I:\ENGINEERING\AIL\PROJECTS\2019\00284 - STD SET - VARIOUS RAIL STREAM CROSSING, QC\ORDER\DRAFTING\R.2\2019-00284-000 - R.2

Wednesday, March 31, 2021 4:27:31 PM BRIAN HEANEY

BAFFINLAND IRON MINES CORPORATION
RAIL STREAM CROSSINGS, NUNAVUT

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Date March 31, 2021
PERMIT NUMBER: P 552
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
D.C.N. ESSERY
LICENSEE
NWT/NU
March 31, 2021

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BAFFINLAND IRON MINES CORPORATION
RAIL STREAM CROSSINGS, NUNAVUT
COVER SHEET

DESIGNED	JZ	28 JAN 21	BRANCH P.O.	CUSTOMER REF.	TOTAL DWGS
DES. CHK	MME	29 JAN 21	-	-	10
DRAWN BY	BH	25 JAN 21	PROJECT NUMBER 2019-00284	DWG NO. 000	REV. 2
DWG. CHK	LM	26 JAN 21			

SPECIFICATIONS FOR ENGINEERED BACKFILL ENVELOPE AND ENVIRONMENT

1. GENERAL
   - 1.1. BACKFILL SOIL SPECIFICATIONS REFERRED TO HATCH STANDARD SPECIFICATION, QUARRIED FILL MATERIALS REQUIREMENTS, REV 0, 2016-12-14 AND EMAIL CORRESPONDENCE - 2019-00284 / JANUARY 21ST MEETING FOLLOW UP, DATED 2021/01/27.
   - 1.2. BURIED METAL STRUCTURES ARE A COMPOSITE STRUCTURE MADE UP OF THE METAL AND SOIL ENVELOPE. BOTH ELEMENTS PLAY A VITAL PART IN THE DESIGN.
   - 1.3. THESE SPECIFICATIONS PERTAIN TO BACKFILL MATERIALS PLACED WITHIN THE ENGINEERED BACKFILL ENVELOPE AND DO NOT INCLUDE MATERIAL OUTSIDE THE ENGINEERED BACKFILL ZONE.
   - 1.4. IF THERE ARE ANY DISCREPANCIES BETWEEN THESE SPECIFICATIONS AND THE CONTRACT DOCUMENTS, THE MORE STRINGENT REQUIREMENTS GOVERN. ATLANTIC INDUSTRIES LIMITED SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.
   - 1.5. THE ENGINEERED BACKFILL ENVELOPE SHALL BE CONSTRUCTED AS DESIGNATED ON THE ATLANTIC INDUSTRIES LIMITED DRAWING(S). MODIFICATIONS TO THE ENGINEERED BACKFILL ENVELOPE, DUE TO UNFORESEEN LOCAL CONDITIONS OR CIRCUMSTANCES, SHALL NOT BE PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF ATLANTIC INDUSTRIES LIMITED.
   - 1.6. BACKFILL MATERIAL PLACED WITHIN THE ENGINEERED BACKFILL ENVELOPE SHALL, AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER, SATISFY THE BACKFILL MATERIAL STRENGTH, DURABILITY AND COMPRESSIBILITY CRITERIA INDICATED ON THE ATLANTIC INDUSTRIES LIMITED DRAWINGS.
   - 1.7. THE IN-PLACE COMPACTED DENSITY OF BACKFILL MATERIALS WITHIN THE ENGINEERED BACKFILL ENVELOPE SHALL NOT BE ADVERSELY AFFECTED AFTER PLACEMENT BY SUBSEQUENT WETTING, DRYING, PLACEMENT OF GEOFABRIC LAYERS, SATURATION, THAWING, VIBRATIONS, FLOWING WATER OR BY SEEPAGE FLOW WITHIN OR THROUGH THE BACKFILL AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER.
   - 1.8. THE ELECTROCHEMICAL PROPERTIES OF THE BACKFILL SHALL NOT EXCEED THE LIMITS INDICATED ON THE DRAWING FOR THE DESIGN LIFE OF THE STRUCTURE AS DETERMINED BY THE PROJECT'S GEOTECHNICAL/HYDROTECHNICAL ENGINEER. ATLANTIC INDUSTRIES LIMITED SHALL BE ADVISED IF ADDITIONAL MEANS SUCH AS A GEOMEMBRANE TO PREVENT SURFACE WATER CONTAMINANTS SUCH AS ROAD SALT IS REQUIRED.
   - 1.9. THE OWNER'S GEOTECHNICAL ENGINEER SHALL EVALUATE THE ANTICIPATED SETTLEMENT AND REVIEW WITH THE OWNER TO DETERMINE IF THE ANTICIPATED SETTLEMENT IS ACCEPTABLE.
   - 1.10. ANY SOFT, YIELDING OR UNSUITABLE MATERIAL OUTSIDE ENGINEERED BACKFILL, AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER, SHALL BE EXCAVATED AND REPLACED BY CONTRACTOR WITH SUITABLE MATERIAL AND COMPACTED BY SAME.
   - 1.11. GLOBAL STABILITY IS THE RESPONSIBILITY OF THE PROJECT'S GEOTECHNICAL ENGINEER.
   - 1.12. BACKFILL MATERIAL SHALL BE ADEQUATELY DRAINED, AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER, NOT TO BUILD UP HYDROSTATIC LOAD. BACKFILL SHALL BE PROPERLY DRAINED SUCH THAT BACKFILL RESISTANCE IS NOT ADVERSELY AFFECTED BY WATER. SUBDRAINS AND MEMBRANES MAY BE REQUIRED, AS DETERMINED BY THE PROJECT'S HYDROTECHNICAL ENGINEER, TO ENSURE PROPER DRAINAGE.
   - 1.13. STRUCTURE MUST MEET HYDRAULIC REQUIREMENTS OF THE SITE AS DETERMINED BY THE PROJECT'S HYDROTECHNICAL ENGINEER. THE PROJECT'S HYDROTECHNICAL ENGINEER SHALL ENSURE NO MOVEMENT OF ANY PART OF THE STRUCTURE SHALL OCCUR AS A RESULT OF SCOUR. PLACE RIP-RAP PROTECTION AS DESIGNED AND SUPPLIED BY THE PROJECT'S HYDROTECHNICAL ENGINEER. SCOUR PROTECTION ON THE INSIDE OF THE FOOTING TO PREVENT LOSS OF ENGINEERED BACKFILL DUE TO SCOUR AS SUPPLIED AND DESIGNED BY PROJECT'S HYDROTECHNICAL ENGINEER.
   - 1.14. PROTECTION OF END SLOPES WITH USE OF HEADWALLS, CUT-OFF WALLS OR OTHER MEANS SHALL BE GIVEN SPECIAL CONSIDERATION BY THE PROJECT'S HYDROTECHNICAL/GEOTECHNICAL ENGINEER WHEN BACKWATER CONDITIONS OCCUR OR WHERE EROSION OR UPLIFT COULD BE EXPECTED.
   - 1.15. BACKFILL GRADATION MODIFICATIONS AND OTHER MEASURES SUCH AS HEADWALLS TO ELIMINATE THE RISK OF BACKFILL MIGRATION FROM FLOWING WATER SHALL BE USED AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER.
   - 1.16. FOOTING ELEVATIONS MUST PROVIDE ADEQUATE FROST PROTECTION AS DETERMINED BY PROJECT'S GEOTECHNICAL ENGINEER.

2. QUALITY CONTROL/ASSURANCE
   - 2.1. LABORATORY TESTS ON BACKFILL MATERIALS SHALL CONFORM TO THE STANDARDS AS SPECIFIED HEREIN.
   - 2.2. LABORATORY TESTING REPORTS SHALL IDENTIFY THE LOCATION AND/OR SOURCE OF TEST SAMPLES, METHODS OF SAMPLING, DATES SAMPLED AND TESTED, TESTING STANDARDS USED AND ANY SPECIAL TECHNIQUES OR METHODS EMPLOYED, INCLUDING DETAILS OF ANY DEVIATION FROM STANDARD PROCEDURES DUE TO THE TYPE OF MATERIAL BEING TESTED OR CONDITIONS UNDER WHICH THE TESTING WAS PERFORMED.
   - 2.3. OWNER'S GEOTECHNICAL ENGINEER TO CONFIRM TO AIL THAT LABORATORY TESTING CONFORM TO AIL REQUIREMENTS PRIOR TO PLACING ANY BACKFILL MATERIALS WITHIN THE ENGINEERED BACKFILL ENVELOPE.
   - 2.4. LABORATORY TESTING SHALL BE REPRESENTATIVE OF THE MATERIAL PLACED WITHIN THE ENGINEERED BACKFILL ENVELOPE. IF SOURCE PIT MATERIAL VARIES AND TESTING IS NO LONGER REPRESENTATIVE OF THE TESTING, ADDITIONAL TESTING IS REQUIRED.
3. REQUIREMENTS FOR BACKFILL MATERIALS IN THE ENGINEERED BACKFILL ENVELOPE
   - 3.1. BACKFILL MATERIALS SHALL BE FREE OF VEGETATIVE ORGANIC MATTER (E.G., ROOTS, TOPSOIL, PEAT, MOSS, WOODY MATTER, COMPOST).
   - 3.2. BACKFILL MATERIALS CLASSIFIED IN THE AASHTO CLASSIFICATION SYSTEM AS A-4, A-5, A-6 AND A-7 OR IN THE UNIFIED SOIL CLASSIFICATION SYSTEM AS CL, CH, ML, MH, OL, OH, SHALL NOT BE PERMITTED FOR USE WITHIN THE ENGINEERED BACKFILL ENVELOPE. BACKFILL MATERIALS CLASSIFIED IN OTHER LOCAL JURISDICTION CLASSIFICATION SYSTEMS THAT MATCH THE MATERIAL TYPES NOTED ABOVE SHALL ALSO BE EXCLUDED FOR USE WITHIN THE ENGINEERED BACKFILL ENVELOPE.
   - 3.3. UNLESS OTHERWISE AGREED BY ATLANTIC INDUSTRIES LIMITED BACKFILL MATERIALS SHALL SATISFY THE CRITERIA FOR CHEMICAL AND ENVIRONMENTAL COMPLIANCE GIVEN IN TABLE 1-1, THE PARTICLE SIZE, SHAPE, AND GRADATION REQUIREMENTS GIVEN IN TABLE 1-3 AND ADDITIONAL MATERIAL PROPERTY TESTS GIVEN IN TABLE 1-2.

4. OTHER BACKFILL MATERIAL OPTIONS AND ADDITIONAL TESTING REQUIREMENTS
   - 4.1. ATLANTIC INDUSTRIES LIMITED SHALL BE CONTACTED IF ANY BACKFILL MATERIAL DERIVED FROM SOURCES SUSCEPTIBLE TO BREAKDOWN WHEN HANDLED, WETTED AND COMPACTED IS CONSIDERED AS USE OF THIS BACKFILL COULD NEGATIVELY IMPACT PERFORMANCE. SOURCES OF CONCERN INCLUDE SHALES, PHYLLITES, WEAKLY BONDED SLATES AND WEAKLY CEMENTED SANDSTONES. ADDITIONAL TESTING IS REQUIRED FOR THESE MATERIALS.
   - 4.2. THE ADDITIONAL TESTS (TABLE 1-2) ARE WAIVED FOR BACKFILL SOILS USED SUCCESSFULLY IN THE PAST, AS DETERMINED BY THE PROJECT'S GEOTECHNICAL ENGINEER, WITH SIMILAR ATLANTIC INDUSTRIES LIMITED STRUCTURES UNDER SIMILAR CONDITIONS AND GEOGRAPHIC LOCATIONS.

5. WINTER FILL CONSTRUCTION NOTES
   - 5.1. THE DECISION TO PERFORM COLD WEATHER CONSTRUCTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE OWNER.
   - 5.2. COLD WEATHER CONDITIONS WILL BE DEFINED BY THE GEOTECHNICAL ENGINEER. THE MATERIAL TEMPERATURE IS IN REFERENCE TO THE ENGINEERED BACKFILL, FOUNDATION MATERIAL, RETAINED MATERIAL AND ANY OF STRUCTURAL COMPONENTS.
   - 5.3. STRUCTURAL COMPONENTS RELY ON SOIL-STEEL INTERACTION TO SUPPORT BACKFILL AND APPLIED LOADS. THE DESIGN AND INSTALLATION OF THE ENGINEERED BACKFILL IS AS IMPORTANT TO THE STRUCTURAL INTEGRITY AS THE DESIGN AND INSTALLATION OF THE SOIL REINFORCEMENT. BUILDING DURING COLD WEATHER TEMPERATURES CAN PRESENT EXTREME CHALLENGES BOTH WITH CONSTRUCTION PRACTICE AND THE PERFORMANCE OF THE ENGINEERED BACKFILL THAT CAN SIGNIFICANTLY AFFECT THE INTERNAL STABILITY AND LOAD CARRYING CAPACITY OF THE STRUCTURAL COMPONENTS. COLD WEATHER CONDITIONS CAN PRESENT ENVIRONMENTAL CONDITIONS THAT ADVERSELY AFFECT THE ENGINEERED BACKFILL, AND HENCE THE INTERNAL STABILITY AND LOAD CARRYING CAPACITY OF STRUCTURAL COMPONENTS.
   - 5.4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT FROZEN MATERIAL, ICE AND SNOW IS NOT PRESENT IN THE ENGINEERED BACKFILL MATERIAL. ENGINEERED BACKFILL EXHIBITING EVIDENCE OF FROST, ICE AND/OR SNOW IS NOT TO BE USED IN THE INSTALLATION OF STRUCTURAL COMPONENTS. IMPROPER INSTALLATION WILL RESULT IN LARGE SETTLEMENTS, STRUCTURAL COMPONENTS DEFORMATIONS, AND EVEN COLLAPSE OF THE STRUCTURE.
   - 5.5. CONSTRUCTION IN COLD WEATHER CONDITIONS MUST FOLLOW ASTM A1115/A1115M, CSPI TECH BULLETIN 20 AND METHODS SPECIFIED BY THE GEOTECHNICAL ENGINEER.

TABLE 1-1. CHEMICAL AND ENVIRONMENTAL COMPLIANCE REQUIREMENTS

	TEST METHOD	CRITERIA
PH	AASHTO T289-91 OR EQUIVALENT	5 TO 10
RESISTIVITY	AASHTO T288-91 OR EQUIVALENT	> 3000 OHM-cm
CHLORIDES	AASHTO T291-91 OR EQUIVALENT	< 100 ppm WAIVED WHEN RESISTIVITY ≥ 5000 OHM-cm
SULPHATES	AASHTO T290-91 OR EQUIVALENT	< 200 ppm WAIVED WHEN RESISTIVITY ≥ 5000 OHM-cm
ORGANIC CONTENT*	AASHTO T267-86 OR EQUIVALENT	< 1.0%

*THE 1% LIMIT IS ONLY APPLICABLE TO MATERIAL SMALLER THAN A 2mm (COARSE SAND). MATERIAL LARGER THAN 2mm SHALL BE FREE FROM ORGANICS AS PER NOTE 3.1.

TABLE 1-3. PARTICLE SIZE, SHAPE AND GRADATION REQUIREMENTS FOR BACKFILL [4]

	TEST METHOD	CRITERIA
PARTICLE SIZE WITHIN 300mm OF SIDE WALL		≤ 75mm
PARTICLE SIZE BEYOND 300mm OF SIDE WALL		≤ 150mm
GRAVEL CONTENT (> 4.75mm)	ASTM C136	≥ 35%
FINES CONTENT[3] (0.075mm)	WET SIEVE ANALYSIS (ASTM C117) OR HYDROMETER TESTING (ASTM D-422)	0-1%
PLASTICITY INDEX WAIVED IF FINES CONTENT (< 0.075mm) IS LESS THAN 5%	AASHTO T-90	≤ 6%
GRADATION CURVE $C_U = (D_{60} / D_{10})$ $C_C = [(D_{30})^2 / (D_{60} * D_{10})]$ WAIVED IF GRAVEL CONTENT (4.75mm) IS GREATER THAN 60%		$C_U \geq 4$; $1 < C_C < 3$
ANGULARITY OF NON-CRUSHED MATERIALS[1]	ASTM D-2488	> 35% ANGULAR/SUB-ANGULAR
FLATS/ELONGATES[2]	ASTM D-2488 (VISUAL INSPECTION) OR ASTM D-4791	< 25%

1 WAIVED FOR ALL CRUSHED SOURCES OF GRAVEL. ON NON-CRUSHED MATERIALS, INSPECTION AS PER ASTM D2488.

2 FLATS/ELONGATES PRINCIPALLY APPLY TO CRUSHER RUN SCREENED MATERIALS (E.G., LIMESTONE SCREENINGS). AS PER ASTM D2488, FLATS ARE DEFINED AS HAVING A WIDTH/THICKNESS RATIO GREATER THAN 3 AND ELONGATES ARE DEFINED AS HAVING A LENGTH/WIDTH RATIO GREATER THAN 3.

3 CLASS "A*" MATERIAL ≤5% WITH IN 2.0m OF WALL FACE.

4 MODIFY BACKFILL REQUIREMENTS TO THE MORE STRINGENT LIMITS FOR COLD WEATHER INSTALLATION TO SATISFY CONSTRUCTION CONDITIONS, SEE CHBDC CL C6.19.4 FOR FURTHER TECHNICAL SUPPORT

TABLE 1-4. NON-AGGRESSIVE WATER CHEMICAL AND ENVIRONMENTAL COMPLIANCE REQUIREMENTS

	GALV. STEEL CAPABILITIES
PH	6 ≤ TO < 9
RESISTIVITY	2000 - 8000 ohm-cm
CHLORIDES	≤ 50 ppm
SULPHATES	≤ 240 ppm
CALCIUM CARBONATE	> 80 ppm
ABRASION	ANTICIPATED MAXIMUM FLOW VELOCITY DURING A 2-YEAR EVENT = 1.5 m/s

WHEN PERMITTED BY THE OWNER, WATER TESTING MAY BE WAIVED BASED ON SUCCESSFUL PERFORMANCE OF SIMILAR STRUCTURES UNDER SIMILAR CONDITIONS AND GEOGRAPHIC LOCATION, AS DETERMINED BY THE OWNER'S ENGINEER. WATER TESTING IS NOT REQUIRED WHEN THE DESIGN WATER ELEVATION IS BELOW THE STRUCTURE'S BASE.

TABLE 1-2. ADDITIONAL TESTING REQUIREMENTS

	TEST METHOD	CRITERIA
MAXIMUM ABRASION LOSS	LOS ANGELES ABRASION LOSS ASTM C-131	< 40%
MAGNESIUM SULPHATE SOUNDNESS LOSS	AASHTO T-104	< 30% AFTER FOUR CYCLES

REGISTERED PROFESSIONAL ENGINEER — M.B.E.D. EL-SHARNOUBY — LICENSEE 2021/03/31 — NT/NU

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BAFFINLAND IRON MINES CORPORATION
RAIL STREAM CROSSINGS, NUNAVUT
SPECIFICATIONS FOR ENGINEERED BACKFILL ENVELOPE

DESIGNED	JZ	28 JAN 21
DES. CHK	MME	29 JAN 21
DRAWN BY	BH	25 JAN 21
DWG. CHK	LM	26 JAN 21

BRANCH P.O. -
CUSTOMER REF. -
PROJECT NUMBER 2019-00284
DWG NO. 001
REV. 2

MSE WALL DESIGN NOTES:

1. THE DESIGN IS BASED ON THE ASSUMPTION THAT THE SELECT BACKFILL WITHIN THE REINFORCED SOIL MASS, FOUNDATION SOIL, RETAINED BACKFILL, METHODS OF CONSTRUCTION AND QUALITY OF MATERIALS CONFORM TO THE REQUIREMENTS SHOWN ON THESE DRAWINGS.
2. THE STRUCTURE DESIGN REQUIRES A NON-SATURATED BACKFILL ABOVE THE DESIGN WATER LEVEL. THE PREVENTION OF BACKFILL SATURATION, HYDROSTATIC PRESSURES OR CONTAMINATION OF THE SELECT BACKFILL BY SALT LADEN RUN-OFF OR OTHER CORROSIVE CHEMICALS IS REQUIRED TO MAINTAIN STRUCTURE INTEGRITY AND SERVICE LIFE. FOR SOME APPLICATIONS, MECHANICAL DRAINAGE CONTROL AND/OR PROTECTIVE MEMBRANES MAY BE REQUIRED TO ENSURE SURFACE AND SUBSURFACE DRAINAGE REQUIREMENTS ARE MET.
   DRAINAGE DESIGN AND CONTROL IS SITE SPECIFIC. DRAINAGE DESIGN IS THE RESPONSIBILITY OF THE BRIDGE ENGINEER OR ROAD DESIGN ENGINEER OR BOTH WHO MUST HAVE DETAILED KNOWLEDGE OF THE PROJECT PLANS, DETAILS AND SPECIFICATIONS TO ENSURE PROPER IMPLEMENTATION, INCLUDING ADDRESSING THE ABOVE DRAINAGE ISSUES. ON SITE DRAINAGE CONTROL IS THE RESPONSIBILITY OF THE CONTRACTOR WHO CARRIES OUT THE WORK ACCORDING TO THE DESIGN. AIL HAS NOT BEEN RETAINED TO PREPARE THE DRAINAGE DESIGN AND CONTROL NOR TO DO THE WORK TO IMPLEMENT THE DESIGN. AIL ACCEPTS NO RESPONSIBILITY WHATSOEVER FOR THESE ASPECTS OF THE PROJECT
3. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. GLOBAL STABILITY, INCLUDING FOUNDATION AND SLOPE STABILITY, IS THE RESPONSIBILITY OF THE PROJECT GEOTECHNICAL ENGINEER.
4. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED SOIL VOLUME, AS DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER, SHALL BE EXCAVATED FOR THE FULL LENGTH OF THE SOIL REINFORCEMENT AND TO A DEPTH AS DIRECTED BY THE PROJECT GEOTECHNICAL ENGINEER. EXCAVATED UNSUITABLE MATERIAL SHALL BE REPLACED WITH GRANULAR MATERIAL AND COMPACTED AS DIRECTED BY THE PROJECT GEOTECHNICAL ENGINEER.
5. CALCULATIONS BY ATLANTIC INDUSTRIES LIMITED CAN BE SUBMITTED UPON REQUEST.
6. THE MAXIMUM CALCULATED APPLIED BEARING PRESSURES AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL ELEVATION. IT IS THE RESPONSIBILITY OF THE OWNER'S GEOTECHNICAL ENGINEER TO DETERMINE THAT THE BEARING CAPACITY IS ADEQUATE
7. IF ACTUAL CHARACTERISTICS, GRADES OR DIMENSIONS OF SOIL MATERIALS DIFFER FROM THOSE LISTED IN THESE DRAWINGS OR SHOWN ON THE PLANS, ATLANTIC INDUSTRIES LIMITED SHALL BE NOTIFIED TO EVALUATE THE NEED TO REDESIGN.
8. THE DESIGN OF THE MSE WALL FOLLOWS THE AREMA 2015 & AASHTO 2020 LRFD DESIGN PROCEDURE.
9. ALL DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS ARE IN METERS.
10. DESIGN TO ACCOMMODATE SETTLEMENT AS NOTED IN SETTLEMENT AND ALIGNMENT NOTES.

DEFINITIONS:

1. PROJECT GEOTECHNICAL ENGINEER - HATCH
2. ROAD AND DRAINAGE DESIGN ENGINEER - HATCH
3. SELECT BACKFILL - REINFORCED FILL IN CONTACT WITH THE SOIL REINFORCEMENT
4. RETAINED BACKFILL - FILL RETAINED BY THE REINFORCED ZONE
5. FOUNDATION SOIL - MATERIAL BELOW THE REINFORCED ZONE

MSE WALL SELECT BACKFILL NOTES:

SELECTION AND TESTING OF BACKFILL IS THE RESPONSIBILITY OF THE CONTRACTOR. BACKFILL TEST RESULTS ARE TO BE PROVIDED TO AIL AS RECORDS OF COMPLIANCE WITH THE BACKFILL REQUIREMENTS. ANY STRUCTURE BUILT USING MATERIAL THAT DOES NOT MEET ALL BACKFILL REQUIREMENTS WILL NOT PERFORM AS INTENDED AND WILL NOT BE CERTIFIED BY AIL.

THE FOLLOWING BACKFILL REQUIREMENTS, NOTES AND PROCEDURES APPLY TO CONSTRUCTION COMPLETED STRUCTURES NOT SUBMERGED IN WATER.

1. THE SELECT BACKFILL SHALL COMPLY WITH AIL REQUIREMENTS OF 2019-00284-001, AS WELL AS THE FOLLOWING NOTES BELOW.
2. THE SELECT BACKFILL MUST CONFORM TO THE GRADATION LIMITS SHOWN ON DWG. 2019-00284-001.
3. THE SELECT BACKFILL MUST EXHIBIT AN ANGLE OF INTERNAL FRICTION NOT LESS THAN THAT SHOWN IN THE SITE SPECIFIC MSE WALL DESIGN PARAMETERS AND A UNIT WEIGHT ±2% OF THAT SHOWN IN THE SITE SPECIFIC MSE WALL DESIGN PARAMETERS.
4. SELECT BACKFILL PLACEMENT SHALL CLOSELY FOLLOW ERECTION OF EACH COURSE OF SOIL REINFORCING. SELECT BACKFILL SHALL BE PLACED IN SUCH A MANNER AS TO AVOID ANY DAMAGE OR DISTURBANCE TO THE WALL MATERIALS OR MISALIGNMENT OF THE FACING. NO COMPACTION EQUIPMENT SHALL BE OPERATED ON EXPOSED SOIL REINFORCING. ANY WALL MATERIALS WHICH BECOME DAMAGED OR MISALIGNED DURING THE PLACEMENT OF BACKFILL SHALL BE REPAIRED, REPLACED OR CORRECTED AS DIRECTED BY THE OWNERS SITE ENGINEER.
5. SELECT BACKFILL SHALL BE COMPACTED IN 200mm MAXIMUM LIFTS AND COMPACTED TO 98% OF MODIFIED PROCTOR DENSITY AS DETERMINED BY ASTM D698. FOR LIFT HEIGHTS WITHIN THE STRUCTURE ENGINEERED BACKFILL ZONE, REFER TO DWG 2019-00284-001-TABLE 1.3 & DWG 2019-00284-003-TABLE 2.2.
6. MOISTURE CONTENT OF THE BACKFILL SHALL BE MAINTAINED EVENLY AT ALL TIMES. MOISTURE CONTENT SHALL BE +0%/-2% OF THE OPTIMUM MOISTURE CONTENT. ANY BACKFILL MATERIAL EXCEEDING THE OPTIMUM MOISTURE CONTENT MUST BE ALLOWED TO DRY.
7. COMPACTION WITHIN 1 METER (APPROXIMATELY 3'-0") OF THE WALL FACE SHALL BE ACHIEVED BY A LIGHTWEIGHT (HAND OPERATED) MECHANICAL TAMPER, ROLLER OR VIBRATORY SYSTEM. NO LARGE COMPACTION EQUIPMENT SHALL BE ALLOWED IN THIS ZONE AS DISTORTION OF THE FACING MAY RESULT. REFER TO NOTE 5 FOR COMPACTION REQUIREMENTS.
8. BACKFILL PRECAUTIONS SHOULD BE TAKEN AT THE END OF THE DAY. THE BACKFILL SURFACE SHALL BE SLOPED TO RAPIDLY DIRECT RUN-OFF AWAY FROM THE FACE OF THE WALL AND TO PREVENT PONDING OF SURFACE WATER. DURING PERIODS OF ANTICIPATED INCLEMENT WEATHER, THE SURFACE OF THE FILL SHALL BE SEALED WITH AN IMPERVIOUS MEMBRANE. IF PONDING OF SURFACE WATER DOES OCCUR, THE WATER SHALL BE REMOVED AND THE BACKFILL REPLACED OR ALLOWED THE DRY TO PROJECT REQUIREMENTS. ALL DRAINAGE ELEMENTS SUCH AS CATCH BASINS AND INLETS SHALL BE PROPERLY SEALED TO PREVENT SURFACE RUNOFF FROM ENTERING THE CONSTRUCTION SITE AND TO PREVENT THE BACKFILL FROM WASHING OUT THE REINFORCED VOLUME OF SOIL.

REGISTERED PROFESSIONAL ENGINEER
D.C.N. ESSERY
LICENSEE
NWT/NU
March 31, 2021

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MSE Retaining Wall Systems

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MSE WALL DESIGN NOTES

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DWG. CHK	MS	28 JAN 21

BRANCH P.O. -
CUSTOMER REF. -
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DWG NO. 002
REV. 2

BACKFILLING PROCEDURE, CONSTRUCTION AND QUALITY CONTROL

1. IN-SITU SOILS BELOW AND ADJACENT TO THE ENGINEERED BACKFILL ENVELOPE SHALL BE PREPARED TO PROVIDE A FIRM SURFACE AGAINST WHICH TO COMPACT THE ENGINEERED BACKFILL MATERIAL. THE PROJECT'S GEOTECHNICAL ENGINEER SHALL EVALUATE THE IN-SITU SOILS TO DETERMINE THE DEGREE AND TYPE OF IMPROVEMENT NEEDED TO ACHIEVE A FIRM BEARING SURFACE FOR THE ENGINEERING BACKFILL MATERIALS, INCLUDING ANY BENCHING OR SLOPING THAT MAY BE NEEDED FOR THE SIDE SOILS. BACKFILL MATERIALS PLACEMENT MAY NOT BEGIN UNTIL THE PROJECT'S GEOTECHNICAL ENGINEER HAS APPROVED PREPARATION OF THE IN-SITU SOILS.
2. GEOTEXTILE SEPARATORS AND/OR GRADED FILTERS SHALL, AT THE DIRECTION OF THE PROJECT'S GEOTECHNICAL ENGINEER, BE PROVIDED BETWEEN DIFFERENT TYPES OF BACKFILL MATERIALS IF THEIR GRADATION CHARACTERISTICS CAN CAUSE LOSS OF FINER GRAINED SOIL INTO A COARSER TEXTURED SOIL DUE TO SEEPAGE ACROSS THE CONTACT BOUNDARIES.
3. AT NO TIME SHALL THE BACKFILL MATERIAL BE DUMPED NEXT TO THE STRUCTURE WALL SO AS TO CHANGE THE SHAPE OR ALIGNMENT. MATERIAL IS NOT TO BE DUMPED ON TOP OF THE STRUCTURE AT ANY TIME. TRUCKS CAN UNLOAD IN ROUGH LAYERS NO CLOSER THAN 1500mm FROM THE SIDEWALLS. HEAVY EQUIPMENT SHALL ALSO VEER AWAY FROM ENDS OF STRUCTURE BARREL.
4. BACKFILL PLACEMENT AND COMPACTION EQUIPMENT SHALL OPERATE PARALLEL TO THE LONGITUDINAL AXIS OF THE STRUCTURE. PLACE AND COMPACT THE BACKFILL OVER THE TOP OF THE STRUCTURE (ABOVE 3/4 OF THE RISE) USING LIGHT EQUIPMENT PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE STRUCTURE. THE MINIMUM REQUIRED COVER OVER THE STRUCTURE WILL BE DETERMINED BY THE AIL ENGINEER FOR EACH PIECE OF EQUIPMENT. NO EQUIPMENT SHALL BE ALLOWED OVER THE STRUCTURE THAT WOULD EXCEED THE DESIGN LIVE LOAD AT THE FINAL MINIMUM DESIGN HEIGHT OF COVER.
5. EQUIPMENT WITH A STATIC MASS GREATER THAN 12 TONNES SHALL NOT OPERATE WITHIN 1000 mm OF THE STRUCTURE /MSE WALL FACE OR CLOSE ENOUGH TO CAUSE DISTORTION, AS DETERMINED BY THE OWNER'S ENGINEER. BACKFILL CLOSEST TO THE CORRUGATION PROFILE SHALL BE COMPACTED WITH HAND-OPERATED EQUIPMENT SUCH AS POLE RODDING, AIR TAMPING OR VIBRATORY EQUIPMENT.
6. THE MAXIMUM LOOSE THICKNESS OF BACKFILL LAYERS PRIOR TO COMPACTION SHALL BE AS SHOWN IN TABLE 2-1 AND THE MINIMUM DEGREE OF COMPACTION ACHIEVED ON ANY LIFT AT ANY TESTED LOCATION SHALL BE AS SPECIFIED IN TABLES 2-2.
7. THE COMPACTED BACKFILL HEIGHT DIFFERENTIAL ON THE OPPOSITE SIDES OF AN AIL STRUCTURE, AT ANY GIVEN TRANSVERSE SECTION, SHALL NOT BE GREATER THAN 200mm FOR ALL APPROVED BACKFILL.
8. FIELD GAUGES AND INSTRUMENTS THAT RAPIDLY DETERMINE IN-PLACE DENSITY AND MOISTURE CONTENT OF COMPACTED BACKFILL SHALL BE ACCURATE AND HAVE BEEN CALIBRATED WITHIN THE PRECEDING 24 MONTH PERIOD. INSTRUMENTS AND GAUGES LIKELY TO BE AFFECTED BY THE CHEMICAL COMPOSITION OF THE BACKFILL MATERIAL SHALL BE RE-CALIBRATED USING ALTERNATIVE METHODS OF IN-PLACE DRY DENSITY AND MOISTURE CONTENT MEASUREMENTS.
9. NEW BACKFILL LIFTS SHALL NOT BE PLACED UNTIL PRIOR COMPACTED LIFTS HAVE MET ACCEPTANCE COMPLIANCE CRITERIA. AT LEAST FOUR COMPACTION CONTROL TESTS SHALL BE CONDUCTED EVERY SECOND LIFT AND ONE OF THOSE SHALL BE WITHIN A 300 TO 900mm DISTANCE OF THE STRUCTURE SIDEWALL PER 10m LENGTH OF STRUCTURE. BACKFILL COMPACTION ACCEPTANCE FOR EACH COMPACTED LIFT SHALL BE DETERMINED BY QUALITY CONTROL METHODS APPROVED BY THE PROJECT'S GEOTECHNICAL ENGINEER. IT IS THE RESPONSIBILITY OF THE PROJECT'S GEOTECHNICAL ENGINEER TO ENSURE THE COMPACTION CRITERIA IS MET.
10. FIELD COMPACTION RECORDS SHOWING DATE OF TESTING, TEST LOCATION, LIFT NUMBER, TESTING DEPTH BELOW THE COMPACTED BACKFILL SURFACE (OR FILL ELEVATION) AND METHODS USED TO DETERMINE THE BACKFILL MOISTURE AND DENSITY SHALL BE SUBMITTED TO AIL WITHIN 48 HOURS OF COMPLETION. A LETTER FROM THE PROJECT'S GEOTECHNICAL ENGINEER CERTIFYING BACKFILL CONFORMS AND WAS PLACED IN ACCORDANCE WITH AIL'S REQUIREMENTS SHALL BE SUBMITTED TO AIL AT THE COMPLETION OF CONSTRUCTION.
11. BACKFILL SOILS SHALL NOT BE FROZEN DURING PLACEMENT OR COMPACTION. FROZEN REF TO FROZEN WATER, NOT TEMPERATURE DURING BACKFILL. IF CONSTRUCTION OCCURS DURING COLD WEATHER. THERE ARE NO DEFINITIVE CRITERIA FOR ESTABLISHING THE MINIMUM TEMPERATURE AT WHICH COLD WEATHER CONSTRUCTION PROCEDURES ARE REQUIRED. THE CONTRACTOR SHALL DISCUSS COLD WEATHER PROCEDURES AND THE APPLICABILITY OF AIL'S GUIDANCE WITH THEIR GEOTECHNICAL ENGINEER.
12. BACKFILL SOILS SHALL NOT BE CONTAMINATED WITH LOCAL FINE GRAINED OR PLASTIC SOILS DURING TRANSPORT OR PLACEMENT.
13. THE STRUCTURE SHALL BE CHECKED PERIODICALLY DURING THE BACKFILLING PROCEDURE TO ENSURE THE SHAPE IS CONSISTENT WITH THE MANUFACTURER'S TOLERANCES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SHAPE CONTROL MONITORING TO ENSURE THE STRUCTURE SHAPE IS WITHIN AIL'S LIMITS THROUGHOUT CONSTRUCTION.

TABLE 2-1. MAXIMUM LOOSE LIFT THICKNESS OF BACKFILL MATERIALS WITHIN THE ENGINEERED BACKFILL ENVELOPE

BACKFILL GRADATION	MAX. LOOSE LIFT THICKNESS	CRITERIA
GRAVEL/SAND	*150mm WITHIN 1000mm OF SIDEWALL *200mm BEYOND 1000mm OF SIDEWALL	LOOSE LIFT THICKNESS MAY BE INCREASED TO 200mm SUBJECT TO ACCEPTABLE COMPACTION AND DEMONSTRATION OF COMPACTION ACHIEVED USING METHODS APPROVED BY AIL

TABLE 2-2. BACKFILL COMPACTION REQUIREMENTS[2]

STANDARD PROCTOR COMPACTION	ASTM D698[1]	98% OF LABORATORY MAXIMUM DRY DENSITY
MOISTURE CONTROL		± 0-2% OF OPTIMUM MOISTURE CONTENT

[1] IF MATERIAL DOES NOT CONFORM TO ASTM D698 DUE TO COLD WEATHER CONSTRUCTION, COMPACTION IS SUBJECT TO ACCEPTABLE COMPACTION AND DEMONSTRATION OF COMPACTION ACHIEVED USING METHODS AS DETERMINED BY THE PROJECTS GEOTECHNICAL ENGINEER.

[2] LABORATORY PROCTOR TESTS SHALL BE CORRECTED FOR OVERSIZE CONTENT FOR BACKFILL MATERIAL CONTAINING MORE THAN 15% BY DRY MASS OF PARTICLE SIZES LARGER THAN 19 mm (ASTM D-4718).

ASSUMED SOIL PARAMETERS FOR FINITE ELEMENT ANALYSIS

PROJECT GEOTECHNICAL ENGINEER TO ADVISE AIL IF CONDITIONS DIFFER FROM THE FOLLOWING:
(VALUES USED WERE FROM: HATCH STANDARD SPECIFICATION, QUARRIED FILL MATERIALS REQUIREMENTS, REV 0, 2016-12-14) AND EMAIL CORRESPONDENCE - 2019-00284 / JANUARY 21ST MEETING FOLLOW UP, DATED 2021/01/27.

GRANULAR BACKFILL IN ENGINEERED BACKFILL ZONE:
SW 98% MOHR-COULOMB MODEL
γ = 18 kN/m^3, SECANT STIFFNESS = 70 MPa, POISSON'S RATIO = 0.33, INTERNAL FRICTION ANGLE: 38°
OTHER BACKFILL (SIDES)
SW 98% MOHR-COULOMB MODEL MODEL
γ = 18 kN/m^3, SECANT STIFFNESS = 70 MPa, POISSON'S RATIO = 0.33, INTERNAL FRICTION ANGLE: 38°
FOUNDATION MATERIAL
LINEAR ELASTIC MODEL, STATED SETTLEMENT LIMITS ON 2019-00284-E03
CONCRETE FOUNDATION
LINEAR ELASTIC MODEL
ν = 0.17
E' = 30000 MPa

REGISTERED PROFESSIONAL ENGINEER
M.B.E.D. EL-SHARNOUBY
LICENSEE
2021/03/31
NT/NU

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DWG. CHK	LM	26 JAN 21

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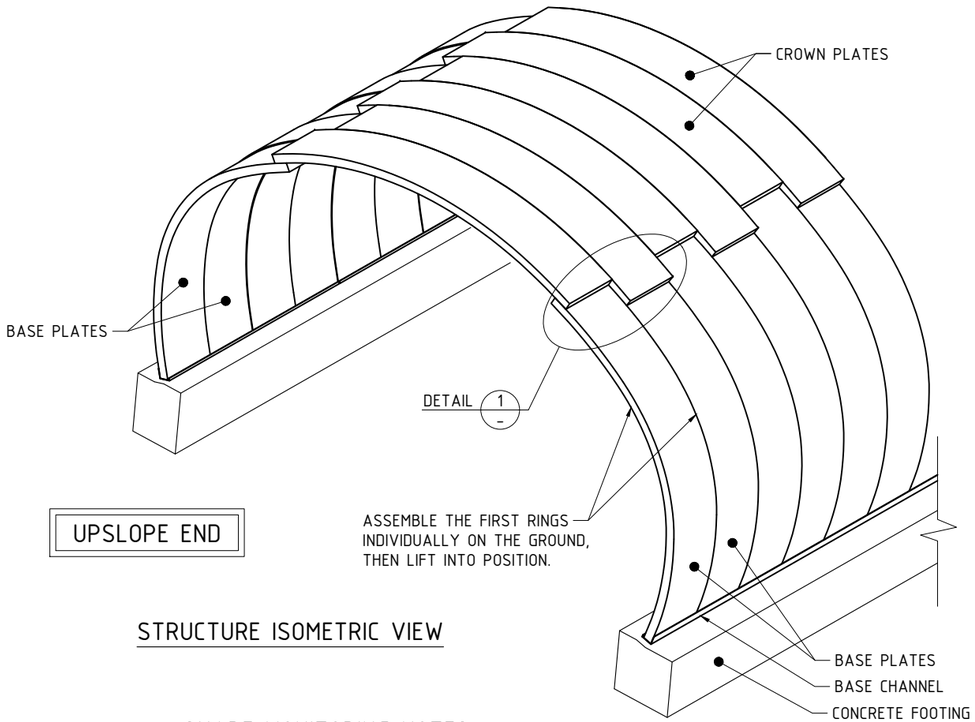
REV. 2

NOTE:
CORRUGATIONS AND END TREATMENTS HAVE NOT BEEN SHOWN FOR CLARITY.



STRUCTURE ISOMETRIC VIEW

NOTE:
THIS ISOMETRIC ILLUSTRATION IS A REPRESENTATION OF A STANDARD SUPER-COR ARCH STRUCTURE AND IS ONLY INTENDED FOR THE PURPOSE OF DEMONSTRATING THE PLATE ASSEMBLY PROCEDURE.

ACTUAL SUPER-COR ARCH STRUCTURE MAY DIFFER FROM WHAT IS SHOWN IN THIS ILLUSTRATION.

FIELD NOTES:

1. SPAN AND RISE DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES.
2. PLACE NUTS WITH TAPERED FACE TO HOLE UNLESS NOTED OTHERWISE.
3. BOLT HEADS PLACED ON EXPOSED SIDE OF STRUCTURE (NUTS ON SOIL SIDE), UNLESS NOTED OTHERWISE.
4. REQUIRED TORQUE ON BOLTS : MINIMUM 203 N.M (150 FT.LBS)
   AVERAGE 270 N.M (200 FT.LBS)
   MAXIMUM 338 N.M (250 FT.LBS)
   AND HAVE A MINIMUM TWO BOLT THREAD PITCHES PROTRUDING BEYOND THE FACE OF THE NUT.
5. ALL GALVANIZED SURFACES DAMAGED BY FIELD DRILLING, CUTTING OR WELDING SHALL BE THOROUGHLY CLEANED AND TREATED WITH A ZINC-RICH COATING TO A DRY THICKNESS OF 50 µm, AS PER CSA/G401-14, CL. 6.2.1.
6. RECOMMEND ASSEMBLING PLATES FROM UPSLOPE END TO DOWNSLOPE END.

SHAPE MONITORING NOTES

1.1. THE CONTRACTOR SHALL MEASURE THE AS BUILT SHAPE AND VERIFY THAT THE SHAPE IS WITHIN TOLERANCES.
1.2. IF SHAPE IS OUTSIDE LIMITS, STOP WORK AND CONTACT AN ATLANTIC INDUSTRIES LIMITED REPRESENTATIVE.
1.3. MEASURE DEFLECTION AT MAXIMUM 600mm FILL HEIGHT INTERVALS, AT THE SAME TIME OF DAY IF POSSIBLE TO MINIMIZE POTENTIAL EFFECTS OF TEMPERATURE.
1.4. RECORD DEFLECTIONS IN 3 DIMENSIONS USING THE COORDINATE SYSTEM INDICATED ON THE DRAWINGS.
1.5. FOR EACH SET OF MEASUREMENTS, RECORD THE LEVEL OF COMPACTED FILL ON EACH SIDE OF THE STRUCTURE AND THE TEMPERATURE.

ASSEMBLY TOLERANCES

1.1 TRANSVERSE DIRECTION (PARALLEL TO CORRUGATION): DIMENSIONS OF THE ASSEMBLED AND FULLY TORQUED STRUCTURE SHALL BE WITHIN THE SMALLER OF 1% AND 125 mm OF THE DESIGN DIMENSIONS PRIOR TO PLACEMENT OF BACKFILL.
1.2 LONGITUDINAL DIRECTION (PERPENDICULAR TO CORRUGATION): DIMENSIONS IN THE LONGITUDINAL DIRECTION OF THE STRUCTURE SHALL NOT VARY MORE THAN 50 mm FROM THE DRAWING.

CONSTRUCTION TOLERANCES

2.1 IF ANY TRANSVERSE DIMENSION DIFFERS FROM THE ASSEMBLED SHAPE BY:

- < 1%: WORK MAY PROCEED AS IS.
- 1% ≤ DEFLECTION < 2%: WORK MAY PROCEED WITH CAUTION. HOWEVER, AN AIL'S REPRESENTATIVE SHALL BE NOTIFIED TO EVALUATE THE SITUATION.
- ≥2%: WORK MUST STOP UNTIL DIRECTION IS RECEIVED FROM AN AIL REPRESENTATIVE.

POST-CONSTRUCTION TOLERANCES

3.1 POST-CONSTRUCTION SHAPE MAY CHANGE A MAXIMUM OF 1% OF THE FINAL CONSTRUCTION SHAPE BEFORE A DESIGN CHECK IS REQUIRED.

RECOMMENDED ASSEMBLY PROCEDURE

1.0 VERIFY BASE CHANNEL AT ANY TRANSVERSE SECTION IS LEVEL AND SQUARE.

2.0 PLATES SHOULD BE INSTALLED IN A SHINGLING PATTERN AS DEPICTED IN THE "STRUCTURE ISOMETRIC VIEW ILLUSTRATION" ON THIS PAGE.

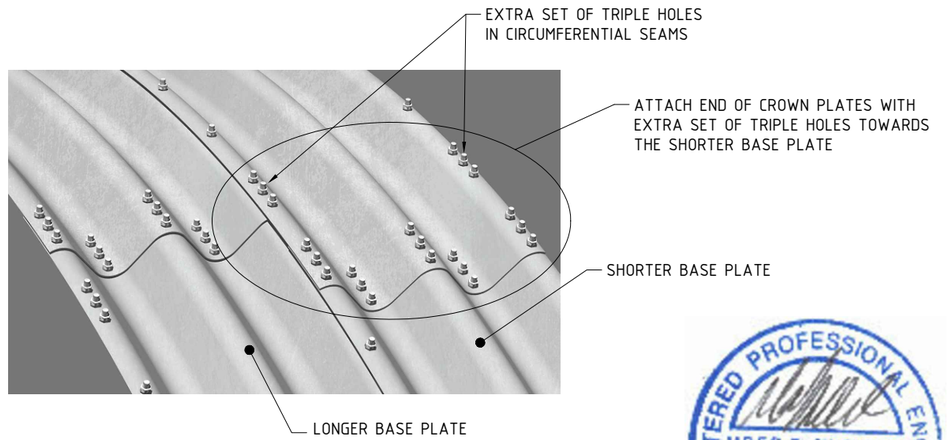
3.0 THE FIRST RINGS SHOULD BE PRE-ASSEMBLED ON THE GROUND. BOLTS SHOULD BE FULLY TORQUED ONCE THE SHAPE IS ESTABLISHED. THE CRANE SHOULD BE HOOKED AT 9 HOLES UP FROM THE BOTTOM ON EACH SIDE OF THE COMPLETED RING ON SCA1 STRUCTURES AND 5 HOLES UP FROM THE BOTTOM ON EACH SIDE OF THE COMPLETED RING ON CUSTOM 16S STRUCTURES.

AT THIS STAGE THE STRUCTURE IS QUITE FLEXIBLE AND CAUTION SHOULD BE TAKEN WHILE LIFTING INTO POSITION. ONCE THE RING IS UPRIGHT, GUIDE ONE SIDE INTO THE BASE CHANNEL AND BOLT INTO POSITION (LEAVING BOLTS LOOSE). DRAW THE OPPOSITE SIDE INTO ITS BASE CHANNEL AND SECURE WITH HAND TIGHT BOLTS. WHEN BASE CHANNEL SHEETS ARE PLACED, IT IS IMPORTANT TO INSTALL ALL BOLTS AS YOU PROCEED. DO NOT LEAVE ANY BOLTS OUT AS THE PLATE MAY HAVE A TENDENCY TO CREEP AHEAD. DO NOT TORQUE BOLTS AT THIS POINT, LEAVE THEM HAND TIGHT. THE LOWER ROW OF HOLES ON THE BASE CHANNEL AND IN THE PLATES SHOULD BE USED TO HELP PULL THE PLATES INTO POSITION. BOLTS ARE REQUIRED IN THESE HOLES WHEN THE RING IS IN POSITION.

4.0 THE REMAINDER OF THE STRUCTURE SHOULD BE ERECTED USING PLATE BY PLATE ASSEMBLY. INSTALL THE NEXT TWO BASE PLATES AND CROWN PLATE TO ESTABLISH THE STEPPED PATTERN AS SHOWN IN THE STRUCTURE ISOMETRIC VIEW ILLUSTRATION. CONTINUE INSTALLING PLATES AND COMPLETING ADDITIONAL RINGS, ENSURING THIS STEPPED PATTERN IS MAINTAINED. THE STRUCTURE MAY REQUIRE THE USE OF A CRANE OR OTHER TEMPORARY SUPPORTS TO MAINTAIN THE PROPER GEOMETRY, AND PREVENT THE STRUCTURE FROM SAGGING DURING CONSTRUCTION.

5.0 ONCE THE FIRST FIVE COMPLETE RINGS HAVE BEEN ASSEMBLED, THE FIRST THREE RINGS SHOULD BE CHECKED FOR SPAN AND RISE DIMENSIONS, AND THEN TORQUED TO SPECIFICATIONS. ON LARGE STRUCTURES IT MAY BE BENEFICIAL TO HAVE ONE CREW INSTALLING NEW PLATES WHILE A SMALLER CREW FOLLOWS AT LEAST 2-3 RINGS BEHIND TORQUING THE BOLTS ON PREVIOUSLY COMPLETED RINGS. UPON COMPLETION OF ASSEMBLY THE ENTIRE STRUCTURE SHOULD BE INSPECTED AND CHECKED FOR TORQUE.

6.0 RECOMMEND SLINGING PLATES AS FOLLOWS:
BASE PLATES - PICK AT TWO-THIRDS POINT WITH TWO CLEVISES (HOOKED AT THE TOP END OF THE PLATES)
CROWN PLATES - PICK AT THE CENTRE USING TWO CLEVISES



1 DETAIL - PLATE LAP
-

REGISTERED PROFESSIONAL ENGINEER
M.B.E.D. EL-SHARNOUBY
LICENSEE
2021/03/31
NT/NU

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DESIGNED	JZ	28 JAN 21
DES. CHK	MME	29 JAN 21
DRAWN BY	BH	25 JAN 21
DWG. CHK	LM	26 JAN 21

BRANCH P.O. -
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PROJECT NUMBER 2019-00284
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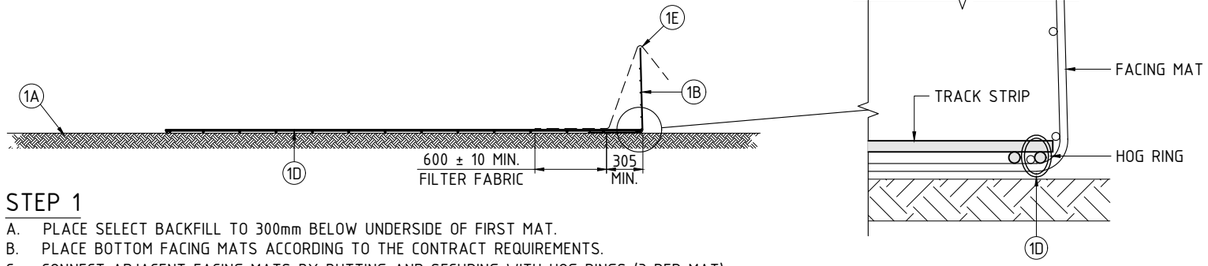
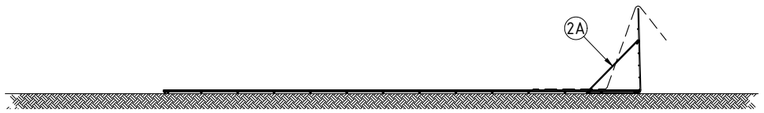
REV. 2



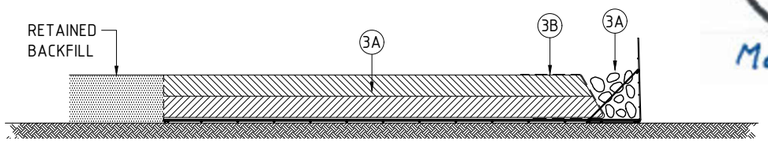
STEP 1

A. PLACE SELECT BACKFILL TO 300mm BELOW UNDERSIDE OF FIRST MAT.
B. PLACE BOTTOM FACING MATS ACCORDING TO THE CONTRACT REQUIREMENTS.
C. CONNECT ADJACENT FACING MATS BY BUTTING AND SECURING WITH HOG RINGS (3 PER MAT), TO MAINTAIN A 2438.4 (8'-0") SPACING (NOT SHOWN).
D. PLACE THE TRACK STRIP AT REQUIRED SPACING ON THE HORIZONTAL SECTION OF FACING MAT AT THE LOCATION OF THE 1" SPACED WIRES. CONNECT TRACK STRIP BY PLACING THE LEAD TRANSVERSE WIRE OF THE TRACK STRIP AT THE BACK FACE OF THE FACING MAT AND SECURE IT FROM REMOVAL WITH A HOG RING. THE TRANSVERSE WIRES ON THE TRACK STRIP SHALL BE PLACED FACING DOWNWARDS AS SHOWN IN ENLARGED DETAIL.
E. PLACE FILTER FABRIC AS SHOWN.



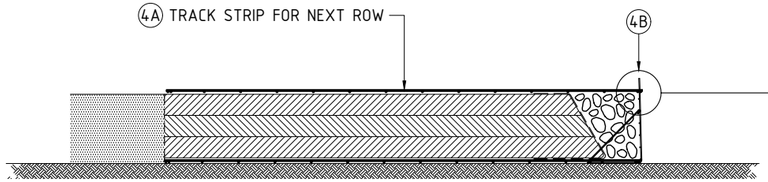
STEP 2

A. PLACE FACING STRUT ON 609.6 CENTERS (3 PER FACING MAT). SLIT/CUT FILTER FABRIC AS REQUIRED TO ENABLE STRUTS TO BE INSTALLED.



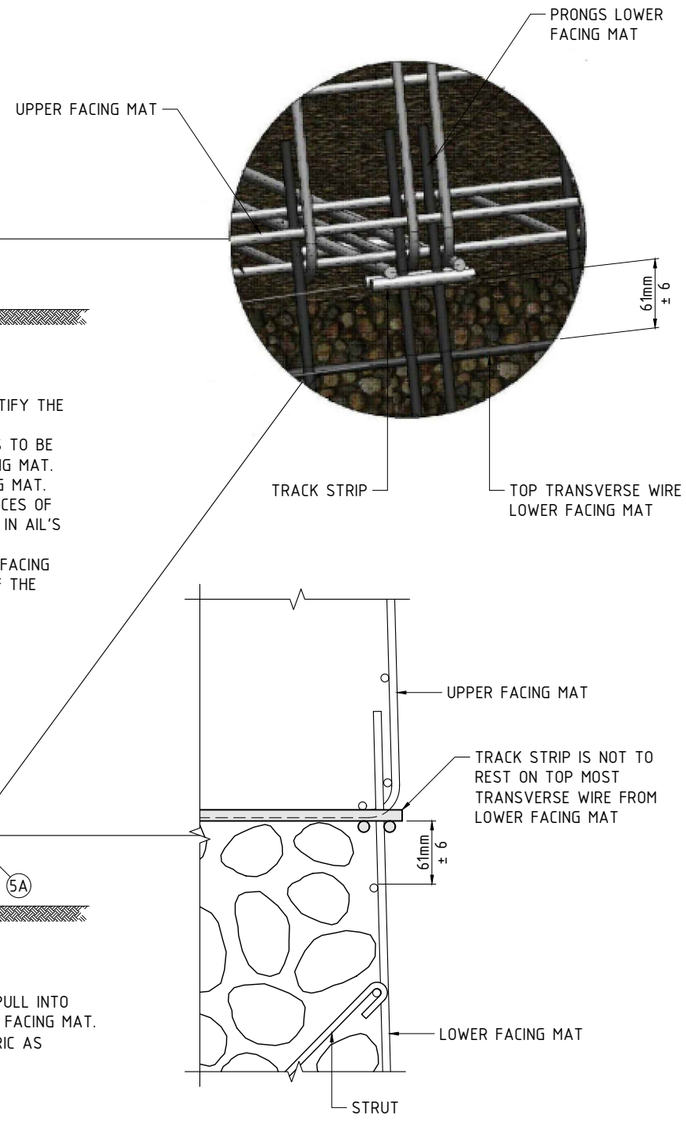
STEP 3

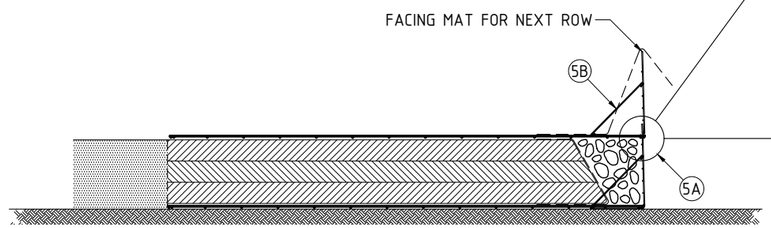
A. PLACE AND COMPACT SELECT BACKFILL AND COBBLE ROCK ACCORDING TO THE MAXIMUM LIFT HEIGHTS AND COMPACTION SHOWN IN THE BACKFILL NOTES. USE ONLY HAND OPERATED EQUIPMENT IN THE 1000mm (3.0') ZONE ADJACENT TO THE FACE OF WALL. MAINTAIN WALL ALIGNMENT IN VERTICAL AND HORIZONTAL DIRECTION.
B. BRING FILTER FABRIC BACK OVER FACE AND TOP OF COMPACTED SELECT BACKFILL.



STEP 4

A. DETERMINE THE SPACING OF THE TRACK STRIPS PER THE ELEVATION VIEW AND IDENTIFY THE REQUIRED LOCATIONS AT THE 1" SPACED VERTICAL FACING WIRES.
B. TRACK STRIP WILL REST ON TOP OF THE COMPACTED BACKFILL. THE TRACK STRIP IS TO BE PLACED 61mm ± 6mm ABOVE THE TOP MOST TRANSVERSE WIRE OF THE LOWER FACING MAT. THE TRACK STRIP DOES NOT REST ON THE TRANSVERSE WIRE OF THE LOWER FACING MAT. IT IS THE CONTRACTORS RESPONSIBILITY TO WORK WITHIN THE PLACEMENT TOLERANCES OF THE MAT PLACEMENT AND ACHIEVE THE TOP THEORETICAL ELEVATIONS AS SET OUT IN AIL'S DRAWINGS.
C. CONNECT THE TRACK STRIP TO THE FACING MAT BY THREADING THE PRONG OF THE FACING MAT BETWEEN THE LEAD TRANSVERSE WIRE AND THE SECOND TRANSVERSE WIRE OF THE TRACK STRIP. PULL TRACK STRIP INTO THE FILL TO MAKE A FIRM CONNECTION.





STEP 5

A. PLACE PRONGS OF THE LOWER FACING MAT THROUGH THE UPPER FACING MAT AND PULL INTO CONTACT SO PRONGS OF LOWER FACING MAT ARE ON THE BACK SIDE OF THE UPPER FACING MAT.
B. PLACE FACING STRUT ON 609.6 CENTERS (3 PER FACE PANEL). SLIT/CUT FILTER FABRIC AS REQUIRED TO ENABLE STRUTS TO BE INSTALLED.
C. REPEAT FROM STEP 3A TO TOP OF WALL.

CONSTRUCTION SEQUENCE

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MSE WALL CONSTRUCTION DETAILS

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DES. CHK	DE	29 JAN 21
DRAWN BY	BH	25 JAN 21
DWG. CHK	MS	28 JAN 21

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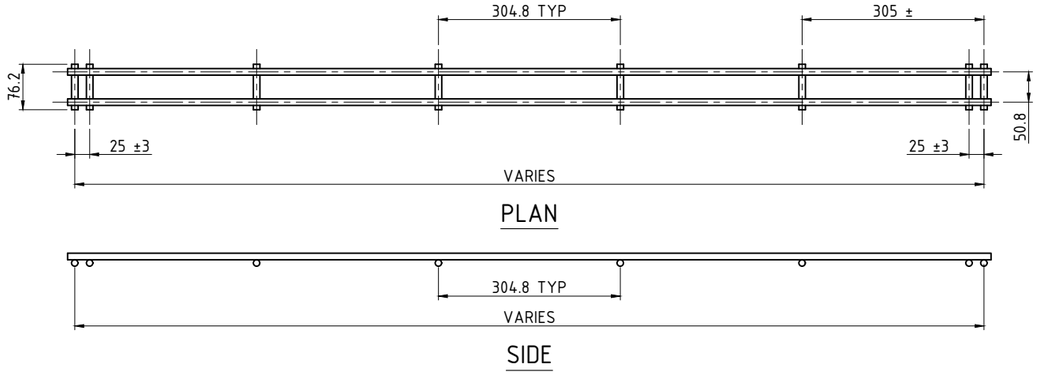
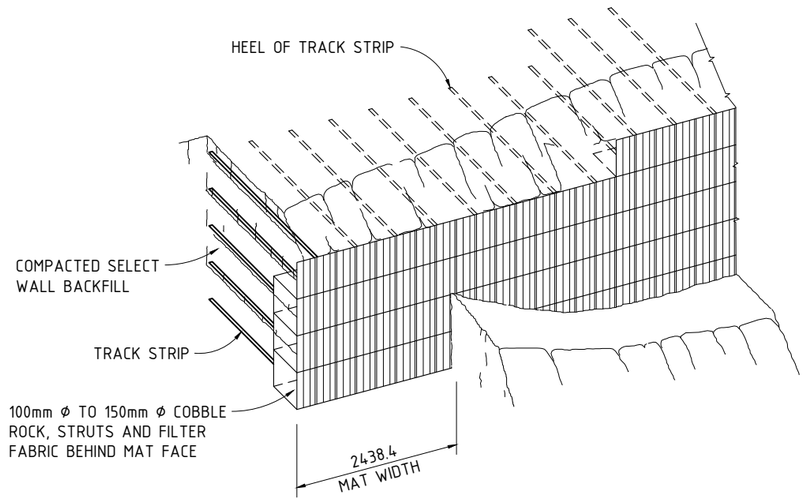
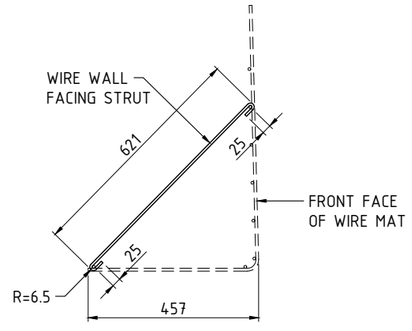
REV. 1



TRACK STRIP DETAIL

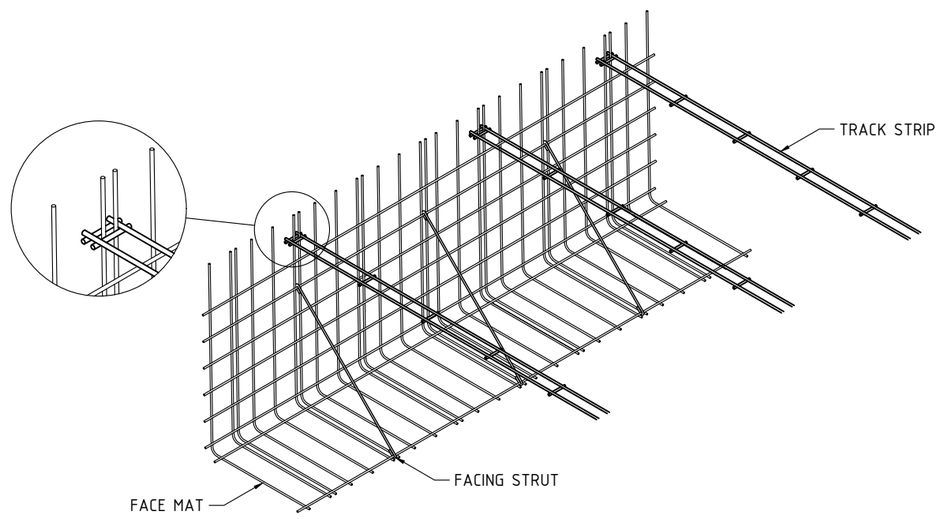


PICTORIAL ELEVATION

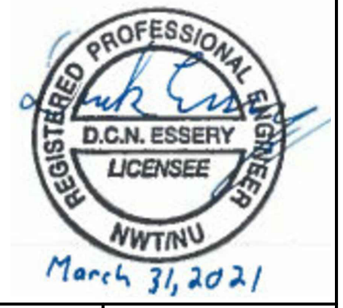


TYPICAL FACING STRUT DETAIL

(3 REQUIRED PER FACING MAT)



ASSEMBLED WALL COMPONENTS



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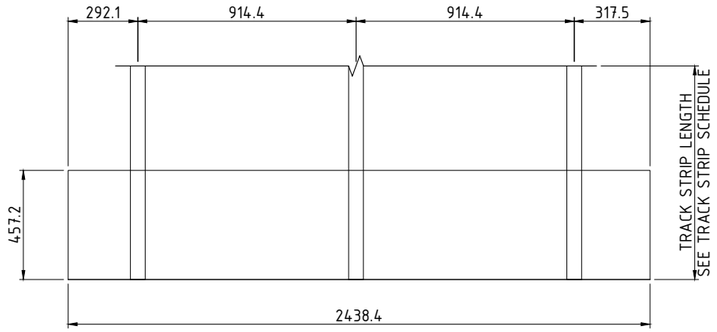
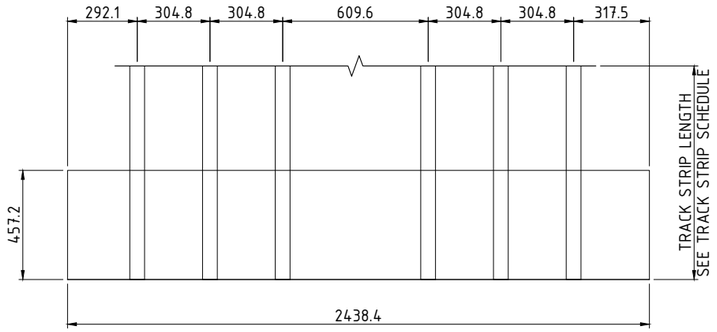
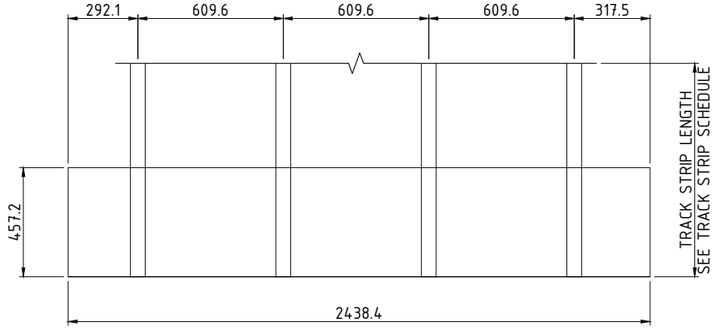
DRAWN BY	BH	25 JAN 21	PROJECT NUMBER 2019-00284 / DWG NO. 006 / REV. 1
DWG. CHK	MS	28 JAN 21	



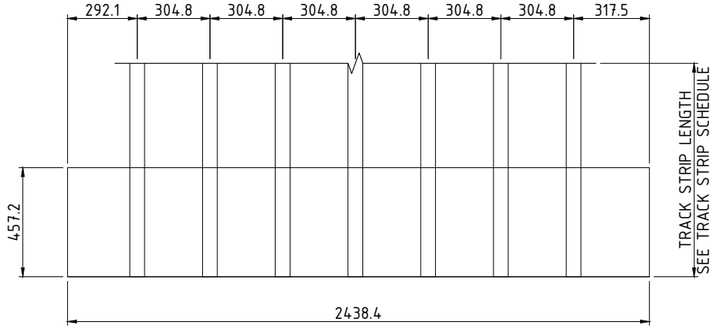
PLAN VIEW - 3 TRACK STRIPS



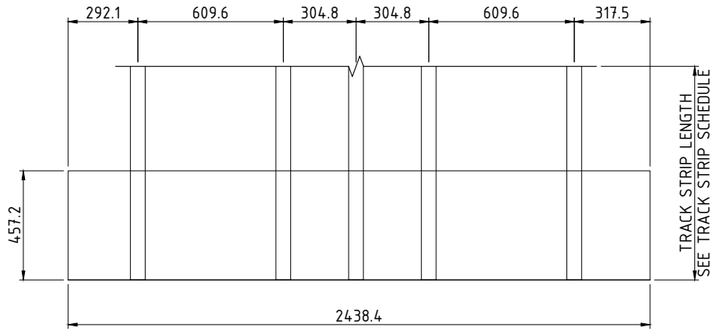
PLAN VIEW - 6 TRACK STRIPS



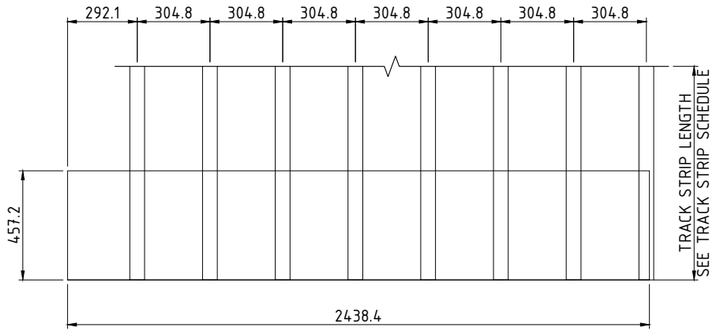
PLAN VIEW - 4 TRACK STRIPS



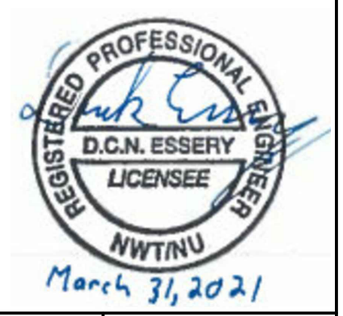
PLAN VIEW - 7 TRACK STRIPS



PLAN VIEW - 5 TRACK STRIPS



PLAN VIEW - 8 TRACK STRIPS



REV NO.	DATE	BY	DESCRIPTION
1	31 MAR 21	BH	ISSUED FOR CONSTRUCTION
0	29 JAN 21	BH	ISSUED FOR APPROVAL

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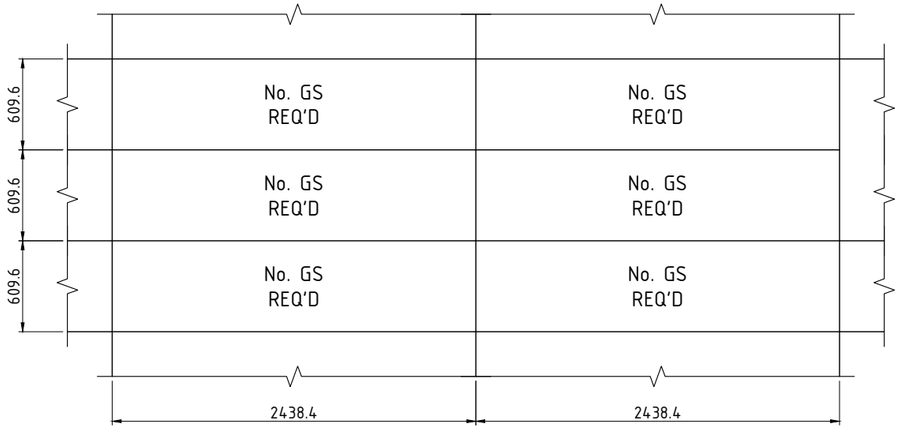
MSE Retaining Wall Systems

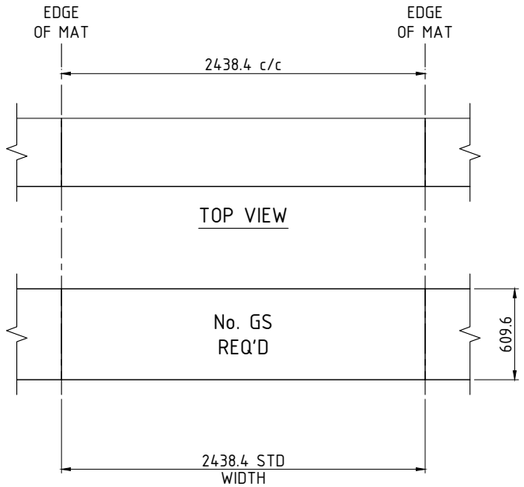
BAFFINLAND IRON MINES CORPORATION
RAIL STREAM CROSSINGS, NUNAVUT
MSE WALL TRACK STRIP LOCATION SETTING OUT

DESIGNED	DE	29 JAN 21
DES. CHK	DE	29 JAN 21
DRAWN BY	BH	25 JAN 21
DWG. CHK	MS	28 JAN 21

BRANCH P.O. -
CUSTOMER REF. -
PROJECT NUMBER 2019-00284
DWG NO. 007
REV. 1



TYPICAL FRONT FACE ELEVATION AS PER
CONSTRUCTION DRAWING



FRONT FACE ELEVATION
ACTUAL WIRE WALL MAT DIMENSIONS

TRACK STRIP WIRE WALL STANDARD DIMENSION DETAIL

SCALE: 1:40

REGISTERED PROFESSIONAL ENGINEER
D.C.N. ESSERY
LICENSEE
NWT/NU
March 31, 2021

REV NO.	DATE	BY	DESCRIPTION
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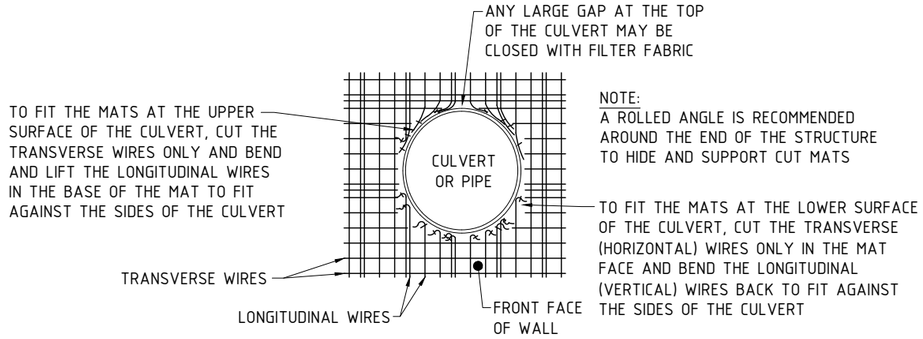
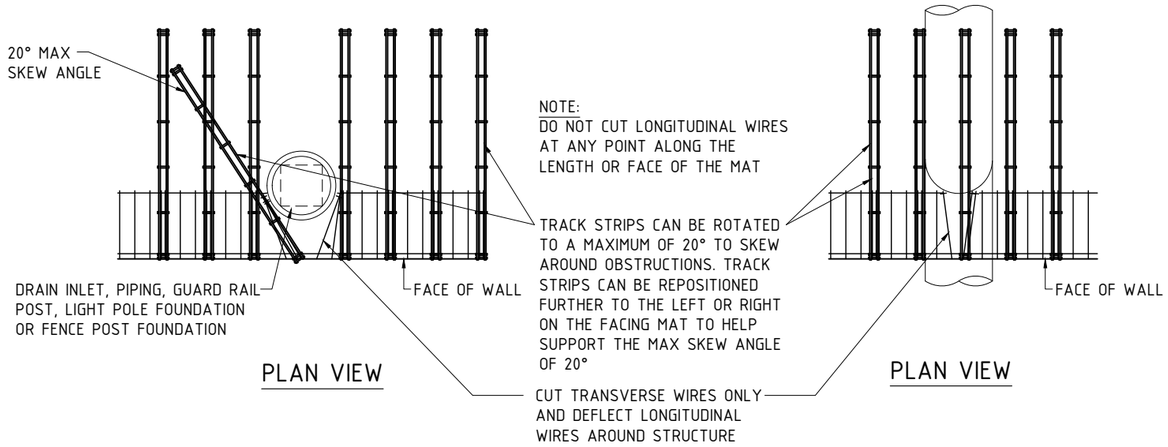
MSE Retaining Wall Systems

BAFFINLAND IRON MINES CORPORATION
RAIL STREAM CROSSINGS, NUNAVUT
MSE WALL WIRE MAT STANDARD DIMENSION DETAIL

DESIGNED	DE	29 JAN 21	BRANCH P.O. - / CUSTOMER REF. -
DES. CHK	DE	29 JAN 21	
DRAWN BY	BH	25 JAN 21	PROJECT NUMBER 2019-00284 / DWG NO. 008 / REV. 1
DWG. CHK	MS	28 JAN 21	

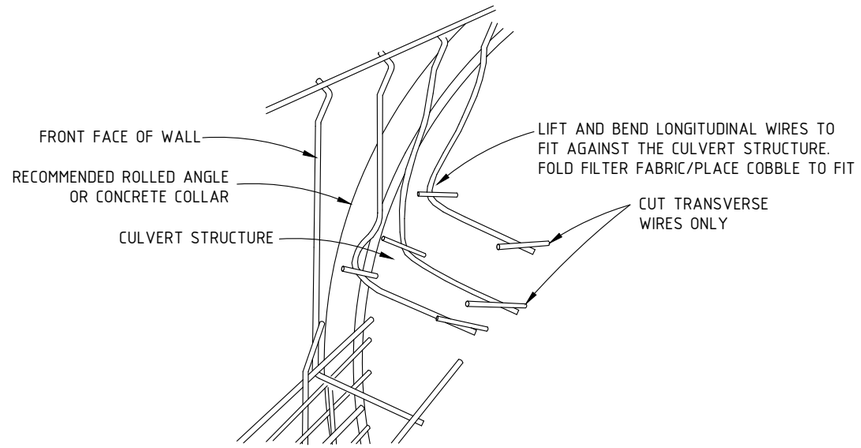


ELEVATION - FRONT FACE OF WALL

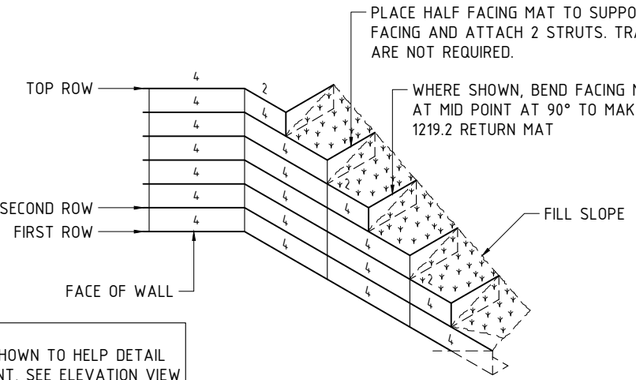


PLAN VIEW

PLAN VIEW

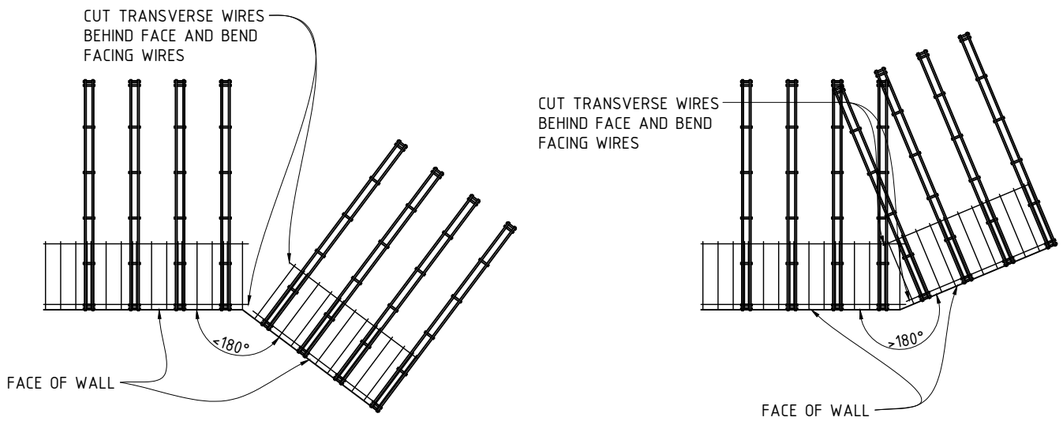


2 DETAIL - WIRE WALL INSTALLATION AROUND ROLLED ANGLE
- N.T.S.



NOTE:
FACING ZONING ONLY SHOWN TO HELP DETAIL TRACK STRIP PLACEMENT, SEE ELEVATION VIEW FOR ACTUAL WALL DESIGN ZONING.

TOP OF WALL DETAILS



DETAIL - WIRE BEND

REGISTERED PROFESSIONAL ENGINEER
D.C.N. ESSERY
LICENSEE
NWTNU
March 31, 2021

REV NO.	DATE	BY	DESCRIPTION
2	31 MAR 21	BH	ISSUED FOR CONSTRUCTION
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RAIL STREAM CROSSINGS, NUNAVUT
MSE WALL MAT PENETRATION AND BEND DETAILS

DESIGNED	DE	29 JAN 21	BRANCH P.O. - / CUSTOMER REF. -
DES. CHK	DE	29 JAN 21	
DRAWN BY	BH	25 JAN 21	PROJECT NUMBER 2019-00284 / DWG NO. 009 / REV. 2
DWG. CHK	MS	28 JAN 21	