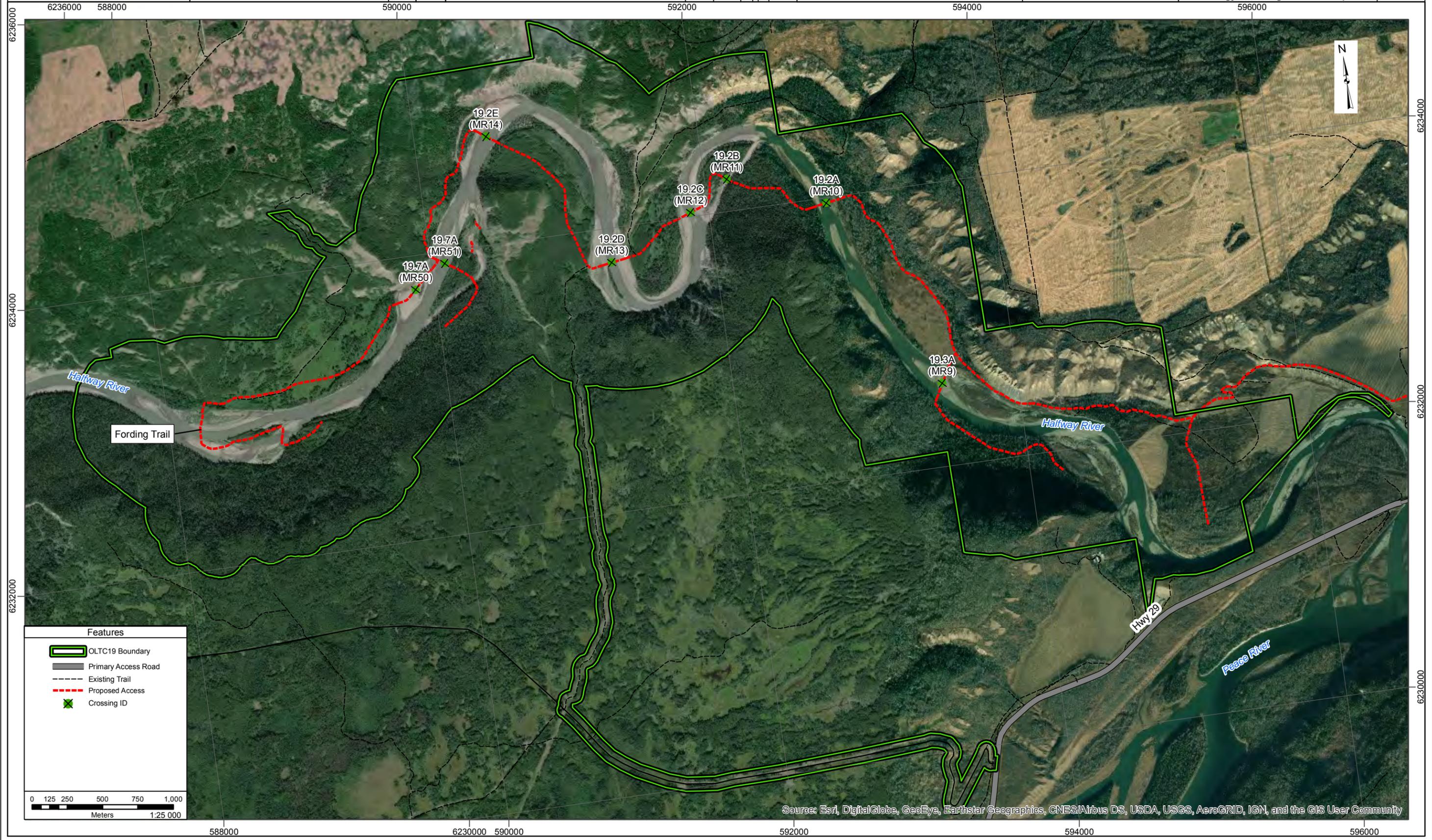
Attachment A – Maps

Overview Map of Halfway River Temporary Access Crossings

Map of Revised Multi-crossing Bridge Locations at 19.7A

Map of Halfway River Blockage Extent

| No. | Revisions | Made | Chkd | Appd | Date |
|-----|-----------|------|------|------|------|
| | | | | | |



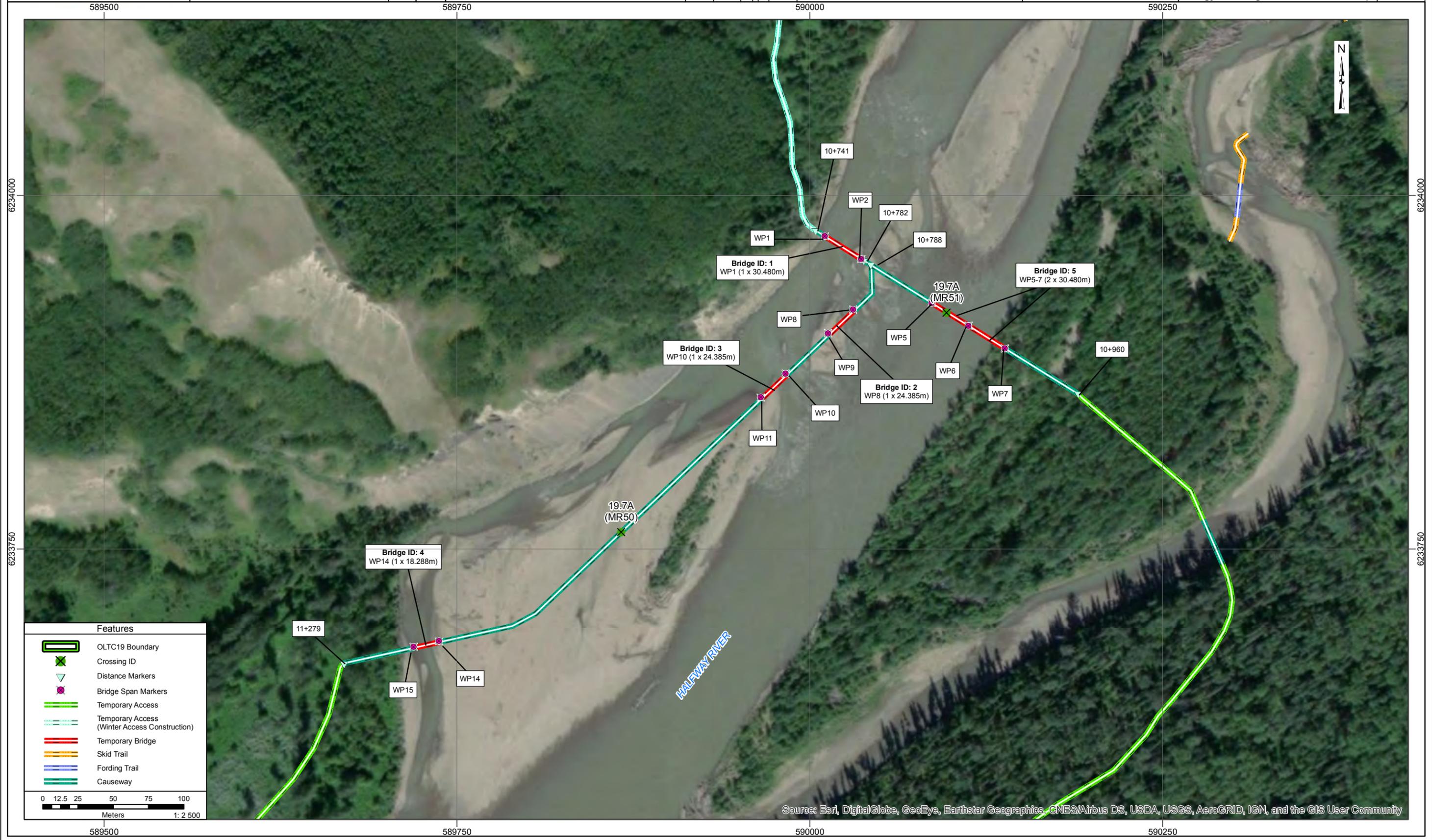
Features

- OLTC19 Boundary
- Primary Access Road
- Existing Trail
- Proposed Access
- Crossing ID

0 125 250 500 750 1,000
 Meters 1:25 000

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

| No. | Revisions | Made | Chkd | Appd | Date |
|-----|-----------|------|------|------|------|
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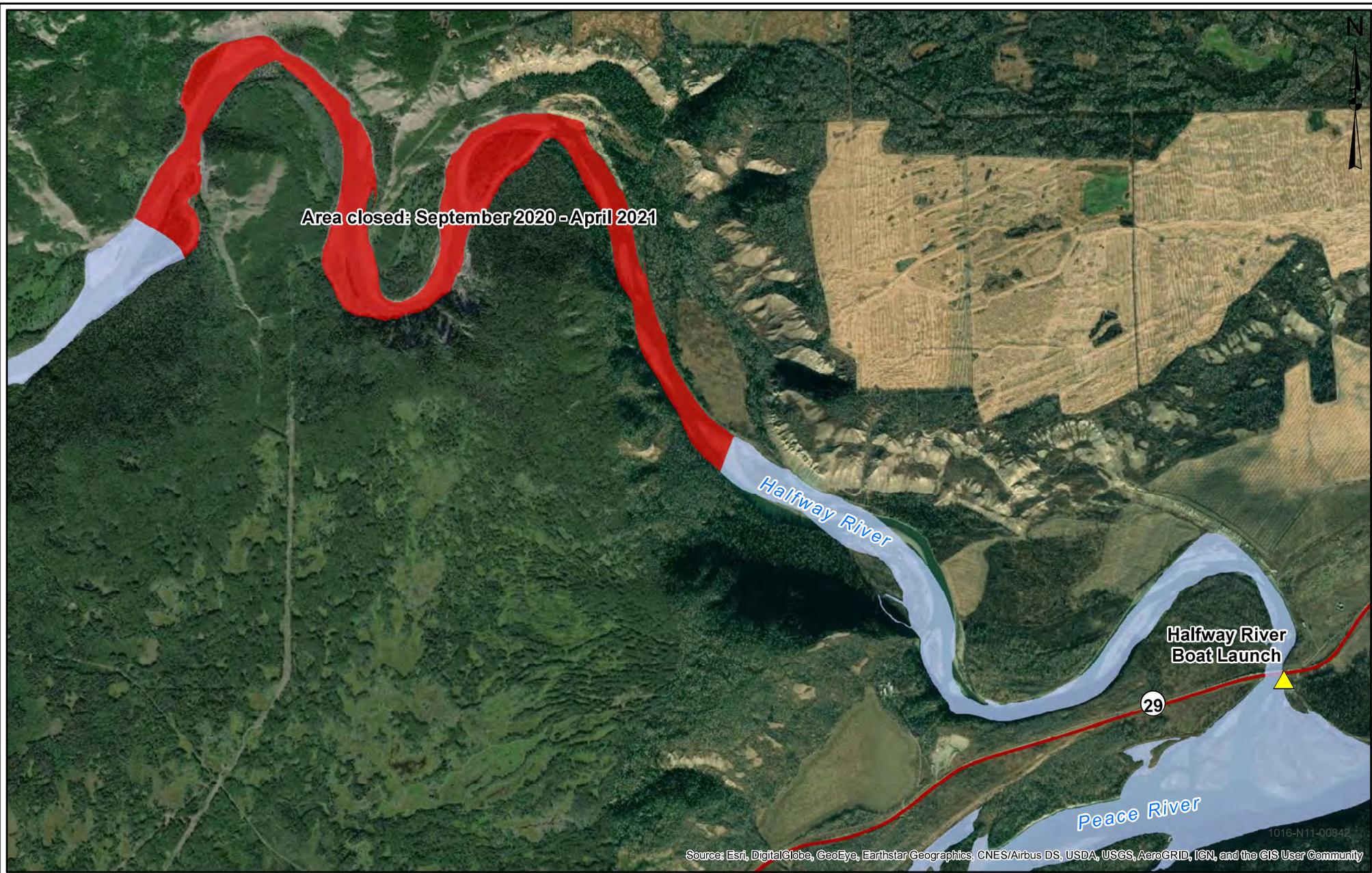


Features

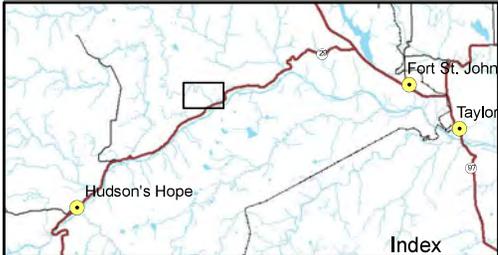
- OLTC19 Boundary
- Crossing ID
- Distance Markers
- Bridge Span Markers
- Temporary Access
- Temporary Access (Winter Access Construction)
- Temporary Bridge
- Skid Trail
- Fording Trail
- Causeway

0 12.5 25 50 75 100
 Meters 1: 2,500

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



X:\ArcGIS\Projects\Public Affairs\Halfway River Closure - 1016-N11-00842.mxd



Map Notes:
 1. Datum: NAD83
 2. Projection: UTM Zone 10N
 3. Base Data: Province of B.C.
 4. Imagery: ESRI Online Basemapping

Legend

- Area**
- Area closed: September 2020 - April 2021
 - Halfway River Boat Launch
 - Highway

1:30,000 0 1 km

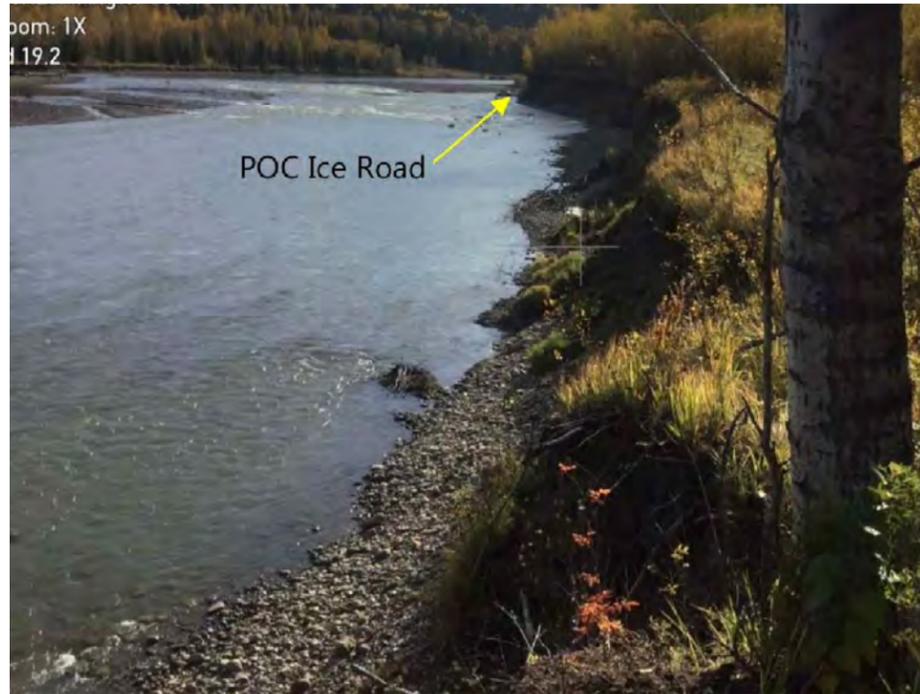


Halfway River Closure Area

| | | | |
|------|--------------|----------------|-----|
| DATE | May 14, 2020 | 1016-N11-00842 | R 0 |
|------|--------------|----------------|-----|

Attachment B

**Design Drawings, Plan and Profile Views of Revised Temporary Access Crossings at
19.7A over Halfway River**



HALFWAY RIVER OLTC 19 - 7A



HALFWAY RIVER CROSSINGS (MIN. CL-625)

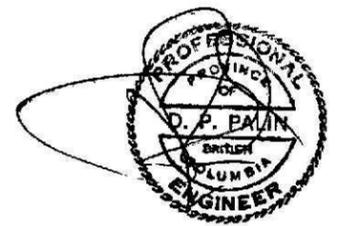
BRIDGE DETAILS

COORDINATES:
LATITUDE: 56.24172°
LONGITUDE: -121.54666°

PROPOSED SET OF PLANS FOR LOW-FLOW OPTION

PROPOSED#2 SET OF PLANS FOR ULTRA LOW-FLOW OPTION (ALMOST NO FLOW PRESENT IN CULVERT CHANNELS AT TIME OF CONSTRUCTION)

| DESCRIPTION | SHEET NUMBER | DESCRIPTION | SHEET NUMBER |
|--------------------------------------|--------------|--|--------------|
| EXISTING SITE PHOTOS | 01 | B1 C1 C3/C4 B5 PROPOSED#2 PLAN VIEW | 16 |
| B1 C1 B2 B5 EXISTING PLAN VIEW | 02 | C5/C6 PROPOSED#2 PLAN VIEW | 17 |
| B3 EXISTING PLAN VIEW | 03 | C2 PROPOSED#2 PLAN VIEW | 18 |
| C2 EXISTING PLAN VIEW | 04 | C7/C8 PROPOSED#2 PLAN VIEW | 19 |
| B4 EXISTING PLAN VIEW | 05 | B1 B5 PROPOSED#2 PROFILES AND SECTIONS | 20 |
| B1 B5 EXISTING PROFILES AND SECTIONS | 06 | C3/C4 C5/C6 PROPOSED#2 PROFILES AND SECTIONS | 21 |
| B2 B3 EXISTING PROFILES AND SECTIONS | 07 | C2 C7/C8 PROPOSED#2 PROFILES AND SECTIONS | 22 |
| C2 B4 EXISTING PROFILES AND SECTIONS | 08 | PROPOSED CUT AND FILL PLAN + DETAILS | 23 |
| B1 C1 B2 B5 PROPOSED PLAN VIEW | 09 | PROPOSED#2 CUT AND FILL PLAN + DETAILS | 24 |
| B3 PROPOSED PLAN VIEW | 10 | LOCKBLOCK/PULLOUT DETAILS | 25 |
| C2 PROPOSED PLAN VIEW | 11 | | |
| B4 PROPOSED PLAN VIEW | 12 | | |
| B1 B5 PROPOSED PROFILES AND SECTIONS | 13 | | |
| B2 B3 PROPOSED PROFILES AND SECTIONS | 14 | | |
| C2 B4 PROPOSED PROFILES AND SECTIONS | 15 | | |



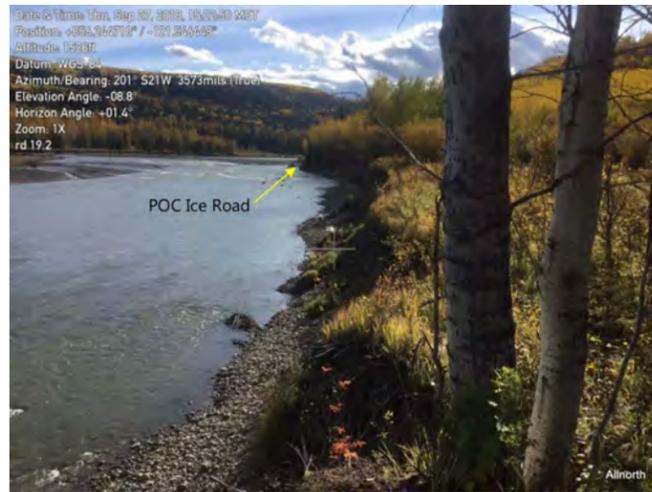
PREPARED BY:



UNIT 315
7326 10TH STREET NE
CALGARY, AB
T2E 8W1

INTENDED TO BE PLOTTED ON 11" X 17". ANY
COPIES OR PDF'S MAY NOT BE TO SCALE.

DOWNSTREAM LOOKING AT LOW-CHAIN BANK



UPSTREAM LOOKING AT LOW-CHAIN BANK



LOW-CHAIN BANK UPSTREAM FROM CROSSING



START OF CROSSING FROM LOW-CHAIN BANK

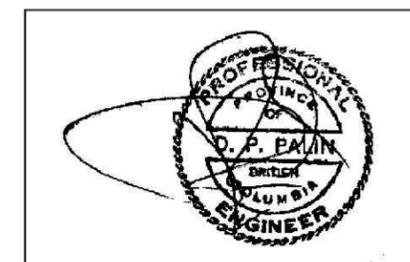


AERIAL IMAGERY



GENERAL NOTES:

1. SITE PHOTOGRAPHS WERE TAKEN BY OTHERS IN SEPTEMBER 2018 AND REPRODUCED IN THESE PLANS FOR REFERENCE.
2. TRILOGY CROSSING CORP. HAS NOT BEEN TO SITE AND THEREFORE IS UNABLE TO VERIFY GRAVEL BAR LOCATIONS AND CREEK BOTTOM LOCATIONS. ALL DETAILS HAVE BEEN BASED OFF IMAGERY AND TECHNICAL INFORMATION PREPARED BY OTHERS.



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ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

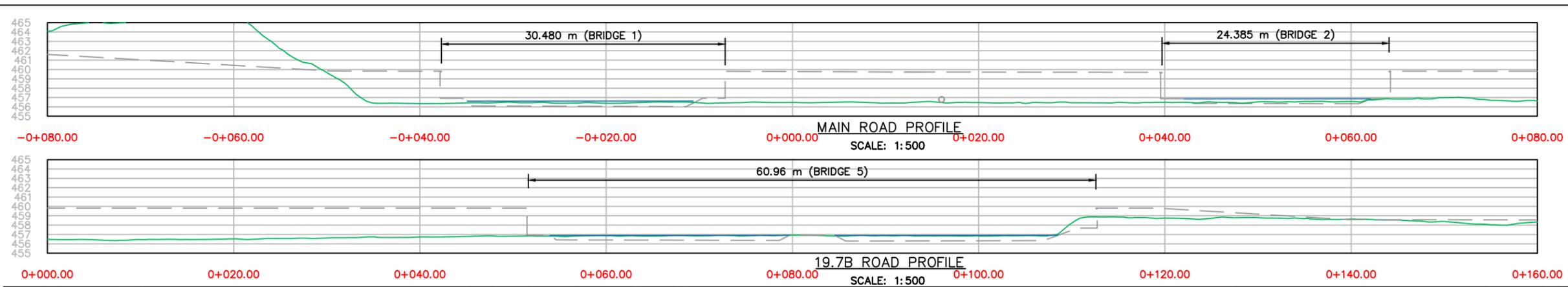
EXISTING SITE PHOTOS

BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
|---------------|-------------|-------------|----------|
| 1 02-JUN-2020 | M.DARASZ | M.DARASZ | D.PALIN |
| DATE | DATE | DATE | PLAN |
| 0 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

REVISIONS

Sheet 01 of 25



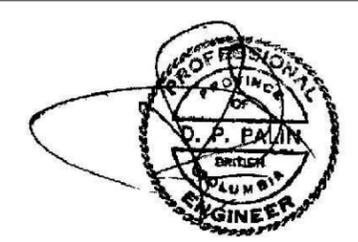
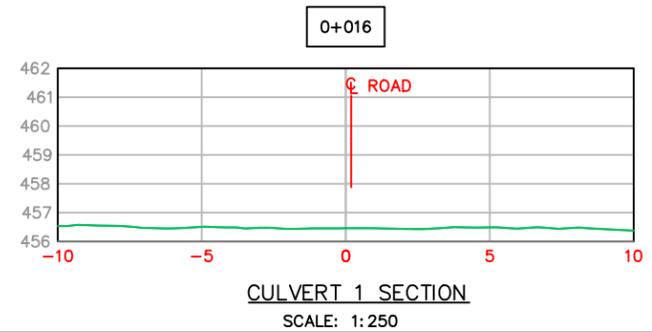
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



- GENERAL NOTES:**
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEOID CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
 4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
 5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
 6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
 7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
 8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.

BENCHMARK SURVEY TABLE

| MARK | ELEV. (m) | NORTHING | EASTING |
|-------|-----------|-------------|-------------|
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| ✕ WP2 | 457.9 | 6233955.039 | 590036.4342 |
| ✕ WP3 | 456.5 | 6233933.212 | 590056.3596 |
| ✕ WP4 | 456.5 | 6233956.244 | 590055.9391 |
| ✕ WP5 | 457.9 | 6233924.021 | 590086.3807 |
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✕ WP9 | 457.9 | 6233902.525 | 590012.8863 |



| NO. | DATE | DESCRIPTION |
|-----|-------------|-------------------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW |

REVISIONS

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ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

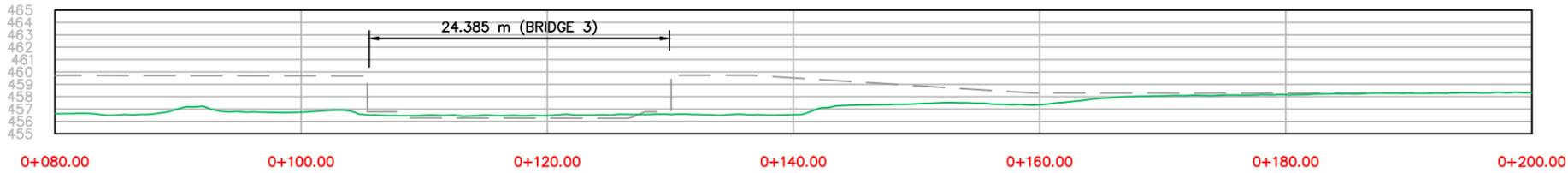
B1 C1 B2 B5 EXISTING PLAN VIEW

BC Hydro
Power smart

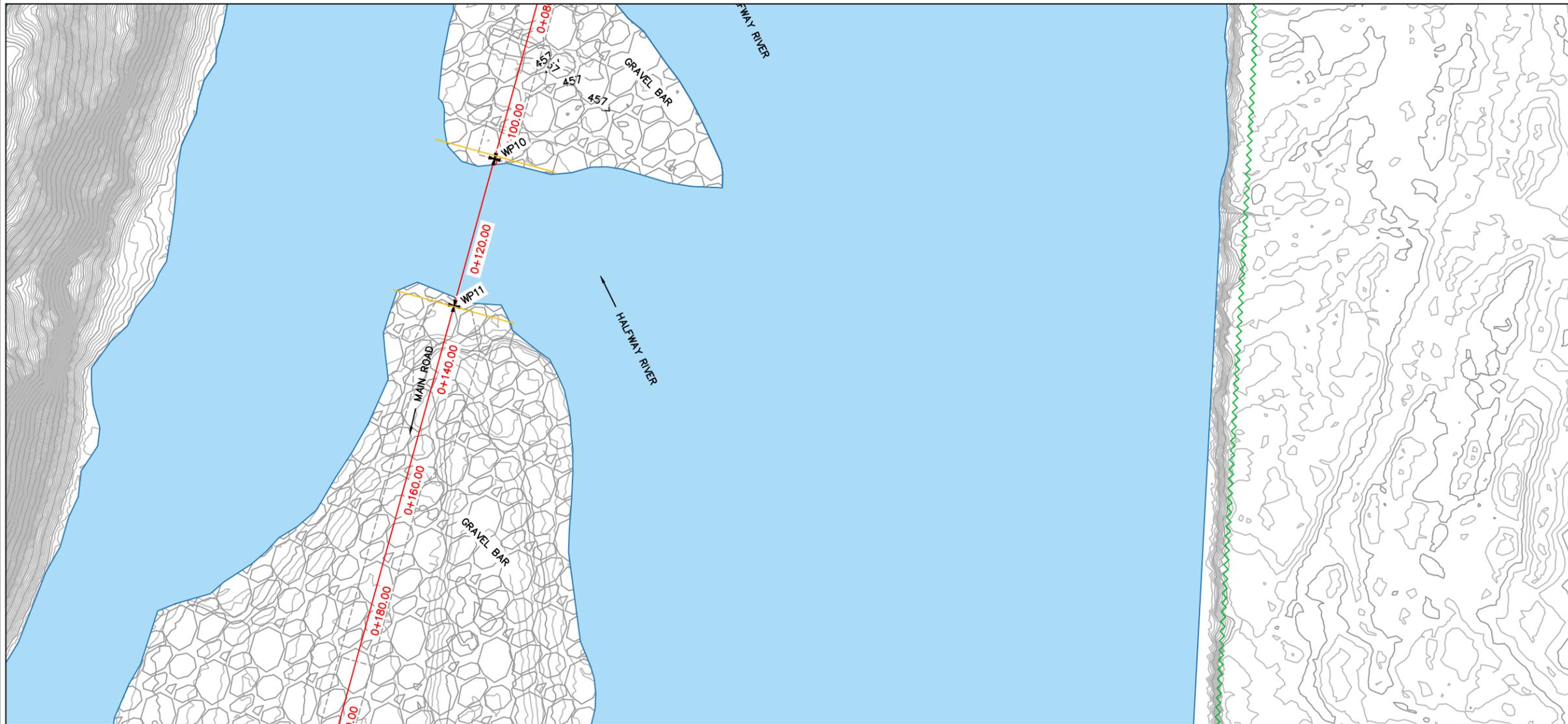
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|-------------|-------------|-------------|--------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /02 |
| DATE | DATE | DATE | PLAN |
| 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

Sheet 02 of 25

LAST DATE REVISED: 2-JUN-2020 6:13 PM



PROFILE
SCALE: 1:500



PLAN
SCALE: 1:700

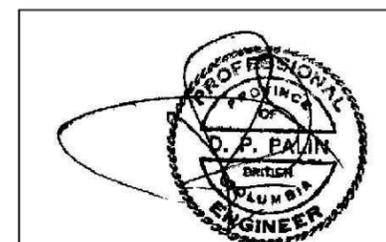
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| ✘ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✘ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✘ WP9 | 457.9 | 6233902.525 | 590012.8863 |
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| ✘ WP15 | 458.934 | 6233681.074 | 589719.4145 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |

GENERAL NOTES:

1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
2. COORDINATE SYSTEM NAD83, GEOID CGG2013.
3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.



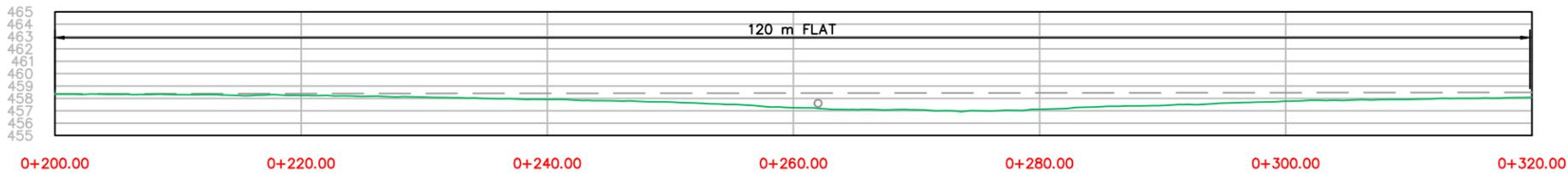
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19.7A HALFWAY CROSSINGS

B3 EXISTING PLAN VIEW

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|-------------|-------------|-------------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /03 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | DATE | DATE | DATE | PLAN |
| | | REVISIONS | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |



PROFILE
SCALE: 1:500



PLAN
SCALE: 1:700

0+262



SECTION VIEW
SCALE: 1:250

| | | | |
|--------|---------|-------------|-------------|
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| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
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| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
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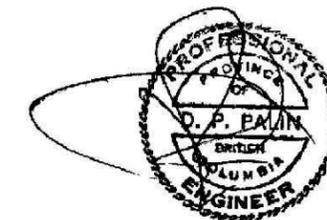
NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT



| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |

GENERAL NOTES:

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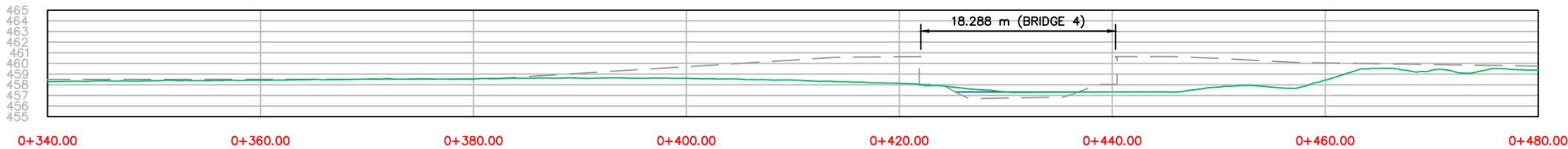
Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS
C2 EXISTING PLAN & PROFILE

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|----------|----------|---------|--------------|
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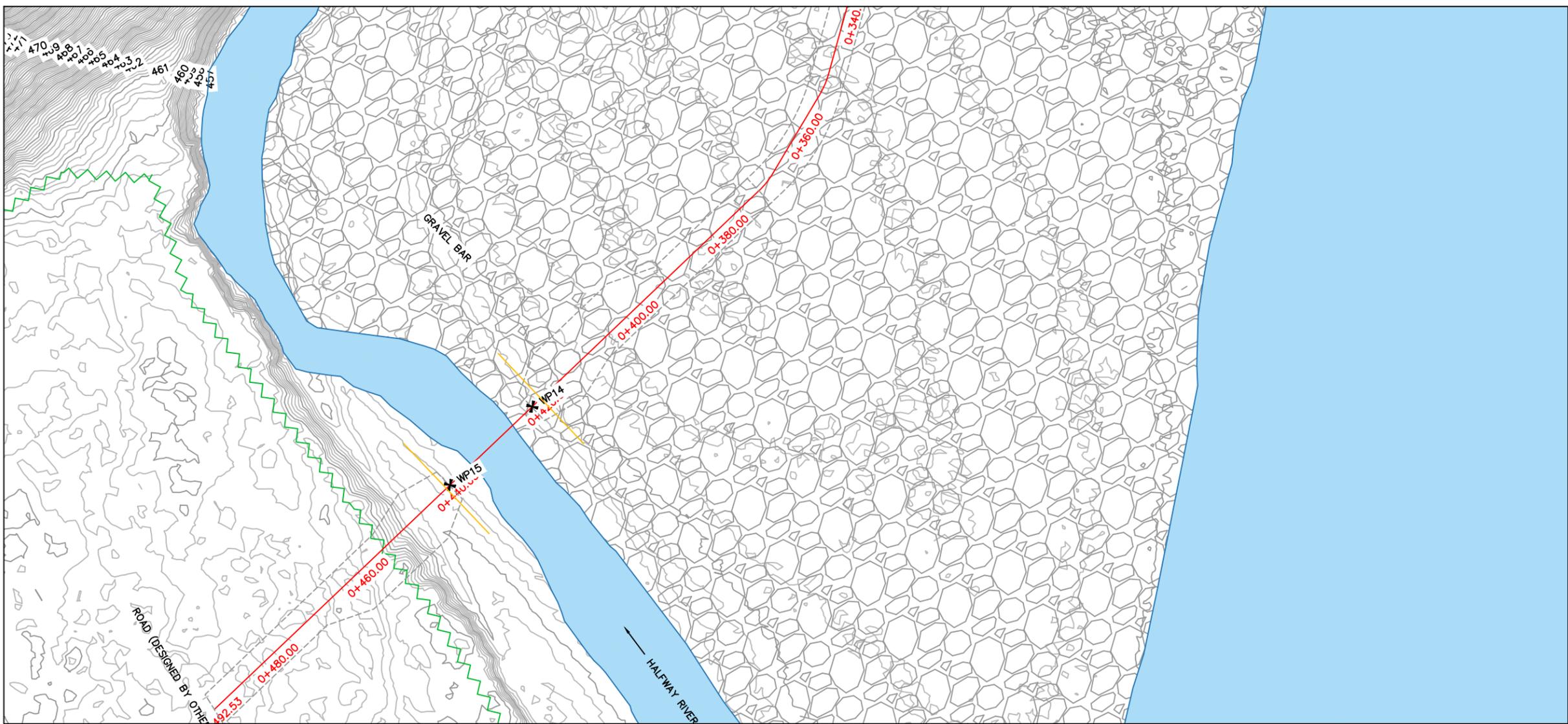
REVISIONS



PROFILE
SCALE: 1:500



| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |

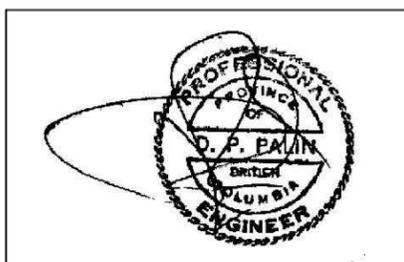


PLAN
SCALE: 1:700

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| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✕ WP9 | 457.9 | 6233902.525 | 590012.8863 |
| ✕ WP10 | 457.9 | 6233874.059 | 589982.8937 |
| ✕ WP11 | 457.9 | 6233857.282 | 589965.1983 |
| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
| ✕ WP13 | 457.3 | 6233772.149 | 589868.7752 |
| ✕ WP14 | 458.934 | 6233685.012 | 589737.2734 |
| ✕ WP15 | 458.934 | 6233681.074 | 589719.4145 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT

- GENERAL NOTES:**
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEIOD CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
 4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
 5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
 6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
 7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
 8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.



Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

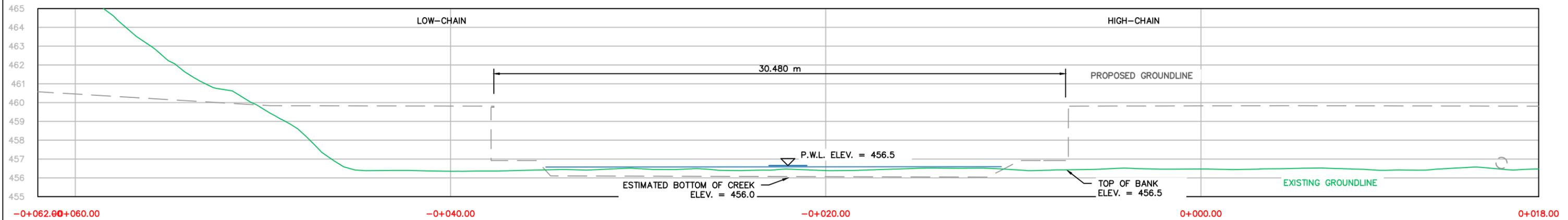
19.7A HALFWAY CROSSINGS

B1 EXISTING PLAN VIEW

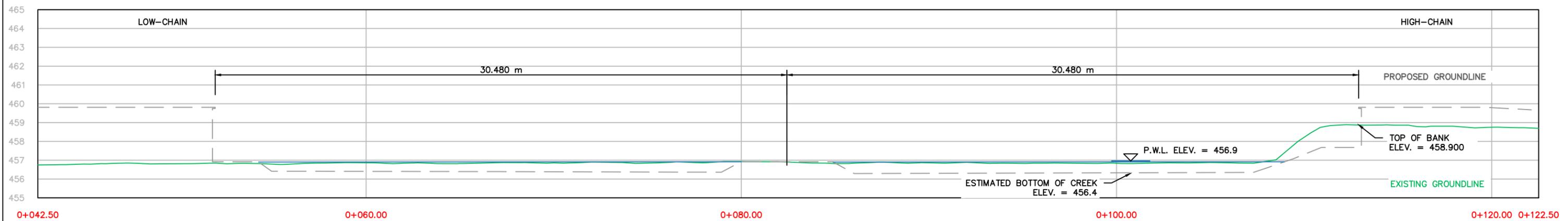
BC Hydro
Power smart

| NO | DATE | REVISIONS |
|----|-------------|-------------------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW |

| DESIGN | DRAWN | CHECKED | FILE |
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| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /05 |
| DATE | DATE | DATE | PLAN |
| 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

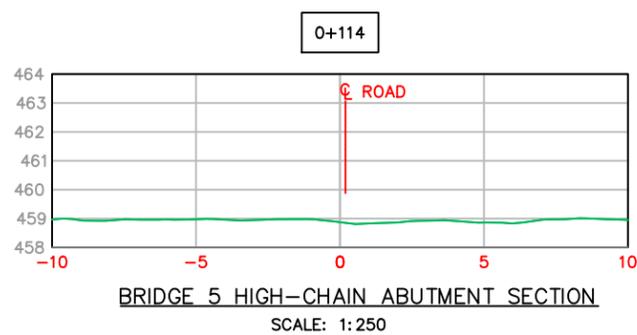
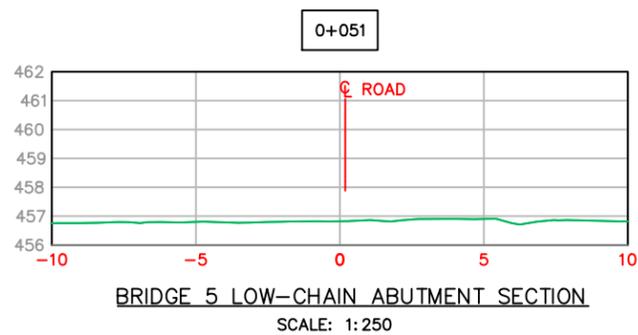
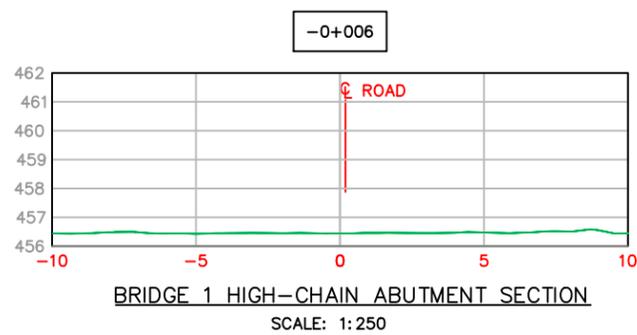
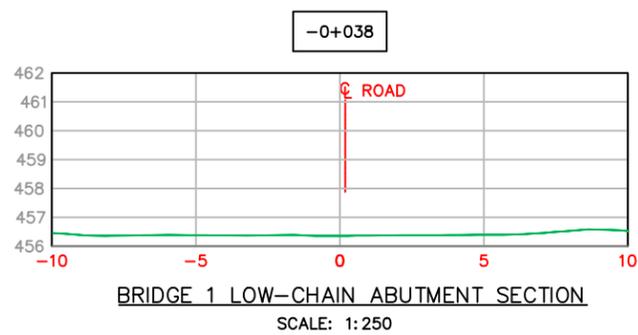


BRIDGE 1 (B1) PROFILE
SCALE: 1:200

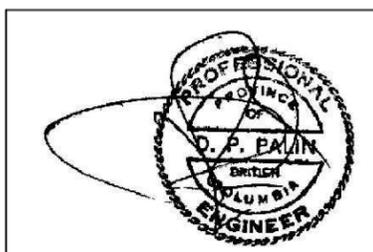


BRIDGE 5 (B5) PROFILE
SCALE: 1:200

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



- GENERAL NOTES:**
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 2. COORDINATE SYSTEM NAD83, GEOD CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
 4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
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ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

B1 B5 EXISTING PROFILES/SECTIONS

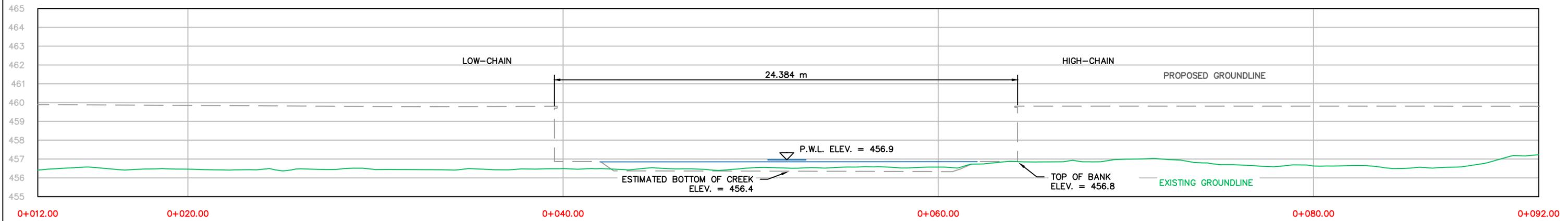
BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
|----------------|-------------|-------------|--------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /06 |
| DATE | DATE | DATE | PLAN |
| 01-02-JUN-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

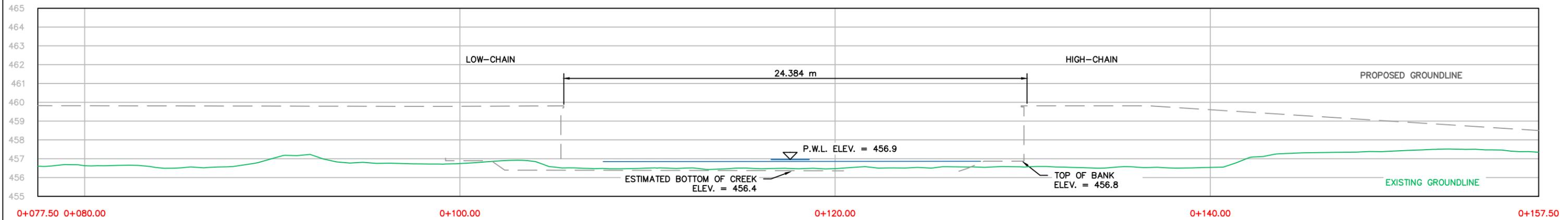
REVISIONS

Sheet 06 of 25

LAST DATE REVISED: 2-Jun-2020 6:13 PM

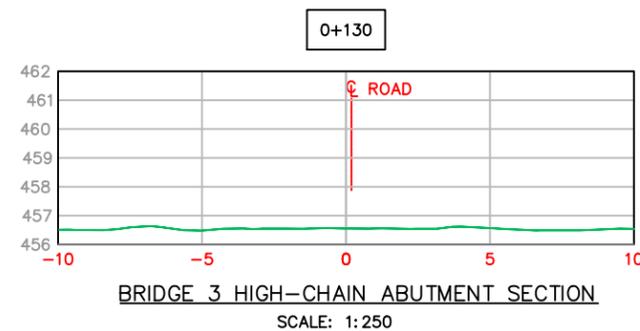
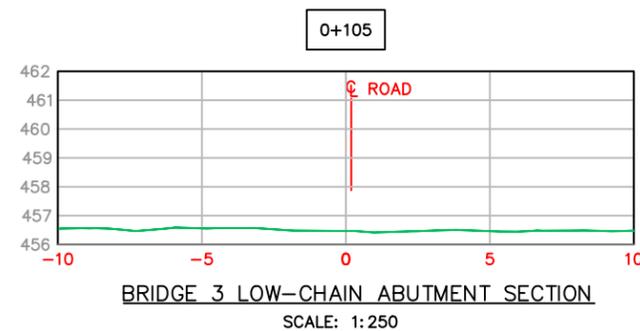
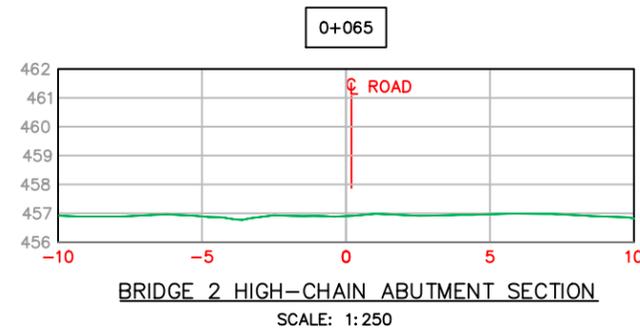
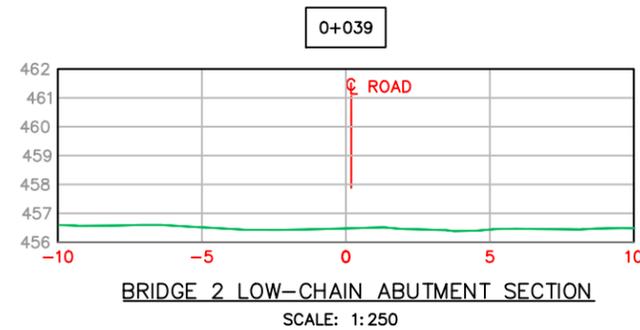


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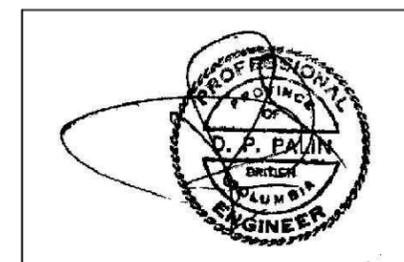


BRIDGE 3 (B3) PROFILE
SCALE: 1:200

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



- GENERAL NOTES:
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Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

B2 B3 EXISTING PROFILES/SECTIONS

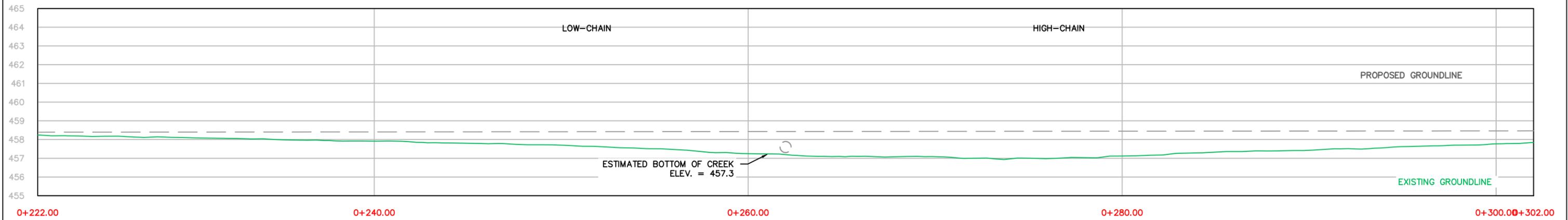
BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
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| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | | | | TC-HY011 |

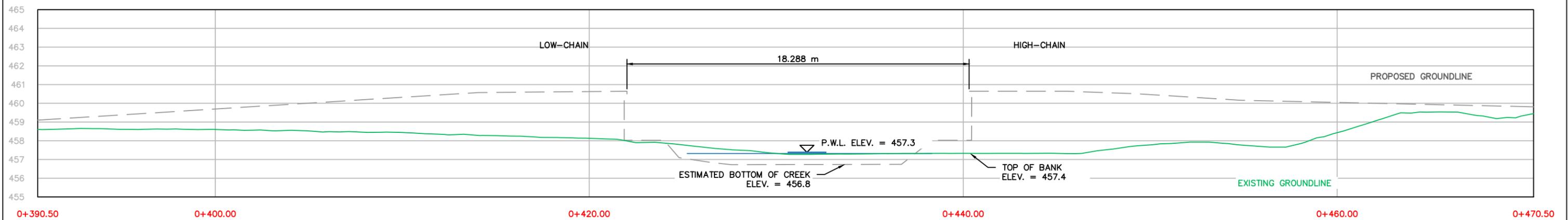
REVISIONS

Sheet 07 of 25

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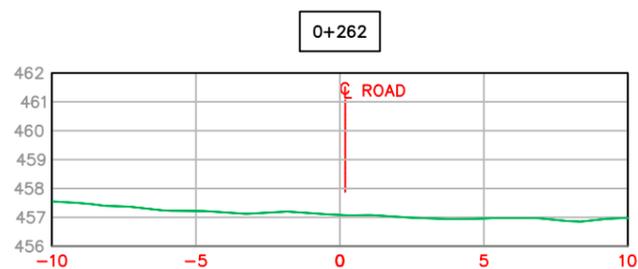


CULVERT 2 (C2) PROFILE
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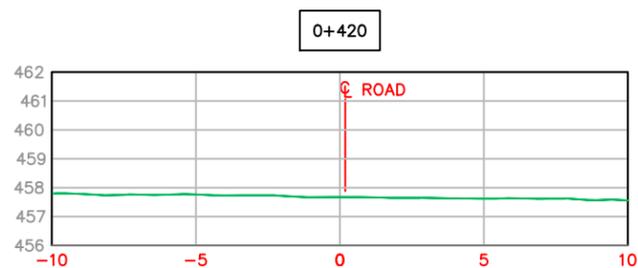


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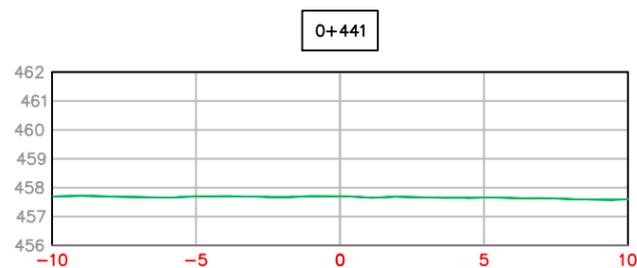
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



CULVERT 2 SECTION
SCALE: 1:250



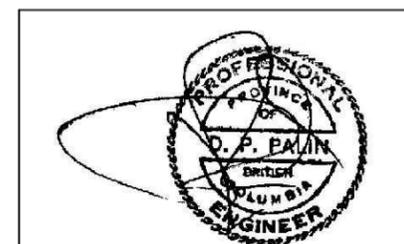
BRIDGE 4 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 4 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

GENERAL NOTES:

1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
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Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

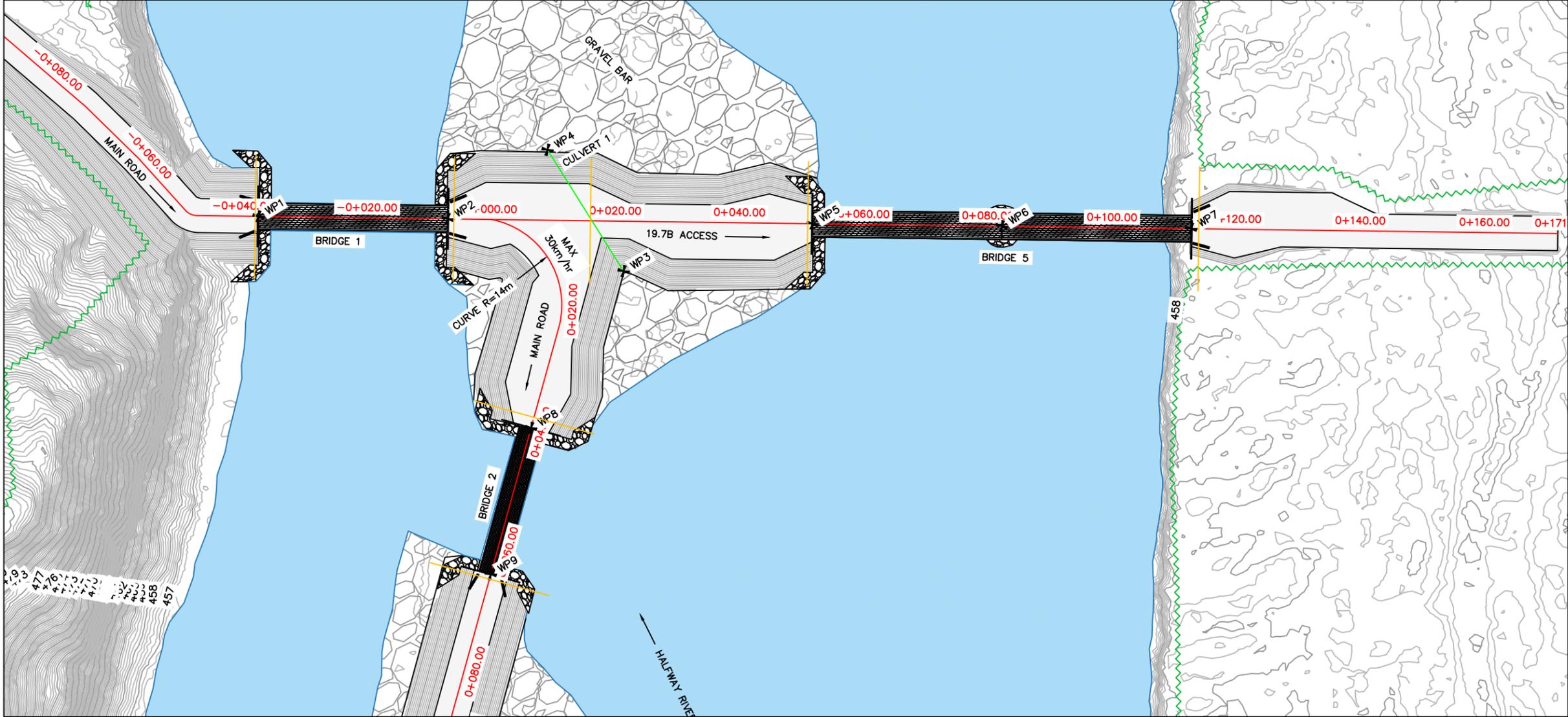
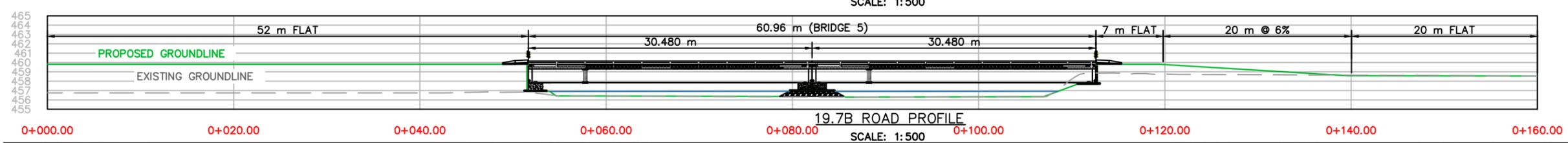
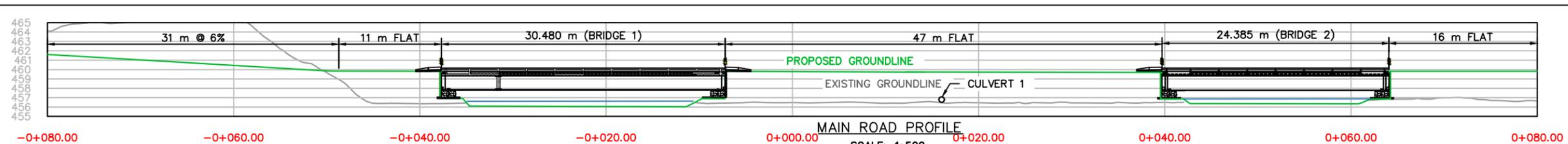
19.7A HALFWAY CROSSINGS

C2 B4 EXISTING PROFILES/SECTIONS

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|----------|----------|---------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /08 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | | | | TC-HY011 |

REVISIONS



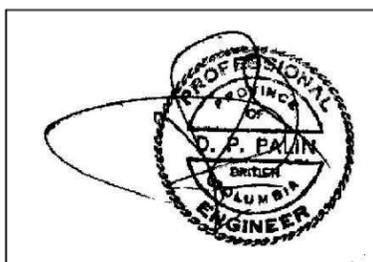
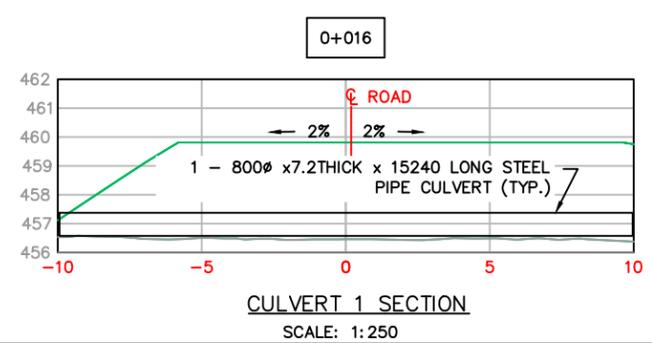
LEGEND

- CREEK
- ROAD
- ROAD ALIGNMENT
- RIPARIAN ROCK
- TREE LINE
- SECTION LINE

- GENERAL NOTES:**
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BENCHMARK SURVEY TABLE

| MARK | ELEV. (m) | NORTHING | EASTING |
|-------|-----------|-------------|-------------|
| ✕ WP1 | 457.9 | 6233971.119 | 590010.5409 |
| ✕ WP2 | 457.9 | 6233955.039 | 590036.4342 |
| ✕ WP3 | 456.5 | 6233933.212 | 590056.3596 |
| ✕ WP4 | 456.5 | 6233956.244 | 590055.9391 |
| ✕ WP5 | 457.9 | 6233924.021 | 590086.3807 |
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✕ WP9 | 457.9 | 6233902.525 | 590012.8863 |



REVISIONS

| | | |
|---|-------------|-------------------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW |

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ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

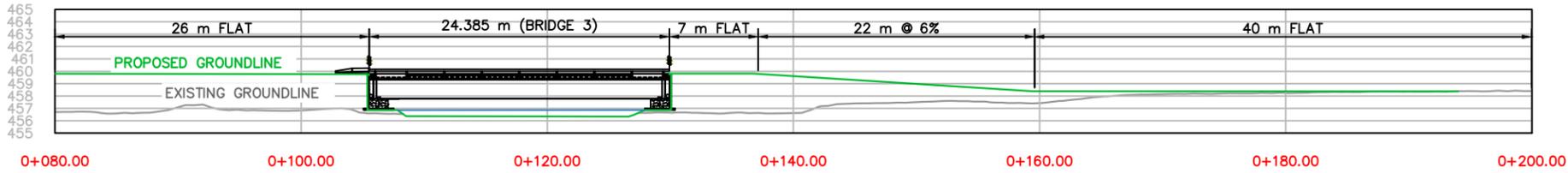
B1 C1 B2 B5 PROPOSED PLAN VIEW

BC Hydro
Power smart

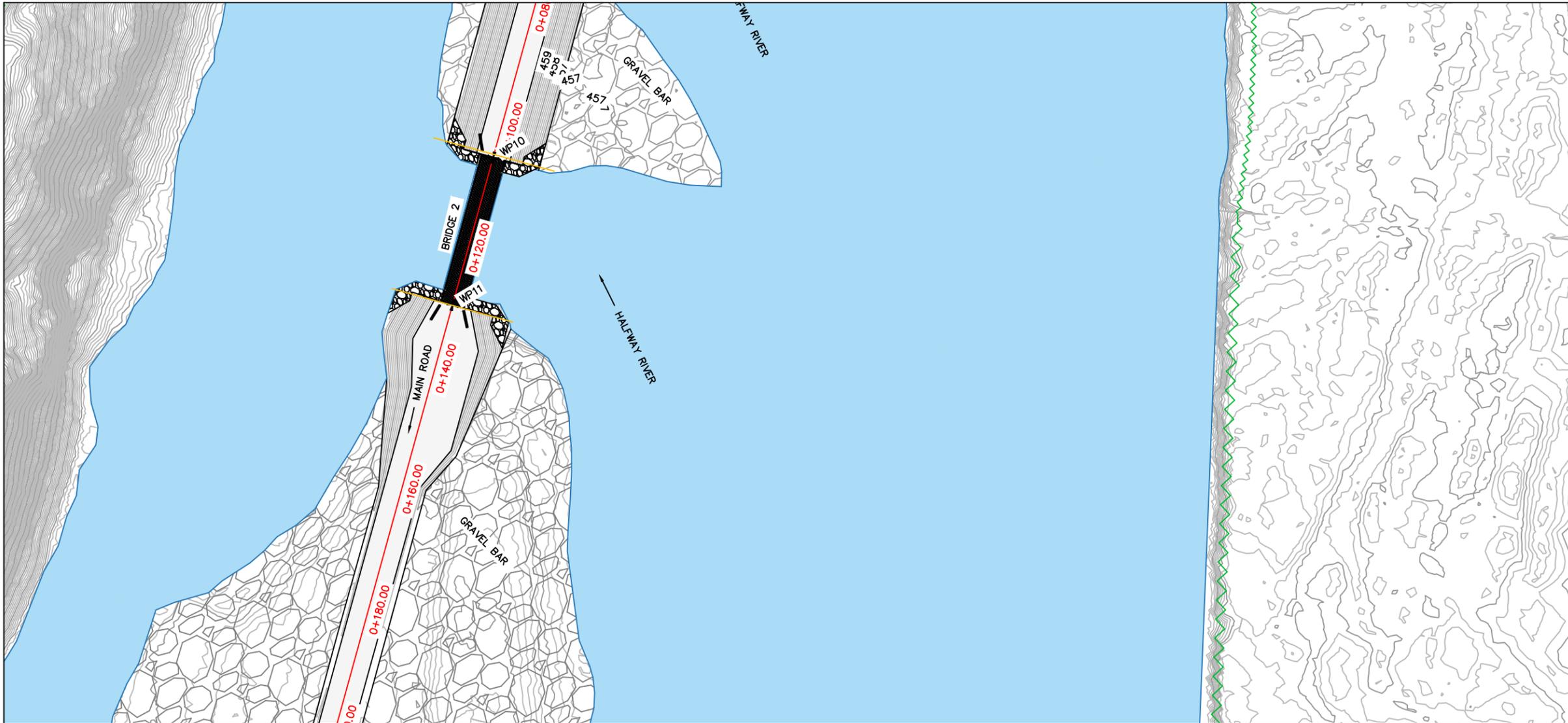
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| DATE | 28-MAY-2020 | DATE | 28-MAY-2020 | DATE | 28-MAY-2020 | PLAN | TC-HY011 |

Sheet 09 of 25

LAST DATE REVISED: 2-JUN-2020 6:13 PM



PROFILE
SCALE: 1:500



PLAN
SCALE: 1:700

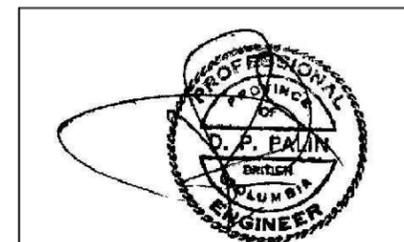
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| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✕ WP9 | 457.9 | 6233902.525 | 590012.8863 |
| ✕ WP10 | 457.9 | 6233874.059 | 589982.8937 |
| ✕ WP11 | 457.9 | 6233857.282 | 589965.1983 |
| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
| ✕ WP13 | 457.3 | 6233772.149 | 589868.7752 |
| ✕ WP14 | 458.934 | 6233685.012 | 589737.2734 |
| ✕ WP15 | 458.934 | 6233681.074 | 589719.4145 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |

GENERAL NOTES:

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7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
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Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

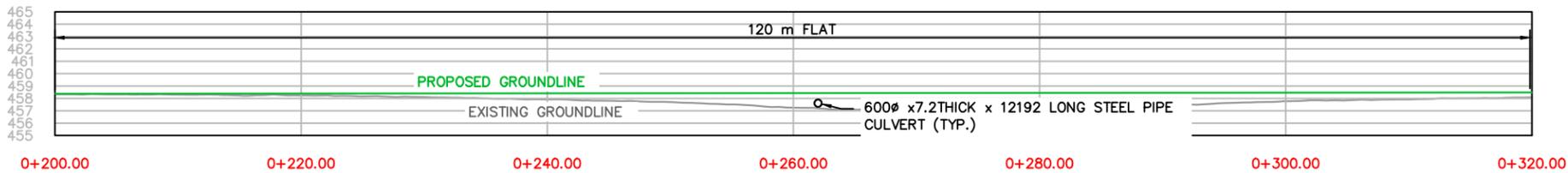
B3 PROPOSED PLAN VIEW

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
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| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | DATE | DATE | DATE | PLAN |
| | | | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

REVISIONS

Sheet 10 of 25

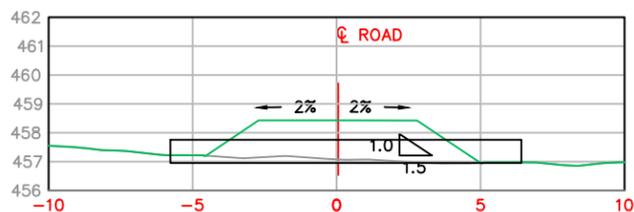


PROFILE
SCALE: 1:500



PLAN
SCALE: 1:700

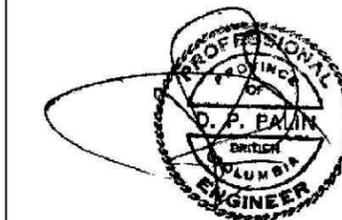
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SECTION VIEW
SCALE: 1:250

| | | | |
|--------|---------|-------------|-------------|
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
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| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
| ✕ WP13 | 457.3 | 6233772.149 | 589868.7752 |
| ✕ WP14 | 458.934 | 6233685.012 | 589737.2734 |
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NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT



Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

C2 PROPOSED PLAN & PROFILE

BC Hydro
Power smart

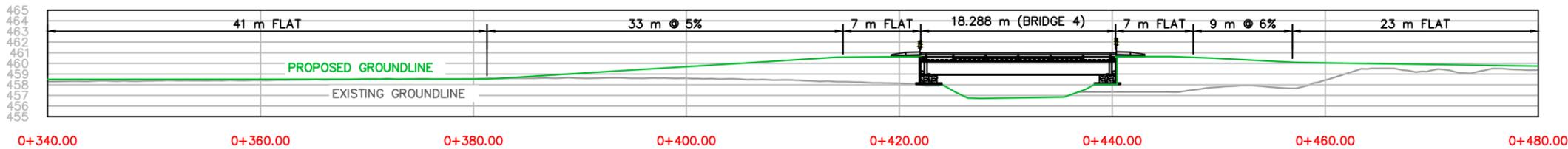
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| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | DATE | DATE | DATE | PLAN |
| | | REVISIONS | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

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GENERAL NOTES:

1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
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6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
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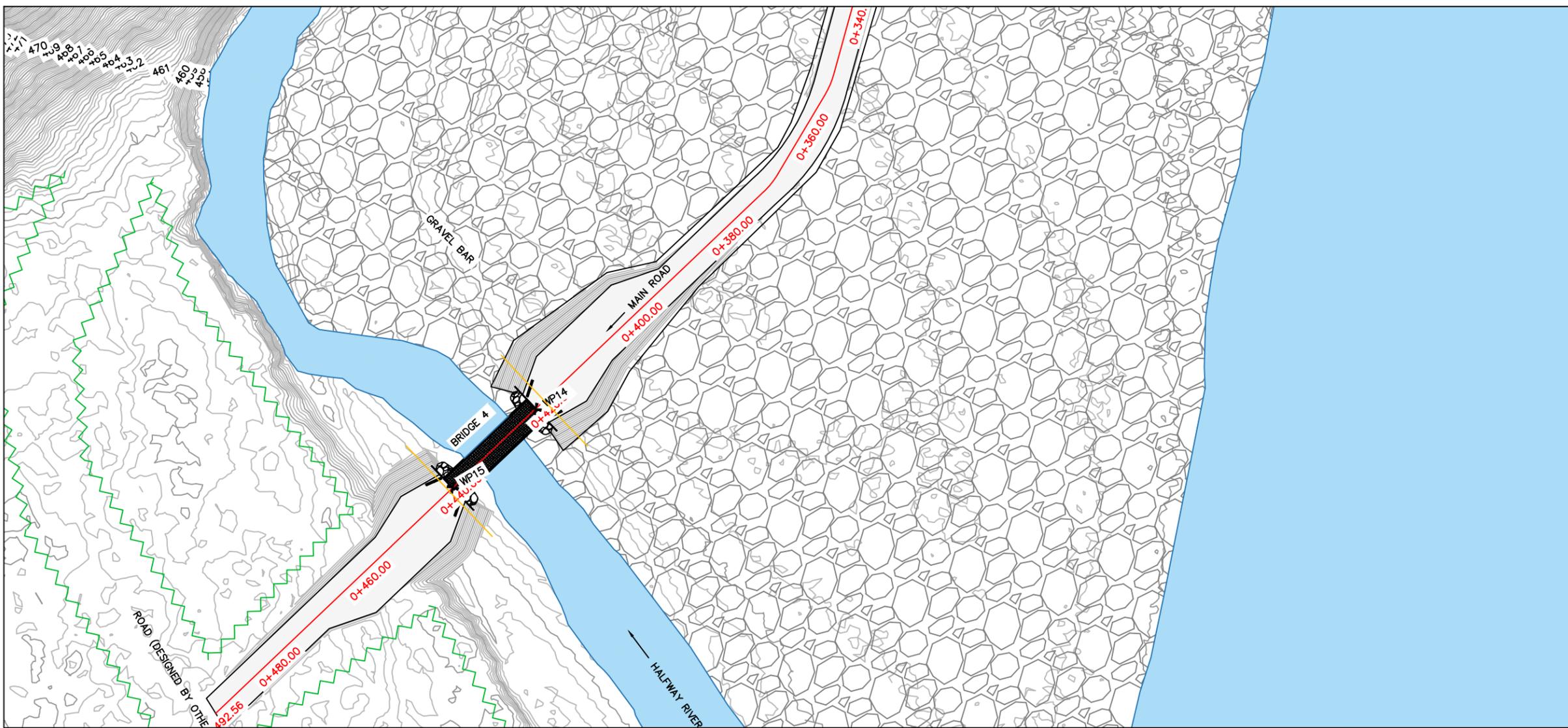
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PROFILE
SCALE: 1:500



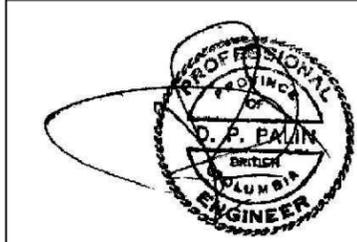
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



PLAN
SCALE: 1:700

| | | | |
|--------|---------|-------------|-------------|
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP8 | 457.9 | 6233919.301 | 590030.5817 |
| ✕ WP9 | 457.9 | 6233902.525 | 590012.8863 |
| ✕ WP10 | 457.9 | 6233874.059 | 589982.8937 |
| ✕ WP11 | 457.9 | 6233857.282 | 589965.1983 |
| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
| ✕ WP13 | 457.3 | 6233772.149 | 589868.7752 |
| ✕ WP14 | 458.934 | 6233685.012 | 589737.2734 |
| ✕ WP15 | 458.934 | 6233681.074 | 589719.4145 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT



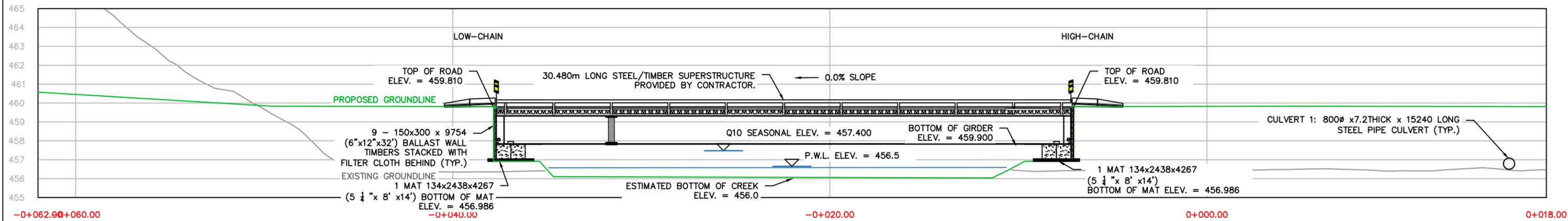
Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

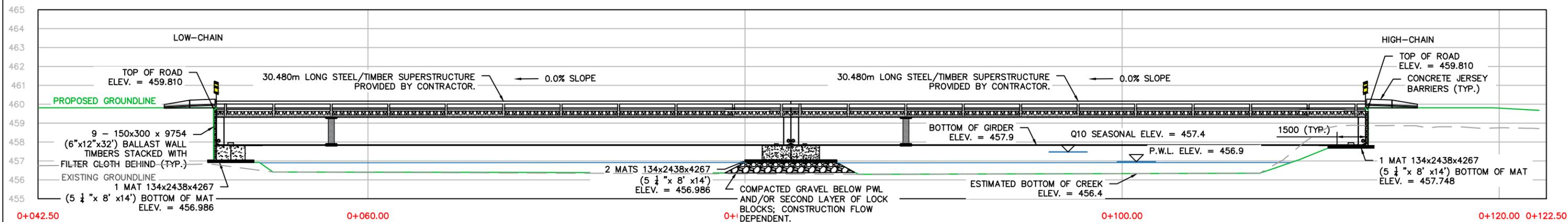
B4 PROPOSED PLAN VIEW

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|-------------|-------------|-------------|-------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/12 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | DATE | DATE | DATE | PLAN |
| | | REVISIONS | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

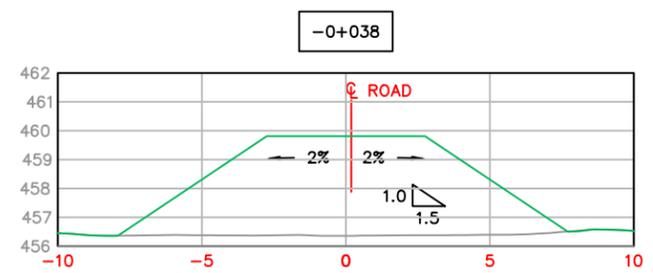


BRIDGE 1 (B1) PROFILE
SCALE: 1:200

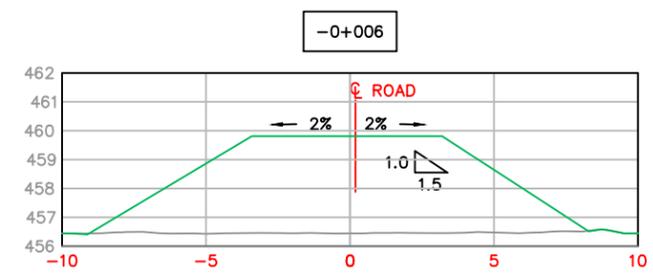


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SCALE: 1:200

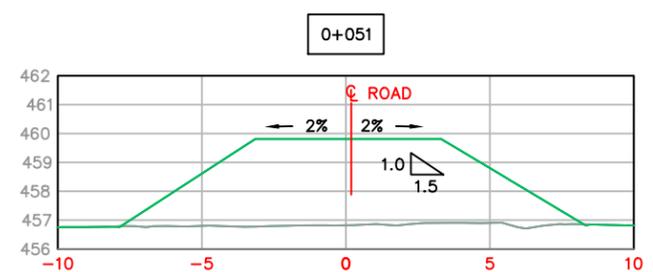
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



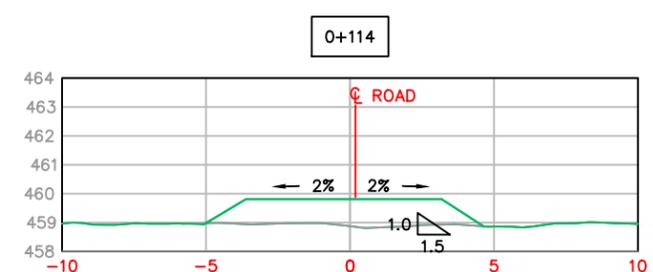
BRIDGE 1 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 1 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

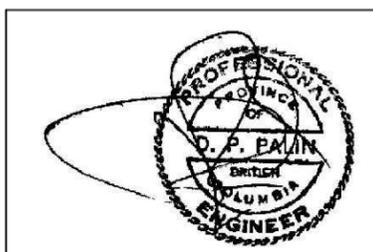


BRIDGE 5 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 5 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

- GENERAL NOTES:**
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEOD CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
 4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
 5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
 6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
 7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
 8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.



Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

B1 B5 PROPOSED PROFILES/SECTIONS

BC Hydro
Power smart

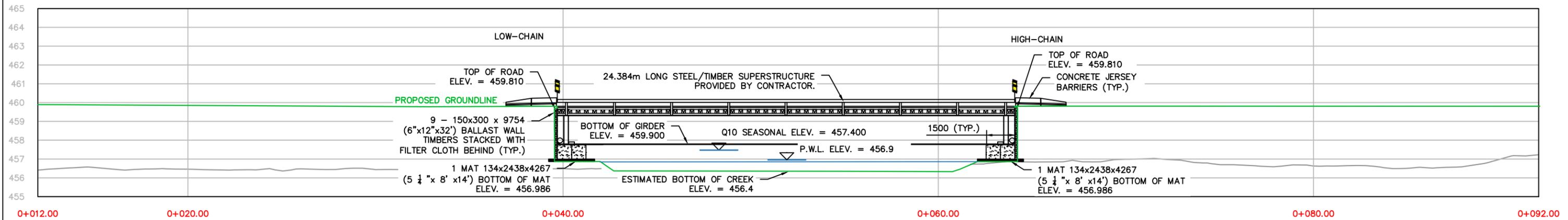
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|----------|----------|---------|-------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/13 |

| DATE | DATE | DATE | PLAN |
|----------------|-------------------------|------|------|
| 01-02-JUN-2020 | ISSUED FOR CONSTRUCTION | | |
| 01-28-MAY-2020 | ISSUED FOR REVIEW | | |

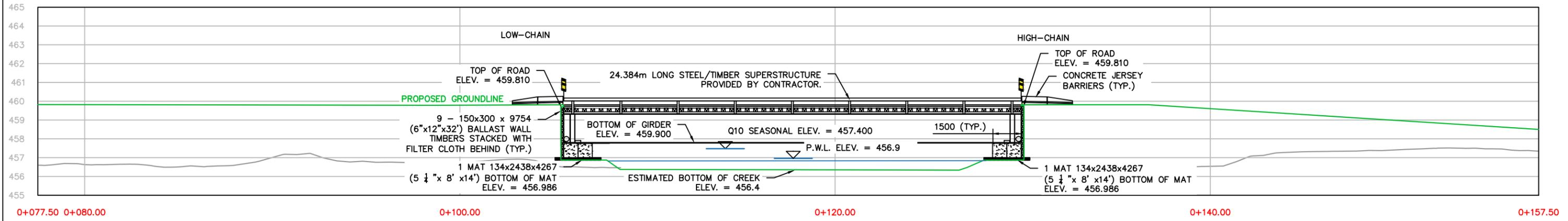
REVISIONS

Sheet 13 of 25

LAST DATE REVISED: 2-JUN-2020 6:13 PM

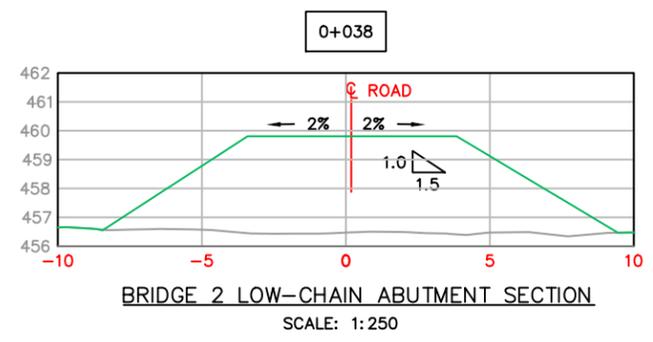


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SCALE: 1:200

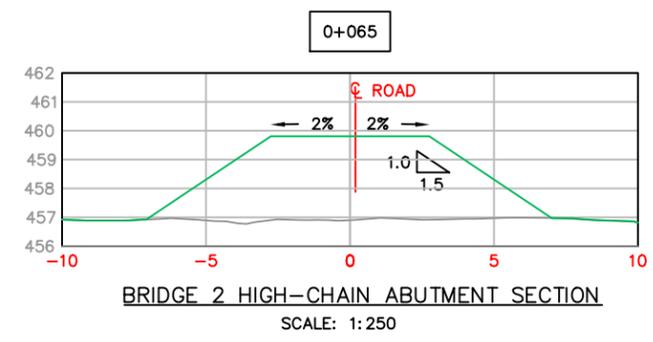


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SCALE: 1:200

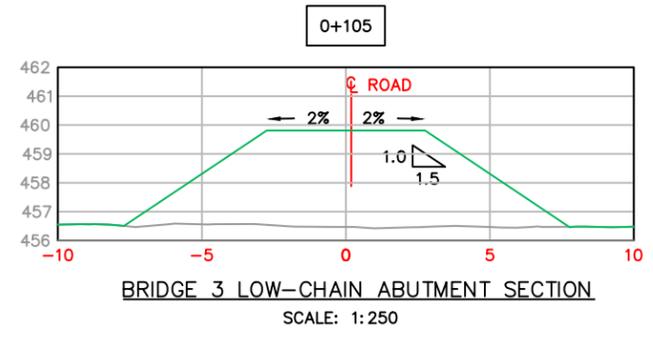
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



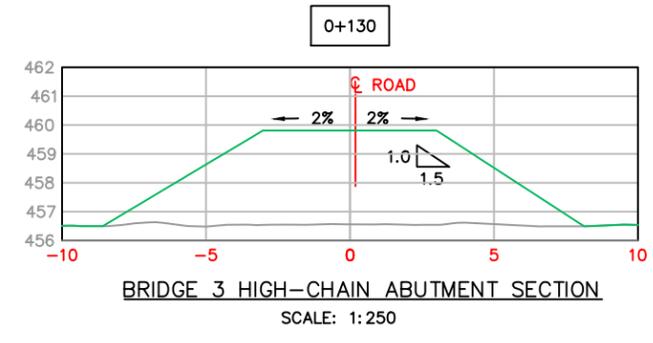
BRIDGE 2 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 2 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

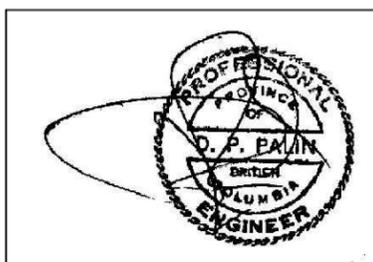


BRIDGE 3 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 3 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

- GENERAL NOTES:
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEOID CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
 4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
 5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
 6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
 7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
 8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.



Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

B2 B3 PROPOSED PROFILES/SECTIONS

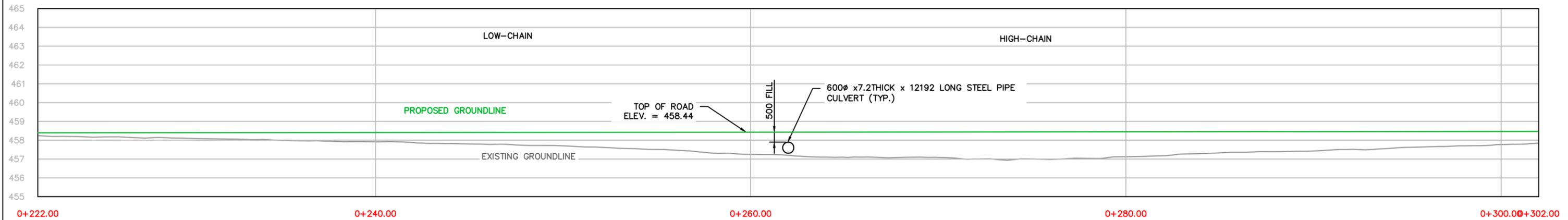
BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
|----------------|-------------|-------------|--------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /14 |
| DATE | DATE | DATE | PLAN |
| 01-02-JUN-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

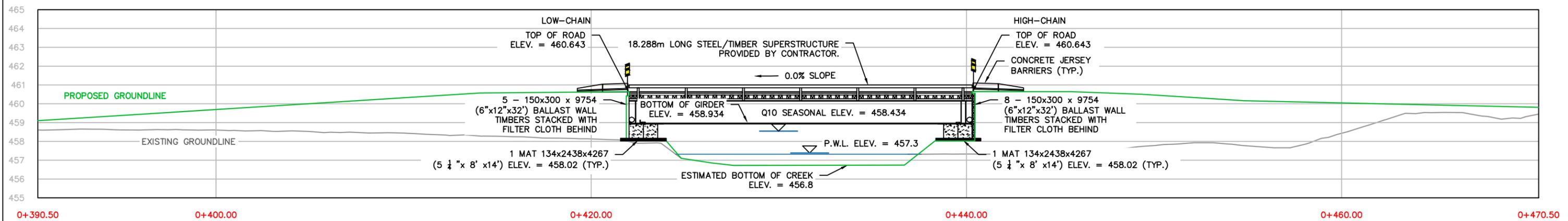
REVISIONS

Sheet 14 of 25

LAST DATE REVISED: 2-Jun-2020 6:13 PM

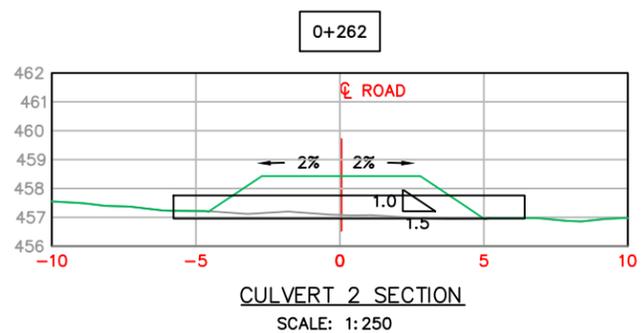


CULVERT 2 (C2) PROFILE
SCALE: 1:200

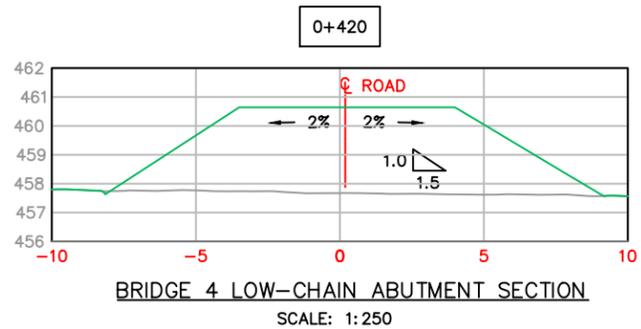


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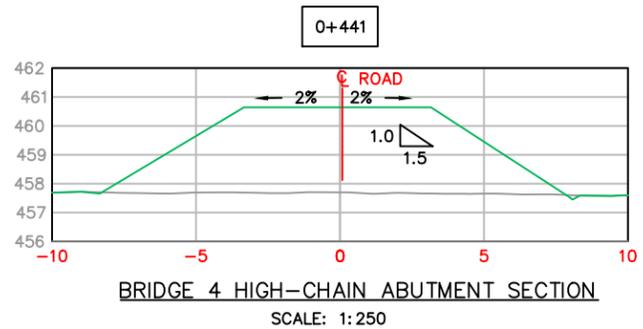
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



CULVERT 2 SECTION
SCALE: 1:250

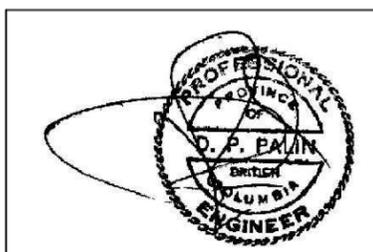


BRIDGE 4 LOW-CHAIN ABUTMENT SECTION
SCALE: 1:250



BRIDGE 4 HIGH-CHAIN ABUTMENT SECTION
SCALE: 1:250

- GENERAL NOTES:**
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEIOD CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
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Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

C2 B4 PROPOSED PROFILES/SECTIONS

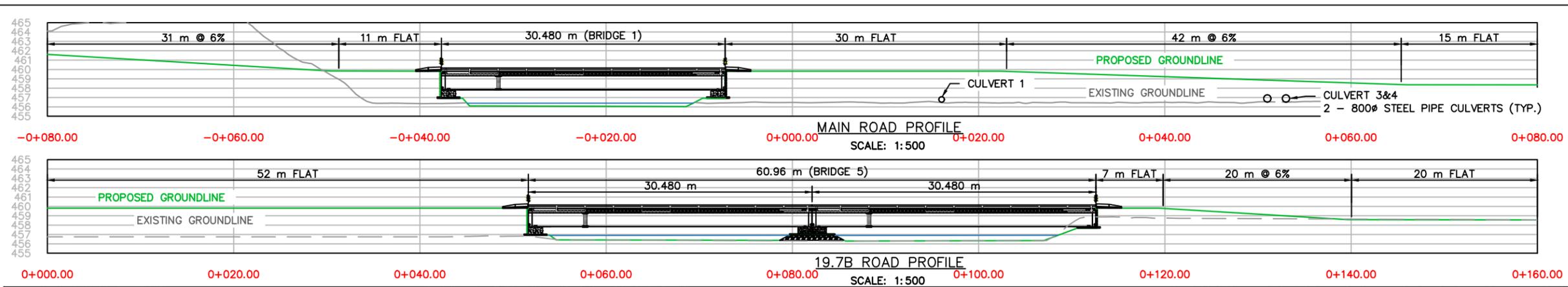
BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
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| DATE | DATE | DATE | PLAN |
| 01-02-JUN-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

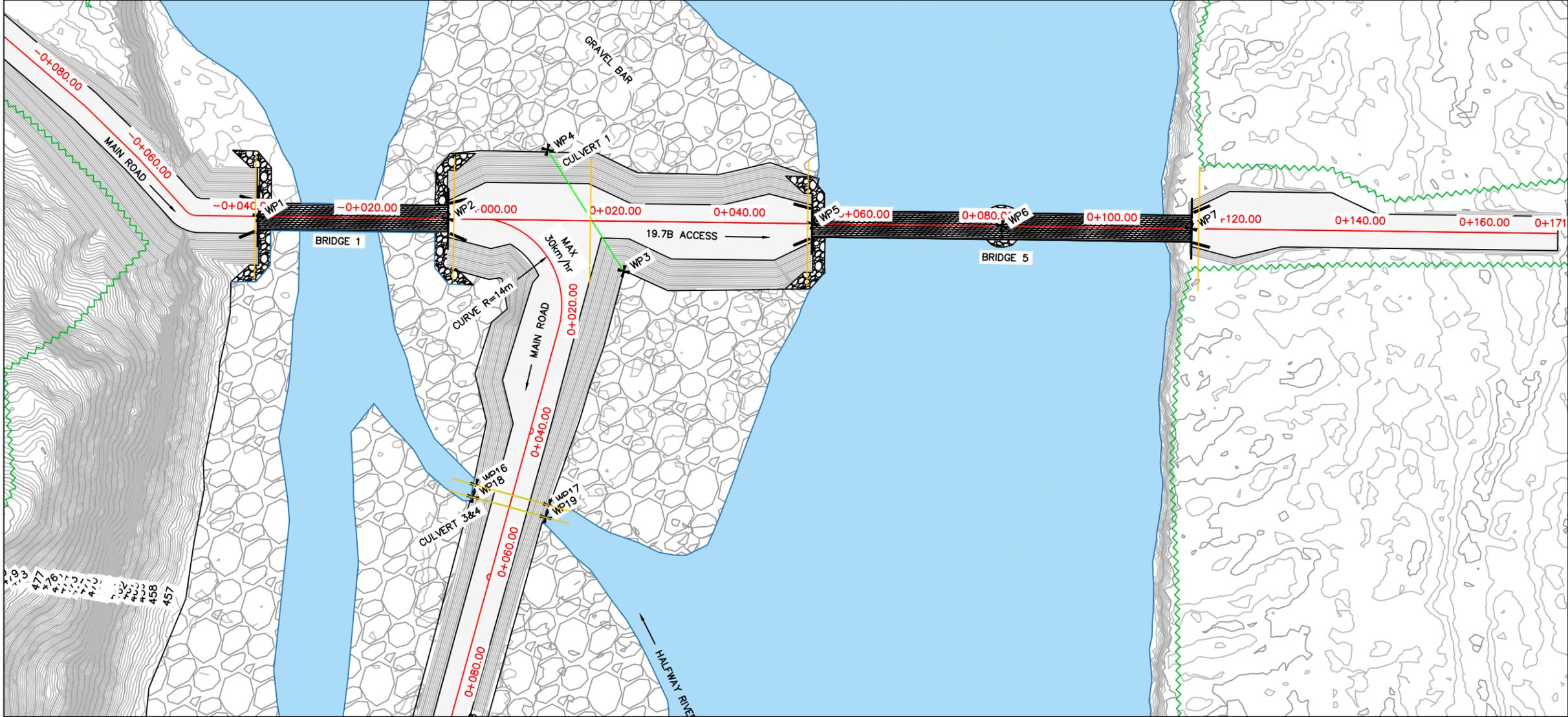
REVISIONS

Sheet 15 of 25

LAST DATE REVISED: 2-Jun-2020 6:13 PM



| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



NO FLOW FOR BRIDGE NOTES:

1. DEPICTED CULVERT PAIRS TO REPLACE BRIDGES IF NO FLOW IS PRESENT IN CHANNEL AT TIME OF CONSTRUCTION AND NO MAJOR PRECIPITATION OR SNOW MELT IS FORESEEABLE UNTIL APRIL.

GENERAL NOTES:

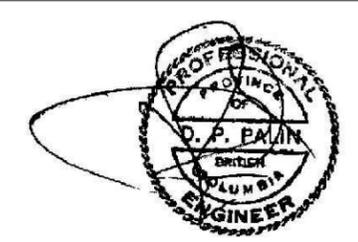
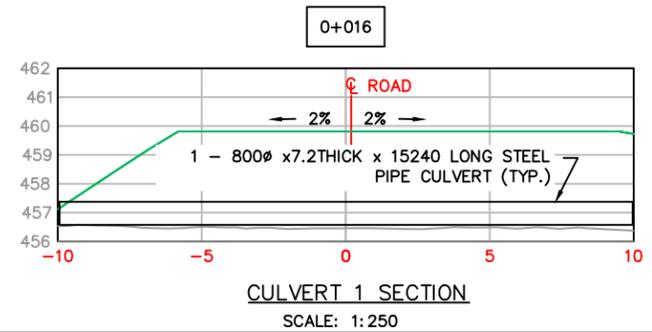
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
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6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.

BENCHMARK SURVEY TABLE

| MARK | ELEV. (m) | NORTHING | EASTING |
|-------|-----------|-------------|-------------|
| ✕ WP1 | 457.9 | 6233971.119 | 590010.5409 |
| ✕ WP2 | 457.9 | 6233955.039 | 590036.4342 |
| ✕ WP3 | 456.5 | 6233933.212 | 590056.3596 |
| ✕ WP4 | 456.5 | 6233956.244 | 590055.9391 |
| ✕ WP5 | 457.9 | 6233924.021 | 590086.3807 |
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |

| | | | |
|--------|-------|-------------|-------------|
| ✕ WP18 | 456.5 | 6233914.662 | 590016.8323 |
| ✕ WP19 | 456.5 | 6233905.796 | 590025.2017 |
| ✕ WP20 | 456.5 | 6233870.796 | 589970.5953 |
| ✕ WP21 | 456.5 | 6233861.93 | 589978.9648 |
| ✕ WP22 | 456.5 | 6233869.423 | 589969.141 |
| ✕ WP23 | 456.5 | 6233860.557 | 589977.5105 |
| ✕ WP24 | 457.3 | 6233677.408 | 589731.0886 |
| ✕ WP25 | 457.3 | 6233689.362 | 589728.6921 |
| ✕ WP26 | 457.3 | 6233676.756 | 589727.9967 |
| ✕ WP27 | 457.3 | 6233688.71 | 589725.6002 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT



| NO. | DATE | DESCRIPTION |
|-----|-------------|-------------------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW |

Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

B1 C1 C3/C4 B5 PROPOSED#2 PLAN VIEW

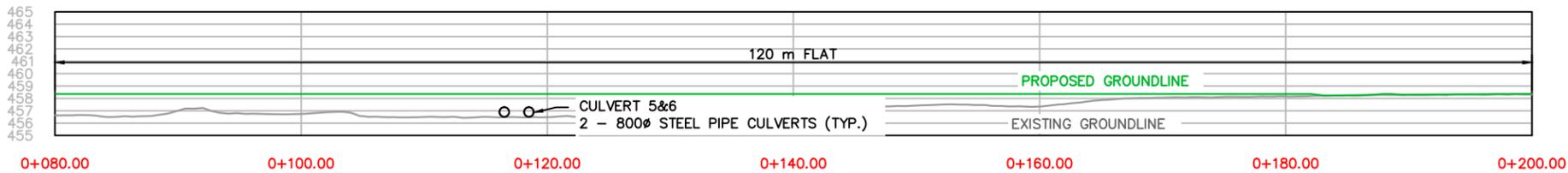
BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
|----------|----------|---------|-------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/16 |

| DATE | DATE | DATE | PLAN |
|-------------|-------------|-------------|----------|
| 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

Sheet 16 of 25

LAST DATE REVISED: 2-JUN-2020 6:13 PM



PROFILE
SCALE: 1:500



PLAN
SCALE: 1:700

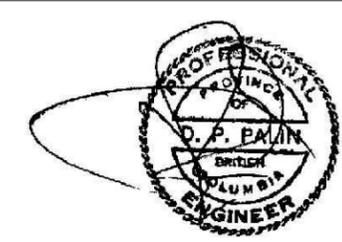
| | | | |
|--------|-------|-------------|-------------|
| ✕ WP18 | 456.5 | 6233914.662 | 590016.8323 |
| ✕ WP19 | 456.5 | 6233905.796 | 590025.2017 |
| ✕ WP20 | 456.5 | 6233870.796 | 589970.5953 |
| ✕ WP21 | 456.5 | 6233861.93 | 589978.9648 |
| ✕ WP22 | 456.5 | 6233869.423 | 589969.141 |
| ✕ WP23 | 456.5 | 6233860.557 | 589977.5105 |
| ✕ WP24 | 457.3 | 6233677.408 | 589731.0886 |
| ✕ WP25 | 457.3 | 6233689.362 | 589728.6921 |
| ✕ WP26 | 457.3 | 6233676.756 | 589727.9967 |
| ✕ WP27 | 457.3 | 6233688.71 | 589725.6002 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |

- NO FLOW FOR BRIDGE NOTES:**
1. DEPICTED CULVERT PAIRS TO REPLACE BRIDGES IF NO FLOW IS PRESENT IN CHANNEL AT TIME OF CONSTRUCTION AND NO MAJOR PRECIPITATION OR SNOW MELT IS FORESEEABLE UNTIL APRIL.

- GENERAL NOTES:**
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
 2. COORDINATE SYSTEM NAD83, GEOID CGG2013.
 3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
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 8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.

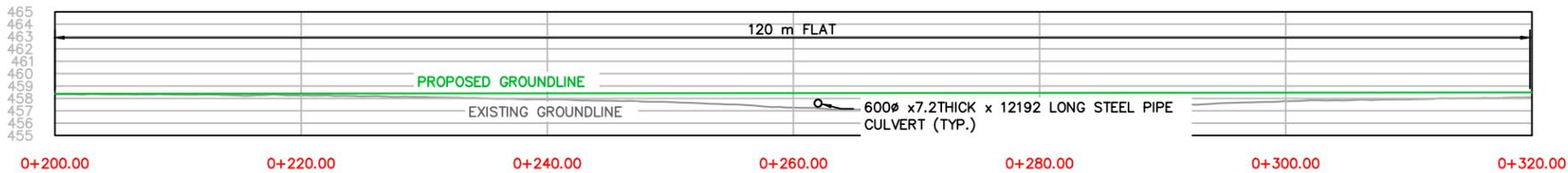


Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS
C5 C6 PROPOSED#2 PLAN VIEW

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----------|-------------|-------------------------|-------------|-------------|-------------|-------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/17 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |
| REVISIONS | | | | | | |

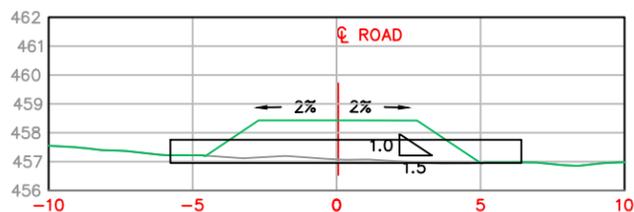


PROFILE
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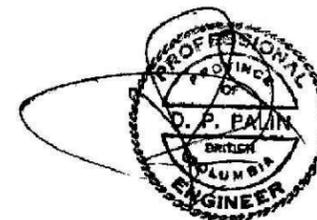
PLAN
SCALE: 1:700

0+262



SECTION VIEW
SCALE: 1:250

| | | | |
|--------|-------|-------------|-------------|
| ✕ WP6 | 457.9 | 6233907.941 | 590112.2741 |
| ✕ WP7 | 457.9 | 6233891.861 | 590138.1674 |
| ✕ WP12 | 457.3 | 6233759.962 | 589869.1056 |
| ✕ WP13 | 457.9 | 6233772.149 | 589868.7752 |
| ✕ WP16 | 457.9 | 6233916.035 | 590018.2863 |
| ✕ WP17 | 456.5 | 6233907.17 | 590026.6558 |
| ✕ WP18 | 456.5 | 6233914.662 | 590016.8323 |
| ✕ WP19 | 456.5 | 6233905.796 | 590025.2017 |
| ✕ WP20 | 456.5 | 6233870.796 | 589970.5953 |
| ✕ WP21 | 456.5 | 6233861.93 | 589978.9648 |
| ✕ WP22 | 456.5 | 6233869.423 | 589969.141 |



Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

C2 PROPOSED#2 PLAN & PROFILE

BC Hydro
Power smart

| NO | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|----|-------------|-------------------------|-------------|-------------|-------------|-------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/18 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | DATE | DATE | DATE | PLAN |
| | | REVISIONS | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

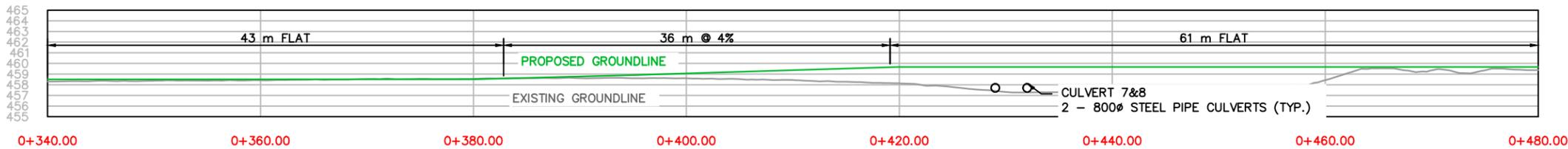
Sheet 18 of 25

NO FLOW FOR BRIDGE NOTES:

1. DEPICTED CULVERT PAIRS TO REPLACE BRIDGES IF NO FLOW IS PRESENT IN CHANNEL AT TIME OF CONSTRUCTION AND NO MAJOR PRECIPITATION OR SNOW MELT IS FORESEEABLE UNTIL APRIL.

GENERAL NOTES:

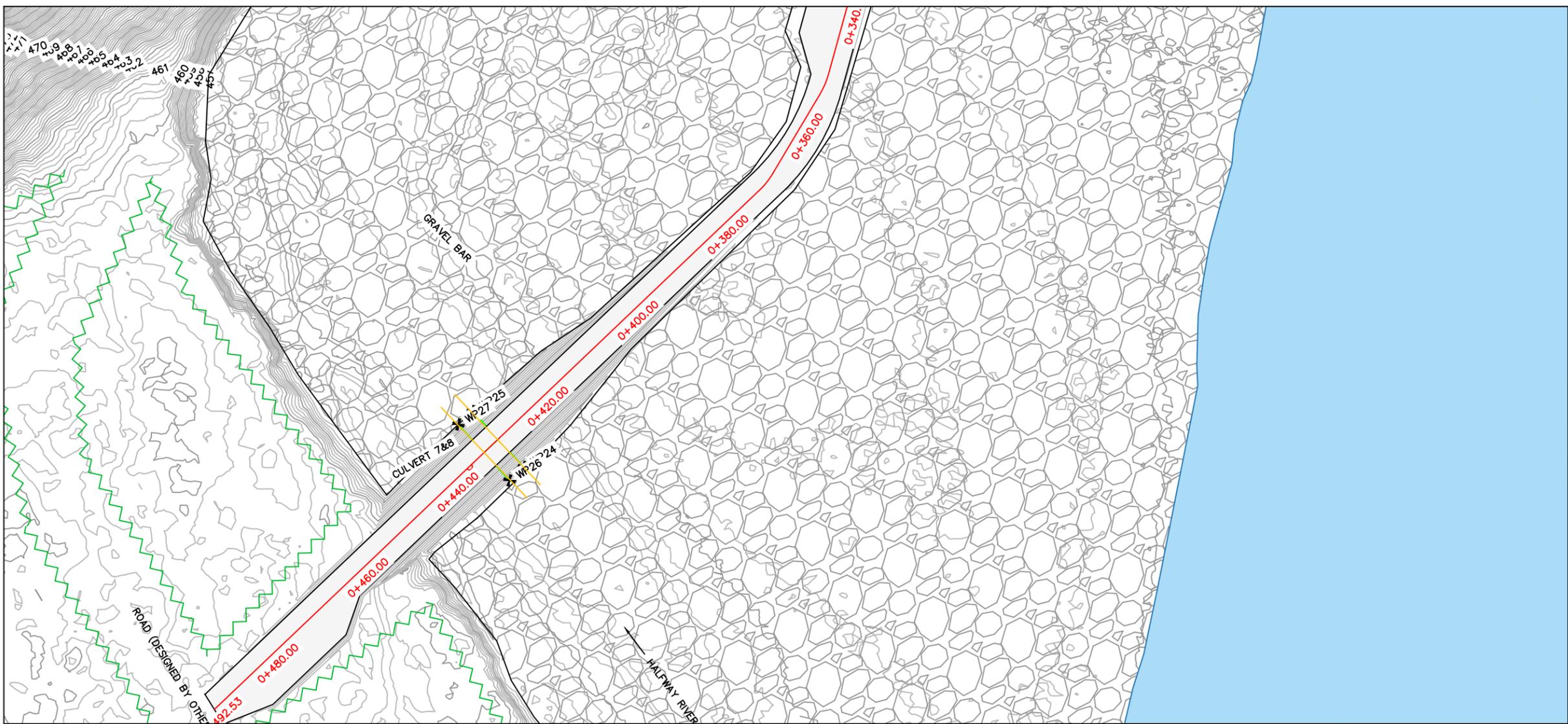
1. TOPOGRAPHIC SURVEY DEVELOPED BASED OFF LIDAR DATA PROVIDED BY MAPLE LEAF FORESTRY.
2. COORDINATE SYSTEM NAD83, GEOID CGG2013.
3. NO GEOTECHNICAL INFORMATION HAS BEEN PROVIDED OR GATHERED TO DATE.
4. HALFWAY RIVER DEPTH ESTIMATED AT 0.5m AT CROSSING LOCATIONS. TRUE RIVER DEPTH UNKNOWN AND HAS BEEN ASSUMED FOR BRIDGE CONFIGURATION PURPOSES.
5. HYDROLOGICAL INFORMATION ACQUIRED BASED ON NEARBY CROSSINGS AND HYDROTECHNICAL REPORTS PREPARED BY OTHERS. VOLUME OF 88m³/s HAS BEEN DETERMINED FOR THIS CHANNEL.
6. FLOW VELOCITY AT BRIDGES DETERMINED TO BE 1.6m/s FOR Q10 SEASONAL FLOW.
7. BRIDGE CONFIGURATION HAS BEEN CHOSEN TO SPAN DEEPEST PARTS OF CHANNELS TO CAUSE THE LEAST FLOW OBSTRUCTION POSSIBLE.
8. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.



PROFILE
SCALE: 1:500



| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



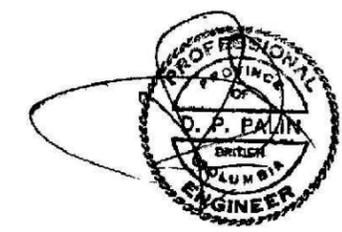
PLAN
SCALE: 1:700

| | | | |
|--------|-------|-------------|-------------|
| ✕ WP18 | 456.5 | 6233914.662 | 590016.8323 |
| ✕ WP19 | 456.5 | 6233905.796 | 590025.2017 |
| ✕ WP20 | 456.5 | 6233870.796 | 589970.5953 |
| ✕ WP21 | 456.5 | 6233861.93 | 589978.9648 |
| ✕ WP22 | 456.5 | 6233869.423 | 589969.141 |
| ✕ WP23 | 456.5 | 6233860.557 | 589977.5105 |
| ✕ WP24 | 457.3 | 6233677.408 | 589731.0886 |
| ✕ WP25 | 457.3 | 6233689.362 | 589728.6921 |
| ✕ WP26 | 457.3 | 6233676.756 | 589727.9967 |
| ✕ WP27 | 457.3 | 6233688.71 | 589725.6002 |

NOTE: ELEV. IS AT BOTTOM OF GIRDERS OR CULVERT

- NO FLOW FOR BRIDGE NOTES:**
1. DEPICTED CULVERT PAIRS TO REPLACE BRIDGES IF NO FLOW IS PRESENT IN CHANNEL AT TIME OF CONSTRUCTION AND NO MAJOR PRECIPITATION OR SNOW MELT IS FORESEEABLE UNTIL APRIL.

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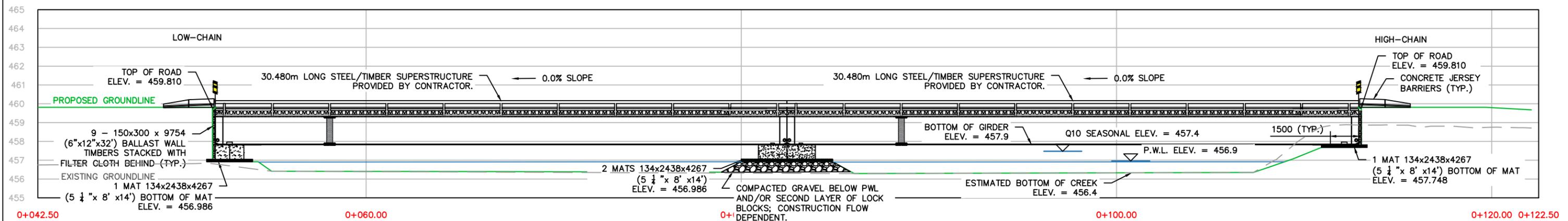
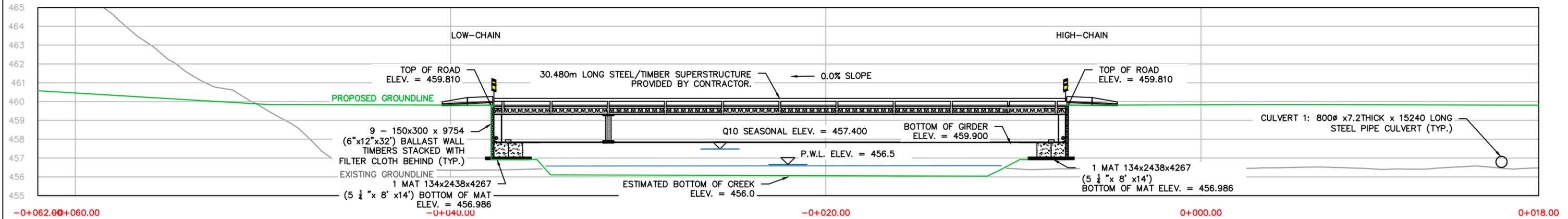
Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS
C7 C8 PROPOSED#2 PLAN VIEW

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGNER | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|-------------|-------------|-------------|-------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011/19 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

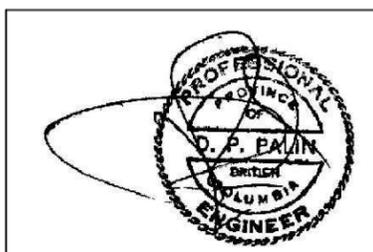
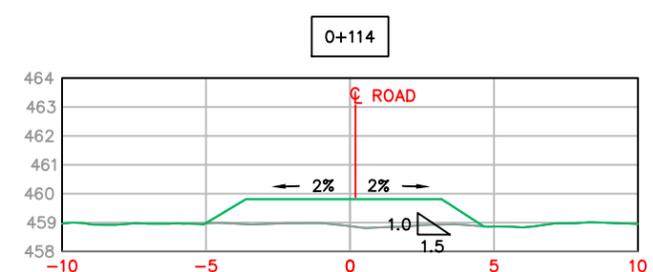
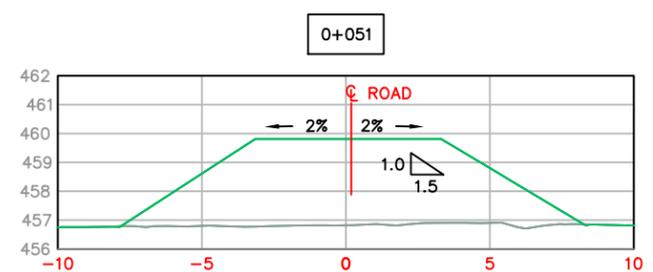
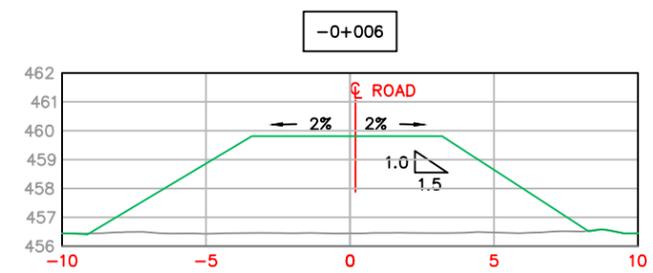
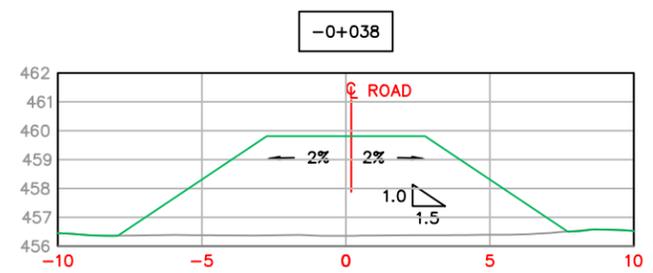
REVISIONS



LEGEND

- CREEK
- ROAD
- ROAD ALIGNMENT
- RIPARIAN ROCK
- TREE LINE
- SECTION LINE

- GENERAL NOTES:**
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| NO. | DATE | DESCRIPTION |
|-----|-------------|-------------------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW |

Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

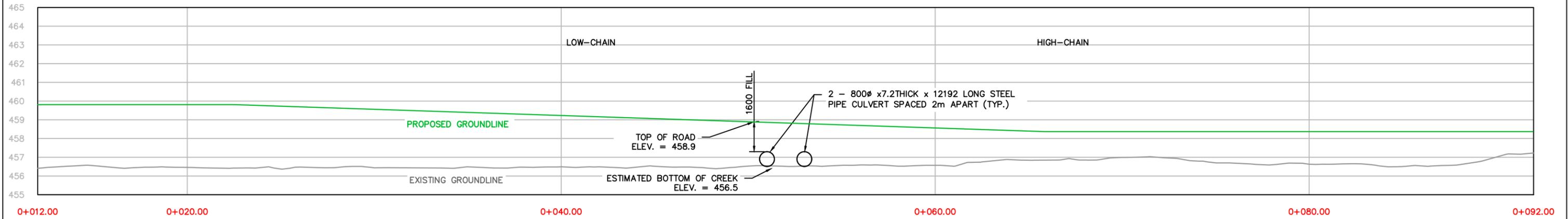
B1 B5 PROPOSED#2 PROFILES/SECTIONS

BC Hydro
Power smart

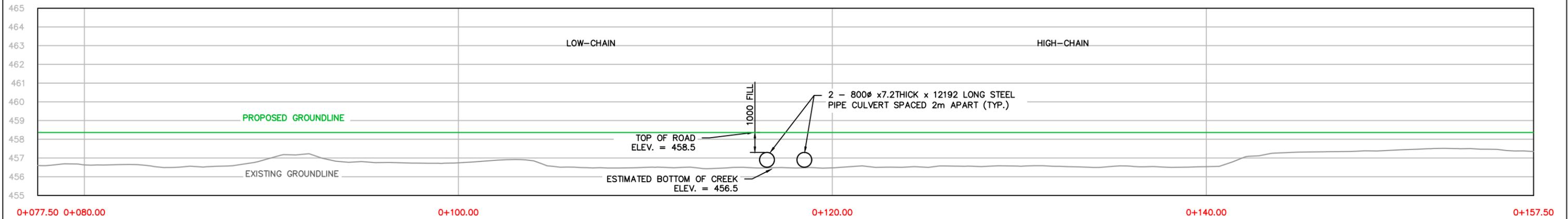
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|-------------|-------------|-------------|--------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /20 |
| DATE | DATE | DATE | PLAN |
| 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

Sheet 20 of 25

LAST DATE REVISED: 2-Jun-2020 6:13 PM

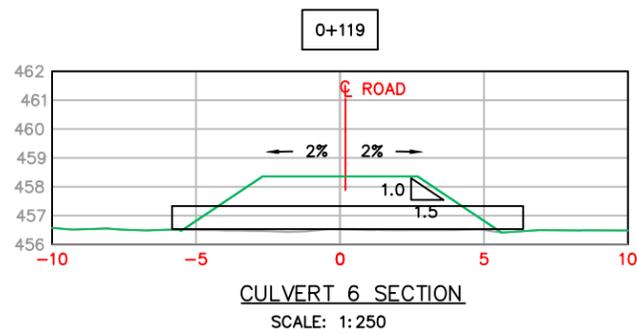
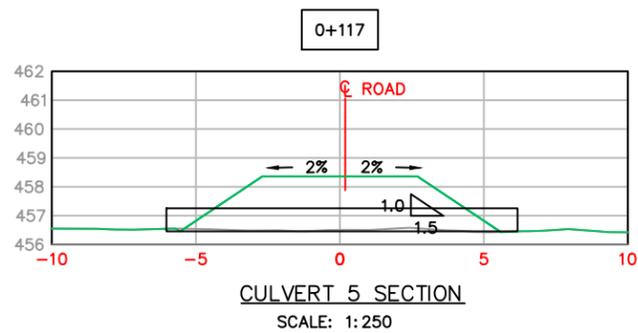
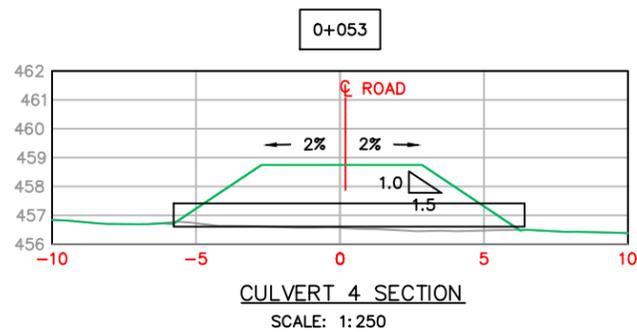
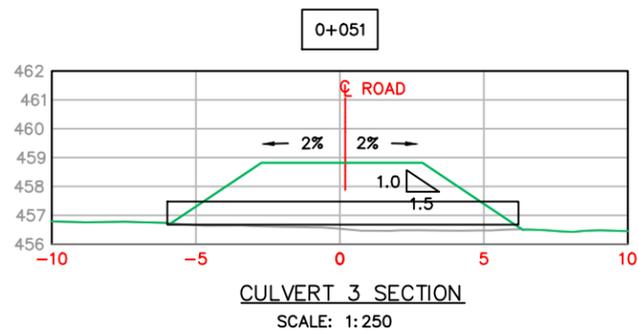


CULVERT 3/4 (C3/C4) PROFILE
SCALE: 1:200

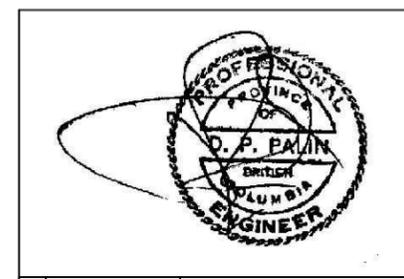


CULVERT 5/6 (C5/C6) PROFILE
SCALE: 1:200

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



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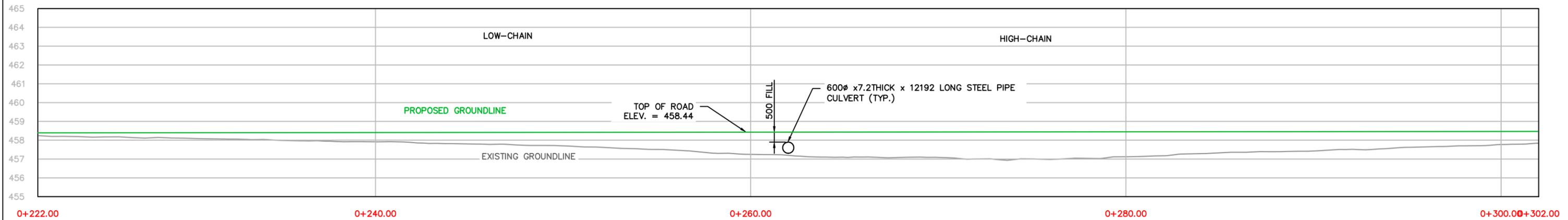
Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS
C3/C4 C5/C6 PROPOSED PROFILES/SECTIONS

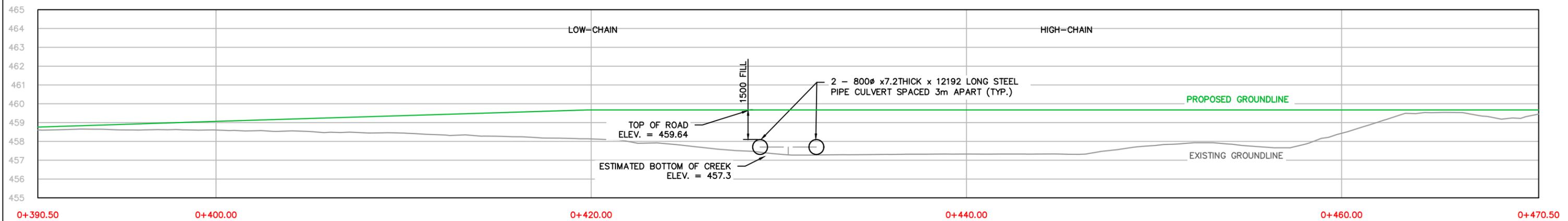
BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|----------|----------|---------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /21 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | | | | TC-HY011 |

REVISIONS

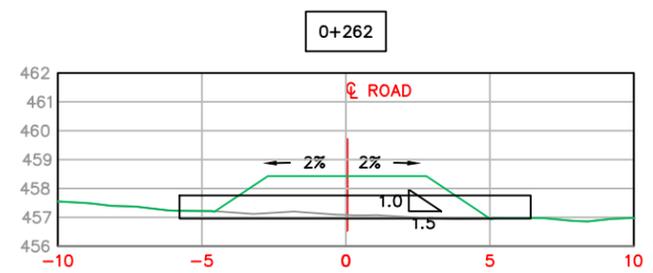


CULVERT 2 (C2) PROFILE
SCALE: 1:200

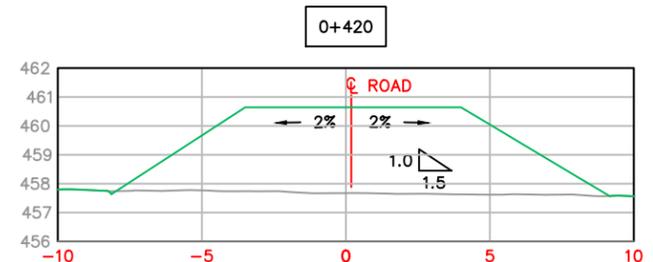


CULVERT 7/8 (C7/C8) PROFILE
SCALE: 1:200

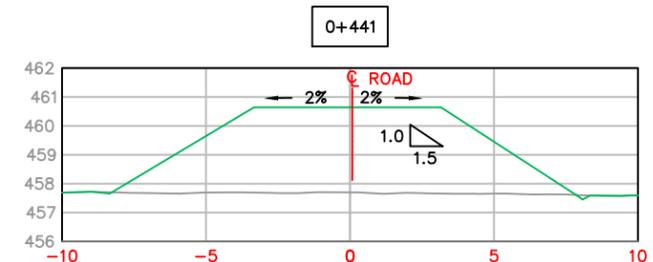
| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



CULVERT 2 SECTION
SCALE: 1:250

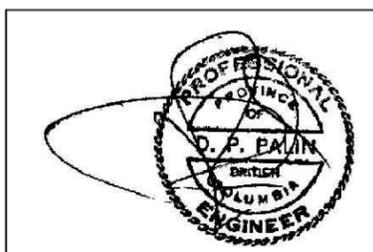


CULVERT 7 SECTION
SCALE: 1:250



CULVERT 8 SECTION
SCALE: 1:250

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Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS
C2 C7 C8 PROPOSED#2 PROFILES/SECTIONS

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|----------|----------|---------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /22 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | | | | TC-HY011 |

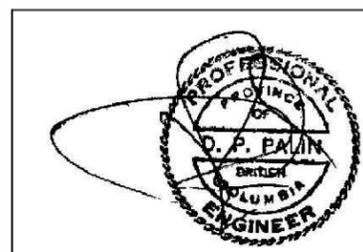
REVISIONS



CUT AND FILL PLAN
SCALE: N.T.S.

| Elevations Table | | |
|-------------------|-------------------|-------|
| Minimum Elevation | Maximum Elevation | Color |
| -6.500 | -6.000 | Red |
| -6.000 | -5.500 | Red |
| -5.500 | -5.000 | Red |
| -5.000 | -4.500 | Red |
| -4.500 | -4.000 | Red |
| -4.000 | -3.500 | Red |
| -3.500 | -3.000 | Red |
| -3.000 | -2.500 | Red |
| -2.500 | -2.000 | Red |
| -2.000 | -1.500 | Red |
| -1.500 | -1.000 | Red |
| -1.000 | -0.500 | Red |
| -0.500 | 0.000 | Red |
| 0.000 | 0.500 | Green |
| 0.500 | 1.000 | Green |
| 1.000 | 1.500 | Green |
| 1.500 | 2.000 | Green |
| 2.000 | 2.500 | Green |
| 2.500 | 3.000 | Green |
| 3.000 | 3.500 | Green |
| 3.500 | 4.000 | Green |

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



- GENERAL NOTES:**
- BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED AT A MINIMUM CL-625 LOADING.
 - INITIAL BRIDGE LENGTHS DETERMINED USING LIDAR IMAGERY IN COMBINATION WITH IMAGERY; BRIDGE LENGTH AND FINAL LOCATION TO BE VERIFIED BY MEASUREMENT PRIOR TO INSTALLATION.
 - BRIDGE DESIGNED FOR A MINIMUM Q10 SEASONAL FLOW +0.5m OF WATER CLEARANCE.
 - BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED AT A MINIMUM CL-625 LOADING.
 - BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED BY A PROFESSIONAL ENGINEER AND AN AS-BUILT PLAN PRODUCED AFTER CONSTRUCTION.
 - PERMITS: OBTAINING, SUBMITTING, AND RECEIVING APPROVAL SHALL BE THE RESPONSIBILITY OF THE OWNER PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
 - UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.
 - THIS IS AN ENVIRONMENTALLY SENSITIVE LOCATION DUE TO STREAM PROXIMITY; ALL FILTER CLOTH, LOCK BLOCKS, ROAD ACCESS MATS, FENDER SYSTEMS AND DECKING TO BE FREE OF SOIL AND FOREIGN MATERIAL PRIOR TO TRANSPORT TO SITE. SPILL KITS AND TRAYS HIGHLY RECOMMENDED.

- VOLUME NOTES:**
- RIPRAP SHALL BE HARD, DURABLE, ANGULAR ROCK AND IN ACCORDANCE TO THE MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS "ENGINEERING MANUAL", APRIL 7, 2016.

CLASS 250 kg AVERAGE SIZE ROCK RIPRAP, 500 THICK WITH THE FOLLOWING ROCK GRADATION:

| | MASS | DIAMETER |
|-----|--------------------|----------|
| 85% | LARGER THAN 25 kg | 300 |
| 50% | LARGER THAN 250 kg | 600 |
| 15% | LARGER THAN 750 kg | 900 |

MINIMUM RIPRAP VOLUME: 218 m³

- LINE EXCAVATION WITH NON-WOVEN GEO-TEXTILE, MINIMUM MULLEN BURST STRENGTH OF 2619 KPA (Armtex 250/ProPex 4553 OR APPROVED EQUIVALENT).

TOTAL GEOTEXTILE: 7205 m²

- ESTIMATED CUT AND FILL VOLUMES:

| | |
|---------------------|---------------------|
| COMPACTED BACKFILL: | 8664 m ³ |
| EXCAVATION: | 1871 m ³ |
| NET FILL: | 6793 m ³ |

- ESTIMATED GRANULAR BASE FILL: 130 m³

BACKFILL AND GRANULAR FILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm IN LOOSE THICKNESS AND EACH LAYER SHALL BE COMPACTED TO THE CLIENTS ROAD SPECIFICATIONS WITH A PLATE TAMPER EVENLY ACROSS THE ENTIRE SURFACE TO THE DESIRED ELEVATION.

*** IF CONDITIONS ADEQUATE AT TIME OF INSTALLATION, SUBSTITUTE FILL FOR A SNOW/ICE SLURRY WITH A MINIMUM OF 1m OF ICE/SNOW BELOW ALL BRIDGE MATS IF BUILT UP. (LOCK BLOCKS & RIP-RAP NOT REQUIRED)

Trilogy Crossing Corp.
ENGINEERING, ENVIRONMENTAL, INSPECTION

19.7A HALFWAY CROSSINGS

PROPOSED CUT AND FILL PLAN + DETAILS

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----|-------------|-------------------------|----------|----------|---------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /23 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 |

REVISIONS

Sheet 23 of 25

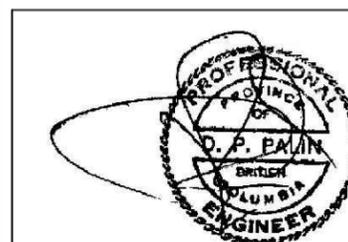
LAST DATE REVISED: 2-JUN-2020 6:13 PM



CUT AND FILL PLAN
SCALE: N.T.S.

| Elevations Table | | |
|-------------------|-------------------|-------|
| Minimum Elevation | Maximum Elevation | Color |
| -6.500 | -6.000 | Red |
| -6.000 | -5.500 | Red |
| -5.500 | -5.000 | Red |
| -5.000 | -4.500 | Red |
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| -4.000 | -3.500 | Red |
| -3.500 | -3.000 | Red |
| -3.000 | -2.500 | Red |
| -2.500 | -2.000 | Red |
| -2.000 | -1.500 | Red |
| -1.500 | -1.000 | Red |
| -1.000 | -0.500 | Red |
| -0.500 | 0.000 | Red |
| 0.000 | 0.500 | Green |
| 0.500 | 1.000 | Green |
| 1.000 | 1.500 | Green |
| 1.500 | 2.000 | Green |
| 2.000 | 2.500 | Green |
| 2.500 | 3.000 | Green |
| 3.000 | 3.500 | Green |
| 3.500 | 4.000 | Green |

| LEGEND | |
|--------|----------------|
| | CREEK |
| | ROAD |
| | ROAD ALIGNMENT |
| | RIPARIAN ROCK |
| | TREE LINE |
| | SECTION LINE |



NO FLOW FOR BRIDGE NOTES:

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|-----|--------------------|----------|
| 85% | LARGER THAN 25 kg | 300 |
| 50% | LARGER THAN 250 kg | 600 |
| 15% | LARGER THAN 750 kg | 900 |

MINIMUM RIPRAP VOLUME: 101 m³

- LINE EXCAVATION WITH NON-WOVEN GEO-TEXTILE, MINIMUM MULLEN BURST STRENGTH OF 2619 KPA (Armtex 250/ProPex 4553 OR APPROVED EQUIVALENT).

TOTAL GEOTEXTILE: 8802 m²

- ESTIMATED CUT AND FILL VOLUMES:

| | |
|---------------------|---------------------|
| COMPACTED BACKFILL: | 7756 m ³ |
| EXCAVATION: | 1895 m ³ |
| NET FILL: | 5861 m ³ |

- ESTIMATED GRANULAR BASE FILL: 90 m³

- BACKFILL AND GRANULAR FILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm IN LOOSE THICKNESS AND EACH LAYER SHALL BE COMPACTED TO THE CLIENTS ROAD SPECIFICATIONS WITH A PLATE TAMPER EVENLY ACROSS THE ENTIRE SURFACE TO THE DESIRED ELEVATION.

*** IF CONDITIONS ADEQUATE AT TIME OF INSTALLATION, SUBSTITUTE FILL FOR A SNOW/ICE SLURRY WITH A MINIMUM OF 1m OF ICE/SNOW BELOW ALL BRIDGE MATS IF BUILT UP. (LOCK BLOCKS & RIP-RAP NOT REQUIRED)

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19.7A HALFWAY CROSSINGS

PROPOSED#2 CUT AND FILL PLAN + DETAILS

BC Hydro
Power smart

| DESIGN | DRAWN | CHECKED | FILE |
|-------------|-------------|-------------|--------------|
| M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /24 |
| DATE | DATE | DATE | PLAN |
| 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |

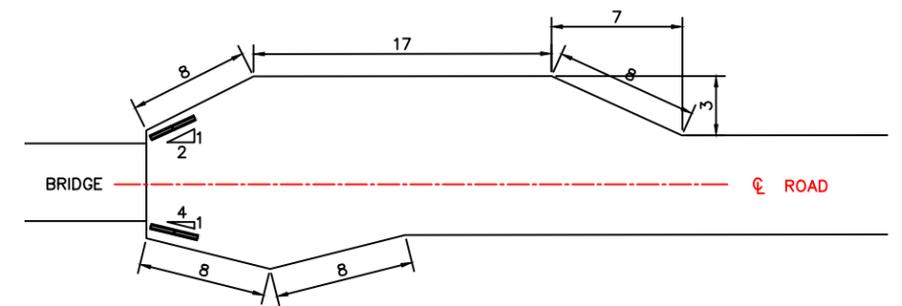
REVISIONS

1 02-JUN-2020 ISSUED FOR CONSTRUCTION

0 28-MAY-2020 ISSUED FOR REVIEW

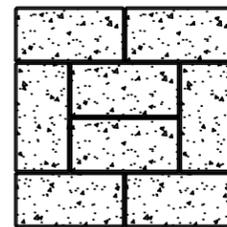
Sheet 24 of 25

LAST DATE REVISED: 2-Jun-2020 6:13 PM



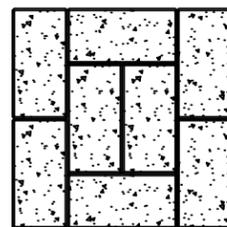
TYPICAL FLARE DETAILS

SCALE: 1:100



PIER BOTTOM LAYER PLAN

SCALE: 1:100



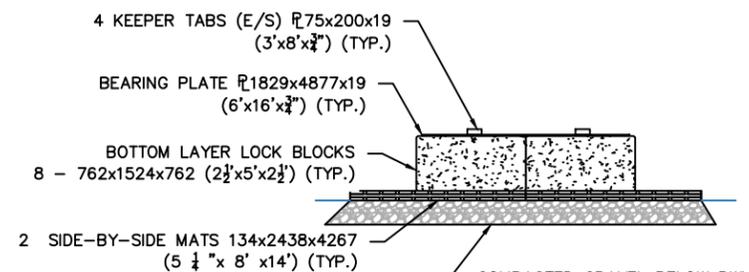
PIER TOP LAYER PLAN

SCALE: 1:100 ** IF REQUIRED



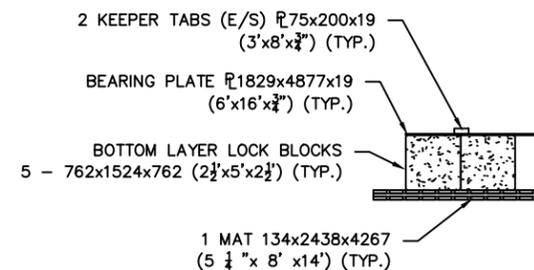
ABUTMENT BOTTOM LAYER PLAN

SCALE: 1:100



PIER PROFILE

SCALE: 1:100

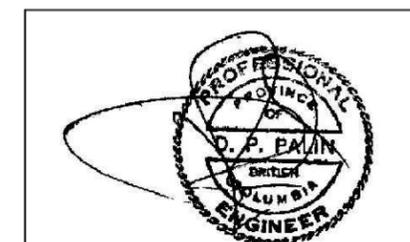


ABUTMENT PROFILE

SCALE: 1:100

GENERAL NOTES:

1. BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED AT A MINIMUM CL-625 LOADING.
2. INITIAL BRIDGE LENGTHS DETERMINED USING LIDAR IMAGERY IN COMBINATION WITH IMAGERY; BRIDGE LENGTH AND FINAL LOCATION TO BE VERIFIED BY MEASUREMENT PRIOR TO INSTALLATION.
3. BRIDGE DESIGNED FOR A MINIMUM Q10 SEASONAL FLOW +0.5m OF WATER CLEARANCE.
4. BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED AT A MINIMUM CL-625 LOADING.
5. BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE CERTIFIED BY A PROFESSIONAL ENGINEER AND AN AS-BUILT PLAN PRODUCED AFTER CONSTRUCTION.
6. PERMITS: OBTAINING, SUBMITTING, AND RECEIVING APPROVAL SHALL BE THE RESPONSIBILITY OF THE OWNER PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
7. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS AND ALL ELEVATIONS AND STATIONS ARE IN METERS.
8. THIS IS AN ENVIRONMENTALLY SENSITIVE LOCATION DUE TO STREAM PROXIMITY; ALL FILTER CLOTH, LOCK BLOCKS, ROAD ACCESS MATS, FENDER SYSTEMS AND DECKING TO BE FREE OF SOIL AND FOREIGN MATERIAL PRIOR TO TRANSPORT TO SITE. SPILL KITS AND TRAYS HIGHLY RECOMMENDED.



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19.7A HALFWAY CROSSINGS

LOCKBLOCK/PULLOUT DETAILS

BC Hydro
Power smart

| NO. | DATE | DESCRIPTION | DESIGN | DRAWN | CHECKED | FILE |
|-----------|-------------|-------------------------|-------------|-------------|-------------|--------------|
| 1 | 02-JUN-2020 | ISSUED FOR CONSTRUCTION | M.DARASZ | M.DARASZ | D.PALIN | TC-HY011 /25 |
| 0 | 28-MAY-2020 | ISSUED FOR REVIEW | 28-MAY-2020 | 28-MAY-2020 | 28-MAY-2020 | TC-HY011 |
| REVISIONS | | | | | | |