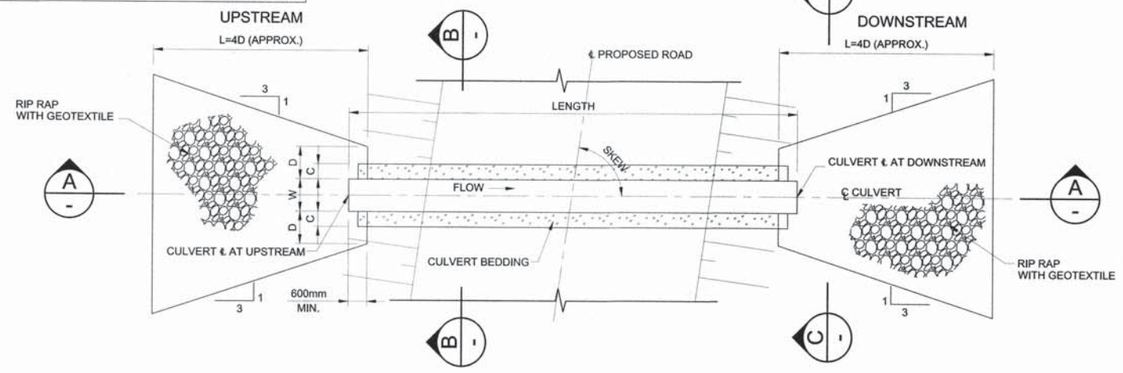
ATTACHMENT 12

Road Modifications

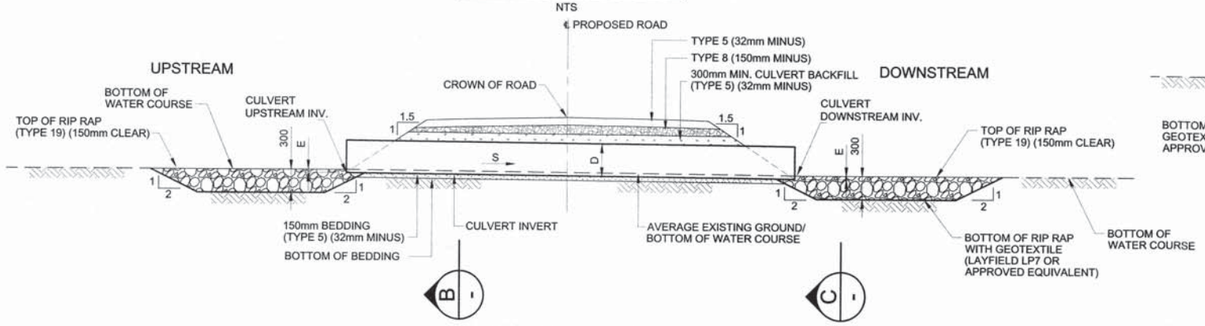
(44 Pages)

DWG. No. H353004-00000-221-294-0001-0001



CULVERT PLAN VIEW

NTS



SECTION A - A

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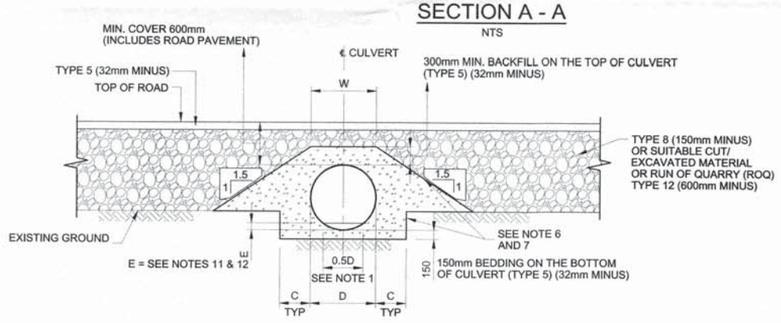

SECTION B - B (SINGLE PIPE)

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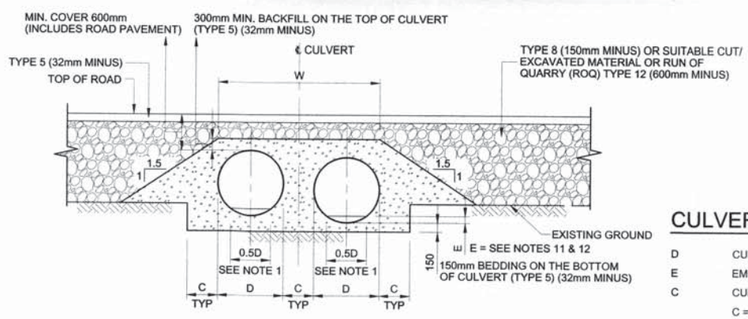

SECTION B - B (DOUBLE PIPE)

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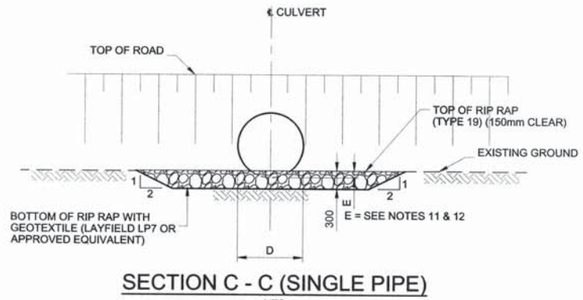
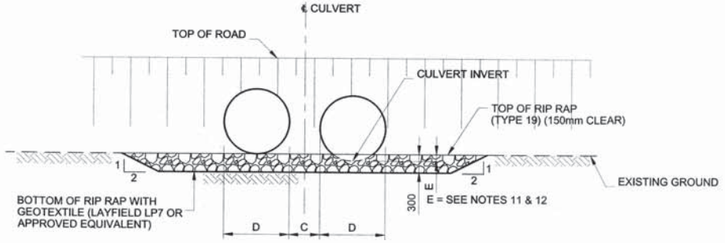


SECTION C - C (SINGLE PIPE)

NTS



SECTION C - C (DOUBLE PIPE)

NTS

NOTES:

1. THE PIPE BED SHALL BE SHAPED TO RECEIVE THE BOTTOM OF THE PIPE.
2. GRANULAR MATERIAL PLACED UNDER THE HAUNCH MUST BE COMPACTED.
3. BEDDING AND BACKFILL MATERIAL SHALL BE HOMOGENEOUS GRANULAR MATERIAL, AND SHALL BE PLACED AND COMPACTED UNIFORMLY AROUND THE PIPE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE
5. ALL ELEVATIONS ARE IN METERS UNLESS NOTED OTHERWISE.
6. WHERE VERTICAL EXCAVATION IS NOT POSSIBLE, MODIFY EXCAVATION SLOPE TO MIN. 1.5H: 1V.
7. PROVIDE 300mm TYPE 8 (150mm MINUS) AROUND BEDDING AND BACK FILL MATERIAL ONLY WHEN ROCKFILL IS PRESENT.
8. THE CULVERT UPSTREAM AND DOWNSTREAM LOCATIONS AND INVERT ELEVATIONS ARE BASED ON LIDAR DATA. NO BOTTOM OF STREAM SURVEY DATA WAS AVAILABLE AT THE TIME OF PREPERATION OF THIS DRAWING.
9. ADJUST CULVERT START AND END COORDINATES AND INVERT ELEVATIONS IN THE FIELD AS APPROVED BY COMPANY'S REPRESENTATIVE.
10. FLOW DIRECTION MUST BE FROM UPSTREAM TO DOWNSTREAM. PROVIDE AVERAGE STREAM SLOPE ALONG THE CULVERT AS CULVERT SLOPE BASED ON ACTUAL FIELD CONDITION.
11. FOR FISH BEARING CULVERT, E=0.1D
    FOR NON-FISH BEARING CULVERT, E=0
12. FOR FISH BEARING CULVERT WITH MULTIPLE PIPES, ONLY ONE PIPE SHALL BE EMBEDDED BY "E" (APPROXIMATELY 0.1D) AND ALL OTHER PIPES SHALL BE PLACED ON GROUND/BOTTOM OF WATER COURSE.

MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

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 COMPACTORS SUCH AS HEAVY LOADED RUBBER TIRED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.

CULVERT SCHEDULE

								UPSTREAM CULVERT CENTRE				DOWNSTREAM CULVERT CENTRE						
CULVERT ID	FISH BEARING	NUMBER OF PIPES	D (mm)	LENGTH (m)	E (mm)	W (mm)	TYPE	NORTHING	EASTING	U/S INV. ELEV (m)	RIP RAP REQ'D	NORTHING	EASTING	D/S INV. ELEV (m)	RIP RAP REQ'D	C (mm)	L (m)	S (%)	SKEW (DEGREE)

CULVERT SCHEDULE LEGEND:

D	CULVERT DIAMETER
E	EMBEDMENT DEPTH
C	CULVERT SPACING AND BEDDING CLEARANCE C = 500 WHILE D > 900mm C = 300 WHILE D < = 900mm
W	CULVERT BACKFILL TOP WIDTH W = (n*D) + (n-1)*C
TYPE	CULVERT MATERIAL
U/S INV.	CULVERT UPSTREAM INVERT ELEVATION
D/S INV.	CULVERT DOWNSTREAM INVERT ELEVATION
L	RIPRAP APRON LENGTH L = 4xD (APPROX)
S	CULVERT SLOPE
LENGTH	CULVERT LENGTH
CSP	CORRUGATED STEEL PIPE

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-09-20
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER R. A. HALIM LICENSEE 2018-09-20 NWT/NU L1247

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIAL AND COMPACTION SPECIFICATION ADDED	IHB	FH	18/09/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	
DESIGNER	I BARNARD	NR	
CHECKER	F HUGO		2018-09-20
DESIGN COORD.	R GOOSEN		2018-09-20
RESP. ENG.	R HALIM		2018-09-20
LEAD DISC. ENG.	A GROBBELAAR		20 September
AREA LEAD	V LAVRIC		2018-09-20
ENG. MANAGER	D STANGER		2018-09-25
AREA MANAGER	T ATIBA		2018.09.25

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
TYPICAL CULVERT DETAILS

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	REG. PROFESSIONAL

SCALE NTS OR AS NOTED
DWG. No. H353004-00000-221-294-0001-0001
REV 1
SHEET SIZE: D

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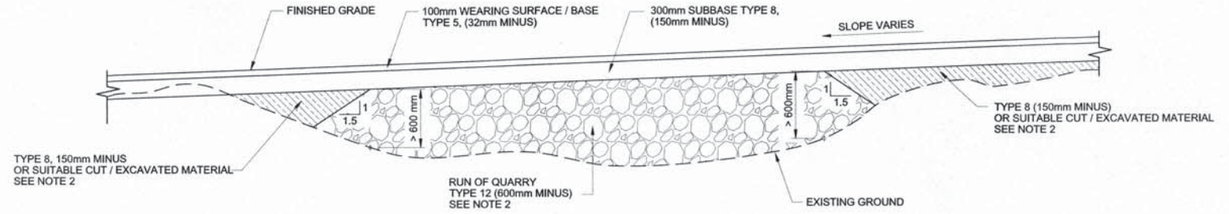
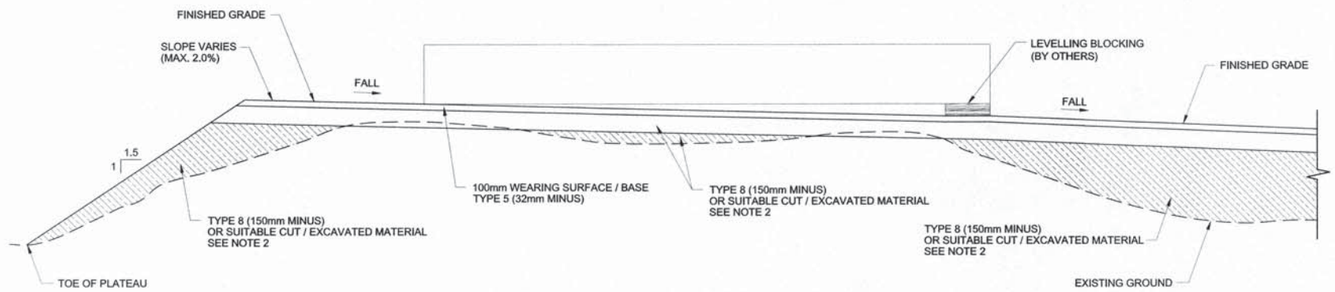
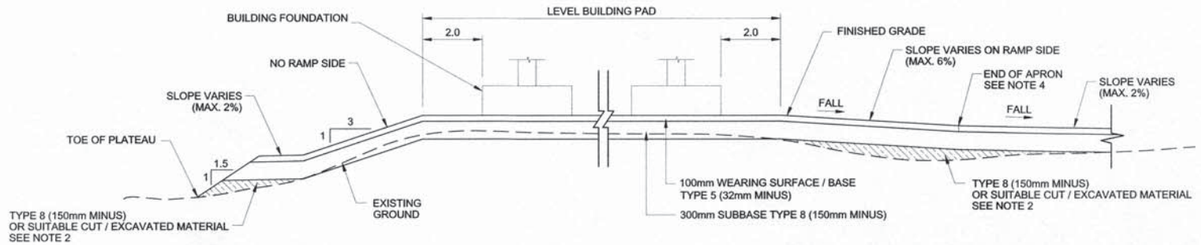
DWG. No. H353004-00000-221-294-0002-0001



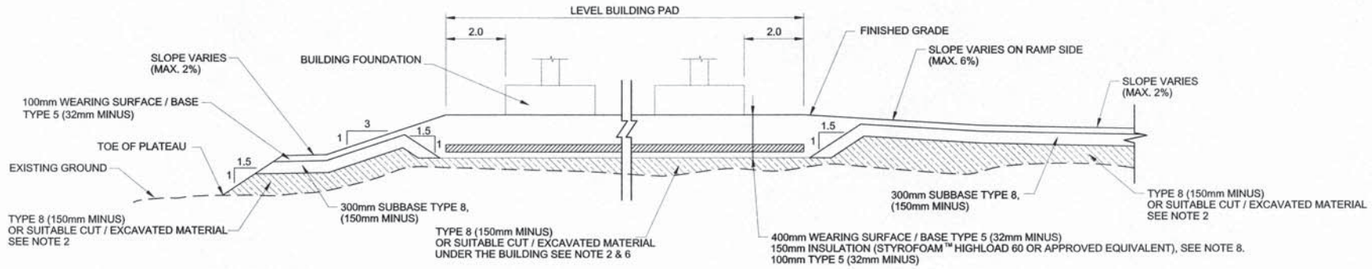
DETAIL 1 - TYPICAL EARTHWORKS FOR FINISHED GRADING



DETAIL 2 - TYPICAL EARTHWORKS FOR SKIDDED BUILDINGS - ALL GROUND MATERIALS



DETAIL 3 - TYPICAL EARTHWORKS FOR "FOLD-AWAY" / "FABRIC" BUILDINGS - IN NON-FROST SUSCEPTIBLE GROUND MATERIAL



DETAIL 4 - TYPICAL EARTHWORKS FOR "FOLD-AWAY" / "FABRIC" BUILDINGS - IN FROST SUSCEPTIBLE GROUND MATERIAL

NOTES:

1. ALL DIMENSIONS SHOWN ARE IN METRES, UNLESS OTHERWISE NOTED.
2. FOR FILL DEPTH > 600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12 MATERIAL, ie RUN OF QUARRY (600mm MINUS).
3. THE FOUNDATIONS SHOWN ON THESE DETAILS ARE PRELIMINARY AND SHOULD BE VALIDATED AFTER FINALIZING THE BUILDINGS / STRUCTURES.
4. FOR BUILDINGS WITH NO TRUCK ACCESS RAMP REQUIREMENTS, SLOPE FINISH GRADE FROM EDGE OF BUILDING PAD TO SURROUNDING GRADE AT 3H:1V AS INDICATED ON THE DRAWING COVERING THE SPECIFIC BUILDING. OTHERWISE SLOPE AWAY TO THE SURROUNDING GRADE AT 2% MAXIMUM.
5. CUT / EXCAVATION MATERIAL USED AS FILL SHALL BE FREE FROM FROZEN MATERIAL, ICE, ORGANIC MATERIAL AND SHALL BE COMPACTED AS APPROVED BY THE COMPANY'S REPRESENTATIVE.
6. IF RUN OF QUARRY IS USED, THEN PLACE 300mm TYPE 8 MATERIAL (150mm MINUS) UNDER TYPE 5 (32mm MINUS).
7. "FROST SUSCEPTIBLE" AND "NON-FROST SUSCEPTIBLE" GROUND MATERIAL IS TO BE DETERMINED BY THE GEOTECHNICAL ENGINEER ON SITE OR THEIR DESIGNATE.
8. INSULATION UNDER BUILDINGS TO BE PROVIDED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.

MATERIAL AND COMPACTION SPECIFICATION:

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PERMIT TO PRACTICE
HATCH LTD.
Signature
2018-09-14
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
L1247
R. A. HALIM
LICENSEE
2018-09-14
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIAL AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-14
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	R HALIM		2018-09-14
LEAD DISC. ENG.	A GROBBELAAR		2018-09-14
AREA LEAD	V LAVRIC		
ENG. MANAGER	D STANGER		2018-09-17
AREA MANAGER	T ATIBA		18-09-17

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

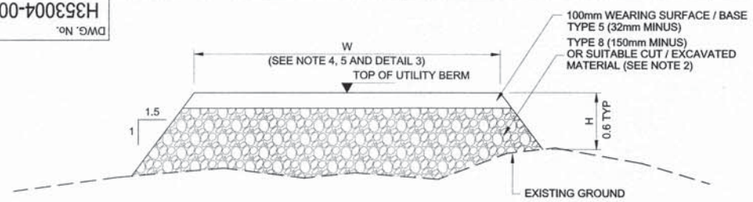
SITE WIDE
STANDARD DRAWING
EARTHWORKS & DRAINAGE DETAILS

SCALE	DWG. No.	REV
NTS OR AS NOTED	H353004-00000-221-294-0002-0001	1

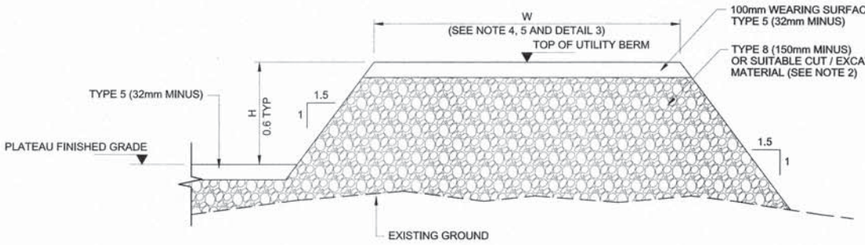
SHEET SIZE: D

DRAWING No. | DRAWING TITLE
REFERENCE DRAWINGS
REG. PROFESSIONAL
REVISIONS

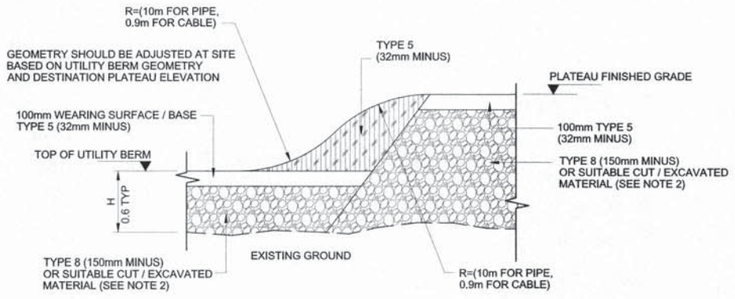
DWG. No. H353004-00000-221-294-0003-0001



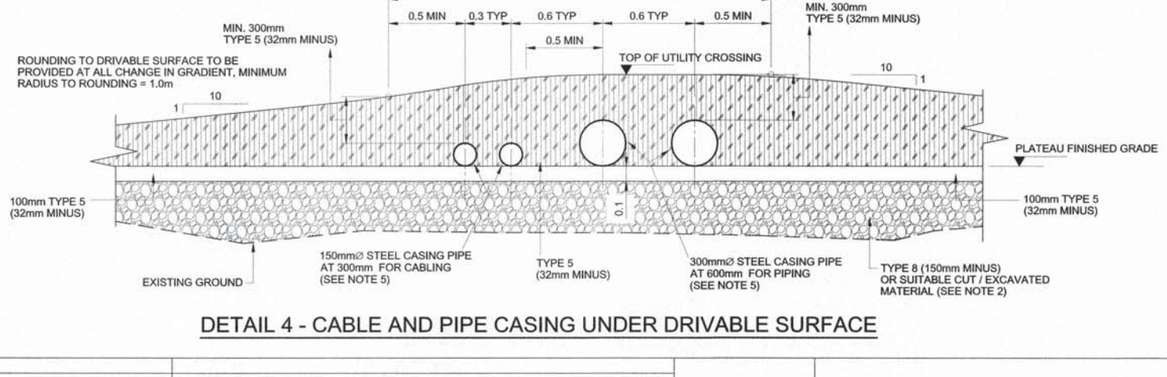
DETAIL 1 - UTILITY BERM ON EXISTING GROUND



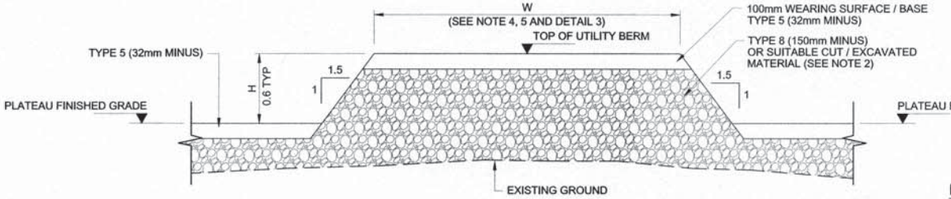
DETAIL 2 - UTILITY BERM AT EDGE OF FINISHED EARTHWORKS SURAFCE



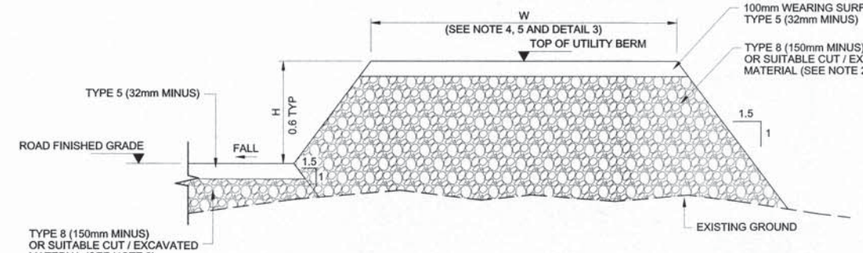
DETAIL 3 - UTILITY BERM TO PADS



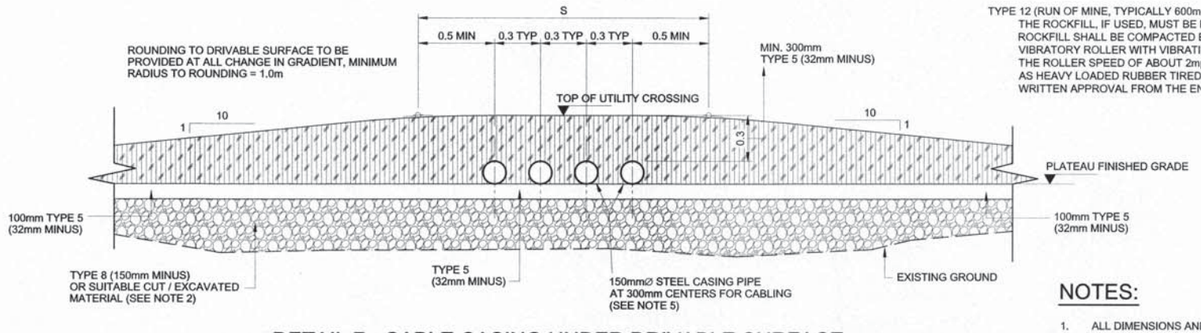
DETAIL 4 - CABLE AND PIPE CASING UNDER DRIVABLE SURFACE



DETAIL 5 - UTILITY BERM ON FINISHED EARTHWORKS SURFACE



DETAIL 6 - UTILITY BERM BESIDE ROAD BUT HIGHER THAN ROAD LEVEL



DETAIL 7 - CABLE CASING UNDER DRIVABLE SURFACE

LEGEND:

W	UTILITY BERM TOP WIDTH (SEE DETAIL 3)
H	UTILITY BERM HEIGHT
S	UTILITY CROSSING TOP WIDTH
N	NUMBER OF STEEL CASING PIPES

MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

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 COMPACTORS SUCH AS HEAVY LOADED RUBBER TIRED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH >600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12, I.E. RUN OF QUARRY (600mm MINUS)
3. THIS DRAWING ONLY COVERS THE UTILITY BERM EARTHWORKS AND ALL OF DIMENSIONS AND DETAILS ARE PARAMETRIC AND SHOULD BE READ IN CONJUNCTION WITH ELECTRICAL / MECHANICAL REQUIREMENTS.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.
5. NUMBERS AND DIAMETERS OF STEEL CASING PIPES, WHERE APPLICABLE, SHALL BE PLACED ACCORDING TO ELECTRICAL / MECHANICAL REQUIREMENTS AS DEFINED ON THE PROJECT UTILITY SERVICES DRAWINGS.

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-09-14
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
R.A. HALIM
LICENSEE
2018-09-14
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIALS AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-14
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	R HALIM		2018-09-14
LEAD DISC. ENG.	A GROBBELAAR		2018-09-14
AREA LEAD	V LAVRIC	N/A	
ENG. MANAGER	D STANGER		2018-09-17
AREA MANAGER	T ATIBA		18-09-19

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
EARTHWORKS & DRAINAGE DETAILS

DRAWING No.	DRAWING TITLE
.	.

REFERENCE DRAWINGS

REG. PROFESSIONAL

REVISIONS

SCALE NTS OR AS NOTED

DWG. No. H353004-00000-221-294-0003-0001

REV 1

SHEET SIZE: D

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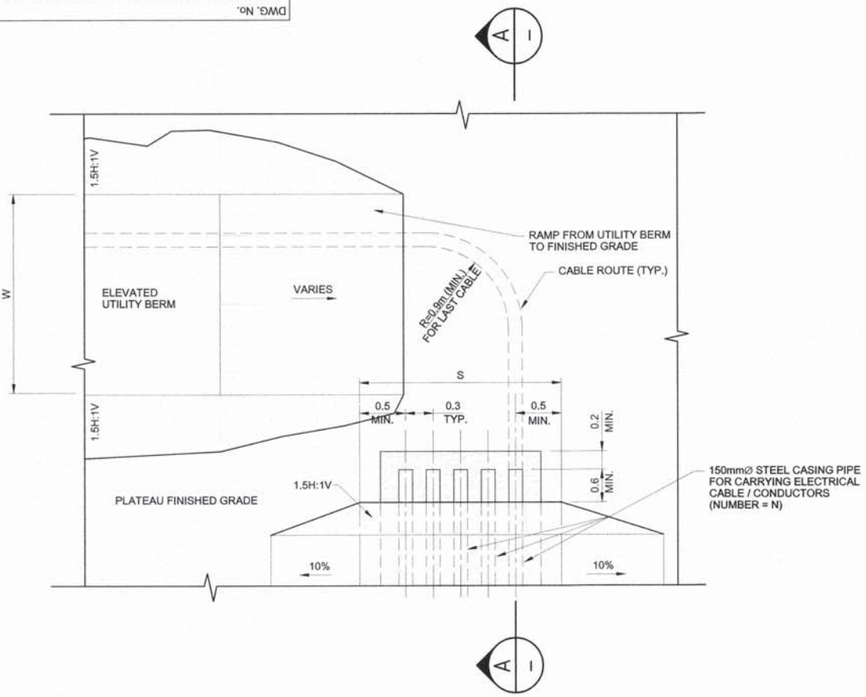
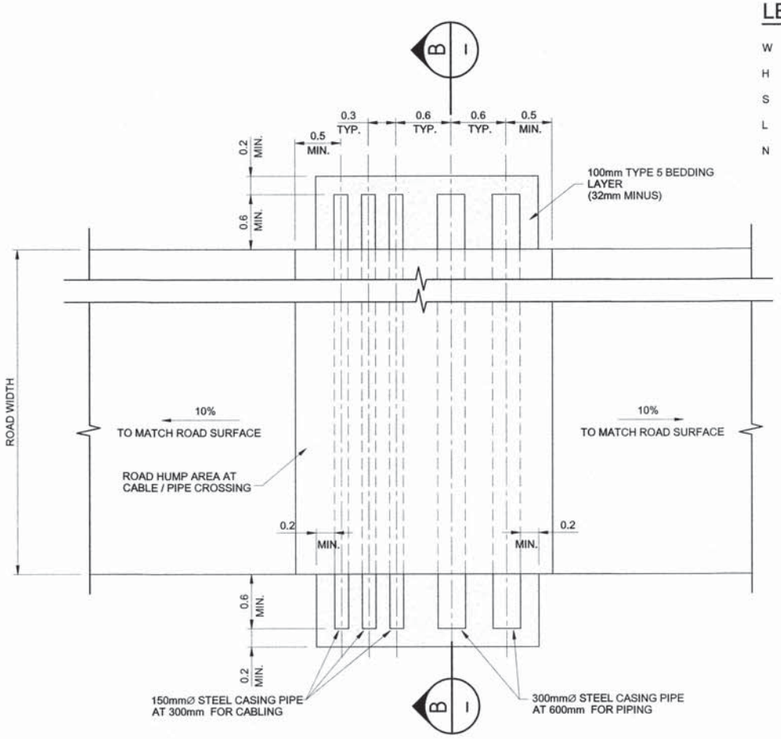


DETAIL 1 - UTILITY BERM TO STEEL CASING ON TOP OF DRIVABLE SURFACE



DETAIL 2 - ROAD UTILITY BERM CROSSING

LEGEND:

W	UTILITY BERM TOP WIDTH
H	UTILITY BERM HEIGHT
S	UTILITY CROSSING TOP WIDTH
L	UTILITY BERM RAMP LENGTH
N	NUMBER OF STEEL CASING PIPES

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH >600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12, I.E. RUN OF QUARRY (600mm MINUS)
3. THIS DRAWING ONLY COVERS THE UTILITY BERM EARTHWORKS AND ALL OF DIMENSIONS AND DETAILS ARE PARAMETRIC AND SHOULD BE READ IN CONJUNCTION WITH ELECTRICAL / MECHANICAL REQUIREMENTS.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.
5. NUMBERS AND DIAMETERS OF STEEL CASING PIPES, WHERE APPLICABLE, SHALL BE PLACED ACCORDING TO ELECTRICAL / MECHANICAL REQUIREMENTS AS DEFINED ON THE PROJECT UTILITY SERVICES DRAWINGS.

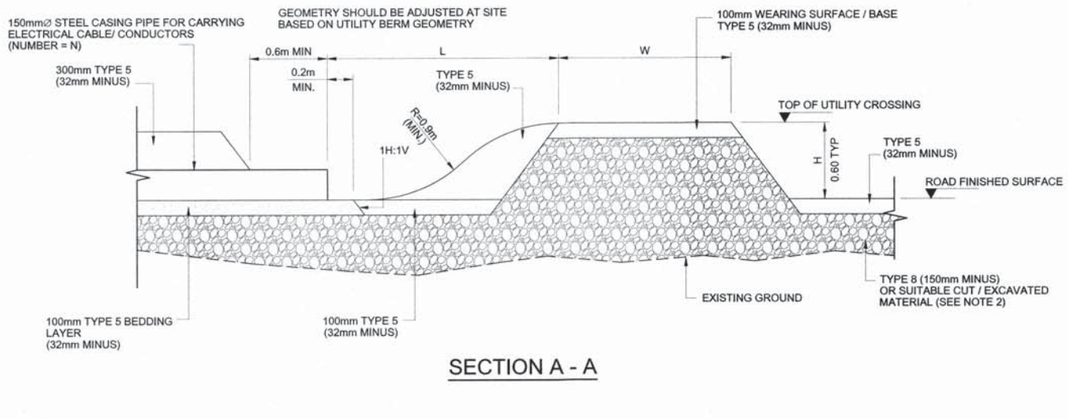
MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

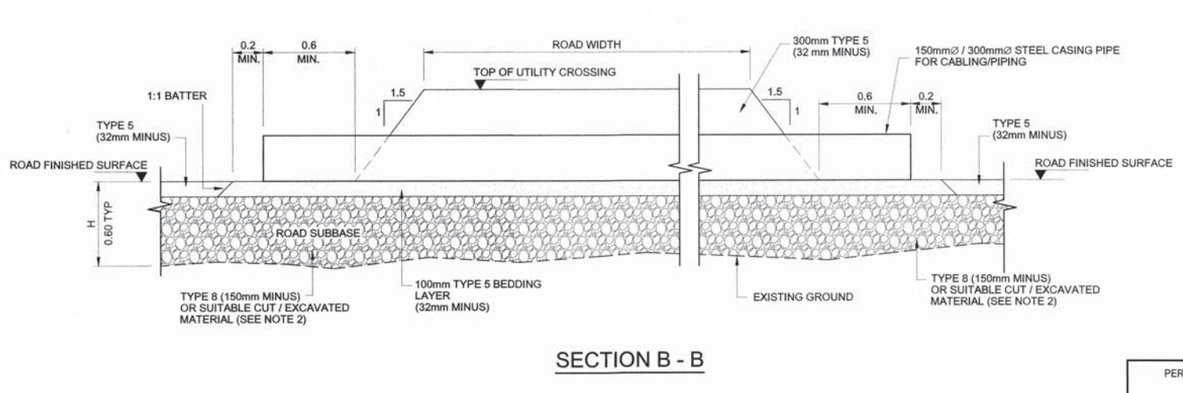
1 TYPE 5 (CRUSHER RUN 32mm MINUS MATERIAL) OR TYPE 3 (CRUSHER RUN 50mm MINUS):
THE MATERIAL MUST BE PLACED IN LIFTS NOT EXCEEDING 200mm AND SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). 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 COMPACTORS SUCH AS HEAVY LOADED RUBBER TIRED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.



SECTION A - A



SECTION B - B

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-09-27
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

.	.								
DRAWING No.	DRAWING TITLE								
REFERENCE DRAWINGS		REG. PROFESSIONAL	REVISIONS						

REGISTERED PROFESSIONAL ENGINEER
R.A. HALIM
LICENSEE
2018-09-27
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIAL AND COMPACTION SPECIFICATION ADDED	IHB	FH	18/09/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	01/12/2017
DESIGNER	I BARNARD	NR	01/12/2017
CHECKER	F HUGO		2018-09-21
DESIGN COORD.	R GOOSEN		2018-09-21
RESP. ENG.	R HALIM		2018-09-27
LEAD DISC. ENG.	A GROBBELAAR		21 September
AREA LEAD	V LAVRIC		
ENG. MANAGER	D STANGER		2018-09-27
AREA MANAGER	T ATIBA		2018-09-27

DRAWING APPROVAL STATUS: Approved for Construction

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

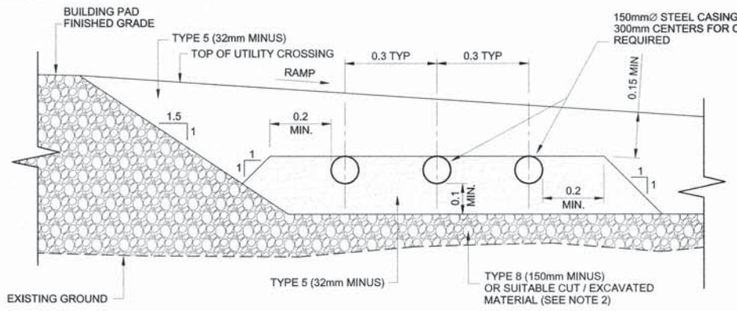
SITE WIDE
STANDARD DRAWING
EARTHWORKS & DRAINAGE DETAILS

SCALE	DWG. No.	REV
NTS OR AS NOTED	H353004-00000-221-294-0004-0001	1

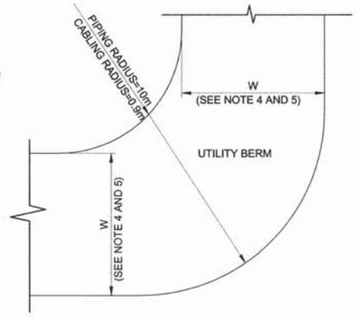
SHEET SIZE: D

$USERNAME

DWG. No. H353004-00000-221-294-0005-0001

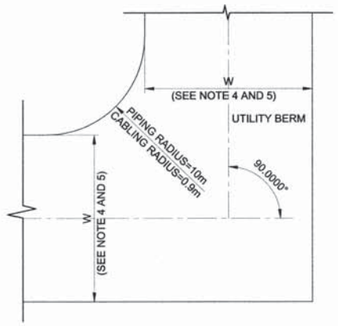


DETAIL 1 - RAMP CROSSING



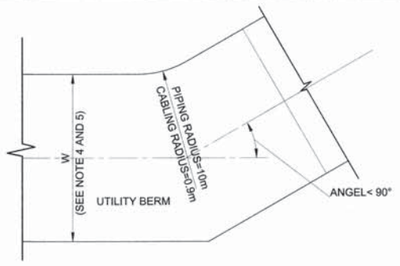
DETAIL 4

90° RADIUS UTILITY BERM GEOMETRY



DETAIL 5

90° RADIUS UTILITY BERM GEOMETRY FOR PIPING / CABLING WITH 90° ELBOW

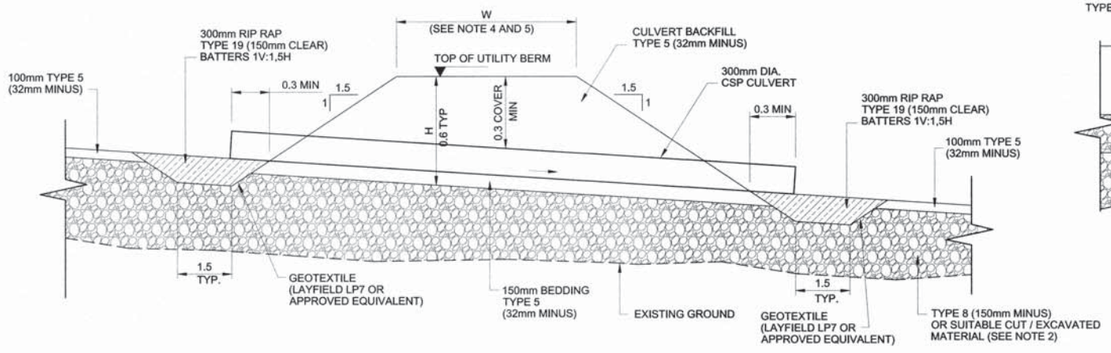


DETAIL 6

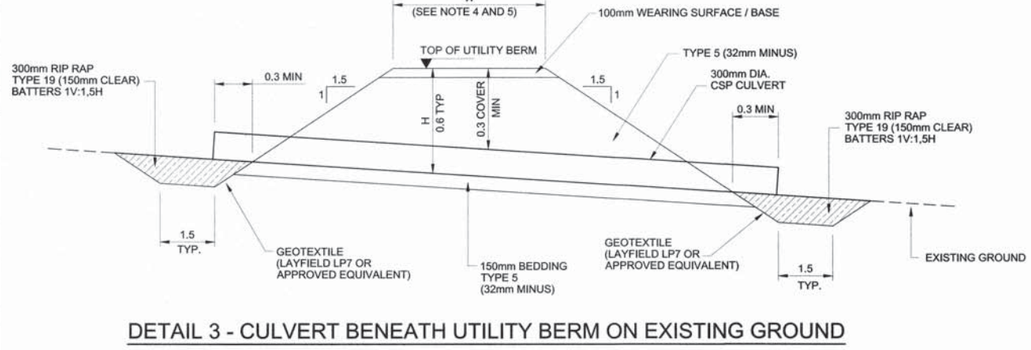
UTILITY BERM GEOMETRY FOR PIPING / CABLING WITH LESS THAN 90° (LATERAL)

NOTES:

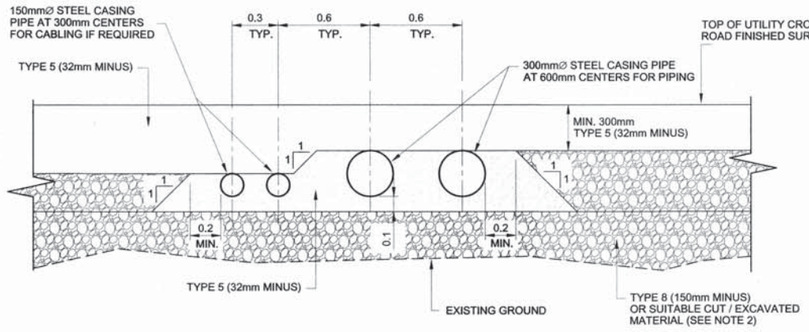
1. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH >600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12, I.E. RUN OF QUARRY (600mm MINUS)
3. THIS DRAWING ONLY COVERS THE UTILITY BERM EARTHWORKS AND ALL OF DIMENSIONS AND DETAILS ARE PARAMETRIC AND SHOULD BE READ IN CONJUNCTION WITH ELECTRICAL / MECHANICAL REQUIREMENTS.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.
5. NUMBERS AND DIAMETERS OF STEEL CASING PIPES, WHERE APPLICABLE, SHALL BE PLACED ACCORDING TO ELECTRICAL / MECHANICAL REQUIREMENTS AS DEFINED ON THE PROJECT UTILITY SERVICES DRAWINGS.



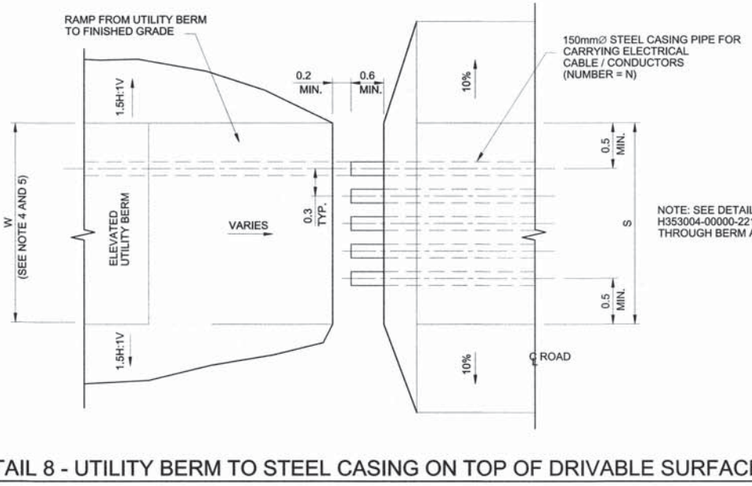
DETAIL 2 - CULVERT BENEATH UTILITY BERM ON DRIVABLE SURFACE



DETAIL 3 - CULVERT BENEATH UTILITY BERM ON EXISTING GROUND



DETAIL 7 - ROAD PAVEMENT UTILITY CROSSING WITHOUT HUMP



NOTE: SEE DETAIL 1 AND SECTION A - A ON DWG No. H353004-00000-221-294-0004-0001 FOR TYPICAL SECTION THROUGH BERM AND ROAD

DETAIL 8 - UTILITY BERM TO STEEL CASING ON TOP OF DRIVABLE SURFACE

MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
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TYPE 8 (CRUSHER RUN 150mm MINUS):
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LEGEND:

W	UTILITY BERM TOP WIDTH
H	UTILITY BERM HEIGHT
S	UTILITY CROSSING TOP WIDTH
B	UTILITY BERM WIDTH AT RAMP
L	UTILITY BERM RAMP LENGTH
N	NUMBER OF STEEL CASING PIPES

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-09-20
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
R. A. HALIM
LICENSEE
2018-09-20
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIAL AND COMPACTION SPECIFICATION ADDED	IHB	FH	18/09/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

REVISIONS

DRAFTSPERSON	I BARNARD	NR	01/12/2017
DESIGNER	I BARNARD	NR	01/12/2017
CHECKER	F HUGO		2018-09-20
DESIGN COORD.	R GOOSEN		2018-09-20
RESP. ENG.	R HALIM		2018-09-20
LEAD DISC. ENG.	A GROBBELAAR		20 September
AREA LEAD	V LAVRIC		2018-09-20
ENG. MANAGER	D STANGER		2018-09-20
AREA MANAGER	T ATIBA		2018-09-20

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
EARTHWORKS & DRAINAGE DETAILS

DRAWING No.	DRAWING TITLE
H353004-00000-221-294-0004-0001	EARTHWORKS AND DRAINAGE DETAILS

REFERENCE DRAWINGS

REG. PROFESSIONAL

SCALE NTS OR AS NOTED

DWG. No. H353004-00000-221-294-0005-0001

REV 1

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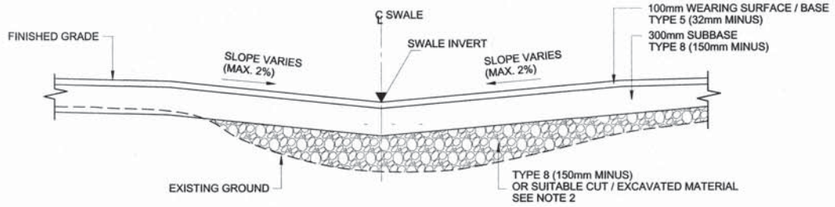
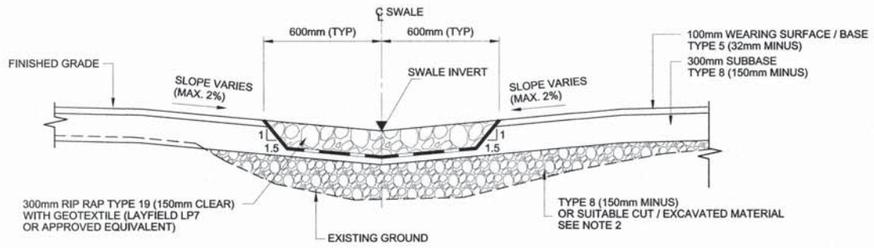
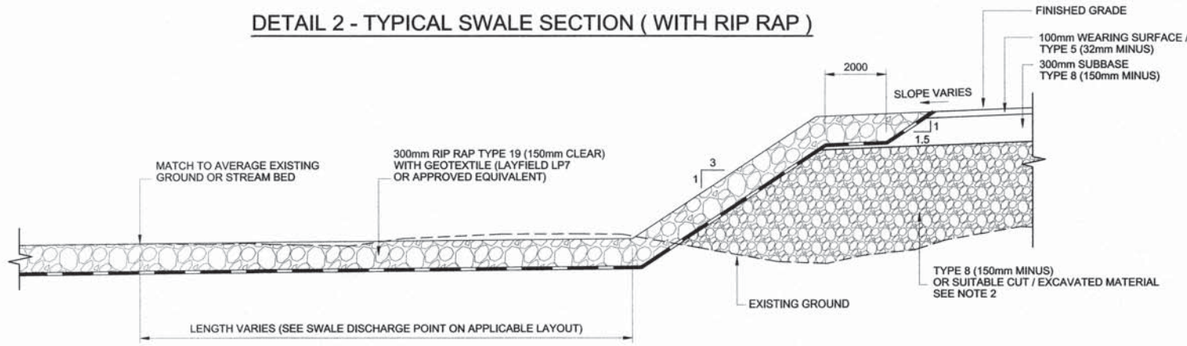
DWG. No. H353004-00000-221-294-0006-0001



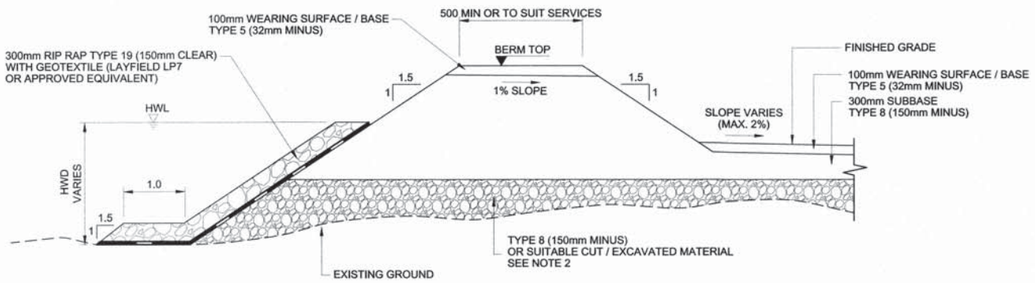
DETAIL 1 - TYPICAL SWALE SECTION (WITHOUT RIP RAP)



DETAIL 2 - TYPICAL SWALE SECTION (WITH RIP RAP)



DETAIL 3 - TYPICAL DETAIL AT SWALE DISCHARGE POINT



ABBREVIATIONS:

HWD	HIGH WATER DEPTH
HWL	HIGH WATER LEVEL

DETAIL 4 - TYPICAL DETAIL OF BERM AT EDGE OF PLATEAU EARTHWORKS

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH >600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12, I.E. RUN OF QUARRY (600mm MINUS)
3. THIS DRAWING ONLY COVERS THE UTILITY BERM EARTHWORKS AND ALL OF DIMENSIONS AND DETAILS ARE PARAMETRIC AND SHOULD BE READ IN CONJUNCTION WITH ELECTRICAL / MECHANICAL REQUIREMENTS.
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PERMIT TO PRACTICE
HATCH LTD.
Signature
2018-09-20
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER R. A. HALIM LICENSEE L1247 2018-09-20 NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIALS AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-20
DESIGN COORD.	R GOOSEN		2018-09-20
RESP. ENG.	R HALIM		2018-09-20
LEAD DISC. ENG.	A GROBBELAAR		20 September
AREA LEAD	V LAVRIC		2018-09-20
ENG. MANAGER	D STANGER		2018-09-25
AREA MANAGER	T ATIBA		2018.09.25

DRAWING APPROVAL STATUS: Approved for Construction

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
EARTHWORKS & DRAINAGE DETAILS

SCALE	DWG. No.	REV
NTS OR AS NOTED	H353004-00000-221-294-0006-0001	1

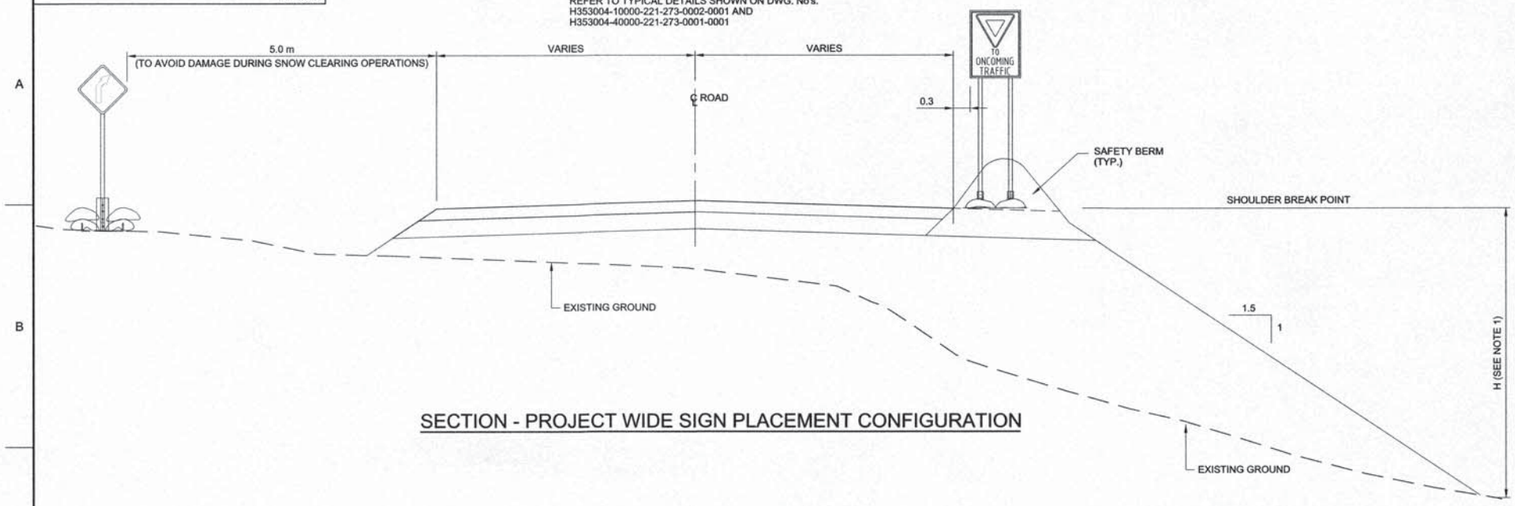
SHEET SIZE: D

DRAWING No. | DRAWING TITLE
REFERENCE DRAWINGS
REG. PROFESSIONAL
REVISIONS

SUSERNAMES

DWG. No. H353004-00000-221-294-0007-0001

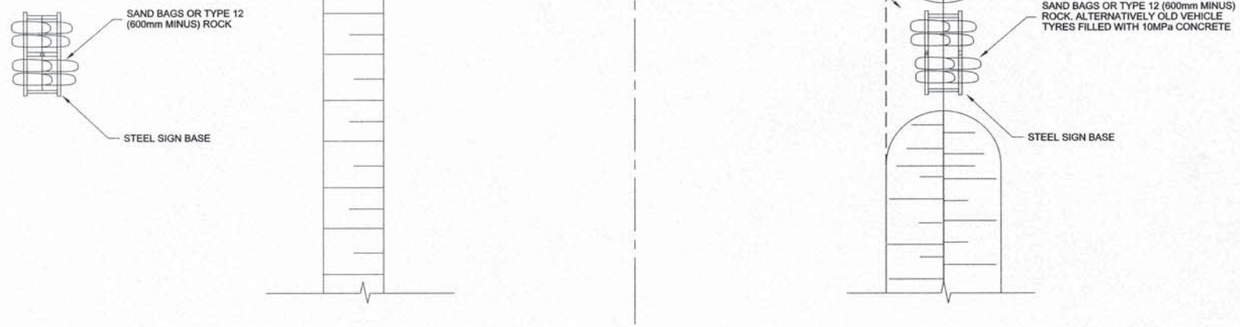
NOTE: FOR ROAD WIDTHS AND ROAD LAYERWORKS REFER TO TYPICAL DETAILS SHOWN ON DWG. No's. H353004-10000-221-273-0002-0001 AND H353004-40000-221-273-0001-0001



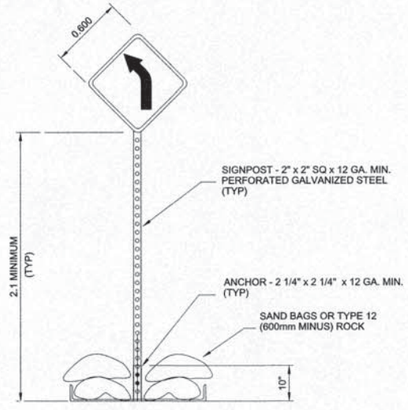
SECTION - PROJECT WIDE SIGN PLACEMENT CONFIGURATION

NOTES:

1. FOR FILL > 3.0m SEE DRAWING H353004-00000-221-294-0010-0001.
2. DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED.
3. FINAL SIGN PLACEMENT TO BE DETERMINED IN THE FIELD AND APPROVED BY THE ENGINEER OR THEIR REPRESENTATIVE.



PLAN - PROJECT WIDE SIGN PLACEMENT CONFIGURATION



STEEL SIGN SINGLE BASE

STEEL SIGN DOUBLE BASE

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2017-12-12
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
R. A. HALIM
LICENSEE
2017-12-12
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	
DESIGNER	I BARNARD	NR	
CHECKER	F HUGO		2017-12-12
DESIGN COORD.	R GOOSEN		2017-12-12
RESP. ENG.	R HALIM		2017-12-12
LEAD DISC. ENG.	A GROBBELAAR		2017-12-12
AREA MANAGER	V LAVRIC		2017-12-19
ENG. MANAGER	J HOWES		2017-12-14
CLIENT	F PITTMAN		2017-12-18

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
ROAD SIGNAGE PLACEMENT DETAILS

DRAWING No.	DRAWING TITLE
.	.

REFERENCE DRAWINGS

REG. PROFESSIONAL

REVISIONS

SCALE: NTS OR AS NOTED

DWG. No. H353004-00000-221-294-0007-0001

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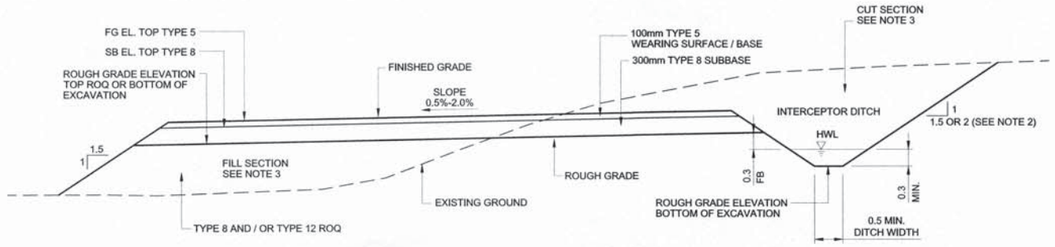
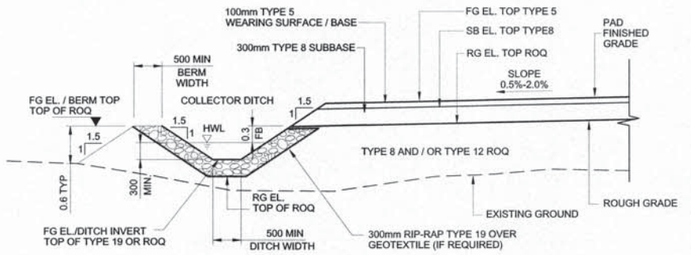
DWG. No. H353004-00000-221-294-0008-0001



TYPICAL PAD SECTION - CUT / FILL



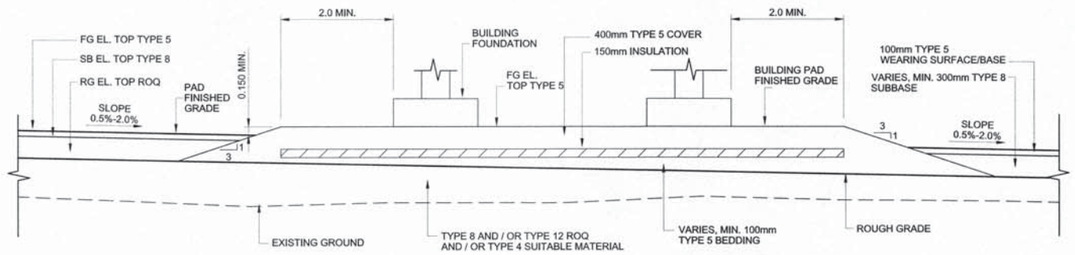
TYPICAL DITCH SECTION - FILL

LEGEND:

ROQ	RUN OF QUARRY
FG EL.	FINISHED GRADE ELEVATION
SB EL.	SUBBASE ELEVATION
RG EL.	ROUGH GRADE ELEVATION
HWL	HIGH WATER LEVEL
FB	FREEBOARD

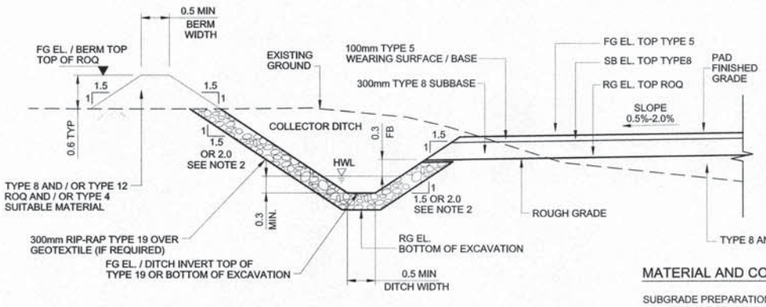
NOTES:

1. PROVIDE DITCH WITH 300mm RIP-RAP TYPE 19 OVER GEOTEXTILE (AS REQUIRED) FOR CUT SECTION ONLY WITH APPROVAL FROM COMPANY'S REPRESENTATIVE.
2. CUT SLOPE FOR NON ICE-RICH OVERBURDEN SHALL BE 1.5H:1V AND FOR ICE-RICH OVERBURDEN SHALL BE 2H:1V.
3. FOR OVERBURDEN CUT / FILL HEIGHTS OF GREATER THAN 5m, PROVIDE 1.5m WIDE BENCHING WITH MINIMUM 2% CROSS SLOPE.
4. FOR MATERIAL TYPE DETAILS, REFER TO STANDARD SPECIFICATIONS:
5. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.



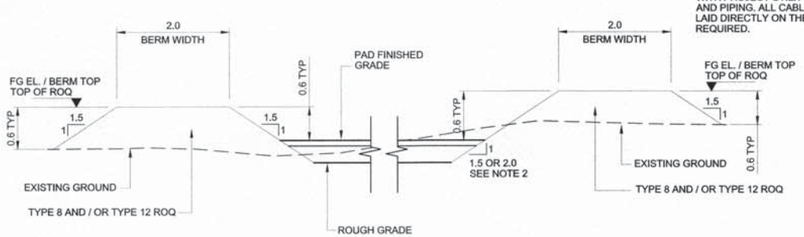
TYPICAL PAD SECTION - BUILDING

NOTE : ISULATION UNDER BUILDINGS TO BE PROVIDED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.



TYPICAL DITCH SECTION - CUT

NOTE : THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.



TYPICAL UTILITY BERM SECTION - CUT / FILL ABOVE PAD

MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

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 COMPACTORS SUCH AS HEAVY LOADED RUBBER TIRED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.

PERMIT TO PRACTICE
HATCH LTD.
Signature
2018-09-14
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
R. A. HALIM
L1247
LICENSEE
2018-09-14
NWT/NU

FOR CONSTRUCTION

HATCH

Baffinland

DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-14
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	R HALIM		2018-09-14
LEAD DISC. ENG.	A GROBBELAAR		2018-09-14
AREA LEAD	V LAVRIC	N/A	
ENG. MANAGER	D STANGER		19-09-19
AREA MANAGER	T ATIBA		

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIALS AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

DRAWING APPROVAL STATUS: Approved for Construction

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

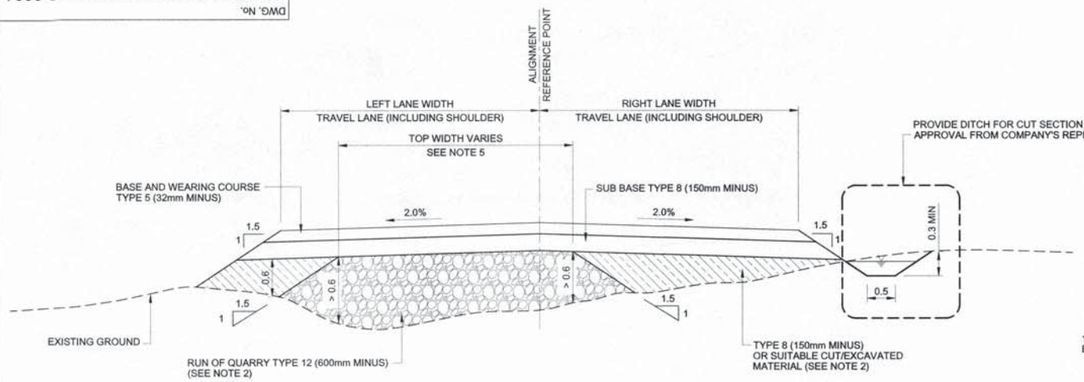
SITE WIDE
STANDARD DRAWING
TYPICAL PAD, DITCH & BERM SECTIONS

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	REG. PROFESSIONAL

SCALE NTS OR AS NOTED
DWG. No. H353004-00000-221-294-0008-0001
REV 1
SHEET SIZE: D

$USERNAMES $DATES $FILES $TIMES

DWG. No. H353004-00000-221-294-0009-0001



DETAIL 1 - INTERNAL ROAD - NORMAL CROWN (WITHOUT UTILITY BERM)

MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

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.

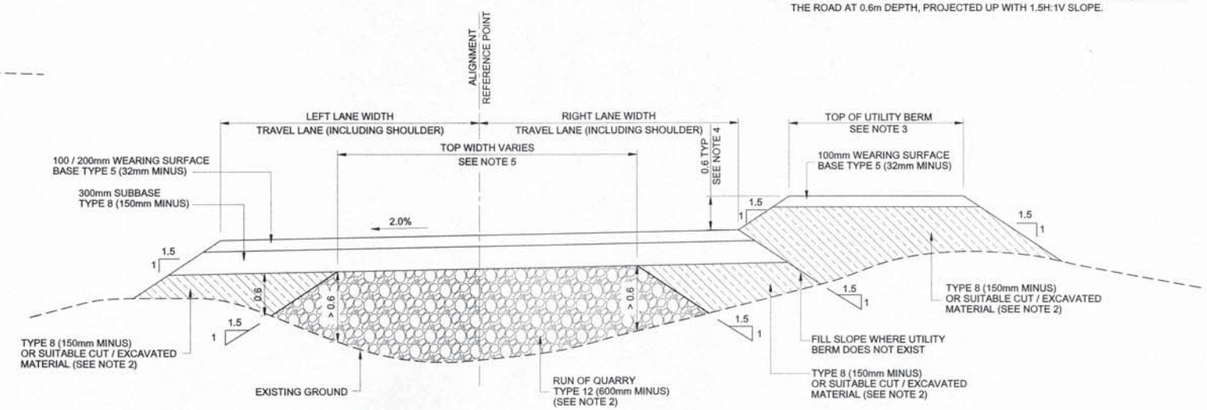
MATERIAL AND COMPACTION SPECIFICATION (CONTINUED):

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 COMPACTORS SUCH AS HEAVY LOADED RUBBER TIRED HAUL TRUCKS CAN ONLY BE USED AS PER A WRITTEN APPROVAL FROM THE ENGINEER.

NOTES:

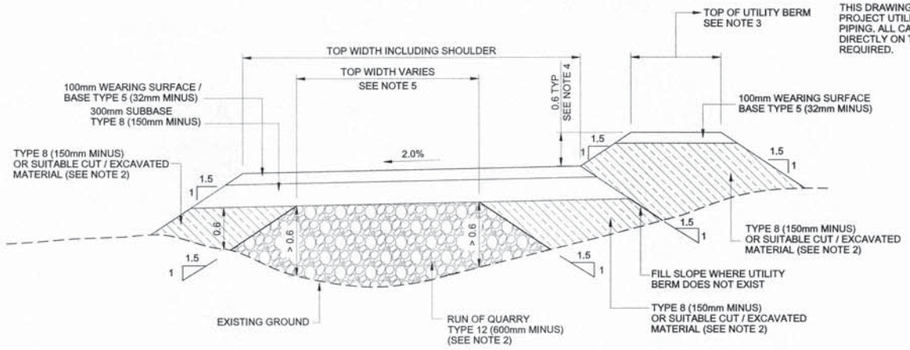
1. ALL DIMENSIONS SHOWN ARE IN METRES, UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH > 600mm AND DEPENDING ON FILL EXTENT, USE TYPE 12. I.E. RUN OF QUARRY (600mm MINUS).
3. MINIMUM HEIGHT OF UTILITY BERM SHALL BE 600mm UNLESS OTHERWISE SPECIFIED IN UTILITY BERM PLAN AND PROFILE DRAWINGS.
4. UTILITY BERM MAY NOT EXIST IN SOME PARTS OF THE ROAD AS PER THE UTILITY BERM ARRANGEMENT AND ROAD ALIGNMENT.
5. WIDTH VARIES DEPENDING ON THE LOCATION OF THE EXISTING GROUND BELOW THE ROAD AT 0.6m DEPTH, PROJECTED UP WITH 1.5H:1V SLOPE.



DETAIL 2 - INTERNAL ROAD - REVERSE CROWN (WITH UTILITY BERM)

NOTE:

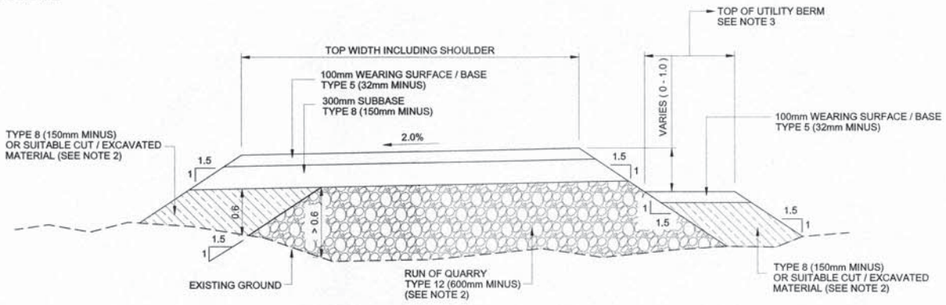
THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.



DETAIL 3 - INTERNAL ROAD - REVERSE CROWN (WITH HIGHER UTILITY BERM)

NOTE:

THIS DRAWING SHALL BE READ IN CONJUNCTION WITH PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.



DETAIL 4 - INTERNAL ROAD - REVERSE CROWN (WITH LOWER UTILITY BERM)

PERMIT TO PRACTICE
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Signature _____ 2018-09-14
Date _____
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

H353004-40000-221-273-0001-0001	PORT SITE - HAUL, PRIMARY AND SECONDARY ROADS - TYPICAL CROSS SECTIONS
H353004-10000-221-273-0002-0001	MINE SITE - HAUL, PRIMARY AND SECONDARY ROADS - TYPICAL CROSS SECTIONS
DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	REG. PROFESSIONAL

REGISTERED PROFESSIONAL ENGINEER — L1247 — R. A. HALIM — LICENSEE — 2018-09-14 — NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIALS AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

REVISIONS

HATCH

DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-14
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	R HALIM		2018-09-14
LEAD DISC. ENG.	A GROBBELAAR		2018-09-14
AREA LEAD	V LAVRIC	N/A	
ENG. MANAGER	D STANGER		2018-09-17
AREA MANAGER	T ATIBA		18-09-17

DRAWING APPROVAL STATUS: Approved for Construction

Baffinland

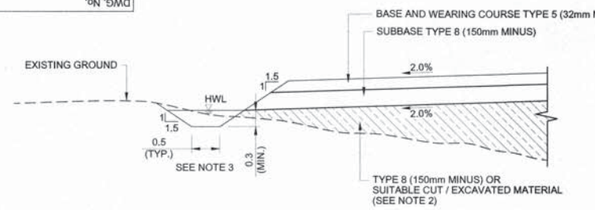
BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
TYPICAL INTERNAL ROAD SECTIONS

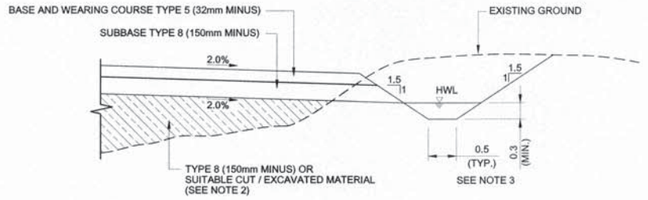
SCALE: NTS OR AS NOTED
DWG. No.: H353004-00000-221-294-0009-0001
REV: 1
SHEET SIZE: D

$USERNAME$
$TIME$
$DATE$
$FILE$

DWG. No. H353004-00000-221-294-0010-0001



DETAIL 1 - INTERNAL ROAD - TYPICAL SIDE DITCH - FILL



DETAIL 2 - INTERNAL ROAD - TYPICAL SIDE DITCH - CUT

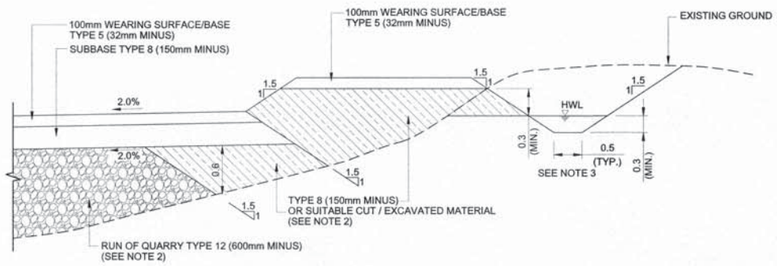
MATERIAL AND COMPACTION SPECIFICATION:

SUBGRADE PREPARATION:
THE SUBGRADE SHOULD SHOULD BE PROOF-ROLLED AND INSPECTED PRIOR TO PLACING FILL MATERIALS. THE IDENTIFIED SOFT AREAS SHALL BE FURTHER COMPACTED, OR IF NECESSARY, BE MITIGATED USING GRANULAR OR ROCK FILL. A QUALIFIED GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SUBGRADE.
THE ROCKFILL SHALL NOT BE PLACED IN WATER OR ON ICE. DEWATERING IS REQUIRED WHERE PONDING WATER IS ENCOUNTERED. OVER-EXCAVATION IS REQUIRED FOR GROUND ICE, IF ENCOUNTERED.
THE SUBGRADE ON THE GROUND SHALL BE LEFT AS IT IS NATURALLY BEFORE CONSTRUCTION AS MUCH AS POSSIBLE. THE OVER-EXCAVATION SHOULD BE MINIMIZED TO AVOID DISTURBANCE OF THE EXISTING PERMAFROST.

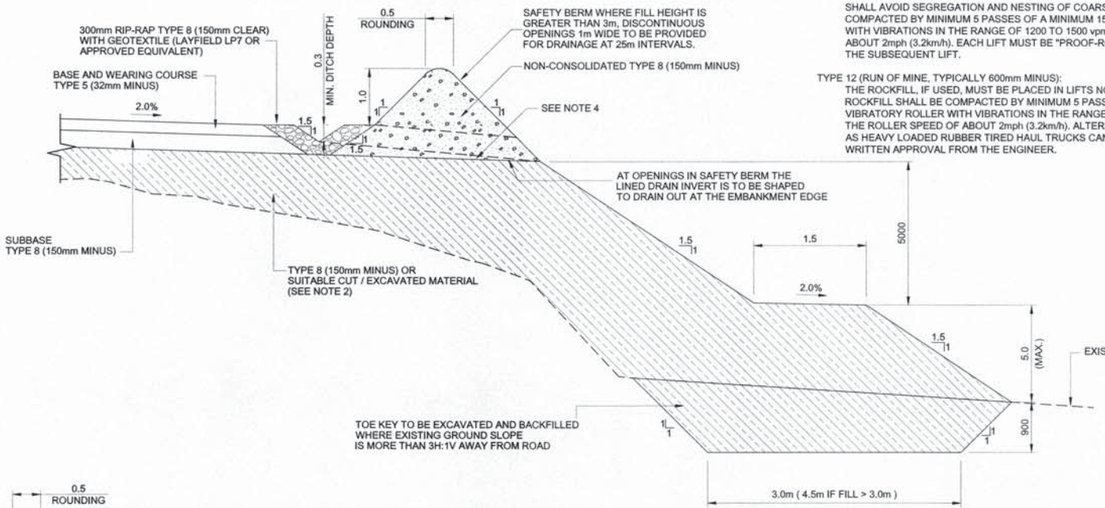
TYPE 5 (CRUSHER RUN 32mm MINUS MATERIAL) OR TYPE 3 (CRUSHER RUN 50mm MINUS):
THE MATERIAL MUST BE PLACED IN LIFTS NOT EXCEEDING 200mm AND SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). 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.

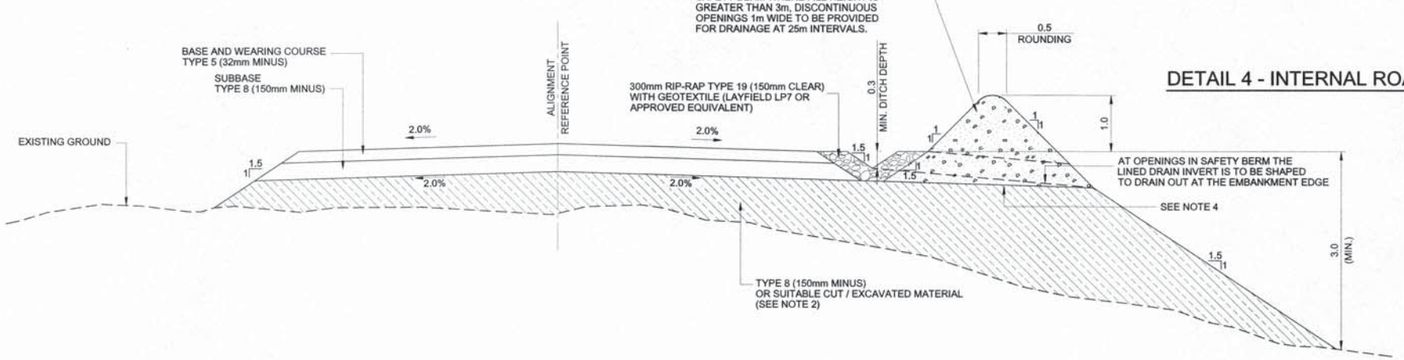
TYPE 12 (RUN OF MINE, TYPICALLY 600mm MINUS):
THE ROCKFILL, IF USED, MUST BE PLACED IN LIFTS NOT EXCEEDING 1000mm. THE ROCKFILL SHALL BE COMPACTED BY MINIMUM 5 PASSES OF A MINIMUM 15 TON VIBRATORY ROLLER WITH VIBRATIONS IN THE RANGE OF 1200 TO 1500 vpm AND THE ROLLER SPEED OF ABOUT 2mph (3.2km/h). ALTERNATIVE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



DETAIL 3 - INTERNAL ROAD - TYPICAL SIDE DITCH - CUT (WITH UTILITY BERM)



DETAIL 4 - INTERNAL ROAD SAFETY BERM DETAIL WITH TOE KEY - AS REQUIRED



DETAIL 5 - INTERNAL ROAD SAFETY BERM DETAIL - AS REQUIRED

NOTES:

1. ALL DIMENSIONS SHOWN ARE IN METRES, UNLESS NOTED OTHERWISE.
2. FOR FILL DEPTH > 600mm AND DEPENDING ON FILL EXTENTS, USE TYPE 12 ie. RUN OF QUARRY (600mm MINUS).
3. FOR SIDE DITCH SLOPE STEEPER THAN 3% (TYPICAL), PROVIDE 300mm RIP-RAP WITH GEOTEXTILE (LAYFIELD LP7 OR APPROVED EQUIVALENT) UP TO HIGH WATER LEVEL.
4. THE VOIDS OF TYPE 12 (RUN OF QUARRY) FINISHED SURFACE SHALL BE FILLED PRIOR TO PLACEMENT OF THE NEXT LAYER.
5. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE PROJECT UTILITY SERVICES DRAWINGS FOR CABLING AND PIPING. ALL CABLING AND PIPING UTILITIES ARE TO BE LAID DIRECTLY ON THE BERM, NO PIPE SUPPORTS ETC ARE REQUIRED.

LEGEND

HWL HIGH WATER LEVEL

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-09-14
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
R. A. HALIM
LICENSEE
2018-09-14
NWT/NU

FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
1	MATERIALS AND COMPACTION SPECIFICATION ADDED	IHB	FH	16/08/2018
0	APPROVED FOR CONSTRUCTION	IHB	FH	01/12/2017

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	I BARNARD	NR	16/08/2018
DESIGNER	I BARNARD	NR	16/08/2018
CHECKER	F HUGO		2018-09-14
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	R HALIM		2018-09-14
LEAD DISC. ENG.	A GROBBELAAR		2018-09-14
AREA LEAD	V LAVRIC	N/A	
ENG. MANAGER	D STANGER		2018-09-17
AREA MANAGER	T ATIBA		17-09-18

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

SITE WIDE
STANDARD DRAWING
TYPICAL INTERNAL ROAD SECTIONS

SCALE	DWG. No.	REV
NTS OR AS NOTED	H353004-00000-221-294-0010-0001	1

SHEET SIZE: D

$USERNAMES $DATES $FILES $TIMES

DRAWING No. | DRAWING TITLE
REFERENCE DRAWINGS
REG. PROFESSIONAL