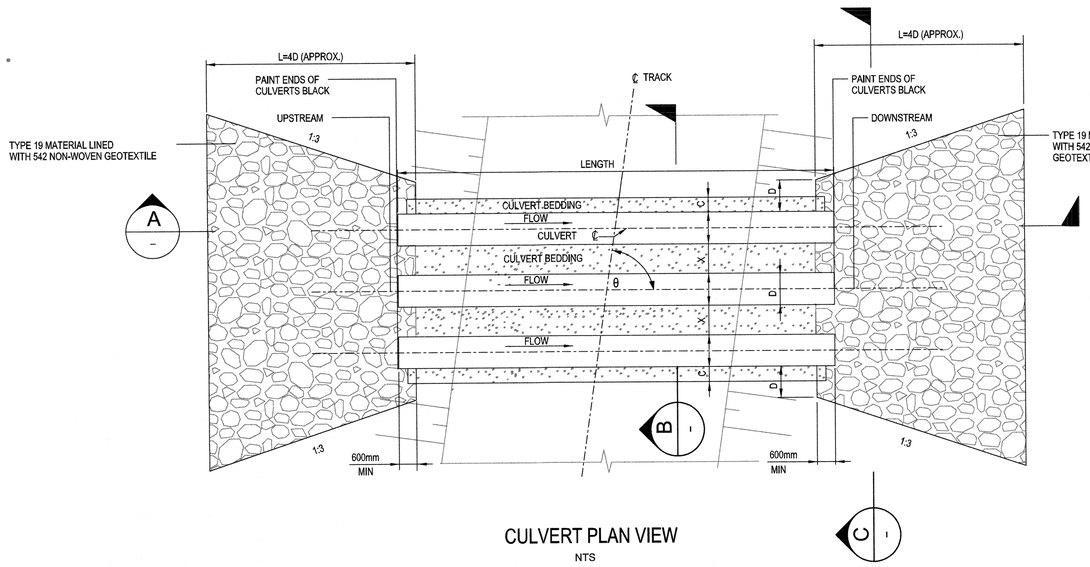
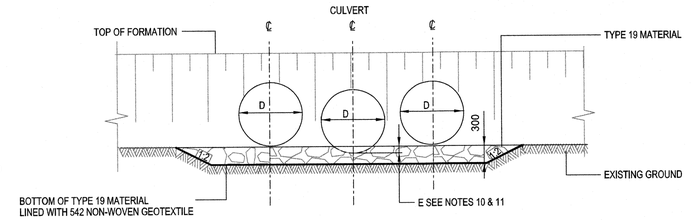
DWG. No. H353004-30000-224-294-0001-0001



CULVERT PLAN VIEW

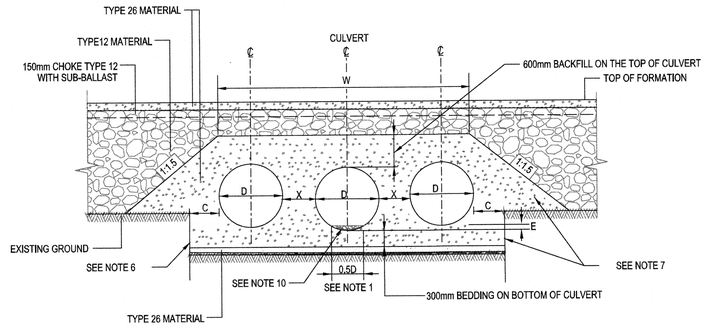
NTS



MULTIPLE PIPE SECTION

NTS

C -



MULTIPLE PIPE SECTION

NTS

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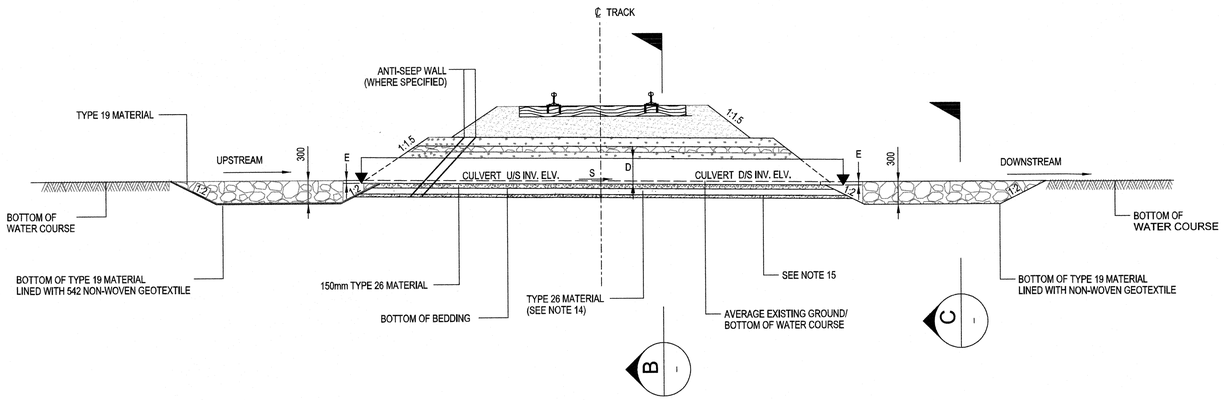

SECTION

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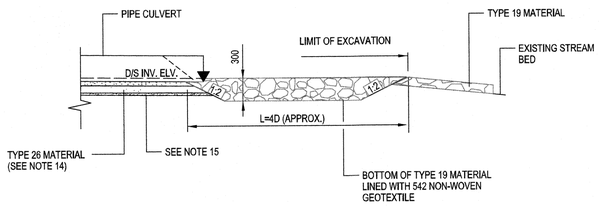


RIP RAP APRON TREATMENT ON STEEP STREAM

NTS

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
U/S INV. ELV.	CULVERT UPSTREAM INVERT ELEVATION
D/S INV. ELV.	CULVERT DOWNSTREAM INVERT ELEVATION
L	RIPRAP APRON LENGTH L=4*D (APPROX.)
S	CULVERT SLOPE
LENGTH	CULVERT LENGTH
INV	INVERT
θ	ANGLE OF SKEW
X	DISTANCE BETWEEN CULVERTS
n	NUMBER OF CULVERTS

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. 1V:1.5H
7. PROVIDE 300mm TYPE 8 (150mm MINUS) AROUND BEDDING AND BACK FILL MATERIAL ONLY WHEN ROCKFILL IS PRESENT.
8. ADJUST CULVERT START AND END COORDINATES AND INVERT ELEVATIONS IN THE FIELD AS APPROVED BY COMPANY'S REPRESENTATIVE.
9. PROVIDE AVERAGE STREAM SLOPE ALONG THE CULVERT AS CULVERT SLOPE BASED ON ACTUAL FIELD CONDITION.
10. FOR FISH BEARING CULVERT, E=0.1D TO 0.25D
    FOR NON-FISH BEARING CULVERT, E=0
    TYPE 19 MATERIAL IN BASE OF LOWERED CULVERT.
11. FOR FISH BEARING CULVERT WITH MULTIPLE PIPES, ONLY ONE PIPE SHALL BE EMBEDDED BY "E" (APPROXIMATELY 0.1D TO 0.25D) ALL OTHER PIPES SHALL BE PLACED ON GROUND/BOTTOM OF WATER COURSE.
12. COMPACTED ROCK-FILL (TYPE 8) MATERIAL TO BE PLACED ON THE NATURAL GROUND OR RAISED GRADE, DEPTH OF ROCK-FILL VARIES BETWEEN 1m AND 1.5m.
13. ADDITIONAL FILL OF RUN OF QUARRY (TYPE 12) OR ROCK-FILL (TYPE 8) MAY BE REQUIRED TO RAISE GRADE OF EMBANKMENT TO MATCH VERTICAL PROFILE OF RAILROAD OR WHERE A WEAK FOUNDATION SOIL IS PRESENT.
14. THE DEPTH OF THE EXCAVATION UNDER THE CULVERT AND THE REQUIREMENT OF THE INSULATION LAYER IS TO BE DEFINED BY CULVERT LOCATION.
15. 100mm OF DRY SAND, TYPE 9 FILL-CRUSHER FINES/LINER BEDDING OR A FILTER CLOTH PLACED ABOVE AND BELOW INSULATION LAYER FOR PROTECTION.
16. PREFABRICATED CONCRETE WINGWALLS WILL BE ALLOWED FOR. FLAG WILL BE PLANTED TO INDICATE BEGINNING/END OF PIPE.
17. DESIGN FOR 1:200 RETURN PERIOD.
18. MATERIAL TYPE DEFINITION:
    TYPE 12: RUN OF QUARRY/ROCK FILL LAYER
    TYPE 19: RIP RAP LAYER
    TYPE 25: BALLAST LAYER
    TYPE 26: SUB-BALLAST LAYER
19. THIS DRAWING WAS PREVIOUSLY ISSUED AS H353004-00000-220-294-0001-0001.

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2018-11-08
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER D. STANGER LICENSEE 2018-11-8 NT/NU

APPROVED FOR CONSTRUCTION

No.	DESCRIPTION	BY	CHK'D	DATE
0	APPROVED FOR CONSTRUCTION	S.P-A	G.J	2018/10/19

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	S. PINKNEY-ATKINSON	NR	2018/09/26
DESIGNER	S. PINKNEY-ATKINSON	NR	
CHECKER	GLEN JOHNSTONE	Johnstone, Glen	Digitally signed by Johnstone, Glen Date: 2018.10.09 09:25:44 -06'00'
DESIGN COORD.	GLEN JOHNSTONE	Johnstone, Glen	Digitally signed by Johnstone, Glen Date: 2018.10.09 09:26:01 -06'00'
RESP. ENG.	FANUS VAN BILJON		2018-10-30
LEAD DISC. ENG.	FANUS VAN BILJON		2018.11.06 10:11:08 -06'00'
AREA LEAD	FANUS VAN BILJON		2018.11.06 10:12:23 -06'00'
ENG. MANAGER	DANIEL STANGER		2018-10-30
AREA MANAGER	FAY PITTMAN	Fay Pittman	2018-11-08

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

RAIL SITE
STANDARD DRAWING
TYPICAL CROSS SECTION- MULTIPLE BARREL PIPE CULVERT

SCALE	DWG. No.	REV
NTS OR AS NOTED	H353004-30000-224-294-0001-0001	0

SHEET SIZE: D

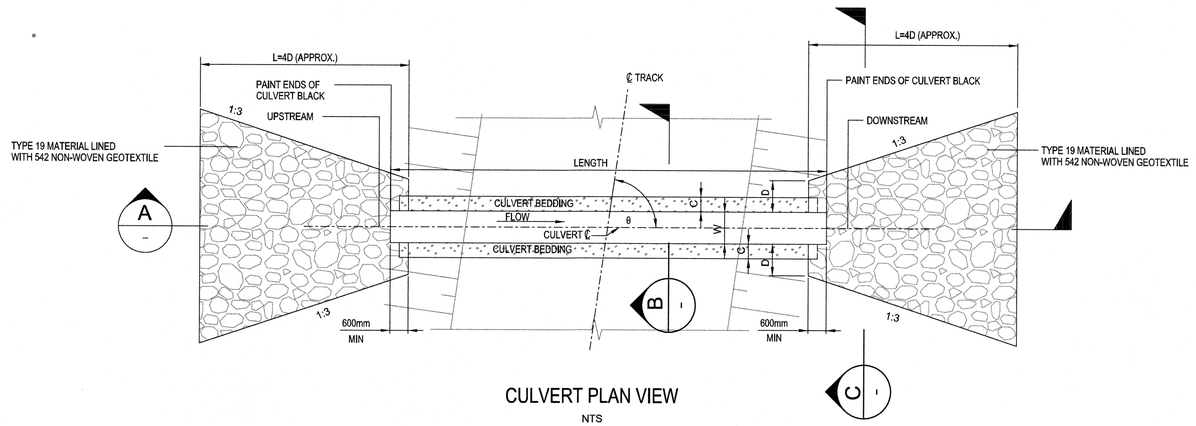
DRAWING No.	DRAWING TITLE
H353004-30000-224-294-0002-0001	TYPICAL CROSS SECTION- SINGLE BARREL PIPE CULVERT

REFERENCE DRAWINGS

REG. PROFESSIONAL

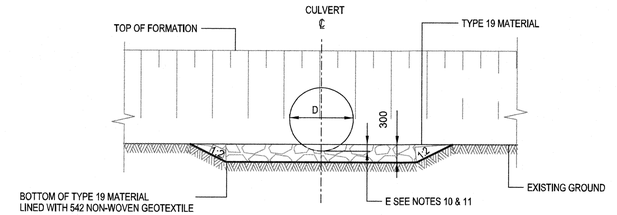
$USERNAMES $TIMES $DATES $FILES

DWG. No. H353004-30000-224-294-0002-0001



CULVERT PLAN VIEW

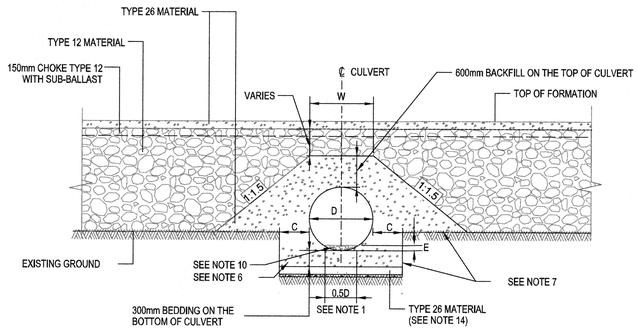
NTS



SINGLE PIPE SECTION

NTS

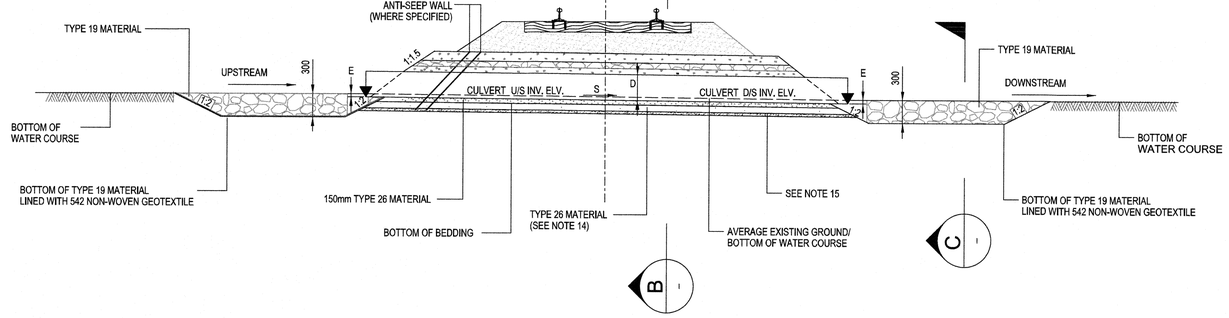
C



SINGLE PIPE SECTION

NTS

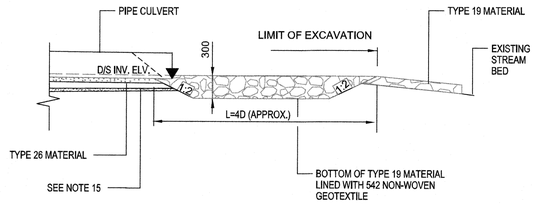
B



SECTION

NTS

A



RIP RAP APRON TREATMENT ON STEEP STREAM

NTS

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
U/S INV. ELV.	CULVERT UPSTREAM INVERT ELEVATION
D/S INV. ELV.	CULVERT DOWNSTREAM INVERT ELEVATION
L	RIPRAP APRON LENGTH L=4*D (APPROX.)
S	CULVERT SLOPE
LENGTH	CULVERT LENGTH
INV	INVERT
θ	ANGLE OF SKEW
X	DISTANCE BETWEEN CULVERTS
n	NUMBER OF CULVERTS

NOTES:

1. THE PIPE BED SHALL BE SHAPED TO RECEIVE THE BOTTOM OF THE PIPE.
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3. BEDDING AND BACKFILL MATERIAL SHALL BE HOMOGENEOUS GRANULAR MATERIAL, AND SHALL BE PLACED AND COMPACTED UNIFORMLY AROUND THE PIPE.
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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. ADJUST CULVERT START AND END COORDINATES AND INVERT ELEVATIONS IN THE FIELD AS APPROVED BY COMPANY'S REPRESENTATIVE.
9. FLOW DIRECTION MUST BE FROM UPSTREAM TO DOWNSTREAM. PROVIDE AVERAGE STREAM SLOPE ALONG THE CULVERT AS CULVERT SLOPE BASED ON ACTUAL FIELD CONDITION.
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    FOR NON-FISH BEARING CULVERT, E=0
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No.	DESCRIPTION	BY	CHK'D	DATE
0	APPROVED FOR CONSTRUCTION	S.P-A	G.J	2018/10/19

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	S PINKNEY-ATKINSON	NR	2018/03/19
DESIGNER	S PINKNEY-ATKINSON	NR	
CHECKER	GLEN JOHNSTONE	Johnstone, Glen	Digitally signed by Johnstone, Glen DN: cn=CA, o=HATCH, ou=NWT
DESIGN COORD.	GLEN JOHNSTONE	Johnstone, Glen	Digitally signed by Johnstone, Glen DN: cn=CA, o=HATCH, ou=NWT
RESP. ENG.	FANUS VAN BILJON		2018-10-30
LEAD DISC. ENG.	FANUS VAN BILJON		2018.11.06 10:17:55 -05'00'
AREA LEAD	FANUS VAN BILJON		2018.11.06 10:18:25 -05'00'
ENG. MANAGER	DANIEL STANGER		2018-10-30
AREA MANAGER	FAY PITTMAN	Fay Pittman	2018-11-08

DRAWING APPROVAL STATUS: Approved for Construction

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

RAIL SITE
STANDARD DRAWING
TYPICAL CROSS SECTION- SINGLE BARREL PIPE CULVERT

DRAWING No.	DRAWING TITLE
H353004-30000-224-294-0001-0001	TYPICAL CROSS SECTION - MULTIPLE BARREL PIPE CULVERT

REFERENCE DRAWINGS

SCALE NTS OR AS NOTED

DWG. No. H353004-30000-224-294-0002-0001 REV 0

SHEET SIZE: D

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$FILES
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