

APPENDIX 1-I

Feasibility Study Design Drawings

SAVED: M:\110100594\04AA\cadd\DWGS\G001\G001_6/29/2017 8:17:03 PM, RFAHAM PRINTED: 6/30/2017 4:17:26 PM, G001, RFAHAM XREF FILE(S): IMAGE FILE(S): Pdfnet

RED MOUNTAIN PROJECT - BROMLEY HUMPS TMF			
NO. OF DRAWINGS	DRAWING NOS	TITLE	
7	000	GENERAL CIVIL	
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	G002	INDEX SHEET	
	G003	OVERALL SITE PLAN	
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M311		TAILINGS RECLAIM AND SURPLUS WATER MANAGEMENT - STAGE 4 PLAN AND PROFILE	



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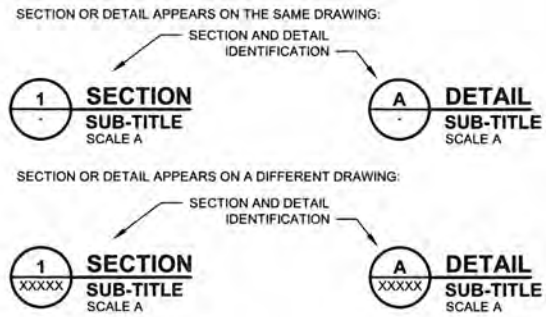
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		<p>RED MOUNTAIN UNDERGROUND GOLD PROJECT</p>	
		<p>COVER SHEET</p>	
<p>PROFESSIONAL PROVINCE J. FOGARTY # 44041</p>	<p><Original signed by></p>	<p>1/A NO. VA101-594/4</p>	<p>DRAWING NO. G001</p>
		<p>REVISION 0</p>	

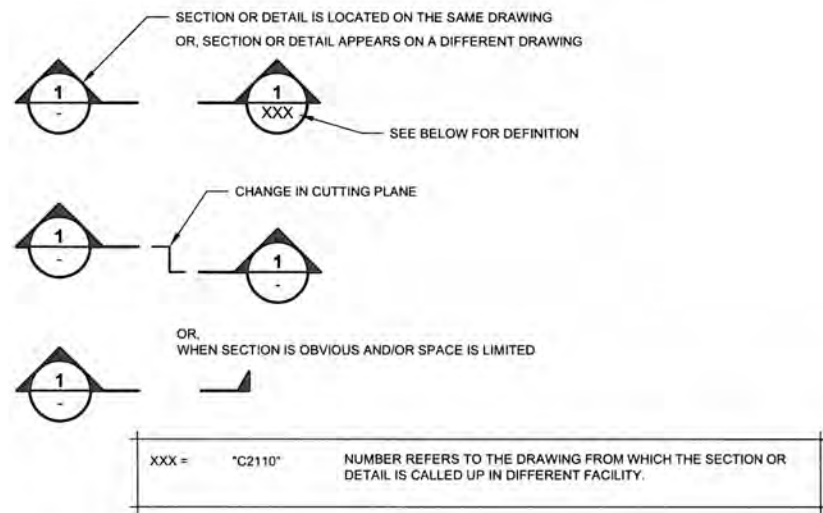
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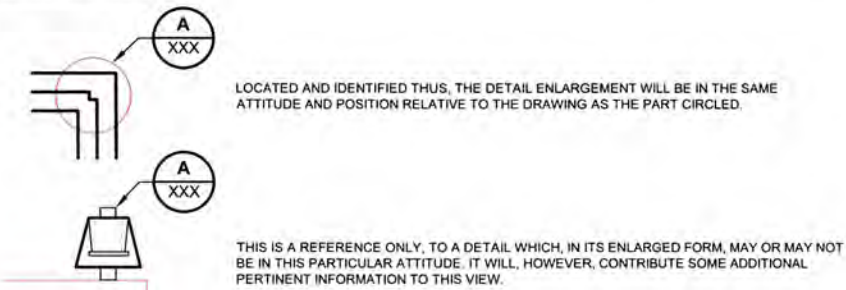
SECTIONAL VIEW AND DETAIL IDENTIFICATION



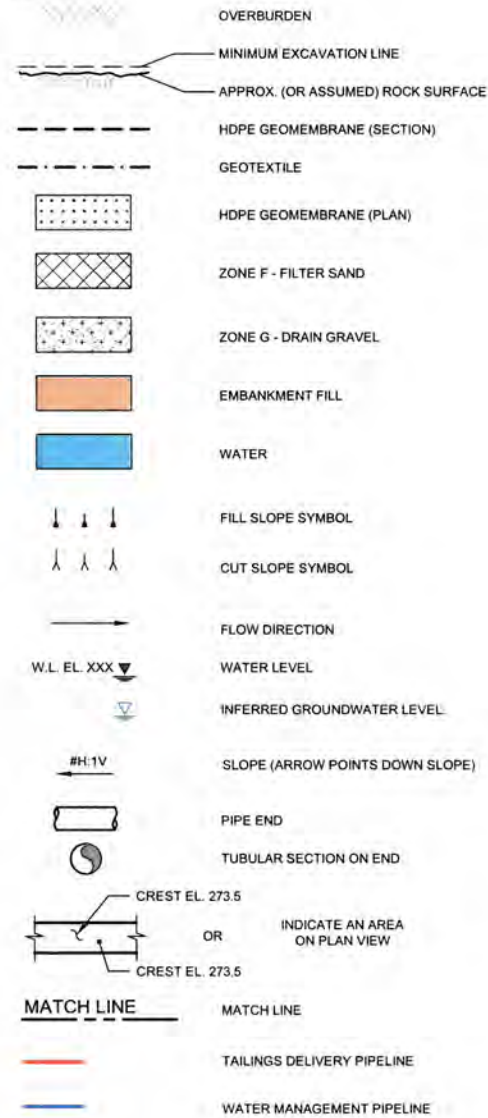
SECTION LOCATION ARROWS



DETAIL REFERENCE



LEGEND



ABBREVIATIONS

APPROX.	APPROXIMATE
CTR	CENTRE
DIA OR Ø	DIAMETER
EA.	EACH
EL.	ELEVATION IN METERS
EMB	EMBANKMENT
GWL	GROUNDWATER
m	METER
mm	MILLIMETER
NA	NOT APPLICABLE
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
REQ'D	REQUIRED
SOL	SETTING OUT LINE
TMF	TAILINGS MANAGEMENT FACILITY
TYP.	TYPICAL
UNO	UNLESS NOTED OTHERWISE
W/	WITH

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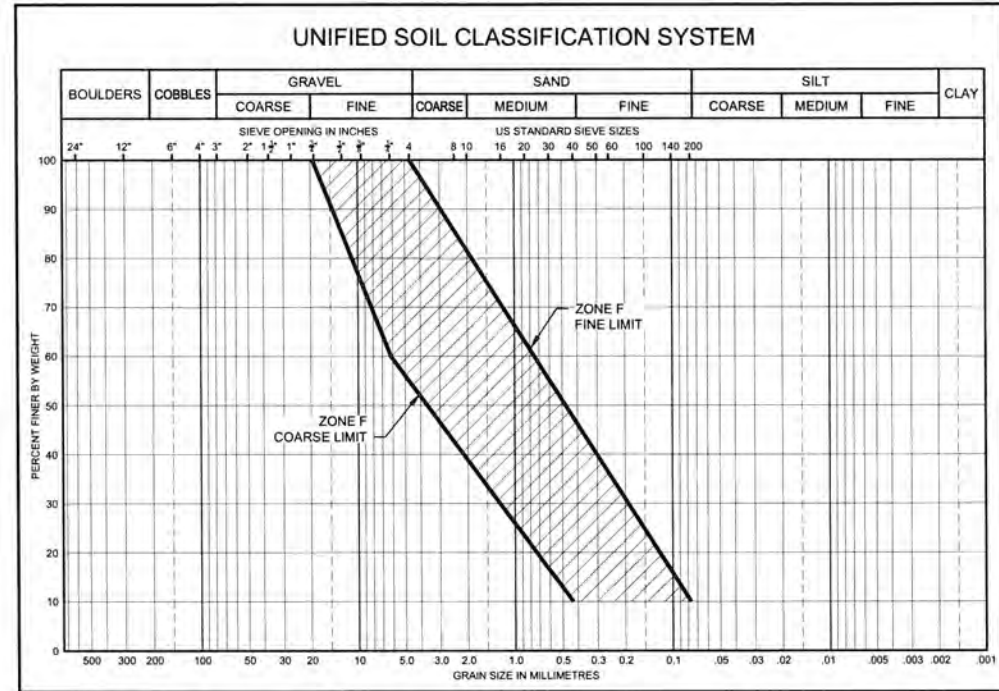
RED MOUNTAIN UNDERGROUND GOLD PROJECT

INDEX SHEET

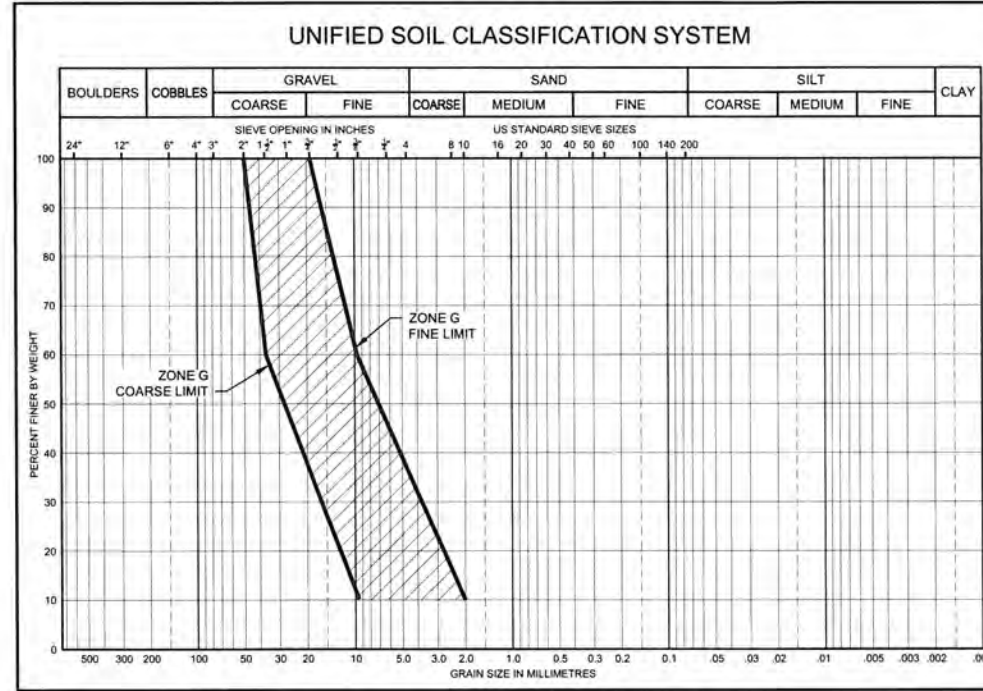
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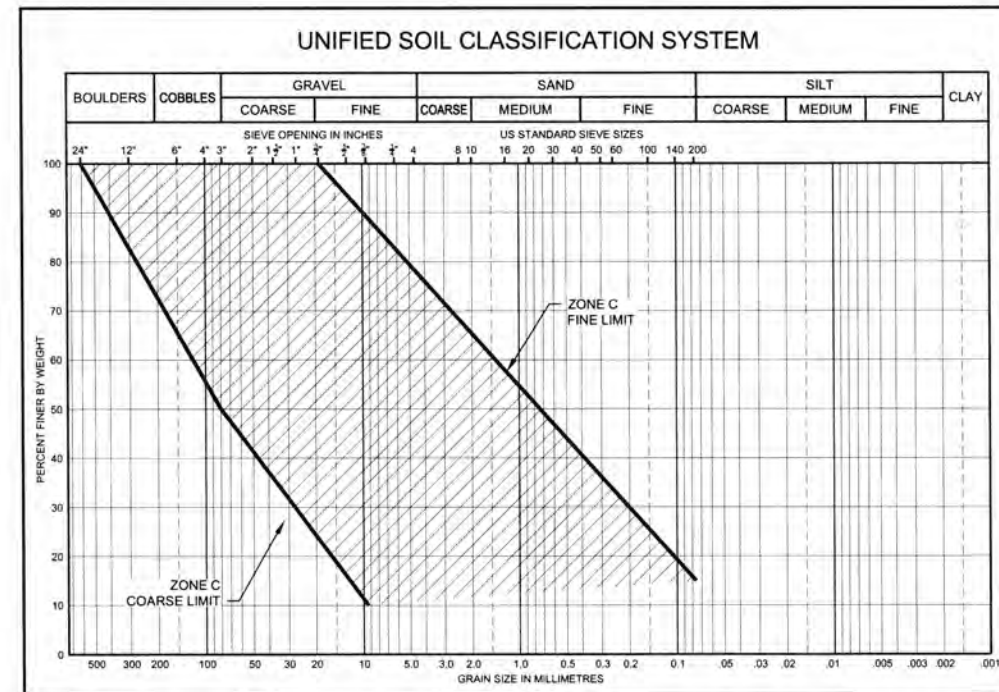
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	REFERENCE DRAWINGS							0	29JUN'17	ISSUED WITH FEASIBILITY STUDY REPORT	JEF	RAF		



ZONE F



ZONE G



ZONE C

MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS			
ZONE	MATERIAL TYPE	LOCATIONS	PLACING AND COMPACTION REQUIREMENTS
F	FILTER SAND	GEOMEMBRANE BEDDING LAYER/ UNDERDRAIN	PLACED AND SPREAD IN MAXIMUM 500 mm THICK LAYERS AND COMPACTED WITH MINIMUM 2 PASSES OF 10 TON SMOOTH DRUM VIBRATORY ROLLER, OR AS APPROVED BY THE ENGINEER.
G	DRAIN GRAVEL	UNDERDRAIN SUMP/ FOUNDATION DRAIN	PLACED AND SPREAD IN MAXIMUM 500 mm THICK LAYERS AND COMPACTED WITH NOMINAL COMPACTION.
C	GENERAL FILL	EMBANKMENT FILL ZONE	PLACED AND SPREAD IN MAXIMUM 1,000 mm THICK LAYERS AND COMPACTED TO 95% MODIFIED PROCTOR WITH MINIMUM 4 PASSES OF 10 TON SMOOTH DRUM VIBRATORY ROLLER, OR AS APPROVED BY THE ENGINEER.

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RED MOUNTAIN UNDERGROUND GOLD PROJECT

**CONSTRUCTION MATERIAL
SPECIFICATIONS**

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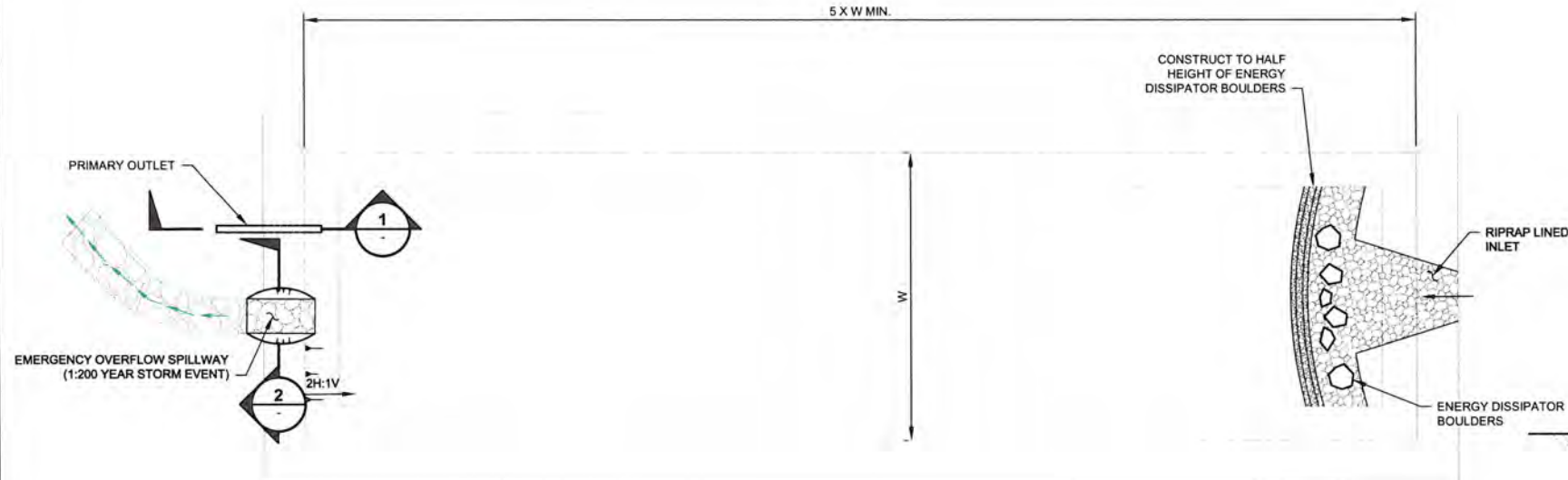
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ENGINEER
OF
J. FOGARTY
44041

<Original signed
by>

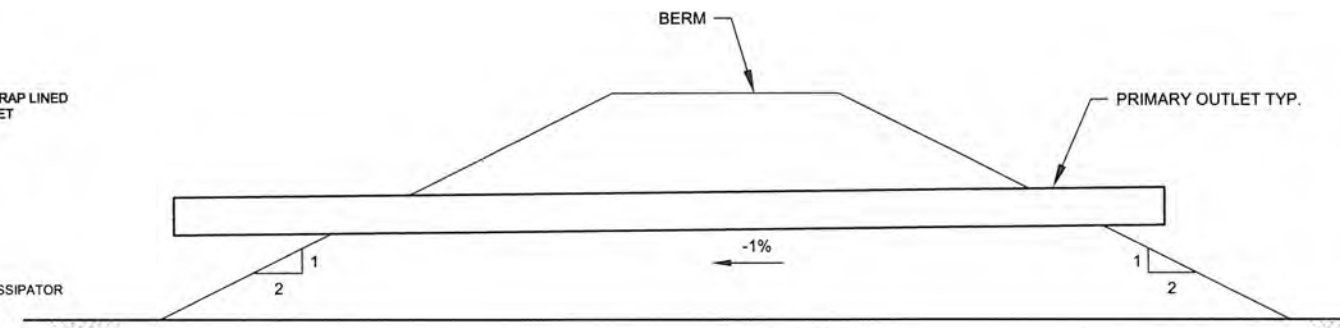
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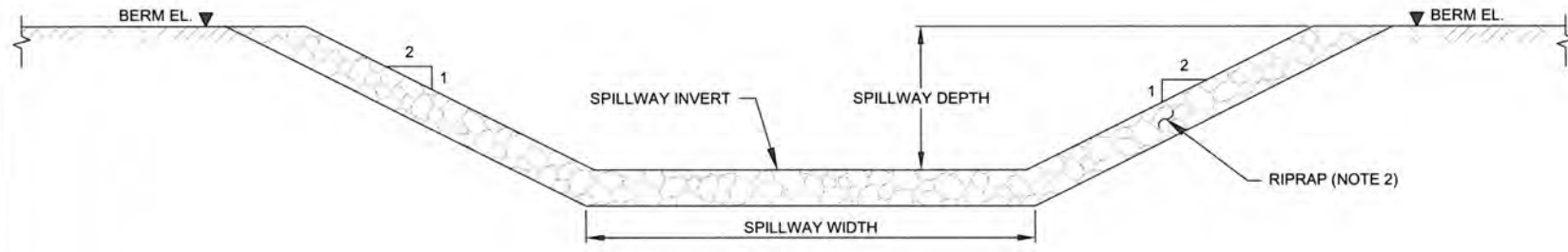
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VA101-594/4	G004	0



PLAN VIEW
SCALE A



1 PRIMARY OUTLET SECTION
NTS



2 SPILLWAY SECTION
NTS

- NOTES:**
1. SEDIMENT POND LINING REQUIREMENTS SUBJECT TO ENGINEER'S REVIEW OF FOUNDATION MATERIAL.
 2. RIPRAP TO BE SPECIFIED FOR EACH INDIVIDUAL SEDIMENT POND DURING DETAILED DESIGN PHASE.
 3. DIMENSIONS AND ELEVATIONS ARE IN METERS, UNLESS NOTED OTHERWISE.

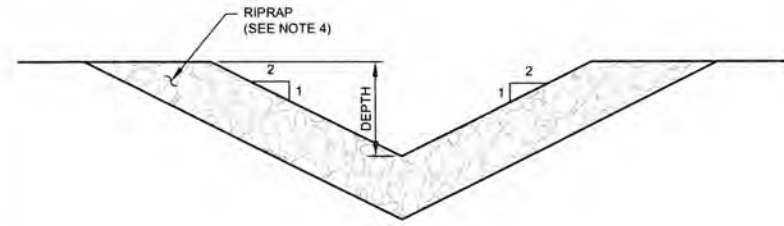
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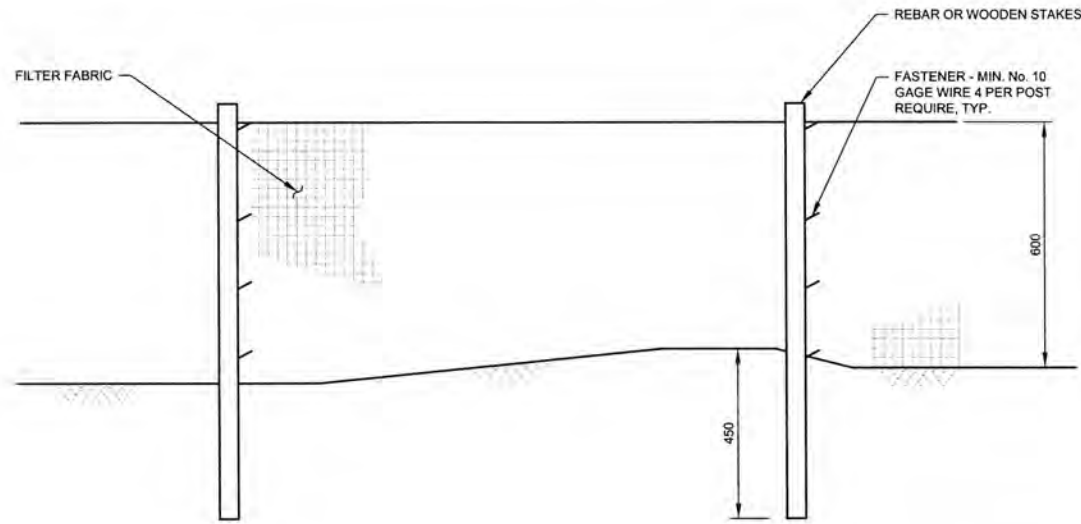
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<p>SEDIMENT AND EROSION CONTROL TYPICAL SECTIONS AND DETAILS SH 1 OF 3</p>		
<p>PROFESSIONAL PROVINCE OF J. FOGARTY # 44041</p>	<p><Original signed by></p>	
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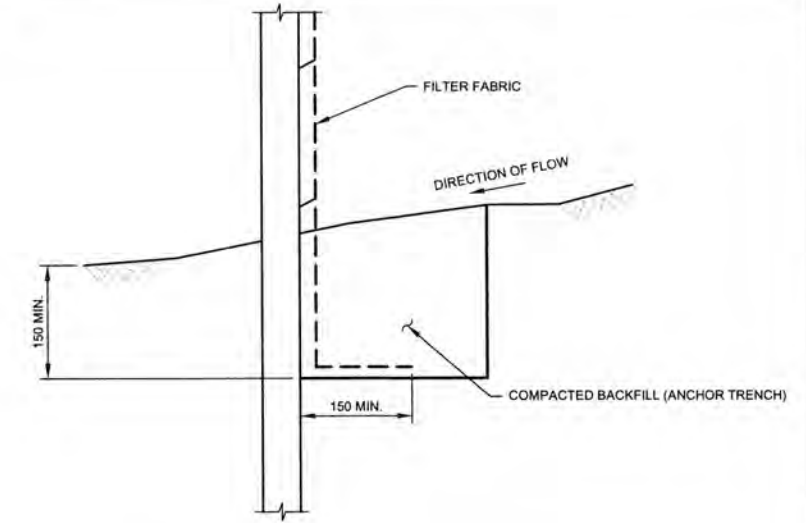
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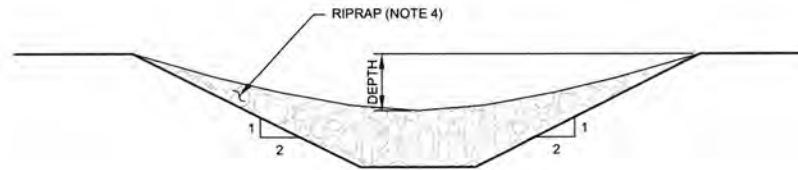
CD DD COLLECTION AND DIVERSION DITCH
SCALE A



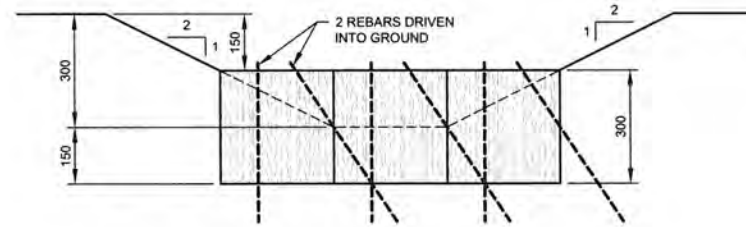
SF SILT FENCING PROFILE
SCALE A



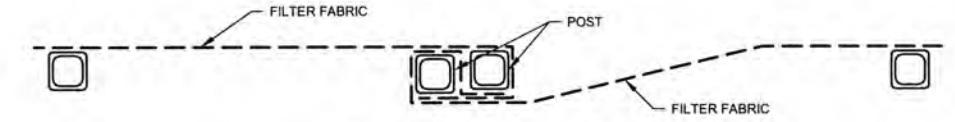
SF SILT FENCING CROSSING SECTION
SCALE B



RD ROCK DAM CROSSING SECTION
SCALE A



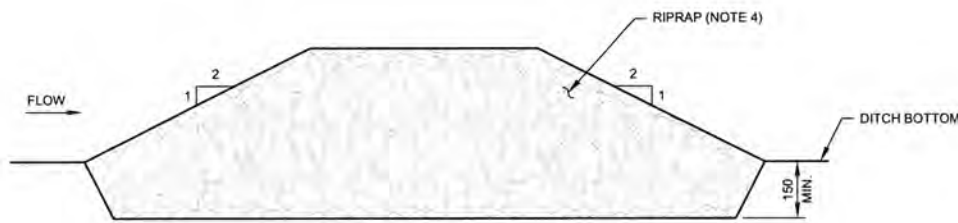
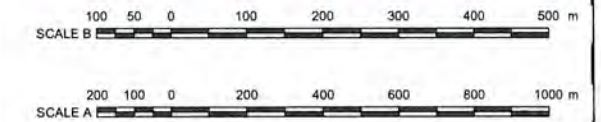
ST STRAW BALE CROSSING SECTION
SCALE A



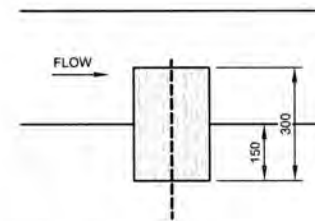
SF ATTACHING TWO SILT FENCES
SCALE B

- NOTES:**
1. ALL SEDIMENT AND EROSION CONTROL MEASURES MUST BE CONSTRUCTED, STABILIZED AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS.
 2. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
 3. AN AREA IS CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER TO RESIST ACCELERATED SURFACE EROSION.
 4. RIPRAP ONLY REQUIRED WHEN ERODIBLE SOILS HAVE BEEN EXPOSED.
 5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

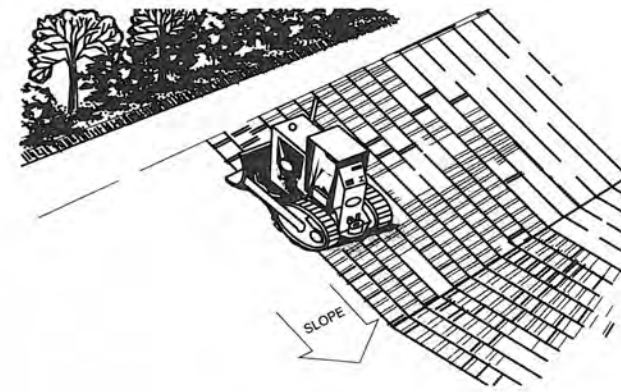
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RD ROCK DAM PROFILE
SCALE A



ST STRAW BALE PROFILE
SCALE A



SR SLOPE ROUGHENING
NTS

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PROVINCE OF
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44041

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RED MOUNTAIN UNDERGROUND GOLD PROJECT

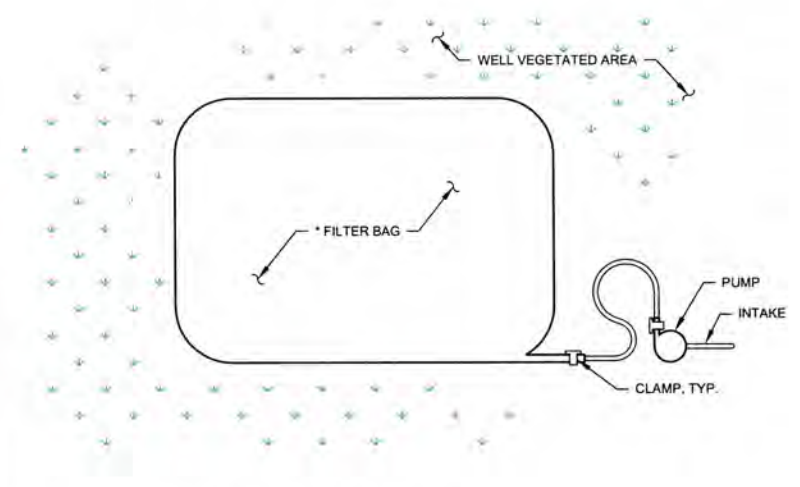
SEDIMENT AND EROSION CONTROL TYPICAL SECTIONS AND DETAILS SHEET 2 OF 3

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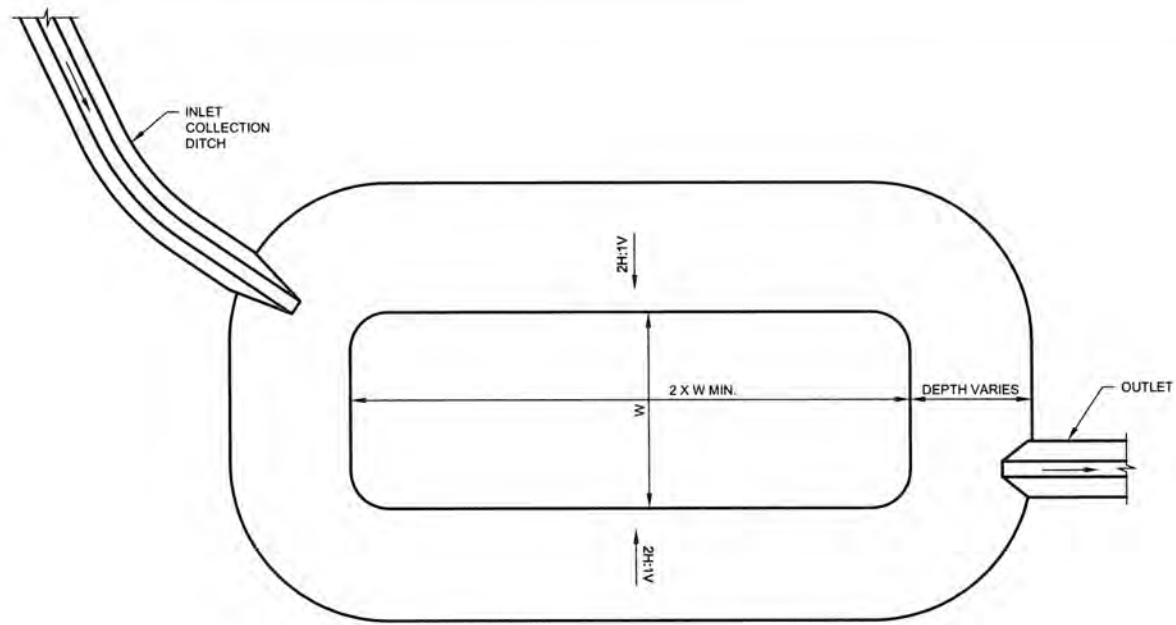
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FB FILTER BAG PLAN
SCALE A



SB SEDIMENT BASIN PLAN
SCALE B

ROCK ENERGY DISSIPATOR NOTES:

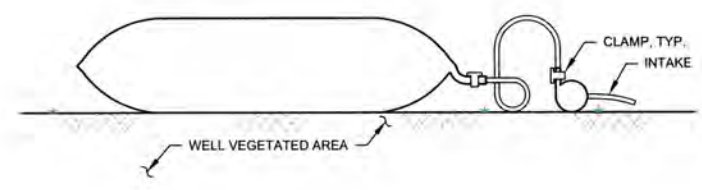
1. RIPRAP TO BE SPECIFIED DURING DETAILED DESIGN PHASE BASED ON SITE SPECIFIC PARAMETERS.

SEDIMENT BASIN GENERAL NOTES:

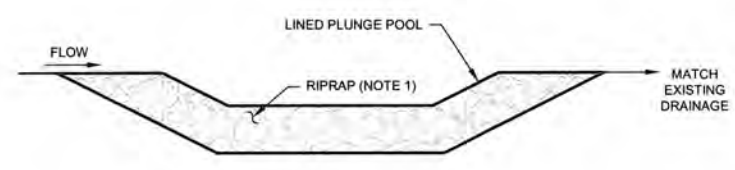
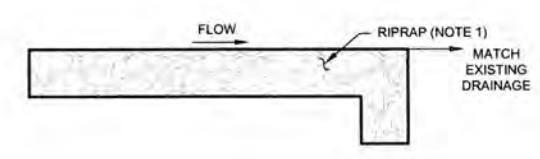
1. SEDIMENT BASINS DETAIN STORMWATER RUNOFF FROM A DISTURBED AREA FOR AN EXTENDED TIME, ALLOWING SEDIMENT TO SETTLE.
2. SEDIMENT BASINS MAY REMAIN IN PLACE DURING OPERATIONS, AS INDICATED IN THE PLANS OR AS DIRECTED BY THE ENGINEER, OR SITE ENVIRONMENTAL MONITORING TECHNICIAN.
3. SEDIMENT BASINS MAY HAVE PUMP OR GRAVITY OUTLET CHANNEL TO COLLECTION DITCH.
4. RELEASES FROM SEDIMENT BASINS REQUIRE FURTHER WATER MANAGEMENT/BMPS (EX. PUMPBACK, DISCHARGE TO COLLECTION DITCHES, FILTER BAGS, AND VEGETATED BUFFER STRIPS.)
5. SEDIMENT BASINS TO BE FIELD FIT TO OPTIMIZE CUT AND FILL QUANTITIES TO ACHIEVE MINIMUM SPECIFIED DIMENSIONS.

SEDIMENT FILTER BAG GENERAL NOTES:

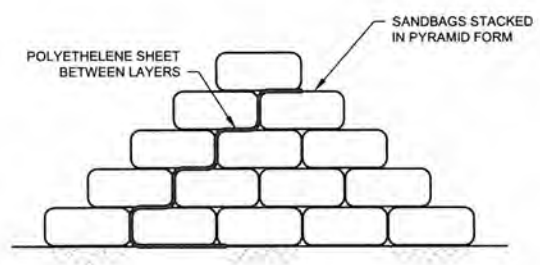
1. NON-WOVEN GEOTEXTILE FILTER BAG WHICH RETAINS ALL SEDIMENT PARTICLES LARGER THAN 150 MICRONS.
2. PLACE FILTER BAGS ON STABLE OR WELL VEGETATED AREAS WHICH ARE FLATTER THAN 5% AND WILL NOT ERODE WHEN SUBJECTED TO BAG DISCHARGE.
3. CLAMP PUMP DISCHARGE HOSE SECURELY INTO FILTER BAGS.
4. THE PUMPING RATE SHALL BE NO GREATER THAN 750 gpm OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.
5. WHEN SEDIMENTS FILL 1/2 THE VOLUME OF A FILTER BAG, IMMEDIATELY REMOVE THAT BAG FROM SERVICE. PROPERLY DISPOSE OF SPENT BAGS WITH THEIR SEDIMENTS. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FILLED.
6. THE DISCHARGE FROM THE FILTER BAG SHOULD NOT PASS THROUGH A DISTURBED AREA OR CAUSE AN EROSION PROBLEM DOWN SLOPE.
7. VEGETATED BUFFER STRIP WILL BE LEFT DOWNSTREAM OF THE FILTER BAG.
8. FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED PUMPING SHALL CEASE AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.



FB FILTER BAG ELEVATION
SCALE A

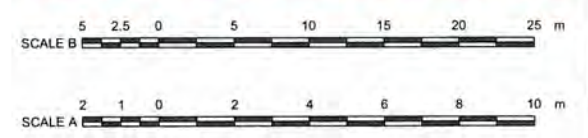


ED ROCK ENERGY DISSIPATOR
NTS



DS TEMPORARY STREAM DIVERSION STRUCTURE
NTS

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 # 44041
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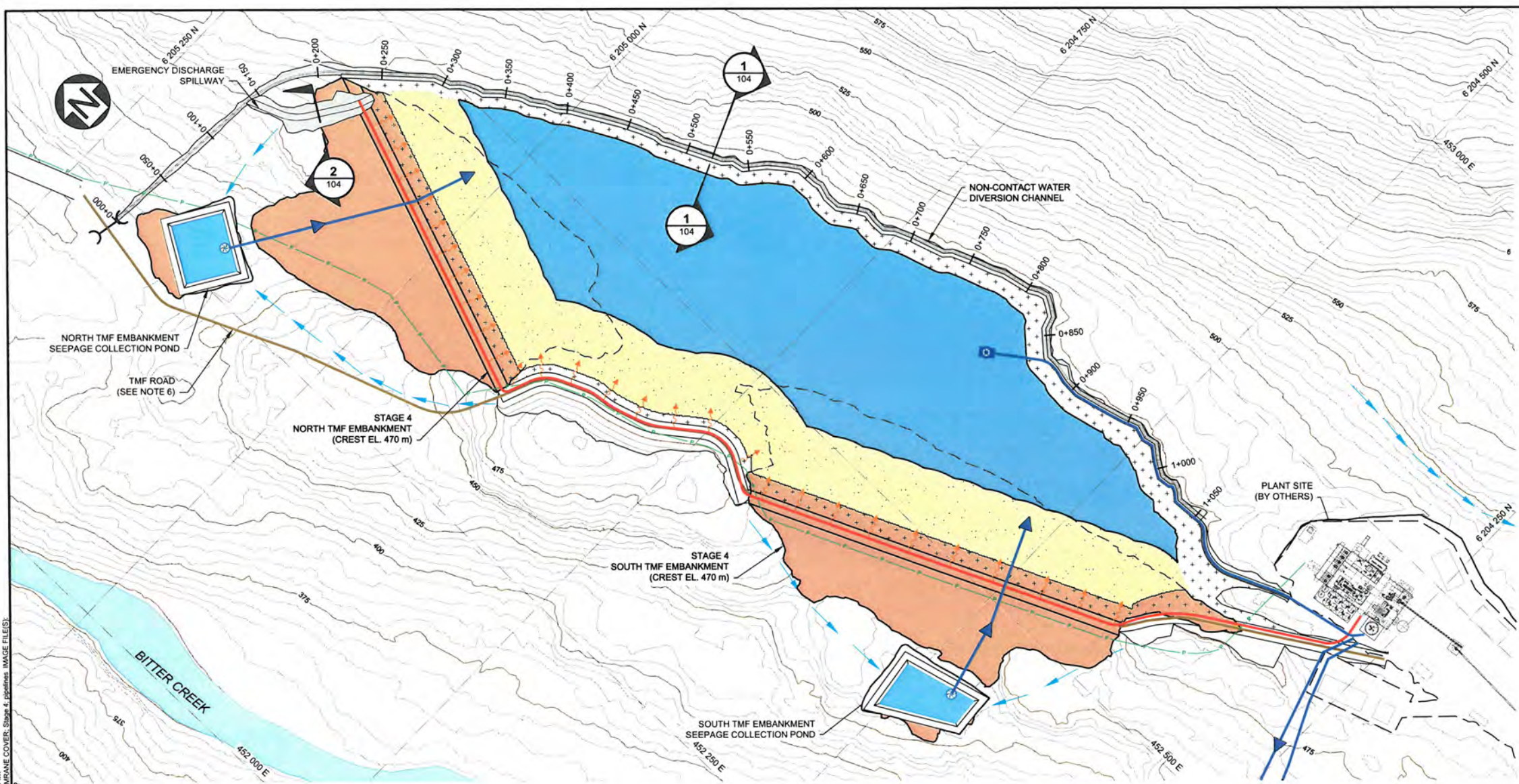
RED MOUNTAIN UNDERGROUND GOLD PROJECT

SEDIMENT AND EROSION CONTROL TYPICAL SECTIONS AND DETAILS SHEET 3 OF 3

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	REVISIONS						
	REVISIONS						

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PLAN
NON - CONTACT DIVERSION CHANNEL
SCALE A

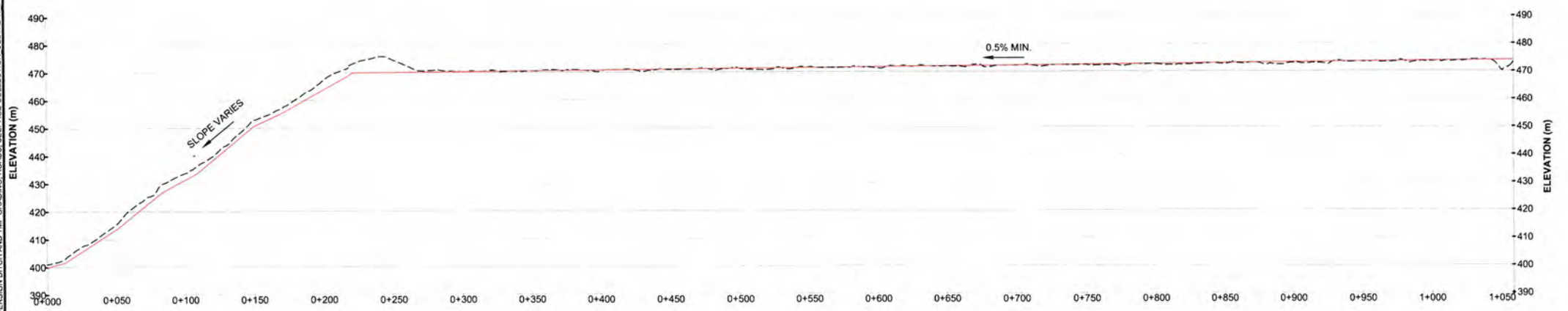
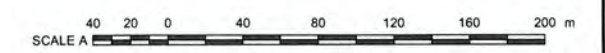
LEGEND:

- GEOMEMBRANE
- WATER
- EMBANKMENT FILL
- TAILINGS
- TAILINGS DELIVERY PIPELINE
- WATER MANAGEMENT PIPELINE
- FLOATING PUMP BARGE
- SEEPAGE RECYCLE PUMP SYSTEM
- CULVERT
- DIVERSION CHANNEL/DITCH
- POWER LINE
- T.M.F. ROAD

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. PLANT SITE LOCATION PROVIDED BY JDS MINING (NOVEMBER 2016).
6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
7. FINAL (STAGE 4) T.M.F. LAYOUT SHOWN.

**FOR INFORMATION ONLY
NOT FOR CONSTRUCTION**



1 PROFILE
HORIZONTAL SCALE A
VERTICAL SCALE A

DISCLAIMER
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PROFESSIONAL ENGINEER
J. FOGARTY
44041

Knicht Piesold CONSULTING
IDM MINING LTD.
RED MOUNTAIN GOLD UNDERGROUND PROJECT

BROMLEY HUMPS T.M.F. NON-CONTACT WATER DIVERSION CHANNEL PLAN AND PROFILE
PIA NO. **VA101-594/4** DRAWING NO. **C103** REVISION **0**

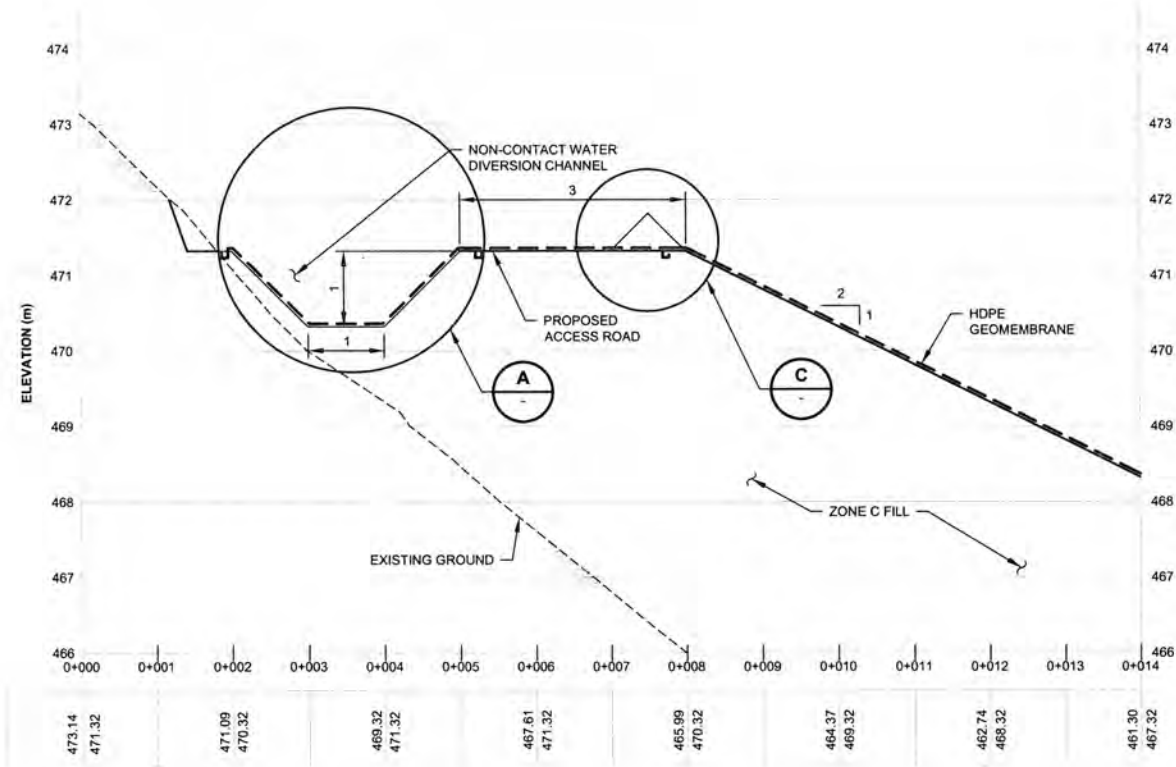
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	REFERENCE DRAWINGS						
	REVISIONS						

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0	29JUN17	ISSUED WITH FEASIBILITY STUDY REPORT	JEF	RAF		
		REVISIONS				

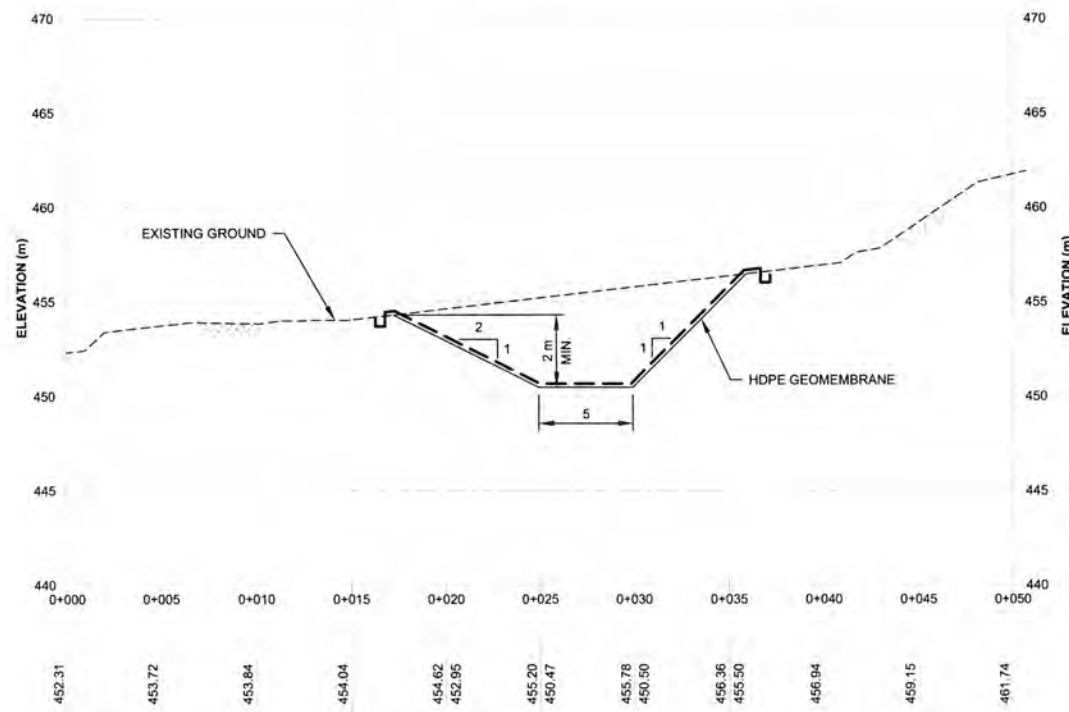
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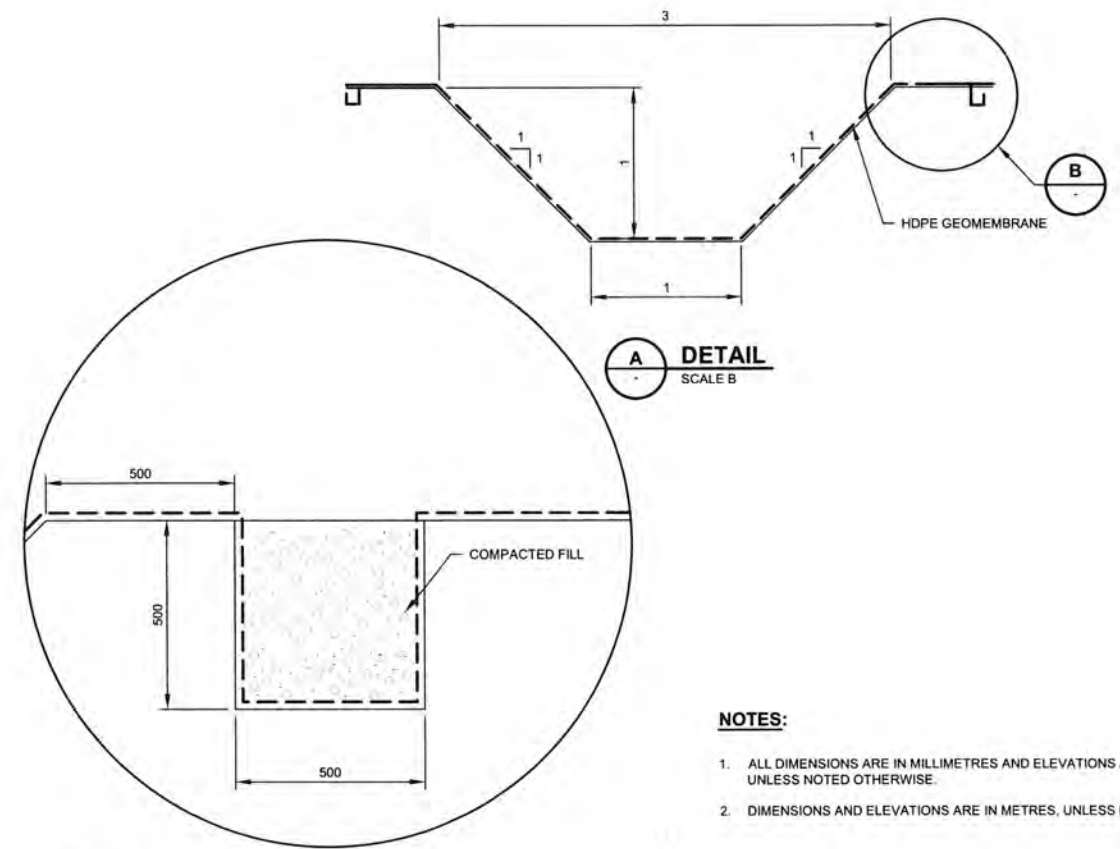
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 XREF FILES: IMAGE FILES:



1 SECTION STA 0+520
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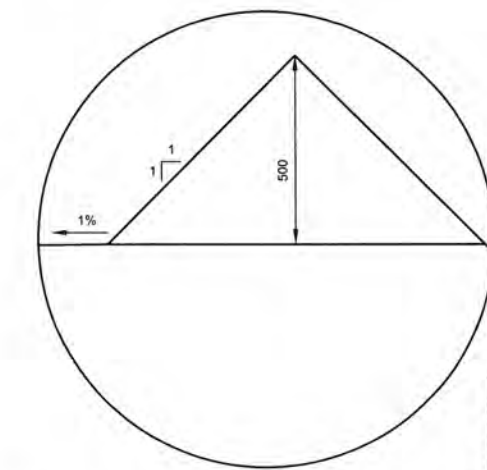


2 SECTION
SCALE C



A DETAIL
SCALE B

B ANCHOR TRENCH DETAIL
NTS

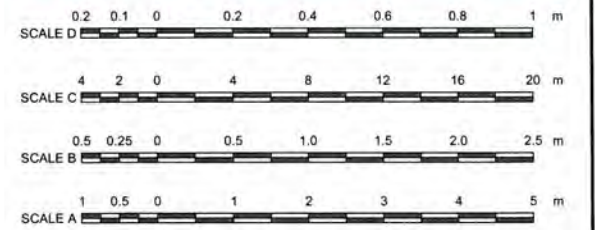


C SAFETY BERM DETAIL
NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

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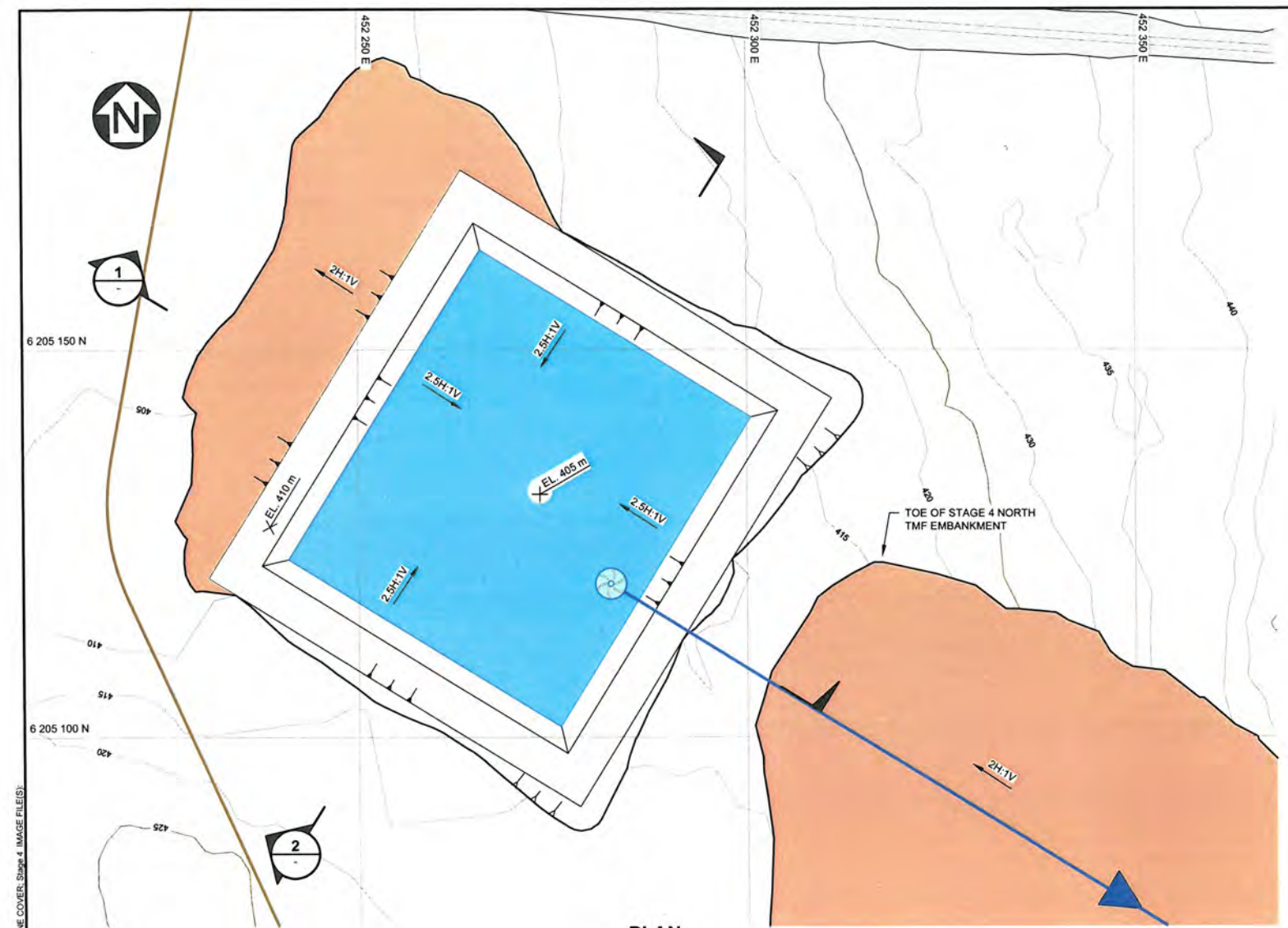
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		<p>IDM MINING LTD.</p>	
		<p>RED MOUNTAIN GOLD UNDERGROUND PROJECT</p>	
		<p>BROMLEY HUMPS TMF NON-CONTACT WATER DIVERSION CHANNEL SECTIONS AND DETAILS</p>	
<p>PIA NO. VA101-594/4</p>	<p>DRAWING NO. C104</p>	<p>REVISION 0</p>	

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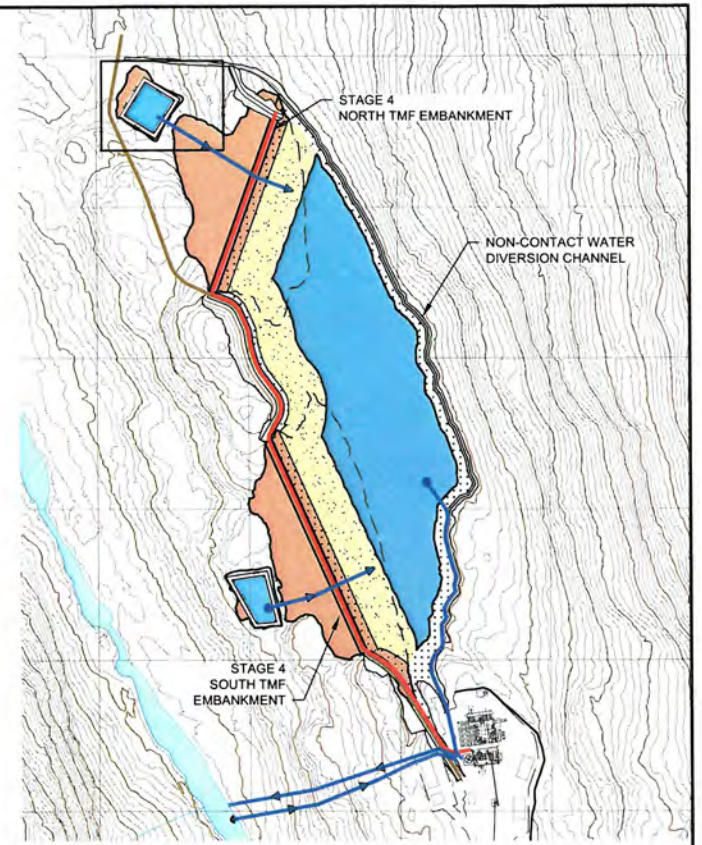
PROFESSIONAL
 PROVINCE OF
 J. FOGARTY
 # 44041

<Original signed by>

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS						
	REVISIONS						



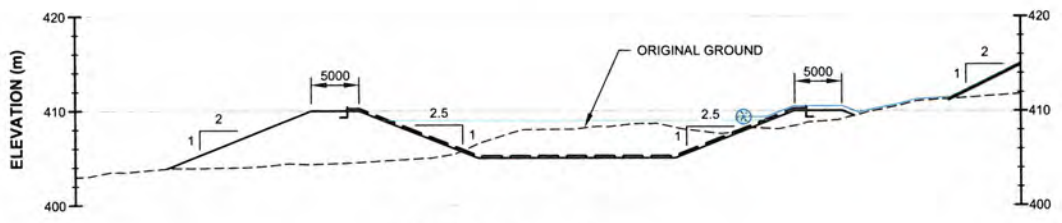
PLAN
SCALE A



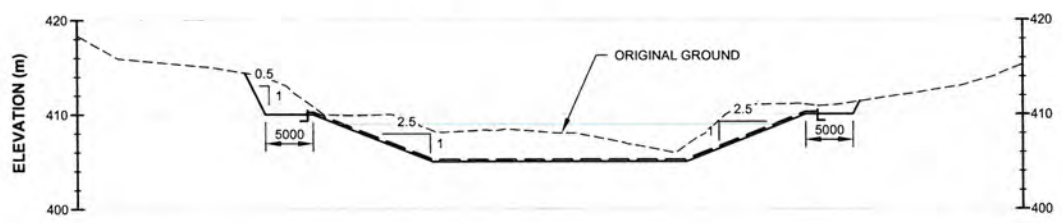
KEY PLAN
NTS

- LEGEND:**
- POND WATER
 - EMBANKMENT FILL
 - TAILINGS
 - TAILINGS DELIVERY PIPELINE
 - WATER MANAGEMENT PIPELINE
 - GEOMEMBRANE
 - FLOATING PUMP BARGE
 - SEEPAGE RECYCLE PUMP SYSTEM

- NOTES:**
1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
 2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
 3. CONTOUR INTERVAL IS 5 METRES.
 4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
 6. FINAL (STAGE 4) TMF LAYOUT SHOWN.



1 SECTION
SCALE A



2 SECTION
SCALE A

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PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO
J. FOGARTY
44041

<Original signed by>

SAVED: M:\1100594\04\A\A\Gad\DWGS\C105\C105_6/30/2017 10:33:52 AM - RFAHAM PRINTED: 6/30/2017 3:42:49 PM, C105 - RFAHAM
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DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
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										REVISIONS				

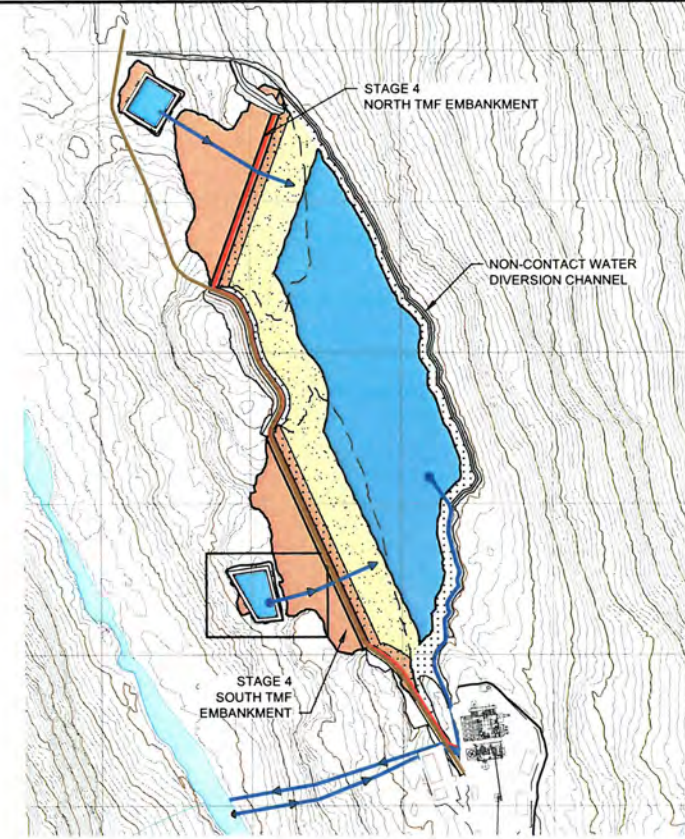
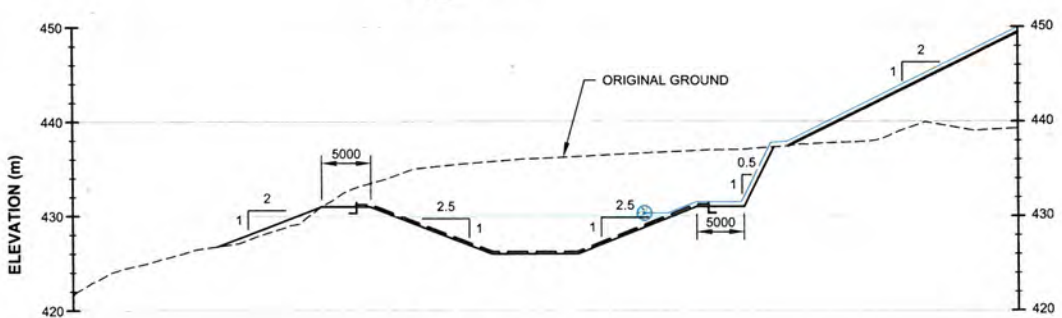
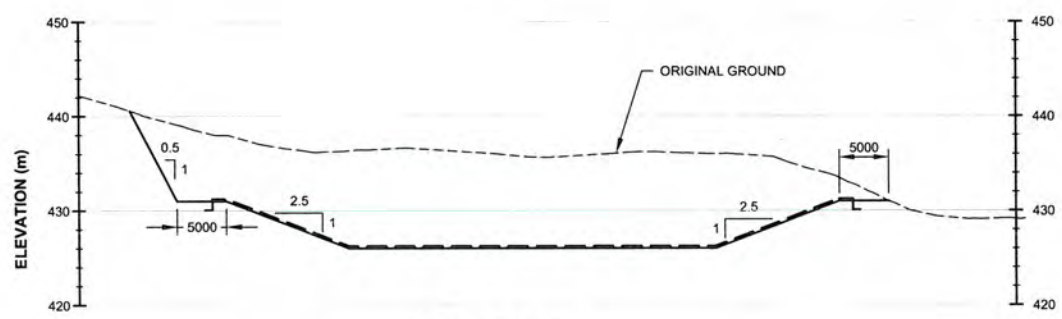
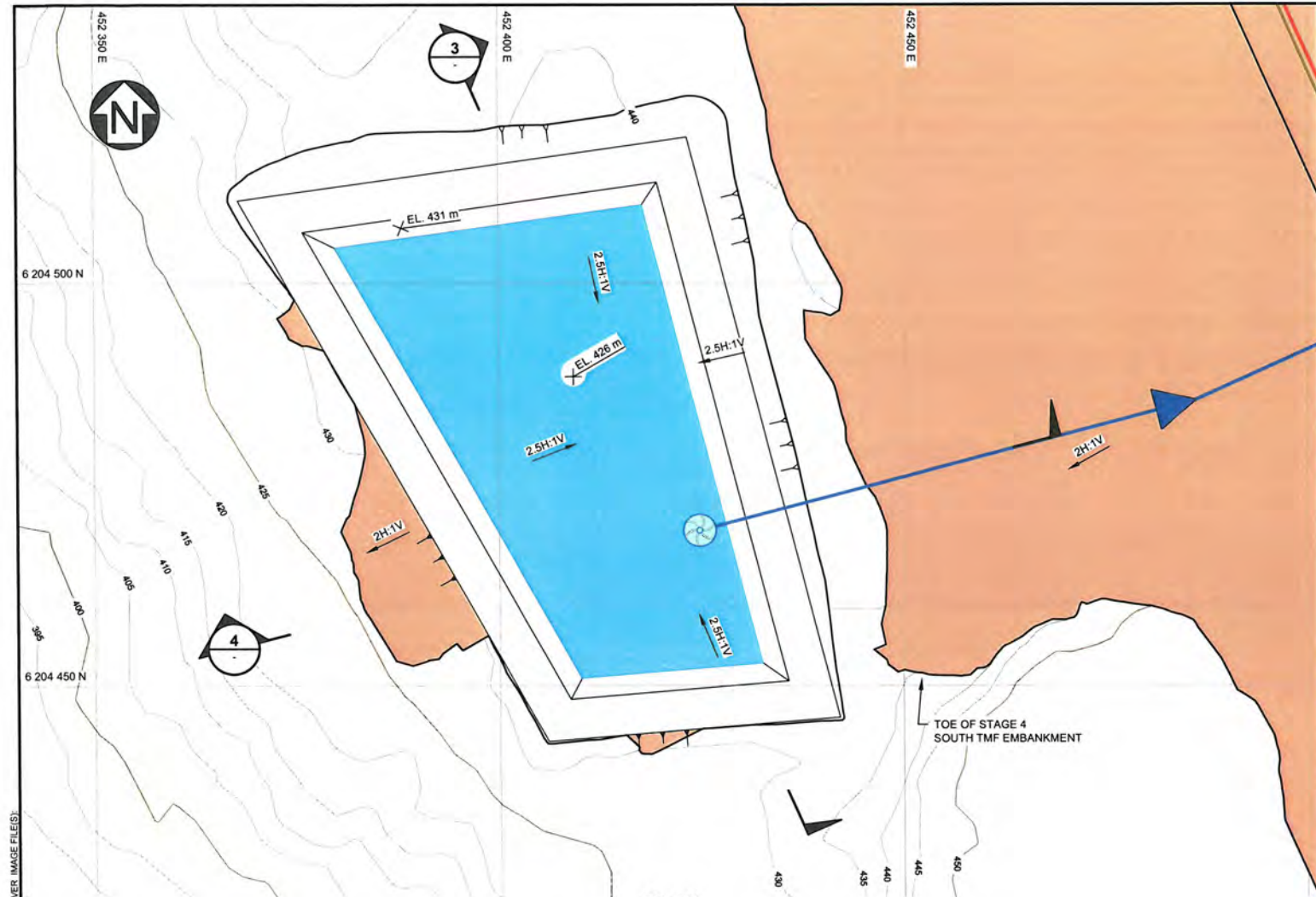
Knicht Piésold
CONSULTING

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
NORTH TMF EMBANKMENT
SEEPAGE COLLECTION POND
PLAN AND SECTIONS**

PIA NO.	DRAWING NO.	REVISION
VA101-594/4	C105	0



- LEGEND:**
- WATER
 - EMBANKMENT FILL
 - TAILINGS
 - TAILINGS DELIVERY PIPELINE
 - WATER MANAGEMENT PIPELINE
 - GEOMEMBRANE
 - FLOATING PUMP BARGE
 - SEEPAGE RECYCLE PUMP SYSTEM

- NOTES:**
1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
 2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
 3. CONTOUR INTERVAL IS 5 METRES.
 4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
 6. FINAL (STAGE 4) TMF LAYOUT SHOWN.



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PROFESSIONAL
PROVINCE OF
J. FOGARTY
44041

<Original signed by>

Knights Piesold CONSULTING

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

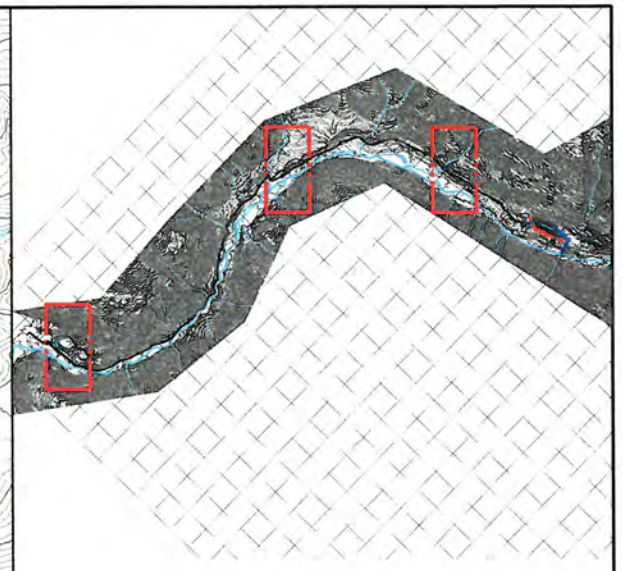
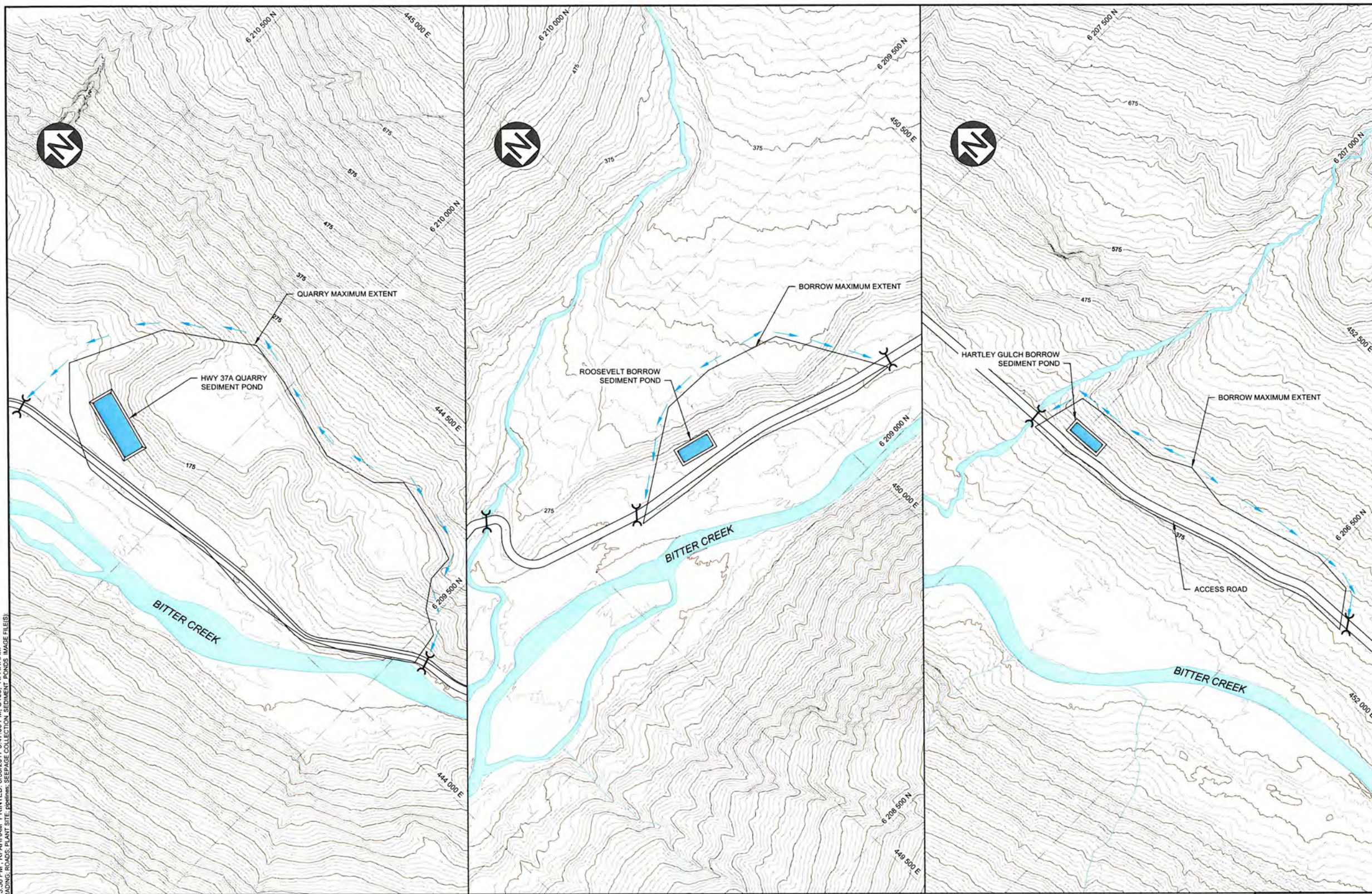
BROMLEY HUMPS TMF SOUTH TMF EMBANKMENT SEEPAGE COLLECTION POND PLAN AND SECTIONS

PIA NO. **VA101-594/4** DRAWING NO. **C106** REVISION **0**

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DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
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KEY PLAN
SCALE B

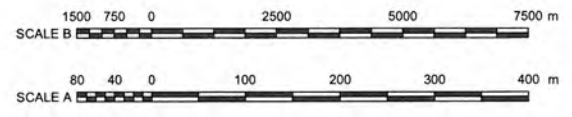
LEGEND:

- POND WATER
- EXISTING ROAD
- DIVERSION CHANNEL/DITCH
- CULVERT

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. PLANT SITE LOCATION QUARRY PROVIDED BY JDS MINING (MAY 2017).

FOR INFORMATION ONLY



PLAN
SCALE A

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Knight Piesold
CONSULTING

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

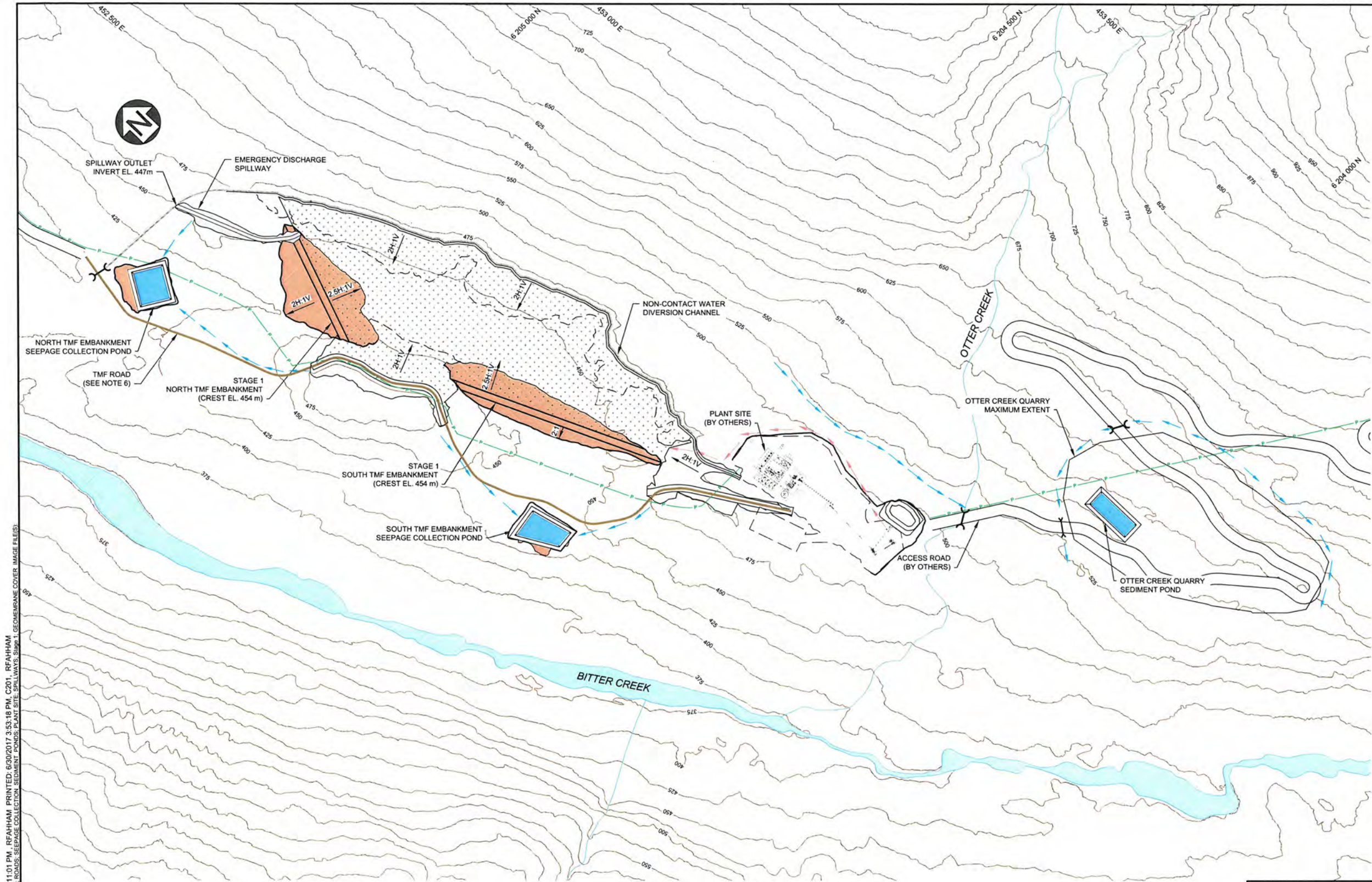
**BORROW AND QUARRY -
WATER MANAGEMENT STRUCTURES
PLAN**

<Original signed by>

J. FOGARTY
 # 44041
 BRITISH COLUMBIA

<Original signed by>

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS						
	REVISIONS						



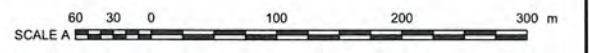
LEGEND:

- GEOMEMBRANE
- EMBANKMENT FILL
- WATER
- POWER LINE
- DIVERSION CHANNEL/DITCH
- CULVERT
- COLLECTION DITCH
- TMF ROAD

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
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5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
7. POWER LINE ALIGNMENT TO BE ADJUSTED BY JDS MINING.

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PLAN
SCALE A

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<Original signed by>

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PROFESSIONAL
 PROVINCE OF
 J. FOGARTY
 # 44041
 BRITISH

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Knight Piesold
CONSULTING

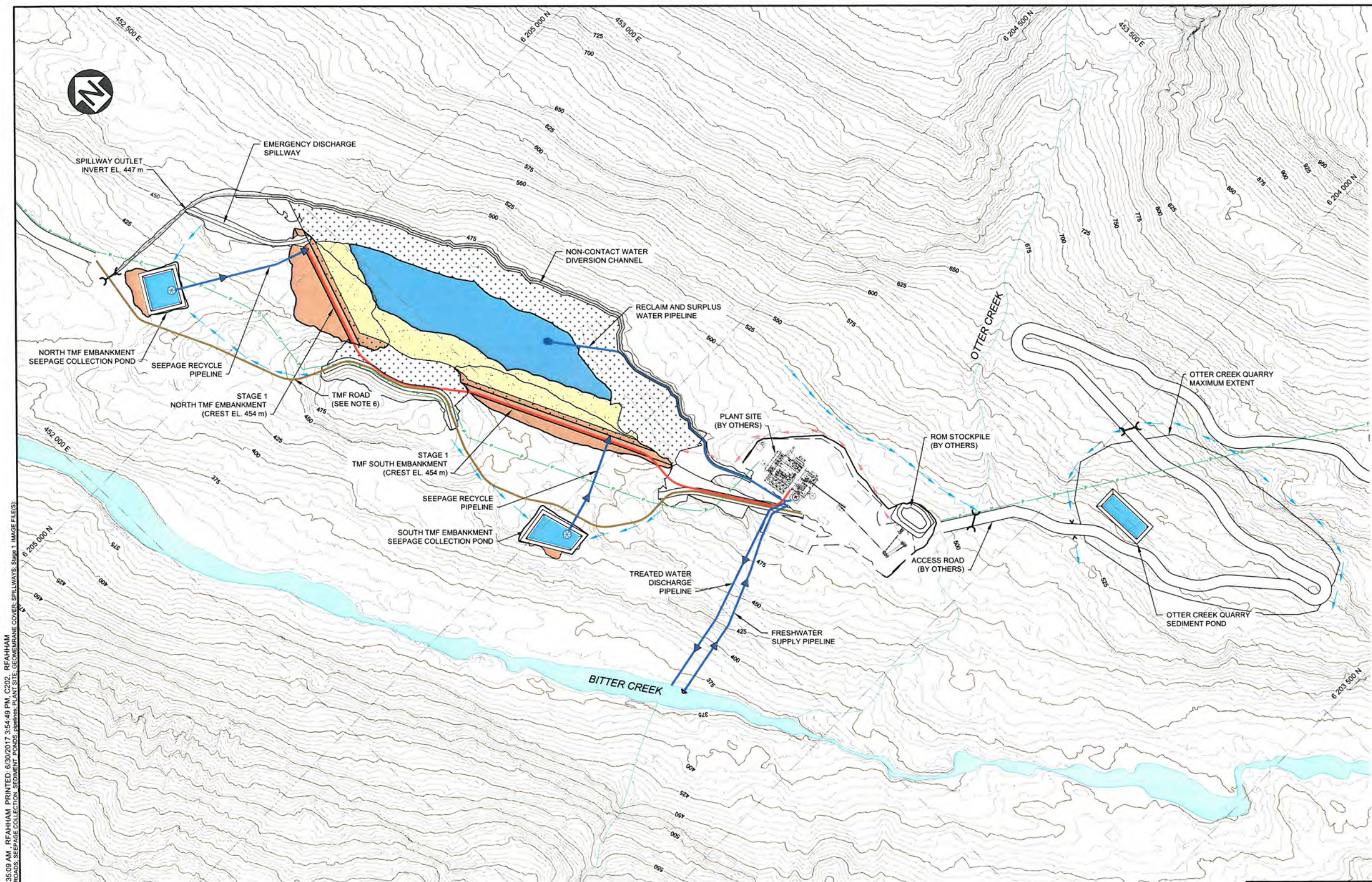
IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
STARTUP CONSTRUCTION END OF YEAR - 1**

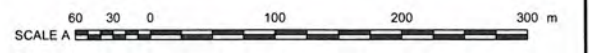
PIA NO. **VA101-594/4** DRAWING NO. **C201** REVISION **0**

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS							0	29JUN17	ISSUED WITH FEASIBILITY STUDY REPORT	JEF	RAF		
	REVISIONS									REVISIONS				



- LEGEND:**
- GEOMEMBRANE
 - WATER
 - EMBANKMENT FILL
 - TAILINGS
 - TAILINGS DELIVERY PIPELINE
 - WATER MANAGEMENT PIPELINE
 - FLOATING PUMP BARGE
 - PUMP
 - DIVERSION CHANNEL/DITCH
 - POWER LINE
 - CULVERT
 - COLLECTION DITCH
 - TMF ROAD
- NOTES:**
1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
 2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
 3. CONTOUR INTERVAL IS 5 METRES.
 4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
 6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS @JDS MINING.
 7. POWER LINE ALIGNMENT TO BE ADJUSTED BY JDS MINING.

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PLAN
SCALE A

SAVED: M:\110100594\04\A\GARD\WGS\C202\C202_6\30\2017 11:35:09 AM - RFAHAM PRINTED: 6/30/2017 3:54:49 PM, C202, RFAHAM
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PROFESSIONAL ENGINEER
 J. FOGARTY
 # 44041

<Original signed by>

Knicht Piesold
CONSULTING

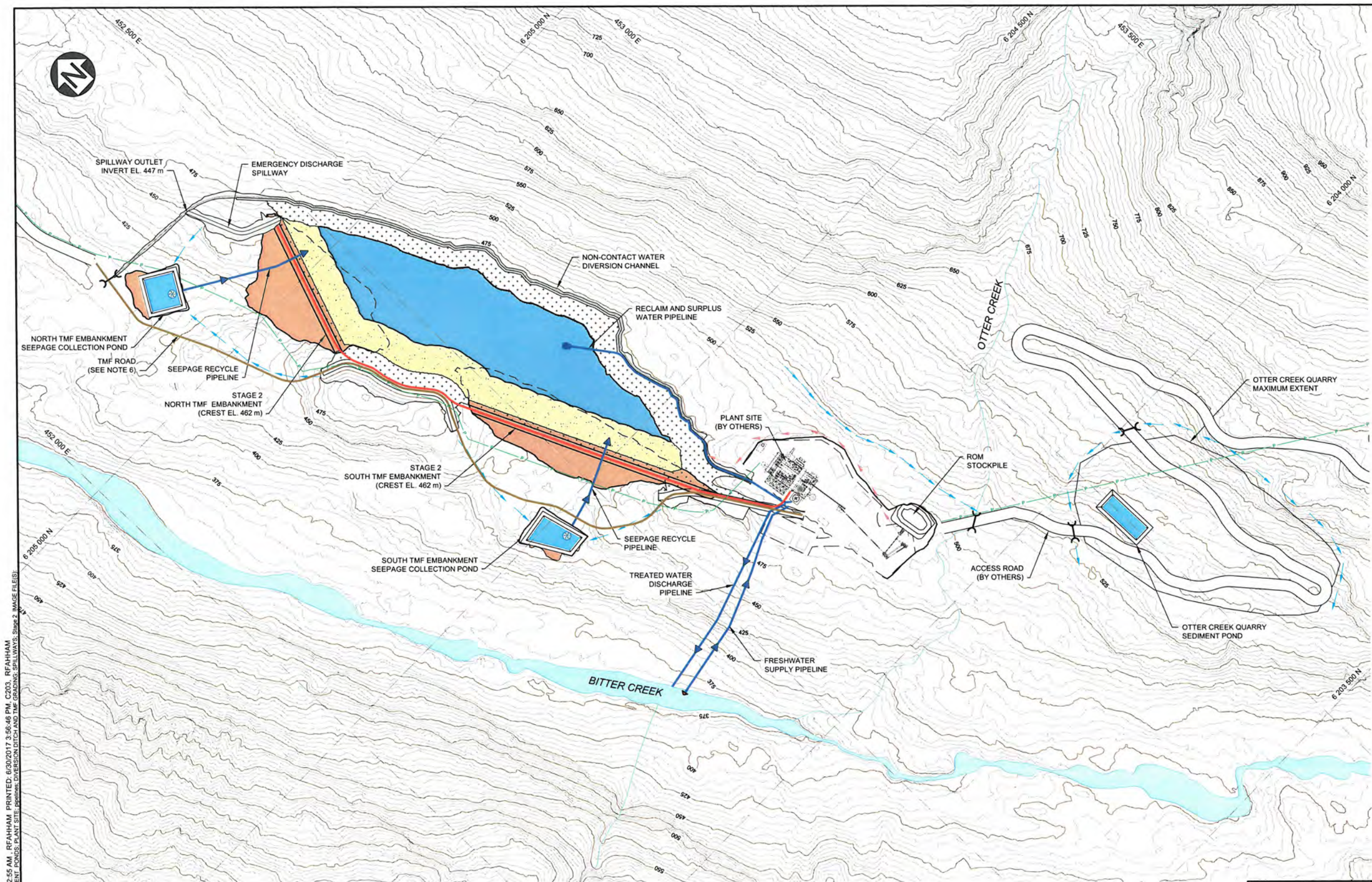
IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
STAGE 1 END OF YEAR 1**

PIA NO. **VA101-594/4** DRAWING NO. **C202** REVISION **0**

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS						
	REVISIONS						



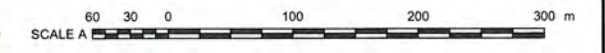
LEGEND:

- GEOMEMBRANE
- WATER
- EMBANKMENT FILL
- TAILINGS
- TAILINGS DELIVERY PIPELINE
- WATER MANAGEMENT PIPELINE
- FLOATING PUMP BARGE
- PUMP
- DIVERSION CHANNEL/DITCH
- POWER LINE
- CULVERT
- COLLECTION DITCH
- TMF ROAD

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
7. POWER LINE ALIGNMENT TO BE ADJUSTED BY JDS MINING.

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SAVED: M:\1100594\04\Acad\DWGS\C203\C203_6/30/2017 9:32:55 AM - RFAHAM PRINTED: 6/30/2017 3:56:46 PM - C203 - RFAHAM
 XREF FILE(S): CONTOURS - 5 m; LXD00; ROADS; SEEPAGE COLLECTION; SEDIMENT POND; PLANT SITE; DIVERSION DITCH AND TMF GRADING; SPILLWAYS; SHIP 2; IMAGE FILE(S)

**PLAN
SCALE A**

<Original signed by>

PROVINCIAL
OF ONTARIO

J. FOGARTY
44041

<Original signed by>

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS						
	REVISIONS						
	REVISIONS						

DISCLAIMER

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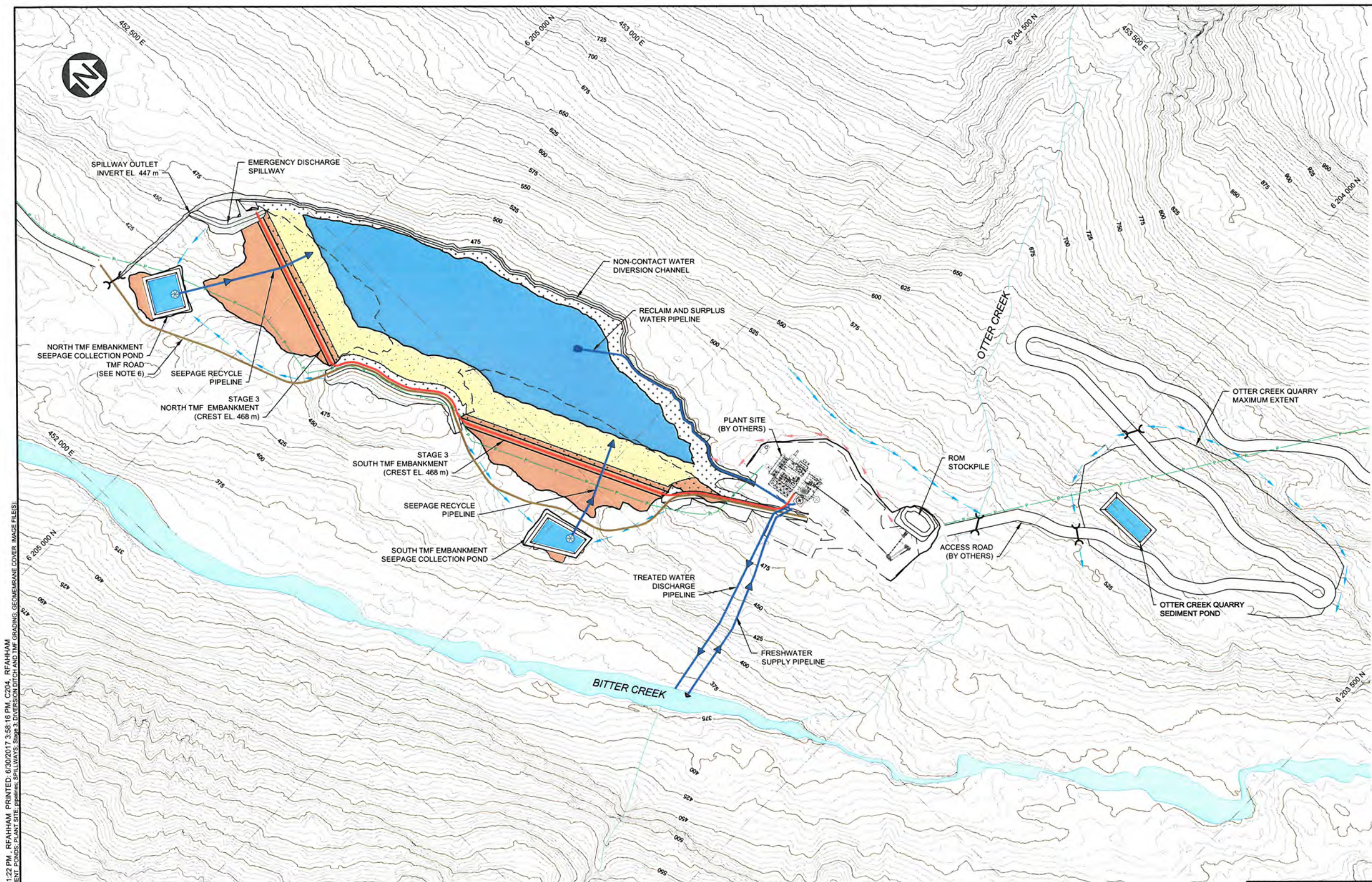
**Knight Piesold
CONSULTING**

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
STAGE 2 END OF YEAR 3**

PIA NO.	DRAWING NO.	REVISION
VA101-594/4	C203	0



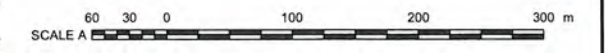
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- GEOMEMBRANE
- WATER
- EMBANKMENT FILL
- TAILINGS
- TAILINGS DELIVERY PIPELINE
- WATER MANAGEMENT PIPELINE
- FLOATING PUMP BARGE
- PUMP
- DIVERSION CHANNEL/DITCH
- POWER LINE
- CULVERT
- COLLECTION DITCH
- TMF ROAD

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
7. POWER LINE ALIGNMENT TO BE ADJUSTED BY JDS MINING.

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PLAN
SCALE A

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Knight Piesold

CONSULTING

IDM MINING LTD.

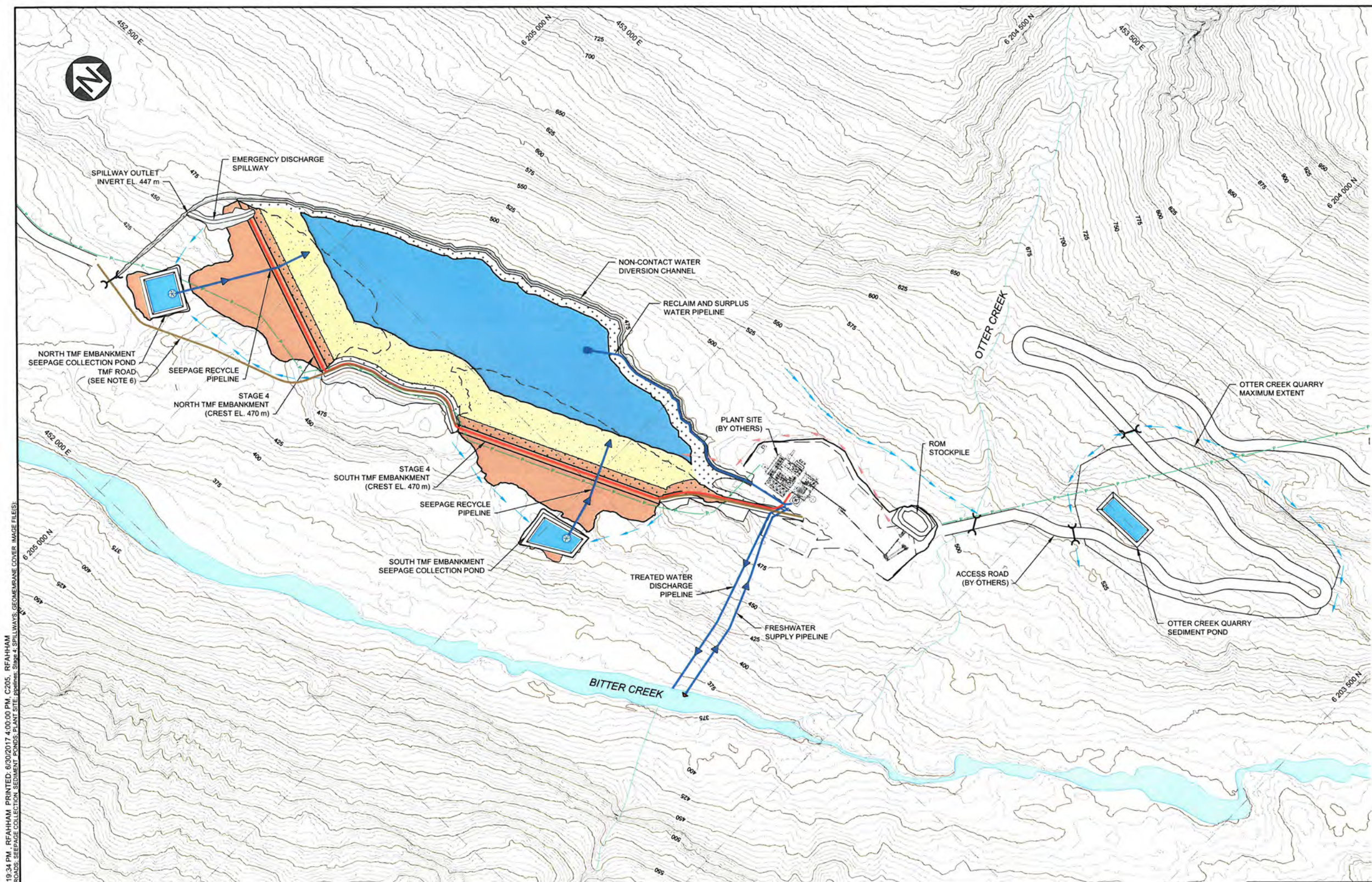
RED MOUNTAIN UNDERGROUND GOLD PROJECT

BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
STAGE 3 END OF YEAR 5

J. FOGARTY
 # 44041
 <Original signed by>

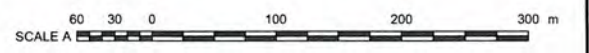
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DRG. NO.	DESCRIPTION	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS							
				REVISIONS				
				REVISIONS				



- LEGEND:**
- GEOMEMBRANE
 - WATER
 - EMBANKMENT FILL
 - TAILINGS
 - TAILINGS DELIVERY PIPELINE
 - WATER MANAGEMENT PIPELINE
 - FLOATING PUMP BARGE
 - PUMP
 - DIVERSION CHANNEL/DITCH
 - POWER LINE
 - CULVERT
 - COLLECTION DITCH
 - TMF ROAD
- NOTES:**
1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
 2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
 3. CONTOUR INTERVAL IS 5 METRES.
 4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
 6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
 7. POWER LINE ALIGNMENT TO BE ADJUSTED BY JDS MINING.

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**PLAN
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<Original signed by>

PROFESSIONAL
 ASSOCIATION OF
 ONTARIO
 J. FOGARTY
 # 44041
 <Original signed by>

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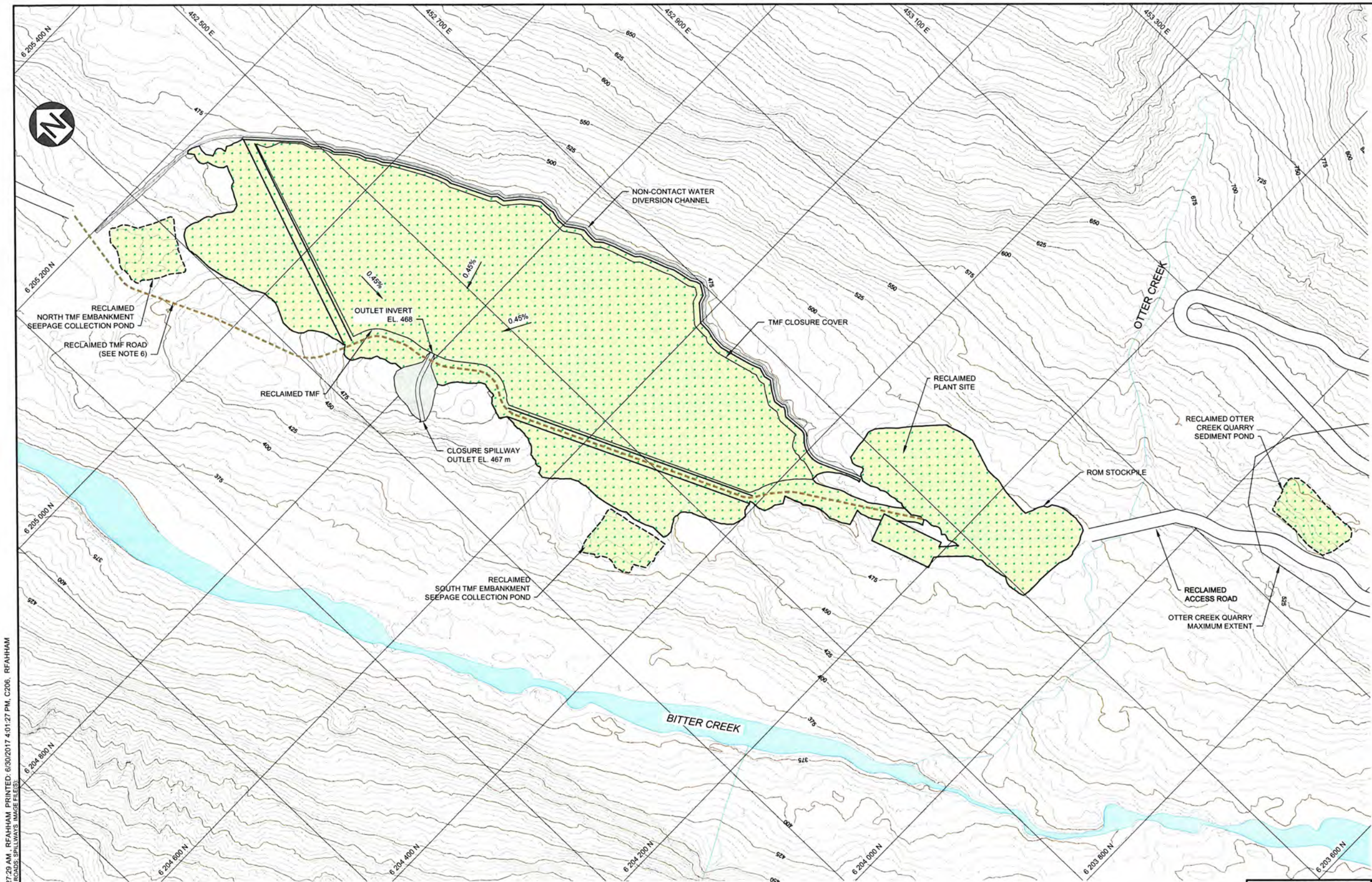
**Knight Piésold
CONSULTING**

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
STAGE 4 END OF YEAR 6**

PIA NO.	DRAWING NO.	REVISION
VA101-594/4	C205	0



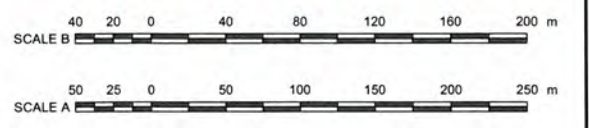
LEGEND:

- RECLAIMED AREA
- RECLAIMED ROAD

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).

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PLAN
SCALE A

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RED MOUNTAIN UNDERGROUND GOLD PROJECT

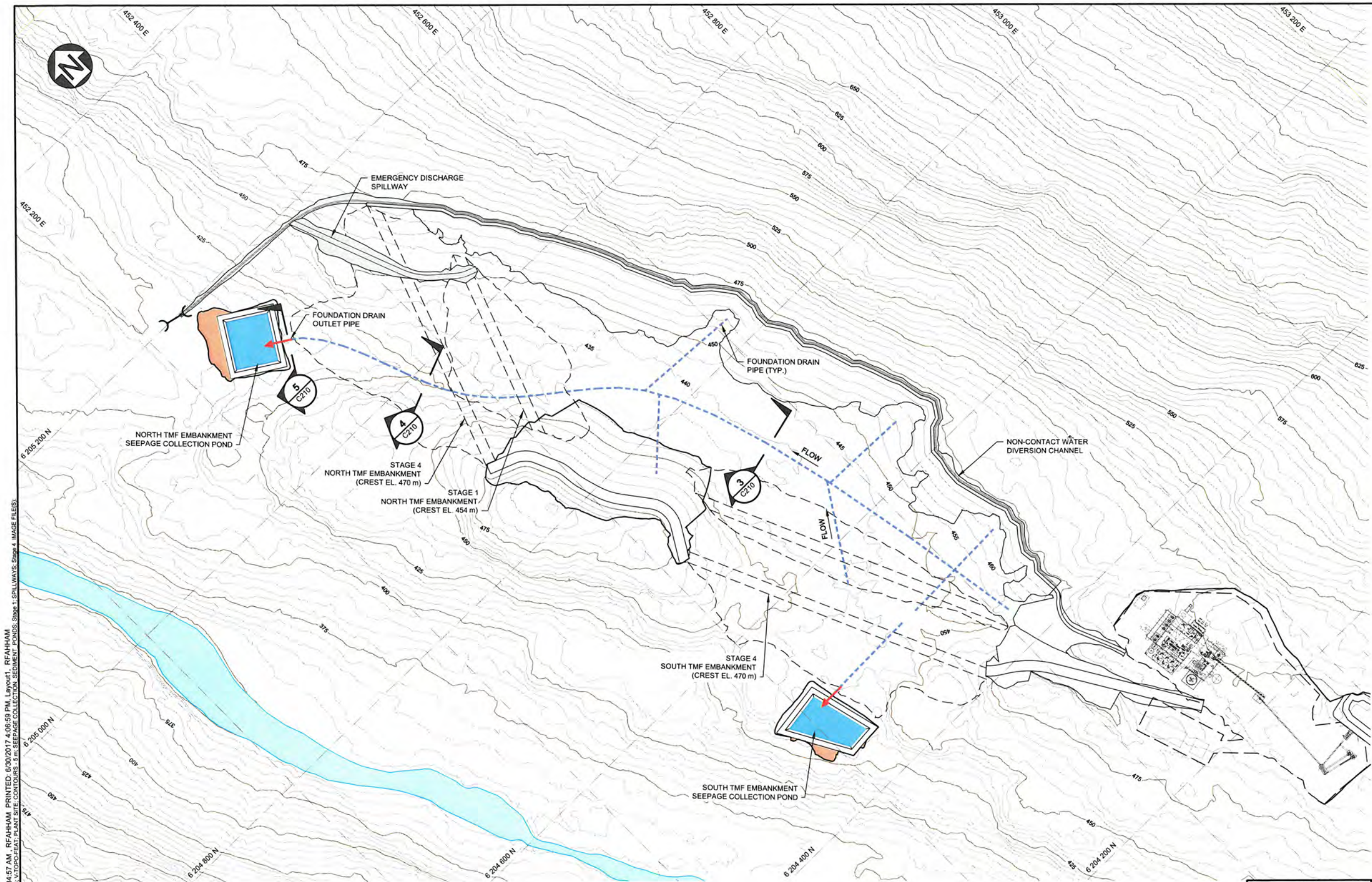
BROMLEY HUMPS TMF
GENERAL ARRANGEMENT
CLOSURE PLAN

J. FOGARTY
 # 44041
 <Original signed by>

<Original signed by>

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
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PIA NO. VA101-594/4	DRAWING NO. C206	REVISION 0
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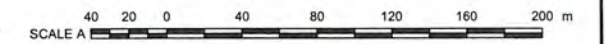
LEGEND:

- FOUNDATION DRAIN PIPE (BELOW GEOMEMBRANE)
- OUTLET PIPE
- CULVERT

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
3. CONTOUR INTERVAL IS 5 METRES.
4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

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**PLAN
FOUNDATION DRAIN**
SCALE A

DISCLAIMER
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IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

**BROMLEY HUMPS TMF
TMF FOUNDATION DRAIN
PLAN**

<Original signed by>

J. FOGARTY
44041
<Original signed by>

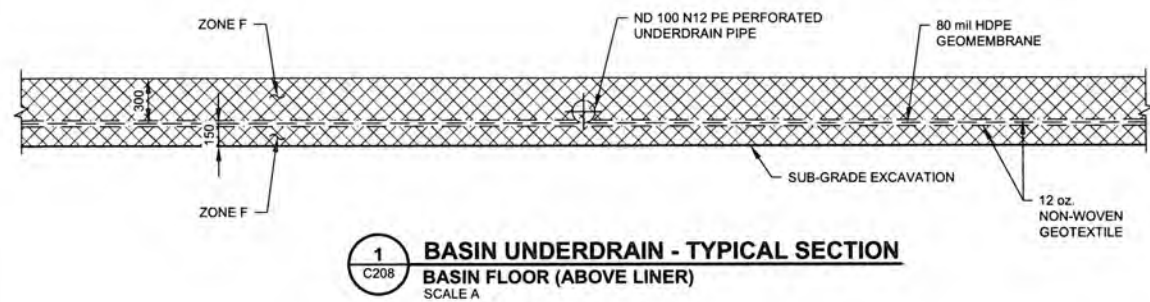
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C210	TMF BASIN UNDERDRAIN AND FOUNDATION DRAIN SYSTEMS - SECTIONS		
REFERENCE DRAWINGS			

DESIGNED	DRAWN	REVIEWED	APPROVED
REVISIONS			

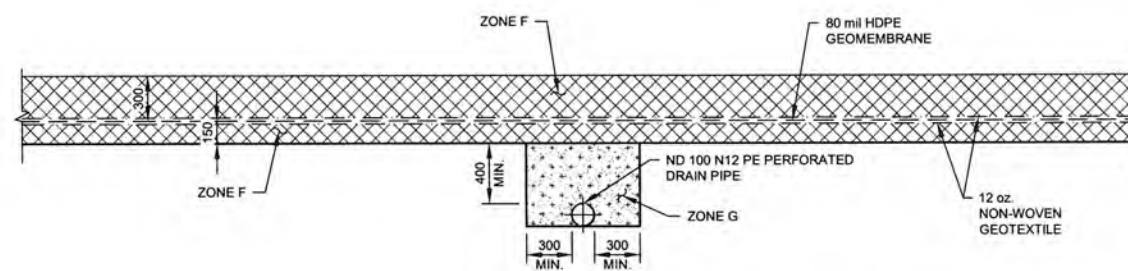
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0	29JUN'17	ISSUED WITH FEASIBILITY STUDY REPORT	JEF	RAF		
REVISIONS						

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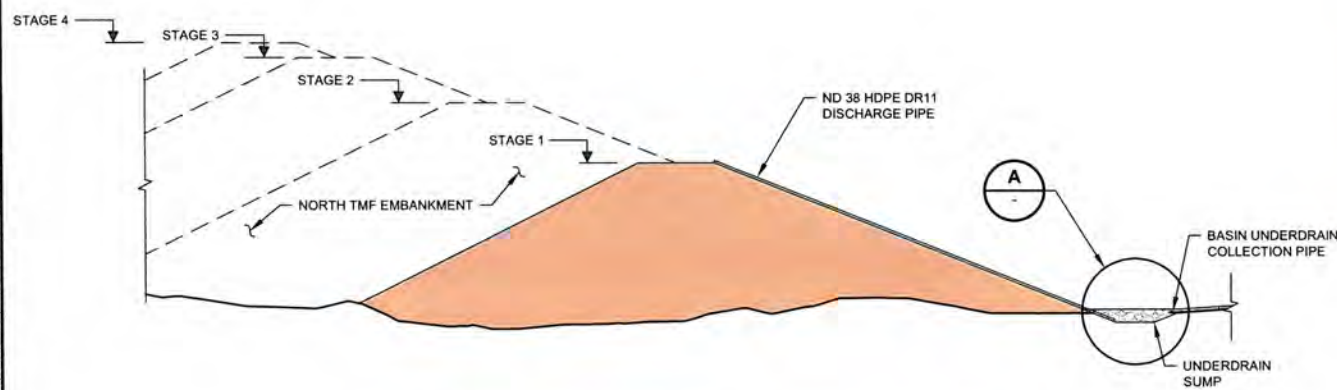
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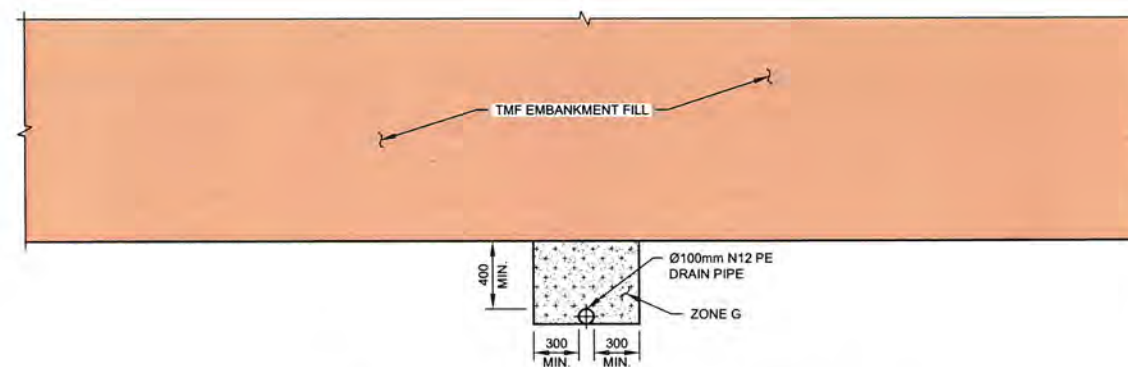
1 BASIN UNDERDRAIN - TYPICAL SECTION
 C208 BASIN FLOOR (ABOVE LINER)
 SCALE A



3 FOUNDATION DRAIN TRENCH - TYPICAL SECTION
 C209 BASIN FLOOR (BELOW LINER)
 SCALE A



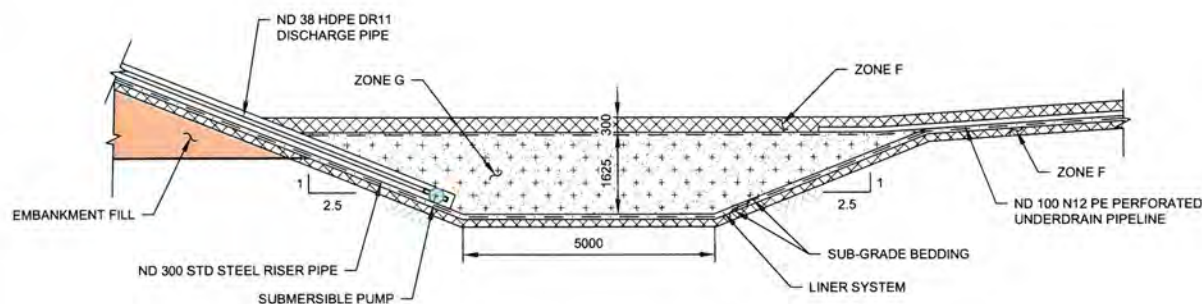
2 BASIN UNDERDRAIN PUMPBACK SYSTEM - SECTION
 C208 SCALE B



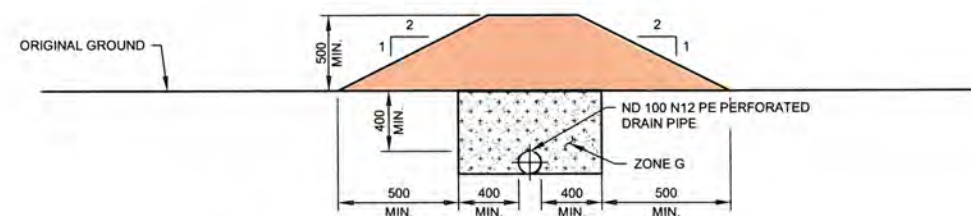
4 FOUNDATION DRAIN TRENCH - TYPICAL SECTION
 C209 BELOW EMBANKMENT FILL
 SCALE A

- LEGEND:**
- EMBANKMENT FILL
 - ZONE F - FILTER SAND
 - ZONE G - DRAIN GRAVEL
 - HDPE GEOMEMBRANE (SECTION)
 - GEOTEXTILE

- NOTES:**
1. ALL DIMENSION ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 2. ENSURE FOUNDATION DRAIN TRENCH IS CONTINUOUSLY GRADED DOWNWARD TOWARDS SEEPAGE COLLECTION POND.

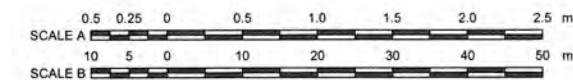


A UNDERDRAIN SUMP DETAIL
 NTS



5 FOUNDATION DRAIN - TYPICAL SECTION
 C209 OUTLET PIPE (NO OVERLYING EMBANKMENT FILL)
 SCALE A

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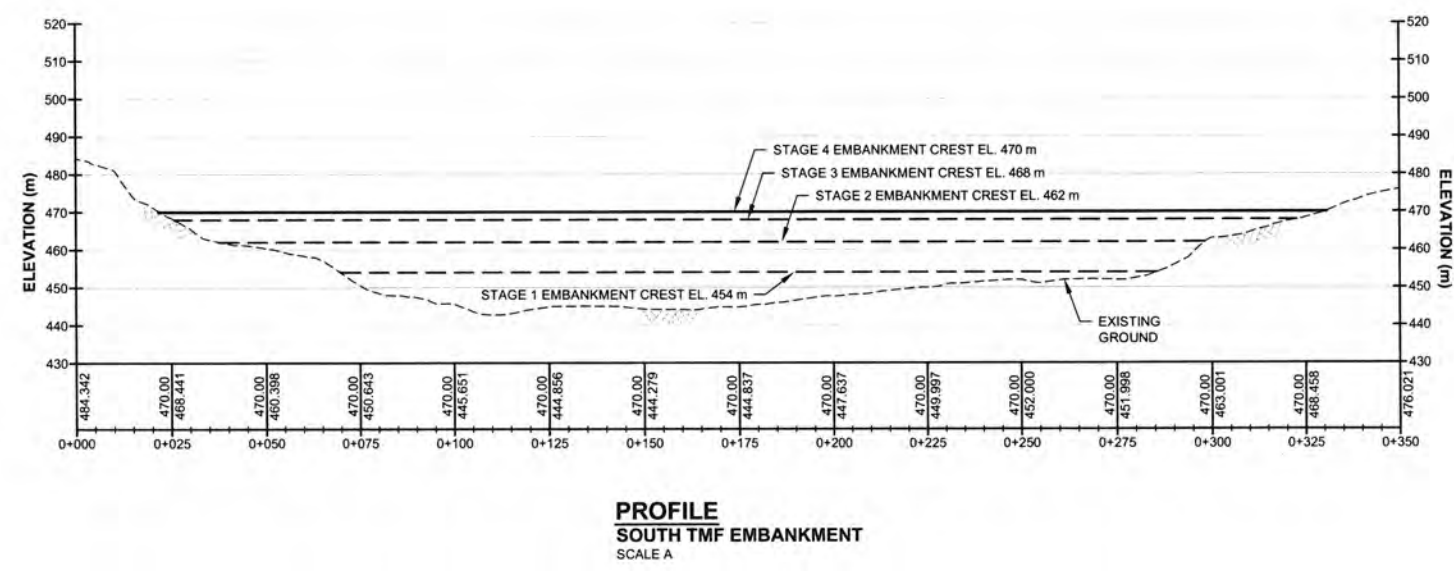
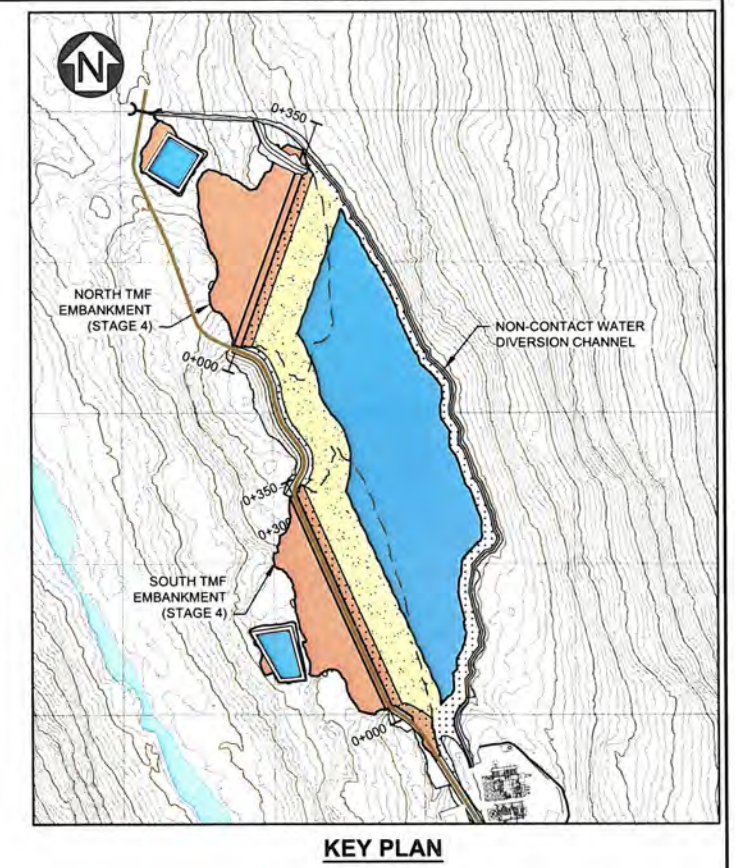
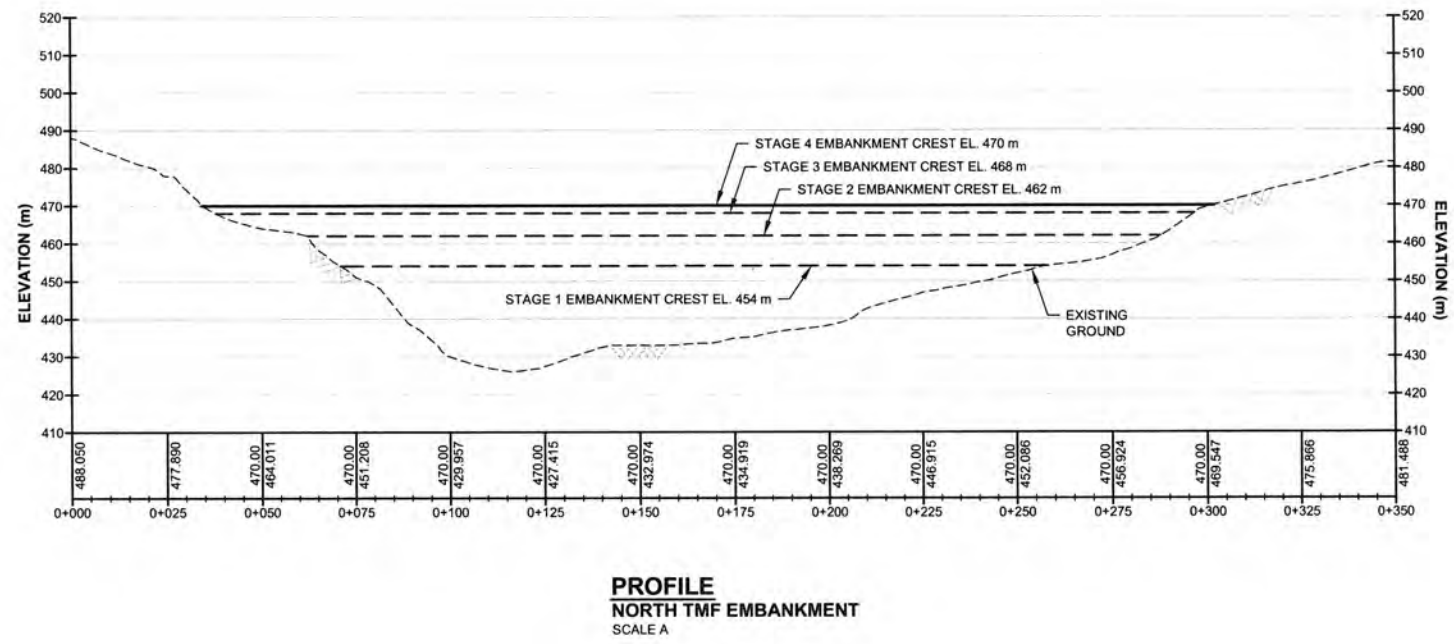
PROFESSIONAL
 J. FOGARTY
 # 44041
 <Original signed by>

Knight Piésold
 CONSULTING
 IDM MINING LTD.
 RED MOUNTAIN UNDERGROUND GOLD PROJECT
BROMLEY HUMPS TMF
TMF BASIN UNDERDRAIN AND
FOUNDATION DRAIN
SECTIONS AND DETAILS

R/A NO.	DRAWING NO.	REVISION
VA101-594/4	C210	0

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
	REFERENCE DRAWINGS						
	REVISIONS						

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SCALE A

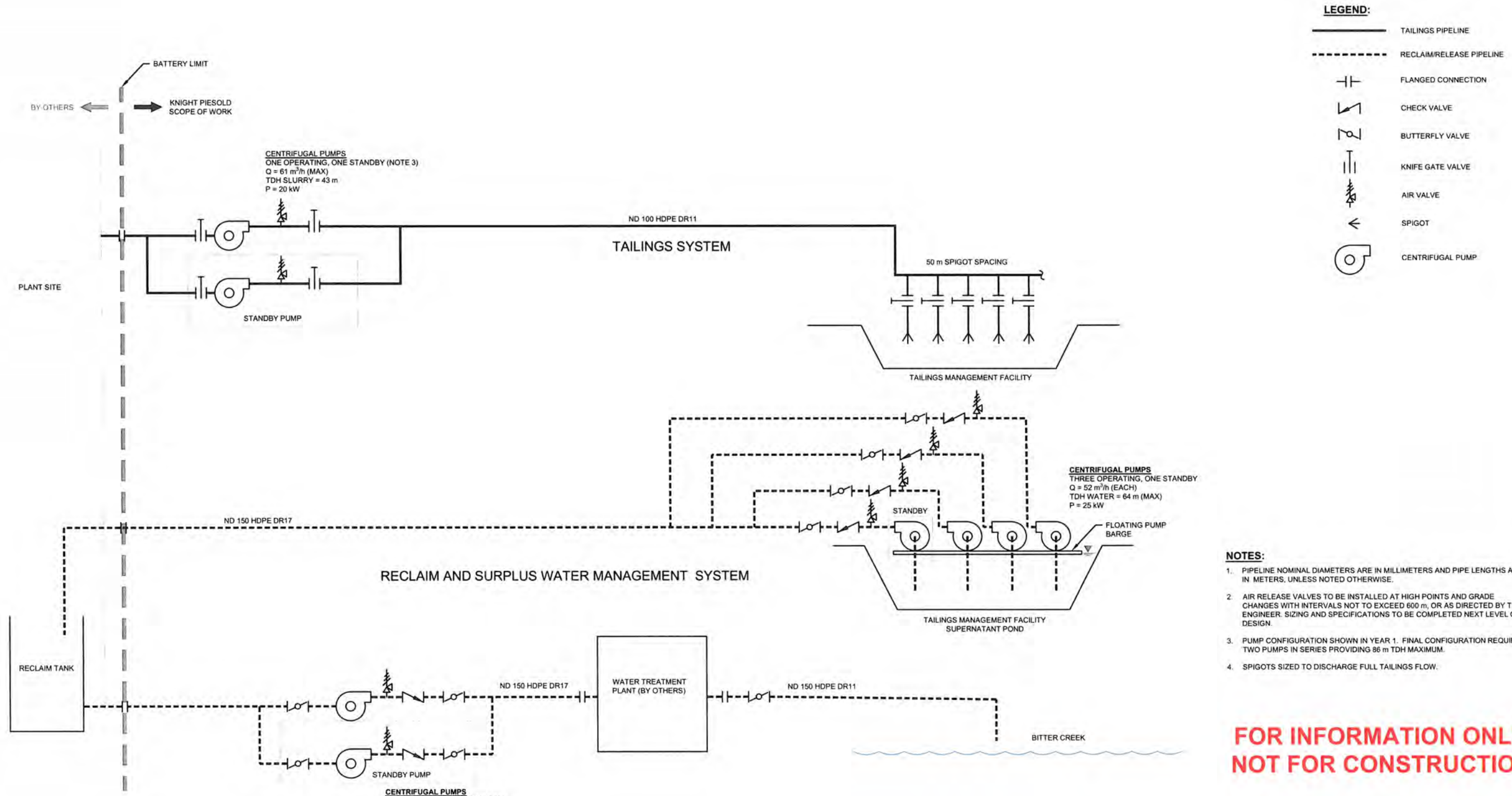
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J. FOGARTY
 # 44041
 <Original signed by>

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	REFERENCE DRAWINGS													
										REVISIONS				
										REVISIONS				

<p style="font-size: 0.8em;">- DISCLAIMER -</p> <p style="font-size: 0.6em;">THIS DRAWING WAS PREPARED BY KNIGHT PIESOLD LTD. FOR THE ACCOUNT OF THE CLIENT LISTED ON THIS DRAWING. THE MATERIAL ON IT REFLECTS KNIGHT PIESOLD'S BEST JUDGMENT IN THE LIGHT OF THE INFORMATION AVAILABLE TO IT AT THE TIME OF PREPARATION. ANY USE WHICH A THIRD PARTY MAKES OF THIS DRAWING OR ANY RELIANCE ON OR DECISIONS TO BE MADE BASED ON IT, ARE THE RESPONSIBILITY OF SUCH THIRD PARTIES. KNIGHT PIESOLD ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY THE THIRD PARTY AS A RESULT OF DECISIONS MADE OR ACTIONS BASED ON THIS DRAWING. COPIES RESULTING FROM ELECTRONIC TRANSFER OR REPRODUCTION OF THIS DRAWING ARE UNCONTROLLED AND MAY NOT BE THE MOST RECENT VERSION OF THIS DRAWING.</p>		
<p style="font-size: 1.2em; font-weight: bold;">Knight Piesold</p> <p style="font-size: 0.8em; font-weight: bold;">CONSULTING</p>		
<p style="font-weight: bold;">IDM MINING LTD.</p>		
<p style="font-weight: bold;">RED MOUNTAIN UNDERGROUND GOLD PROJECT</p>		
<p style="font-weight: bold;">BROMLEY HUMPS TMF TMF EMBANKMENT PROFILES</p>		
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Knight Piesold
CONSULTING

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

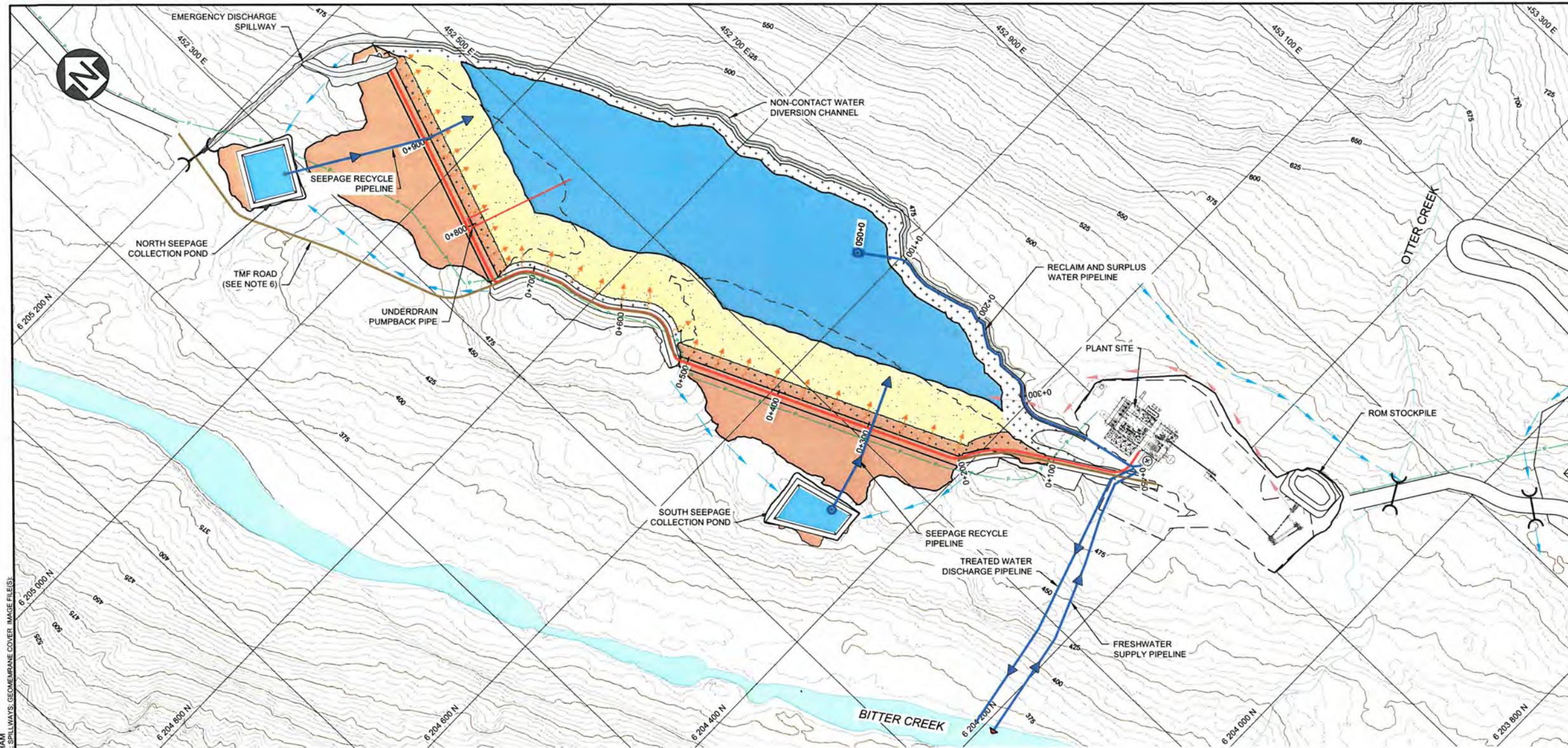
PROFESSIONAL
ENGINEER
OF
J. FOGARTY
44041

<Original signed by>

BROMLEY HUMPS TMF
TAILINGS, RECLAIM AND SURPLUS
WATER MANAGEMENT SYSTEMS
PIPING AND INSTRUMENTATION DIAGRAM

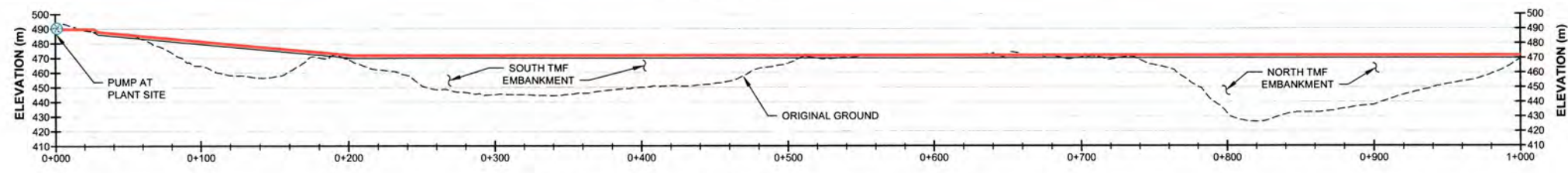
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VA101-594/4	M301	0

DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED	
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REFERENCE DRAWINGS				REVISIONS				REVISIONS							

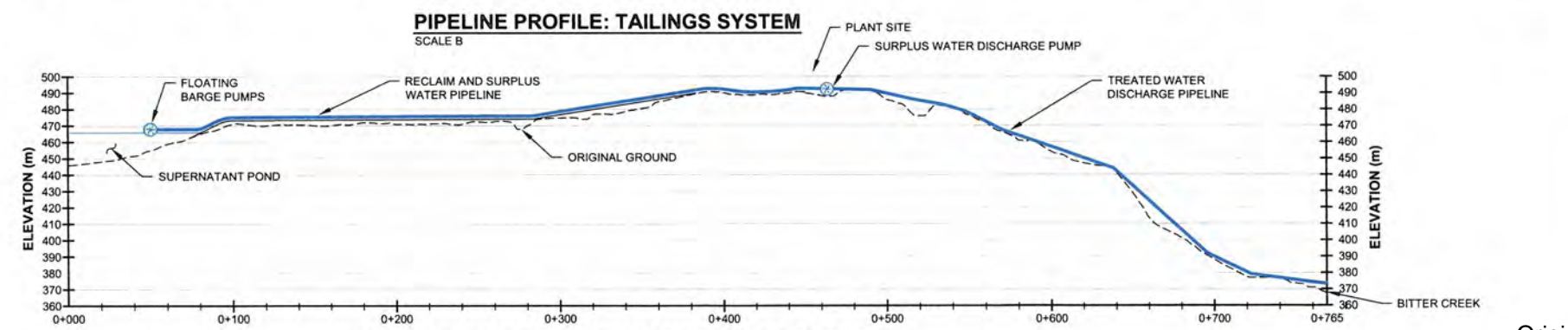
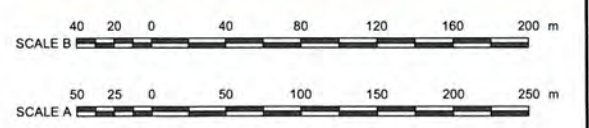


- LEGEND:**
- GEOMEMBRANE
 - WATER
 - EMBANKMENT FILL
 - TAILINGS
 - TAILINGS DELIVERY PIPELINE
 - WATER MANAGEMENT PIPELINE
 - FLOATING PUMP BARGE
 - PUMP
 - DIVERSION CHANNEL/DITCH
 - POWER LINE
 - TAILINGS SPIGOT
 - CULVERT
 - COLLECTION DITCH
 - TMF ROAD
- NOTES:**
1. COORDINATE GRID IS UTM NAD 83 ZONE 9.
 2. TOPO PROVIDED BY JDS MINING (JANUARY 2016).
 3. CONTOUR INTERVAL IS 5 METRES.
 4. ALL ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 5. PLANT SITE LOCATION PROVIDED BY JDS MINING (APRIL 2017).
 6. FINAL ROAD ALIGNMENT TO BE DESIGNED BY OTHERS (JDS MINING).
 7. PLANT SITE PIPE CONNECTIONS TO BE VERIFIED IN SUBSEQUENT STAGE OF DESIGN.
 8. AIR RELEASE VALVES TO BE INSTALLED AT HIGH POINTS AND GRADE CHANGES WITH INTERVALS NOT TO EXCEED 600 m OR AS DIRECTED BY THE ENGINEER. SIZING AND SPECIFICATIONS TO BE COMPLETED AT NEXT LEVEL OF DESIGN.

PLAN
SCALE A



**FOR INFORMATION ONLY
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PIPELINE PROFILE: RECLAIM PIPELINE AND SURPLUS WATER MANAGEMENT SYSTEM
SCALE B

<Original signed by>

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PROFESSIONAL
J. FOGARTY
44041

<Original signed by>

Knicht Piesold
CONSULTING

IDM MINING LTD.

RED MOUNTAIN UNDERGROUND GOLD PROJECT

BROMLEY HUMPS TMF TAILINGS, RECLAIM AND SURPLUS WATER MANAGEMENT SYSTEMS STAGE 4 PLAN AND PROFILE

PIA NO. **VA101-594/4** DRAWING NO. **M311** REVISION **0**

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DRG. NO.	DESCRIPTION	REV	DATE	DESIGNED	DRAWN	REVIEWED	APPROVED
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REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
0	29JUN'17	ISSUED WITH FEASIBILITY STUDY REPORT	JEF	RAF		
		REVISIONS				

APPENDIX 1-I

Access / Haul Road Design Drawings



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 0+000.0 to 1+280.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000	
Design Speed: 50 km/h	Min Curve Radius = 80m	Profile Vert Scale 1:400	Profile Horz Scale 1:2000
Design Speed: 30 km/h	Min Curve Radius = 35m	Formatted to Plot on 24"x36" Paper	
	Max Grade = 12%		
	Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface	Red Profile Subgrade
Blue Road Edges	Blue Fill into Riparian Zone	Green Cut / Fill limits	Green Original Ground
Green Cut / Fill limits	Red Fill into High Water	Black Bedrock	
Black Clearing Limits	Green Borrow Site		
Black Benchmark	Purple Waste Site		

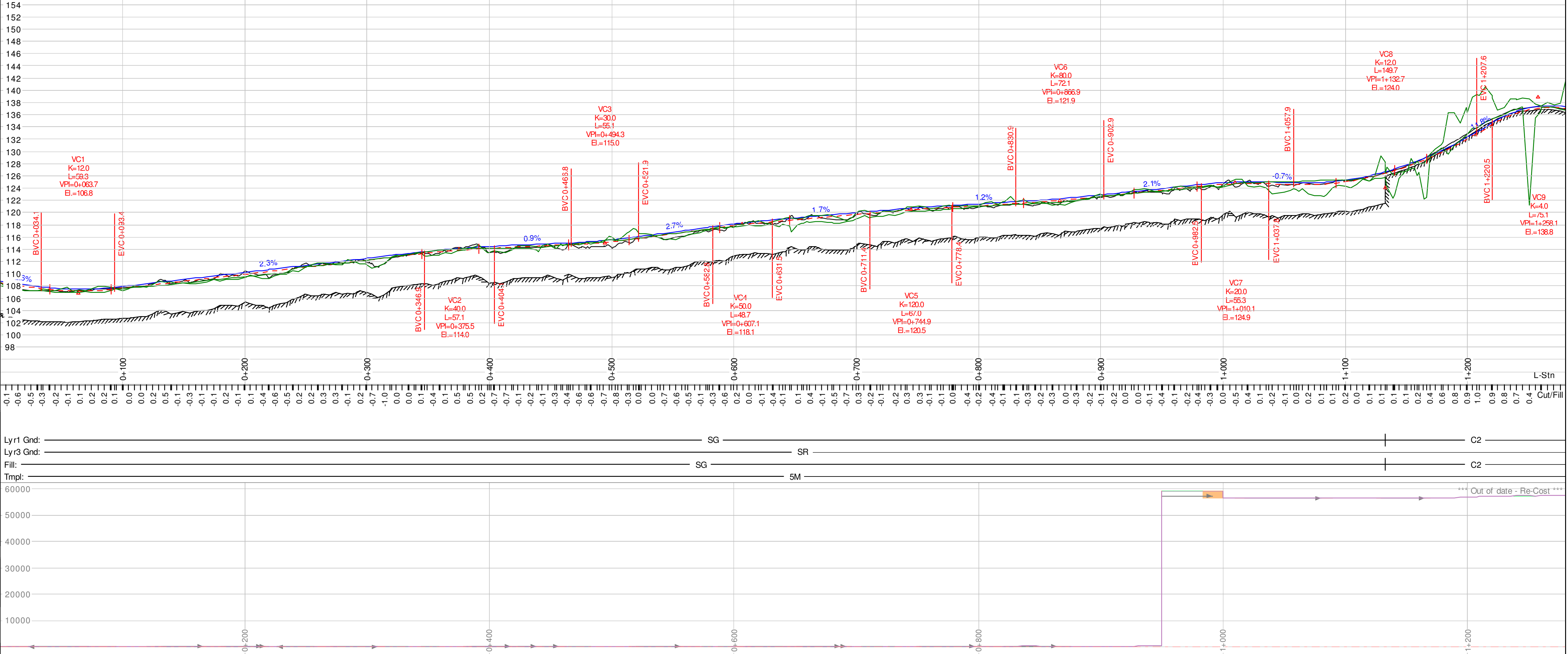
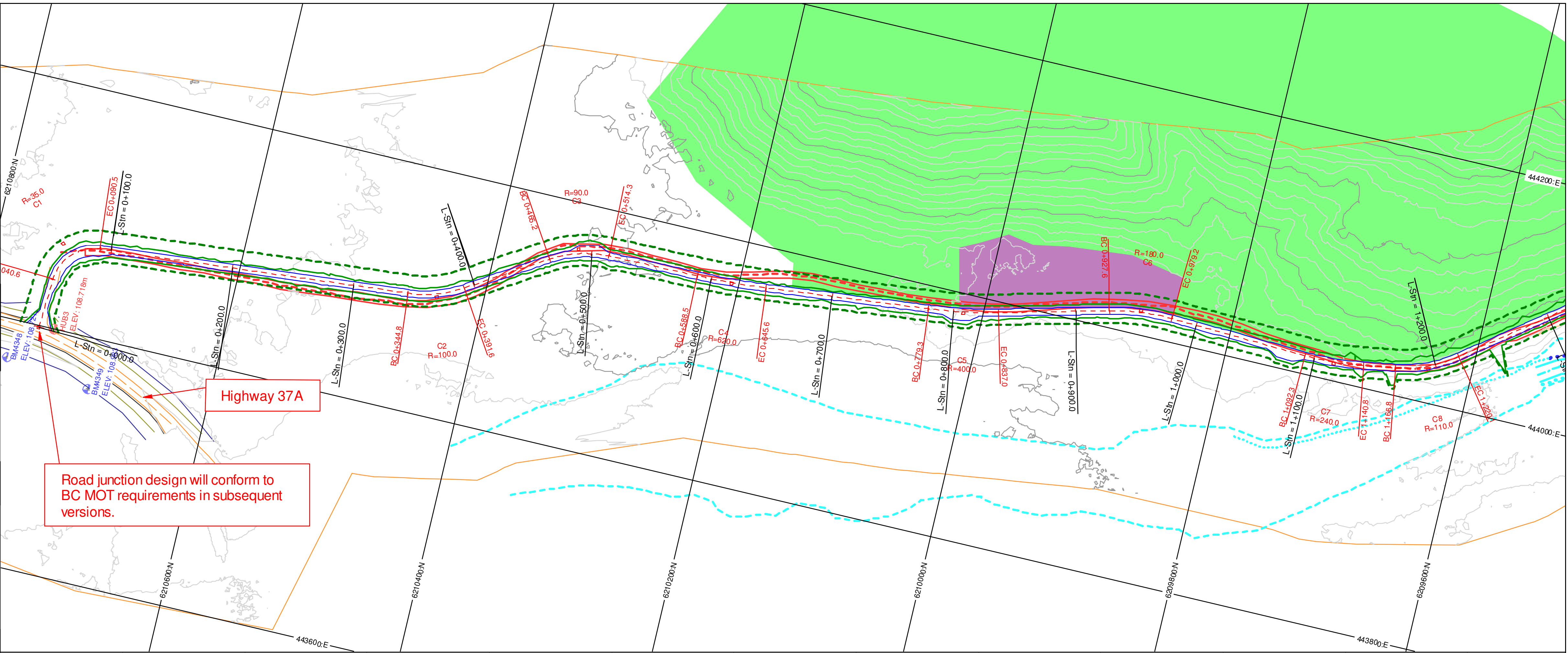
IP Stn	C1	C2	C3	C4	C5	C6	C7	C8
IP Stn	0+071	0+369	0+490	0+617	0+808	0+954	1+117	1+194
BC Stn	0+041	0+345	0+465	0+599	0+779	0+928	1+092	1+167
EC Stn	50	47	49	57	58	52	48	53
Radius	0+091	0+392	0+514	0+646	0+837	0+979	1+141	1+220
Angle	35	100	90	620	400	180	240	110
Tangent	82°	-27°	31°	-5°	-8°	16°	-12°	-28°
Da, a=100	30	24	25	29	29	26	24	27
	164°	57°	64°	9°	14°	32°	24°	52°

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
0+000.0	124.3	0.0	179.1	0.0	173.8		250.4
0+100.0	94.7	0.0	156.2	0.0	85.6		163.9
0+200.0	98.7	0.0	167.8	0.0	169.3		163.9
0+300.0	101.0	0.0	258.2	0.0	162.4		163.9
0+400.0	104.4	0.0	168.9	0.0	229.6		179.8
0+500.0							
Pg. Tot.	523.1	0.0	930.3	0.0	820.7		922.0
Cum. Tot.	523.1	0.0	930.3	0.0	820.7		922.0

Station	Structure	Notes
0+100.0	2.3m	
0+200.0	0.9m	
0+300.0	2.7m	
0+400.0	0.7m	
0+500.0	1.7m	
0+600.0	1.2m	
0+700.0	2.1m	
0+800.0	0.7m	
0+900.0	2.1m	
1+000.0	0.7m	
1+100.0	2.1m	
1+200.0	0.7m	

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 1+024.0 to 2+304.0

ROAD DESIGN SPECIFICATIONS	Plan Scale 1:2000
Design Speed: 50 km/h	Profile Vert Scale 1:400
Min Curve Radius = 80m	Profile Horz Scale 1:2000
Max Grade = 12%	Formatted to Plot on 24"x36" Paper
Design Speed: 30 km/h	
Min Curve Radius = 35m	
Max Grade = 18%	

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Fill into Riparian Zone	Finished Road Surface
— Road Edges	Fill into High Water	Profile Subgrade
— Cut / Fill limits	Borrow Site	Cut / Fill limits
— Cleaning Limits	Waste Site	Original Ground
⊕ Benchmark		Bedrock

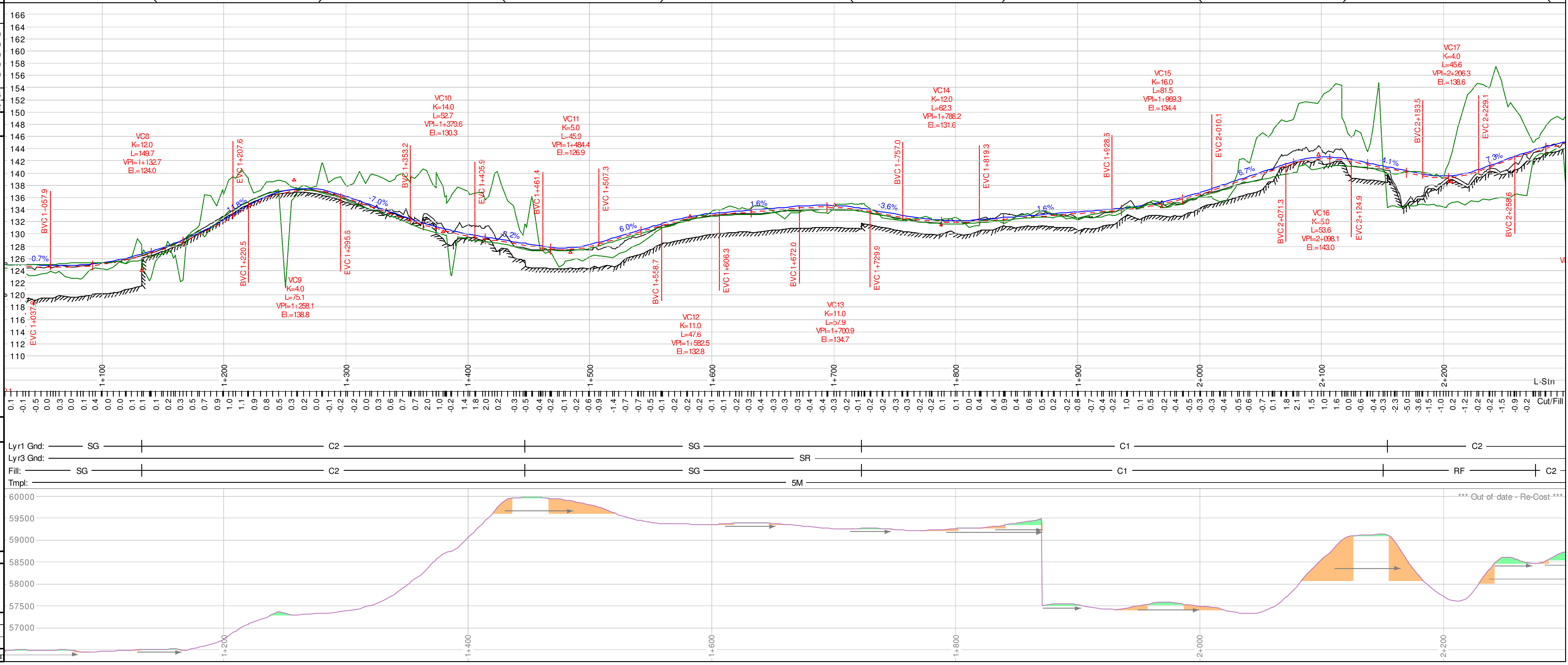
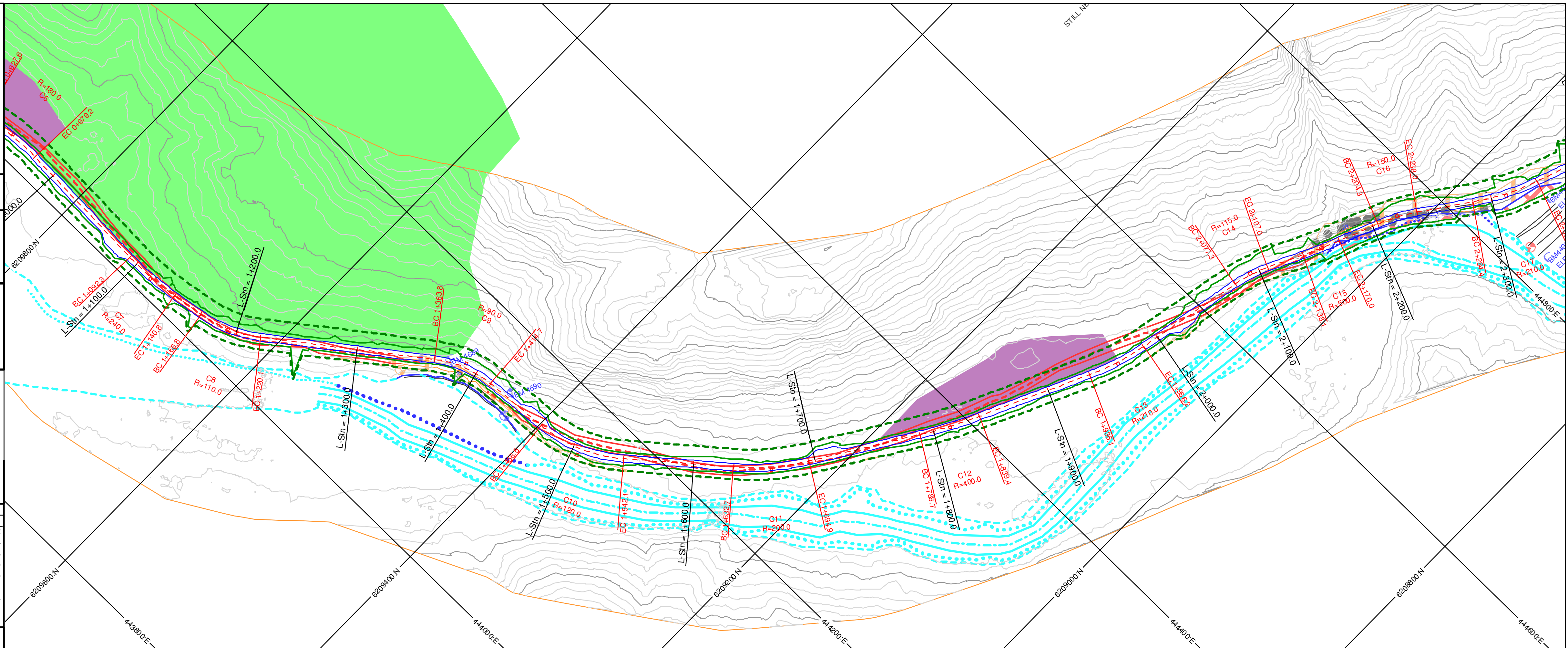
IP Stn.	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
BC Stn.	1+117	1+194	1+390	1+506	1+664	1+814	1+961	2+092	2+154	2+221	2+312
Arc Len.	48	53	51	74	62	51	50	30	32	34	56
EC Stn.	1+141	1+220	1+415	1+542	1+695	1+839	1+986	2+107	2+170	2+238	2+340
Radius	240	110	90	120	200	400	210	115	500	150	210
Angle	-12°	-28°	32°	-35°	-18°	-7°	-14°	15°	-4°	13°	-15°
Tangent	24	27	26	38	31	25	25	15	16	17	28
Da, a=100	24°	52°	64°	48°	29°	14°	14°	50°	11°	38°	27°

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
1+100.0	109.0	0.0	216.3	136.3	83.8		163.9
1+200.0	117.4	0.0	272.5	556.2	172.0		163.9
1+300.0	118.1	0.0	513.4	1288.0	140.2		163.9
1+400.0	243.2	0.0	635.7	435.2	321.1		191.0
1+500.0	99.6	0.0	64.8	0.0	509.8		163.9
Pg. Tot.	687.4	0.0	1702.7	2415.7	1226.8		846.6
Cum. Tot.	1827.3	0.0	3858.8	2415.7	3118.9		2817.2

Culvert ID	Start Stn	End Stn	Structure
VC8	1+149.7	1+149.7	K=120, L=149.7, VPI=1+132.7, EI=124.0
VC9	1+281.1	1+281.1	K=4.0, L=75.1, VPI=1+281.1, EI=138.8
VC10	1+379.6	1+379.6	K=14.0, L=52.7, VPI=1+379.6, EI=130.3
VC11	1+484.4	1+484.4	K=5.0, L=45.9, VPI=1+484.4, EI=126.9
VC12	1+582.5	1+582.5	K=11.0, L=47.6, VPI=1+582.5, EI=132.8
VC13	1+700.9	1+700.9	K=11.0, L=57.9, VPI=1+700.9, EI=134.7
VC14	1+788.2	1+788.2	K=12.0, L=62.3, VPI=1+788.2, EI=131.6
VC15	1+999.3	1+999.3	K=16.0, L=61.5, VPI=1+999.3, EI=134.4
VC16	2+088.1	2+088.1	K=5.0, L=33.6, VPI=2+088.1, EI=143.0
VC17	2+206.3	2+206.3	K=4.0, L=45.6, VPI=2+206.3, EI=138.6

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MRI = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	BRBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 2+048.0 to 3+328.0

ROAD DESIGN SPECIFICATIONS	
Design Speed: 50 km/h	Min Curve Radius = 80m
	Max Grade = 12%
Design Speed: 30 km/h	Min Curve Radius = 35m
	Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000
Formatted to Plot on 24"x36" Paper

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

Plan Legend (all may not be applicable)

- - - L-line Location
- Road Edges
- Cut / Fill limits
- Clearing Limits
- ⊕ Benchmark
- R.O.W. in Riparian Zone
- Fill into Riparian Zone
- Fill into High Water
- Borrow Site
- Waste Site
- Finished Road Surface
- Profile Subgrade
- Cut / Fill limits
- Original Ground
- Bedrock

IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)									
	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23
2+092	2+154	2+221	2+312	2+524	2+722	2+797	2+887	3+144	3+294	
2+077	2+138	2+204	2+284	2+481	2+692	2+773	2+862	3+119	3+256	
30	32	34	56	86	61	48	50	51	76	
2+107	2+170	2+238	2+340	2+567	2+753	2+821	2+911	3+170	3+332	
115	500	150	210	9000	4000	150	100	250	200	
15°	-4°	13°	-15°	-1°	1°	-18°	28°	-12°	-22°	
15	16	17	28	43	30	24	25	25	39	
50°	11°	38°	27°	1°	38°	57°	23°	29°		

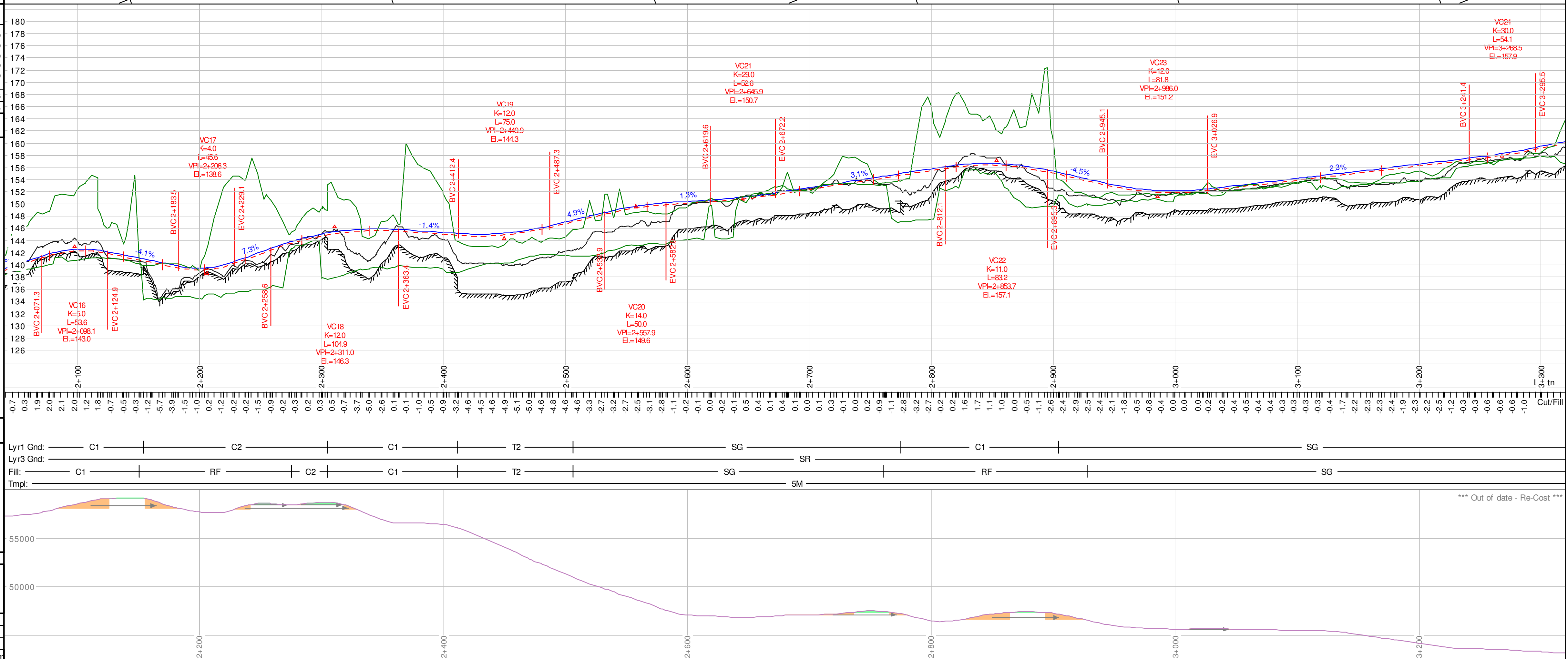
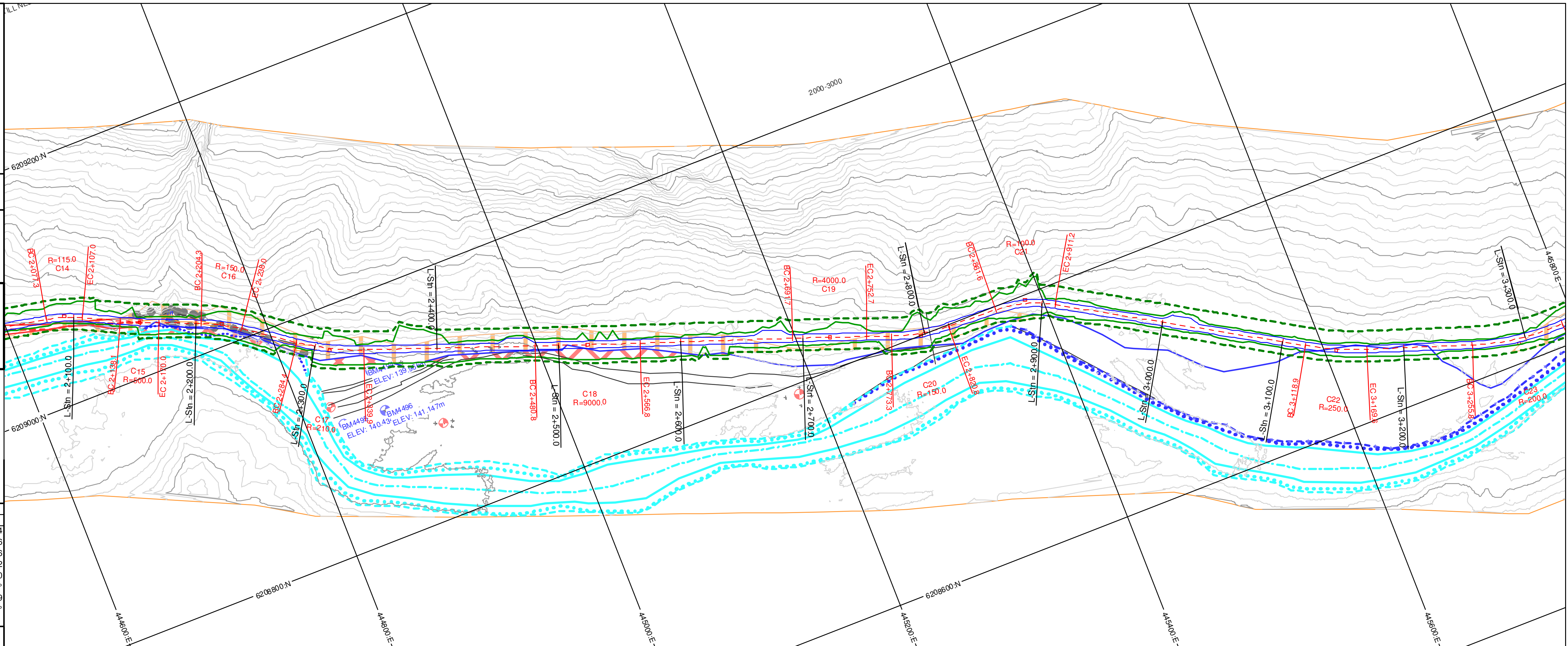
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn m.	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
2+100.0	167.3	0.0	537.8	233.7	1605.5	163.9
2+200.0	274.2	0.0	370.6	2183.4	1540.8	163.9
2+300.0	209.0	0.0	892.1	32.7	3201.8	163.9
2+400.0	190.1	0.0	37.0	0.0	5137.3	190.9
2+500.0	315.1	0.0	38.6	0.0	4279.1	163.9
Pg. Tot.	1155.7	0.0	1876.2	2449.9	15764.6	846.6
Cum. Tot.	3499.3	0.0	7373.7	5420.3	19996.1	4537.4

CULVERT TABLE

Station	Structure	Notes
2+071.3	BVC 2+071.3	
2+071.3	VC16	K=5.0, L=53.6, VPI=2+138.1, EI=143.0
2+124.9	EVC 2+124.9	
2+133.5	BVC 2+133.5	
2+229.1	EVC 2+229.1	
2+363.4	EVC 2+363.4	
2+363.4	VC18	K=12.0, L=104.9, VPI=2+311.0, EI=146.3
2+412.4	BVC 2+412.4	
2+487.3	EVC 2+487.3	
2+516.6	BVC 2+516.6	
2+572.2	EVC 2+572.2	
2+616.6	VC20	K=14.0, L=50.0, VPI=2+557.9, EI=149.6
2+812.2	BVC 2+812.2	
2+863.3	EVC 2+863.3	
2+945.1	BVC 2+945.1	
2+945.1	VC22	K=11.0, L=83.2, VPI=2+883.7, EI=157.1
3+026.9	EVC 3+026.9	
3+241.4	BVC 3+241.4	
3+241.4	VC24	K=30.0, L=54.1, VPI=3+288.5, EI=157.9
3+295.5	EVC 3+295.5	

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 3+072.0 to 4+352.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h		
Min Curve Radius = 80m		
Max Grade = 12%		
Design Speed: 30 km/h		
Min Curve Radius = 35m		
Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Fill into Riparian Zone	Finished Road Surface
— Road Edges	Fill into High Water	Profile Subgrade
- - - Cut / Fill limits	Borrow Site	Cut / Fill limits
- - - Clearing Limits	Waste Site	Original Ground
⊕ Benchmark		Bedrock

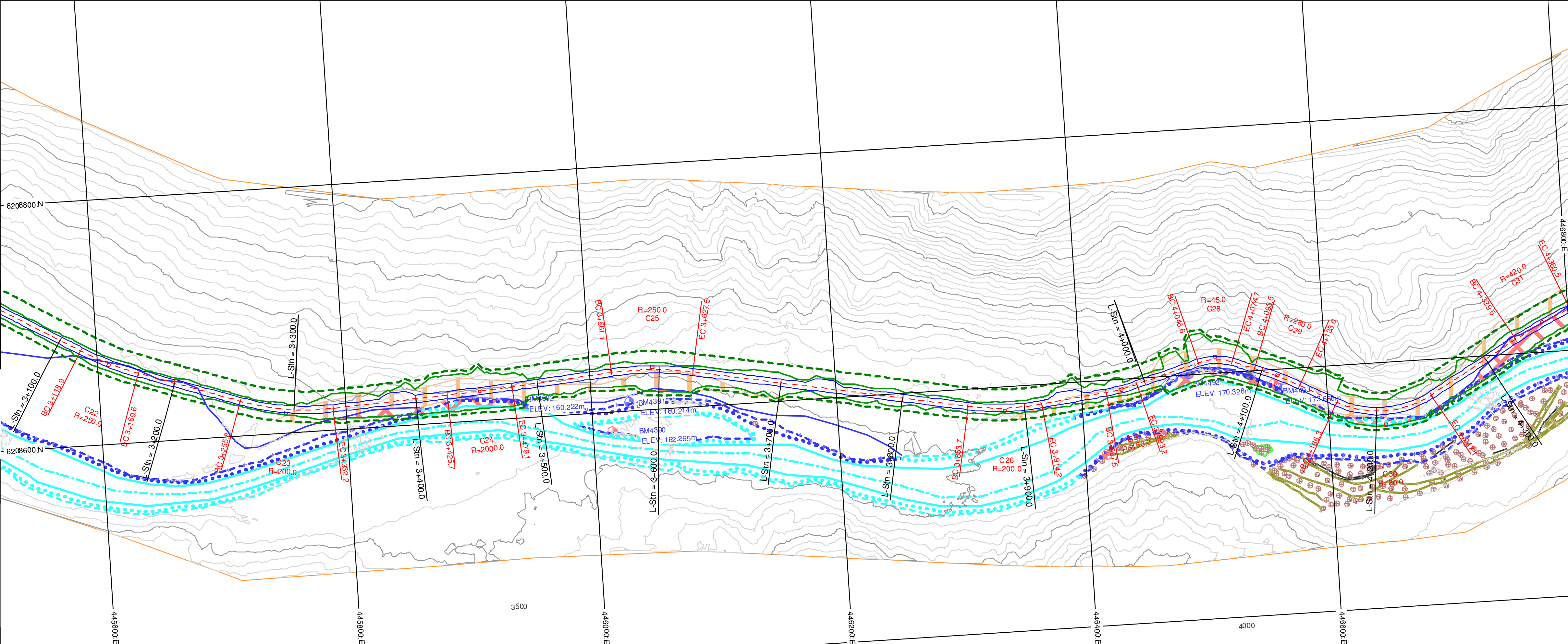
IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)									
	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31
BC Stn.	3+119	3+256	3+426	3+561	3+854	3+968	4+047	4+094	4+166	4+330
Arc. Len.	51	76	53	66	26	28	39	81	51	51
EC Stn.	3+170	3+332	3+479	3+626	3+914	3+993	4+075	4+133	4+247	4+380
Radius	250	200	2000	250	200	160	45	280	80	420
Angle	-12°	-22°	-2°	15°	-17°	-9°	36°	8°	-58°	7°
Tangent	25	39	27	33	30	13	15	20	44	26
Da, a=100	23°	29°	3°	23°	29°	36°	127°	20°	72°	14°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
3+100.0	100.1	0.0	14.9	0.0	1318.4	163.9
3+200.0	88.8	0.0	8.5	0.0	873.9	163.9
3+300.0	240.0	0.0	1077.7	263.8	1962.5	190.9
3+400.0	504.8	0.0	1730.5	203.0	3215.7	163.9
3+500.0	182.1	0.0	247.7	0.0	3076.0	163.9
Pg. Tot.	1115.8	0.0	3079.3	466.9	10446.4	846.6
Cum. Tot.	5359.4	0.0	12793.4	6202.2	34590.7	6257.6

CULVERT TABLE	
L-Stn	Notes
3+214.4	VC24 K=30.0 L=54.1 VPI=3+283.5 EI=157.9
3+265.5	VC25 K=120.0 L=39.8 VPI=3+445.3 EI=165.9
3+465.5	VC26 K=15.0 L=64.2 VPI=3+570.7 EI=170.9
3+909.2	VC27 K=4.0 L=37.3 VPI=3+927.9 EI=172.1
3+946.5	VC28 K=3.0 L=28.4 VPI=3+988.4 EI=178.9
4+110.3	VC29 K=42.0 L=51.4 VPI=4+136.0 EI=180.0

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 4+096.0 to 5+376.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h		
Min Curve Radius = 80m		
Max Grade = 12%		
Design Speed: 30 km/h		ISSUED FOR ENVIRONMENTAL ASSESSMENT. NOT FOR CONSTRUCTION.
Min Curve Radius = 35m		
Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Fill into Riparian Zone	Finished Road Surface
— Road Edges	Fill into High Water	Profile Subgrade
— Cut / Fill limits	Borrow Site	Cut / Fill limits
- - - Clearing Limits	Waste Site	Original Ground
⊙ Benchmark		Bedrock

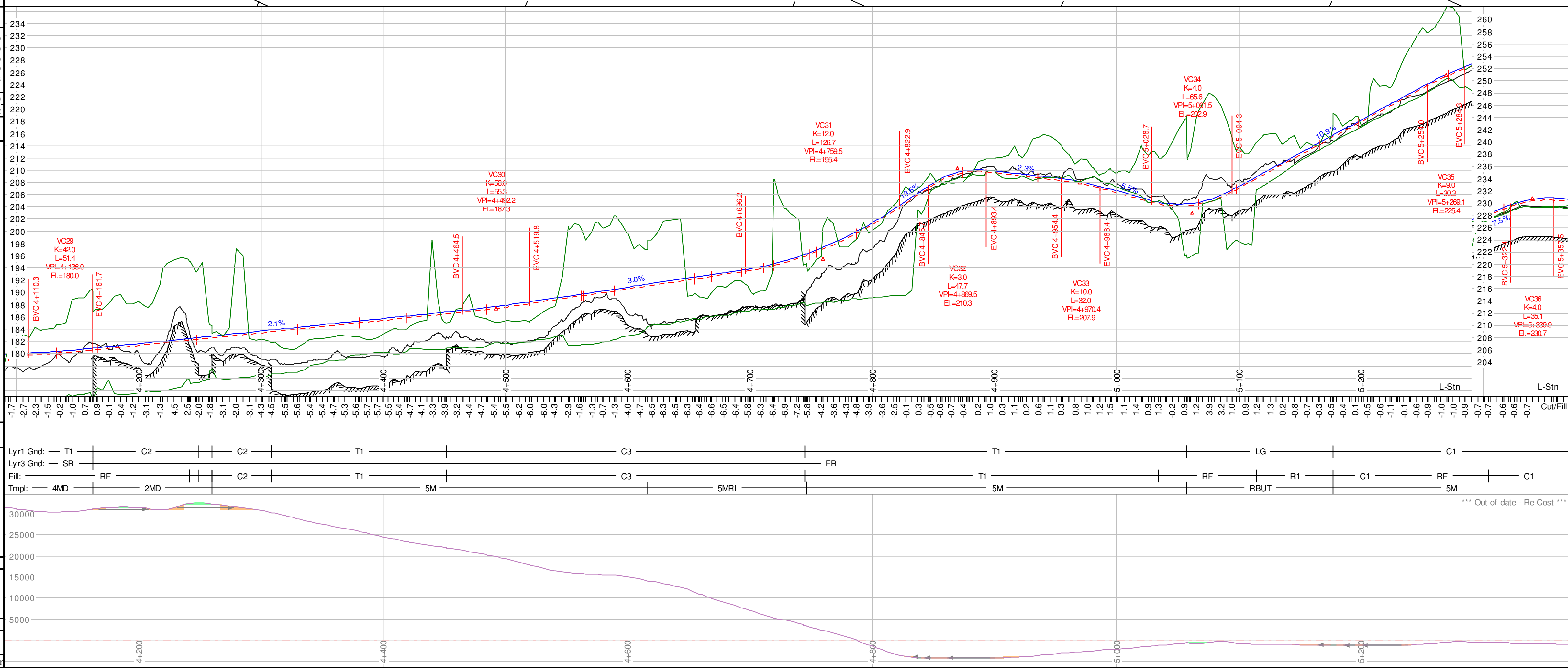
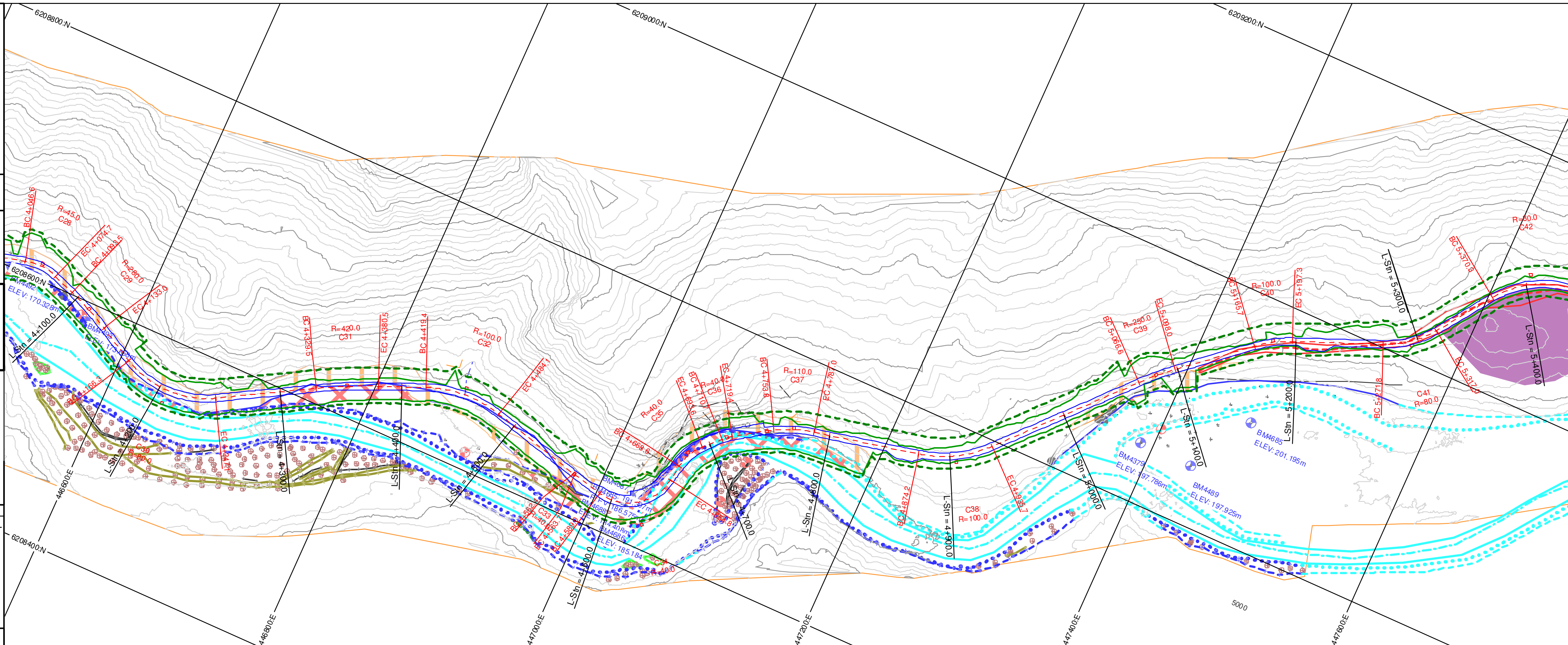
IP Stn.	Curve Table (Da = deflection angle for a 10m arc)													
	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C42
BC Stn.	4+113	4+211	4+355	4+453	4+563	4+632	4+682	4+715	4+771	4+908	5+082	5+182	5+295	5+407
Arc Len.	39	81	51	65	1	66	25	9	33	62	31	32	45	68
EC Stn.	4+133	4+247	4+380	4+484	4+564	4+655	4+694	4+719	4+787	4+936	5+098	5+197	5+317	5+439
Radius	280	80	420	100	40	40	40	40	110	100	250	100	80	80
Angle	8°	-59°	7°	37°	-2°	-94°	36°	12°	17°	-35°	7°	18°	-32°	49°
Tangent	20	44	26	34	1	43	13	4	17	32	16	16	23	36
Da, a=100	20°	72°	14°	57°	143°	143°	143°	143°	52°	57°	23°	57°	72°	72°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Srf1 Fill V. Cu. m.
4+100.0	477.6	0.0	2296.2	662.3	2665.8	163.9
4+200.0	1001.5	0.0	1090.3	1903.2	3444.6	163.9
4+300.0	205.3	0.0	0.0	0.0	6309.1	163.9
4+400.0	108.6	0.0	108.6	0.0	5306.9	163.9
4+500.0	0.0	0.0	888.0	222.9	5327.7	178.3
Pg. Tot.	1793.0	0.0	4383.0	2788.4	23054.2	834.0
Cum. Tot.	8164.1	0.0	19942.4	9332.4	68207.3	7965.2

CULVERT TABLE	
L-Stn	Notes
4+110.3	VC29 K=42.0 L=51.4 VPI=4+136.0 EI=180.0
4+161.7	EVC 4+161.7
4+464.5	BVC 4+464.5
4+519.8	EVC 4+519.8
4+632.2	BVC 4+632.2
4+822.9	EVC 4+822.9
4+899.4	BVC 4+899.4
4+954.4	BVC 4+954.4
4+988.3	EVC 4+988.3
5+028.7	BVC 5+028.7
5+094.3	EVC 5+094.3
5+229.9	BVC 5+229.9
5+339.9	EVC 5+339.9

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MRI = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision



*** Out of date - Re-Cost ***



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 5+120.0 to 6+400.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:4000 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h	Min Curve Radius = 80m	
Design Speed: 30 km/h	Min Curve Radius = 35m	
Max Grade = 12%	Max Grade = 18%	

Notes:
- Ground model data obtained by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Fill into Riparian Zone	Finished Road Surface
— Road Edges	Fill into High Water	Profile Subgrade
— Cut / Fill Limits	Borrow Site	Cut / Fill Limits
— Clearing Limits	Waste Site	Original Ground
⊙ Benchmark		Bedrock

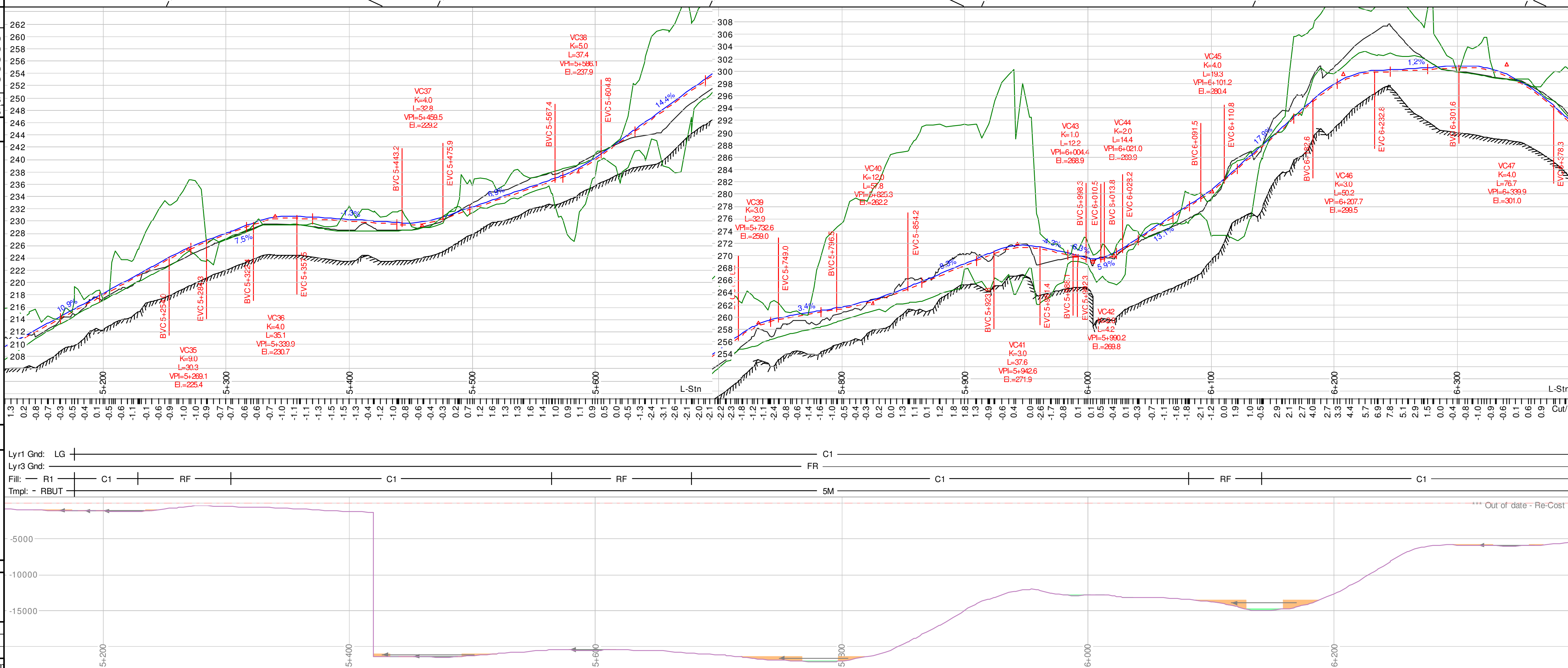
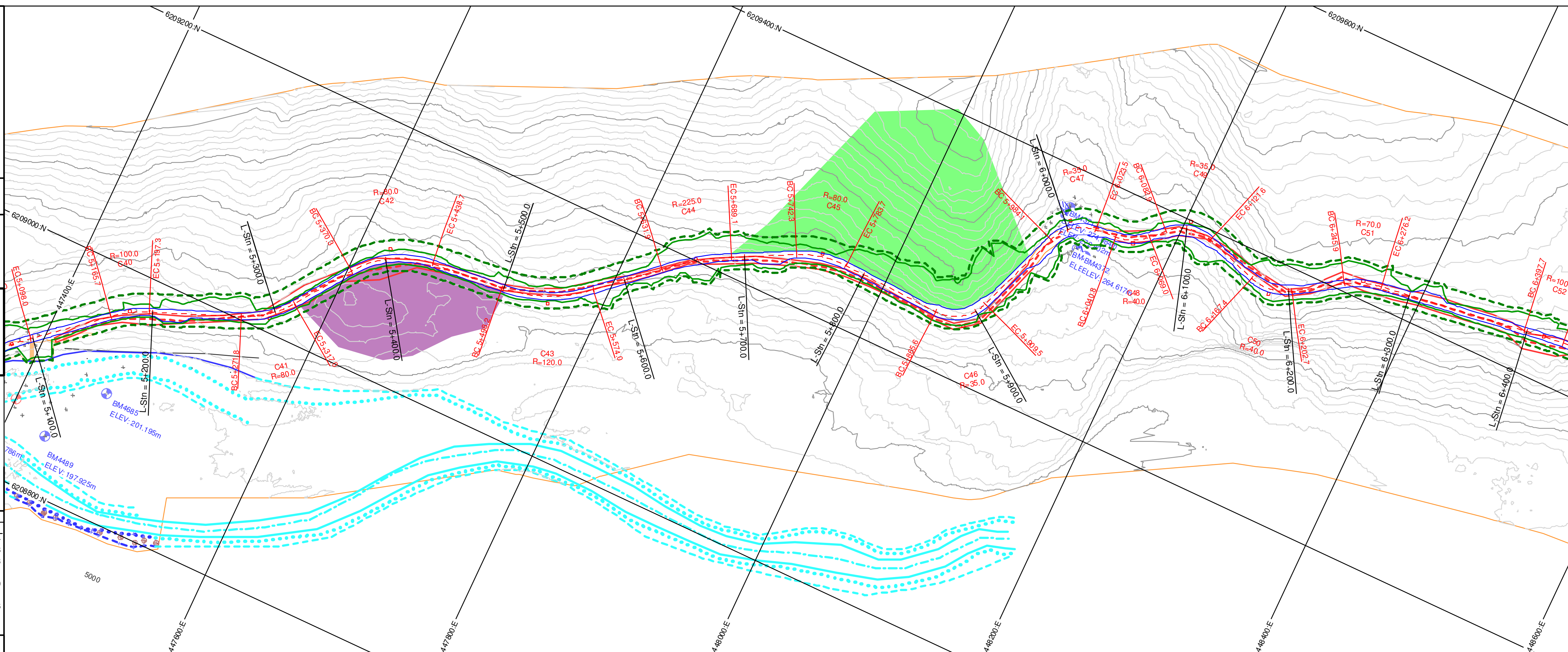
IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)												
	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49	C50	C51	C52
5+182	5+295	5+407	5+537	5+661	5+783	5+891	6+006	6+055	6+104	6+186	6+261	6+414	
BC Stn.	5+166	5+272	5+370	5+498	5+632	5+742	5+866	5+984	6+041	6+083	6+167	6+246	6+398
Arc. Len.	32	45	68	76	41	44	39	28	39	35	30	33	33
EC Stn.	5+197	5+317	5+439	5+574	5+689	5+784	5+910	6+024	6+069	6+122	6+203	6+276	6+431
Radius	100	80	80	120	225	80	35	35	40	35	40	70	1000
Angle	18°	-32°	49°	-36°	15°	30°	-72°	65°	-40°	63°	-51°	25°	2°
Tangent	16	23	36	39	29	21	25	22	15	22	19	15	16
Da, a=100	57°	72°	72°	48°	25°	72°	164°	143°	164°	143°	82°	82°	6°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
5+200.0	152.4	0.0	1223.7	0.0	580.4	190.9
5+300.0	95.1	0.0	25.7	0.0	761.8	163.9
5+400.0	112.0	0.0	411.2	0.0	401.4	163.9
5+500.0	133.8	0.0	1096.3	0.0	322.1	163.9
5+600.0	219.3	0.0	652.2	0.0	1294.8	163.9
Pg. Tot.	712.6	0.0	3409.2	0.0	3360.4	846.6
Cum. Tot.	13221.2	0.0	30511.3	11247.0	94460.7	10023.5

CULVERT TABLE

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
C3 - Blocky colluvium	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	Surfacing depth = 0.3m
T2 - Silt or clay based basal till	

Revision	Description	Date	By	Approved	Revision
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Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 6+144.0 to 7+424.0

ROAD DESIGN SPECIFICATIONS	
Design Speed: 50 km/h	Min Curve Radius = 80m
Max Grade = 12%	Design Speed: 30 km/h
Min Curve Radius = 35m	Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000
Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface	Red Profile Subgrade
Blue Road Edges	Blue Fill into Riparian Zone	Green Cut / Fill limits	Green Original Ground
Green Cut / Fill limits	Red Fill into High Water	Green Bedrock	
Dashed Clearing Limits	Green Borrow Site		
Circle with cross Benchmark	Purple Waste Site		

Curve Table (Da = deflection angle for a 10m arc)											
	C50	C51	C52	C53	C54	C55	C56	C57	C58	C59	C60
IP Stn.	6+186	6+261	6+414	6+514	6+603	6+758	6+893	7+105	7+208	7+327	7+409
BC Stn.	6+167	6+246	6+398	6+489	6+575	6+733	6+870	7+084	7+178	7+320	7+366
Arc Len.	35	30	33	50	54	50	47	42	59	14	42
EC Stn.	6+203	6+276	6+431	6+539	6+629	6+783	6+916	7+126	7+237	7+334	7+408
Radius	40	70	1000	900	150	300	120	120	500	20	18
Angle	-51°	25°	2°	3°	21°	-10°	-22°	20°	-7°	40°	134°
Tangent	19	15	16	25	27	25	24	21	29	7	43
Da, a=100	143°	82°	6°	6°	19°	48°	48°	11°	286°	318°	

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
6+200.0	205.5	0.0	6883.3	0.0	35.0	168.6
6+300.0	136.6	0.0	933.3	0.0	304.1	190.9
6+400.0	305.3	0.0	2548.0	0.0	91.8	163.9
6+500.0	1134.5	0.0	131.6	0.0	109.3	163.9
6+600.0	212.4	0.0	76.7	0.0	769.0	190.8
Pg. Tot.	1994.2	0.0	10572.8	0.0	1309.3	878.1
Cum. Tot.	16294.5	0.0	55410.2	11833.4	102231.0	11945.9

CULVERT TABLE

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	
T2 - Silt or clay based basal till	

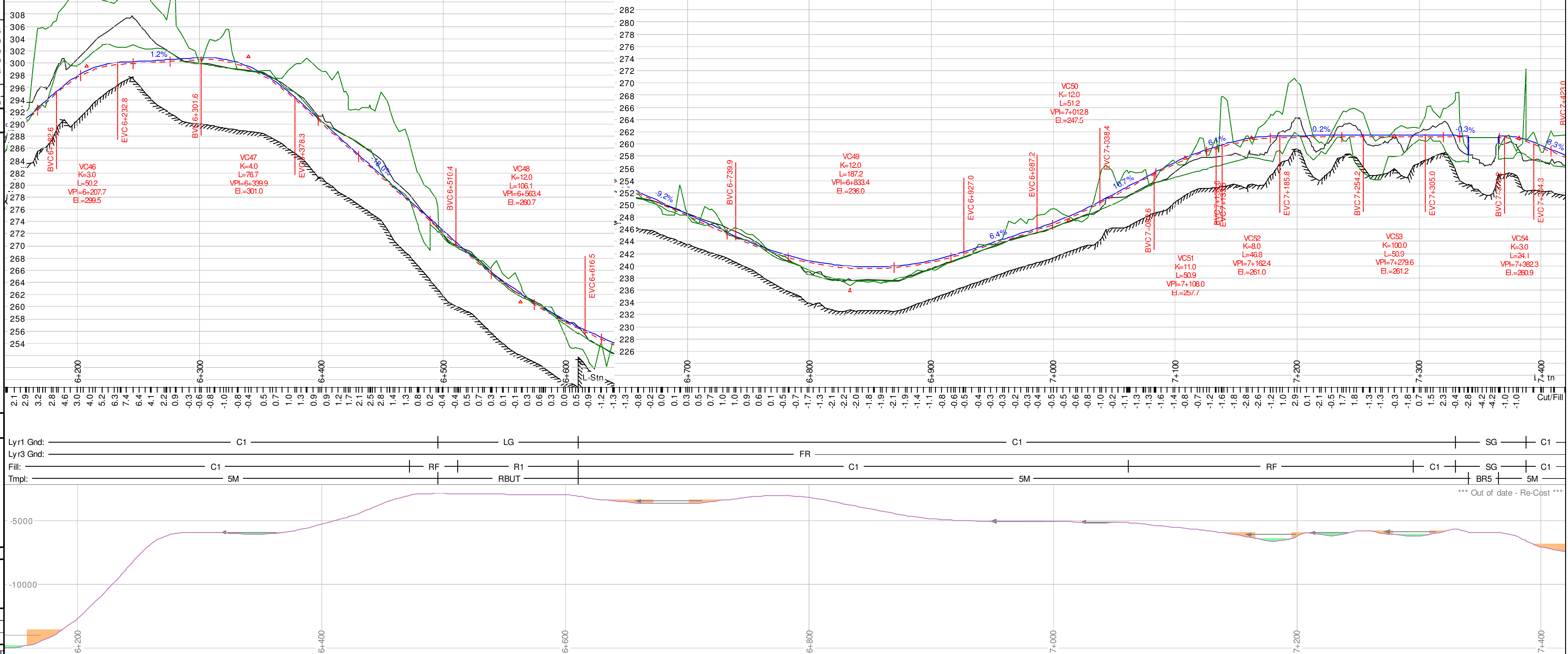
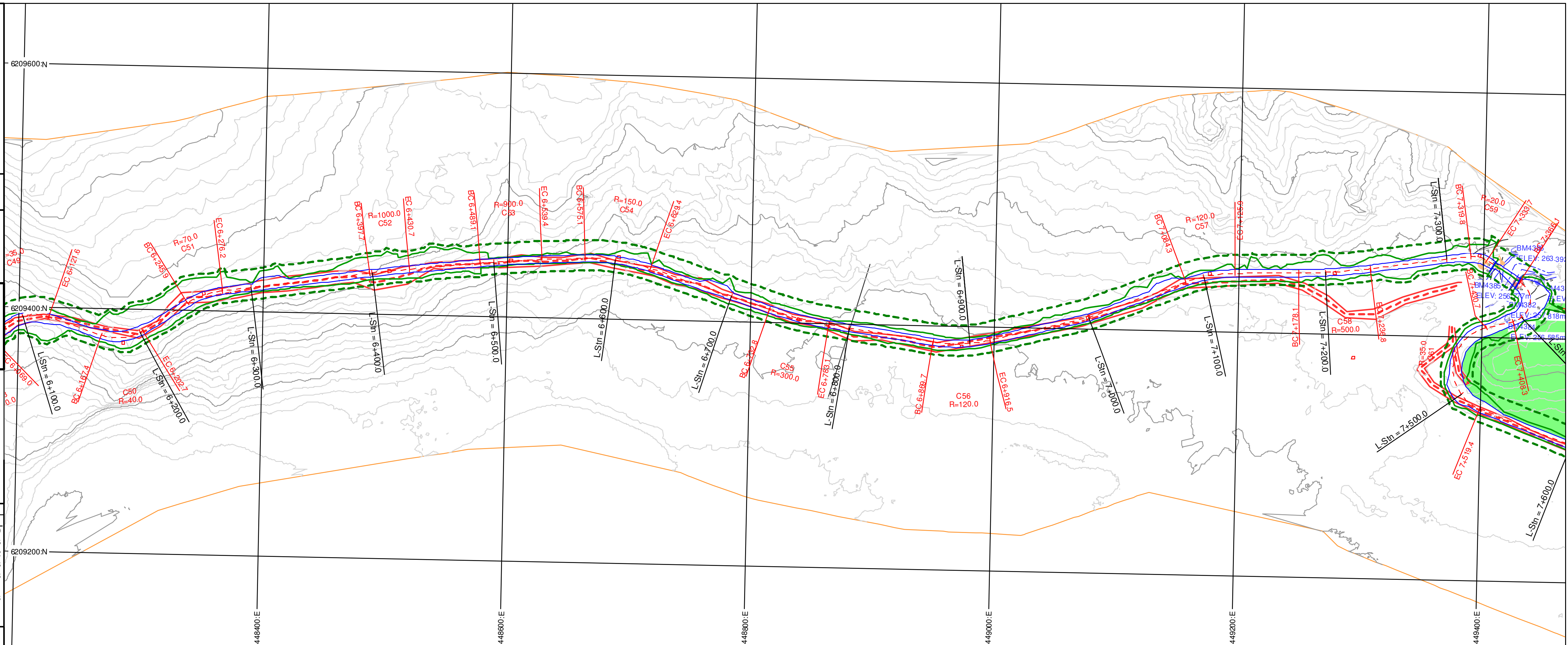
Revision	Description	Date	By	Approved	Revision

ON SITE Engineering Ltd. Page 7 of 13

Survey By: See Notes Above
Design By: Matthew Dickie, ET
Reviewed By: Michael Foster, P.Eng

May 2017
May 2017

Plot Date: 17/11/08 | Design File Name: U:\Projects\1464\2\8\Road\RoadEng\EA Designs\Access Road\RedMountain





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 7+168.0 to 8+448.0

ROAD DESIGN SPECIFICATIONS	Plan Scale 1:2000
Design Speed = 50 km/h	Profile Vert Scale 1:4000
Min Curve Radius = 80m	Profile Horz Scale 1:2000
Max Grade = 12%	Formatted to Plot on 24"x36" Paper
Design Speed = 30 km/h	
Min Curve Radius = 35m	
Max Grade = 18%	

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface
Blue Road Edges	Blue Fill into Riparian Zone	Red Profile Subgrade
Green Cut / Fill limits	Red Fill into High Water	Green Cut / Fill limits
Dashed Clearing Limits	Green Borrow Site	Grey Original Ground
Circle with cross Benchmark	Purple Waste Site	Black hatched Bedrock

	C58	C59	C60	C61	C62	C63	C64	C65
IP Stn.	7+208	7+327	7+409	7+543	7+780	8+056	8+246	8+475
BC Stn.	7+178	7+320	7+366	7+431	7+752	8+010	8+196	8+433
Arc Len.	59	14	42	89	57	91	99	83
EC Stn.	7+237	7+334	7+408	7+519	7+808	8+101	8+295	8+516
Radius	500	20	18	35	300	400	500	500
Angle	-7°	40°	134°	-145°	-11°	13°	-11°	10°
Tangent	29	7	43	112	28	46	50	42
Da, a=100	11°	286°	318°	164°	19°	14°	11°	11°

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
7+200.0	134.2	0.0	969.2	0.0	941.4		163.9
7+300.0	240.7	0.0	732.8	0.0	1582.0		248.1
7+400.0	342.4	0.0	1310.3	0.0	912.9		299.6
7+500.0	245.6	0.0	466.7	0.6	315.1		207.8
7+600.0	101.5	0.0	42.8	0.0	314.6		163.9
Pg. Tot.	1064.4	0.0	3521.8	0.6	4066.1		1083.2
Cum. Tot.	17925.0	0.1	60668.4	11834.0	110642.8		13875.9

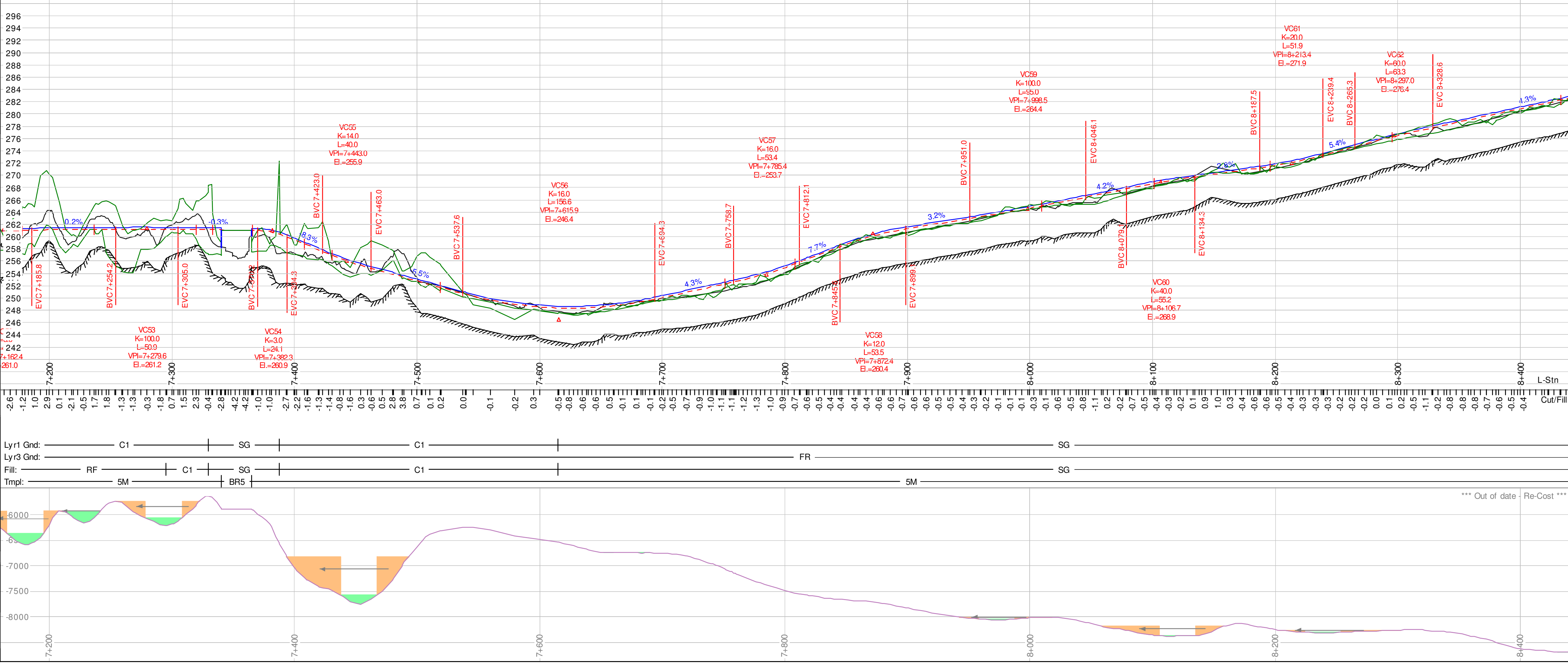
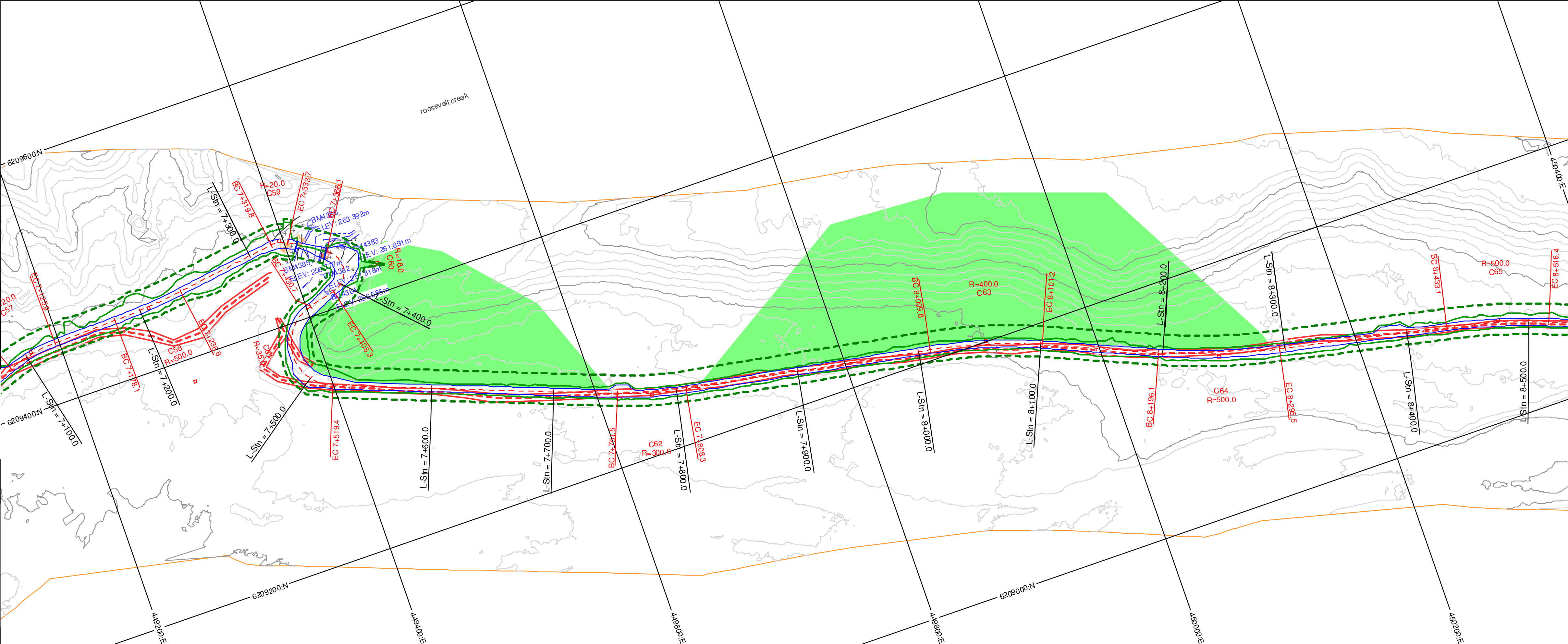
CULVERT TABLE

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
7+200.0	134.2	0.0	969.2	0.0	941.4		163.9
7+300.0	240.7	0.0	732.8	0.0	1582.0		248.1
7+400.0	342.4	0.0	1310.3	0.0	912.9		299.6
7+500.0	245.6	0.0	466.7	0.6	315.1		207.8
7+600.0	101.5	0.0	42.8	0.0	314.6		163.9
Pg. Tot.	1064.4	0.0	3521.8	0.6	4066.1		1083.2
Cum. Tot.	17925.0	0.1	60668.4	11834.0	110642.8		13875.9

SOIL TYPES

SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision



*** Out of date - Re-Cost ***



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 8+192.0 to 9+472.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000	
Design Speed: 50 km/h	Min Curve Radius = 80m	Profile Vert Scale 1:400	Profile Horz Scale 1:2000
Design Speed: 30 km/h	Min Curve Radius = 35m	Formatted to Plot on 24"x36" Paper	
	Max Grade = 12%		
	Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface	Red Profile Subgrade
Blue Road Edges	Blue Fill into Riparian Zone	Green Cut / Fill limits	Green Original Ground
Green Cut / Fill limits	Red Fill into High Water	Green Bedrock	
Dashed Green Clearing Limits	Green Borrow Site		
Circle with cross Benchmark	Purple Waste Site		

IP Stn.	C64	C65	C66	C67	C68	C69	C70
IP Stn.	8+246	8+475	8+690	8+943	9+148	9+273	9+437
BC Stn.	8+196	8+433	8+665	8+917	9+121	9+251	9+413
Arc. Len.	99	83	50	51	54	44	46
EC Stn.	8+295	8+516	8+715	8+968	9+175	9+295	9+459
Radius	500	500	700	160	130	300	80
Angle	-11°	10°	4°	-18°	24°	-8°	33°
Tangent	50	42	25	26	27	22	24
Da, a=100	11°	11°	8°	36°	44°	19°	72°

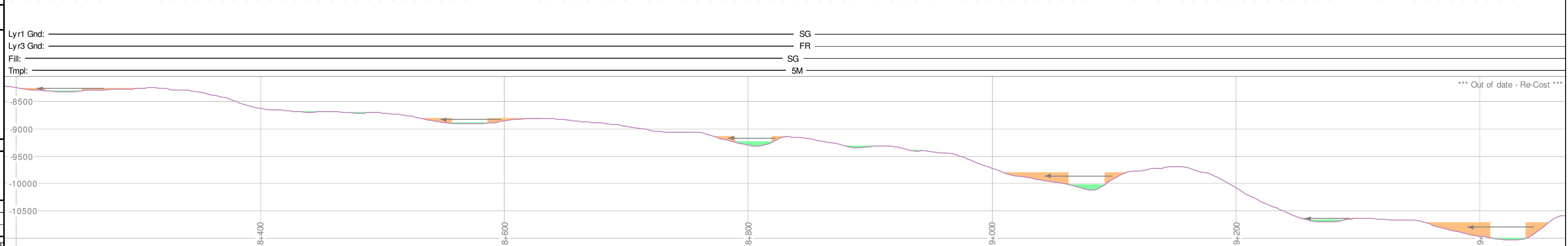
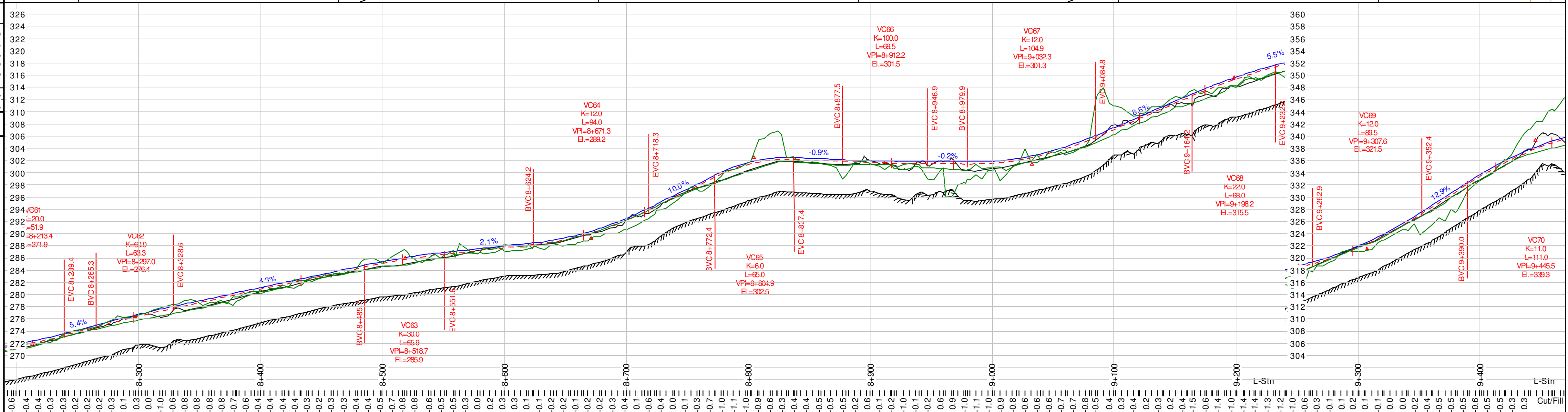
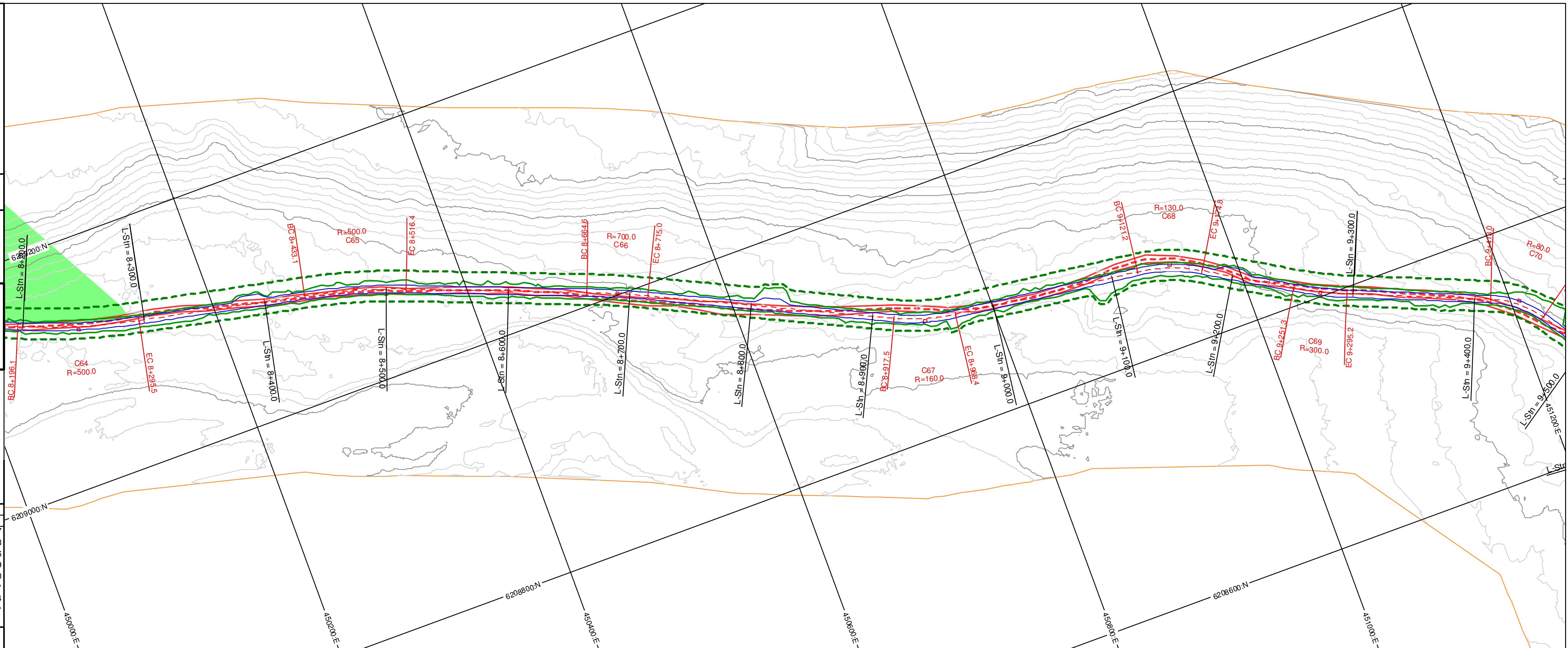
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Sr1 Fill V. Cu. m.
8+200.0	100.2	0.0	168.9	0.0	185.1		163.9
8+300.0	102.9	0.0	130.2	0.0	489.8		190.3
8+400.0	102.8	0.0	137.7	0.0	228.1		164.5
8+500.0	102.3	0.0	145.2	0.0	290.1		163.9
8+600.0	100.1	0.0	115.8	0.0	210.2		163.9
Pg. Tot.	508.4	0.0	697.8	0.0	1403.2		846.6
Cum. Tot.	18912.4	0.1	61900.9	11834.0	114067.1		15561.6

CULVERT TABLE

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision

ONSITE Engineering Ltd.	Page 9 of 13	Survey By: See Notes Above	Design By: Matthew Dickie, ET	Reviewed By: Michael Foster, P.Eng	May 2017
Plot Date: 17/11/08	Design File Name: U:\Projects\1464\2\8\Road\RoadEng\EA Designs\Access Road\RedMountain				May 2017



*** Out of date - Re-Cost ***



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 9+216.0 to 10+496.0

ROAD DESIGN SPECIFICATIONS	
Design Speed: 50 km/h	Min Curve Radius = 80m
Max Grade = 12%	
Design Speed: 30 km/h	Min Curve Radius = 35m
Max Grade = 18%	

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000
Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)

- - - L-line Location	Fill into Riparian Zone	Finished Road Surface
— Road Edges	Fill into High Water	Profile Subgrade
— Cut / Fill limits	Borrow Site	Cut / Fill limits
— Clearing Limits	Waste Site	Original Ground
⊕ Benchmark		Bedrock

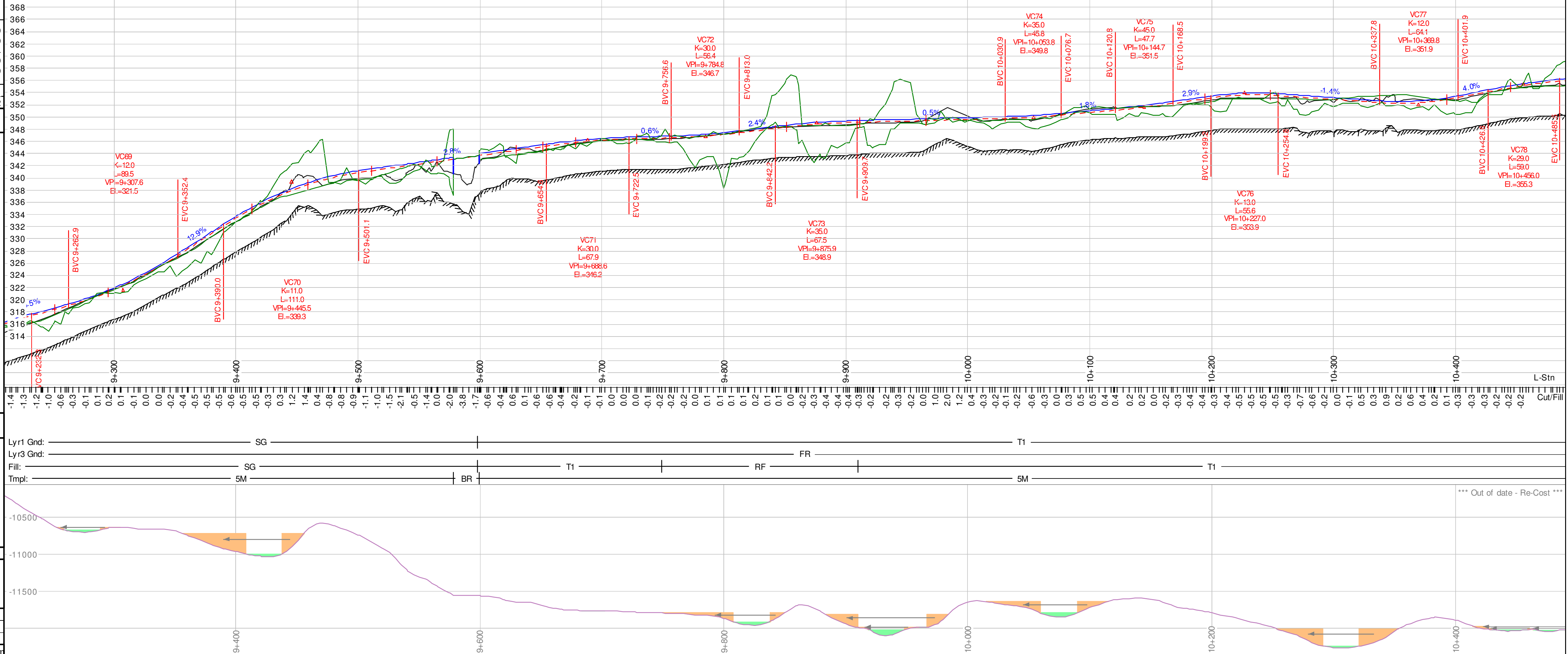
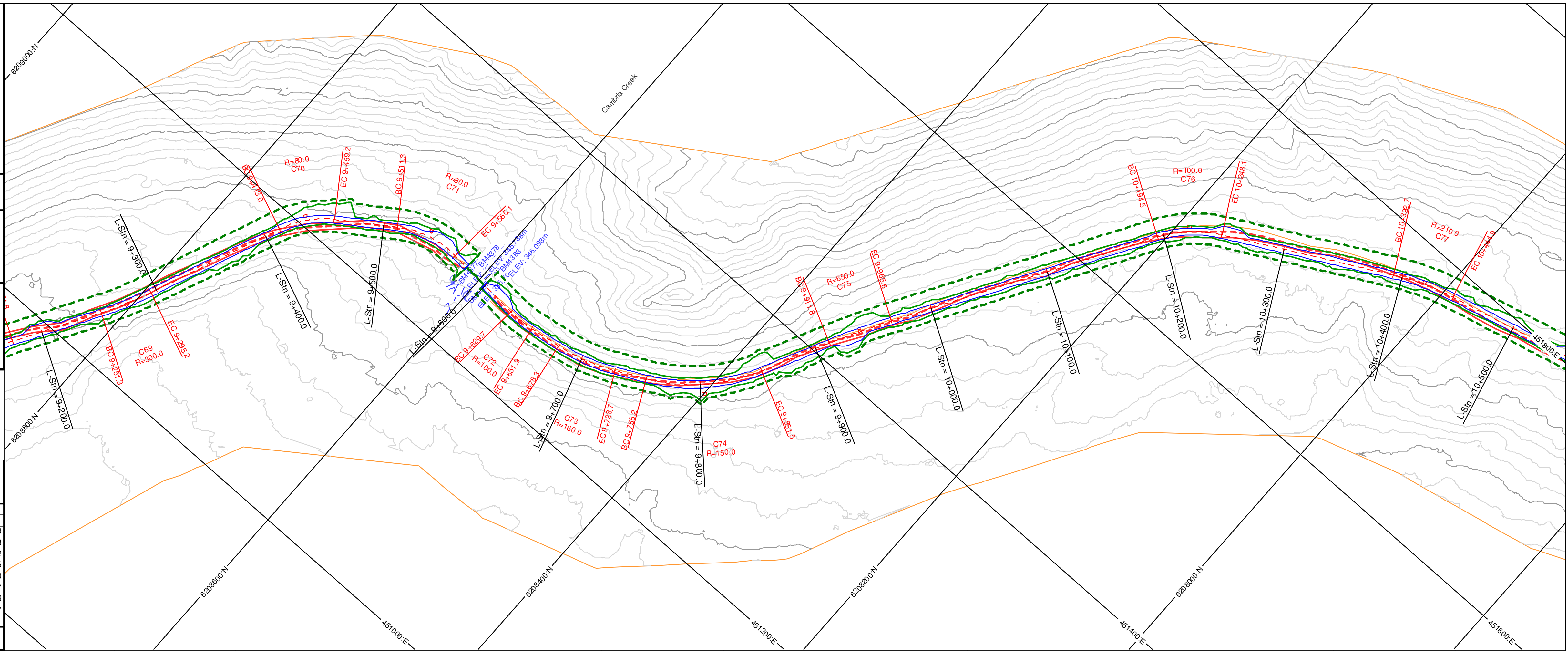
IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)								
	C69	C70	C71	C72	C73	C74	C75	C76	C77
BC Stn.	9+251	9+413	9+511	9+630	9+678	9+755	9+912	10+195	10+393
Arc. Len.	44	46	54	22	50	96	54	54	52
EC Stn.	9+295	9+459	9+565	9+652	9+729	9+851	9+966	10+248	10+445
Radius	300	80	80	100	160	150	650	100	210
Angle	-8°	33°	39°	-13°	-18°	-37°	5°	31°	14°
Tangent	22	24	28	11	25	50	27	27	26
Da, a=100	19°	72°	72°	57°	36°	38°	9°	57°	27°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
9+300.0	101.6	0.0	40.6	0.0	364.5	163.9
9+400.0	127.1	0.0	541.5	0.0	317.6	163.9
9+500.0	93.0	0.0	83.9	0.0	904.8	156.4
9+600.0	108.9	0.0	98.2	0.0	302.1	190.9
9+700.0	121.0	0.0	105.0	0.0	206.8	163.9
9+800.0						
Pg. Tot.	551.7	0.0	869.1	0.0	2095.7	839.1
Cum. Tot.	20101.6	0.1	63970.4	11834.0	119053.5	17438.2

CULVERT TABLE

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision



*** Out of date - Re-Cost ***



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 10+240.0 to 11+520.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000	
Design Speed = 50 km/h	Min Curve Radius = 80m	Profile Vert Scale 1:400	Profile Horz Scale 1:2000
Design Speed = 30 km/h	Min Curve Radius = 35m	Formatted to Plot on 24"x36" Paper	
	Max Grade = 12%		
	Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining, OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	Fill into Riparian Zone	Finished Road Surface	Profile Subgrade
— Road Edges	Fill into High Water	— Cut / Fill limits	— Original Ground
— Cut / Fill limits	Borrow Site	— Bedrock	
— Clearing Limits	Waste Site		
⊙ Benchmark			

	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86	C87
IP Stn.	10+222	10+419	10+638	10+706	10+773	10+848	10+925	10+973	11+045	11+192	11+446	11+534
BC Stn.	10+195	10+393	10+611	10+682	10+749	10+823	10+909	10+957	11+027	11+166	11+418	11+502
Arc Len.	54	52	55	48	47	50	32	31	35	52	57	63
EC Stn.	10+248	10+445	10+666	10+730	10+796	10+873	10+941	10+988	11+062	11+218	11+475	11+565
Radius	100	210	500	100	140	920	60	90	80	650	1100	2500
Angle	31°	14°	6°	27°	19°	3°	-31°	20°	25°	-5°	-3°	1°
Tangent	27	26	28	24	24	25	17	16	18	26	28	31
Da, a=100	57°	27°	11°	57°	41°	6°	95°	64°	72°	9°	5°	2°

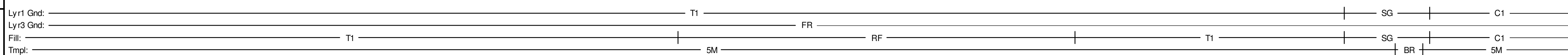
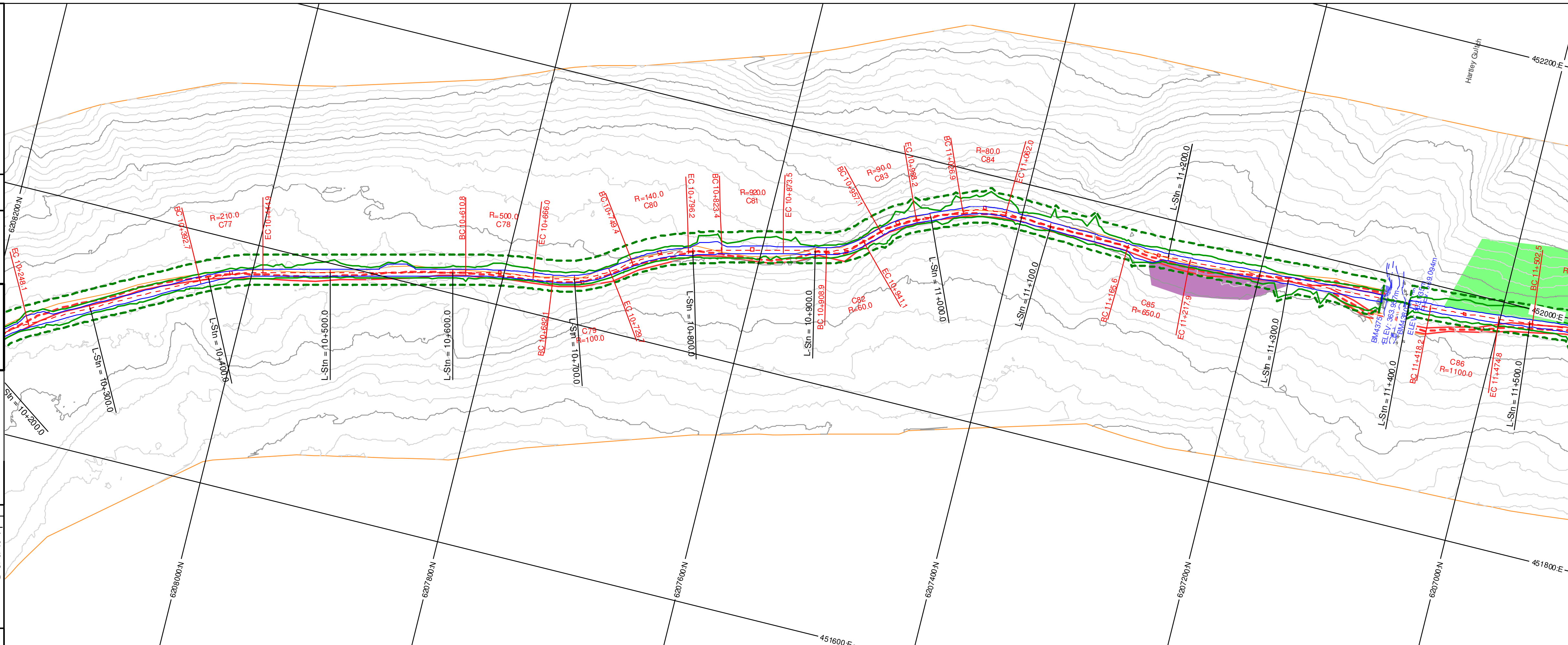
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
10+300.0	114.3	0.0	517.3	0.0	142.4	163.9	163.9
10+400.0	113.1	0.0	204.8	0.0	312.9	163.9	163.9
10+500.0	109.6	0.0	90.7	0.0	583.5	190.9	190.9
10+600.0	117.4	0.0	5.2	0.0	1038.5	163.9	163.9
10+700.0	108.9	0.0	158.9	0.0	905.1	164.3	164.3
10+800.0							
Pg. Tot.	563.2	0.0	976.9	0.0	2982.3	847.0	847.0
Cum. Tot.	21290.9	0.1	66247.7	11834.0	123731.9	19158.8	19158.8

CULVERT TABLE

Station	Grade	Structure
10+248	-1.4%	VC77 K=120 L=64.1 VPI=10+388.8 EI=351.9
10+419	4.0%	VC78 K=29.0 L=58.0 VPI=10+456.0 EI=355.3
10+666	1.9%	VC79 K=25.0 L=46.5 VPI=10+548.3 EI=357.1
10+730	0.1%	VC80 K=120 L=100.3 VPI=10+668.3 EI=357.1
10+848	6.7%	VC81 K=11.0 L=185.4 VPI=10+836.4 EI=372.1
10+925	0.5%	VC82 K=5.0 L=31.3 VPI=10+883.9 EI=382.2
10+973	6.6%	VC83 K=5.0 L=45.6 VPI=11+033.2 EI=381.7
11+045	0.6%	VC84 K=120 L=111.0 VPI=11+215.1 EI=372.2
11+192	3.0%	VC85 K=120 L=42.9 VPI=11+343.5 EI=371.4
11+446	0.6%	VC86 K=4.0 L=21.2 VPI=11+419.4 EI=373.7
11+534	0.6%	VC87 K=11.0 L=64.9 VPI=11+477.5 EI=378.5

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MRI = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision
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*** Out of date - Re-Cost ***



Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 11+264.0 to 12+544.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h	Min Curve Radius = 80m	
Design Speed: 30 km/h	Min Curve Radius = 35m	
	Max Grade = 18%	

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining, OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface
Blue Road Edges	Blue Fill into Riparian Zone	Red Profile Subgrade
Green Cut / Fill limits	Red Fill into High Water	Green Cut / Fill limits
Dashed Green Clearing Limits	Green Borrow Site	Black Original Ground
Black Benchmark	Purple Waste Site	Black Bedrock

	C86	C87	C88	C89	C90	C91	C92	C93	C94	C95
IP Stn.	11+446	11+534	11+636	11+828	11+931	12+030	12+197	12+347	12+483	12+573
BC Stn.	11+418	11+502	11+606	11+802	11+907	12+007	12+171	12+316	12+454	12+538
Arc Len.	57	63	58	51	49	45	51	62	57	70
EC Stn.	11+475	11+565	11+665	11+853	11+956	12+052	12+222	12+378	12+512	12+608
Radius	1100	2500	250	600	800	170	450	220	170	450
Angle	-3°	1°	-13°	5°	-4°	15°	-6°	-16°	19°	-9°
Tangent	28	31	29	26	24	23	25	31	29	35
Da, a=100	5°	2°	23°	10°	7°	34°	13°	26°	34°	13°

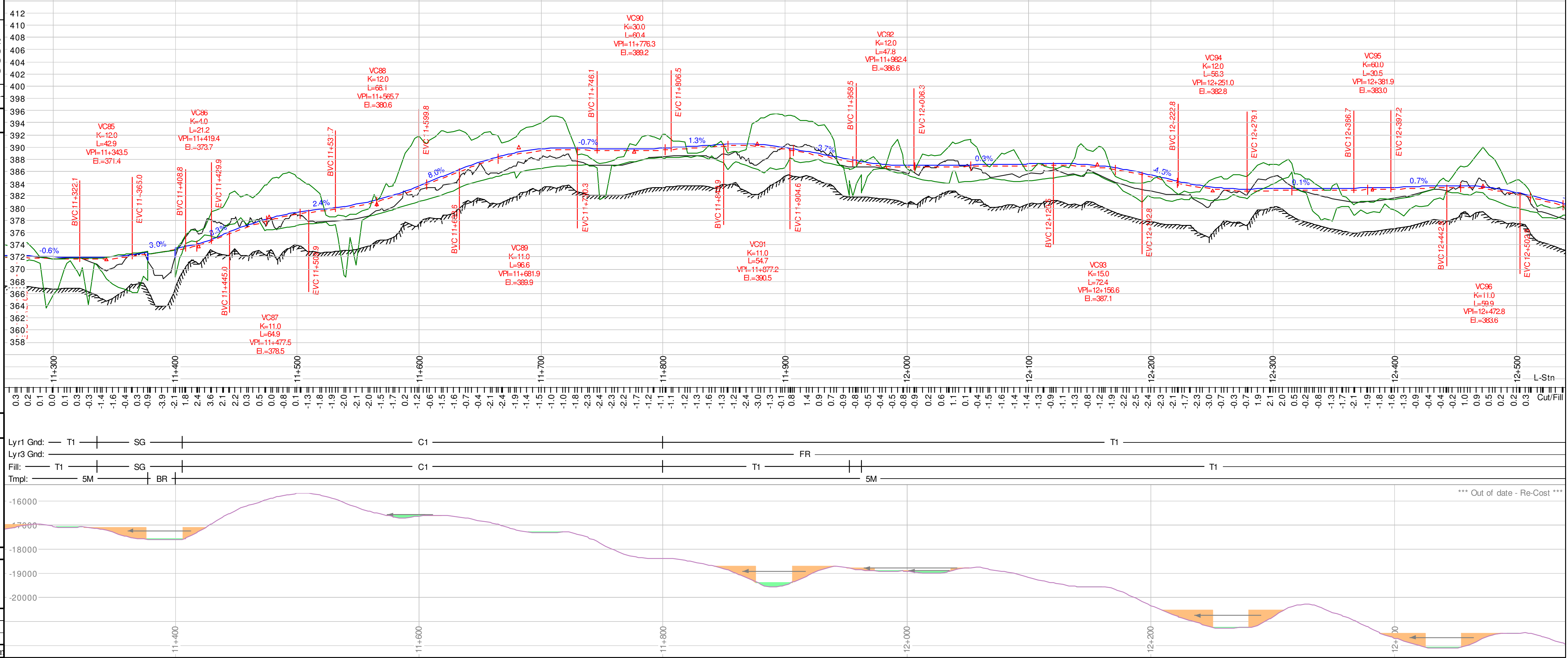
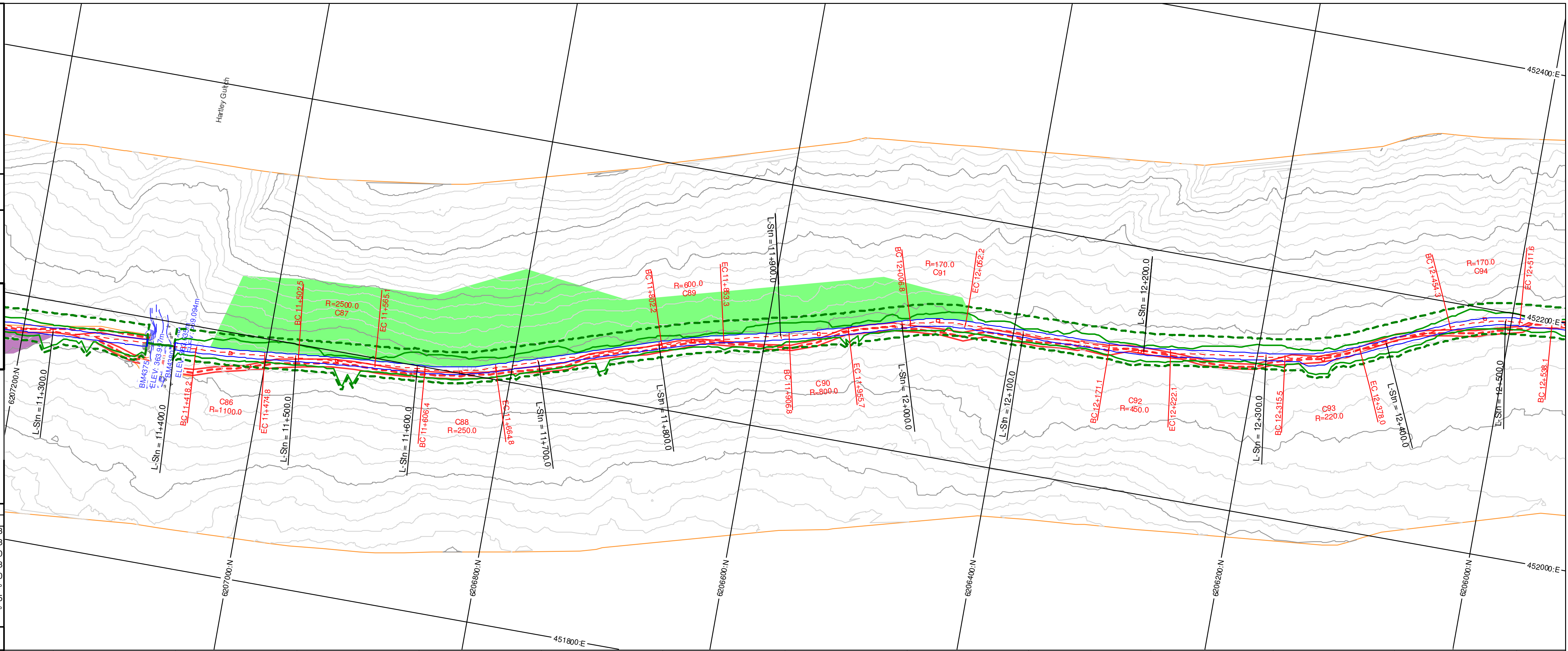
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
11+300.0	108.8	0.0	167.8	0.0	705.1		127.1
11+400.0	149.6	0.0	2098.1	0.0	203.5		163.2
11+500.0	141.5	0.0	365.1	0.0	1297.1		163.9
11+600.0	163.3	0.0	731.4	0.0	1418.5		163.9
11+700.0	130.5	0.0	424.5	0.0	1490.4		163.9
Pg. Tot.	693.8	0.0	3786.8	0.0	5114.7		782.1
Cum. Tot.	22705.7	0.1	72249.6	11834.0	132203.0		20814.1

CULVERT TABLE

Station	Structure	Material	Notes
11+300.0	VC85	K=12.0, L=42.9, VPI=11+343.5, EI=371.4	
11+400.0	VC86	K=4.0, L=21.9, VPI=11+419.4, EI=373.7	
11+500.0	VC87	K=11.0, L=49.9, VPI=11+477.5, EI=378.5	
11+600.0	VC88	K=12.0, L=60.4, VPI=11+565.7, EI=380.6	
11+700.0	VC89	K=11.0, L=54.7, VPI=11+637.2, EI=380.5	
11+800.0	VC90	K=30.0, L=60.4, VPI=11+776.3, EI=383.2	
11+900.0	VC91	K=15.0, L=72.4, VPI=11+877.2, EI=387.1	
12+000.0	VC92	K=12.0, L=56.3, VPI=11+982.4, EI=386.6	
12+100.0	VC93	K=12.0, L=56.3, VPI=12+251.0, EI=382.8	
12+200.0	VC94	K=12.0, L=56.3, VPI=12+251.0, EI=382.8	
12+300.0	VC95	K=12.0, L=56.3, VPI=12+381.9, EI=383.0	
12+400.0	VC96	K=11.0, L=59.9, VPI=12+472.8, EI=383.6	

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MRI = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	BRBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain Access Road

Route Upgrade and Establishment Access Road Geometric Alignment Km 0+000 - 12+981

Page Stations: 12+288.0 to 13+568.0

ROAD DESIGN SPECIFICATIONS	
Design Speed: 50 km/h	Min Curve Radius = 80m
Design Speed: 30 km/h	Min Curve Radius = 35m
Max Grade = 12%	Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000
Formatted to Plot on 24"x36" Paper

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	Orange R.O.W. in Riparian Zone	Blue Finished Road Surface	Red Profile Subgrade
Blue Road Edges	Blue Fill into Riparian Zone	Green Cut / Fill limits	Green Cut / Fill limits
Green Cut / Fill limits	Red Fill into High Water	Green Original Ground	Green Original Ground
Green Clearing Limits	Green Borrow Site	Black Bedrock	Black Bedrock
Black Benchmark	Purple Waste Site		

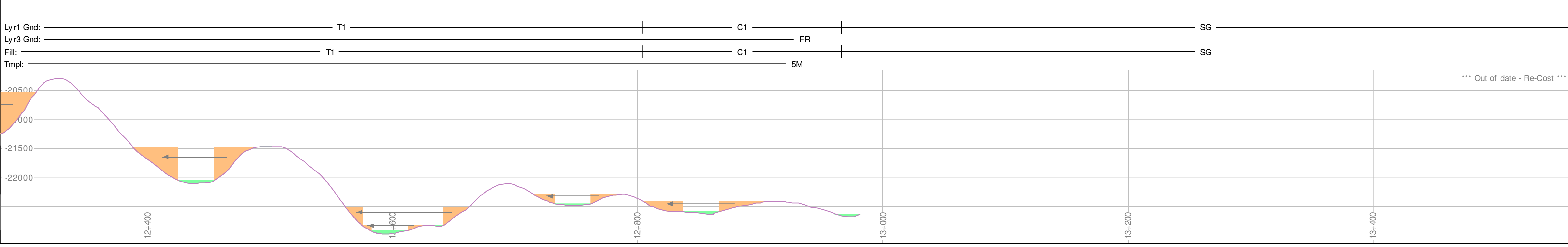
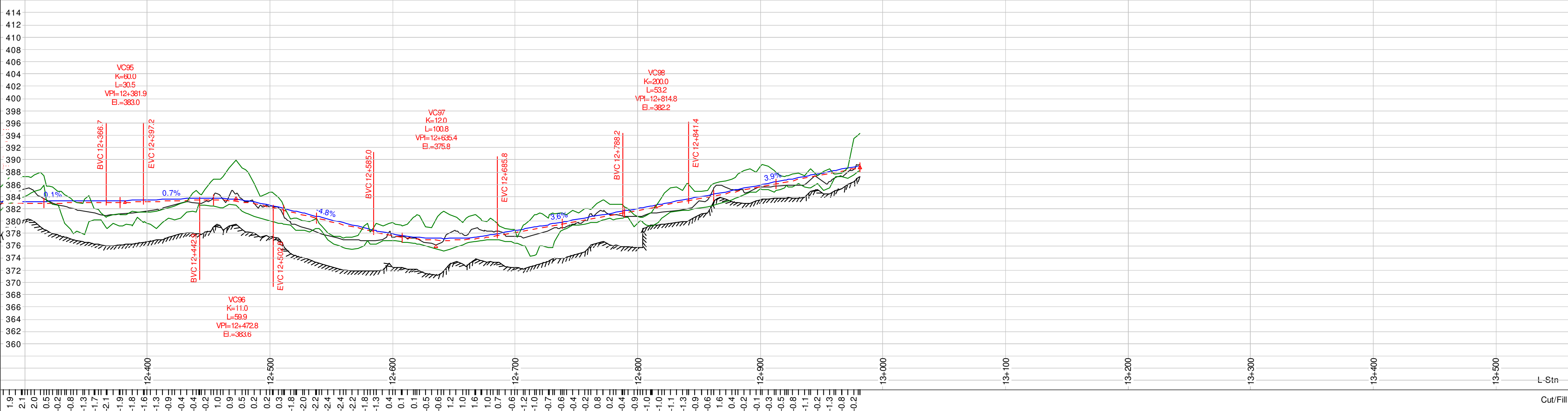
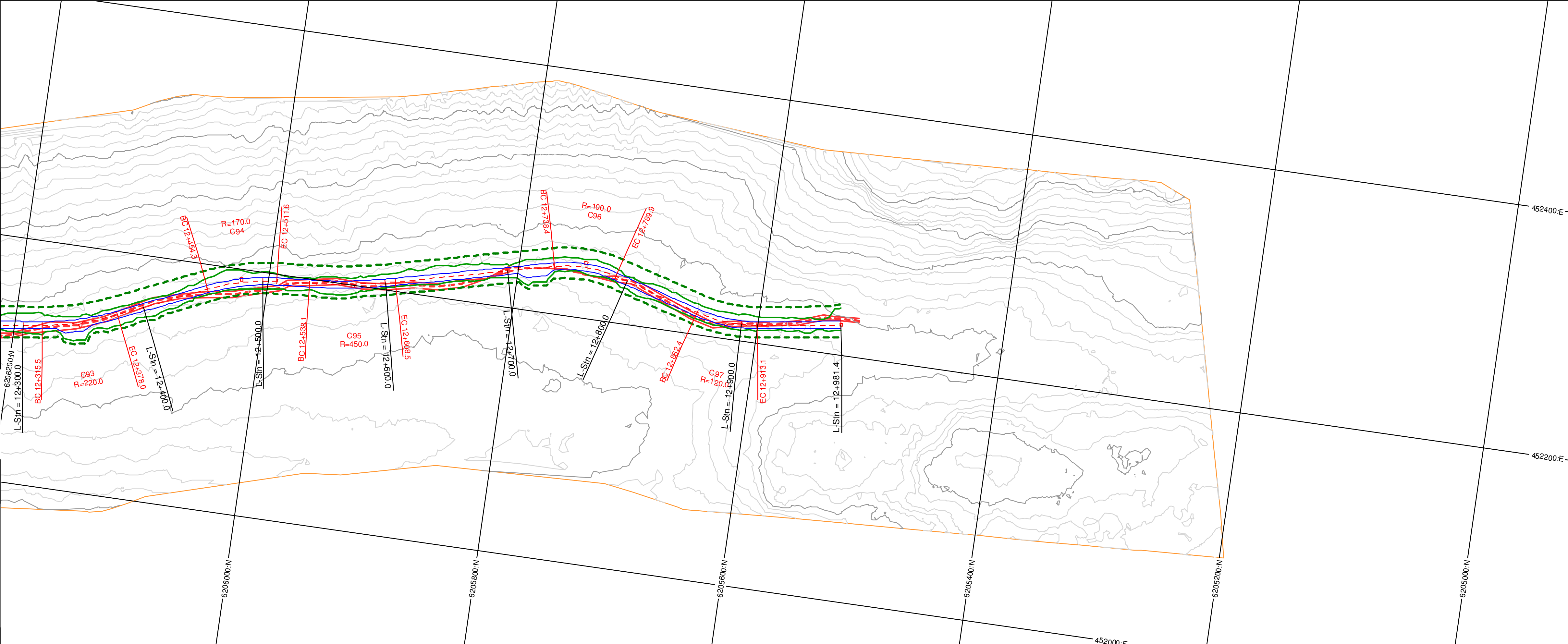
Curve Table (Da = deflection angle for a 10m arc.)					
	C93	C94	C95	C96	C97
IP Stn.	12+347	12+483	12+573	12+765	12+888
BC Stn.	12+316	12+454	12+538	12+738	12+862
Arc. Len.	62	57	70	52	51
EC Stn.	12+378	12+512	12+608	12+790	12+913
Radius	220	170	450	100	120
Angle	-16°	19°	-9°	30°	-24°
Tangent	31	29	35	26	26
Da, a=100	26°	34°	13°	57°	48°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn m.	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
12+300.0	320.9	0.0	581.6	0.0	1436.4	190.9
12+400.0	279.8	0.0	822.2	0.0	614.9	163.9
12+500.0	286.6	0.0	130.4	0.0	1623.7	163.9
12+600.0	268.6	0.0	1039.8	0.0	207.1	163.9
12+700.0	279.5	0.0	429.3	0.0	658.8	190.9
Pg. Tot.	1435.4	0.0	3003.3	0.0	4540.9	873.6
Cum. Tot.	25512.9	0.1	78023.1	11834.0	141954.7	22507.3

CULVERT TABLE	
12+300.0	12+400.0
12+500.0	12+600.0
12+700.0	12+800.0
12+900.0	12+981.0

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision



*** Out of date - Re-Cost ***



Mine Site Road Geometric Alignment Km 12+981 - 14+467

Page Stations: 12+950.0 to 14+230.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h Min Curve Radius = 50m Max Grade = 12%		
Design Speed: 30 km/h Min Curve Radius = 35m Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	- - - Profile Subgrade
█ Road Edges	█ Other Major Mine Facilities	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill Limits	█ Borrow Site	█ Bedrock	
█ Clearing Limits	█ Waste Site		
⊕ Benchmark			

IP Stn.	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
13+007	13+090	13+192	13+284	13+394	13+456	13+554	13+639	13+707	13+784	14+179	
BC Stn.	12+983	13+052	13+163	13+256	13+371	13+417	13+527	13+614	13+678	13+755	14+145
Arc. Len.	48	76	58	56	41	77	55	49	57	56	70
EC Stn.	13+030	13+128	13+221	13+311	13+412	13+495	13+581	13+663	13+735	13+811	14+214
Radius	150	800	150	100	35	300	120	500	250	120	800
Angle	18°	-5°	-22°	32°	-67°	-15°	26°	6°	-13°	27°	5°
Tangent	24	38	29	29	23	39	28	24	28	28	35
Da, a=100	38°	7°	38°	57°	164°	19°	48°	11°	23°	48°	7°

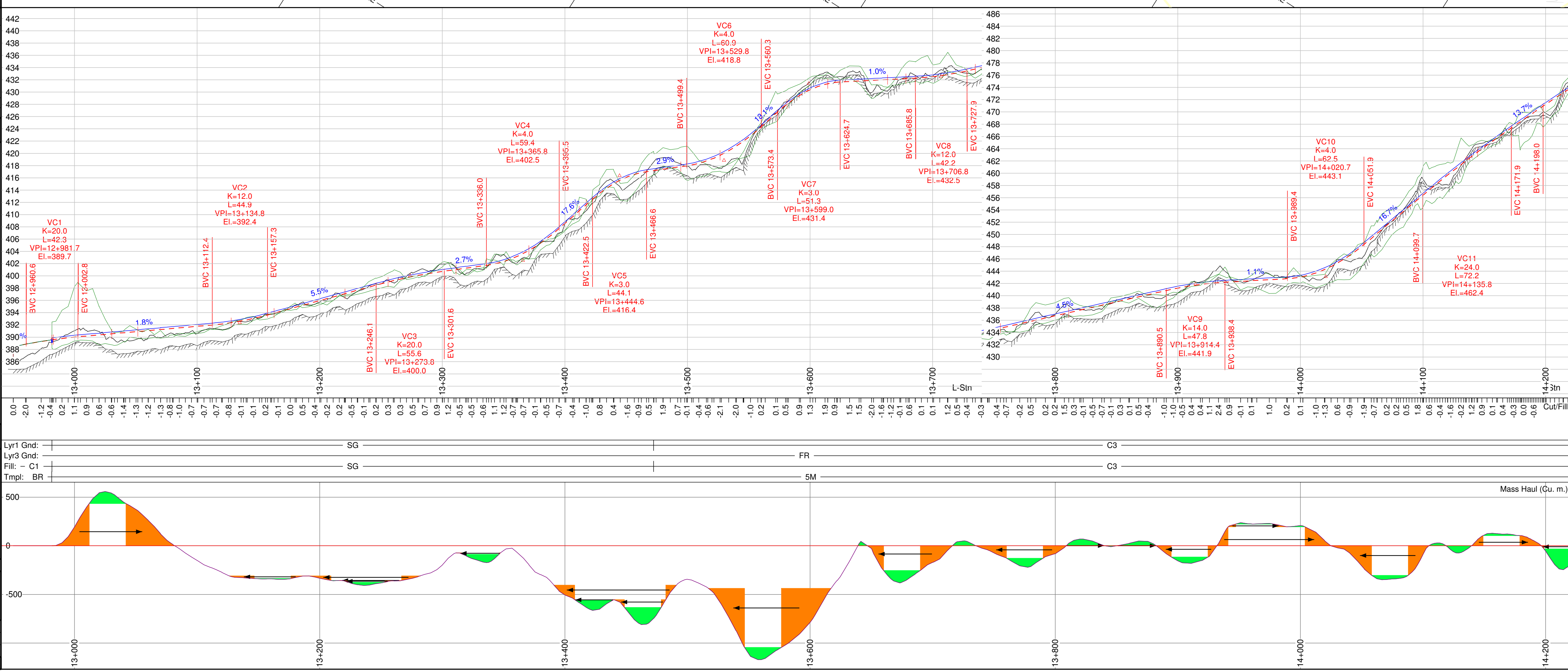
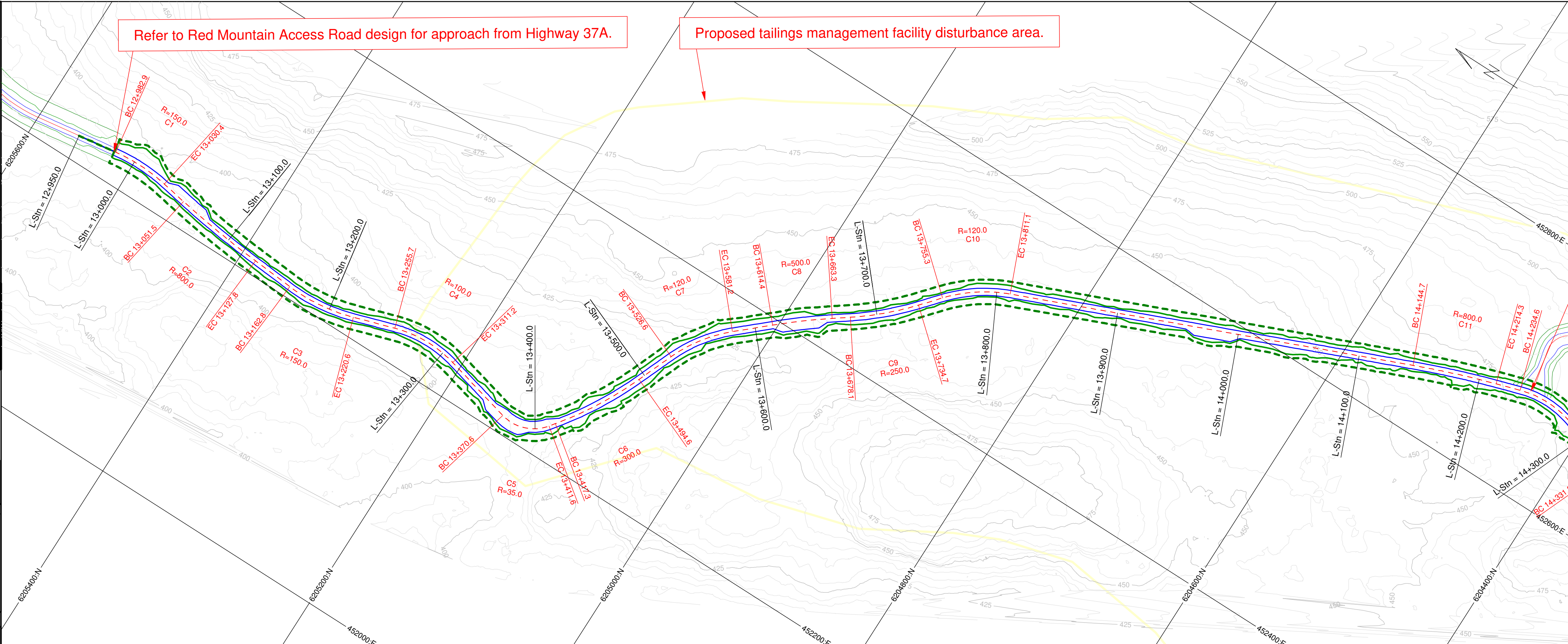
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Sr1 Fill V. Cu. m.
B 12+950.0	52.2	0.0	192.7	42.8	43.9		30.2
13+000.0	256.9	0.0	370.5	84.0	798.0		209.1
13+100.0	191.2	0.0	104.7	0.0	163.9		163.9
13+200.0	203.5	0.0	279.5	1.3	145.4		183.9
13+300.0	245.8	0.0	320.0	5.4	634.0		239.8
13+400.0	311.7	0.0	511.8	157.7	507.5		178.9
13+500.0	395.5	0.0	112.4	352.3	908.2		163.9
Pg. Tot.	1657.2	0.0	1891.7	643.5	3323.6		1149.8
Cum. Tot.	1657.2	0.0	1891.7	643.5	3323.6		1149.8

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flows.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till LG - Glaciolacustrine silt and clay	SM = 5m running surface with 0.6m deep by 0.6m wide ditch 4MD = 5m running surface with 0.6m deep by 4m wide ditch 2MD = 5m running surface with 0.6m deep by 2m wide ditch 5MRI = 5m running surface with fill into river RBUT = 5m running surface with rock buttress BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings) BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings) Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





**Mine Site Road
Geometric Alignment
Km 12+981 - 14+467**

Page Stations: 13+974.0 to 15+254.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 50 km/h Min Curve Radius = 50m Max Grade = 12%		
Design Speed: 30 km/h Min Curve Radius = 35m Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	- - - Profile Subgrade
█ Road Edges	█ Other Major Mine Facilities	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Clearing Limits	█ Bedrock
█ Benchmark	█ Waste Site		

IP Stn.	C11	C12	C13	C14
BC Stn.	14+179	14+263	14+356	14+457
Arc. Len.	70	55	49	21
EC Stn.	14+214	14+290	14+380	14+467
Radius	800	80	80	35
Angle	5°	40°	-35°	-35°
Tangent	35	29	25	11
Da, a=100	7°	72°	72°	164°

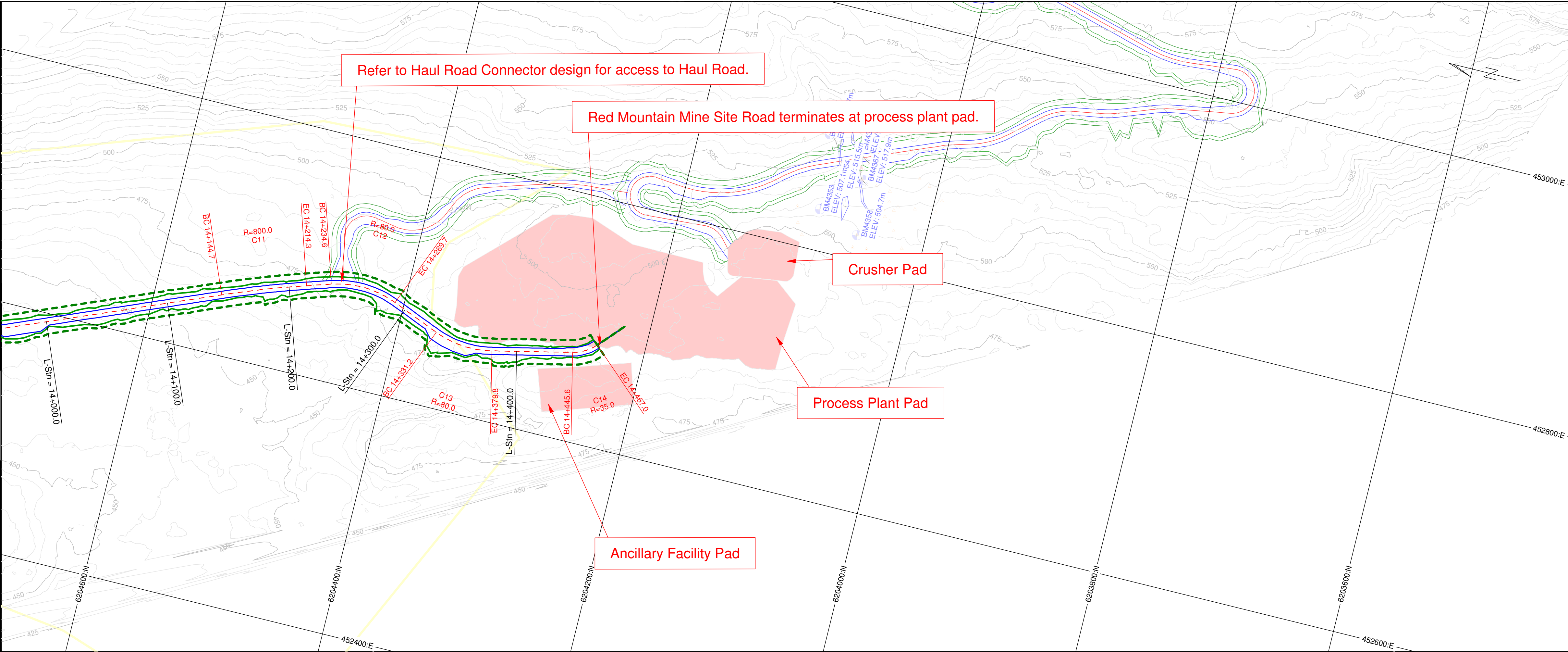
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Sr1 Fill V. Cu. m.
14+000.0	399.8	0.0	127.0	349.0	771.3		164.2
14+100.0	379.6	0.0	90.3	450.0	507.9		163.9
14+200.0	417.6	0.0	139.2	1000.6	969.6		163.9
14+300.0	467.2	0.0	140.0	1488.8	1185.0		208.9
14+400.0	215.0	0.0	27.4	110.4	557.1		117.6
B 14+494.0							
Pg. Tot.	1879.3	0.0	522.8	3398.7	3990.9		818.6
Cum. Tot.	5017.8	0.0	3574.5	5396.7	8833.9		2713.8

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flows.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till LG - Glaciolacustrine silt and clay	SM = 5m running surface with 0.6m deep by 0.6m wide ditch 4MD = 5m running surface with 0.6m deep by 4m wide ditch 2MD = 5m running surface with 0.6m deep by 2m wide ditch 5MRI = 5m running surface with fill into river RBUT = 5m running surface with rock buttress BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings) BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings) Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





**Haul Road Connector
Geometric Alignment
Km 0+000 - 0+294**

Page Stations: 0.0 to 1280.0

ROAD DESIGN SPECIFICATIONS	
Design Speed: 50 km/h	Min Curve Radius = 80m
Design Speed: 30 km/h	Max Grade = 12%
Min Curve Radius = 35m	Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	— Finished Road Surface	- - - Profile Subgrade
— Road Edges	█ Other Major Mine Facility	— Cut / Fill limits	— Original Ground
— Cut / Fill limits	█ Borrow Site	— Cleaning Limits	▨ Bedrock
— Cleaning Limits	█ Waste Site		
⊕ Benchmark			

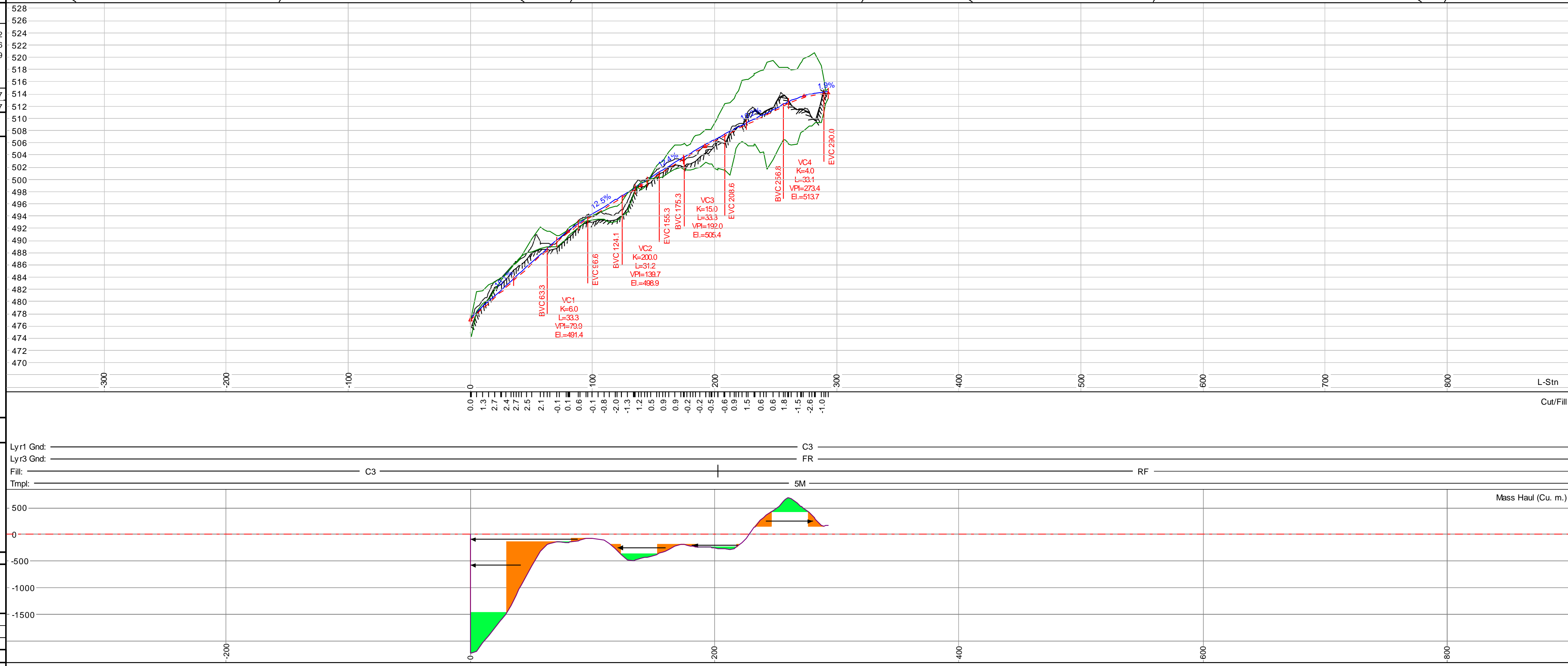
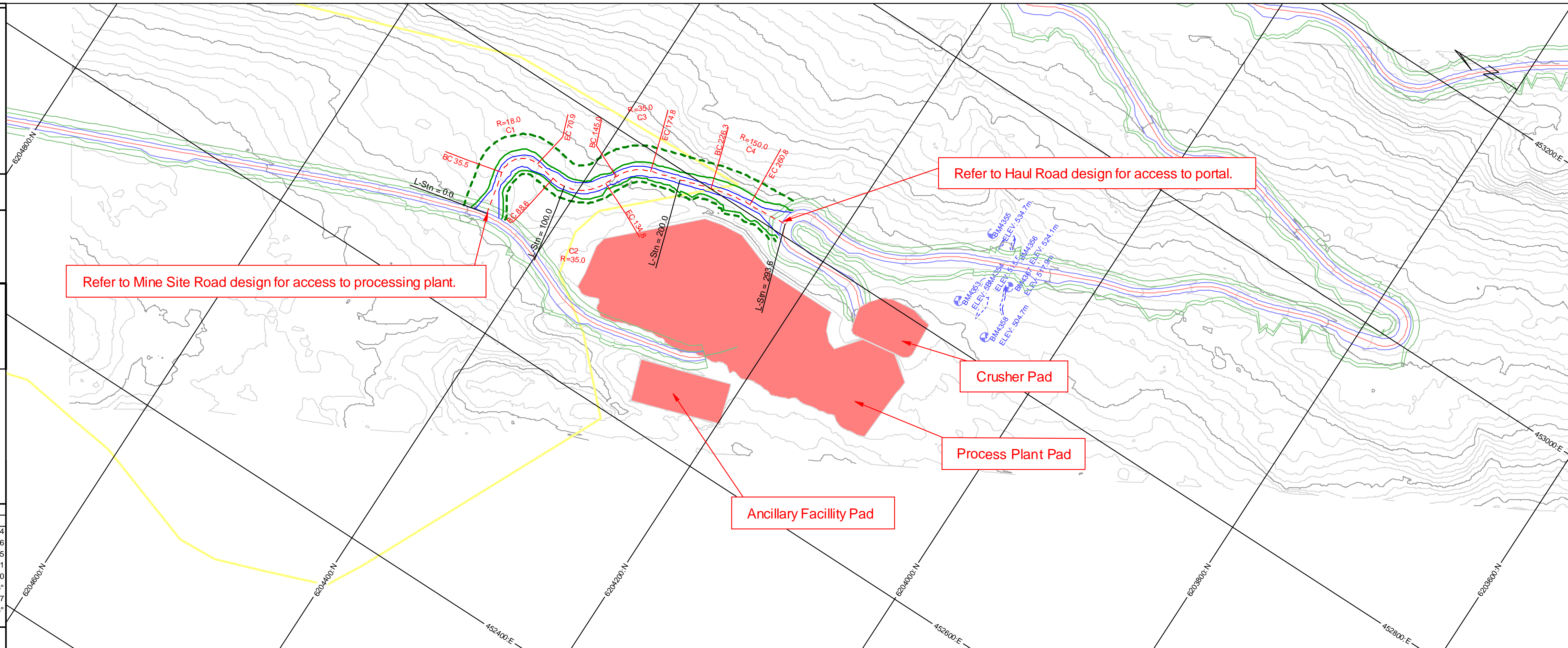
Curve Table (Da = deflection angle for a 10m arc.)				
IP Stn.	C1	C2	C3	C4
BC Stn.	63	116	161	244
Arc. Len.	36	89	145	226
EC Stn.	35	46	30	35
Radius	71	135	175	261
Angle	113°	-76°	49°	13°
Tangent	27	27	16	17
Da, a=100	318°	164°	164°	38°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V.	Lyr1 V.	Lyr2 V.	Lyr3 V.	SG Fill V.	B/W Vol.
m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.
0.0	498.6	0.0	796.2	1488.2	120.8	278.2
100.0	432.0	0.0	292.5	237.0	716.6	223.6
200.0	320.4	0.0	52.3	2019.1	1649.9	202.9
293.6						
Pg. Tot.	1251.0	0.0	1140.9	3744.2	2487.3	704.7
Cum. Tot.	1251.0	0.0	1140.9	3744.2	2487.3	704.7

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flows.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	5M = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	4MD = 5m running surface with 0.6m deep by 4m wide ditch
FR - Fractured, weak rock	2MD = 5m running surface with 0.6m deep by 2m wide ditch
C1 - Silty Sand rubble colluvium	5MR1 = 5m running surface with fill into river
C2 - Sand and gravel rubble colluvium with cobbles	RBUT = 5m running surface with rock buttress
C3 - Blocky colluvium	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T1 - Silty sand and gravel till	BR5 = 5m wide Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

Page Stations: 0-053.4 to 1+226.6

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%		

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pad	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Bedrock	
█ Cleaning Limits	█ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc.)	Curve Data																							
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20				
IP Stn.	0+012	0+028	0+110	0+128	0+201	0+261	0+413	0+477	0+520	0+563	0+637	0+664	0+720	0+854	0+904	0+043	0+093	0+131	0+163	0+214				
BC Stn.	0+024	0+018	0+085	0+117	0+153	0+245	0+403	0+463	0+514	0+555	0+619	0+648	0+710	0+833	0+885	0+017	0+078	0+110	0+144	0+199				
Arc Len.	22	18	32	21	80	31	30	27	13	19	29	27	36	28	35	50	32	32	50	30				
EC Stn.	0+002	0+036	0+110	0+138	0+236	0+277	0+433	0+490	0+527	0+574	0+648	0+678	0+740	0+867	0+920	0+067	0+110	0+142	0+194	0+229				
Radius	20	20	16	16	100	100	70	50	70	100	18	18	100	35	35	50	20	20	750	200				
Angle	63°	-53°	115°	74°	-46°	18°	-25°	31°	-11°	11°	-91°	-85°	21°	-47°	58°	-57°	91°	92°	4°	9°				
Tangent	12	10	25	12	43	16	15	14	7	9	18	16	18	15	19	27	20	21	25	15				
Da, a=100	286°	286°	358°	358°	57°	57°	82°	115°	82°	57°	318°	318°	57°	164°	164°	115°	286°	286°	8°	29°				

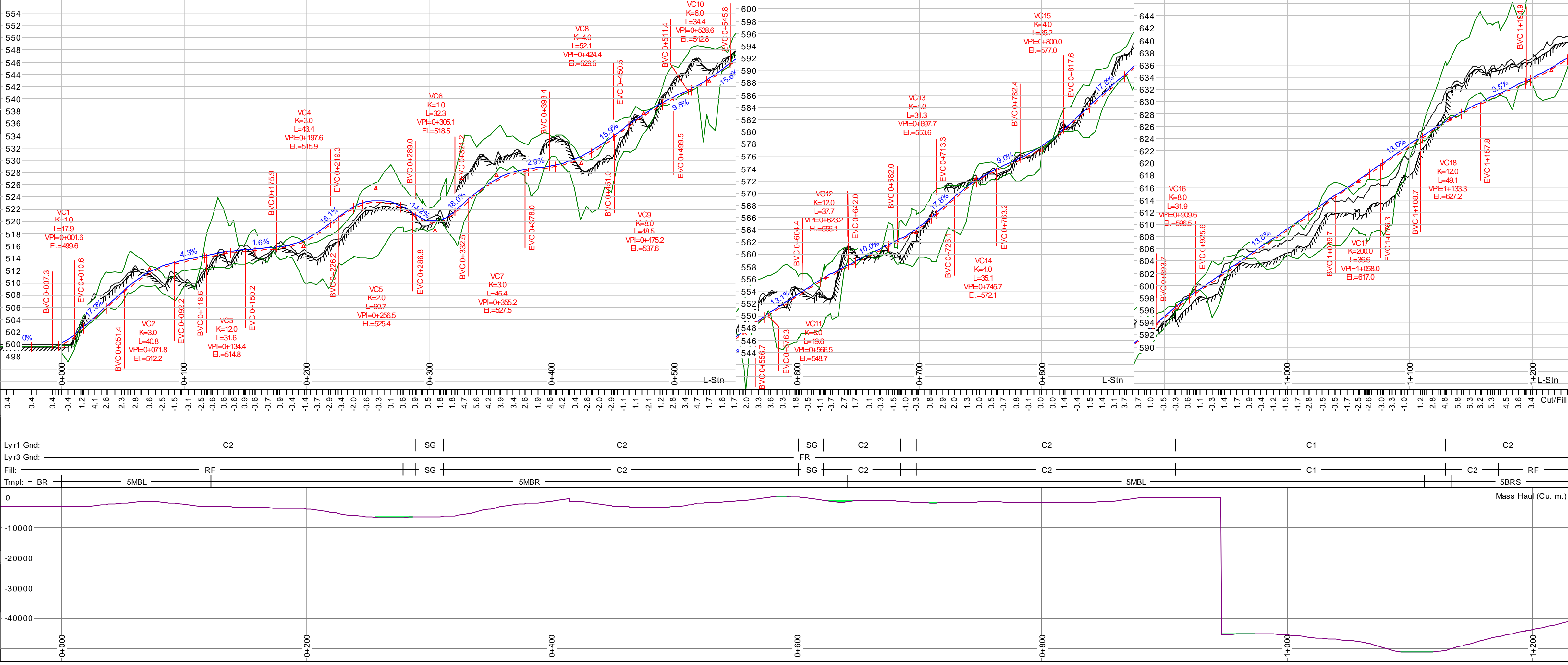
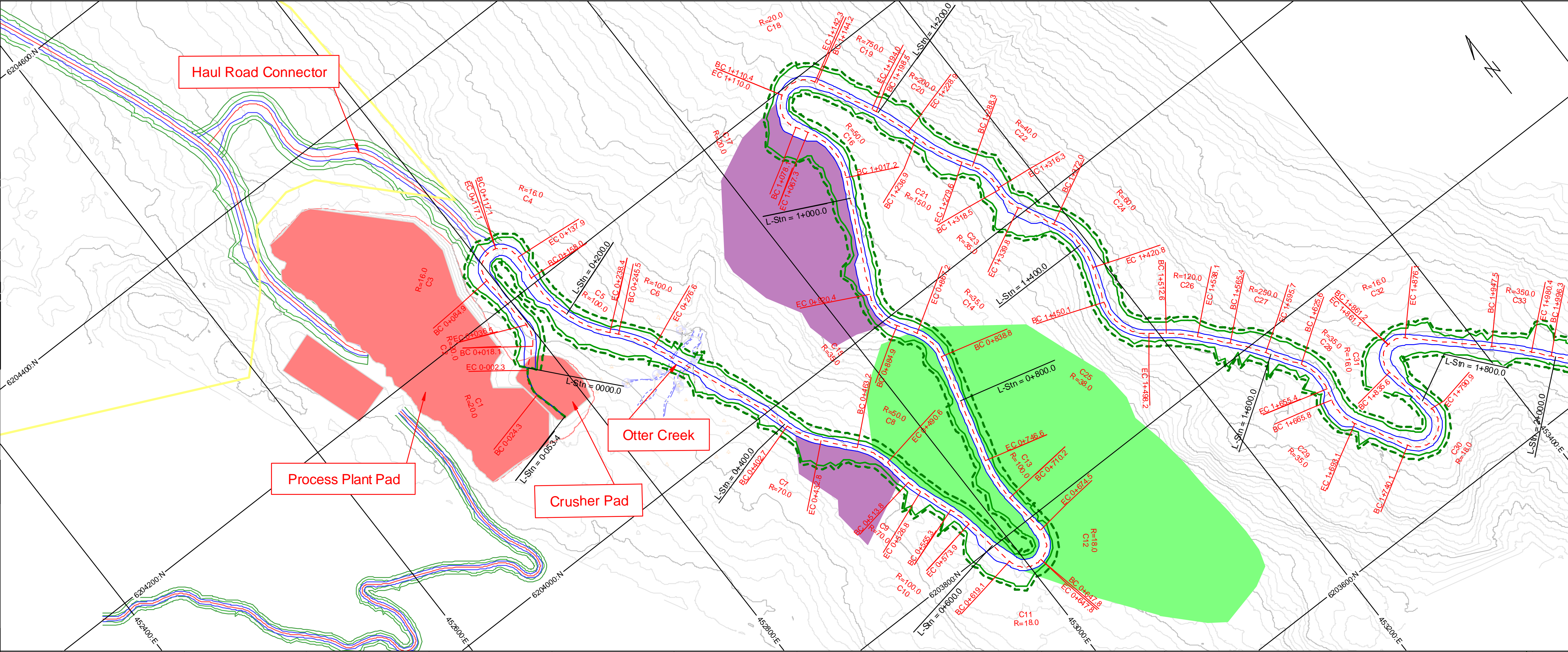
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Srfl Fill V. Cu. m.
B 0-053.4	0.0	0.0	0.0	0.0	0.0	0.0
B 0000.0	622.3	0.0	323.6	2219.1	3268.3	-3174.5
0+200.0	618.9	2.6	261.1	5834.7	3519.3	477.0
0+400.0	686.9	0.0	0.0	5577.7	3378.0	-1000.0
0+600.0	628.6	3.3	91.1	2286.8	4091.7	351.9
0+800.0						424.0
Pg. Tot.	2556.7	5.8	675.8	15918.2	14257.3	1624.9
Cum. Tot.	2556.7	5.8	675.8	15918.2	14257.3	1624.9

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMBL = 5m running surface with 0.6m high berm on left shoulder SMBR = 5m running surface with 0.6m high berm on right shoulder SBR = 5m running surface with 0.6m high berm on right with steepened bermn fill slope SMBB = 5m running surface with 0.6m high berm on left and right shoulder BR = Bridge (no cut/fill) Ditching = 0.6m wide by 0.6m deep Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

Page Stations: 0+970.6 to 2+250.6

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%	Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pad	— Finished Road Surface	— Profile Subgrade
— Road Edges	█ Other Major Mine Facility	— Cut / Fill limits	— Original Ground
— Cut / Fill limits	█ Borrow Site	—	— Bedrock
— Cleaning Limits	█ Waste Site		
⊕ Benchmark			

IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)																																			
	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38													
14045.0964	1311.1664	214.2584	303.3264	308.4784	525.5814	641.6864	850.8584	969.9684	1012.4058	1224.1894	257.1401	17.0784	110.1484	199.2374	288.3184	372.4564	513.5654	626.6664	740.8364	861.9414	982.0434	1084.1604	160.2384	50.32	32.50	30.43	28.21	49.48	26.30	30.27	51.25	15.33	30.30	31.55	37.14	
14067.1104	110.1424	198.2284	286.3164	340.4214	436.5384	596.6554	698.7914	861.9414	876.9884	922.0724	138.2184	275.1401	50.20	20.750	200.150	40.35	60.38	120.250	35.35	18.16	16.350	850.100	60.80	80.80	57.91	92.4	9.16	40.36	47.72	12.77	49.45	61.91	53.5	2.17	29.39	39.27
14067.1104	110.1424	198.2284	286.3164	340.4214	436.5384	596.6554	698.7914	861.9414	876.9884	922.0724	138.2184	275.1401	50.20	20.750	200.150	40.35	60.38	120.250	35.35	18.16	16.350	850.100	60.80	80.80	57.91	92.4	9.16	40.36	47.72	12.77	49.45	61.91	53.5	2.17	29.39	39.27
Da, a=100	15°28'28"	8°29'38"	43°164'	95°151'	48°23'	64°318'	358°358'	16°7'	57°95'	72°72'																										

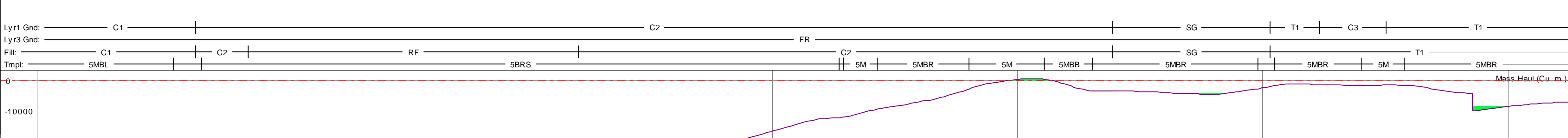
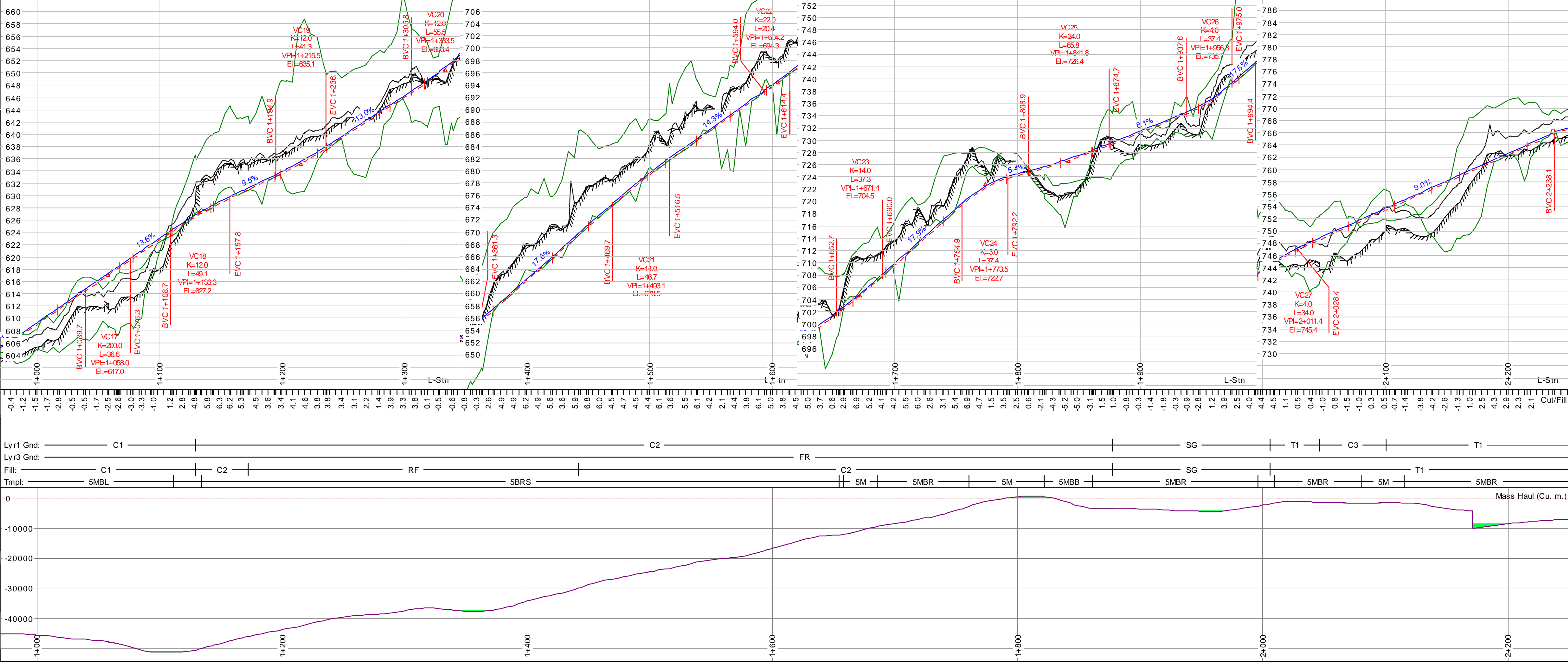
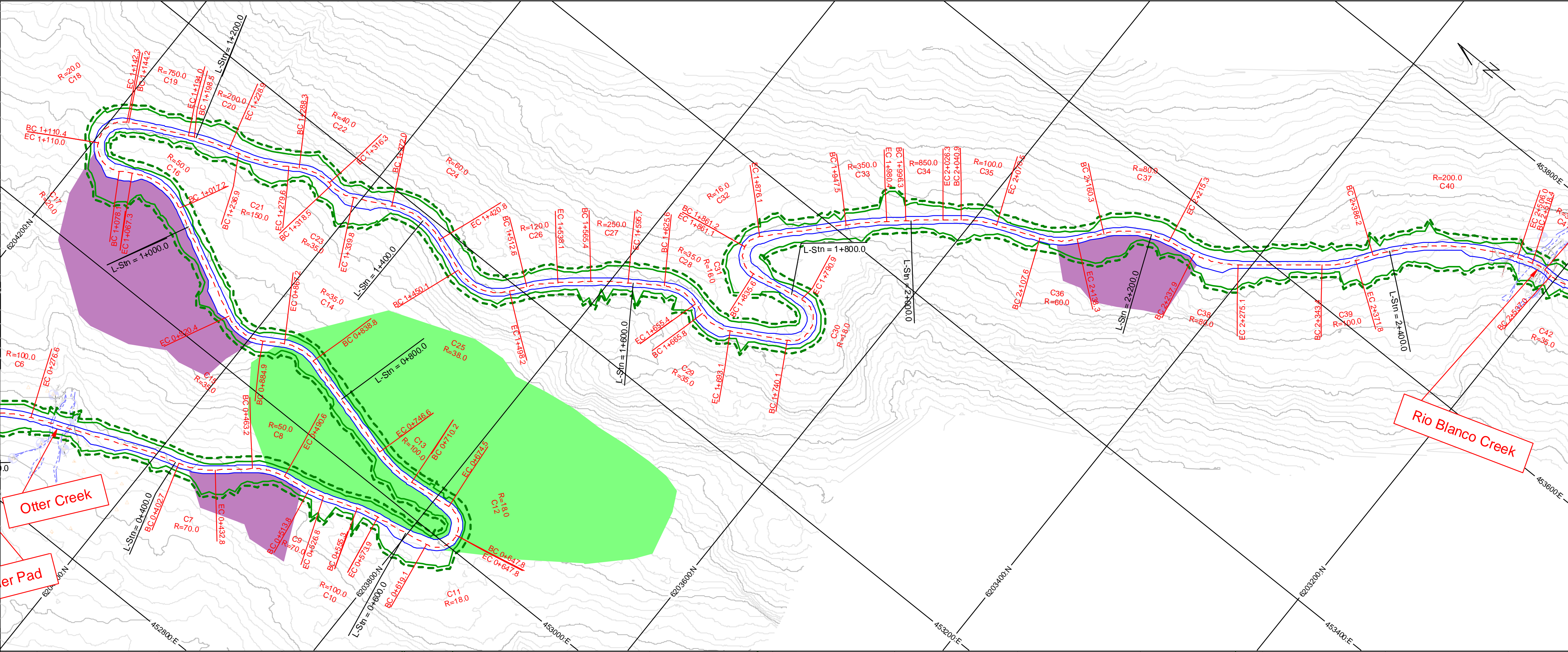
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
1+000.0	656.4	0.0	1020.7	6638.3	5887.7	418.0
1+200.0	950.9	0.0	1164.8	11312.4	2949.4	370.8
1+400.0	704.5	0.0	0.0	17944.2	240.1	337.5
1+600.0	666.3	0.0	0.0	17415.6	338.9	409.5
1+800.0	780.0	0.0	1131.6	2104.3	6028.3	388.1
2+000.0						
Pg. Tot.	3758.1	0.0	3317.1	55414.9	15444.5	1923.9
Cum. Tot.	6937.2	5.9	4574.0	73622.4	31250.7	3919.3

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMBL = 5m running surface with 0.6m high berm on left shoulder SMR = 5m running surface with 0.6m high berm on right shoulder SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope SMBB = 5m running surface with 0.6m high berm on left and right shoulder BR = Bridge (no cut/fill) Ditching = 0.6m wide by 0.6m deep Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

Page Stations: 1+994.6 to 3+274.6

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper	
Design Speed: 30 km/h	Min Curve Radius = 16m		
Max Grade = 18%			

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pad	— Finished Road Surface	— Profile Subgrade
— Road Edges	█ Other Major Mine Facility	— Cut / Fill limits	— Original Ground
— Cut / Fill limits	█ Borrow Site	—	— Bedrock
— Cleaning Limits	█ Waste Site		
⊕ Benchmark			

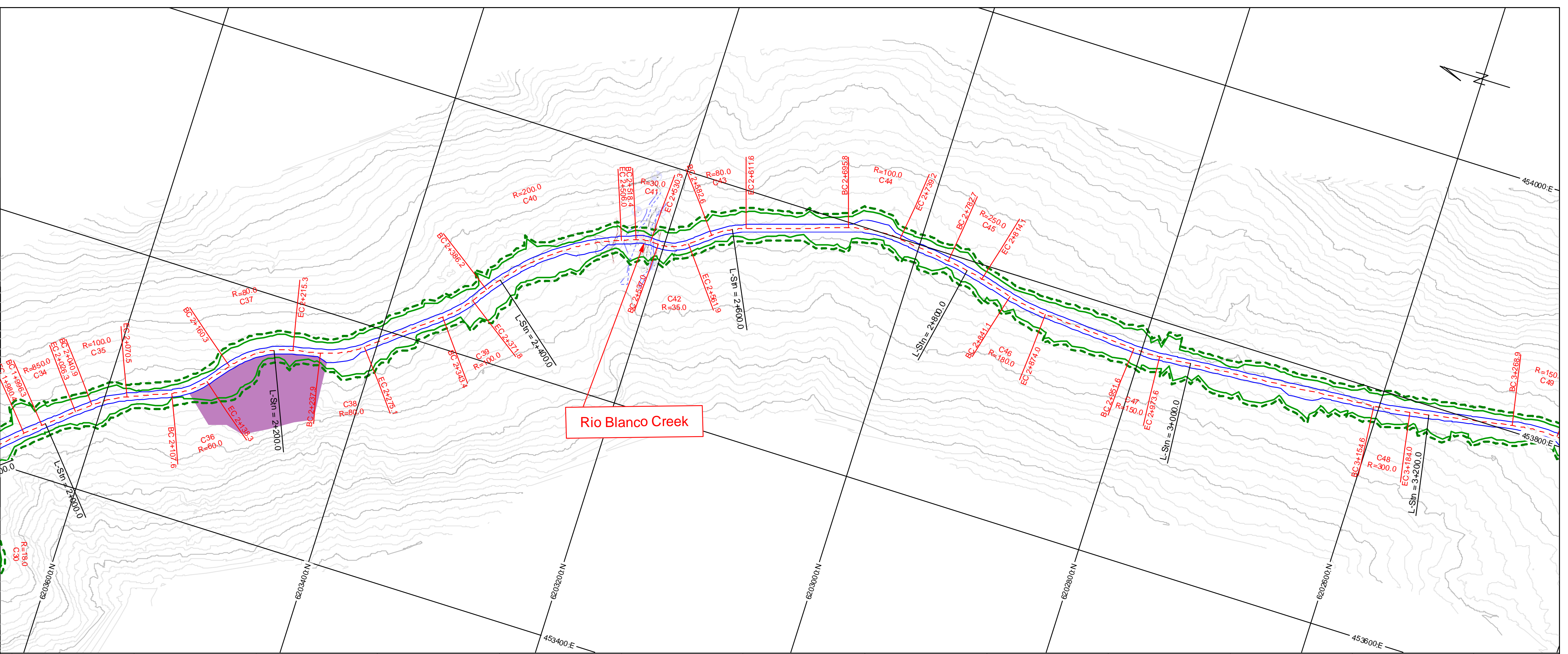
IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)															
	C34	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49
2+011	2+056	2+123	2+189	2+257	2+358	2+448	2+524	2+550	2+597	2+718	2+798	2+858	2+963	3+169	3+288	
BC Stn.	1+996	2+041	2+108	2+160	2+238	2+343	2+386	2+518	2+537	2+583	2+696	2+783	2+841	2+952	3+155	3+269
Arc Len.	30	30	31	55	37	28	120	12	25	29	43	31	33	22	29	38
EC Stn.	2+026	2+071	2+138	2+215	2+275	2+372	2+506	2+530	2+562	2+612	2+739	2+814	2+874	2+974	3+184	3+307
Radius	850	100	60	80	100	200	30	35	80	100	250	180	150	300	150	
Angle	2°	17°	29°	39°	27°	16°	34°	23°	41°	21°	25°	7°	10°	8°	6°	15°
Tangent	15	15	16	29	19	14	62	6	13	15	22	16	16	11	15	19
Da, a=100	7°	57°	95°	72°	72°	57°	29°	191°	164°	72°	57°	23°	32°	38°	19°	38°

EARTH WORK VOLUMES (Final Cubic Meters)							
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
2+000.0	650.9	416.4	2306.2	1421.8	4438.4	-5835.0	337.5
2+200.0	970.8	0.0	4913.2	1204.7	3169.0		370.5
2+400.0	88.3	2032.6	2853.7	399.0	4297.9		370.5
2+600.0	0.0	2243.3	2444.7	84.4	1393.6		370.5
2+800.0	50.2	1701.9	1442.9	323.8	3591.0		337.5
Pg. Tot.	1760.2	6394.2	13760.7	3433.7	16889.9		1786.5
Cum. Tot.	8697.3	6400.1	18334.7	77056.1	48140.6		5705.8

CULVERT TABLE	
Note:	- Required culverts have been excluded from this design.
	- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
	- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SMBL = 5m running surface with 0.6m high berm on left shoulder
FR - Fractured, weak rock	SMBR = 5m running surface with 0.6m high berm on right shoulder
C1 - Silty Sand rubble colluvium	SBR5 = 5m running surface with 0.6m high berm on right with steepened berm fill slope
C2 - Sand and gravel rubble colluvium with cobbles	SMBB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

Page Stations: 3+018.6 to 4+298.6

ROAD DESIGN SPECIFICATIONS

Design Speed: 30 km/h
Min Curve Radius = 16m
Max Grade = 18%

Plan Scale 1:2000

Profile Vert Scale 1:400

Profile Horz Scale 1:2000

Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)

- - - L-line Location
- Road Edges
- Cut / Fill Limits
- Cleaning Limits
- ⊕ Benchmark
- Mine Pad
- Other Major Mine Facility
- Borrow Site
- Waste Site
- Finished Road Surface
- Profile Subgrade
- Cut / Fill limits
- Original Ground
- Bedrock

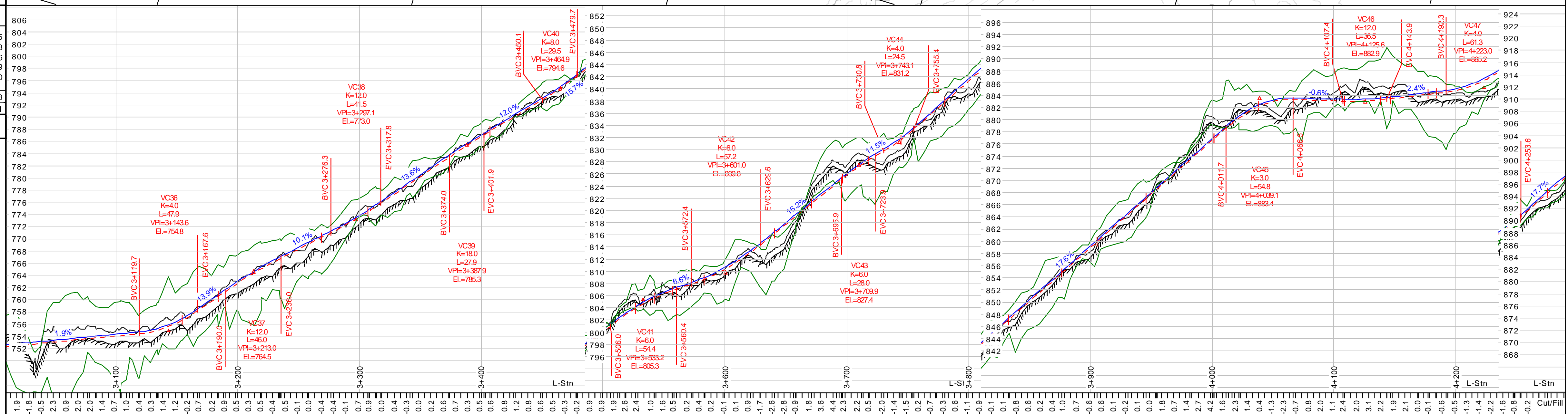
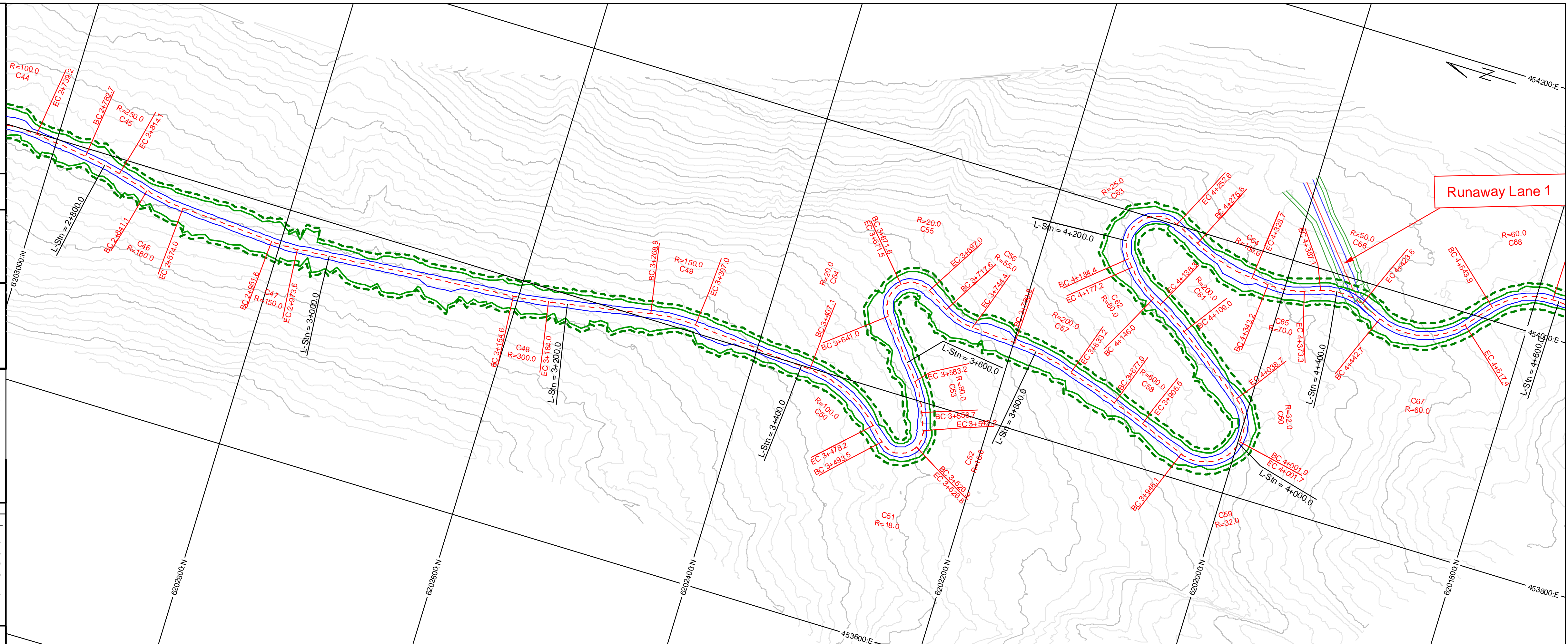
	C48	C49	C50	C51	C52	C53	C54	C55	C56	C57	C58	C59	C60	C61	C62	C63	C64
IP Stn.	3+169.0	3+288.0	3+444.0	3+517.0	3+535.0	3+570.0	3+660.0	3+686.0	3+731.0	3+807.0	3+891.0	3+984.0	4+023.0	4+124.0	4+162.0	4+303.0	4+302.0
BC Stn.	3+155.0	3+269.0	3+407.0	3+493.0	3+527.0	3+557.0	3+641.0	3+672.0	3+718.0	3+781.0	3+877.0	3+946.0	4+002.0	4+109.0	4+146.0	4+184.0	4+276.0
Arc. Len.	29.38	71.33	15.27	30.25	27.30	25.27	29.56	37.29	31.68	53.53							
EC Stn.	3+184.0	3+307.0	3+478.0	3+527.0	3+542.0	3+583.0	3+671.0	3+697.0	3+744.0	3+833.0	3+906.0	4+002.0	4+039.0	4+138.0	4+177.0	4+253.0	4+329.0
Radius	300	150	100	18	18	80	20	20	55	200	600	32	32	200	80	25	150
Angle	-6°	15°	41°	-106°	-49°	-19°	87°	73°	-28°	15°	3°	-100°	-66°	-8°	22°	156°	-20°
Tangent	15	19	37	24	8	13	19	15	14	26	14	38	21	15	16	119	27
Da, a=100	19°	38°	57°	318°	318°	72°	286°	286°	104°	10°	179°	179°	29°	29°	72°	229°	38°

EARTH WORK VOLUMES (Final Cubic Meters)

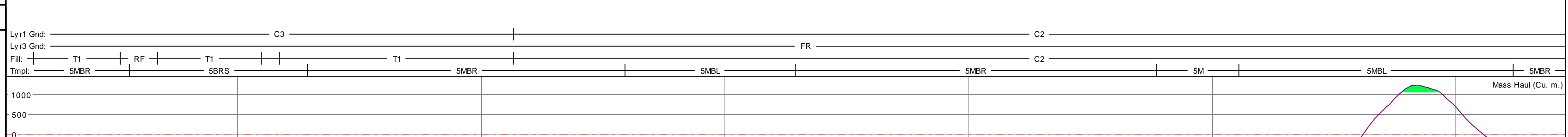
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
3+200.0	774.4	1011.6	590.0	177.4	2656.8		370.5
3+400.0	578.5	121.1	928.2	882.5	1011.0		375.8
3+600.0	734.1	0.0	959.6	2073.7	3855.5		414.6
3+800.0	621.7	0.0	1016.6	1670.3	2001.1		355.9
4+000.0	663.5	0.0	1187.9	2851.2	2187.3		359.0
4+200.0							
Pg. Tot.	3372.3	1132.7	4682.3	7655.1	11711.6		1875.8
Cum. Tot.	12995.2	8797.7	24028.5	86433.5	63424.5		7952.1

CULVERT TABLE

- Note:
- Required culverts have been excluded from this design.
 - Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
 - All stream crossings will be designed to handle Q100 flow s.



SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SMBL = 5m running surface with 0.6m high berm on left shoulder
FR - Fractured, weak rock	SMBR = 5m running surface with 0.6m high berm on right shoulder
C1 - Silty Sand rubble colluvium	5BRS = 5m running surface with 0.6m high berm on right with steepened bermn fill slope
C2 - Sand and gravel rubble colluvium with cobbles	5MBB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silty or clay based basal till	Surfacing depth = 0.3m



Revision	Description	Date	By	Approved	Revision



**Haul Road to Lower Portal
Geometric Alignment
Km 0+000 - 11+175**

Page Stations: 4+042.6 to 5+322.6

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%		

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining, OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	— Mine Pad	— Finished Road Surface
— Road Edges	— Other Major Mine Facility	- - - Profile Subgrade
— Cut / Fill Limits	— Borrow Site	— Cut / Fill limits
- - - Clearing Limits	— Waste Site	— Original Ground
⊕ Benchmark		— Bedrock

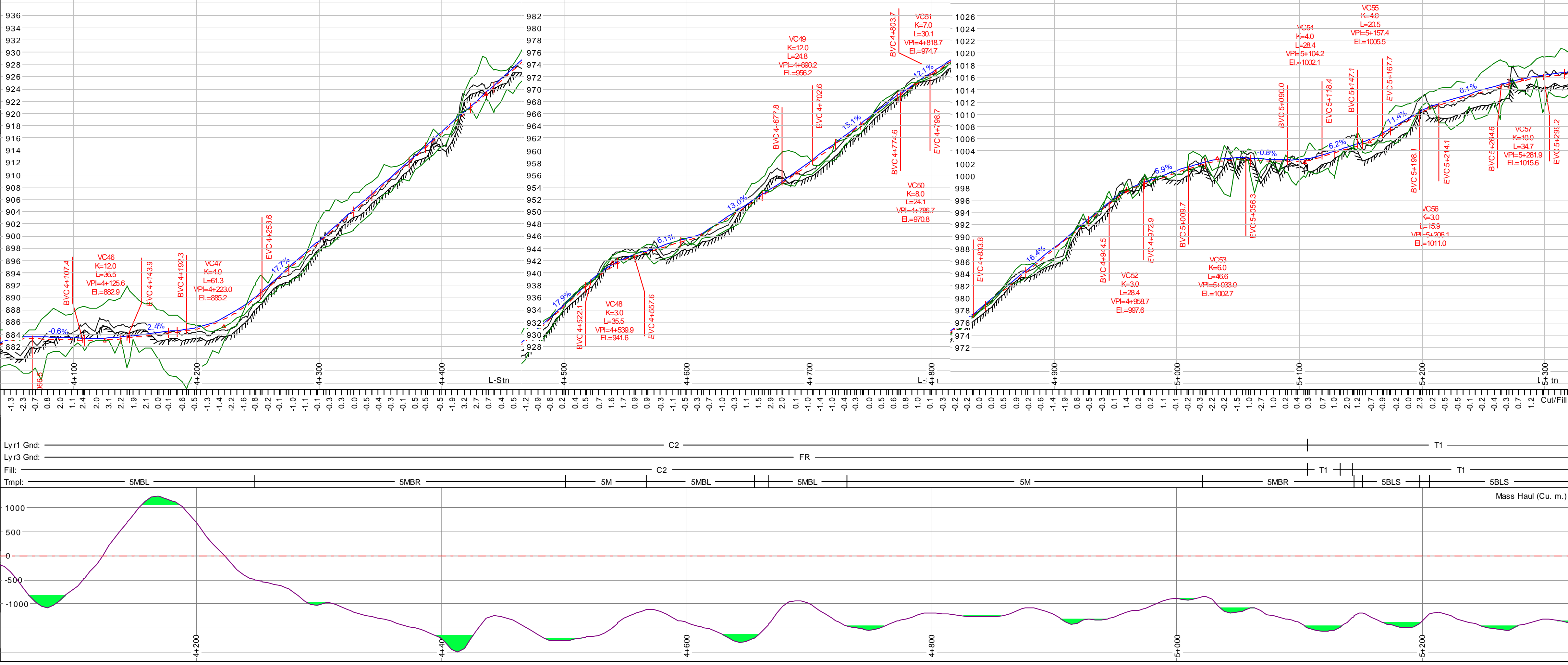
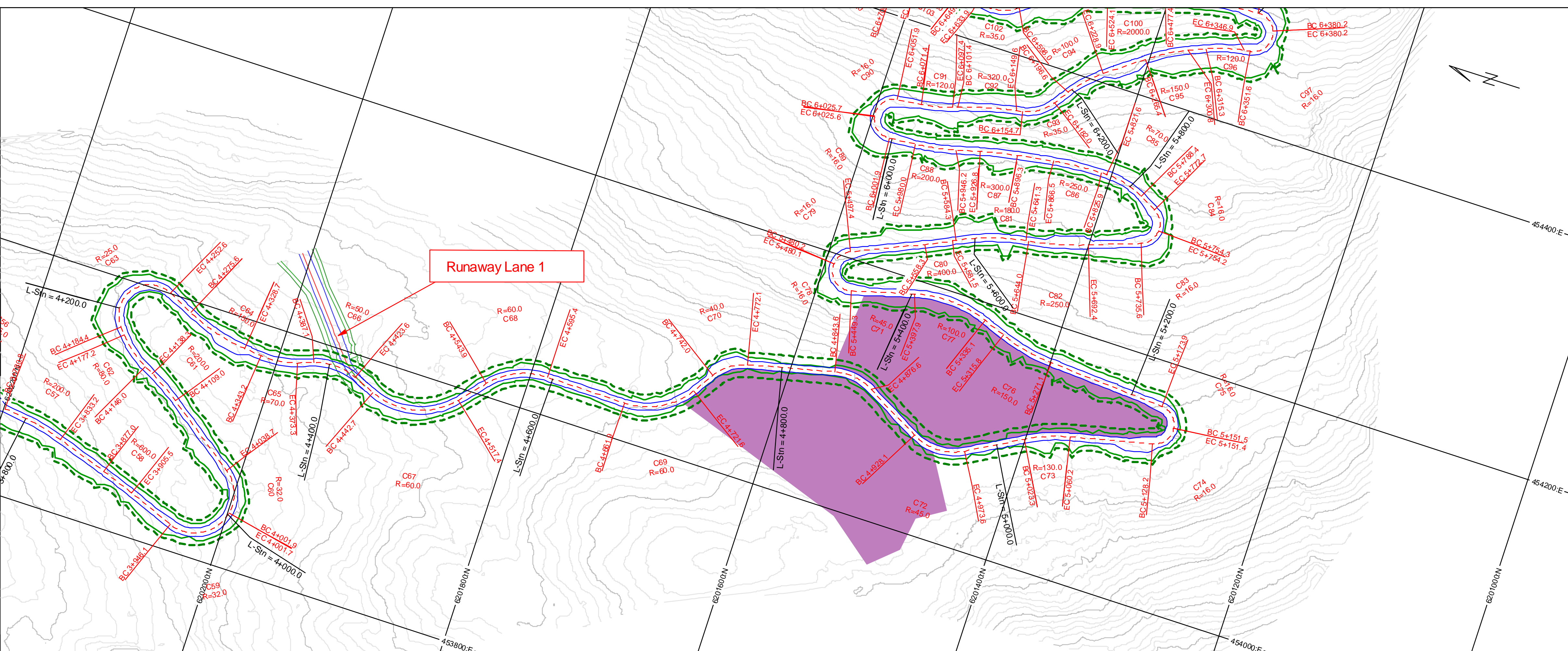
	C61	C62	C63	C64	C65	C66	C67	C68	C69	C70	C71	C72	C73	C74	C75	C76
IP Stn.	4+124	4+162	4+303	4+302	4+358	4+406	4+486	4+571	4+695	4+758	4+861	4+953	5+042	5+142	5+165	5+294
BC Stn.	4+109	4+146	4+184	4+276	4+343	4+387	4+443	4+544	4+662	4+742	4+844	4+928	5+023	5+128	5+151	5+271
Asc. Len.	29	31	68	53	30	37	75	51	60	30	33	45	37	23	22	45
EC Stn.	4+138	4+177	4+253	4+329	4+373	4+424	4+517	4+595	4+722	4+772	4+877	4+974	5+060	5+151	5+174	5+316
Radius	200	80	25	150	70	50	60	60	60	40	45	45	130	16	16	150
Angle	-8°	22°	156°	-20°	-25°	42°	-71°	49°	-57°	43°	42°	-58°	16°	-83°	-80°	17°
Tangent	15	16	119	27	15	19	43	27	33	16	17	25	19	14	14	23
Da, a=100	29°	72°	229°	38°	82°	115°	95°	95°	143°	127°	127°	44°	358°	398°	38°	

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
4+200.0	593.9	0.0	413.7	412.9	3237.7		388.5
4+400.0	503.5	0.0	783.6	947.1	1401.2		337.5
4+600.0	471.5	0.0	673.1	746.3	1215.3		370.5
4+800.0	373.8	0.0	550.3	328.6	586.6		337.5
5+000.0	276.2	8.0	1249.8	240.5	1968.5		419.5
Pg. Tot.	2218.9	8.0	3670.6	2675.3	8409.3		1853.5
Cum. Tot.	15214.1	8805.7	27699.1	89108.8	71833.8		9805.7

Station	Structure	Notes
		- Required culverts have been excluded from this design.
		- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
		- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SMBL = 5m running surface with 0.6m high berm on left shoulder
FR - Fractured, weak rock	SMBR = 5m running surface with 0.6m high berm on right shoulder
C1 - Silty Sand rubble colluvium	SBR5 = 5m running surface with 0.6m high berm on right with steepened bermn fill slope
C2 - Sand and gravel rubble colluvium with cobbles	SMBB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





**Haul Road to Lower Portal
Geometric Alignment
Km 0+000 - 11+175**

Page Stations: 5+066.6 to 6+346.6

ROAD DESIGN SPECIFICATIONS

Design Speed: 30 km/h
Min Curve Radius = 16m
Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000

Formatted to Plot on 24"x36" Paper

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining, OEL supplemented with total station and RTK survey work through Bitter Creek.

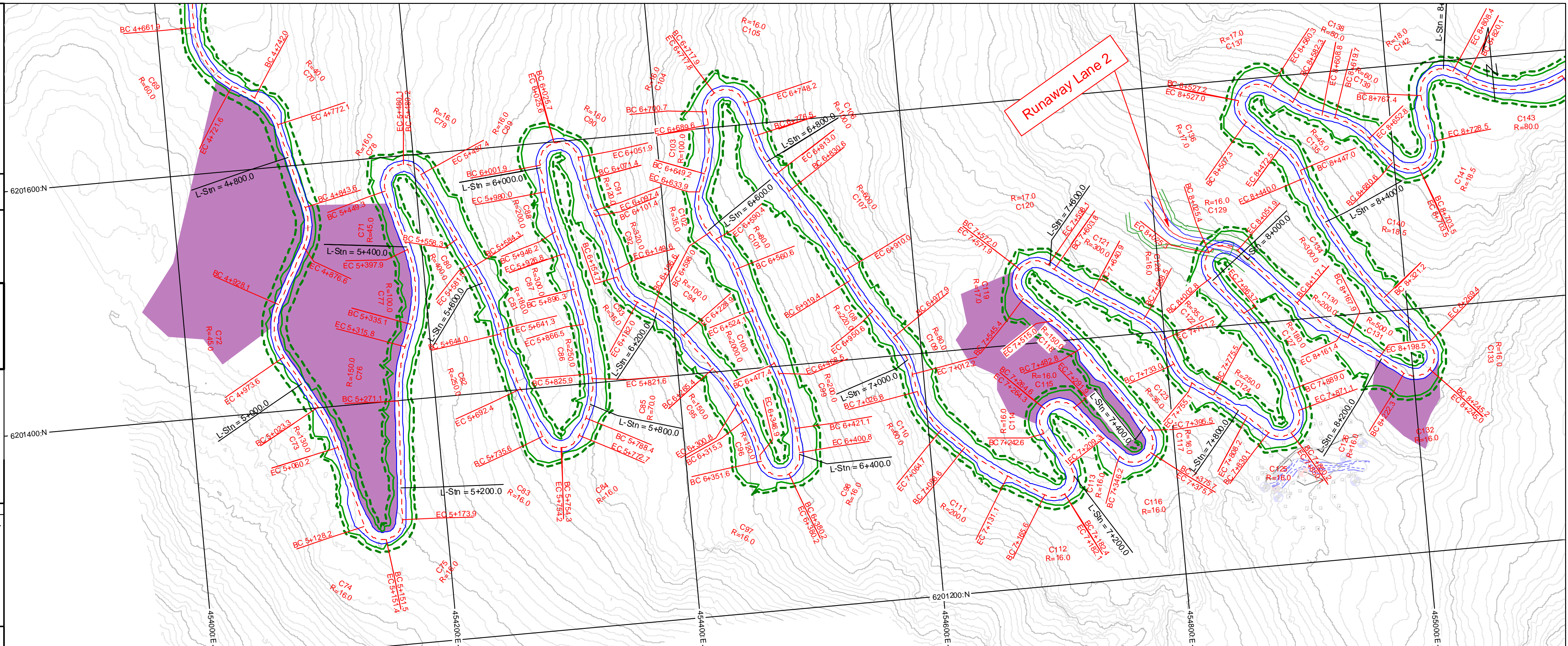
Plan Legend (all may not be applicable)

- - - L-line Location
- Road Edges
- Cut / Fill limits
- Clearing Limits
- ⊕ Benchmark

- Mine Pad
- Other Major Mine Facility
- Borrow Site
- Waste Site

Profile Legend

- Finished Road Surface
- Profile Subgrade
- Cut / Fill limits
- Original Ground
- Bedrock

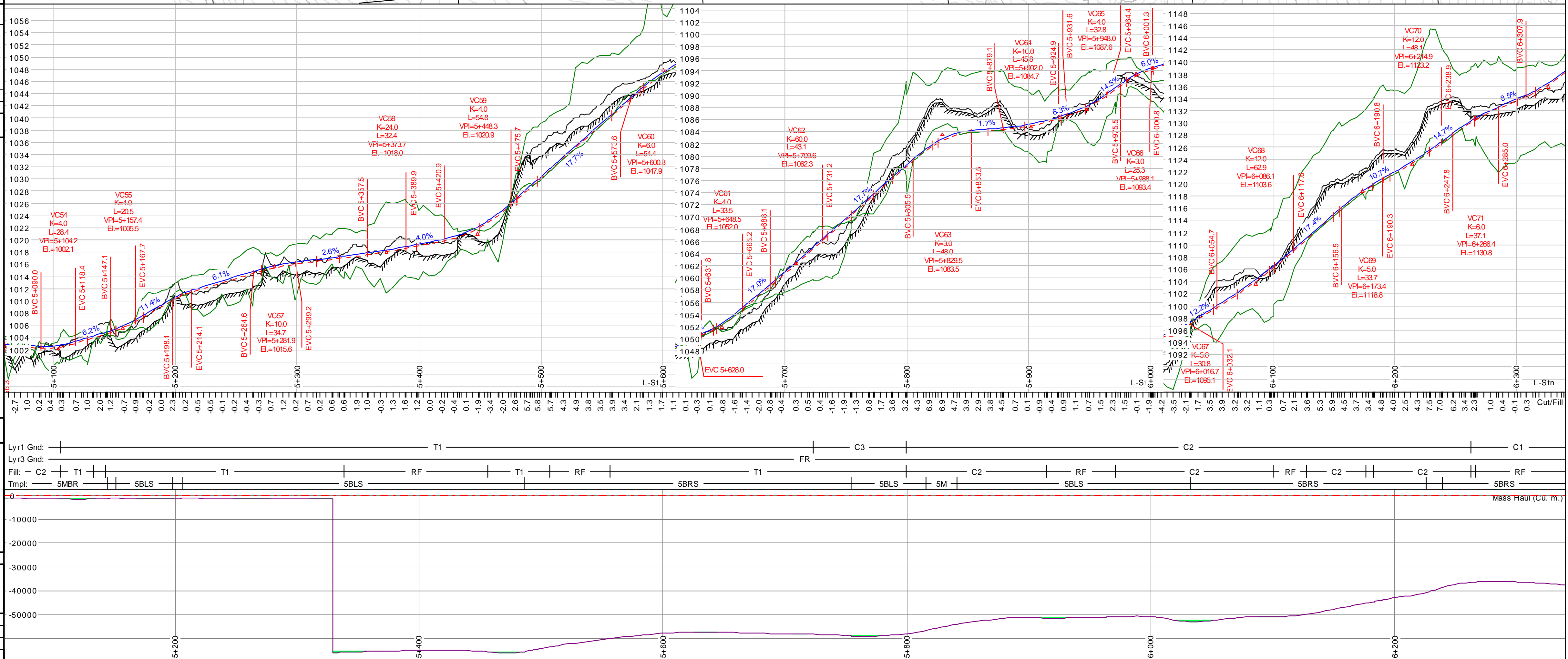


	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86	C87	C88	C89	C90	C91	C92	C93	C94	C95	C96
IP Stn.	54148	1654296	3064728	4364576	6154668	7464765	8054845	9124968	10164084	10484084	11264166	12164288	13114331	14114331	15114331	16114331	17114331	18114331	19114331	20114331	21114331	22114331	23114331
BC Stn.	54126	1654275	3054449	4354498	6144558	7454648	8044736	9114826	10154908	10474908	11254984	12154984	13104984	14104984	15104984	16104984	17104984	18104984	19104984	20104984	21104984	22104984	23104984
Arc Len.	23	22	45	63	31	17	23	57	48	19	18	33	41	31	34	24	26	26	48	27	32	35	32
EC Stn.	54158	1744316	3084485	4384588	6434696	7784779	8294867	9294960	10264058	10584058	11564188	12284308	13474347	14474347	15474347	16474347	17474347	18474347	19474347	20474347	21474347	22474347	23474347
Radius	16	16	150	100	16	16	16	16	16	16	250	300	200	16	16	120	320	35	100	150	120	120	
Angle	-83°	-80°	17°	-36°	10°	62°	-3°	18°	-11°	-67°	-66°	-27°	-9°	-6°	10°	85°	94°	12°	9°	-45°	19°	14°	15°
Tangent	14	14	23	32	23	10	12	29	24	11	10	17	20	15	17	13	24	14	16	18	16	16	
Da, a=100	358°	358°	38°	57°	358°	358°	14°	32°	23°	358°	358°	82°	23°	19°	29°	358°	358°	48°	18°	164°	57°	38°	48°

EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
5+200.0	0.0	20.2	2351.6	383.6	1777.7	337.5
5+400.0	0.0	27.3	3573.7	5181.3	1740.9	394.3
5+600.0	123.4	534.7	1168.7	564.3	2393.0	423.4
5+800.0	693.6	0.0	894.2	7583.8	1312.5	342.4
6+000.0	777.4	0.0	1004.6	9913.2	2978.4	386.5
Pg. Tot.	1594.3	582.2	8992.8	23626.2	10202.5	1884.0
Cum. Tot.	16808.4	9387.9	36691.9	112735.0	82036.3	11689.7

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.



SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SMBL = 5m running surface with 0.6m high berm on left shoulder
FR - Fractured, weak rock	SMBR = 5m running surface with 0.6m high berm on right shoulder
C1 - Silty Sand rubble colluvium	SBRS = 5m running surface with 0.6m high berm on right with steepened bermn fill slope
C2 - Sand and gravel rubble colluvium with cobbles	SMBB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silt or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision
---	Survey By: See Notes Above				---
---	Design By: Matthew Dickie, ET				---
---	Reviewed By: Michael Foster, P.Eng				---



**Haul Road to Lower Portal
Geometric Alignment
Km 0+000 - 11+175**

Page Stations: 6+090.6 to 7+370.6

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%		

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	█ Mine Pad	— Finished Road Surface
— Road Edges	█ Other Major Mine Facility	- - - Profile Subgrade
— Cut / Fill Limits	█ Borrow Site	— Cut / Fill limits
— Cleaning Limits	█ Waste Site	— Original Ground
⊕ Benchmark		▨ Bedrock

Curve Table (Da = deflection angle for a 10m arc.)

IP Stn	BC Stn	Arc Len	EC Stn	Radius	Angle	Tangent	Da, a=100
6+090.6	6+090.6	0	6+090.6				
6+100	6+100	10	6+100				
6+200	6+200	100	6+200				
6+300	6+300	100	6+300				
6+400	6+400	100	6+400				
6+500	6+500	100	6+500				
6+600	6+600	100	6+600				
6+700	6+700	100	6+700				
6+800	6+800	100	6+800				
6+900	6+900	100	6+900				
7+000	7+000	100	7+000				
7+100	7+100	100	7+100				
7+200	7+200	100	7+200				
7+300	7+300	100	7+300				
7+370.6	7+370.6	70.6	7+370.6				

EARTH WORK VOLUMES (Final Cubic Meters)

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
6+200.0	890.9	0.0	1655.8	8479.0	4287.4		420.9
6+400.0	786.0	0.0	1653.2	11049.0	973.9		355.8
6+600.0	794.9	0.0	1267.6	2792.4	2403.7		424.4
6+800.0	351.4	6.3	1908.1	7649.7	1523.4		337.5
7+000.0	441.2	0.0	2817.8	12028.8	283.5		408.3
7+200.0							
Pg. Tot.	3264.5	6.4	9302.5	41998.9	9471.9		1946.9
Cum. Tot.	20072.9	9394.3	45994.4	154733.9	91508.2		13636.6

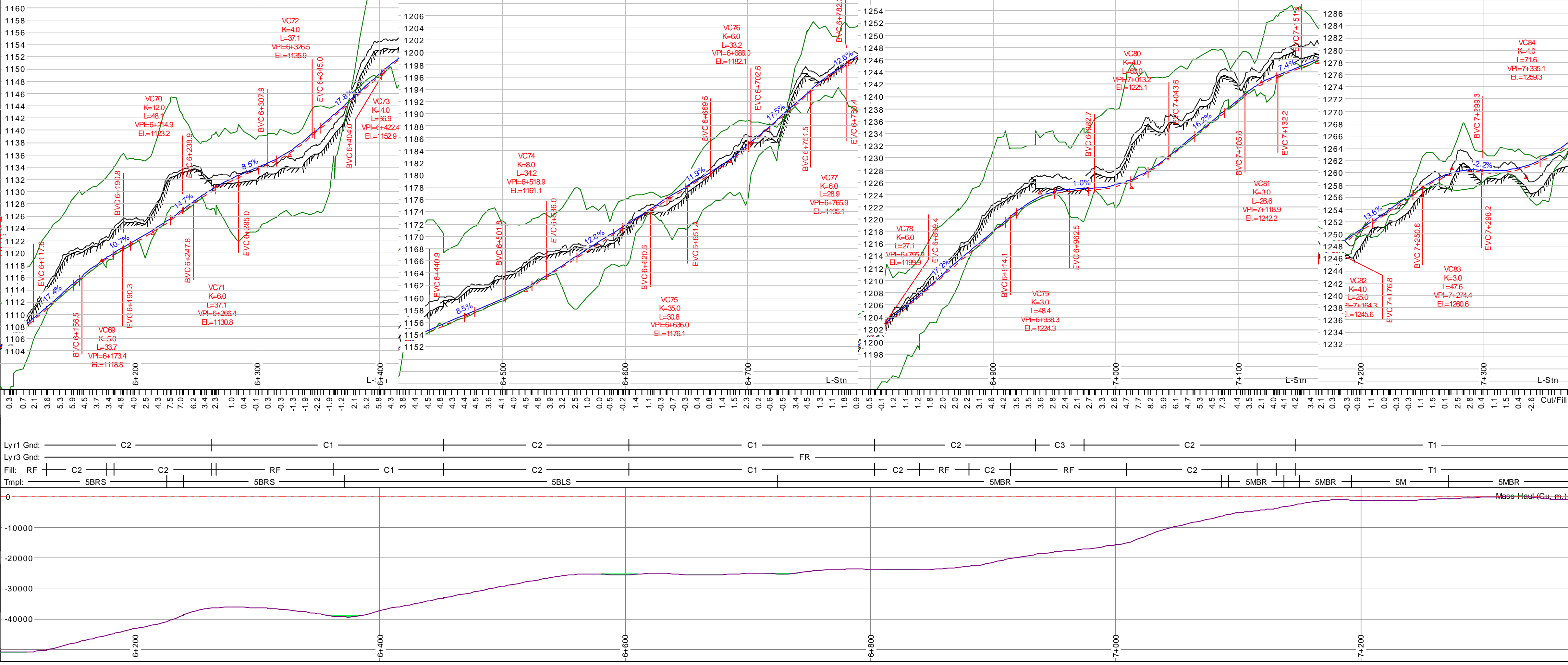
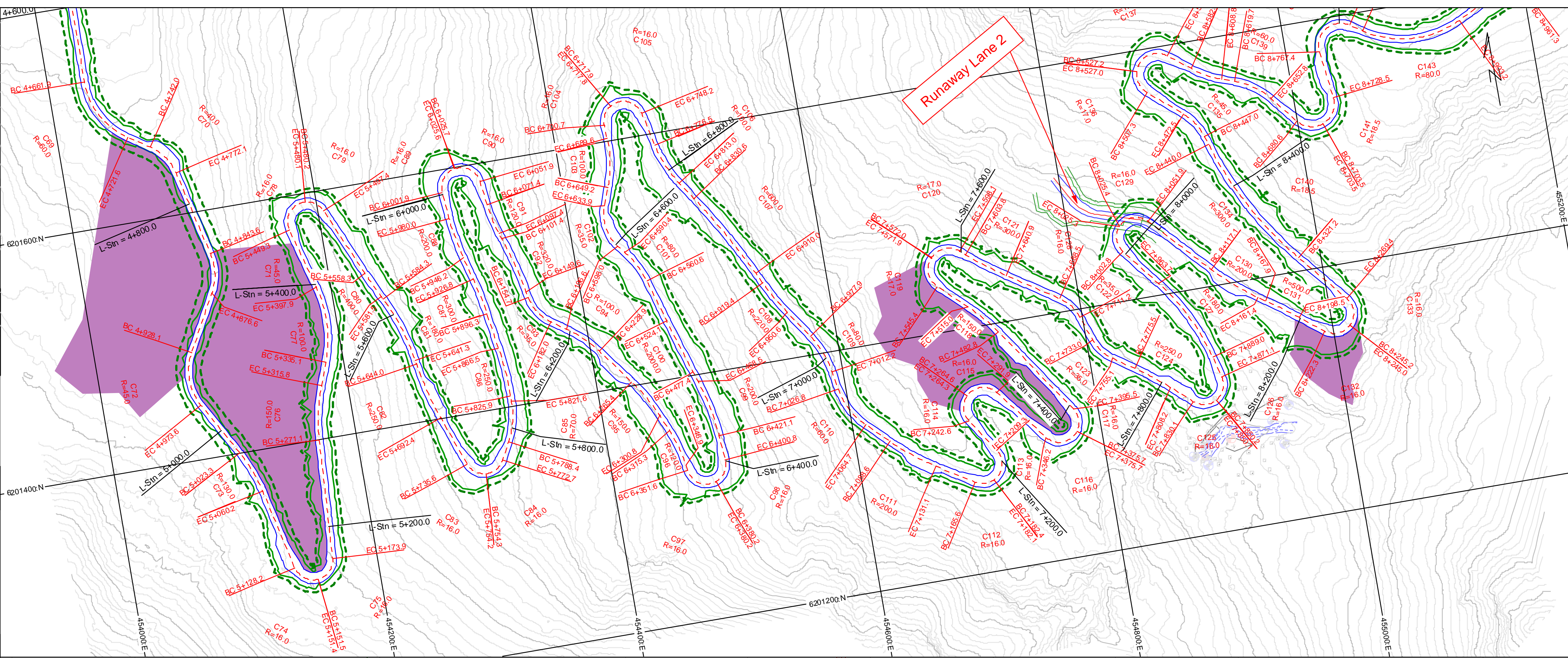
CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
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FR - Fractured, weak rock	SMBR = 5m running surface with 0.6m high berm on right shoulder
C1 - Silty Sand rubble colluvium	SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope
C2 - Sand and gravel rubble colluvium with cobbles	SBMB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silty or clay based basal till	Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision

Survey By: See Notes Above
Design By: Matthew Dickie, ET
Reviewed By: Michael Foster, P.Eng
Page 7 of 11
May 2017
May 2017





Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

Page Stations: 7+114.6 to 8+394.6

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h	Plan Scale 1:2000
Min Curve Radius = 16m	Profile Vert Scale 1:400
Max Grade = 18%	Profile Horz Scale 1:2000
Formatted to Plot on 24"x36" Paper	

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

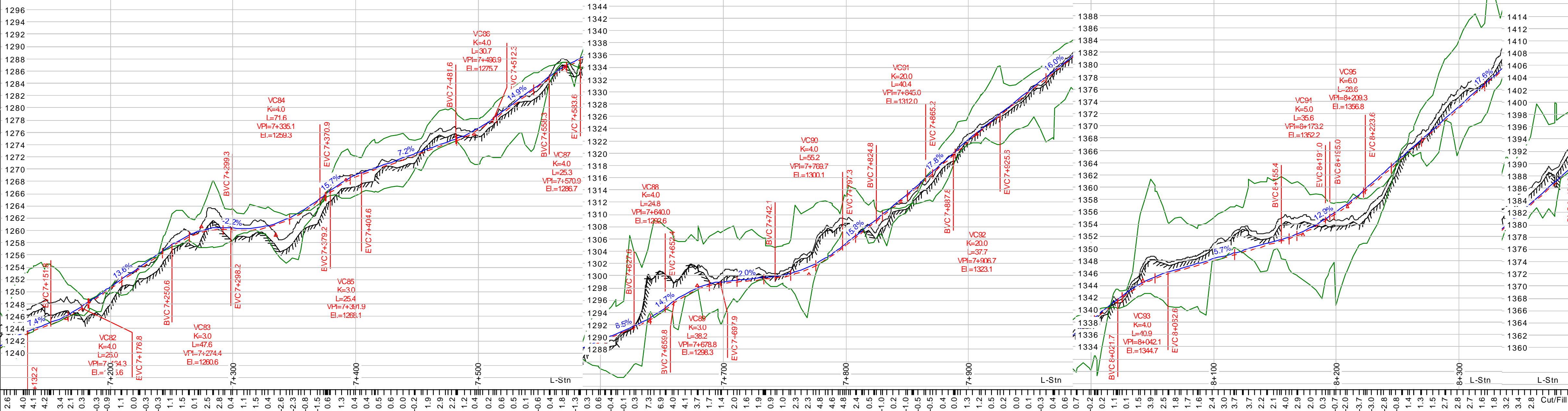
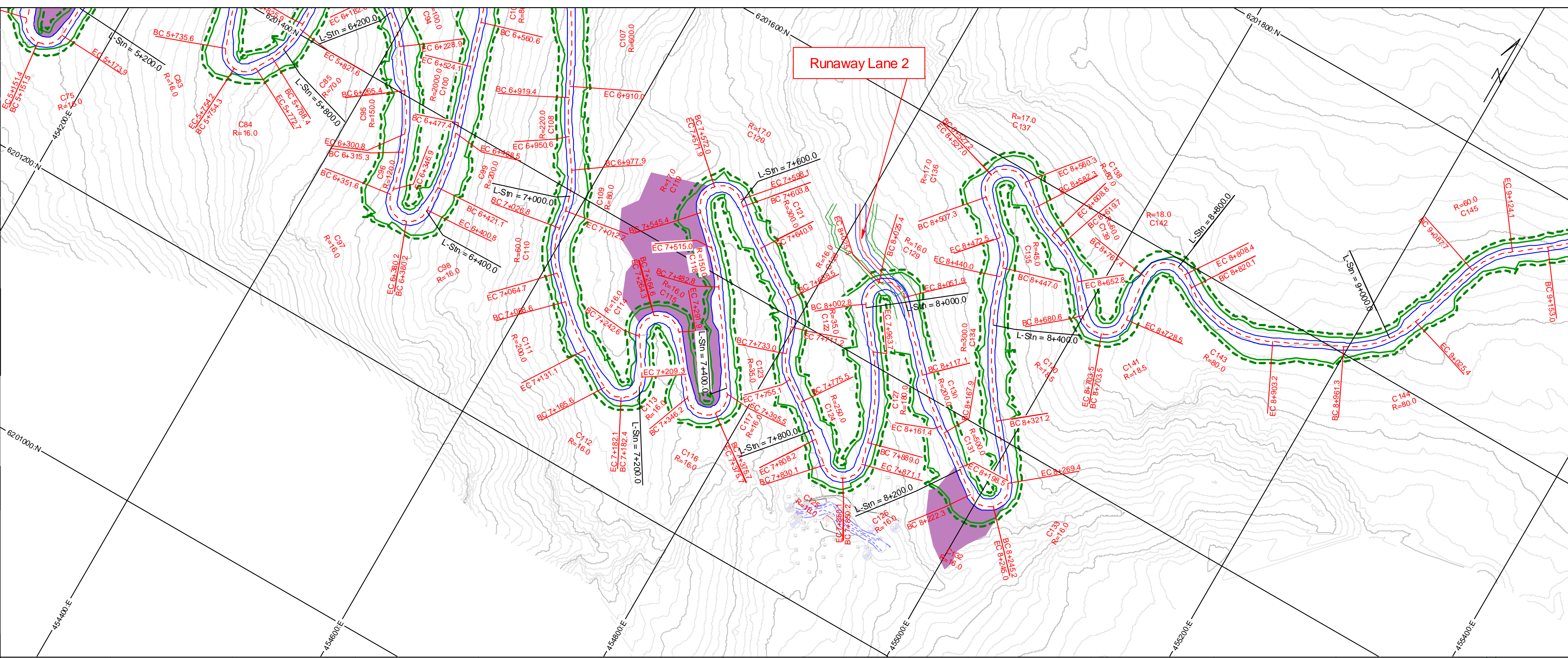
Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	■ Mine Pad	— Finished Road Surface	— Profile Subgrade
— Road Edges	■ Other Major Mine Facility	— Cut / Fill limits	— Original Ground
— Cut / Fill limits	■ Borrow Site	—	— Bedrock
— Clearing Limits	■ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc)	
IP Stn	7+114.6
BC Stn	7+114.6
Arc Len	42.17
EC Stn	7+156.77
Radius	200.16
Angle	12° 59' 96"
Tangent	21.9
Da, a=100	29° 35' 35"

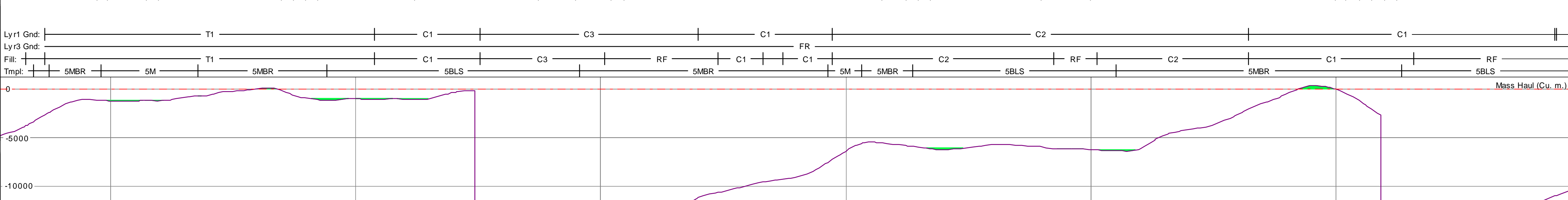
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Srf1 Fill V. Cu. m.
7+200.0	720.8	0.0	1826.6	498.8	2107.8	471.9
7+400.0	548.0	0.0	1256.2	1355.9	2579.6	-14400.0
7+600.0	592.1	0.0	853.6	9481.6	1340.3	341.4
7+800.0	532.7	0.0	759.6	1938.2	2526.0	408.1
8+000.0	427.5	0.0	1267.5	6754.2	1825.3	426.0
Pg. Tot.	2821.0	0.0	5963.6	20028.8	10379.0	2059.0
Cum. Tot.	22893.8	9394.3	51958.0	174762.7	101887.2	15695.6

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.



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C1 - Silty Sand rubble colluvium	SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope
C2 - Sand and gravel rubble colluvium with cobbles	SMBB = 5m running surface with 0.6m high berm on left and right shoulder
C3 - Blocky colluvium	BR = Bridge (no cut/fill)
T1 - Silty sand and gravel till	Ditching = 0.6m wide by 0.6m deep
T2 - Silt or clay based basal till	Surfacing depth = 0.3m



Revision	Description	Date	By	Approved	Revision
---	Survey By: See Notes Above				---
	Design By: Matthew Dickie, ET				May 2017
	Reviewed By: Michael Foster, P.Eng				May 2017



Haul Road to Lower Portal Geometric Alignment Km 0+000 - 11+175

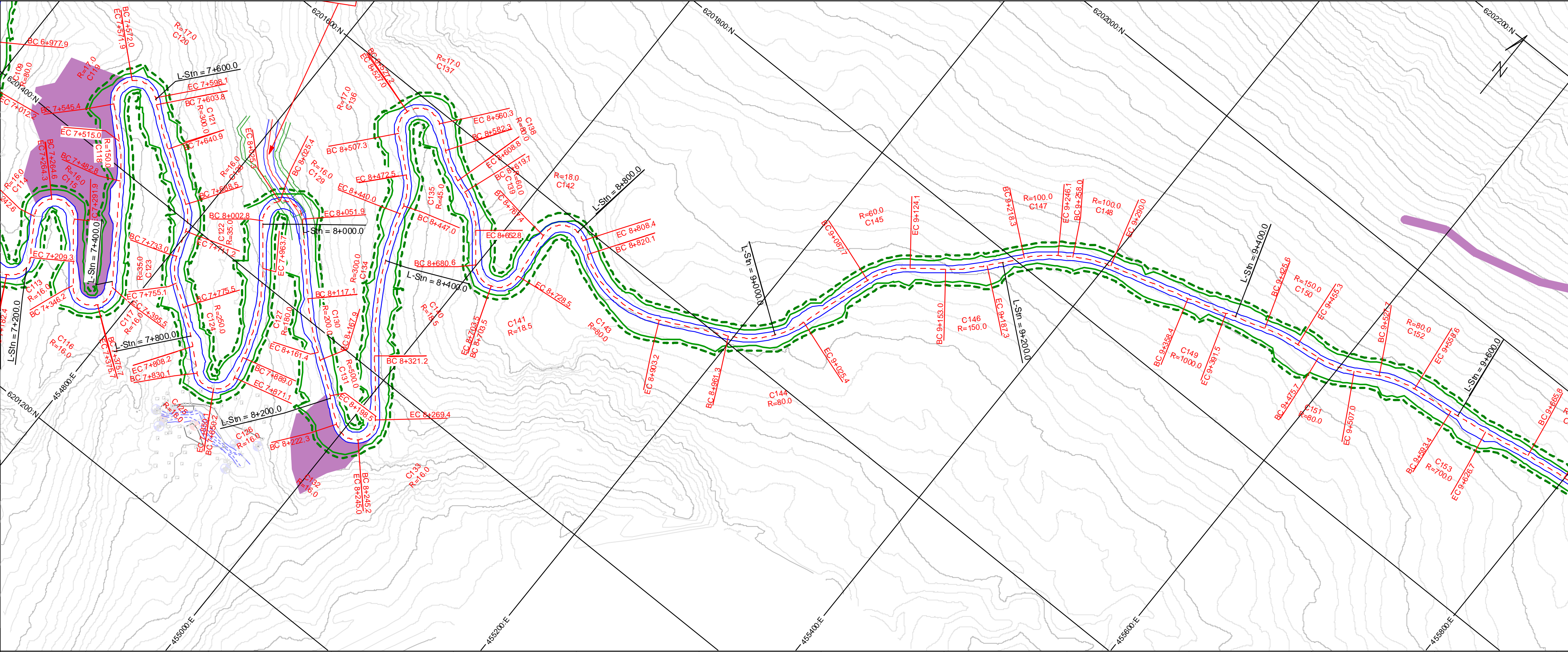
Page Stations: 8+138.6 to 9+418.6

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%	Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining, OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pad	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Cut / Fill limits
█ Cut / Fill limits	█ Borrow Site	█ Original Ground	█ Bedrock
█ Clearing Limits	█ Waste Site		
⊕ Benchmark			

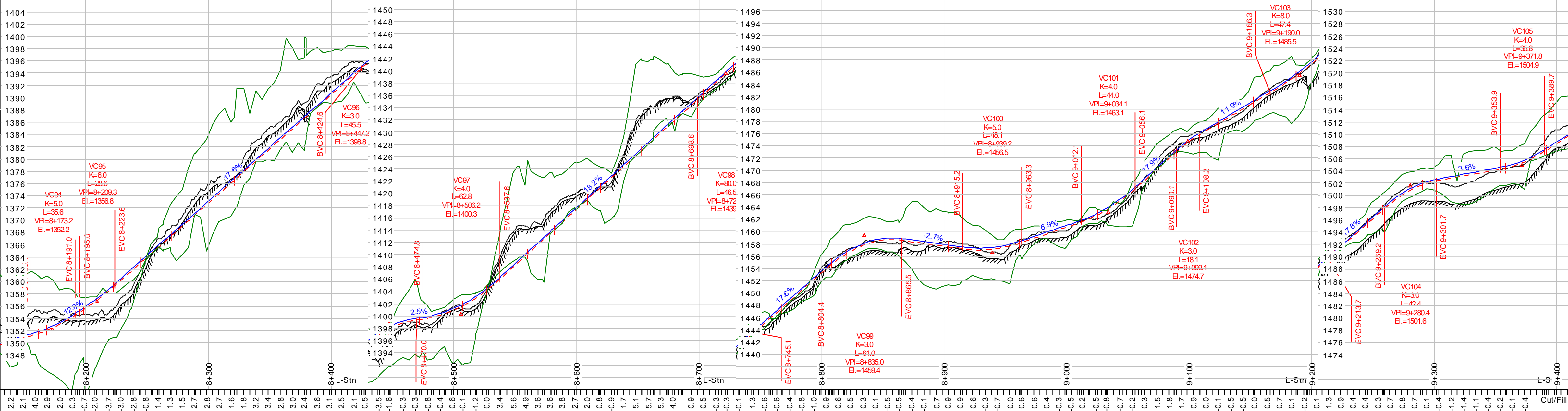


Curve Table (Da = deflection angle for a 10m arc)													
IP Stn	BC Stn	Arc Len	EC Stn	Radius	Angle	Tangent	Da, a=100	13	14	15	16	17	18
8+138.6	8+117.0	44.31	8+161.9	200	-13°	22	29°	13	14	15	16	17	18
8+117.0	8+117.0	0.00	8+117.0	500	-81°	4	11°	358°	358°	19°	127°	337°	337°
8+117.0	8+117.0	0.00	8+117.0	16	-23°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	300	-32°	11	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	45	-66°	11	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	17	-112°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	60	-19°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	60	-32°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	60	-77°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	60	-46°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	60	-13°	13	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	100	16°	14	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	100	18°	16	72°	95°	310°	310°	318°	318°	318°
8+117.0	8+117.0	0.00	8+117.0	100	-2°	17	72°	95°	310°	310°	318°	318°	318°

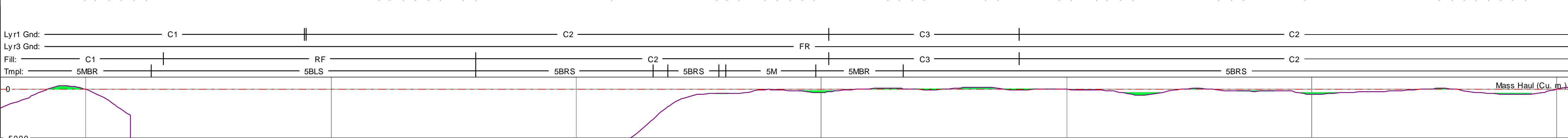
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
8+200.0	356.5	3.2	1666.5	4702.6	3662.6	-12660.0
8+400.0	0.0	19.8	1011.6	5561.2	2489.7	405.4
8+600.0	0.0	18.3	500.4	5873.9	862.8	430.8
8+800.0	0.0	17.8	1330.5	939.1	1977.7	345.6
9+000.0	0.0	13.8	888.0	591.9	1991.9	370.5
Pg. Tot.	356.5	72.9	5397.2	17668.8	10984.6	1947.9
Cum. Tot.	23250.4	9467.2	57355.1	192431.5	112871.8	17643.5

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.



SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMBL = 5m running surface with 0.6m high berm on left shoulder SMBR = 5m running surface with 0.6m high berm on right shoulder SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope SMBB = 5m running surface with 0.6m high berm on left and right shoulder BR = Bridge (no cut/fill) Ditching = 0.6m wide by 0.6m deep Surfacing depth = 0.3m



Revision	Description	Date	By	Approved	Revision
---	---	---	---	---	---
1	Survey By: See Notes Above				---
2	Design By: Matthew Dickie, ET				May 2017
3	Reviewed By: Michael Foster, P.Eng				May 2017



**Haul Road to Lower Portal
Geometric Alignment
Km 0+000 - 11+175**

Page Stations: 9+162.6 to 10+442.6

ROAD DESIGN SPECIFICATIONS

Design Speed: 30 km/h
Min Curve Radius = 16m
Max Grade = 18%

Plan Scale 1:2000
Profile Vert Scale 1:400
Profile Horz Scale 1:2000

Formatted to Plot on 24"x36" Paper

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

Plan Legend (all may not be applicable)

- - - L-line Location
- Road Edges
- Cut / Fill Limits
- Cleaning Limits
- ⊕ Benchmark
- Mine Pad
- Other Major Mine Facility
- Borrow Site
- Waste Site

Profile Legend

- Finished Road Surface
- Profile Subgrade
- Cut / Fill Limits
- Original Ground
- Bedrock

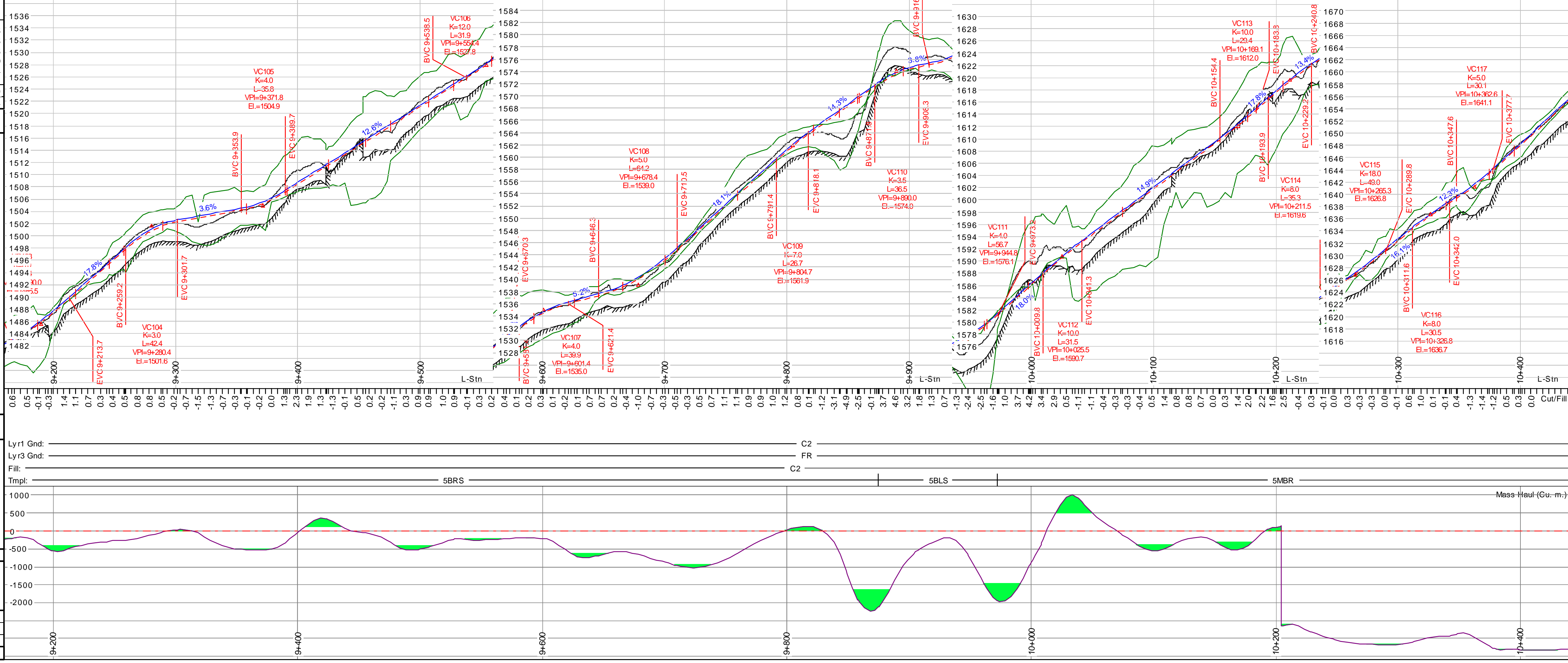
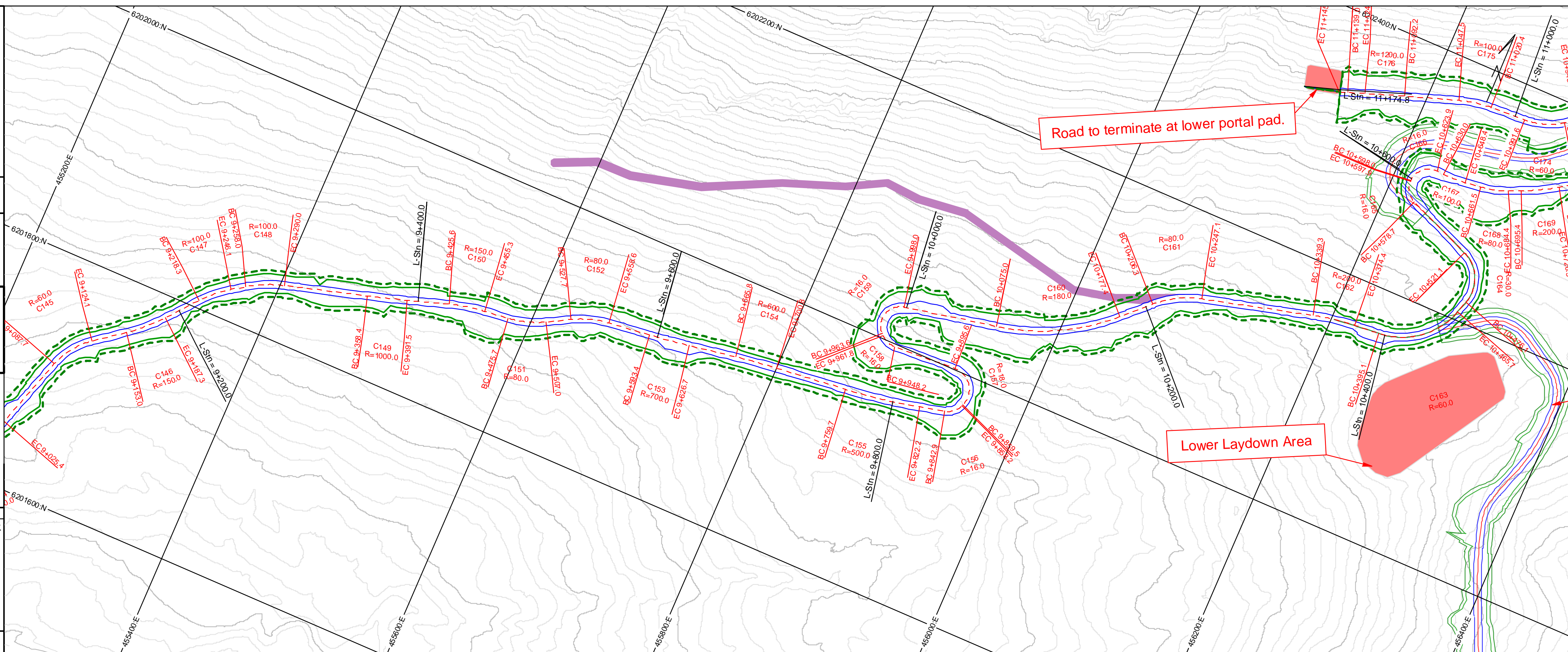
IP Stn.	Curve Table (Da = deflection angle for a 10m arc.)																	
	C146	C147	C148	C149	C150	C151	C152	C153	C154	C155	C156	C157	C158	C159	C160	C161	C162	C163
9+170.9	232.7	274.4	375.4	441.9	492.2	543.9	610.3	683.9	791.9	851.9	888.9	955.9	998.9	1284.2	227.4	357.7	435.7	
BC Stn.	9+153.9	218.9	258.9	358.9	428.9	476.9	528.9	593.9	666.9	760.9	843.9	859.9	948.9	968.9	1074.9	206.9	336.9	395.9
Arc Len.	34	28	32	33	30	31	33	35	62	15	36	14	34	102	41	35	71	
EC Stn.	9+187.9	246.9	290.9	392.9	455.9	507.9	559.9	627.9	701.9	822.9	858.9	896.9	962.9	998.9	1177.9	247.9	378.9	466.9
Radius	150	100	100	1000	150	80	80	700	600	500	16	18	16	16	180	80	200	80
Angle	-13°	16°	18°	-2°	11°	-22°	22°	-3°	3°	-7°	-55°	-115°	49°	123°	-33°	29°	10°	-67°
Tangent	17	14	16	17	15	16	16	17	18	31	8	28	7	30	53	21	18	40
Da, a=100	38°	57°	57°	6°	38°	72°	72°	8°	10°	11°	358°	318°	358°	32°	72°	29°	95°	95°

EARTH WORK VOLUMES (Final Cubic Meters)

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Sr1 Fill V. Cu. m.
9+200.0	0.0	16.5	1723.1	74.7	1310.1		337.5
9+400.0	0.0	19.8	2793.1	509.4	3482.3		337.5
9+600.0	0.0	15.1	1633.2	23.4	1434.8		370.5
9+800.0	0.0	15.9	2703.4	738.7	4370.3		395.0
10+000.0	0.0	21.5	3008.7	1896.7			372.4
Pg. Tot.	0.0	88.8	11861.6	3242.9	14535.1		1812.9
Cum. Tot.	23250.4	9556.0	69216.7	195674.4	127406.9		19456.4

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.



SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMBL = 5m running surface with 0.6m high berm on left shoulder SMR = 5m running surface with 0.6m high berm on right shoulder SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope SMBB = 5m running surface with 0.6m high berm on left and right shoulder BR = Bridge (no cut/fill) Ditching = 0.6m wide by 0.6m deep Surfacing depth = 0.3m
Revision Description	Date By Approved Revision
ONSITE Engineering Ltd.	Survey By: See Notes Above Design By: Matthew Dickie, ET Reviewed By: Michael Foster, P.Eng
Page 10 of 11	May 2017 May 2017



**Haul Road to Lower Portal
Geometric Alignment
Km 0+000 - 11+175**

Page Stations: 10+186.6 to 11+466.6

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h Min Curve Radius = 16m Max Grade = 18%	Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pad	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Bedrock	
█ Clearing Limits	█ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc)	Curve Data																
	C161	C162	C163	C164	C165	C166	C167	C168	C169	C170	C171	C172	C173	C174	C175	C176	C177
IP Stn.	10+227	10+357	10+439	10+504	10+590	10+618	10+639	10+673	10+711	10+750	10+833	10+853	10+930	10+970	10+934	10+81	10+142
BC Stn.	10+208	10+339	10+399	10+478	10+579	10+598	10+630	10+662	10+695	10+734	10+809	10+843	10+915	10+959	10+920	10+82	10+139
Arc Len.	41	35	71	45	19	26	18	23	31	30	33	16	29	33	27	32	7
EC Stn.	10+247	10+374	10+468	10+521	10+598	10+624	10+648	10+684	10+726	10+765	10+843	10+859	10+944	10+992	10+948	10+81	10+146
Radius	80	200	60	30	16	16	100	80	200	80	16	40	60	100	1200	80	5
Angle	29°	10°	-67°	-86°	69°	93°	-11°	-16°	-9°	22°	-106°	-56°	-41°	31°	-16°	-2°	8°
Tangent	21	18	40	28	11	17	9	12	16	15	24	9	15	17	14	16	3
Da, a=100	72°	29°	95°	191°	358°	358°	72°	29°	72°	318°	358°	143°	95°	57°	5°	72°	

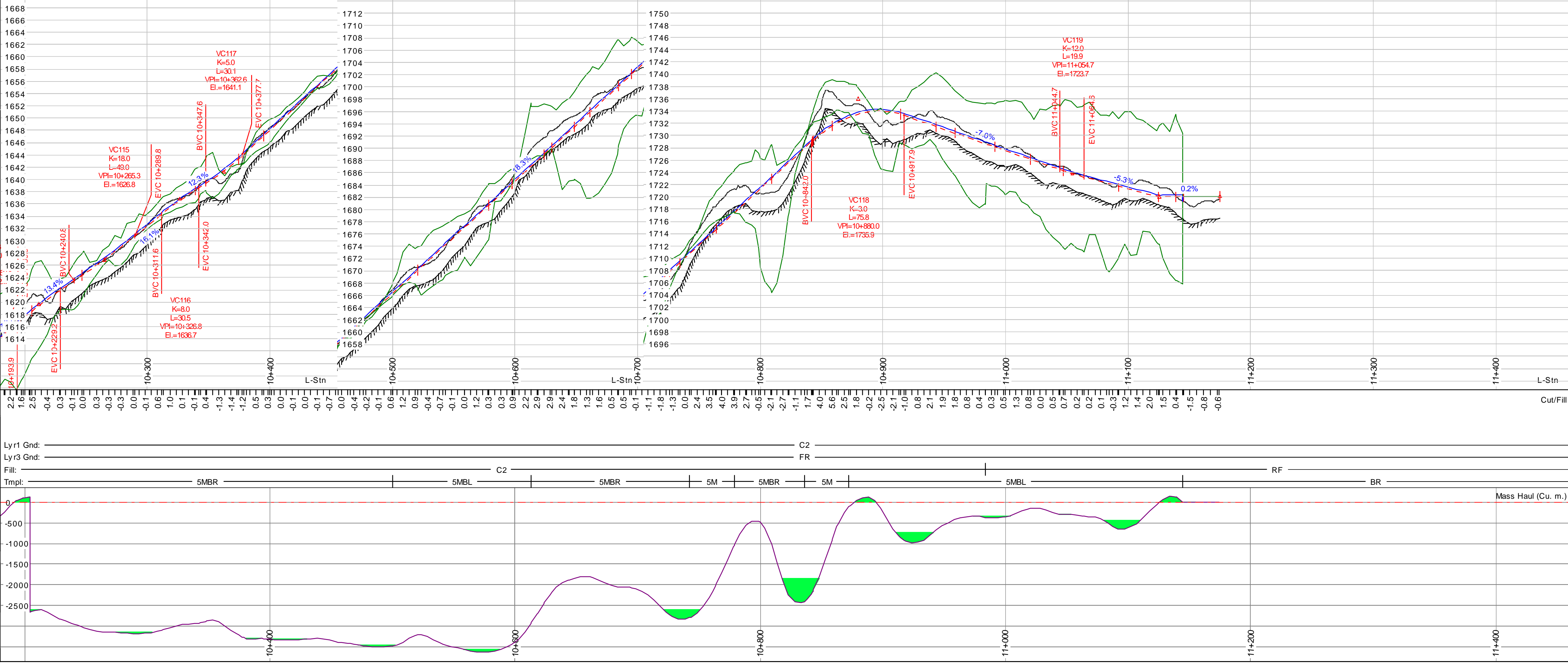
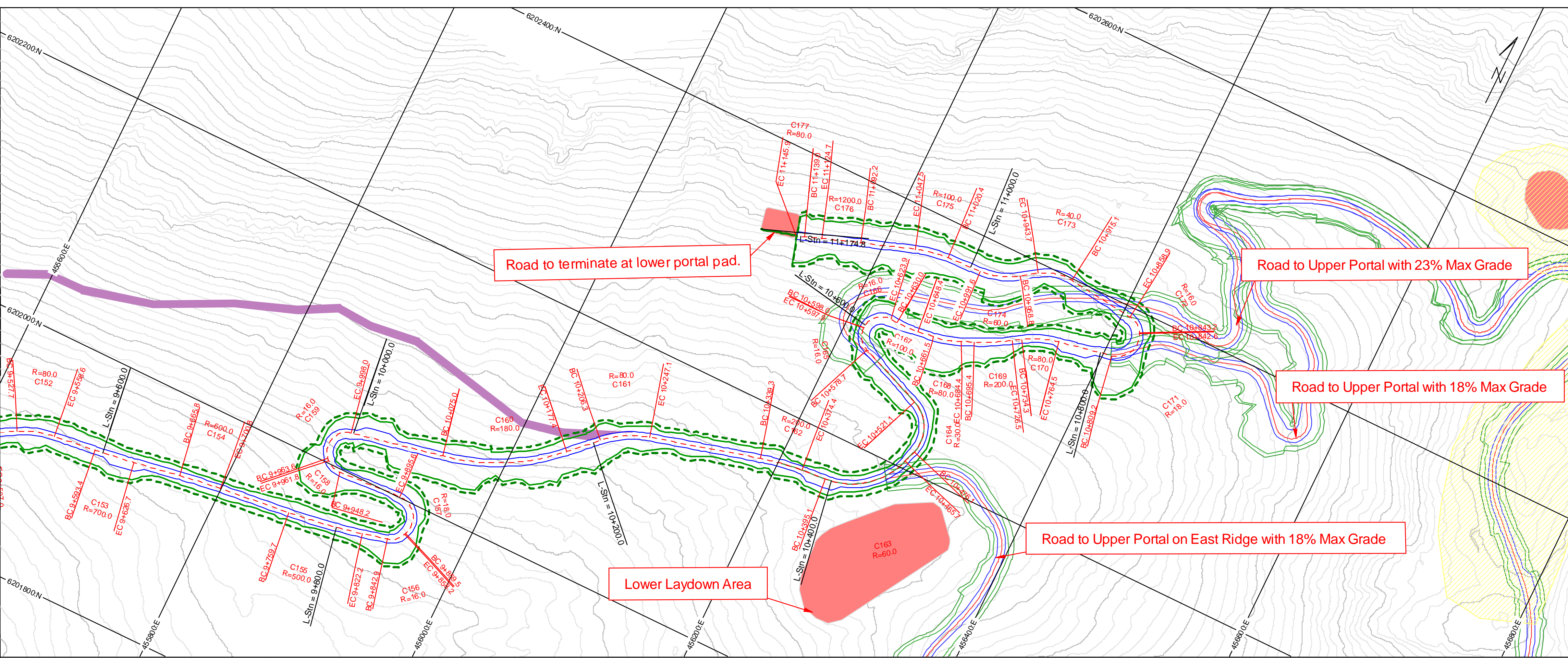
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Srf1 Fill V. Cu. m.
10+200.0	0.0	14.2	1395.7	58.1	2094.2	-2800.0
10+400.0	0.0	14.6	1437.6	5.8	1542.1	
10+600.0	0.0	25.3	4698.4	947.3	2750.3	
10+800.0	0.0	20.8	3663.0	886.8	4440.9	
11+000.0	0.0	20.9	3544.3	414.6	3617.7	
B 11+174.6						
Pg. Tot.	0.0	95.8	14739.0	2312.7	14445.3	1801.5
Cum. Tot.	23250.4	9651.8	83955.7	197987.1	141852.2	21257.9

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMBL = 5m running surface with 0.6m high berm on left shoulder SMBR = 5m running surface with 0.6m high berm on right shoulder SBR = 5m running surface with 0.6m high berm on right with steepened berm fill slope SMBB = 5m running surface with 0.6m high berm on left and right shoulder BR = Bridge (no cut/fill) Ditching = 0.6m wide by 0.6m deep Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Red Mountain
Haul Road to Upper Portal on East Ridge
with 18% Max Grade
Geometric Alignment
Km 10+476 - 13+804

Page Stations: 10476.00 to 11754.00

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h	Plan Scale 1:2000
Min Curve Radius = 35m	Profile Vert Scale 1:400
Max Grade = 18%	Profile Horiz Scale 1:2000
Formatted to Plot on 24"x36" Paper	

ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	- - - Profile Subgrade	█ Cut / Fill limits
▬ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Original Ground
▬ Cut / Fill limits	█ Borrow Site	█ Bedrock	
█ Cleaning Limits	█ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc)																					
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22
105.58	106.04	106.51	106.98	107.45	107.92	108.39	108.86	109.33	109.80	110.27	110.74	111.21	111.68	112.15	112.62	113.09	113.56	114.03	114.50	114.97	115.44
105.58	106.04	106.51	106.98	107.45	107.92	108.39	108.86	109.33	109.80	110.27	110.74	111.21	111.68	112.15	112.62	113.09	113.56	114.03	114.50	114.97	115.44
105.58	106.04	106.51	106.98	107.45	107.92	108.39	108.86	109.33	109.80	110.27	110.74	111.21	111.68	112.15	112.62	113.09	113.56	114.03	114.50	114.97	115.44
105.58	106.04	106.51	106.98	107.45	107.92	108.39	108.86	109.33	109.80	110.27	110.74	111.21	111.68	112.15	112.62	113.09	113.56	114.03	114.50	114.97	115.44

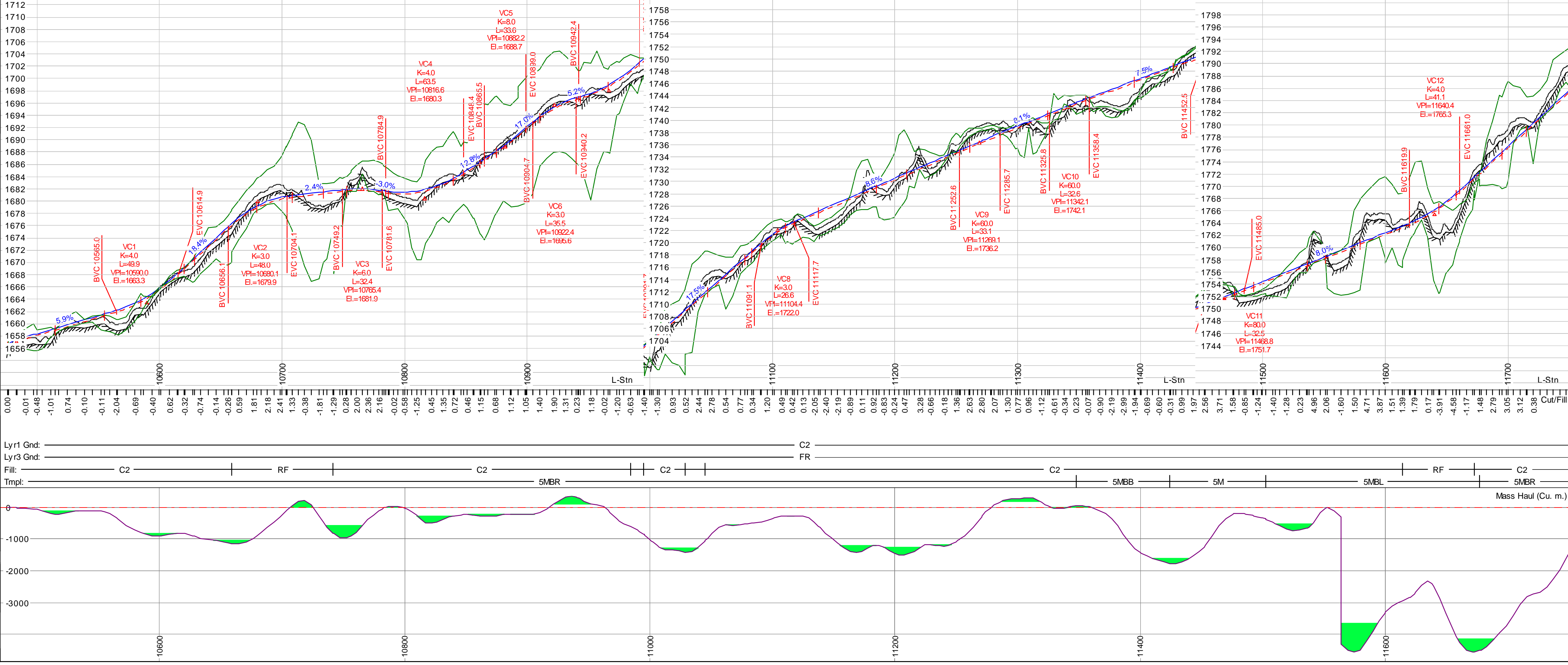
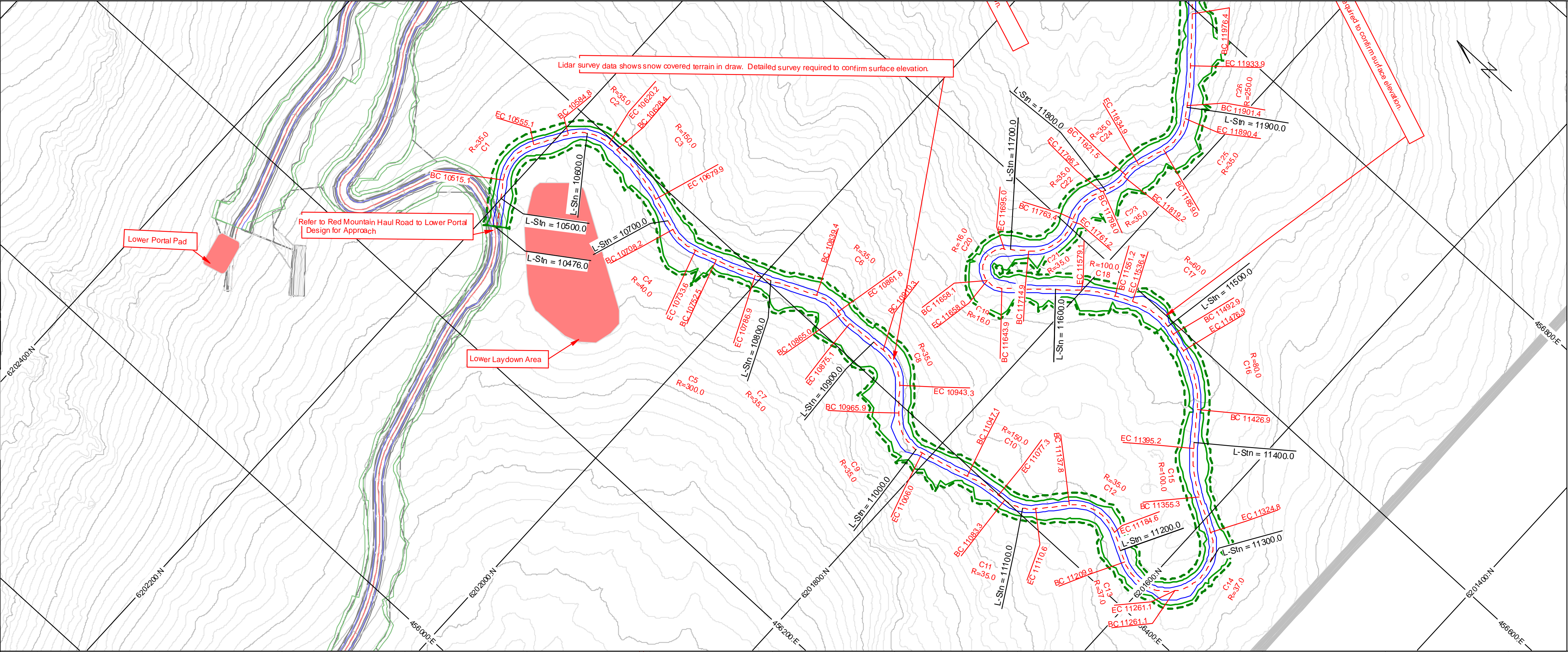
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Sr1 Fill V. Cu. m.
B 10476.00	0.0	1.5	83.8	30.3	190.3	39.1
10500.00	0.0	3.8	190.8	43.0	1061.6	168.8
10600.00	0.0	7.7	572.6	739.0	665.9	168.8
10700.00	0.0	9.1	590.7	1541.1	1916.6	168.8
10800.00	0.0	9.4	629.9	1409.8	2262.9	168.8
10900.00	0.0					
Pg. Tot.	0.0	31.5	2067.8	3763.2	6097.3	714.2
Cum. Tot.	0.0	31.5	2067.8	3763.2	6097.3	714.2

CULVERT TABLE

Note:
 - Required culverts have been excluded from this design.
 - Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
 - All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM - 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SM BR - 5m running surface with berm on right side
FR - Fractured, weak rock	SM BB - 5m running surface with berm on both sides
C1 - Silty Sand rubble	SM BL - 5m running surface with berm on left side
colluvium	BR - Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
C2 - Sand and gravel rubble	Surfacing depth = 0.3m
colluvium with cobbles	
C3 - Blocky colluvium	
T1 - Silty sand and gravel till	
T2 - Silt or clay based basal till	

Revision	Description	Date	By	Approved	Revision





Red Mountain
Haul Road to Upper Portal on East Ridge
with 18% Max Grade
Geometric Alignment
Km 10+476 - 13+804

Page Stations: 11498.40 to 12776.40

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper	
Design Speed: 30 km/h Min Curve Radius = 35m Max Grade = 18%			

Notes:
 - Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

ISSUED FOR ENVIRONMENTAL ASSESSMENT. NOT FOR CONSTRUCTION.

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Original Ground	█ Bedrock
█ Cleaning Limits	█ Waste Site		
⊕ Benchmark			

	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31
PC Stn	11516	11565	11694	11742	11781	11829	11878	11926	11975	12023	12072	12120	12169	12217	12266
BC Stn	11463	11511	11644	11691	11738	11785	11832	11879	11926	11973	12020	12067	12114	12161	12208
EC Stn	11516	11579	11694	11742	11790	11838	11886	11934	11982	12030	12078	12126	12174	12222	12270
Radius	60	100	16	35	35	35	35	35	250	150	120	80	35	35	37
Angle	-42°	-16°	51°	132°	-76°	55°	-35°	22°	-51°	-7°	-48°	-15°	-32°	67°	-60°
Tangent	23	14	8	36	27	18	11	7	17	16	67	16	35	53	20
Da, α=100	95°	57°	358°	358°	164°	164°	164°	164°	23°	38°	46°	46°	72°	164°	

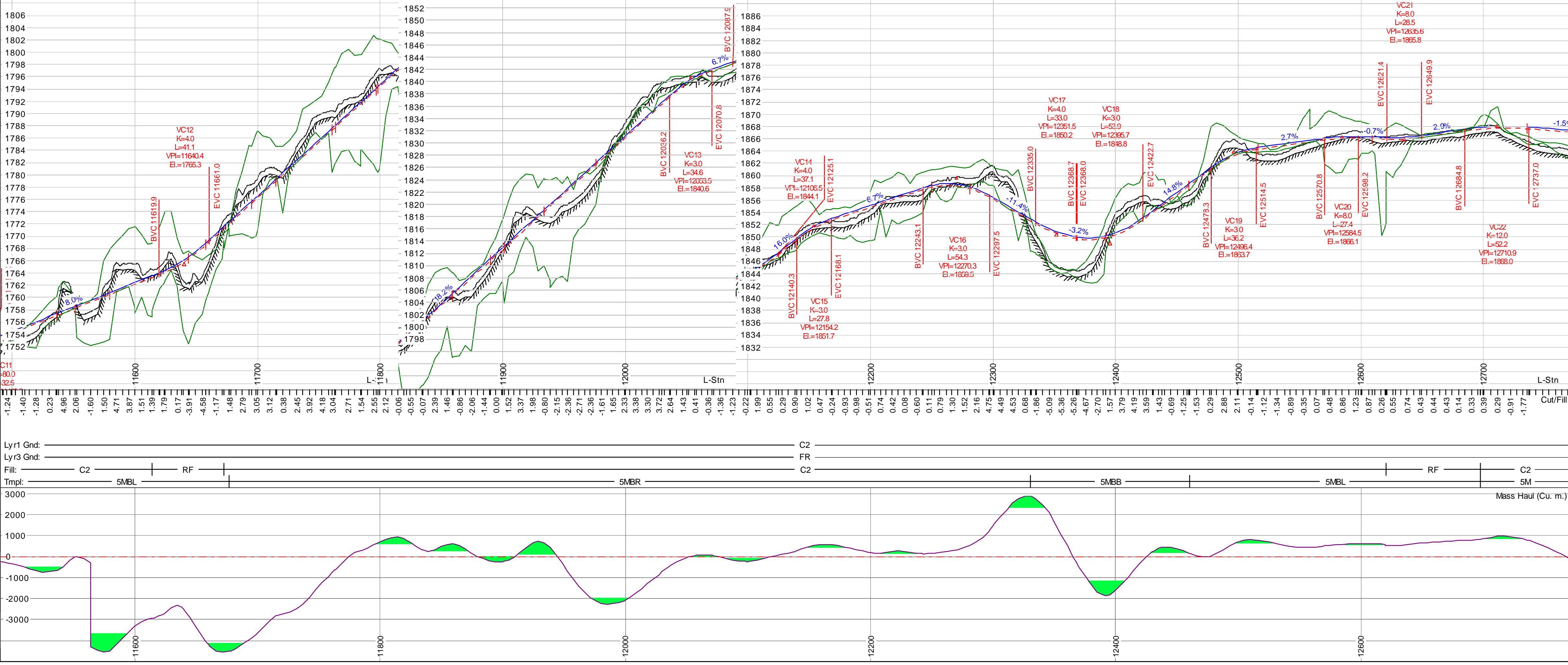
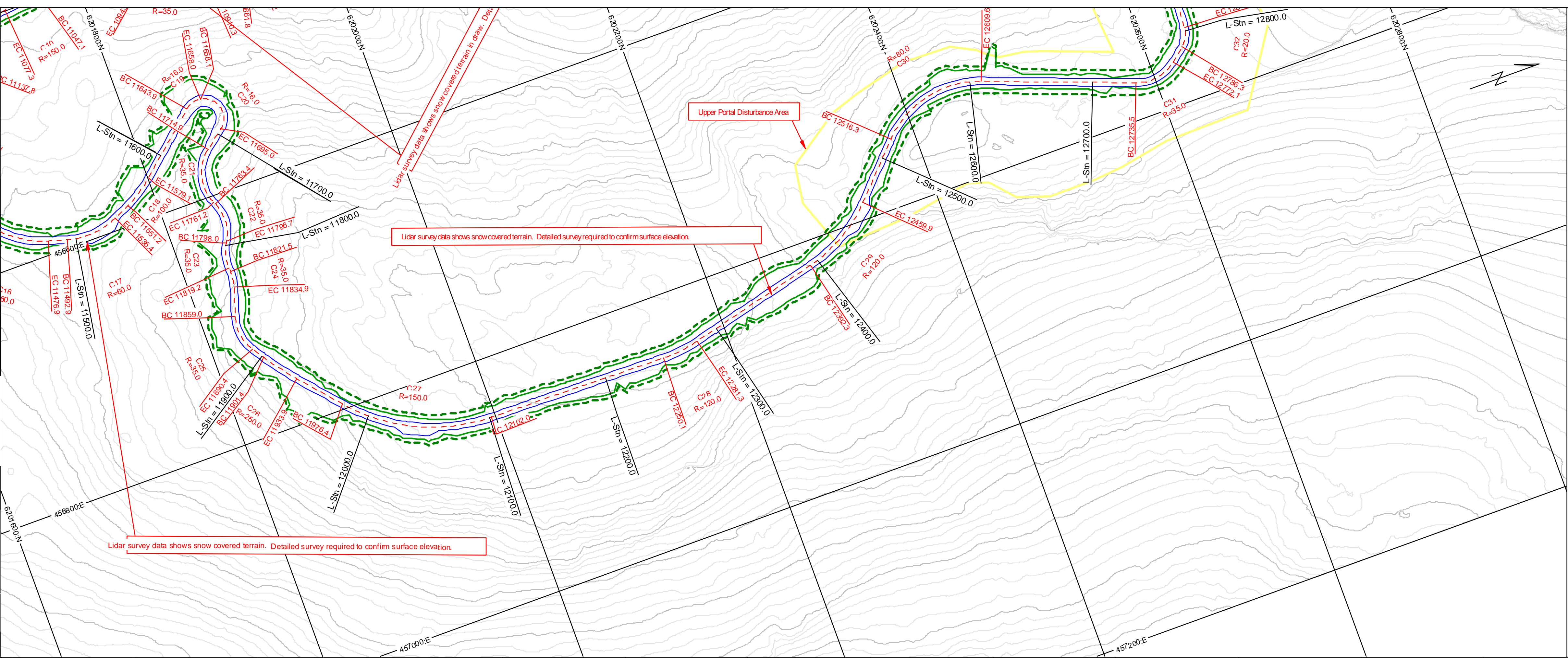
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
11500.00	0.0	8.0	632.6	1652.9	1270.6	-4000.0	201.8
11600.00	0.0	8.3	679.2	1717.6	2747.7		227.7
11700.00	0.0	13.7	1203.5	3623.5	503.5		173.8
11800.00	0.0	6.8	520.5	824.1	2274.9		168.8
11900.00	0.0	6.4	499.6	1088.1	3428.6		168.8
12000.00	0.0						
Pg. Tot.	0.0	43.3	3535.3	8906.2	10225.3		940.8
Cum. Tot.	0.0	116.7	8929.8	17421.3	24554.6		2733.4

CULVERT TABLE

Note:
 - Required culverts have been excluded from this design.
 - Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
 - All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles	SM = 5m running surface with 0.6m deep by 0.6m wide ditch
SR - Strong rock	SM BR = 5m running surface with berm on right side
FR - Fractured, weak rock	SM BB = 5m running surface with berm on both sides
C1 - Silty Sand rubble colluvium	SM BL = 5m running surface with berm on left side
C2 - Sand and gravel rubble colluvium with cobbles	BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings)
C3 - Blocky colluvium	Surfacing depth = 0.3m
T1 - Silty sand and gravel till	
T2 - Silt or clay based basal till	

Revision	Description	Date	By	Approved	Revision
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Red Mountain
Haul Road to Upper Portal on East Ridge
with 18% Max Grade
Geometric Alignment
Km 10+476 - 13+804

Page Stations: 12520.80 to 13798.80

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h Min Curve Radius = 35m Max Grade = 18%	Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper

Notes:
 - Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facility	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Cleaning Limits	█ Bedrock
█ Cleaning Limits	█ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc)				
	C30	C31	C32	C33
IP Stn.	12569	12756	12796	12796
BC Stn.	12519	12735	12786	12786
Asc. Len.	93	37	17	17
EC Stn.	12610	12772	12803	12803
Radius	80	35	20	20
Angle	67°	60°	48°	48°
Tangent	53	20	9	9
Da, α=100	72°	164°	286°	286°

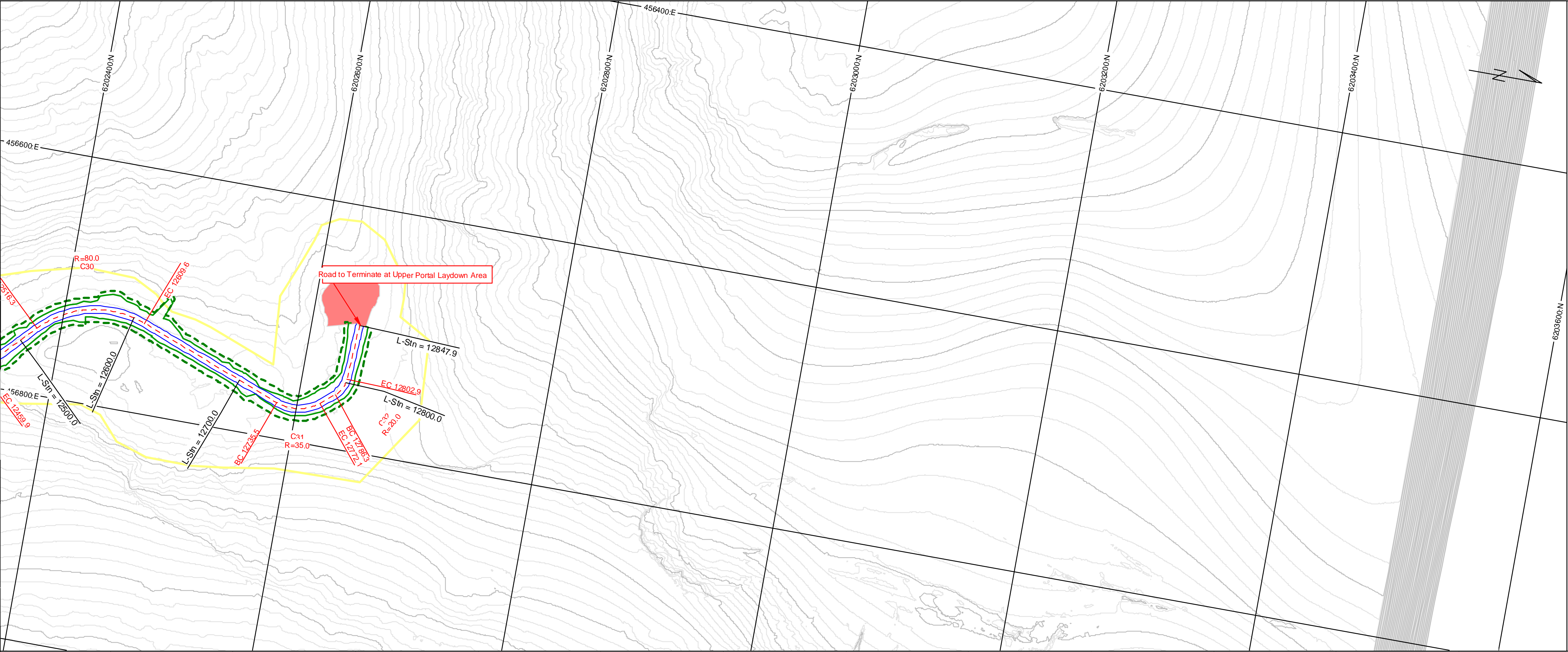
EARTH WORK VOLUMES (Final Cubic Meters)							
L-Stn m.	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
12600.00	0.0	9.0	496.7	94.4	363.3		168.8
12700.00	0.0	2.7	182.3	56.7	1776.6		172.3
12800.00	0.0	5.6	506.5	1292.2	23.7		82.4
12847.95							
Pg. Tot.	0.0	17.3	1185.5	1443.3	2163.7		423.4
Cum. Tot.	0.0	181.6	13830.1	25501.3	34440.2		4235.6

CULVERT TABLE

Note:
 - Required culverts have been excluded from this design.
 - Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
 - All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SM BR = 5m running surface with berm on right side SM BB = 5m running surface with berm on both sides SM BL = 5m running surface with berm on left side BR = Bridge Template (No Cut/Fill Refer To General Arrangement Drawings) Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





Haul Road To Upper Portal with 18% Max Grade Geometric Alignment Km 10+803 - 11+733

Page Stations: 10803.32 to 12083.32

ROAD DESIGN SPECIFICATIONS	
Design Speed: 30 km/h Min Curve Radius = 35m Max Grade = 18%	Plan Scale 1:2000 Profile Vert Scale 1:400 Profile Horz Scale 1:2000 Formatted to Plot on 24"x36" Paper

Notes:
- Ground model data determined by LiDAR survey provided by IDM Mining. OEL supplemented with total station and RTK survey work through Bitter Creek.

ISSUED FOR ENVIRONMENTAL ASSESSMENT. NOT FOR CONSTRUCTION.

Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facilities	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill Limits	█ Borrow Site	█ Bedrock	
█ Clearing Limits	█ Waste Site		
⊕ Benchmark			

Curve Table (Da = deflection angle for a 10m arc)	Curve Data																							
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	
IP Stn.	10812.85	10899.33	10958.01	11046.06	11142.10	11245.25	11351.32	11464.78	11581.54	11700.60	11821.96	11945.62	12071.58	12199.75	12329.13	12459.72	12590.52	12721.52	12852.72	12984.12	13115.72	13247.52	13379.52	
BC Stn.	10803.32	10887.50	10948.00	11034.00	11129.00	11232.00	11342.00	11458.00	11579.00	11703.00	11831.00	11961.00	12092.00	12223.00	12354.00	12485.00	12615.00	12744.00	12871.00	12996.00	13119.00	13240.00	13359.00	
Arc Len.	16	23	29	29	21	17	12	18	28	34	52	26	15	37	28	47	30	36	38	32	31	29	21	
EC Stn.	10819.86	10904.94	10966.00	11052.00	11147.00	11250.00	11360.00	11477.00	11599.00	11724.00	11851.00	11980.00	12109.00	12238.00	12366.00	12492.00	12616.00	12737.00	12855.00	12970.00	13082.00	13191.00	13296.00	
Radius	35	35	120	25	13	20	20	35	25	35	13	13	100	150	100	150	60	16	100	35	16	20		
Angle	26°	38°	14°	66°	93°	76°	34°	51°	46°	79°	84°	15°	64°	21°	11°	27°	11°	34°	36°	18°	50°	102°	59°	
Tangent	8	12	15	16	14	10	6	10	15	21	32	20	8	19	14	24	15	18	40	16	16	20	11	
Da, a=100	64°	64°	48°	229°	81°	81°	286°	286°	64°	229°	64°	81°	81°	57°	38°	57°	38°	95°	358°	57°	64°	358°	286°	

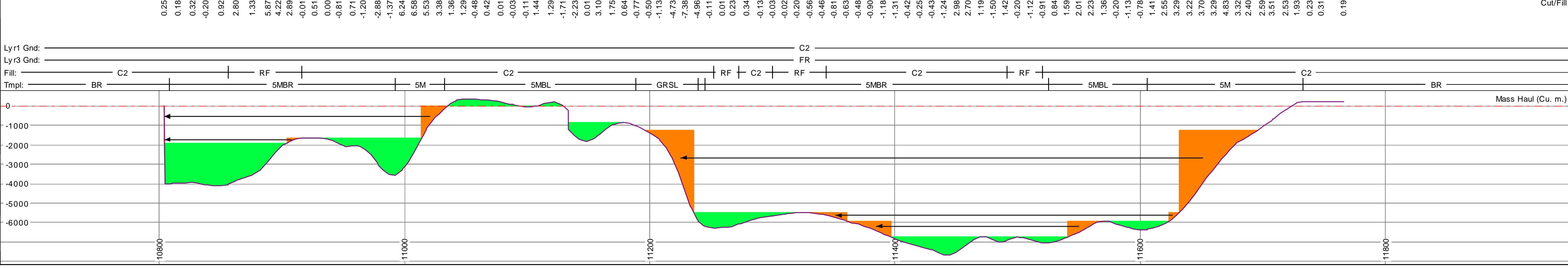
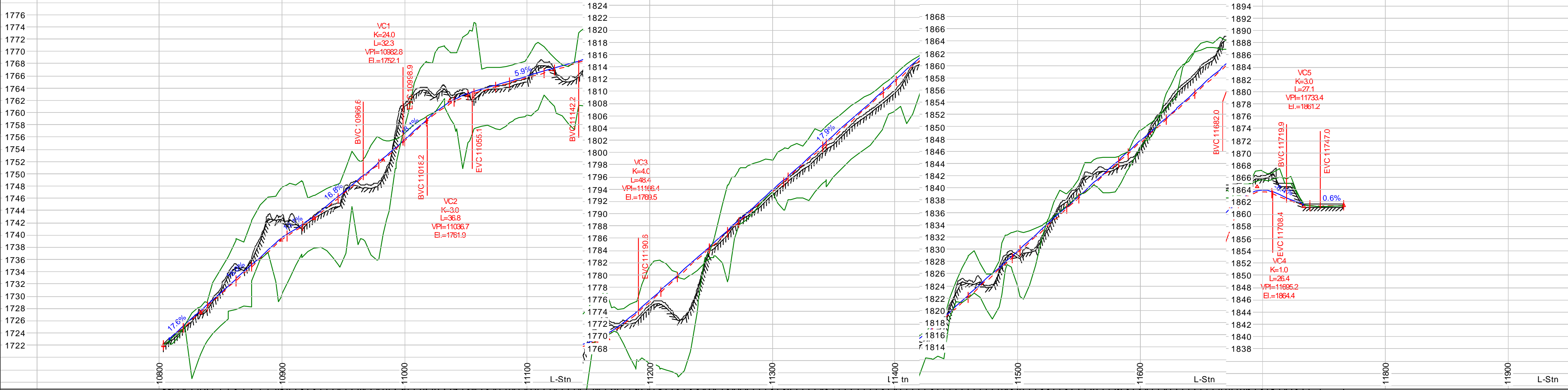
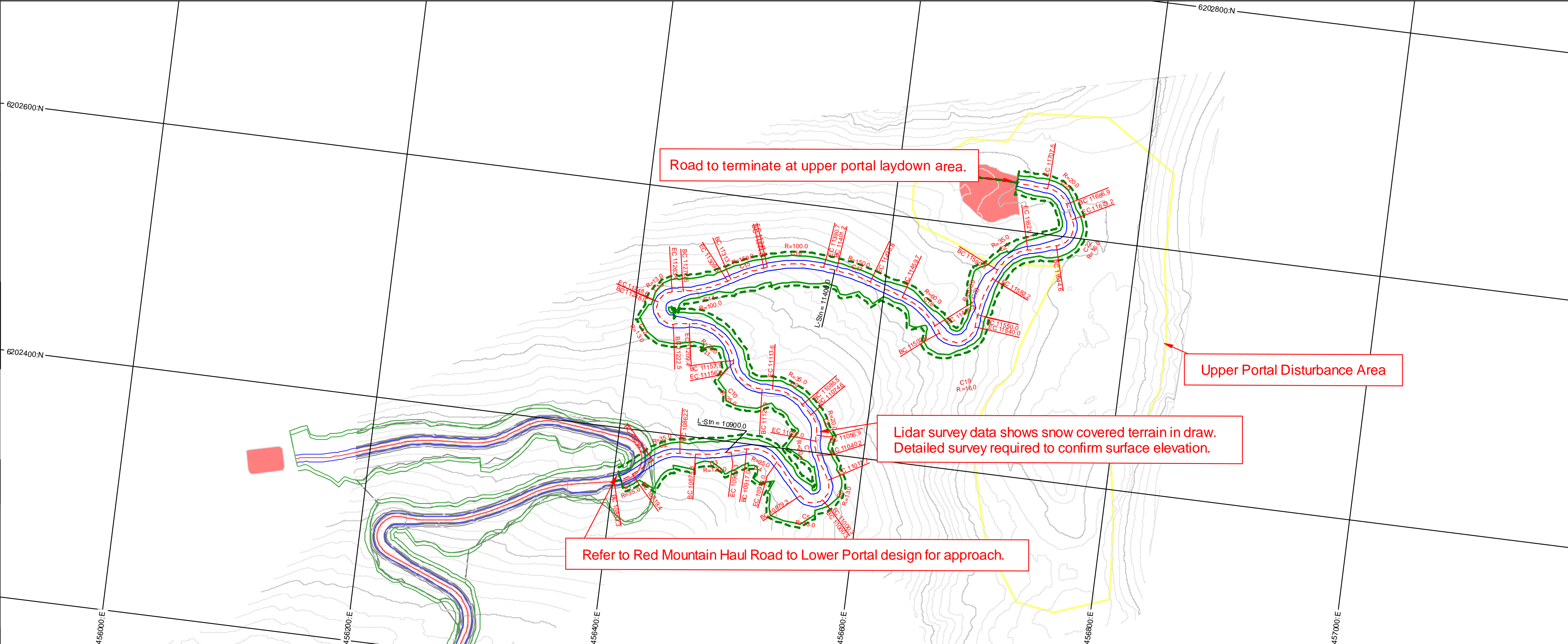
EARTH WORK VOLUMES (Final Cubic Meters)						
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	Srf1 Fill V. Cu. m.
B 10803.32	0.0	9.1	384.5	2280.0	741.9	154.5
10900.00	0.0	7.9	345.8	1766.8	3202.5	217.3
11000.00	0.0	11.4	520.7	3933.3	1968.8	216.8
11100.00	0.0	7.7	335.5	1519.8	2192.1	183.6
11200.00	0.0	5.9	233.4	864.4	5375.0	235.8
11300.00	0.0					
Pg. Tot.	0.0	42.0	1820.0	10364.2	12880.4	1008.0
Cum. Tot.	0.0	42.0	1820.0	10364.2	12880.4	1008.0

CULVERT TABLE

Note:
- Required culverts have been excluded from this design.
- Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
- All stream crossings will be designed to handle Q100 flow s.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch. SMBR = 5m running surface with 0.9m berm on right. SMBL = 5m running surface with 0.9m berm on left. GRSL = 5m running surface with 0.9m berm on left and GRS fill retaining wall. BR = Bridge Template (No Cut/Fill) Surfacing depth = 0.3m

Revision	Description	Date	By	Approved	Revision





**Bitter Creek Quad Trail
Geometric Alignment
Km 0+000 - 0+674**

Page Stations: 0.0 to 640.0

ROAD DESIGN SPECIFICATIONS

Design is for quad access only.

Min Curve Radius = 4m
Max Grade = 30%

Plan Scale 1:1000

Profile Vert Scale 1:200

Profile Horz Scale 1:1000

Formatted to Plot on 24"x36" Paper

Notes:

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**ISSUED FOR ENVIRONMENTAL ASSESSMENT.
NOT FOR CONSTRUCTION.**

Plan Legend (all may not be applicable)

- - - L-line Location
- Road Edges
- Cut / Fill limits
- - - Clearing Limits
- ⊕ Benchmark
- Mine Pads
- Other Major Mine Facilities
- Borrow Site
- Waste Site
- Finished Road Surface
- Profile Subgrade
- Cut / Fill limits
- Original Ground
- Bedrock

Curve Table (Da = deflection angle for a 10m arc)

IP Stn.	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	
57.871	101.36	161.93	191.02	282.61	310.37	343.66	397.08	164.27	444.54	73.91	183.24	498.68	148.70	298.43	49.86	100.29	54.69	90.17	23.53	40.23	37.37	58.89	02.15	18.34	54.70	85.07	29.43	76.83	38.32	7.39		
15	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
65.88	201.44	68.89	93.21	73.46	69.19	35.43	76.01	13.18	34.44	7.63	7.59	97.23	35.55	68.83	90.81	146.31	64.7	60.60	60.25	8.10	20.40	60.60	5.30	30.8	8.30	15.40	10.15	150.00	40.60	20.60	10.20	10.10
Radius	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60		
Angle	14°-1'20"	4°-3'31"	4°-2'21"	5°-7'15"	1°-16'	1°-14'	0°-23'	3°-38'	4°-40'	7°-58'	1°-18'	5°-17'	4°-32'	5°-21'	4°-36'	1°-24'	4°-3'															
Tangent	8	1	1	7	2	1	1	5	8	10	14	6	10	7	7	2	8	6	5	2	6	11	3	6	3	2	4	12	2	4		
Da, a=100	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'	95°-95'															

EARTH WORK VOLUMES (Final Cubic Meters)

L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
0.0	0.0	91.7	0.0	0.0	95.6	0.0	0.0
100.0	0.0	224.3	0.0	0.0	171.9	-50.0	0.0
200.0	0.0	161.9	0.0	0.0	167.3	0.0	0.0
300.0	0.0	207.1	0.0	0.0	187.1	0.0	0.0
400.0	0.0	186.1	0.0	0.0	207.5	0.0	0.0
500.0	0.0	186.1	0.0	0.0	207.5	0.0	0.0
Pg. Tot.	0.0	871.1	0.0	0.0	829.6	0.0	0.0
Cum. Tot.	0.0	871.1	0.0	0.0	829.6	0.0	0.0

Note:

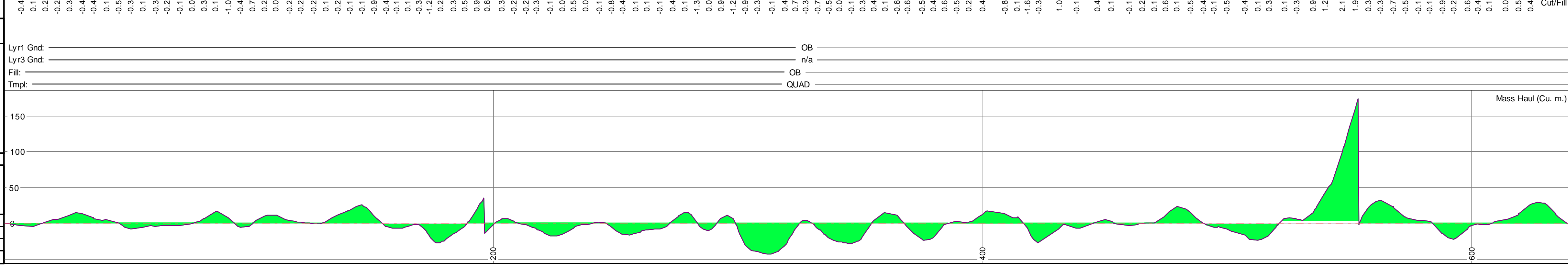
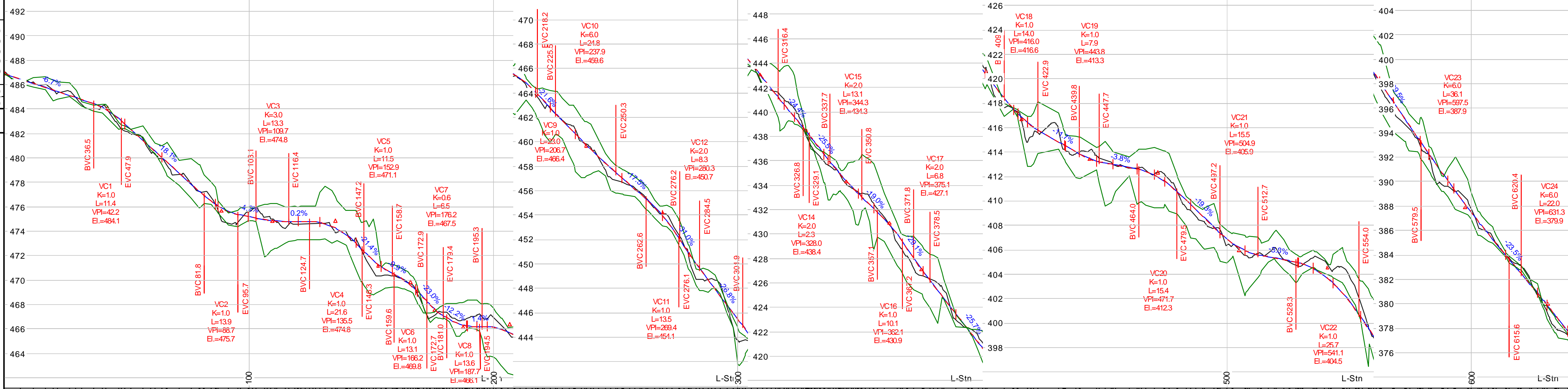
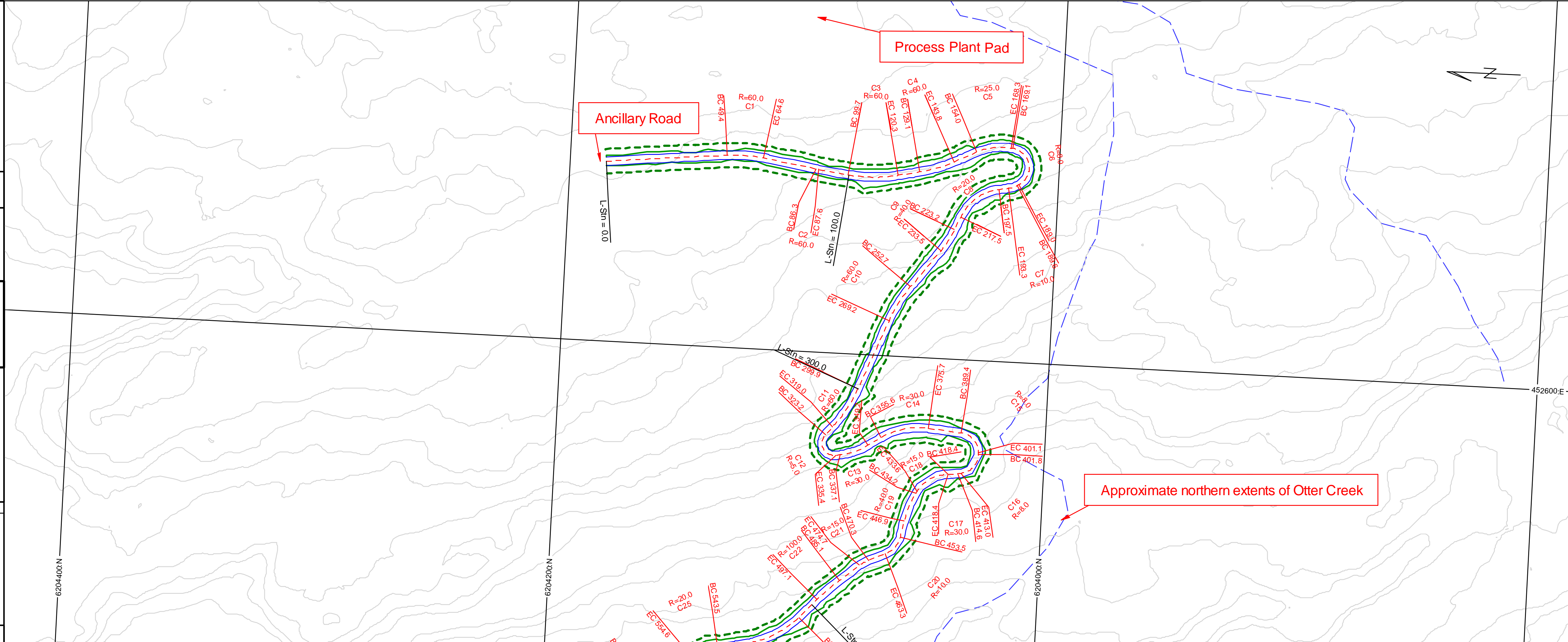
- Adequate road drainage will be achieved through the utilization of cross ditches.
- Cross ditch locations have been excluded from this design.
- Cross ditches to be armoured to minimize erosion and sedimentation.

SOIL TYPES

Ground types to be confirmed following the 2017 field season.

ROAD TEMPLATES

QUAD = 3.5m running surface with 0.2m deep by 0.3m wide ditch





**Bitter Creek Quad Trail
Geometric Alignment
Km 0+000 - 0+674**

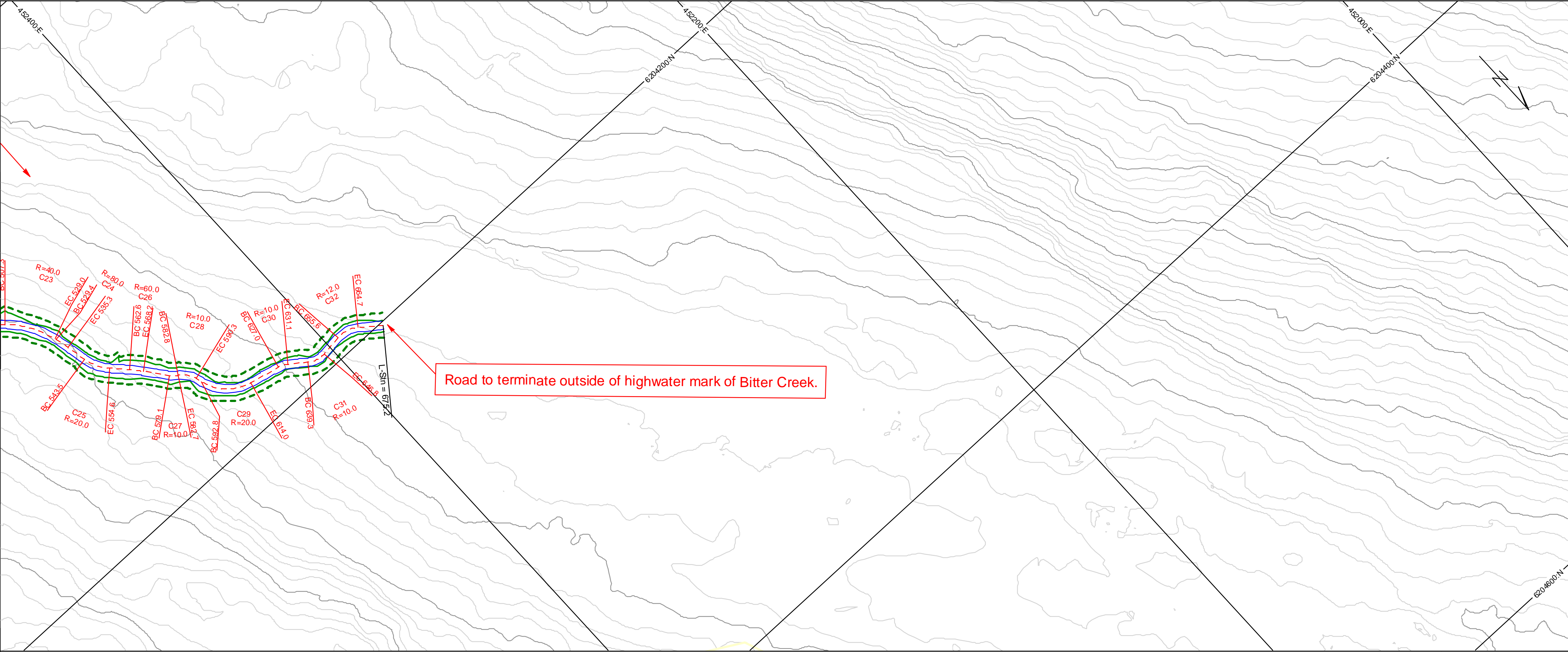
Page Stations: 512.0 to 1152.0

ROAD DESIGN SPECIFICATIONS		Plan Scale 1:1000 Profile Vert Scale 1:200 Profile Horz Scale 1:1000 Formatted to Plot on 24"x36" Paper	
Design is for quad access only.			
Min Curve Radius = 4m Max Grade = 30%			

Notes:
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Plan Legend (all may not be applicable)		Profile Legend	
- - - L-line Location	█ Mine Pads	█ Finished Road Surface	█ Profile Subgrade
█ Road Edges	█ Other Major Mine Facilities	█ Cut / Fill limits	█ Original Ground
█ Cut / Fill limits	█ Borrow Site	█ Cleaning Limits	█ Bedrock
█ Cleaning Limits	█ Waste Site		
⊕ Benchmark			



	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32
IP Stn.	518	532	549	565	581	587	605	629	643	660
BC Stn.	507	529	543	563	579	583	593	627	639	656
Arc Len.	22	6	11	6	4	8	21	4	8	9
EC Stn.	529	535	555	568	583	590	614	631	647	665
Radius	40	80	20	60	10	10	20	10	10	12
Angle	31°	4°	-32°	5°	-21°	43°	-61°	24°	-43°	43°
Tangent	11	3	6	3	2	4	12	2	4	5
Da, a=100	143°	72°	286°	95°	213°	213°	286°	213°	213°	117°

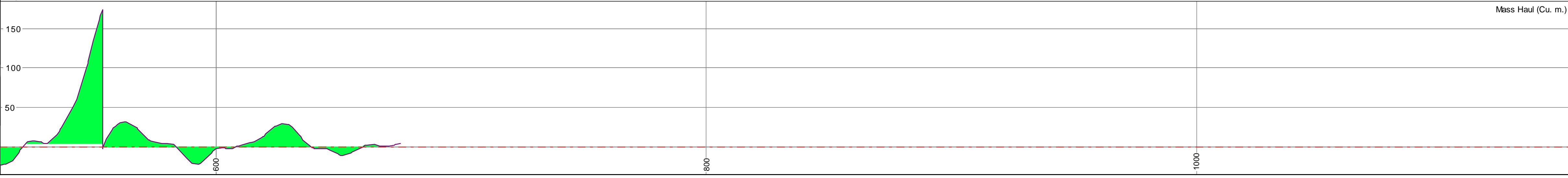
L-Stn	Strip V. Cu. m.	Lyr1 V. Cu. m.	Lyr2 V. Cu. m.	Lyr3 V. Cu. m.	SG Fill V. Cu. m.	B/W Vol. Cu. m.	Srf1 Fill V. Cu. m.
600.0	0.0	77.2	0.0	0.0	70.0		0.0
675.2							
Pg. Tot.	0.0	77.2	0.0	0.0	70.0		0.0
Cum. Tot.	0.0	1278.8	0.0	0.0	1047.3		0.0

Note:
- Adequate road drainage will be achieved through the utilization of cross ditches.
- Cross ditch locations have been excluded from this design.
- Cross ditches to be armoured to minimize erosion and sedimentation.



SOIL TYPES	ROAD TEMPLATES
Ground types to be confirmed following the 2017 field season.	QUAD = 3.5m running surface with 0.2m deep by 0.3m wide ditch

Lyr1 Gnd:	OB
Lyr3 Gnd:	n/a
Fill:	OB
Tmpl:	QUAD



Revision Description	Date	By	Approved	Revision

Page Stations: -8.0 to 312.0

ROAD DESIGN SPECIFICATIONS	
Lane designed to accommodate Runaway Trucks Travelling at a max speed of 75km/hr. Arrestor bed shall be 4m wide, 450mm deep and be constructed using loose gravel.	Plan Scale 1:500 Profile Vert Scale 1:100 Profile Horz Scale 1:500 Formatted to Plot on 24"x36" Paper

Notes:
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Plan Legend (all may not be applicable)		Profile Legend
- - - L-line Location	— Mine Pads	— Finished Road Surface
— Road Edges	— Other Major Mine Facilities	- - - Profile Subgrade
— Cut / Fill Limits	— Borrow Site	— Cut / Fill limits
- - - Clearing Limits	— Waste Site	— Original Ground
⊕ Benchmark		▨ Bedrock

Curve Table (Da = deflection angle for a 10m arc.)

C1	
IP Stn.	8
BC Stn.	-7
Arc. Len.	30
EC Stn.	23
Radius	65
Angle	27
Tangent	15
Da, a=100	88

EARTH WORK VOLUMES (Final Cubic Meters)

L-Stn	Strip V.	Lyr1 V.	Lyr2 V.	Lyr3 V.	SG Fill V.	B/W Vol.	Srf1 Fill V.
m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.	Cu. m.
B -8.0	0.0	0.0	0.0	0.0	0.0		0.0
B 0.0	124.5	0.0	568.2	1076.1	728.6		161.2
100.0	29.0	0.0	0.0	0.0	975.3		22.4
113.0							
Pg. Tot.	153.5	0.0	568.2	1076.1	1703.9		183.6
Cum. Tot.	153.5	0.0	568.2	1076.1	1703.9		183.6

CULVERT TABLE

Note:
 - Required culverts have been excluded from this design.
 - Cross drain culverts will be a minimum of 600mm diameter and be spaced in accordance with the BC MFLNRO Engineering Manual, issued on April 7, 2016.
 - All stream crossings will be designed to handle Q100 flows.

SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMND = 5m running surface with no ditch RUN = Runaway lane with 4m arrestor bed and 3.5 service lane Surfacing depth = 0.3m for approach and service lane, 450mm for arrestor bed.

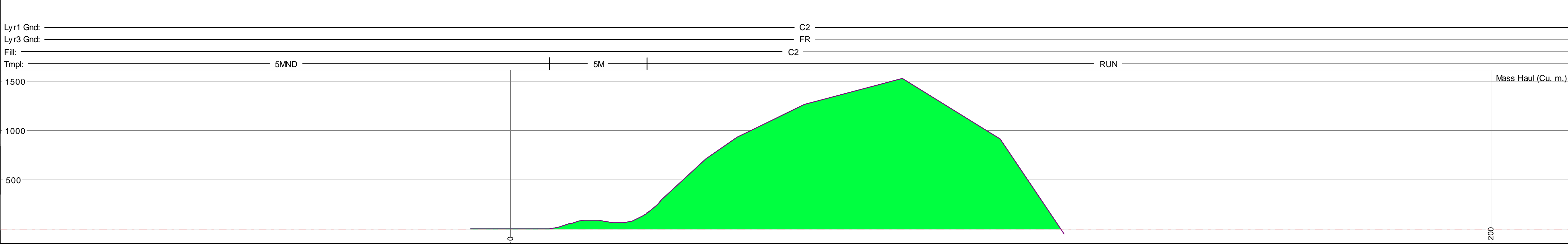
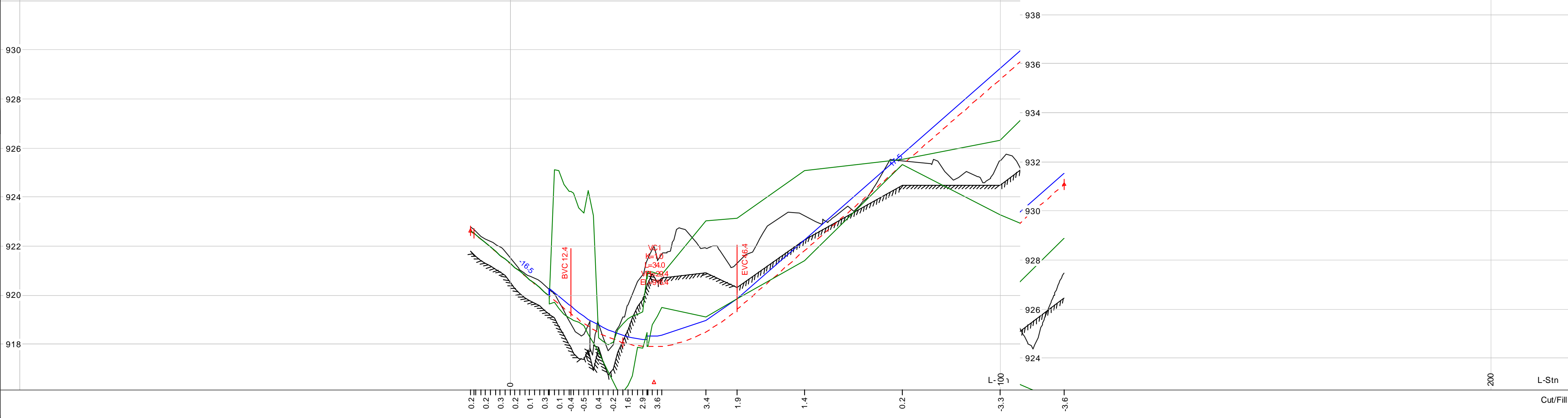
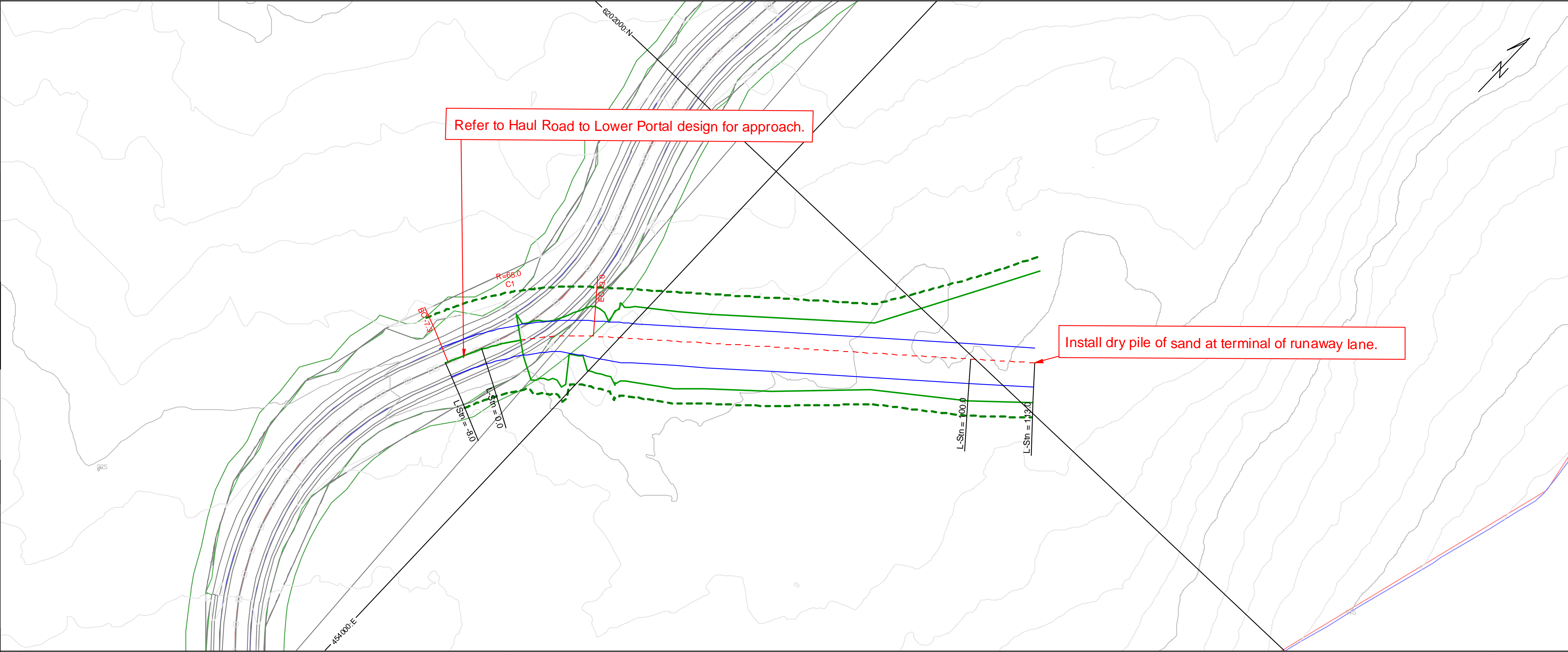
Revision	Description	Date	By	Approved	Revision

Page 1 of 1
 Survey By: See Notes Above
 Design By: Matthew Dickie, EIT
 Reviewed By: Michael Foster, P.Eng

May 2017
 May 2017

ON SITE Engineering Ltd.

Plot Date: 17/11/08 | Design File Name: U:\Projects\1464\2\8\Road\RoadEng\Runaway Lane Design\Runaway Lane 1.dsn



Page Stations: -9.6 to 310.4

ROAD DESIGN SPECIFICATIONS
 Lane designed to accommodate Runaway Trucks
 Travelling at a max speed of 75km/hr.
 Arrestor bed shall be 4m wide, 450mm deep and
 be constructed using loose gravel.

Plan Scale 1:500
 Profile Vert Scale 1:100
 Profile Horz Scale 1:500
 Formatted to Plot on 24"x36" Paper

Notes:
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⊕ Benchmark		▨ Bedrock

Curve Table (Da = deflection angle for a 10m arc.)

	C1	C2
IP Stn.	7	63
BC Stn.	0	48
Arc Len.	15	23
EC Stn.	15	71
Radius	30	30
Angle	-38	43
Tangent	8	12
Da, a=100	191	191

EARTH WORK VOLUMES (Final Cubic Meters)

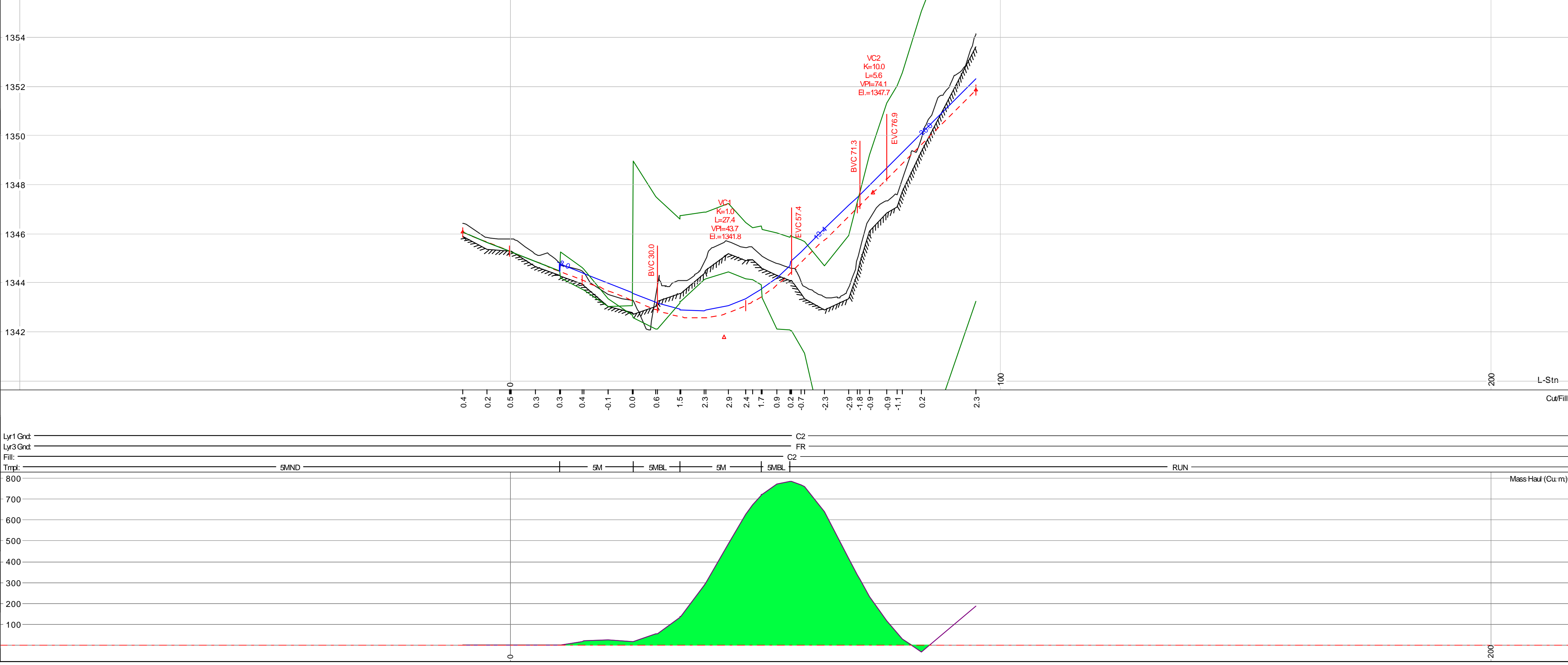
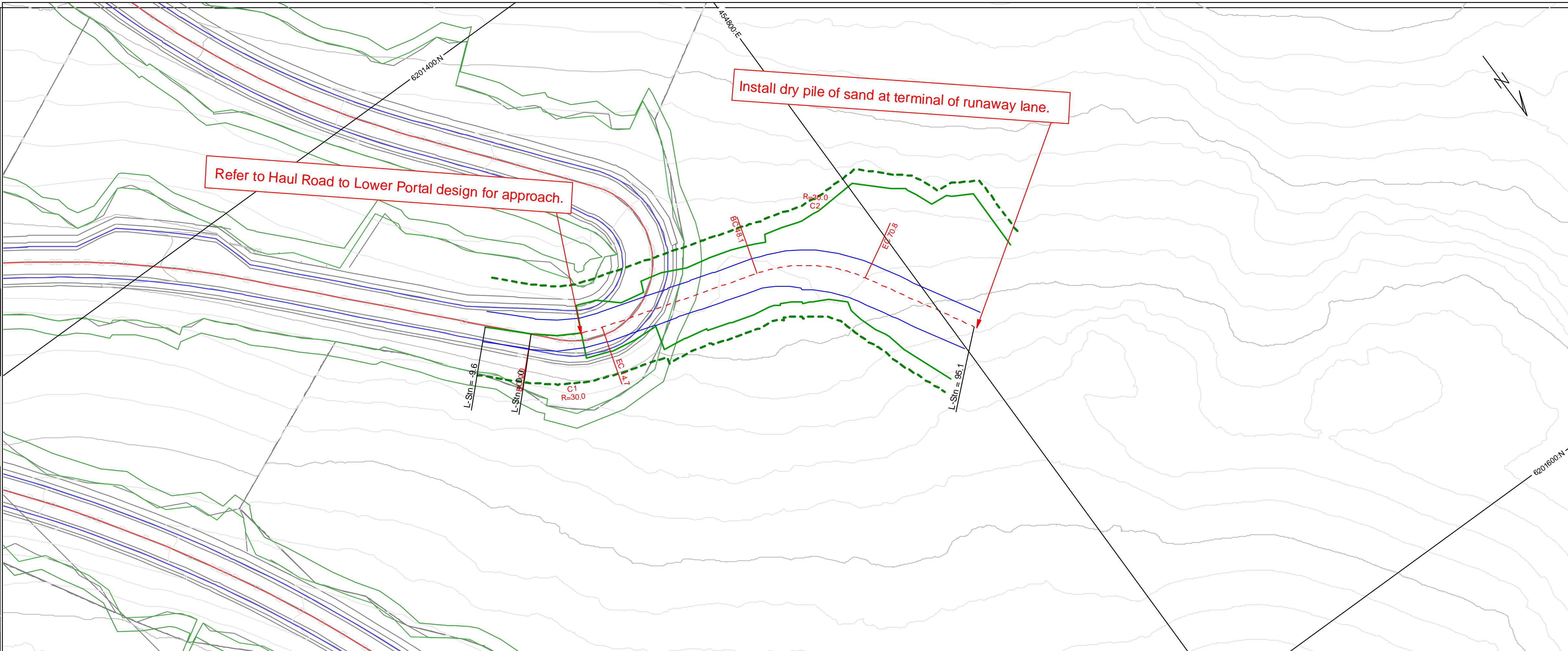
L-Stn	Strip V.	Lyr1 V.	Lyr2 V.	Lyr3 V.	SG Fill V.	BW Vol.	Srfl Fill V.
m	Cu.m	Cu.m	Cu.m	Cu.m	Cu.m	Cu.m	Cu.m
B-9.6	0.0	0.0	0.0	0.0	0.0		0.0
B.0.0	152.2	0.0	230.7	1226.1	1268.3		146.5
95.1							
Pg. Tot.	152.2	0.0	230.7	1226.1	1268.3		146.5
Cum. Tot.	152.2	0.0	230.7	1226.1	1268.3		146.5

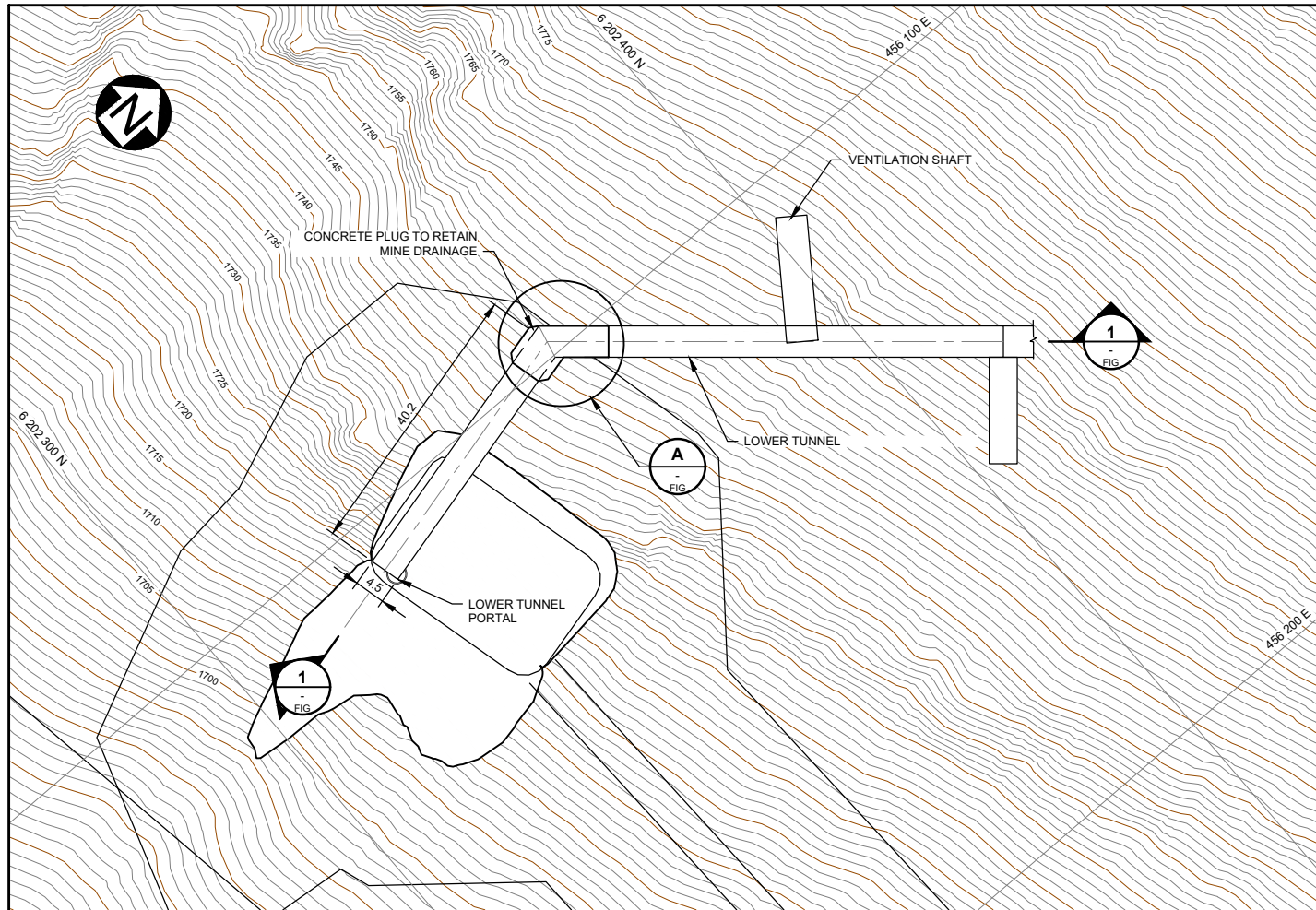
CULVERT TABLE

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 - All stream crossings will be designed to handle Q100 flow s.

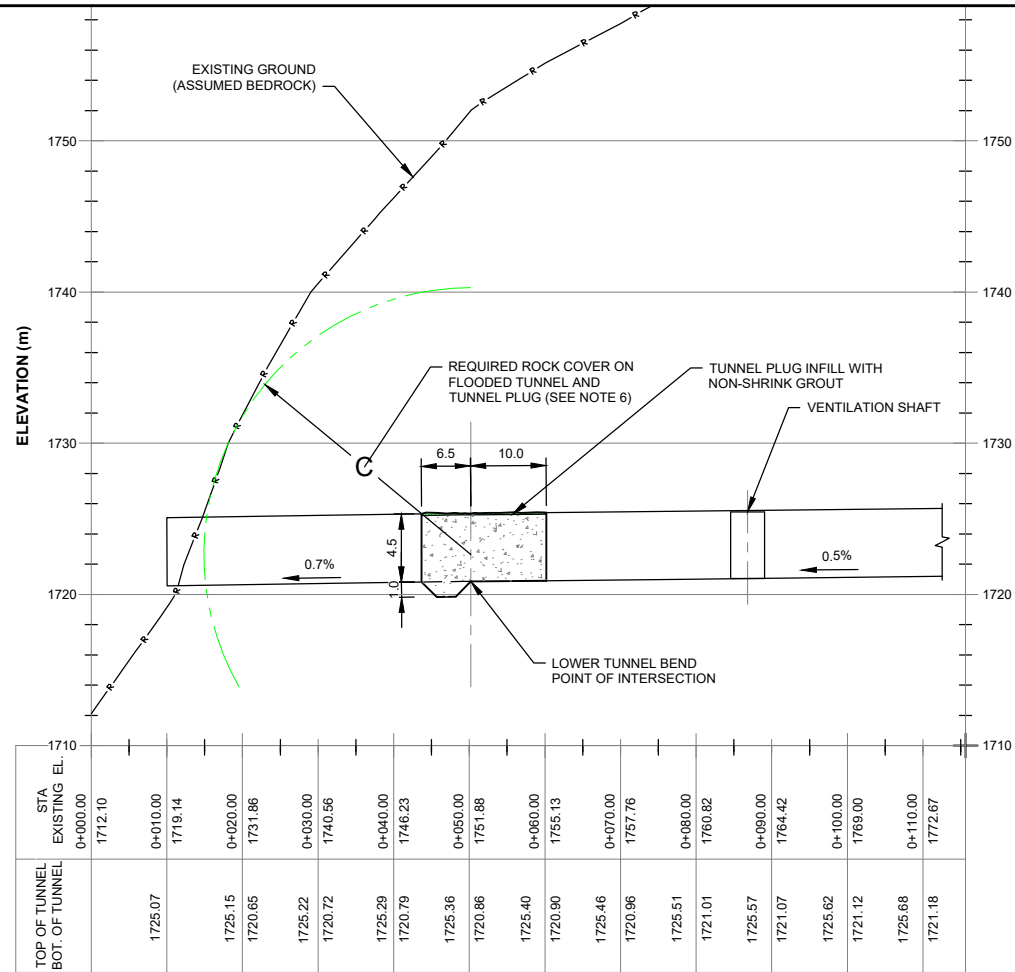
SOIL TYPES	ROAD TEMPLATES
SG - Sand and gravel with some cobbles SR - Strong rock FR - Fractured, weak rock C1 - Silty Sand rubble colluvium C2 - Sand and gravel rubble colluvium with cobbles C3 - Blocky colluvium T1 - Silty sand and gravel till T2 - Silt or clay based basal till	SM = 5m running surface with 0.6m deep by 0.6m wide ditch SMND = 5m running surface with no ditch RUN = Runaway lane with 4m arrestor bed and 3.5 service lane Surfacing depth = 0.3m for approach and service lane, 450mm for arrestor bed.

Revision	Description	Date	By	Approved	Revision

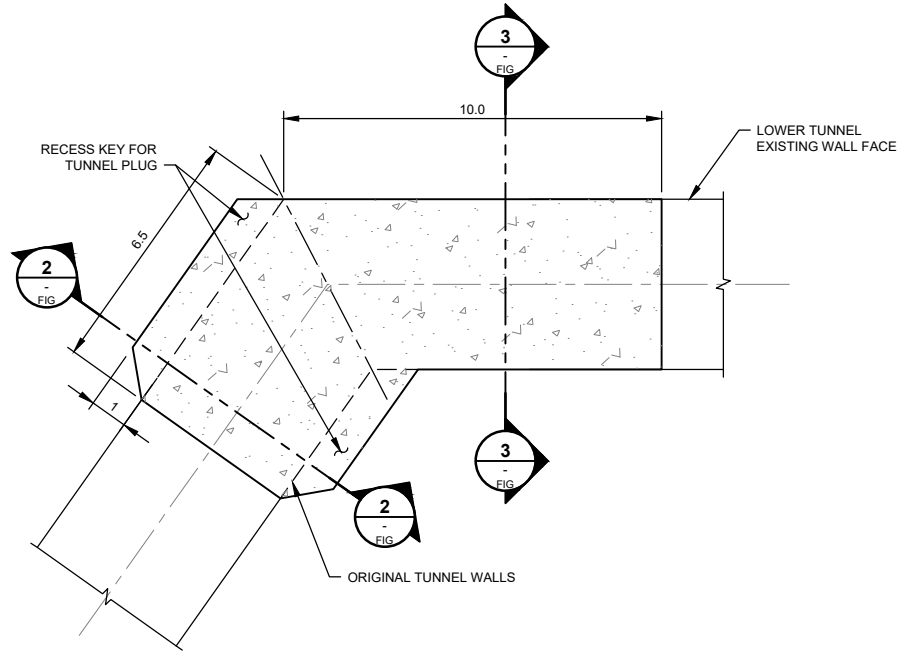




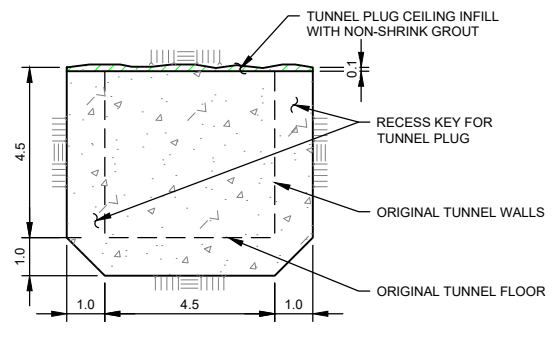
PLAN
SCALE A



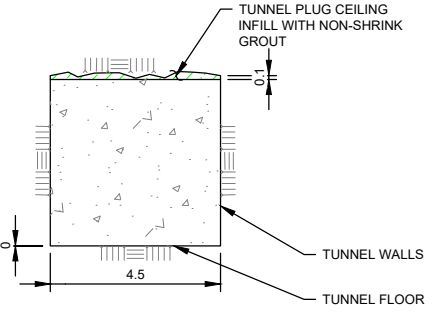
1 LONGITUDINAL SECTION
LOWER TUNNEL
HORIZONTAL: SCALE A
VERTICAL: SCALE B



A DETAIL
TUNNEL CONCRETE PLUG
SCALE C



2 SECTION
TUNNEL CONCRETE PLUG
SCALE C

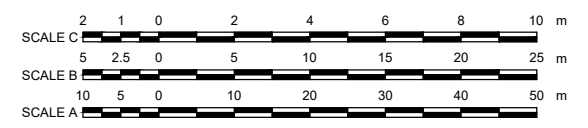


3 SECTION
TUNNEL CONCRETE PLUG
SCALE C

- NOTES:**
- COORDINATE GRID IS UTM NAD 83 ZONE 9.
 - TOPO PROVIDED BY JDS ENERGY & MINING (JANUARY 16, 2016).
 - LOWER TUNNEL MINE DESIGN PROVIDED BY JDS ENERGY & MINING (JUNE 5, 2017).
 - CONTOUR INTERVAL IS 1 METRES.
 - DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
 - THIS DRAWING PRESENTS A REINFORCED CONCRETE TUNNEL PLUG CONCEPT FOR THE RETENTION OF MINE DRAINAGE WATER INSIDE THE LOWER TUNNEL. THE TUNNEL PLUG DESIGN CONCEPT AS SHOWN, IS ABLE TO RESIST 155 M STATIC HEAD METRE WATER COLUMN (MWC). THE CONCEPT WILL BE FURTHER DEVELOPED DURING DETAIL DESIGN AND MAY INCLUDE REINFORCEMENT DOWELS SHOULD ROCK QUALITY REQUIRES IT.
 - THE EXACT LOCATION OF THE TUNNEL PLUG WILL BE DETERMINED DURING DETAIL DESIGN ACCOUNTING FOR SUFFICIENT ROCK QUALITY AND ROCK CONFINEMENT COVER IN ACCORDANCE WITH NORWEGIAN CRITERION (BERG-CHRISTENSEN EN DANNEVIG).
 - ADDITIONAL GROUT CURTAIN (NOT SHOWN) MAYBE REQUIRED, IF ROCK JOINTING/QUALITY NECESSITATES IN ORDER TO PREVENT SEEPAGE THROUGH BEDROCK. TO BE DETERMINED DURING DETAIL DESIGN.

- LEGEND:**
- SELF-CONSOLIDATING CONCRETE (SCC) - 25 MPa
 - NON-SHRINK GROUT - 30 MPa

FOR INFORMATION ONLY



IDM MINING LTD.	
RED MOUNTAIN UNDERGROUND GOLD PROJECT	
LOWER MINE TUNNEL CLOSURE CONCRETE PLUG	
Knight Piesold CONSULTING	P/A NO. VA101-594/4-P REF NO. VA17-00974
FIGURE 1	REV A

SAVED: M:\110100594\04\AA\ca\FIGS\B17_6/8/2017 10:47:34 AM, NDANCHOVA, PRINTED: 6/8/2017 10:54:13 AM, Layout1, NDANCHOVA
 BY: PLSI SITE CONTROLS - TO ADME REG. MADE FILED

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
A	08JUN'17	ISSUED FOR INFORMATION	CPC	ND	EJS