

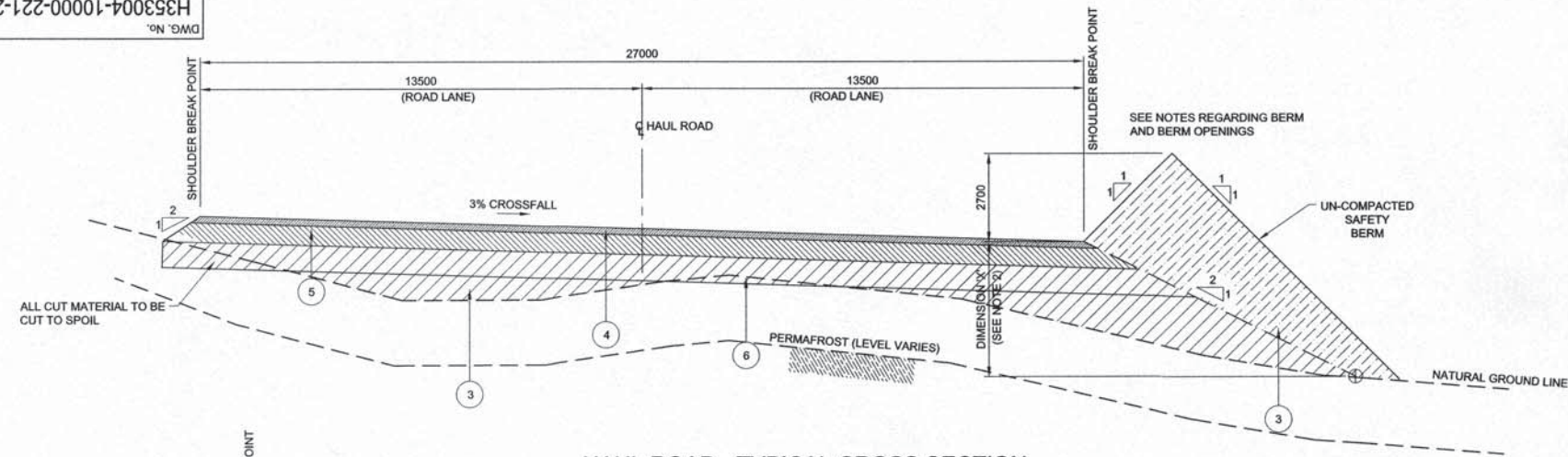
## Attachment 12.4

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### **Tote Road Typical Drawings**

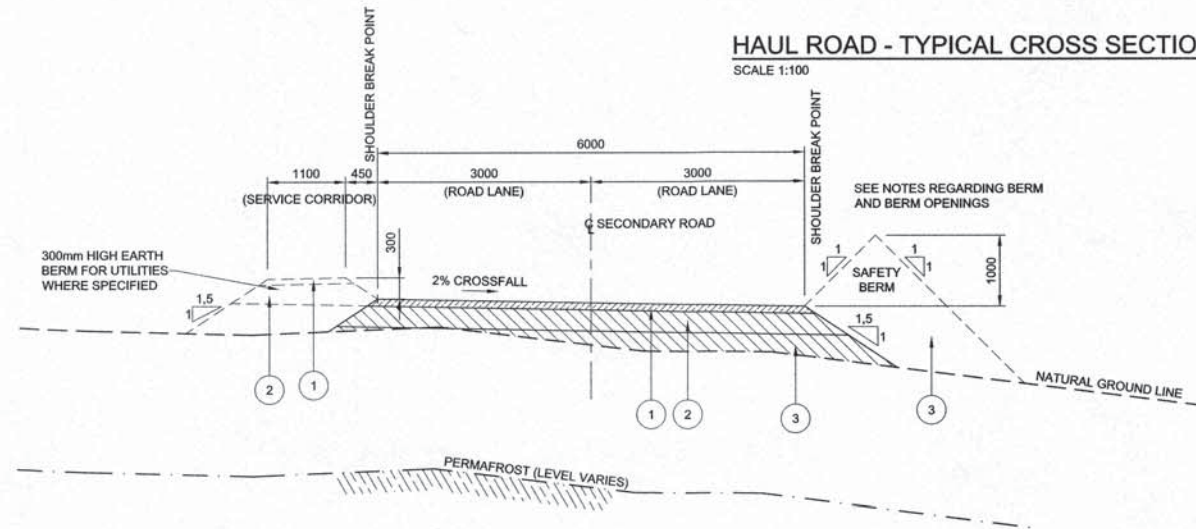
(6 Pages)

H353004-10000-221-273-0002-0001  
DWG. No.



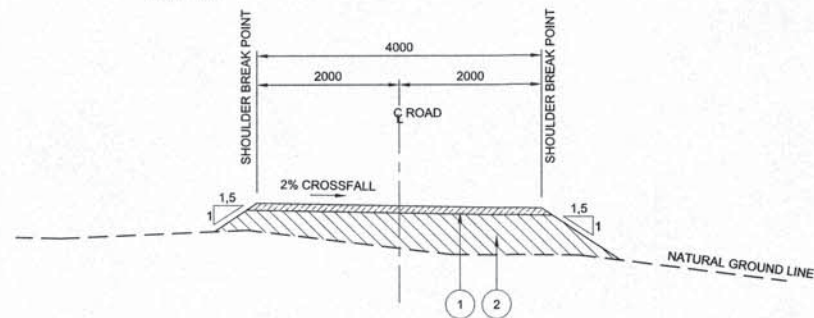
HAUL ROAD - TYPICAL CROSS SECTION

SCALE 1:100



SECONDARY ROAD - TYPICAL CROSS SECTION

SCALE 1:50



TERTIARY AND TEMPORARY ROAD - TYPICAL CROSS SECTION

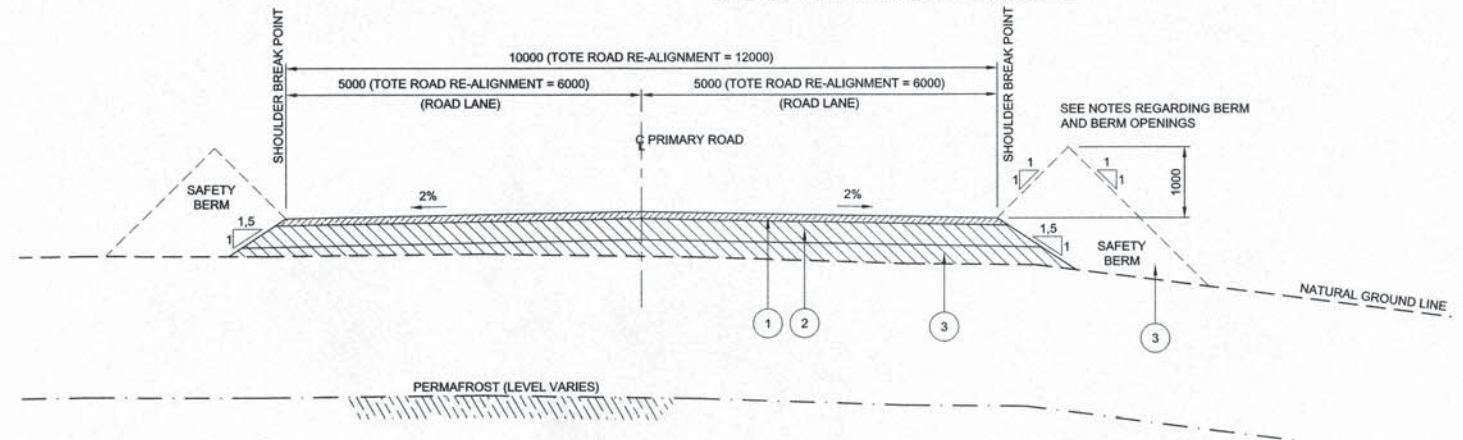
SCALE 1:50

ROAD MATERIAL IDENTIFICATION: (SEE NOTE 4)

- 100mm WEARING COURSE / BASE LAYER, TYPE 5 (-32mm) MATERIAL
- 300mm ROCK SUBBASE LAYER, TYPE 8 (-150mm) MATERIAL WHERE FILL IS LESS THAN 600mm THICK, OR, TYPE 12 (-600mm) MATERIAL WHERE FILL IS GREATER THAN 600mm
- GENERAL FILL, TYPE 8 (-150mm) MATERIAL WHERE FILL IS LESS THAN 600mm THICK, OR, TYPE 12 (-600mm) MATERIAL WHERE FILL IS GREATER THAN 600mm
- 200mm WEARING COARSE / BASE LAYER, TYPE 5 (-32mm) MATERIAL
- 600mm ROCK SUBBASE LAYER, TYPE 8 (-150mm) MATERIAL
- 800mm ROCK SUBGRADE LAYER, TYPE 12 (-600mm) MATERIAL

GENERAL NOTES:

- SAFETY BERMS FOR ALL ROADS SHALL BE PROVIDED BASED ON THE NUNAVUT MINE HEALTH AND SAFETY ACT.
- THIS BARRIER SHALL BE PROVIDED WHERE THE ELEVATION DIFFERENCE IS GREATER THAN 3.0m (DIMENSION 'X'), MEASURED AT THE ROAD SHOULDER BREAK POINT. SEE TYPICAL SECTIONS FOR LOCATION. BERMS TO BE CONSTRUCTED AS PRESCRIBED BY THE ENGINEER ON SITE.
- 1.0m WIDE OPENINGS ARE TO BE PROVIDED IN THE BERMS AT 25.0m C/C FOR WATER RUN OFF AND SNOW CLEARANCE DURING MAINTENANCE.
- THICKNESS FOR ROAD FILL MATERIALS ARE MINIMUM, AND TO BE ADJUSTED IN THE FIELD DEPENDING ON SITE AND LOCAL CONDITIONS



PRIMARY ROAD - TYPICAL CROSS SECTION

SCALE 1:50

PERMIT TO PRACTICE  
HATCH LTD.  
Signature: [Signature]  
Date: 2018-01-23  
PERMIT NUMBER: P 512  
The Association of Professional Engineers,  
Geologists and Geophysicists of NWT/NJ

FOR CONSTRUCTION

HATCH

Baffinland

BAFFINLAND IRON MINES LP  
MARY RIVER EXPANSION PROJECT

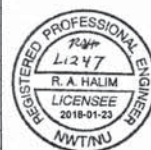
MINE SITE  
HAUL, PRIMARY AND SECONDARY ROADS  
TYPICAL CROSS SECTIONS

|                 |              |            |
|-----------------|--------------|------------|
| DRAFTSPERSON    | I BARNARD    | NR         |
| DESIGNER        | I BARNARD    | NR         |
| CHECKER         | F HUGO       | 2018-01-23 |
| DESIGN COORD.   | R GOOSEN     | 2018-01-23 |
| RESP. ENG.      | R HALIM      | 2018-01-23 |
| LEAD DISC. ENG. | A GROBBELAAR | 2018-01-23 |
| AREA MANAGER    | V LAVRIC     | N/A        |
| ENG. MANAGER    | D STANGER    | 2018-01-23 |
| CLIENT          | F PITTMAN    | 2018-01-23 |

|                          |                           |           |      |
|--------------------------|---------------------------|-----------|------|
| ROLE                     | NAME                      | SIGNATURE | DATE |
| DRAWING APPROVAL STATUS: | Approved for Construction |           |      |

|             |                                 |     |
|-------------|---------------------------------|-----|
| SCALE       | DWG. No.                        | REV |
| 1:50        | H353004-10000-221-273-0002-0001 | 0   |
| OR AS NOTED |                                 |     |

SHEET SIZE: D



REG. PROFESSIONAL

|     |                           |             |           |
|-----|---------------------------|-------------|-----------|
| 0   | APPROVED FOR CONSTRUCTION | DESCRIPTION | REVISIONS |
| No. |                           |             |           |

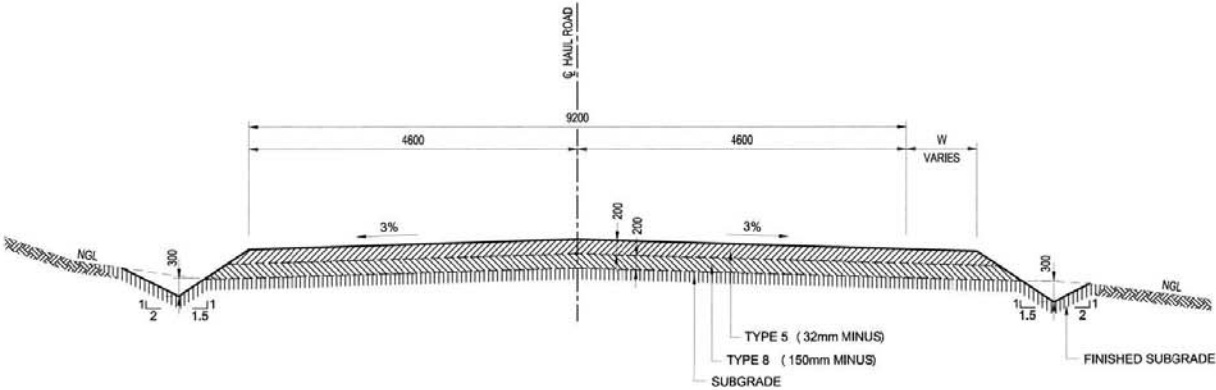
|             |               |
|-------------|---------------|
| DRAWING No. | DRAWING TITLE |
| 1           | 2             |
| 3           | 4             |
| 5           | 6             |
| 7           | 8             |

H353004-30000-224-294-0010-0001  
DWG. No.

| ROAD PAVEMENT STRUCTURE BY SOIL TYPE |                      |                      |
|--------------------------------------|----------------------|----------------------|
| SOIL TYPE<br>BY FROST SUSCEPTIBILITY | TYPE 8<br>DEPTH (mm) | TYPE 5<br>DEPTH (mm) |
| HIGHLY SUSCEPTIBLE (HS)              | 150                  | 150                  |
| MODERATELY SUSCEPTIBLE (MS)          | 150                  | 150                  |
| POTENTIALLY SUSCEPTIBLE (PS)         | -                    | 150                  |
| NON SUSCEPTIBLE                      | -                    | 150                  |

| WIDENING TABLE        |          |                       |          |                       |          |
|-----------------------|----------|-----------------------|----------|-----------------------|----------|
| DESIGN SPEED: 65 km/h |          | DESIGN SPEED: 65 km/h |          | DESIGN SPEED: 65 km/h |          |
| RADIUS                | WIDENING | RADIUS                | WIDENING | RADIUS                | WIDENING |
| 10000                 | 0        | 475                   | 0.3      | 190                   | 1        |
| 5000                  | 0        | 390                   | 0.4      | 180                   | 1.1      |
| 3000                  | 0        | 380                   | 0.5      | 170                   | 1.2      |
| 2000                  | 0        | 370                   | 0.5      | 160                   | 1.3      |
| 1500                  | 0        | 360                   | 0.5      | 150                   | 1.4      |
| 1200                  | 0        | 350                   | 0.5      | 140                   | 1.5      |
| 1000                  | 0        | 340                   | 0.5      | 130                   | 1.6      |
| 950                   | 0        | 330                   | 0.5      | 120                   | 1.7      |
| 900                   | 0        | 320                   | 0.6      | 110                   | 1.9      |
| 850                   | 0.1      | 310                   | 0.6      | 100                   | 2        |
| 800                   | 0.1      | 300                   | 0.6      | 90                    | 2.3      |
| 750                   | 0.1      | 290                   | 0.6      | 80                    | 2.6      |
| 700                   | 0.1      | 280                   | 0.7      | 70                    | 2.9      |
| 650                   | 0.2      | 270                   | 0.7      | 60                    | 3.3      |
| 600                   | 0.2      | 260                   | 0.7      | 55                    | 3.5      |
| 575                   | 0.2      | 250                   | 0.8      | 50                    | 3.7      |
| 550                   | 0.2      | 240                   | 0.8      |                       |          |
| 525                   | 0.2      | 200                   | 1        |                       |          |

- NOTE:
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
  - W - REFER TO WIDENING TABLE FOR WIDTH OF WIDENING.
  - THIS DRAWING WAS PREVIOUSLY ISSUED: H353004-00000-224-272-0034-0001



TYPICAL HAUL ROAD CROSS SECTION  
SCALE 1:50

PERMIT TO PRACTICE  
HATCH LTD.  
Signature: *[Signature]*  
Date: *[Date]*  
PERMIT NUMBER: P-012  
The Association of Professional Engineers,  
Geologists and Geophysicists of NWT/NU

APPROVED FOR CONSTRUCTION

HATCH

Baffinland

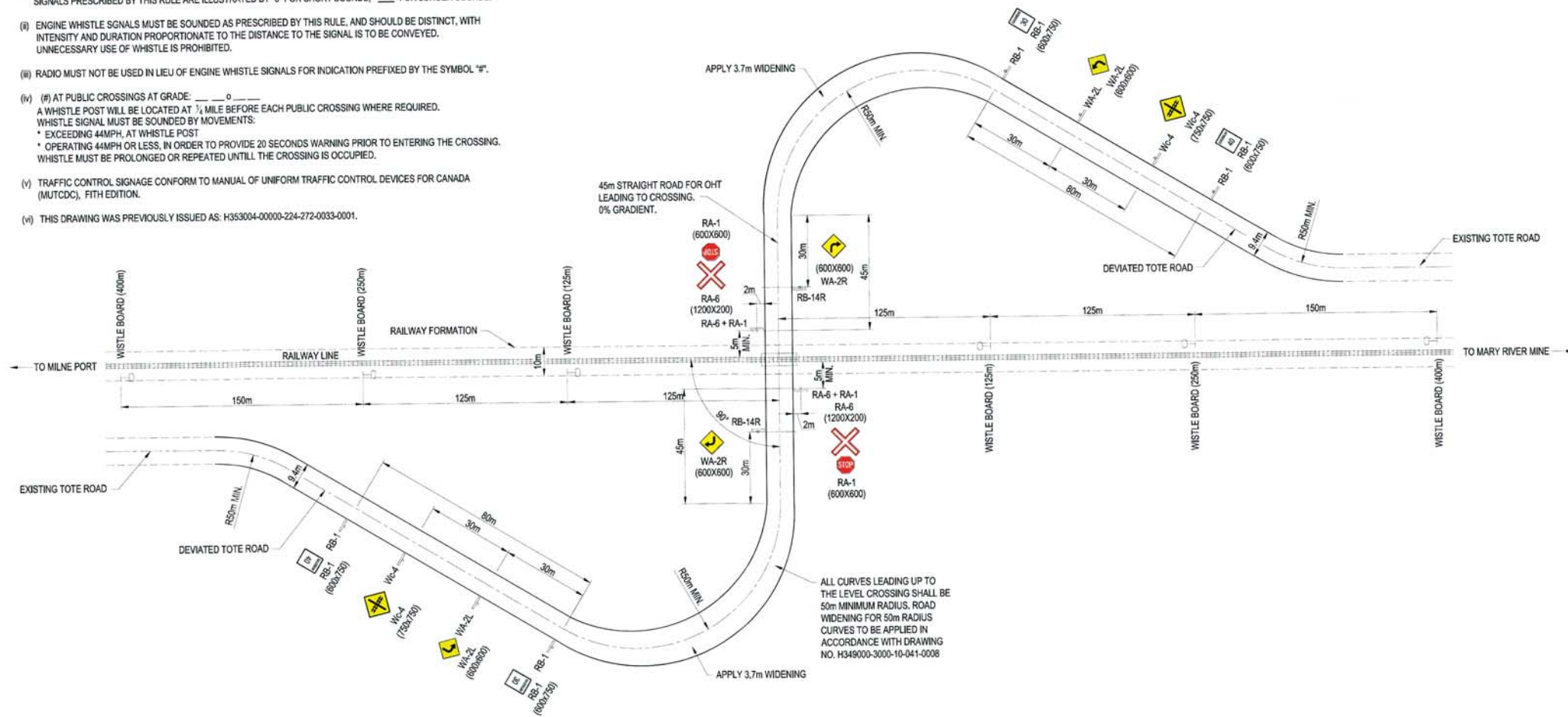
BAFFINLAND IRON MINES LP  
MARY RIVER EXPANSION PROJECT

TOTE ROAD  
STANDARD DRAWING  
TYPICAL HAUL ROAD CROSS SECTION

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NOTES:

- (i) WHEREVER THE WORDS 'ENGINE WHISTLE' APPEAR IN THESE RULES THEY ALSO REFER TO 'ENGINE HORN'. SIGNALS PRESCRIBED BY THIS RULE ARE ILLUSTRATED BY "o" FOR SHORT SOUNDS; "—" FOR LONGER SOUNDS.
- (ii) ENGINE WHISTLE SIGNALS MUST BE SOUNDED AS PRESCRIBED BY THIS RULE, AND SHOULD BE DISTINCT, WITH INTENSITY AND DURATION PROPORTIONATE TO THE DISTANCE TO THE SIGNAL IS TO BE CONVEYED. UNNECESSARY USE OF WHISTLE IS PROHIBITED.
- (iii) RADIO MUST NOT BE USED IN LIEU OF ENGINE WHISTLE SIGNALS FOR INDICATION PREFIXED BY THE SYMBOL "R".
- (iv) (a) AT PUBLIC CROSSINGS AT GRADE: — 0 —  
A WHISTLE POST WILL BE LOCATED AT 1/4 MILE BEFORE EACH PUBLIC CROSSING WHERE REQUIRED. WHISTLE SIGNAL MUST BE SOUNDED BY MOVEMENTS:  
\* EXCEEDING 44MPH, AT WHISTLE POST  
\* OPERATING 44MPH OR LESS, IN ORDER TO PROVIDE 20 SECONDS WARNING PRIOR TO ENTERING THE CROSSING. WHISTLE MUST BE PROLONGED OR REPEATED UNTIL THE CROSSING IS OCCUPIED.
- (v) TRAFFIC CONTROL SIGNAGE CONFORM TO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (MUTCD), FIFTH EDITION.
- (vi) THIS DRAWING WAS PREVIOUSLY ISSUED AS: H353004-00000-224-272-0033-0001.



TYPICAL LEVEL CROSSING LAYOUT  
NTS

PERMIT TO PRACTICE  
HATCH LTD.  
Signature \_\_\_\_\_  
Date \_\_\_\_\_  
PERMIT NUMBER: P-512  
The Association of Professional Engineers,  
Geologists and Geophysicists of NWT/NU

APPROVED FOR CONSTRUCTION

THIS DRAWING WAS PREPARED BY HATCH LTD. (HATCH) FOR THE EXCLUSIVE USE OF BAFFINLAND IRON MINES LP (CLIENT) AND ITS USE IS SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT BETWEEN HATCH AND THE CLIENT. INCLUDING ANY LIMITATIONS ON LIABILITY CONTAINED THEREIN. THIS DRAWING AND ITS CONTENTS REMAIN THE INTELLECTUAL PROPERTY OF HATCH SUBJECT TO CLIENT'S ROYALTY-FREE, IRREVOCABLE, PERPETUAL, AND NON-EXCLUSIVE LICENSE TO USE AND REPRODUCE THE DRAWING FOR PURPOSES CONNECTED WITH THE PROJECT, INCLUDING THE CONSTRUCTION, COMPLETION, MAINTENANCE, EXTENSION, RENOVATION AND REPAIR OF THE PROJECT. THIS DRAWING AND THE INFORMATION CONTAINED HEREIN, SHALL BE TREATED AS CONFIDENTIAL FOR ALL OTHER PURPOSES AND SHALL NOT BE MODIFIED WITHOUT THE WRITTEN CONSENT OF HATCH.

HATCH

Baffinland

BAFFINLAND IRON MINES LP  
MARY RIVER PROJECT

TOTE ROAD  
STANDARD DRAWING  
TYPICAL GRADE CROSSING LAYOUT

|                 |               |    |            |
|-----------------|---------------|----|------------|
| DRAFTSPERSON    | A VAN NIEKERK | NR | 13/12/17   |
| DESIGNER        | A VAN NIEKERK | NR | 13/12/17   |
| CHECKER         | G JOHNSTONE   |    |            |
| DESIGN COORD.   | G JOHNSTONE   |    |            |
| RESP. ENG.      | D STANGER     |    | 2018-12-18 |
| LEAD DISC. ENG. | F VAN BILJON  |    | 2018-12-18 |
| AREA LEAD       | F VAN BILJON  |    | 2018-12-18 |
| ENG. MANAGER    | D STANGER     |    | 2018-12-18 |
| AREA MANAGER    | F PITTMAN     |    | 2018-12-20 |

|      |      |           |      |
|------|------|-----------|------|
| ROLE | NAME | SIGNATURE | DATE |
| ROLE | NAME | SIGNATURE | DATE |

DRAWING APPROVAL STATUS: Approved for Construction

|                      |                                 |     |
|----------------------|---------------------------------|-----|
| SCALE                | DWG. No.                        | REV |
| 1:100<br>OR AS NOTED | H353004-30000-224-294-0009-0001 | 0   |

SHEET SIZE: D

H353004-30000-224-294-0007  
DRAWING No.

ROAD SIGNS AND SIGN POST DETAIL

DRAWING TITLE

REFERENCE DRAWINGS

REG. PROFESSIONAL

0 APPROVED FOR CONSTRUCTION

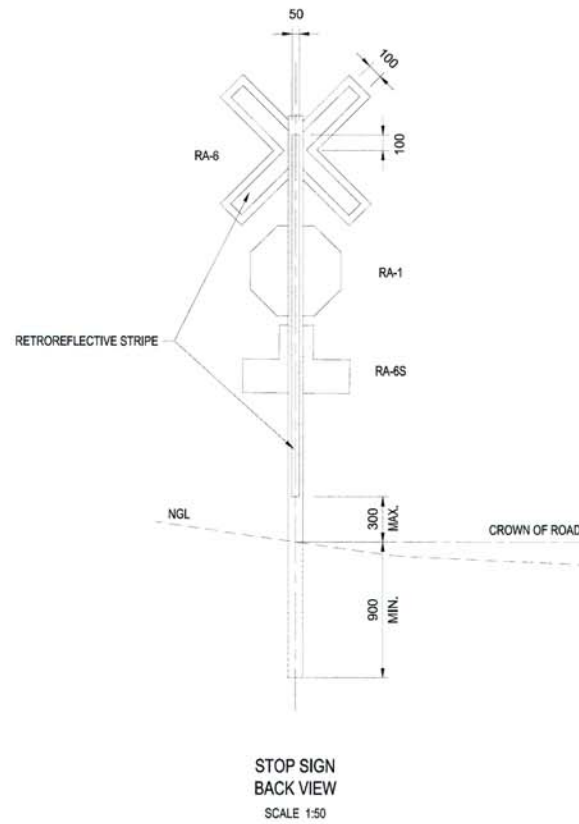
DESCRIPTION

REVISIONS

AVJN  
BY  
CHKD  
DATE

2018/04/09

DRAWING APPROVAL STATUS: Approved for Construction



**NOTES:**

- (i) TRAFFIC CONTROL SIGNAGE CONFORM TO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (MUTCD), FIFTH EDITION.
- (ii) WHEN ROAD CROSSES TWO OR MORE TRACKS, SIGNAGE RA-6S MUST BE ADDED BELOW STOP SIGN RA-1.
- (iii) THIS DRAWING WAS PREVIOUSLY ISSUED AS: H353004-00000-220-294-0008-0001.

**PERMIT TO PRACTICE**  
**HATCH LTD.**  
Signature \_\_\_\_\_  
Date \_\_\_\_\_  
**PERMIT NUMBER: P 512**  
The Association of Professional Engineers,  
Geologists and Geophysicists of NWT/NU

THIS DRAWING WAS PREPARED BY HATCH LTD. (HATCH) FOR THE EXCLUSIVE USE OF BAFINLAND IRON MINES OF CLIENTS) AND ITS USE IS SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT BETWEEN HATCH AND THE CLIENT. ANY AND ALL LIMITATIONS ON LIABILITY CONTAINED HEREIN. THIS DRAWING AND ITS CONTENTS REMAIN THE INTELLECTUAL PROPERTY OF HATCH SUBJECT TO CLIENTS' RIGHT OF FIRST REFUSAL. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TO REPRODUCE THE DRAWING FOR PURPOSES CONNECTED WITH THE PROJECT, INCLUDING THE CONSTRUCTION, COMPLETION, MAINTENANCE, EXTENSION, REINSTATEMENT AND REPAIR OF THE PROJECT. THIS DRAWING, AND THE INFORMATION CONTAINED HEREIN, SHALL BE TREATED AS CONFIDENTIAL FOR ALL OTHER PURPOSES AND SHALL NOT BE MODIFIED WITHOUT THE WRITTEN CONSENT OF HATCH.



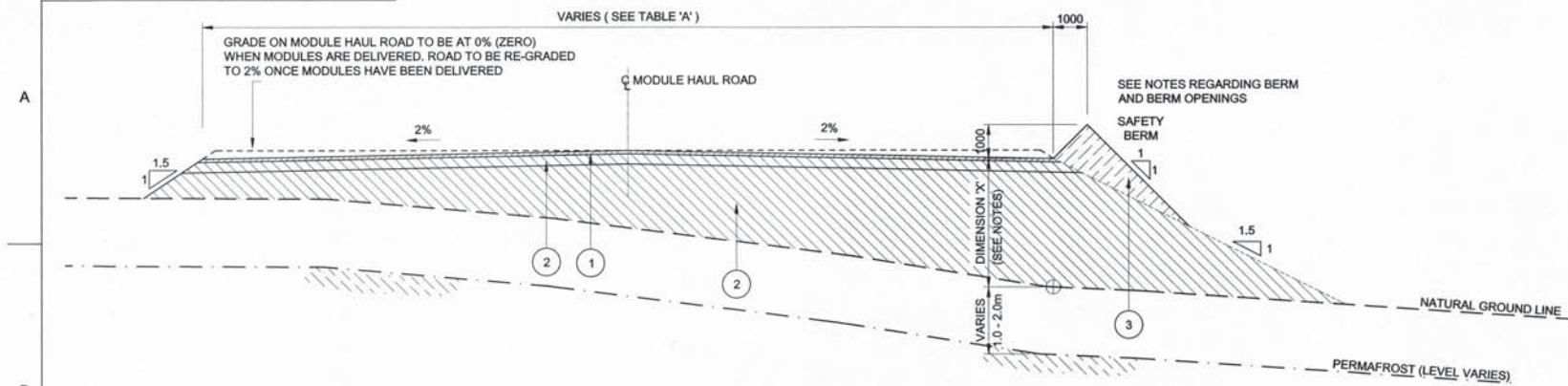
TOTE ROAD  
STANDARD DRAWING  
ROAD SIGNS AND SIGN POST DETAIL

|                          |               |                           |                                                             |
|--------------------------|---------------|---------------------------|-------------------------------------------------------------|
| DRAFTSPERSON             | A VAN NIEKERK | NR                        | 10/01/18                                                    |
| DESIGNER                 | A VAN NIEKERK | NR                        | 10/01/18                                                    |
| CHECKER                  | G JOHNSTONE   |                           | Original approval by the contractor<br>on 20/01/18 at 11:15 |
| DESIGN COORD.            | G JOHNSTONE   |                           | Final approval by the contractor<br>on 20/01/18 at 11:15    |
| RESP. ENG.               | D STANGER     |                           | 2018 12 18                                                  |
| LEAD DISC. ENG.          | F VAN BILJON  |                           | 2018-11-19                                                  |
| AREA LEAD                | F VAN BILJON  |                           | 2017-12-19                                                  |
| ENG. MANAGER             | D STANGER     |                           | 2018 12 18                                                  |
| 09 AREA MANAGER          | F PITTMAN     |                           | 2018-12-20                                                  |
|                          | ROLE          | NAME                      |                                                             |
|                          |               | SIGNATURE                 | DATE                                                        |
| DRAWING APPROVAL STATUS: |               | Approved for Construction |                                                             |

|                             |                                                 |              |
|-----------------------------|-------------------------------------------------|--------------|
| SCALE<br>NTS<br>OR AS NOTED | DWG. No.<br><br>H353004-30000-224-294-0007-0001 | REV<br><br>0 |
|-----------------------------|-------------------------------------------------|--------------|

| USERS | STIMES |
|-------|--------|
| USERS | STIMES |

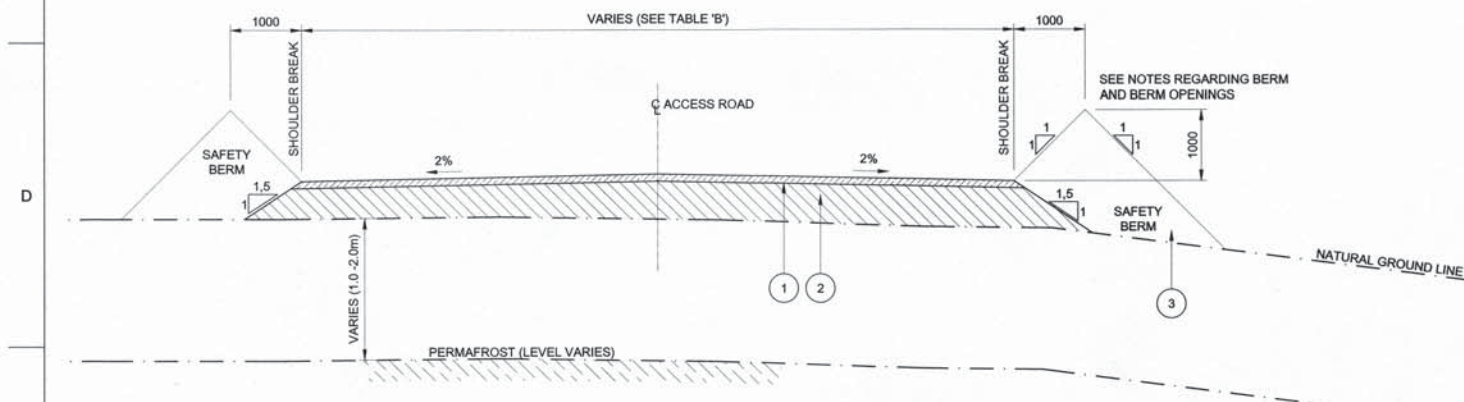
H353004-40000-221-273-0001-0001  
DWG. No.



MODULE ROAD - TYPICAL CROSS SECTION

SCALE 1:100

| TABLE 'A'                                |                     |                                         |
|------------------------------------------|---------------------|-----------------------------------------|
| MODULE                                   | ROAD WIDTH          | APPLICABLE DRAWING NUMBER               |
| RAIL CAR DUMPER / INDEXER                | 15.000m (STRAIGHTS) | H353004-40000-223-271-0007-0001 TO 0004 |
| RAIL CAR DUMPER / INDEXER                | 17.000m (CURVES)    | H353004-40000-223-271-0007-0001 TO 0004 |
| STOCKPILE APRON FEEDER                   | 15.000m             | H353004-40000-223-271-0007-0001 TO 0004 |
| SCREENING BUILDING                       | 24.000m             | H353004-40000-223-271-0007-0001 TO 0004 |
| CRUSHING BUILDING                        | 24.000m             | H353004-40000-223-271-0007-0001 TO 0004 |
| STACKER RECLAIMER AND TRIPPER CAR        | 24.000m             | H353004-40000-223-271-0007-0001 TO 0004 |
| STOCKYARD CONVEYOR AND CONVEYOR SECTIONS | 24.000m             | H353004-40000-223-271-0007-0001 TO 0004 |



PRIMARY ROAD - TYPICAL CROSS SECTION

SCALE 1:50

| TABLE 'B'            |            |                                         |
|----------------------|------------|-----------------------------------------|
| ROAD                 | ROAD WIDTH | APPLICABLE DRAWING NUMBER               |
| DRIVE STATION ACCESS | 20.000m    | H353004-40000-221-272-0005-0001         |
| SOUTHERN BYPASS      | 12.000m    | H353004-40000-223-271-0006-0001 TO 0004 |
| DUMPER TUNNEL ACCESS | 10.000m    | H353004-40000-221-272-0005-0001         |

MATERIAL AND COMPACTION SPECIFICATION:

TYPE 5 (CRUSHER RUN 32mm MINUS MATERIAL) OR TYPE 3 (CRUSHER RUN 50mm MINUS): THE MATERIAL MUST BE PLACED IN LIFTS NOT EXCEEDING 200mm AND SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). ALTERNATIVELY, THE COMPACTION SHOULD ACHIEVE A MINIMUM OF 100 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY TEST METHOD ASTM D698.

TYPE 8 (CRUSHER RUN 150mm MINUS): THE ROCKFILL MUST BE PLACED IN LIFTS NOT EXCEEDING 500mm. THE PLACEMENT SHALL AVOID SEGREGATION AND NESTING OF COARSE PARTICLES. IT SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). EACH LIFT MUST BE "PROOF-ROLLED" PRIOR TO PLACING THE SUBSEQUENT LIFT.

TYPE 12 (RUN OF MINE, TYPICALLY 600mm MINUS): THE ROCKFILL, IF USED, MUST BE PLACED IN LIFTS NOT EXCEEDING 1000mm. THE ROCKFILL SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). ALTERNATIVE COMPACTION SUCH AS HEAVY LOADED RUBBER TIERED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.

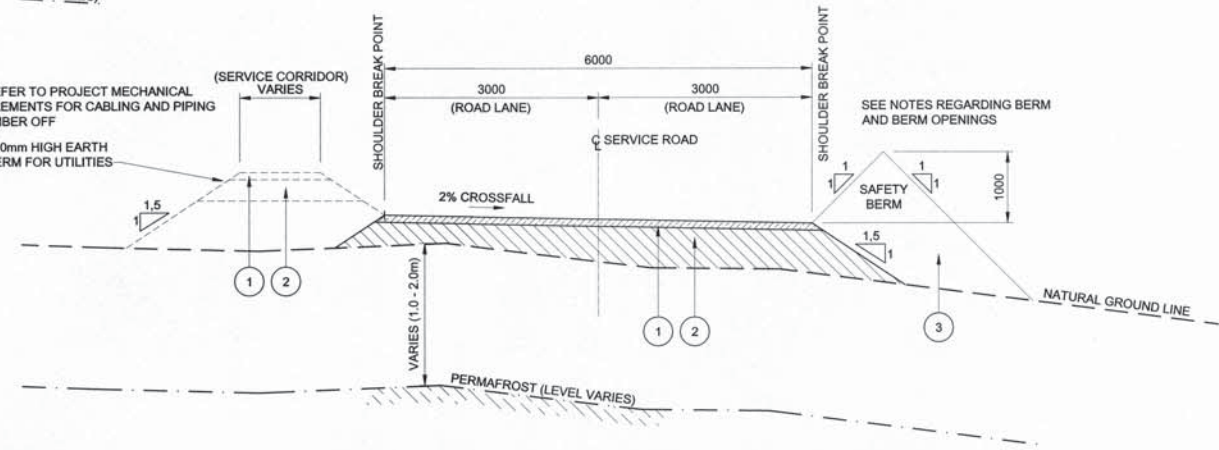
ROAD MATERIAL IDENTIFICATION:

- 100mm WEARING COURSE / BASE LAYER, TYPE 5 (-32mm) MATERIAL
- 300mm ROCK SUBBASE LAYER, TYPE 8 (-150mm) MATERIAL WHERE FILL IS LESS THAN 600mm THICK, OR, TYPE 12 (-600mm) MATERIAL WHERE FILL IS GREATER THAN 600mm
- GENERAL FILL TYPE 12 (-600mm) MATERIAL

GENERAL NOTES:

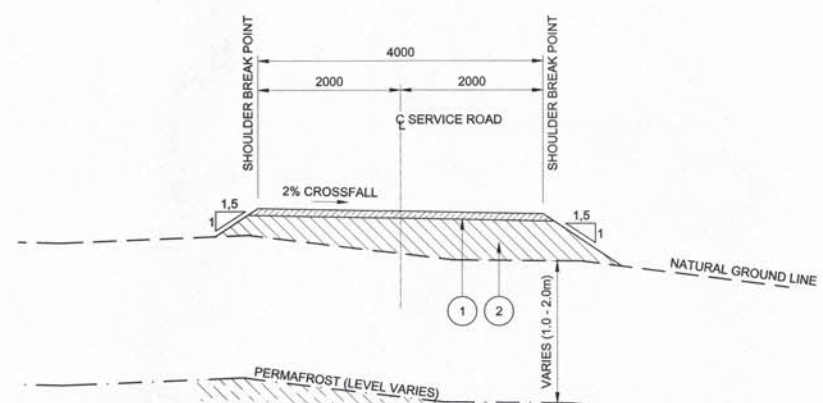
- SAFETY BARRIERS FOR ALL ROADS SHALL BE PROVIDED BASED ON THE NUNAVUT MINE HEALTH AND SAFETY ACT. THIS BARRIER SHALL BE PROVIDED WHERE THE ELEVATION DIFFERENCE IS GREATER THAN 3.0m (DIMENSION 'X'), MEASURED AT THE ROAD SHOULDER BREAK POINT. SEE TYPICAL SECTIONS FOR LOCATION. BERMS TO BE CONSTRUCTED AS PRESCRIBED BY THE ENGINEER ON SITE
- 1.0m WIDE OPENINGS ARE TO BE PROVIDED IN THE BERMS AT 25.0m C/C FOR WATER RUN OFF AND SNOW CLEARANCE DURING MAINTENANCE.
- THICKNESS FOR ROAD FILL MATERIALS ARE MINIMUM, AND ARE TO BE ADJUSTED IN THE FIELD DEPENDING ON SITE AND LOCAL CONDITIONS.

NOTE:  
FOR BERM TOP WIDTH REFER TO PROJECT MECHANICAL AND ELECTRICAL REQUIREMENTS FOR CABLE AND PIPING SIZES, SPACING AND NUMBER OFF



SECONDARY ROAD - TYPICAL CROSS SECTION

SCALE 1:50

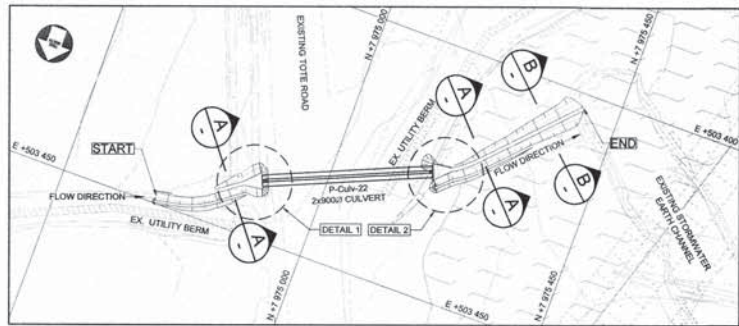


TERTIARY AND TEMPORARY ROAD - TYPICAL CROSS SECTION

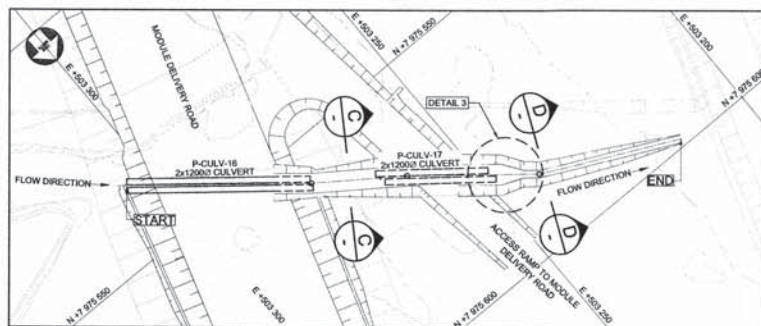
SCALE 1:50

PERMIT TO PRACTICE  
HATCH LTD.  
Signature: *[Signature]*  
Date: 2018-04-05  
PERMIT NUMBER: P 512  
The Association of Professional Engineers,  
Geologists and Geophysicists of NWT/NJ

|                             |  |  |                                                  |  |  |                                          |  |  |
|-----------------------------|--|--|--------------------------------------------------|--|--|------------------------------------------|--|--|
| FOR CONSTRUCTION            |  |  | HATCH                                            |  |  | Baffinland                               |  |  |
| 0 APPROVED FOR CONSTRUCTION |  |  | DRAFTSPERSON I BARNARD NR                        |  |  | BAFFINLAND IRON MINES LP                 |  |  |
| No.                         |  |  | DESIGNER I BARNARD NR                            |  |  | MARY RIVER EXPANSION PROJECT             |  |  |
| DESCRIPTION                 |  |  | CHECKER F HUGO 2018-03-28                        |  |  | PORT SITE                                |  |  |
| REVISIONS                   |  |  | DESIGN COORD. R GOOSEN 2018-03-28                |  |  | MODULE, PRIMARY, SECONDARY ROADS         |  |  |
| BY                          |  |  | RESP. ENG. R HALIM 2018-04-05                    |  |  | TYPICAL CROSS SECTIONS                   |  |  |
| DATE                        |  |  | LEAD DISC. ENG. A GROBBELAAR 2018-03-28          |  |  | SCALE 1:100                              |  |  |
| ROLE                        |  |  | AREA LEAD 2018-04-05                             |  |  | DWG. No. H353004-40000-221-273-0001-0001 |  |  |
| NAME                        |  |  | ENG. MANAGER D STANGER 2018-04-05                |  |  | REV 0                                    |  |  |
| SIGNATURE                   |  |  | AREA MANAGER T. HALIM 2018-04-05                 |  |  | SHEET SIZE: D                            |  |  |
| DATE                        |  |  | DRAFT APPROVAL STATUS: Approved for Construction |  |  |                                          |  |  |



LAYOUT: P-SWD-LP3-1  
SCALE 1:500

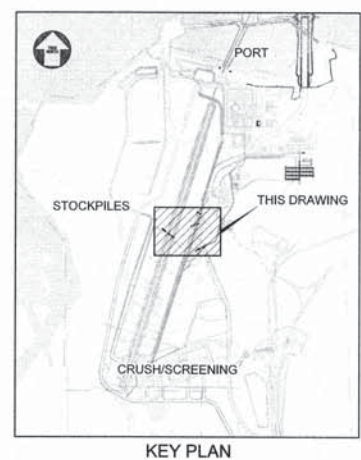


LAYOUT: P-SWD-LP3-2  
SCALE 1:500

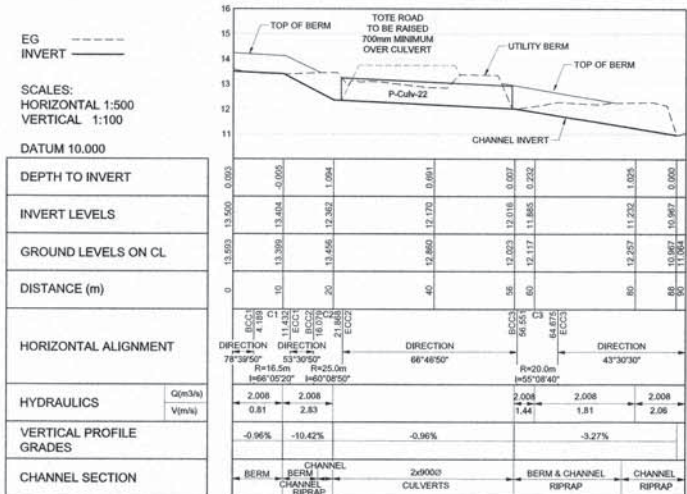
| SETTING OUT DATA-P-SWD-LP3-1 |        |            |             |              |  |
|------------------------------|--------|------------|-------------|--------------|--|
| NAME                         | CH     | E          | N           | DETAILS      |  |
| START                        | 0.000  | 503481.237 | 7975497.573 | L 4.189m     |  |
| BCC1                         | 4.189  | 503477.130 | 7975496.749 | R 16.500m    |  |
| PI1                          | 11.432 | 503473.521 | 7975496.028 | DA 25°00'00" |  |
| ECC1                         |        | 503470.562 | 7975493.837 | TL 3.881m    |  |
|                              |        |            |             | AL 7.243m    |  |
| BCC2                         | 18.079 | 503466.826 | 7975491.074 | R 25.000m    |  |
| PI2                          | 21.868 | 503464.488 | 7975489.345 | DA 12°16'10" |  |
| ECC2                         |        | 503461.818 | 7975488.199 | TL 2.908m    |  |
|                              |        |            |             | AL 5.789m    |  |
| BCC3                         | 56.551 | 503429.842 | 7975474.526 | R 20.000m    |  |
| PI3                          | 64.675 | 503423.321 | 7975472.902 | DA 12°16'20" |  |
| ECC3                         |        | 503420.362 | 7975469.915 | TL 4.119m    |  |
|                              |        |            |             | AL 8.124m    |  |
| END                          | 90.012 | 503405.877 | 7975451.539 | L 25.337m    |  |

| SETTING OUT DATA-P-SWD-LP3-2 |         |            |             |           |  |
|------------------------------|---------|------------|-------------|-----------|--|
| NAME                         | CH      | E          | N           | DETAILS   |  |
| START                        | 0.000   | 503306.928 | 7975533.849 | L 38.920m |  |
| PI1                          | 38.920  | 503276.731 | 7975558.404 | L 38.920m |  |
| PI2                          | 56.041  | 503261.126 | 7975569.453 | L 19.121m |  |
| PI3                          | 84.321  | 503240.725 | 7975586.020 | L 26.280m |  |
| ECC3                         | 113.370 | 503214.518 | 7975598.551 | L 29.469m |  |

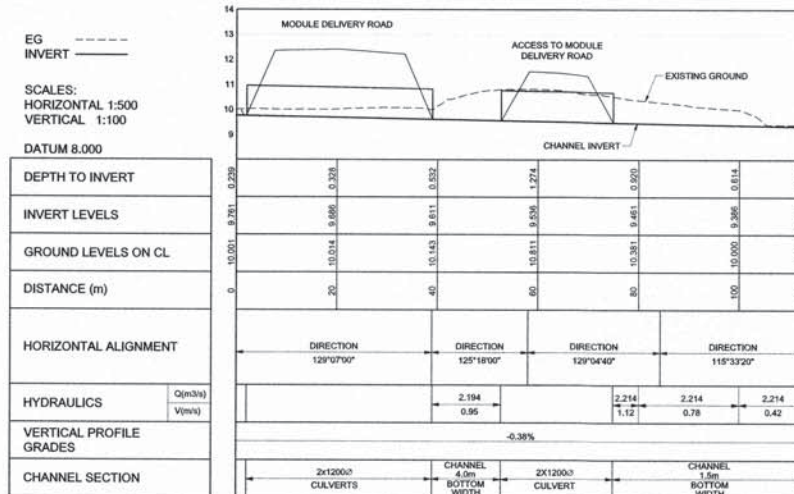
- LEGEND:
- EG EXISTING GROUND
  - CH CHAINAGE
  - L LENGTH
  - R RADIUS
  - DA DEFLECTION ANGLE
  - TL TANGENT LENGTH
  - AL ARC LENGTH
  - BCC BEGINNING OF CURVE
  - ECC END OF CURVE
  - PI POINT OF INTERSECTION
  - HWL HIGH WATER LEVEL
  - FB FREE BOARD
  - FLOW DIRECTION
  - DIVERSION CENTER LINE
  - R/RAP
- NOTES:
1. LEAD SURVEY PROVIDED BY PHOTSAF (2016)
  2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
  3. CONTOURS AND ELEVATIONS ARE IN METERS. CONTOUR INTERVAL IS 0.5m.
  4. ALL DIMENSIONS ARE IN MILLIMETER UNLESS NOTED OTHERWISE.
  5. FINAL CULVERT POSITIONS TO BE CONFIRMED ON SITE.



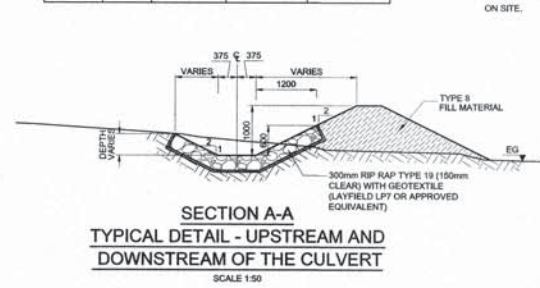
KEY PLAN



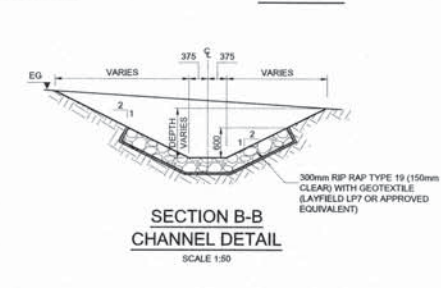
P-SWD-LP3-1 DIVERSION LONGITUDINAL SECTION



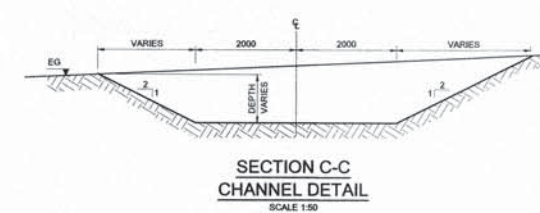
P-SWD-LP3-2 DIVERSION LONGITUDINAL SECTION



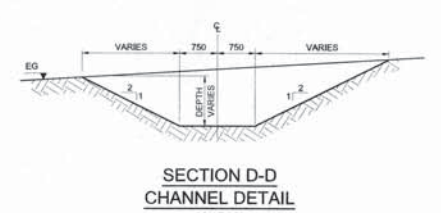
SECTION A-A  
TYPICAL DETAIL - UPSTREAM AND  
DOWNSTREAM OF THE CULVERT  
SCALE 1:50



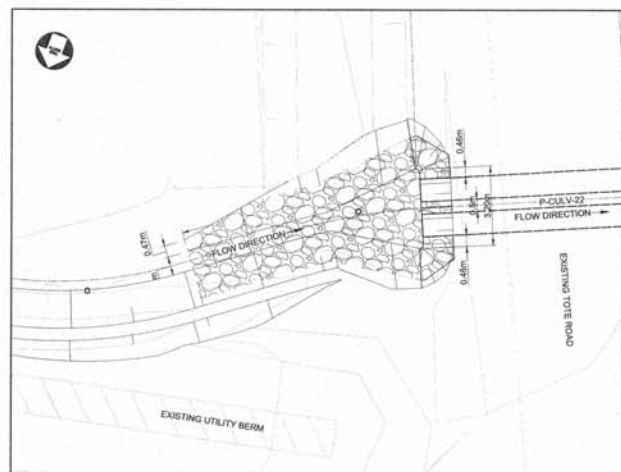
SECTION B-B  
CHANNEL DETAIL  
SCALE 1:50



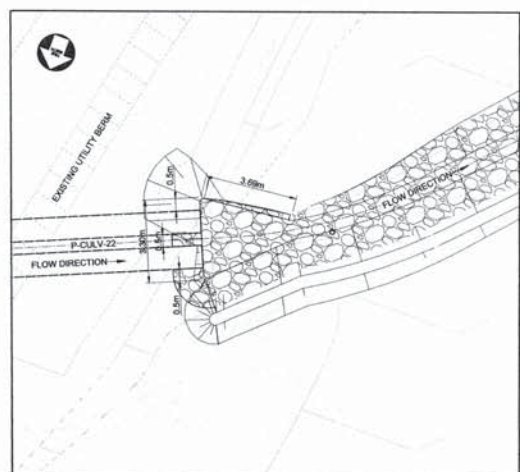
SECTION C-C  
CHANNEL DETAIL  
SCALE 1:50



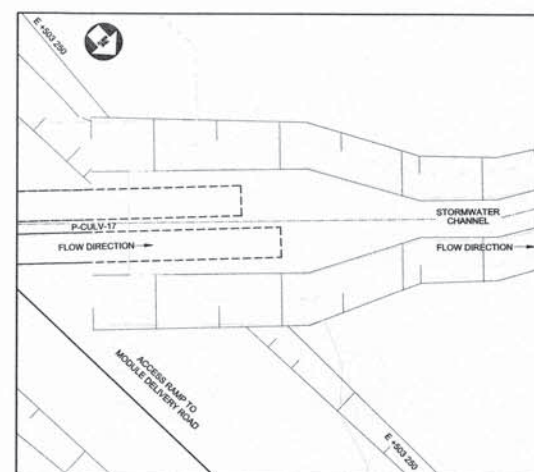
SECTION D-D  
CHANNEL DETAIL  
SCALE 1:50



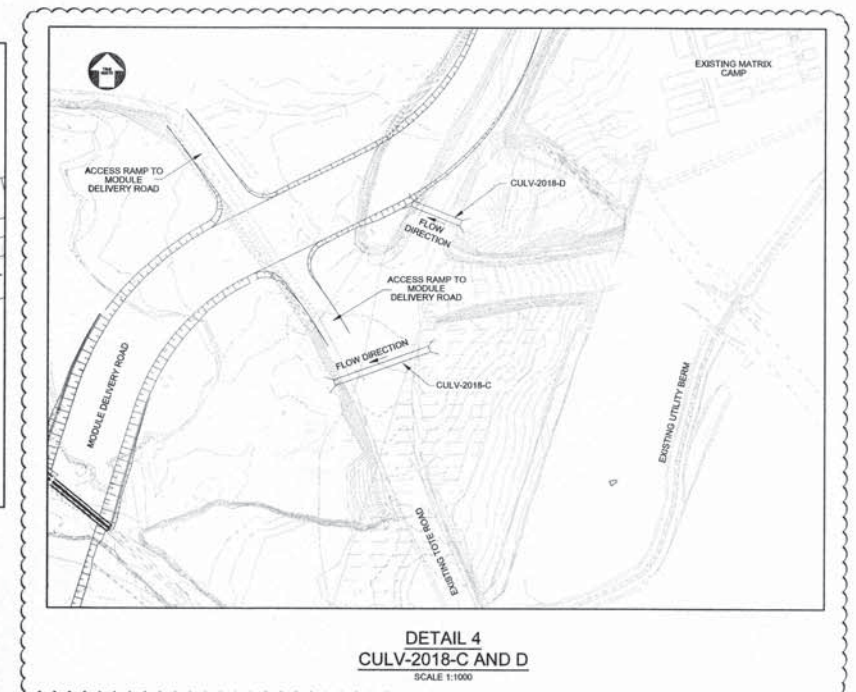
DETAIL 1  
CULVERT INLET  
SCALE 1:100



DETAIL 2  
CULVERT OUTLET  
SCALE 1:100



DETAIL 3  
CULVERT OUTLET  
SCALE 1:100



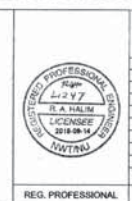
DETAIL 4  
CULVERT OUTLET  
SCALE 1:1000

| CULVERT SCHEDULE<br>(THIS SCHEDULE TO BE READ IN CONJUNCTION WITH DRG. No. H353004-00000-221-294-0001-0001-TYPICAL CULVERT DETAILS) |              |                 |        |            |                       |        |      |             |            |                                                                        |              |             |            |                  |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|--------|------------|-----------------------|--------|------|-------------|------------|------------------------------------------------------------------------|--------------|-------------|------------|------------------|
| CULVERT AT UPSTREAM                                                                                                                 |              |                 |        |            | CULVERT AT DOWNSTREAM |        |      |             |            | NOTE: FINAL US INVERT AND DS INVERT LEVELS ARE TO BE CONFIRMED ON SITE |              |             |            |                  |
| CULVERT ID                                                                                                                          | FISH BEARING | NUMBER OF PIPES | D (mm) | LENGTH (m) | E (mm)                | W (mm) | TYPE | NORTHING    | EASTING    | US INV. ELEV (m)                                                       | RP RAP REQ'D | NORTHING    | EASTING    | DS INV. ELEV (m) |
| P-CULV-18                                                                                                                           | N            | 2               | 1200   | 30.900     | 0                     | 3900   | CSP  | 7975535.240 | 503305.45  | 9.754                                                                  | N            | 7975558.404 | 503276.731 | 9.616            |
| P-CULV-17                                                                                                                           | N            | 2               | 1200   | 22.245     | 0                     | 3900   | CSP  | 7975586.310 | 503265.480 | 9.564                                                                  | Y            | 7975586.076 | 503248.004 | 9.481            |
| P-CULV-12                                                                                                                           | N            | 2               | 900    | 34.000     | 0                     | 2300   | CSP  | 7975488.350 | 503462.190 | 12.339                                                                 | Y            | 7975474.959 | 503430.844 | 12.020           |
| CULV-2018-C                                                                                                                         | N            | 1               | 600    | 40.125     | 0                     | 900    | CSP  | 7975607.324 | 503432.367 | 10.885                                                                 | N            | 7975593.650 | 503394.646 | 10.000           |
| CULV-2018-D                                                                                                                         | N            | 1               | 600    | 20.635     | 0                     | 900    | CSP  | 7975657.567 | 503444.695 | 10.200                                                                 | N            | 7975665.360 | 503425.374 | 10.000           |

| CULVERT SCHEDULE LEGEND: |                                       |  |  |  |  |  |  |  |  |
|--------------------------|---------------------------------------|--|--|--|--|--|--|--|--|
| D                        | CULVERT DIAMETER                      |  |  |  |  |  |  |  |  |
| E                        | EMBEDMENT DEPTH                       |  |  |  |  |  |  |  |  |
| C                        | CULVERT SPACING AND BEDDING CLEARANCE |  |  |  |  |  |  |  |  |
| W                        | C = 500 WHILE D > 900mm               |  |  |  |  |  |  |  |  |
|                          | C = 300 WHILE D < 900mm               |  |  |  |  |  |  |  |  |
|                          | CULVERT BACKFILL TOP WIDTH            |  |  |  |  |  |  |  |  |
|                          | W = (πD) + (π-1)C                     |  |  |  |  |  |  |  |  |
|                          | π = π x NO. OF PIPES / CULVERTS       |  |  |  |  |  |  |  |  |
|                          | CULVERT MATERIAL                      |  |  |  |  |  |  |  |  |
|                          | CULVERT UPSTREAM INVERT ELEVATION     |  |  |  |  |  |  |  |  |
|                          | CULVERT DOWNSTREAM INVERT ELEVATION   |  |  |  |  |  |  |  |  |
|                          | R/RAP APRON LENGTH                    |  |  |  |  |  |  |  |  |
|                          | L = 4m (APPROX)                       |  |  |  |  |  |  |  |  |
| S                        | CULVERT SLOPE                         |  |  |  |  |  |  |  |  |
|                          | CULVERT LENGTH                        |  |  |  |  |  |  |  |  |
|                          | CORRUGATED STEEL PIPE                 |  |  |  |  |  |  |  |  |

| DRAWING No.                     | DRAWING TITLE                              |
|---------------------------------|--------------------------------------------|
| H353004-00000-221-294-0002-0010 | STANDARD DRAWING - EARTHWORKS AND DRAINAGE |
| H353004-00000-221-294-0001-0001 | STANDARD DRAWING - TYPICAL CULVERT DETAIL  |
| H353004-00000-221-294-0001-0001 | PORT SITE - BLOCK PLAN                     |

| REFERENCE DRAWINGS |
|--------------------|
| 1                  |
| 2                  |
| 3                  |
| 4                  |
| 5                  |
| 6                  |
| 7                  |
| 8                  |



| FOR CONSTRUCTION |
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| REVISIONS |
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| DRAFTSPERSON  | H HERBST                                  | NR                     | 08/04/2018 |
|---------------|-------------------------------------------|------------------------|------------|
| CHECKER       | H HERBST <td>NR<th>08/04/2018</th></td>   | NR <th>08/04/2018</th> | 08/04/2018 |
| DESIGN COORD. | F HUGO <td>2018-08-14<td></td></td>       | 2018-08-14 <td></td>   |            |
| REVIEW        | R GOOSSEN <td>2018-08-14<td></td></td>    | 2018-08-14 <td></td>   |            |
| LEAD ENG.     | R HALM <td>2018-08-14<td></td></td>       | 2018-08-14 <td></td>   |            |
| AREA LEAD     | A GROBBELAAR <td>2018-08-14<td></td></td> | 2018-08-14 <td></td>   |            |
| ENG. MANAGER  | V LARIC <td>2018-08-14<td></td></td>      | 2018-08-14 <td></td>   |            |
| AREA MANAGER  | D STANGER <td>2018-08-14<td></td></td>    | 2018-08-14 <td></td>   |            |

| HATCH |
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| Baffinland                               |
|------------------------------------------|
| BAFFINLAND IRON MINES LP                 |
| MARY RIVER PROJECT                       |
| PORT SITE                                |
| MODULE ROAD AND TOTE ROAD                |
| DRAINAGE DETAILS                         |
| DWG. No. H353004-00000-228-271-0005-0001 |
| REV 1                                    |