



THURBER ENGINEERING LTD.



**FOUNDATION INVESTIGATION AND DESIGN REPORT
NEW GARAGE BUILDING
MTO PATROL YARD – MARATHON SITE
TOWN OF MARATHON, ONTARIO
LAT. 48.764986, LONG. -86.355128
AGREEMENT NO. 6015-E-0023, ASSIGNMENT NO. 5
G.W.P. 6053-16-00**

GEOCRES No. 42D-48

Report to

Ministry of Transportation of Ontario

Thurber Engineering Ltd.
2010 Winston Park Drive, Suite 103
Oakville, Ontario
L6H 5R7
Phone: (905) 829 8666
Fax: (905) 829 1166

Date: August 9, 2017
File: 18934

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PART 1: FACTUAL INFORMATION

1. INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the site of a proposed garage building located at an existing Ministry of Transportation Ontario (MTO) Patrol Yard in Northwestern Ontario. The patrol yard is located on Highway 17, approximately 2.1 km west of Peninsula Road, in the Town of Marathon, Ontario.

The purpose of the investigation was to explore the subsurface conditions at the site and, based on the data obtained, provide a borehole location plan, record of borehole sheets, a stratigraphic profile, laboratory test results and a written description of the subsurface conditions.

Thurber carried out the investigation as a consultant to the MTO under the Ministry of Transportation Ontario (MTO) Agreement Number 6015-E-0023.

2. SITE DESCRIPTION

The patrol yard is located on Highway 17, approximately 2.1 km west of Peninsula Road, in the District of Thunder Bay, Ontario.

The site includes two sand domes, a salt shed, a 4 door garage and office, and a gravel stockpile. There is an asphalt access road to the site which provides access to the garage and sand domes. The remainder of the site has a gravel surface. The site terrain is generally flat. The site is

bounded by Highway 17 to the south, a commercial property (motel) to the west, and forested land to the north and east. Photographs of the site are presented in Appendix C.

Quaternary mapping indicates that the site is located within an area generally characterized by glaciofluvial outwash deposits consisting of sand and gravel.

3. SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project was carried out between June 19 and 20, 2017, and consisted of drilling and sampling five boreholes (MAR-01 to MAR-05) within the footprint of the proposed garage building. All boreholes were terminated in overburden at a depth of 9.8 m (Elev. 289.7 to 288.0 m).

The approximate borehole locations are shown on the Borehole Locations and Soil Strata Drawing in Appendix E. The boreholes were drilled near the corners of the proposed building that were staked out by the MTO prior to commencement of the field investigation. The coordinates and elevations of the boreholes are given on these drawings and on the individual Record of Borehole Sheets in Appendix A.

Prior to commencement of drilling, utility clearances were obtained for all borehole locations.

Hollow stems augers used to advance the boreholes through the overburden. Samples were obtained at selected intervals using a 50 mm diameter split spoon sampler in conjunction with the Standard Penetration Test (SPT).

A member of Thurber's engineering staff supervised the drilling and sampling operations on a full time basis. The supervisor logged the boreholes, visually examined the recovered samples, and transported the samples to Thurber's laboratory in Oakville, Ontario, for further examination and laboratory testing.

Groundwater conditions in the open boreholes were observed throughout the drilling operations. A standpipe piezometer consisting of a 25 mm diameter PVC pipe with slotted screen was installed in MAR-01 to permit monitoring of the groundwater level. Details of the piezometer installation and other borehole completion details are on the Record of Borehole Sheets in Appendix A.

The boreholes in which no piezometers were installed were backfilled with bentonite and cuttings to the ground surface in general accordance with MOE Regulation 903. The piezometer in

Borehole MAR-01 was abandoned in accordance with Reg. 903 upon completion of the field program.

4. LABORATORY TESTING

All recovered soil samples were subjected to Visual Identification (VI) and moisture content determination. At least 25% of the recovered soil samples were also subjected to grain size distribution analysis (sieve and hydrometer). The results of the testing program are shown on the Record of Borehole Sheets in Appendix A and on the Figures contained in Appendix B.

5. SUBSURFACE CONDITIONS

Details of the encountered soil stratigraphy are presented on the Record of Borehole Sheets in Appendix A and the Borehole Locations and Soil Strata Drawing in Appendix E.

The stratigraphic boundaries shown on the borehole sheets and on the interpreted stratigraphic profile are inferred observations of drilling progress and from non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. The subsurface conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions at the site consist of a surficial sand fill layer overlying a deposit of native sand, which in turn overlies a deposit of native silt and sand.

A more detailed description of the subsurface conditions encountered in the boreholes is provided below.

5.1 Sand Fill

A 0.8 to 2.1 m thick layer of brown sand fill with some gravel and trace to some silt was encountered from the ground surface in all of the boreholes between Elev. 299.5 and 297.8 m. A 125 mm thick layer of asphalt was encountered at 0.1 m depth in Borehole MAR-02. The base of the layer was encountered between Elev. 298.6 and 296.1 m.

The measured SPT 'N' values within the sand fill ranged from 3 to 28 blows per 0.3 m penetration suggesting a very loose to compact relative density. Natural moisture contents measured on samples of the sand fill ranged from 4 to 20%.

The results of grain size analyses conducted on selected samples of the sand fill are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B1 of Appendix B. The results of the grain size analyses are also summarized in the table below.

Soil Particle	%
Gravel	12 to 20
Sand	72 to 78
Silt + Clay	7 to 13

5.2 Sand

A 4.9 to 7.8 m thick deposit of brown to grey sand was encountered underlying the sand fill in all of the boreholes. The deposit generally contained trace amounts of silt however a tested sample indicated the presence of silty zones. The upper boundary of the deposit was encountered between Elev. 298.6 and 296.1 m in the boreholes and the base of the deposit was encountered between Elev. 292.7 and 289.5 m.

The measured SPT 'N' values within the sand ranged from 3 to 32 blows per 0.3 m penetration indicating a very loose to dense relative density. In general, the 'N' values ranged from 7 to 15 (loose to compact relative density). The natural moisture content measured on samples of the sand ranged from 2 to 23%.

The results of grain size analyses conducted on selected samples silty clay are provided on the Record of Borehole sheets in Appendix B1, and illustrated in Figure B2 of Appendix B. The results of the grain size analyses are also summarized in the table below.

Soil Particle	%
Gravel	0
Sand	71 to 95
Silt + Clay	5 to 29

5.3 Sand and Silt

A deposit of grey sand and silt was encountered underlying the sand deposit in all the boreholes. The sand and silt deposit contained trace amounts of clay. The boreholes were terminated within the sand and silt deposit between Elev. 289.7 and 288.0 m. The upper boundary of the deposit was encountered between Elev. 292.7 and 289.5 m in the boreholes.

The measured SPT 'N' values within the deposit ranged from 0 to 52 blows per 0.3 m penetration. In general, the SPT 'N' values within the deposit ranged between 20 and 50 blows per 0.3 m penetration, indicating a compact to dense relative density. The natural moisture content measured on samples of the sand and silt ranged from 14 to 21%.

The results of grain size analyses conducted on samples of the sand and silt are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B3 of Appendix B. The results of the grain size analyses are also summarized in the table below.

Soil Particle	%
Gravel	0
Sand	37 to 64
Silt	32 to 58
Clay	4 to 6

5.4 Groundwater Levels

Water levels were observed in the boreholes during and upon completion of drilling. A standpipe piezometer was installed in Borehole MAR-01 to monitor the groundwater level at the site. The following table summarizes the water levels measured in the open boreholes and piezometer.

Table 5.1 – Water Level Measurements

Borehole	Date	Water Level (m)		Comment
		Depth	Elevation	
MAR-01	June 19, 2016 June 20, 2017	6.0 6.0	293.5	In piezometer
MAR-02	June 20, 2017	7.8	291.0	In open borehole
MAR-03	June 20, 2017	7.0	290.8	In open borehole
MAR-04	June 20, 2017	5.1	293.1	In open borehole
MAR-05	June 20, 2017	9.8	289.6	In open borehole

The above values are short-term readings and seasonal fluctuations of the groundwater level are to be expected. In particular, the groundwater level may be at a higher elevation after the spring snowmelt or after periods of heavy rainfall.

6. MISCELLANEOUS

The boreholes locations were surveyed by Superior Survey Inc. following completion of drilling.

RPM Drilling of Thunder Bay, Ontario, supplied and operated the drilling, sampling and in-situ testing equipment for the field investigation. The field investigation was supervised on a full time basis by Mr. Simon Paxton of Thurber. Overall supervision of the field program was provided by Mr. Geoff Lay, P.Eng., of Thurber.

Routine laboratory testing was carried out at Thurber's geotechnical laboratory in Oakville, Ontario. Interpretation of the field data and preparation of this report was carried out by Mr. Geoff Lay, P.Eng. The report was reviewed by Mr. Keli Shi, P.Eng., and Dr. P.K. Chatterji, P.Eng, a Designated Principal Contact for MTO Foundations Projects.

Thurber Engineering Ltd.



Geoff Lay, P.Eng.
Geotechnical Engineer



Keli Shi, P.Eng.
Geotechnical Engineer



P.K. Chatterji, P.Eng.
Review Principal, Designated MTO Contact

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PART 2: ENGINEERING DISCUSSION AND RECOMMENDATIONS

7. INTRODUCTION

This report presents interpretation of the geotechnical data in the factual report and provides foundation design recommendations to assist the design team to select and design a suitable foundation system for the proposed garage.

This foundation investigation and design report with the interpretation and recommendations are intended for the use of the Ministry of Transportation, and shall not be used or relied upon by any other parties including the construction or design-build contractor. The design-build contractor must make their own interpretation based on the factual data in Part 1 of the report. Where comments are made on construction, they are provided only in order to highlight those aspects which could affect the design of the project. Contractors must make their own interpretations of the factual information provided as it may affect equipment selection, proposed construction methods and scheduling.

The discussion and recommendations presented in this report are based on our understanding of the project and the factual data obtained during the subsurface investigation.

8. GENERAL

Typical floor plan drawings provided by the Ministry indicate that the proposed new garage and office building will include 6 garage doors and vehicle bays, an office, a training and lunch room, a washroom/laundry room, a utility room, and a mezzanine (storage). The drawings also indicate

that the proposed structure will utilize a concrete floor slab and a wooden frame structure. The proposed garage is reported to be approximately 14.5 x 41.2 m in dimension. Drawings for the proposed structure provided to Thurber by MTO are attached in Appendix F.

9. BUILDING SUBGRADE PREPARATION

The typical garage building drawings indicate that the floor of the interior of the facility will consist of a 150 mm thick concrete slab overlying 300 mm of compacted engineered granular fill.

Any topsoil, buried topsoil, buried asphalt layer, organics, soft or deleterious material should be stripped from the site surface and the floor slab subgrade. The exposed subgrade should be proofrolled to detect any potential soft areas. Where soft areas are detected, these areas should be subexcavated and replaced with well-compacted Granular "A" satisfying the requirements of OPSS.PROV 1010 (*Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material*). The final subgrade surface should be uniformly compacted to 100% of Standard Proctor Maximum Dry Density (SPMDD).

10. FOUNDATION RECOMMENDATIONS

10.1 Strip Footings Founded below Frost Depth in Native Sand

Strip footings founded in native sand below the frost depth are considered a suitable foundation type to support the proposed building.

The highest permitted founding elevations for footings founded in native sand are given in Table 10.1. Frost depth at the site is 2.1 m.

Table 10.1 – Highest Permitted Founding Elevations

Location	Borehole	Min. Depth (m)	Highest Elevation (m)
NE Building Corner	MAR-01	2.1	297.4
Center of Building	MAR-02	2.1	296.7
SE Building Corner	MAR-03	2.1	295.7
SW Building Corner	MAR-04	2.1	296.1
NW Building Corner	MAR-05	2.1	297.3

Spread footings founded in the loose to compact sand below the above noted elevations should be designed using the following resistance values, assuming a minimum 1 m wide footing subjected to vertical concentric loading:

Factored Geotechnical Resistance at ULS = 200 kPa

Factored Geotechnical Resistance at SLS = 125 kPa

The geotechnical resistance at SLS is based on an estimated settlement not exceeding 25 mm. This settlement should be essentially complete by the end of construction.

The resistance values are for vertical, concentric loads. Where eccentric or inclined loads are applied, the resistance values used in design must be reduced in accordance with the CHBDC Clause 6.7.3 and Clause 6.7.4.

The lateral resistance developed along the base of concrete footings founded on the sand may be computed using an ultimate friction coefficient of 0.4.

The footing subgrade should be inspected by a geotechnical engineer following excavation, in accordance with OPSS 902 (*Construction Specification for Excavating and Backfilling – Structures*) to confirm that the soil conditions at the founding level are consistent with the design assumptions and that the base has been adequately cleaned of disturbed soil. The footing bases should be kept free of water and a 50 mm skim slab should be placed over the founding surface if structural concrete cannot be placed within 24 hours of excavation. Subgrade preparation should be carried out in the dry.

Where subexcavation is required to remove unsuitable material from below the design founding level, the founding surface should be re-established using engineered fill or concrete of the same class as the footing. The subexcavation should be stepped down gradually at slope not steeper than 1H:1V and no individual step should be greater than 200 mm. The engineered fill must consist of OPSS Granular “A” placed in 150 mm lifts and compacted to 100% of SPMDD.

10.2 Caissons or Timber Posts founded in Native Sand

The typical design drawing indicates that the new building may be supported on timber post anchorages (Refer to Sheet A7 in Appendix F).

For timber post alternative in the typical design drawing, each post appears to consist of 4 pieces of 50 mm thick and 200 mm wide lumber member nailed together from both sides. In the typical design drawing, the posts are spaced at a centre-to-centre distance of approximately 1.2 m along the longer side (41.5 m) and at 1.8 m distance along the shorter side (14.6 m) of the building. Where the door or window is located, the post spacing is adjusted to accommodate the door or

window frame. It should be noted that this is a typical design prepared by CanTec for the garage at Ignace. The design for the Marathon garage may be different.

Augered Caissons founded in native sand are also considered a feasible foundation option for supporting the new building. Caisson installation in cohesionless soil will require temporary steel liner to protect caisson hole stability below groundwater table or when perched water is encountered. Installation of caissons should be in accordance with OPSS.PROV 903 (*Construction Specification for Deep Foundations*). The base of caisson hole must be clean of any debris prior to concrete pour.

10.2.1 Axial Resistances

The typical design drawing indicates that the timber posts are to be installed to 0.3 m above the base of the hole. The tip of the timber post is to be embedded 0.3 m in the concrete placed to 0.6 m above the base of the hole. The annular space between the hole and the post is to be backfilled with well-graded granular material compacted to 95% of SPMDD.

Recommended axial resistances for timber posts and caissons founded in native sand are provided in Table 10.2 below for various diameters and lengths below the finished grade.

Table 10.2 – Axial Resistances Recommended for Timber Posts and Caissons

Foundation Depth	Foundation Elevation*	Founding Stratum	200 mm x 200 mm Timber Post in a 350 mm Hole		Concrete Caissons			
					350 mm Diameter		450 mm Diameter	
			ULS _f (kN)	SLS (kN)	ULS _f (kN)	SLS (kN)	ULS _f (kN)	SLS (kN)
2.2 m	297.3 to 295.6	Loose Sand	45	35	50	40	80	65
4.0 m	295.5 to 293.8	Loose to Compact Sand	90	75	95	80	150	125
6.0 m	293.5 to 291.8	Compact to Dense Sand	190	150	200	165	320	265

*based on existing ground surface elevations surveyed at borehole locations

The axial resistances for the timber post must not exceed the factored structural capacity of the timber material.

10.2.2 Lateral Resistances

The geotechnical lateral resistance acting on a caisson in cohesionless soils may be calculated using the coefficient of horizontal subgrade reaction (k_s) and ultimate lateral resistance (p_{ult}) as follows:

$$\begin{aligned}
 k_s &= n_h z / D \\
 p_{ult} &= 3 \gamma' z K_p \quad (\text{kPa}) \\
 \text{Where } z &= \text{depth of embedment of pile (m)} \\
 D &= \text{post width or caisson diameter} \\
 n_h &= \text{coefficient related to soil relative density (kN/m}^3\text{)} \\
 \gamma' &= \text{effective unit weight (kN/m}^3\text{)} \\
 K_p &= \text{passive earth pressure coefficient}
 \end{aligned}$$

The above equations and recommended parameters in Table 10.3 below may be used to analyse the interaction between a pile and the surrounding soil. The lateral pressures obtained from the analysis must not exceed the ultimate lateral resistance.

Table 10.3 – Soil Parameters for Lateral Resistance

Soil Unit	Elevation (m)		γ' (kN/m ³)	n_h (kN/m ³)	K _p	S _u (kPa)
	Top	Bottom				
NE Building Corner (MAR-01)						
Sand Fill	299.5	298.2	18	4,000	3.1	-
Sand – Loose	298.2	297.0	17	1,500	2.8	-
Sand - Compact	297.0	293.5	18	3,000	3.0	-
Centre of Building (MAR-02)						
Sand Fill	298.8	297.6	18	4,000	3.1	-
Sand – Loose	297.6	296.4	17	1,500	2.8	-
Sand - Compact	296.4	292.8	18	3,000	3.0	-
SE Building Corner (MAR-03)						
Sand Fill	297.8	296.5	17	1,500	2.8	-
Sand – Loose to Compact	296.5	291.8	18	2,000	2.9	-
SW Corner of Building (MAR-04)						
Sand Fill	298.2	296.1	18	2,500	2.9	-
Sand – Loose	296.1	292.2	18	2,000	2.9	-
NW Corner of Building (MAR-05)						
Sand Fill	299.4	298.6	18	3,000	3.0	-
Sand – Loose	298.6	297.0	17	1,500	2.8	-
Sand – Compact	297.0	293.4	18	4,000	3.1	-

The spring constant, K_s , for analysis may be obtained by the expression, $K_s = k_s L D$ (kN/m), where k_s is the coefficient of horizontal subgrade reaction (kN/m³), D is the pile width (m) and L is the length (m) of the pile segment or element used in the analysis. The ultimate lateral resistance,

P_{ult} , may be obtained from the expression, $P_{ult} = p_{ult} L D$. This represents the ultimate load at which the soil fails and will not support any additional load at greater pile displacement.

The modulus of subgrade reaction and ultimate lateral resistance may have to be reduced, based on the pile spacing. The reduction factors to be used for a pile group oriented perpendicular or parallel to the direction of loading are provided in Table 10.4. Intermediate values may be obtained by linear interpolation.

Table 10.4 – Subgrade Reaction Reduction Factors for Pile Spacing

Condition	Pile Spacing (Centre to Centre)	Reduction Factor
Pile group oriented perpendicular to direction of loading	4D	1.0
	1D	0.5
Pile group oriented parallel to direction of loading	8D	1.0
	6D	0.7
	4D	0.4
	3D	0.25

11. BACKFILL

Excavation for footing construction should be backfilled with free-draining granular materials such as per OPSS.PROV 1010 Granular A or Granular B Type II. Care should be taken to maintain backfill on both sides of the wall at approximately same level to minimize unbalanced lateral forces. Care should be taken to not “over-compact” adjacent to the walls in order to not impose excessive lateral stresses. Compaction equipment to be used adjacent to the foundation walls should be restricted in accordance with OPSS.PROV 501 (*Construction Specification for Compacting*).

12. LATERAL EARTH PRESSURE

The lateral earth pressures acting on the foundation wall from the backfill may be assumed to be triangularly distributed. For a fully drained condition, the lateral pressure should be computed in accordance with the CHBDC 2014 but generally are given by the following equation:

$$p_h = K (\gamma h + q)$$

Where:

- p_h = horizontal pressure on the wall at depth h (kPa)
- K = coefficient of lateral earth pressure (see table below)
- γ = unit weight of retained soil (see table below)
- h = depth below top of stockpile where pressure is computed (m)
- q = value of any surcharge (kPa)

Recommended values of earth pressure coefficients for backfill are shown in the table below.

Loading Condition	OPSS Granular A or Granular B Type II $\phi = 35^\circ$; $\gamma = 22.8 \text{ kN/m}^3$		OPSS Granular B Type I (modified) $\phi = 32^\circ$; $\gamma = 21.2 \text{ kN/m}^3$	
	Horizontal Backfill	Sloping Backfill (2H:1V)	Horizontal Backfill	Sloping Backfill (2H:1V)
Active (Unrestrained Wall)	0.27	0.40	0.31	0.48
At-rest (Restrained Wall)	0.43	0.62	0.47	0.70
Passive	3.7	-	3.3	-

For non-yielding structures, at-rest horizontal earth pressures should be used for design. Active pressures should be used for any unrestrained wall.

13. EXCAVATION

All excavations must be carried out in accordance with the requirements of the Occupational Health and Safety Act (OHSA). For the purposes of the OHSA, the sand fill above the water level and native sand may be classed as Type 3 soil and should be classed as Type 4 soil below the water table. Temporary shallow excavation may be formed unsupported with side slopes no steeper than 1H:1V. Flatter slopes may be required at locations where soils are less competent or where water seepage affects surficial stability.

The excavation and backfilling for foundation construction must be carried out in accordance with OPSS 902.

The selection of the method of excavating soils is the responsibility of the contractor and must be based on his equipment, experience and interpretation of the site conditions. Excavations should be inspected regularly for evidence of instability if they have been left open for extended periods of time and following periods of heavy rain or thawing. If required, remedial actions must be taken to ensure the stability of the excavation and the safety of workers.

14. GROUNDWATER CONTROL

Based on groundwater measurements in open boreholes and piezometer, excavations for construction of footings or deep foundations founded in the loose to compact sand are not anticipated to extend below the groundwater table. Therefore, difficulties associated with groundwater control are not expected over the course of construction. Any groundwater seepage into the excavation which does occur may be removed using perimeter ditches and filtered sump pumping.

The design of an effective dewatering system is the responsibility of the contractor.

15. CONSTRUCTION CONCERNS

Care must be exercised during excavation to minimize disturbance of the founding subgrade. The exposed subgrade soils should be inspected, approved and protected from disturbance as soon as practicable.

Field inspection during construction is recommended to confirm the subgrade conditions. Accordingly, items such as building and pavement subgrade condition, backfilling methods, compaction of granular material should be inspected and tested by geotechnical personnel.

Groundwater seepage into the open excavations is not anticipated over the course of construction; however, should groundwater seepage occur, it is anticipated that perimeter ditches and filtered sump pumping will be adequate for the control of groundwater prior to concrete placement.

16. CLOSURE

Engineering analysis and preparation of the foundation design report was carried out by Mr. Geoff Lay, P.Eng. The report was reviewed by Mr. Keli Shi, P.Eng., and Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

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Geoff Lay, P.Eng.
Geotechnical Engineer



Keli Shi, P.Eng.
Geotechnical Engineer



P.K. Chatterji, P.Eng.
Review Principal, Designated MTO Contact



Appendix A

Record of Borehole Sheets

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
Cobbles	75 to 200mm	same
Gravel	4.75 to 75mm	5 to 75mm
Sand	0.075 to 4.75mm	Not visible particles to 5mm
Silt	0.002 to 0.075mm	Non-plastic particles, not visible to the naked eye
Clay	Less than 0.002mm	Plastic particles, not visible to the naked eye

2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY	PROPORTION
Trace or Occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT ⁽¹⁾ 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

- 1) Laboratory Triaxial Testing
- 2) Field Insitu Vane Testing
- 3) Laboratory Vane Testing
- 4) SPT value
- 5) Pocket Penetrometer



4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT "N" VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES


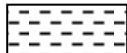



SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE	SS Split Spoon Sample	WS Wash Sample	AS Auger (Grab) Sample
	TW Thin Wall Shelby Tube Sample	TP Thin Wall Piston Sample	
	PH Sampler Advanced by Hydraulic Pressure	PM Sampler Advanced by Manual Pressure	
	WH Sampler Advanced by Self Static Weight	RC Rock Core	SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

 Water Level
 Shear Strength Determination by Pocket Penetrometer

- (1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.
- (2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

EXPLANATION OF ROCK LOGGING TERMS

<u>ROCK WEATHERING CLASSIFICATION</u>		<u>SYMBOLS</u>	
Fresh (FR)	No visible signs of weathering.		
Fresh Jointed (FJ)	Weathering limited to the surface of major discontinuities.		CLAYSTONE
Slightly Weathered (SW)	Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock material.		SILTSTONE
Moderately Weathered (MW)	Weathering extends throughout the rock mass, but the rock material is not friable.		SANDSTONE
Highly Weathered (HW)	Weathering extends throughout the rock mass and the rock is partly friable.		COAL
Completely Weathered (CW)	Rock is wholly decomposed and in a friable condition, but the rock texture and structure are preserved.		Bedrock (general)

<u>DISCONTINUITY SPACING</u>		<u>STRENGTH CLASSIFICATION</u>			
Bedding	Bedding Plane Spacing	Rock Strength	Approximate Uniaxial Compressive Strength		Field Estimation of Hardness*
			(MPa)	(psi)	
Very thickly bedded	Greater than 2m	Extremely Strong	Greater than 250	Greater than 36,000	Specimen can only be chipped with a geological hammer
Thickly bedded	0.6 to 2m				
Medium bedded	0.2 to 0.6m	Very Strong	100-250	15,000 to 36,000	Requires many blows of geological hammer to break
Thinly bedded	60mm to 0.2m	Strong	50-100	7,500 to 15,000	Requires more than one blow of geological hammer to break
Very thinly bedded	20 to 60mm				
Laminated	6 to 20mm	Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of geological hammer.
Thinly Laminated	Less than 6mm				

<u>TERMS</u>		Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty
Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.				
Solid Core Recovery: (SCR)	Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.	Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.
Rock Quality Designation: (RQD)	Total length of sound core recovered in pieces 0.1m in length or larger as a percentage of total core run length.	Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail
Uniaxial Compressive Strength (UCS)	Axial stress required to break the specimen				
Fracture Index: (FI)	Frequency of natural fractures per 0.3m of core run.				

UNIFIED SOILS CLASSIFICATION

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS W _L < 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (W _L < 30%).
		CI	Inorganic clays of medium plasticity, silty clays. (30% < W _L < 50%).
		OL	Organic silts and organic silty-clays of low plasticity.
	SILTS AND CLAYS W _L > 50%	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
CLAY SHALE			
SANDSTONE			
SILTSTONE			
CLAYSTONE			
COAL			

RECORD OF BOREHOLE No MAR-01

1 OF 2

METRIC

GWP# 6053-16-00 LOCATION NE Building Corner, NAD 83-14 N 5 402 781.5 E 352 036.3 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2017.06.19 - 2017.06.19 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa												
299.5	GROUND SURFACE							20	40	60	80	100								
0.0	SAND , some gravel, trace silt Compact Brown Moist (FILL)		1	SS	15		299													
			2	SS	10															
298.2																				
1.3	SAND , trace silt Very Loose to Loose Brown to Grey Moist to Wet		3	SS	4		298													
			4	SS	3															
			5	SS	9		297													
			6	SS	9		296													
	Compact		7	SS	10															
			8	SS	13		295													
							294													
			9	SS	28		293													
							292													
			10	SS	24		291													
290.4																				
9.1	SAND and SILT , trace clay Compact Grey Wet		11	SS	28		290													
289.7																				
9.8	END OF BOREHOLE AT 9.8m.																			

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No MAR-01

2 OF 2

METRIC

GWP# 6053-16-00 LOCATION NE Building Corner, NAD 83-14 N 5 402 781.5 E 352 036.3 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2017.06.19 - 2017.06.19 CHECKED BY GRL



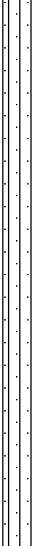
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen. WATER LEVEL READINGS DATE DEPTH(m) ELEV.(m) 2017.06.19 6.0 293.5 2017.06.20 6.0 293.5																

RECORD OF BOREHOLE No MAR-02

1 OF 2

METRIC

GWP# 6053-16-00 LOCATION Centre of Building, NAD 83-14 N 5 402 765.0 E 352 022.4 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									WATER CONTENT (%)			
298.8	GROUND SURFACE							20	40	60	80	100								
0.0	SAND , some gravel, trace silt, 125mm thick asphalt layer at 0.1m Compact Brown Moist (FILL)		1	SS	28		298													15 78 7 (SI+CL)
			2	SS	13															
297.6																				
1.2	SAND , trace silt Loose to Compact Brown Moist		3	SS	4		297													
			4	SS	7															
			5	SS	12		296													0 94 6 (SI+CL)
			6	SS	12															
			7	SS	12		295													
			8	SS	20		294													
								293												
292.7																				
6.1	SAND and SILT , trace clay Compact to Very Dense Brown to Grey Wet		9	SS	25		292													0 55 41 4
			10	SS	39		291													
							290													
			11	SS	52															
289.0																				
9.8	END OF BOREHOLE AT 9.8m.																			

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No MAR-02

2 OF 2

METRIC

GWP# 6053-16-00 LOCATION Centre of Building, NAD 83-14 N 5 402 765.0 E 352 022.4 ORIGINATED BY SMP
HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	WATER LEVEL AT 7.8m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No MAR-03

1 OF 2

METRIC

GWP# 6053-16-00 LOCATION SE Building Corner, NAD 83-14 N 5 402 743.0 E 352 019.6 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY AN
 DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
297.8	GROUND SURFACE							20 40 60 80 100	20 40 60					
0.0	SAND , some gravel, some silt Very Loose to Loose Brown Moist (FILL)		1	SS	5		297							15 72 13 (SI+CL)
			2	SS	3									
296.5														
1.3	SAND , trace silt Loose to Compact Brown to Grey Moist		3	SS	5		296							
			4	SS	10									
			5	SS	7		295							
			6	SS	12									
			7	SS	7		294							
			8	SS	5		293							
							292							
			9	SS	20		291							0 95 5 (SI+CL)
291.4	SAND and SILT , trace clay Very Loose to Compact Grey Wet													0 64 32 4
6.4			10	SS	0		290							
	soil blow back through augers resulting in probable sample disturbance and erroneous N value						289							
			11	SS	26									
288.0														
9.8	END OF BOREHOLE AT 9.8m.													

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No MAR-03

2 OF 2

METRIC

GWP# 6053-16-00 LOCATION SE Building Corner, NAD 83-14 N 5 402 743.0 E 352 019.6 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY AN
 DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL





SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	WATER LEVEL AT 7.0m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No MAR-04

1 OF 2

METRIC

GWP# 6053-16-00 LOCATION SW Building Corner, NAD 83-14 N 5 402 749.2 E 352 005.5 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)													
								20 40 60 80 100					w _P w w _L													
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE																		
298.2	GROUND SURFACE							20	40	60	80	100		20	40	60		GR	SA	SI	CL					
0.0	SAND , some gravel Loose Brown (FILL)		1	SS	9		298							○					12	76	12 (SI+CL)					
			2	SS	7		297								○											
			3	SS	5										○											
			4	SS	8		296								○											
296.1	SAND , trace silt Loose Brown to Grey Moist Wet		5	SS	4									○								0	94	6 (SI+CL)		
2.1			6	SS	7		295								○											
			7	SS	7		294								○											
			8	SS	10										○											
							293																			
							292									○										
							291									○										
						290																				
289.5	SAND and SILT , trace clay Very Dense Grey Wet						289																			
8.7			11	SS	45									○												
288.4	END OF BOREHOLE AT 9.8m.																									
9.8																										

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

METRIC

[illegible]

RECORD OF BOREHOLE No MAR-05

1 OF 2

METRIC

GWP# 6053-16-00 LOCATION NW Building Corner, NAD 83-14 N 5 402 786.9 E 352 024.1 ORIGINATED BY SMP
 HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2017.06.20 - 2017.06.20 CHECKED BY GRL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
299.4	GROUND SURFACE													
0.0	SAND , some gravel, trace silt Compact Brown Moist (FILL)		1	SS	12		299							
298.6														
0.8	SAND , silty to trace silt Loose to Compact Brown Moist		2	SS	5									
			3	SS	8		298							
			4	SS	6									
			5	SS	13		297							
			6	SS	15		296							
			7	SS	16									
			8	SS	15		295							
							294							
			9	SS	32		293							
							292							
291.5			10	SS	40									
7.9	SAND and SILT , trace clay Dense Grey Wet						291							
			11	SS	40		290							
289.6														
9.8	END OF BOREHOLE AT 9.8m.													

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

METRIC

[illegible]



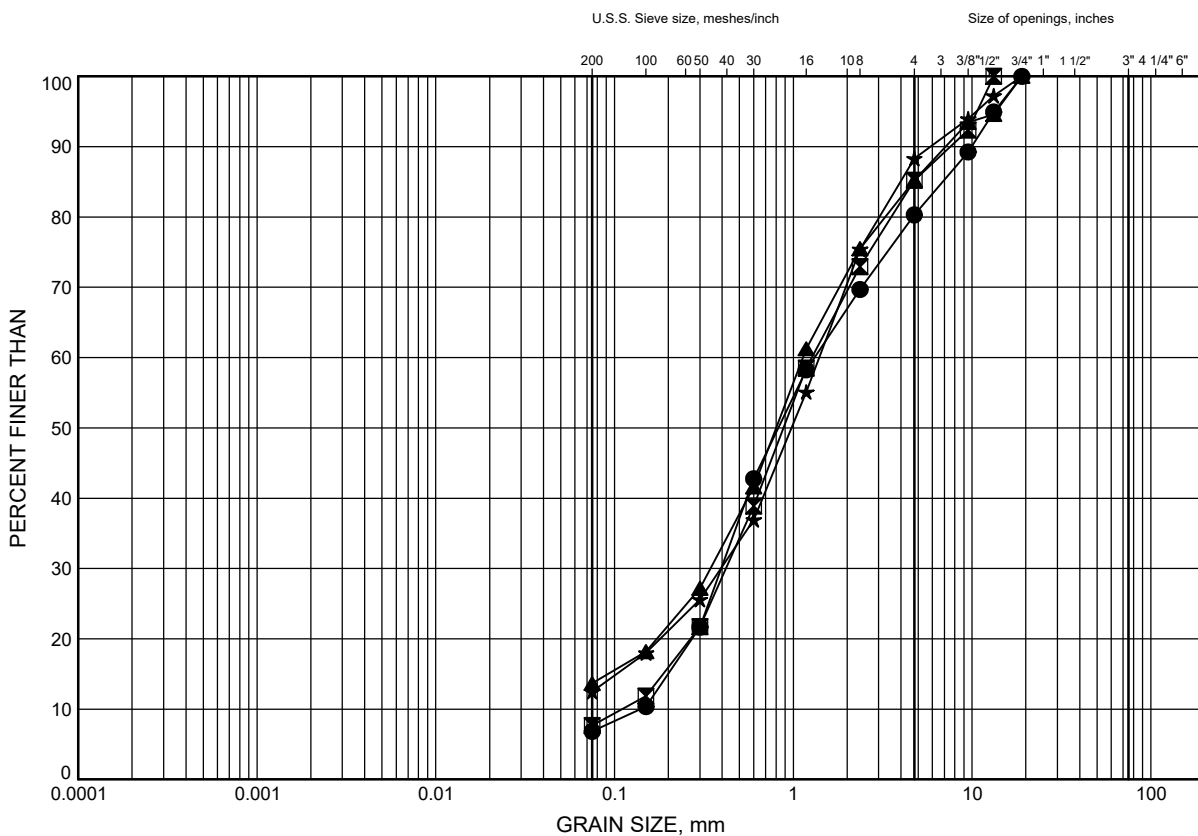
Appendix B

Laboratory Test Results

GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND FILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	MAR-01	0.9	298.6
⊠	MAR-02	0.1	298.7
▲	MAR-03	0.3	297.5
★	MAR-04	0.9	297.3

Date August 2017

GWP# 6053-16-00



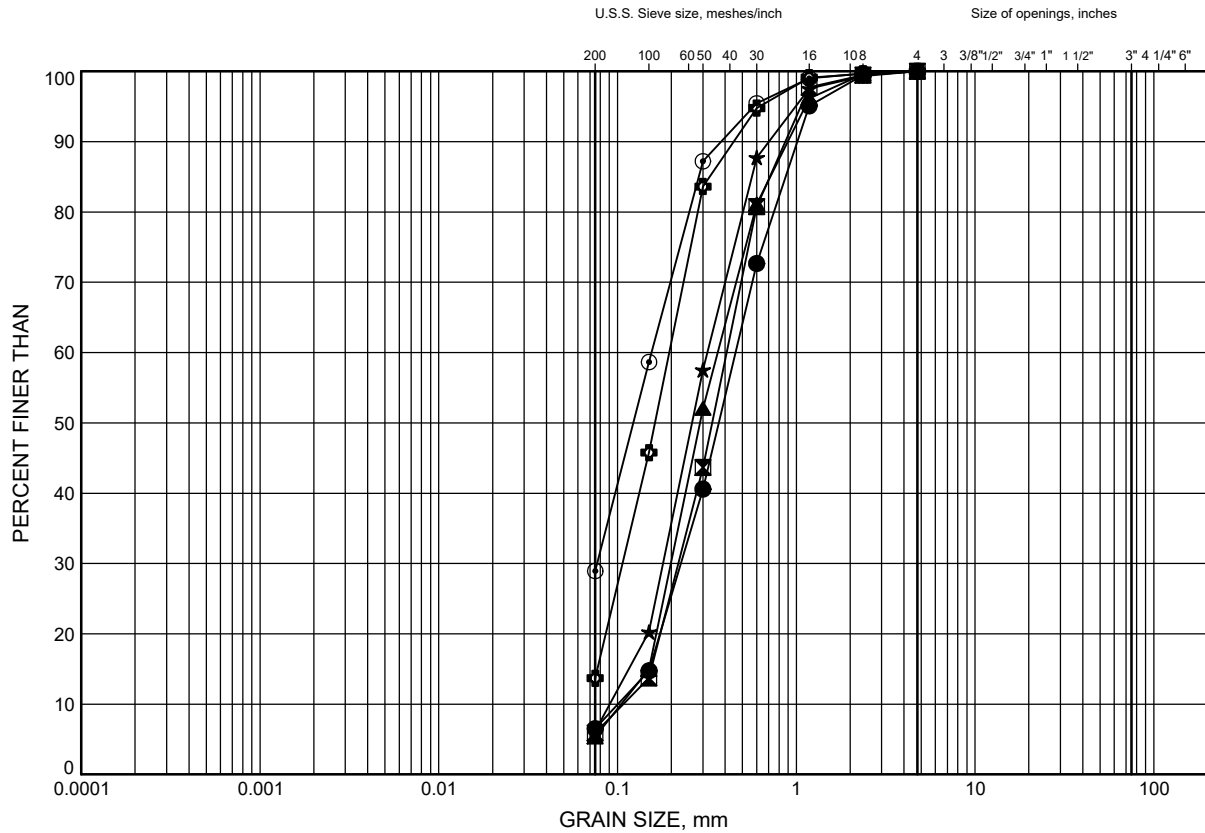
Prep'd AN

Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B2

SAND



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	MAR-01	2.1	297.4
⊠	MAR-02	2.7	296.1
▲	MAR-03	6.2	291.6
★	MAR-04	2.7	295.5
⊙	MAR-05	4.4	295.0
⊕	MAR-05	7.8	291.6

Date August 2017

GWP# 6053-16-00



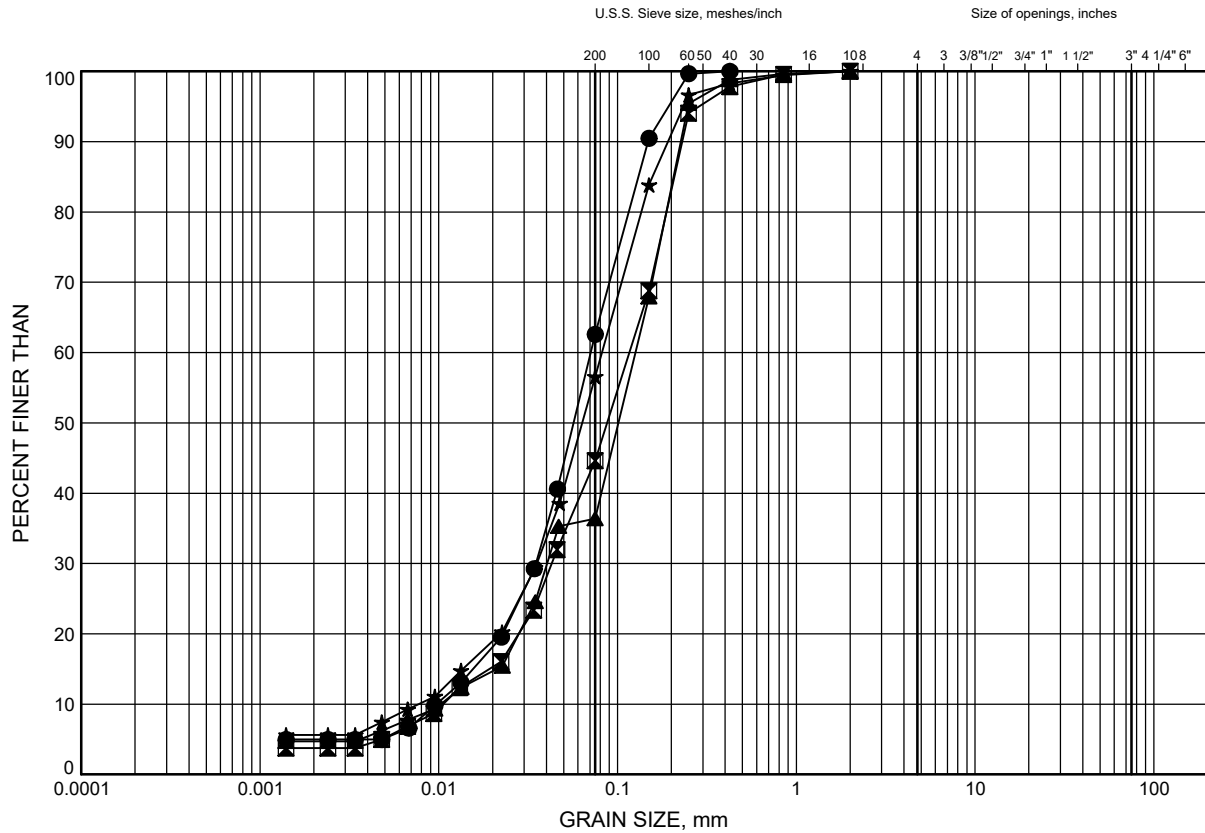
Prep'd AN

Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B3

SAND & SILT



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	MAR-01	9.4	290.1
⊠	MAR-02	6.4	292.4
▲	MAR-03	6.6	291.2
★	MAR-05	8.1	291.3

Date August 2017

GWP# 6053-16-00



Prep'd AN

Chkd. GRL



Appendix C

Site Photographs



Photograph 1 – Panorama of site from site entrance, looking north



Photograph 2 – Existing salt shed and sand dome, looking north



Photograph 3 – Proposed building location, looking east



Appendix D

List of Special Provisions and OPSS Documents

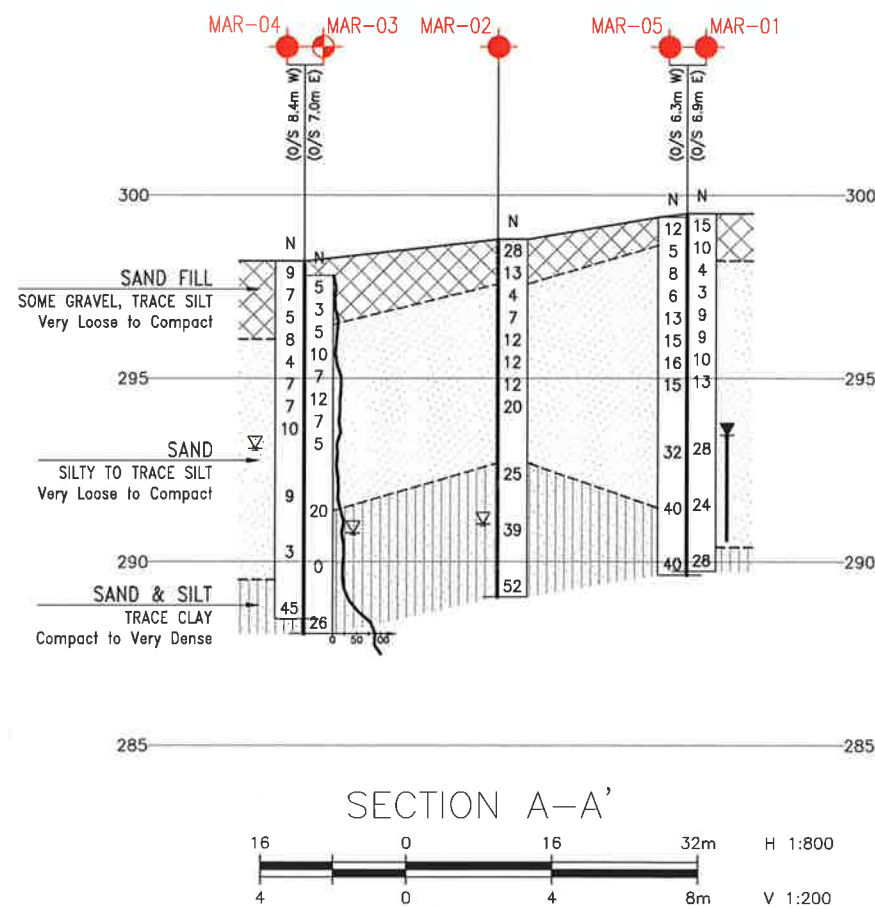
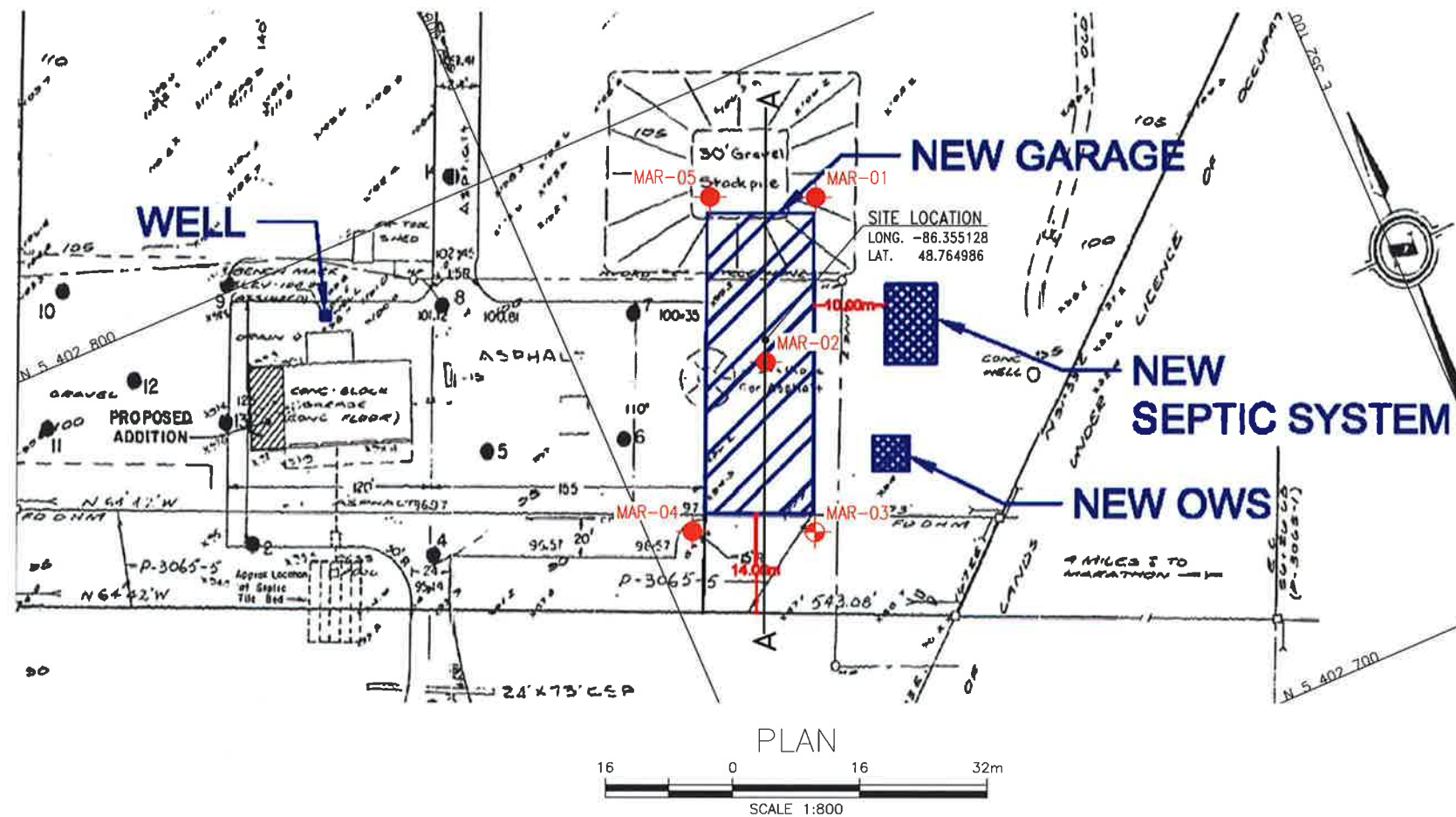
1. List of Special Provisions and OPSS Documents Referenced in this Report

- OPSS.PROV 501 – Construction Specification for Compacting
- OPSS.PROV 1010 – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material
- OPSS 902 – Construction Specification for Excavating and Backfilling – Structures
- OPSS.PROV 903 – Construction Specification for Deep Foundations



Appendix E

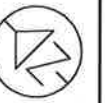
Borehole Locations and Soil Strata Drawing



METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 6053-16-00

NEW GARAGE BUILDING
MTO PATROL YARD-MARATHON
HIGHWAY 11/17
BOREHOLE LOCATIONS AND SOIL STRATA



SHEET



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

◆	Borehole
◆	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
↑	Head Artesian Water
↓	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
MAR-01	299.5	5 402 781.5	352 036.3
MAR-02	298.8	5 402 765.0	352 022.4
MAR-03	297.8	5 402 743.0	352 019.6
MAR-04	298.2	5 402 749.2	352 005.5
MAR-05	299.4	5 402 786.9	352 024.1

NOTES

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- Borehole locations are shown in MTM NAD-83 Zone 14 coordinates.

GEOCRES No. 42D-48

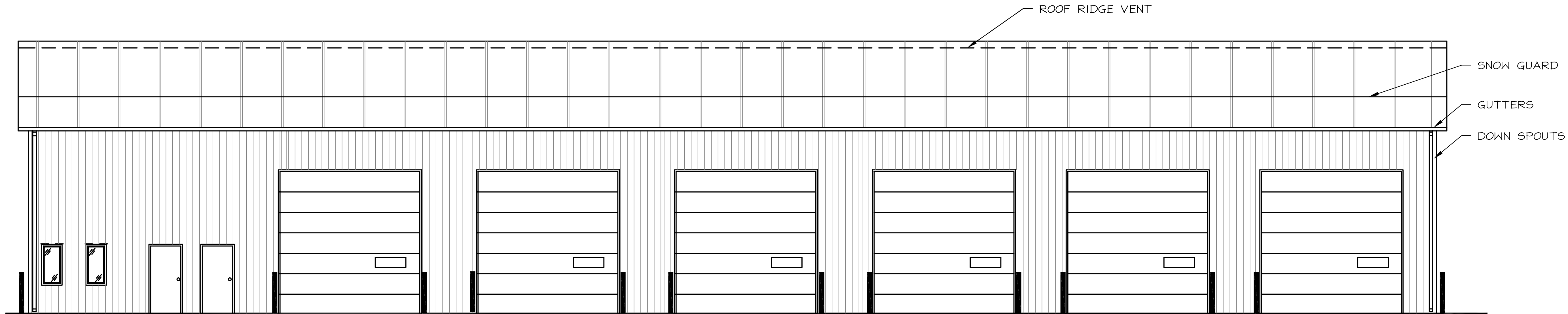


REVISIONS	DATE	BY	DESCRIPTION
DESIGN	GRL	CHK KS	CODE
DRAWN	AN	CHK GRL	SITE
			LOAD
			STRUCT
			DWG 1
			DATE AUG 2017

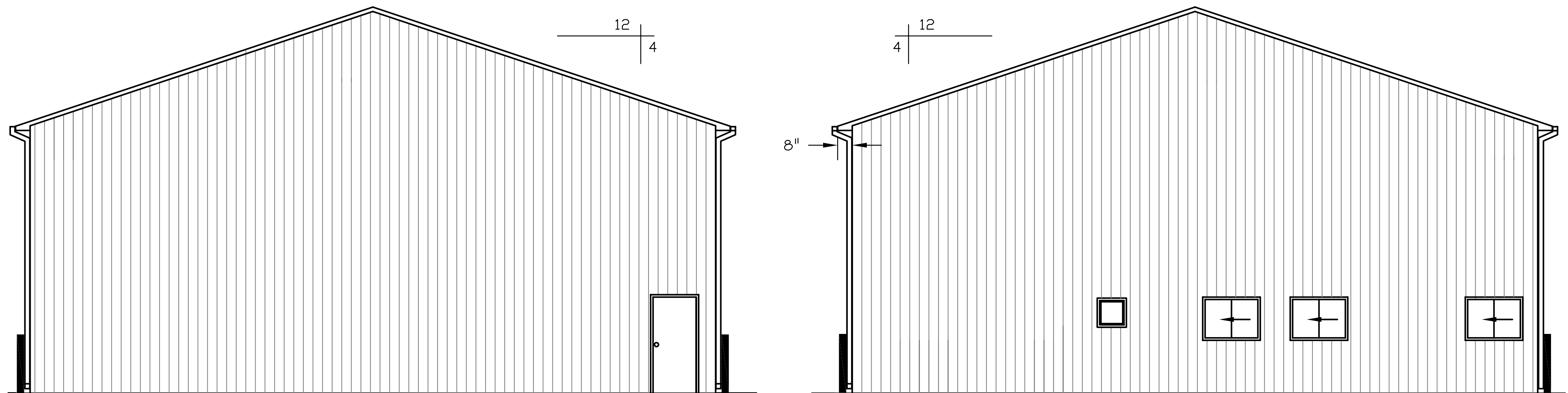


Appendix F

Building Drawings

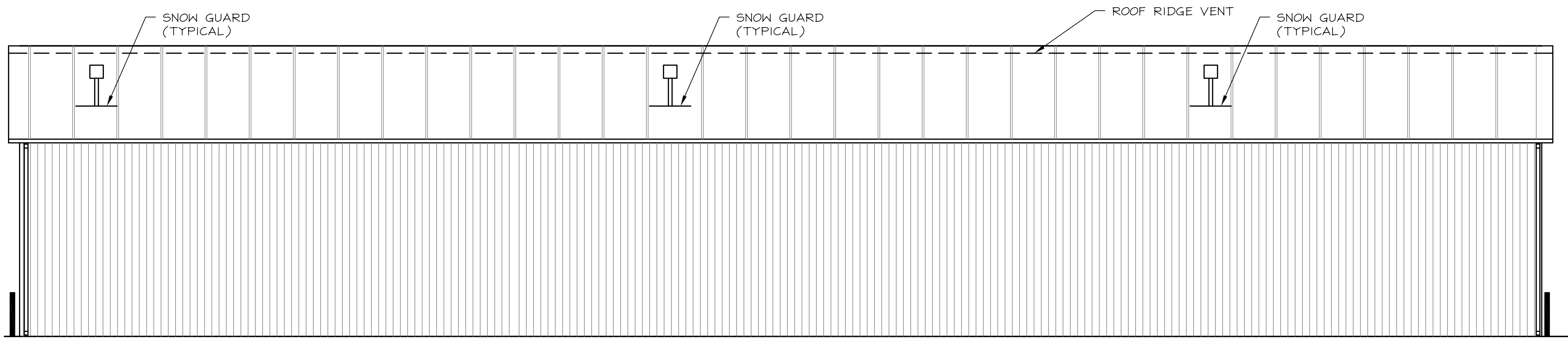


1 EAST ELEVATION
A3 3/16"=1'-0"

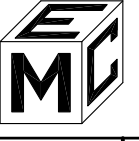


2 NORTH ELEVATION
A3 3/16"=1'-0"

3 SOUTH ELEVATION
A3 3/16"=1'-0"



4 WEST ELEVATION
A3 3/16"=1'-0"



MEC CONSULTING
UNIT 14 - 395 BERRY STREET
WINNIPEG, MANITOBA
R3J 1N6
Tel (204) 783-0757
Fax (204) 774-3778
E-MAIL: manengco@mts.net

DRN: WPM
CHK: WPM


APP: WPM
DATE: SEPT 26, 2007

MEC DWG No. 07238
REV

REV	DESCRIPTION	DATE	BY
0	ISSUED FOR REVIEW	Sept 26 07	RS

DRAFTING SERVICES:

ENGINEERING AND DRAFTING
1948 MAIN STREET
WINNIPEG, MANITOBA
Phone: (204) 943-7222 Fax: (204) 947-5717

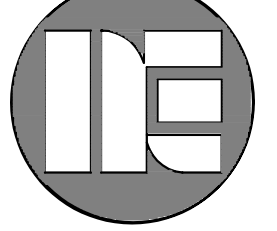
SEAL:


SEAL:

NOTE:
BEFORE STARTING, PROJECT CONTRACTOR IS TO VERIFY DIMENSIONS AND DATA NOTED HEREIN WITH CONDITIONS ON SITE AND IS HELD RESPONSIBLE TO REPORT ANY DISCREPANCIES TO THE DRAFTSPERSON FOR ADJUSTMENT. THE DRAWING AND SPEC, AS INSTRUMENTS OF SERVICE, ARE THE PROPERTY OF newton enterprises (1983). THE COPYRIGHT IN THE SAME BEING RESERVED TO THEM. NO REPRODUCTION MAY BE MADE WITHOUT THE WRITTEN PERMISSION OF newton enterprises (1983) AND WHEN MADE MUST BEAR THE SIGNATURE OF AN AUTHORIZED REPRESENTATIVE OF SAME.

DRAWING:
ELEVATIONS

PROJECT:
MINISTRY OF TRANSPORT
ONTARIO
GARAGE AND OFFICE
IGNACE



newton enterprises (1983)
NEWTON, MANITOBA
PHONE: 267-2211


DRN BY: RS
CHK: WPM

CHECKED BY: WPM
DATE: Sept 26, 2007

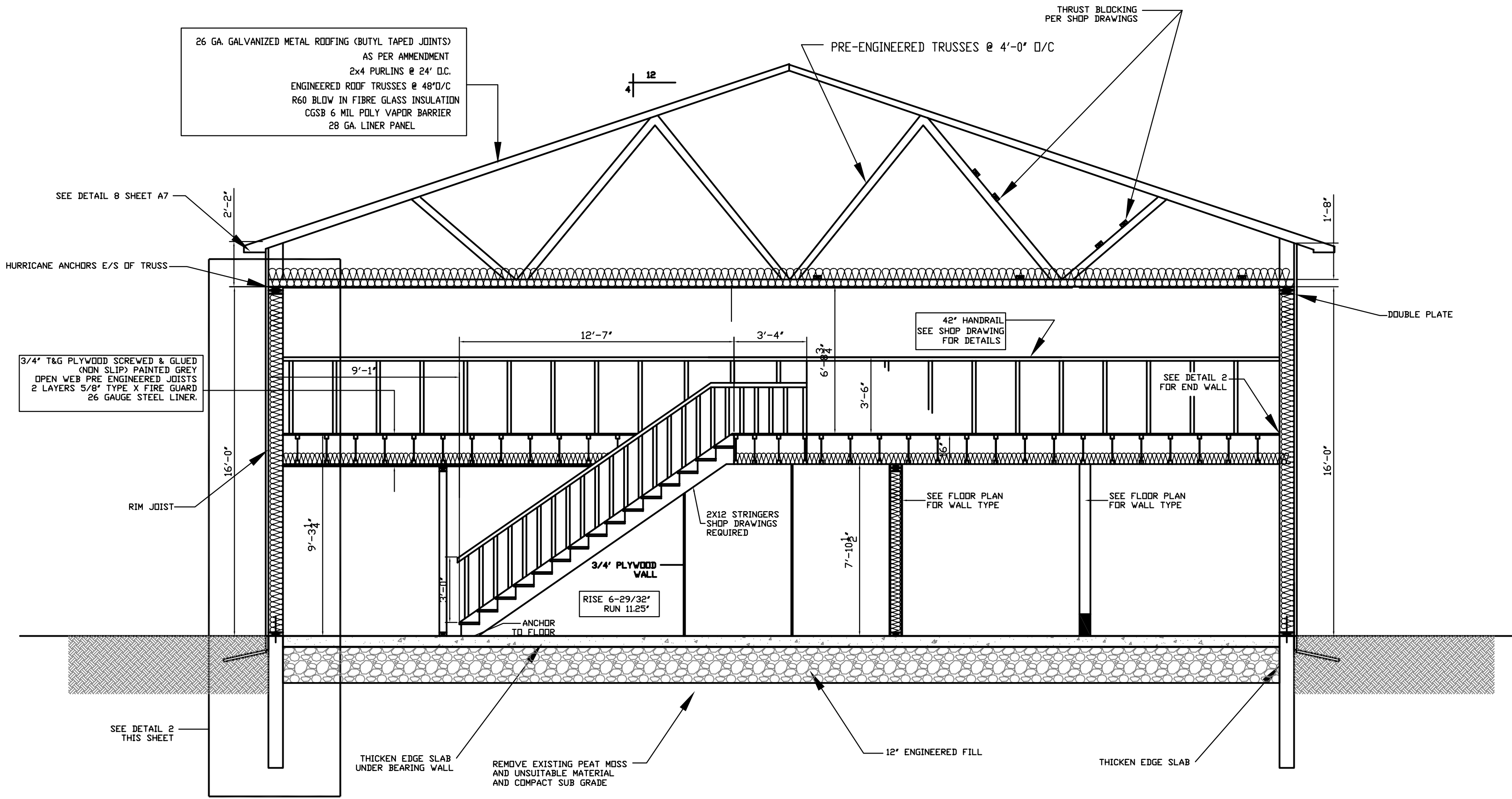
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SCALE: As Noted

REV NO: R0
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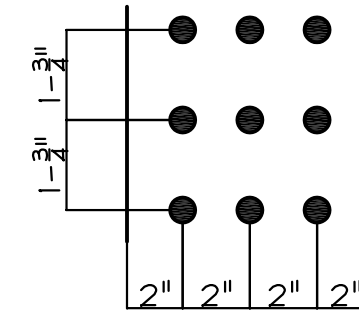
		MEC CONSULTING UNIT 14 - 395 BERRY STREET WINNIPEG, MANITOBA R3J 1N6		Tel (204) 783-0757 Fax (204) 774-3778 E-MAIL manengco@mts.net	
DRN 00000	APP	WPW	MEC DWG No.		REV
CHK WPW	DATE	Sept 26. 2007	<div style="font-size: 2em; font-weight: bold;">07238</div>		

DRAWN BY: RS	CHECKED BY: MFM	SHEET NO.	REV NO.
DATE: Sept 24 2004		A4	RO
SCALE: As Noted			
FILE:			

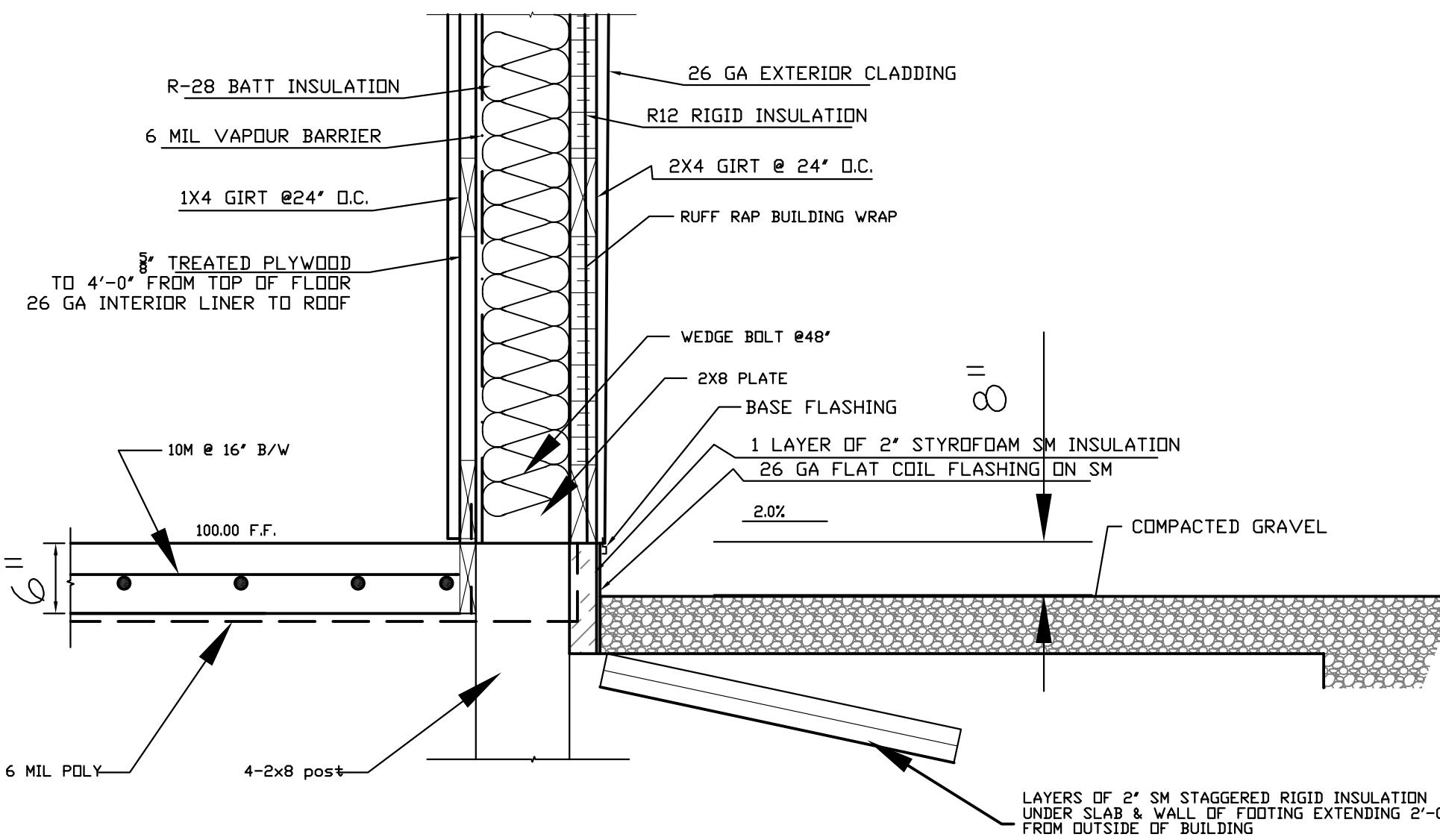
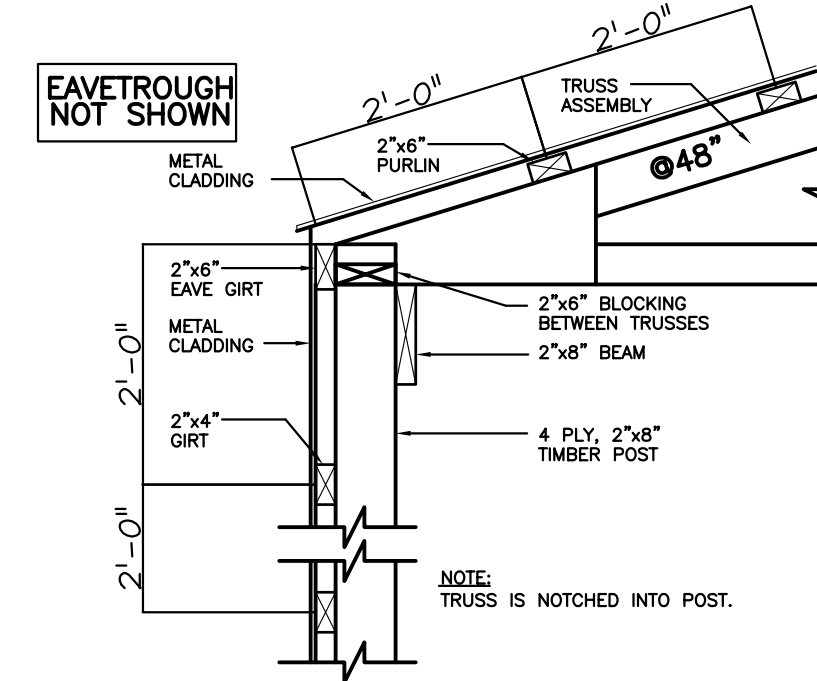


1 CROSS SECTION AT MEZZANINE
A7 1/4\"/>

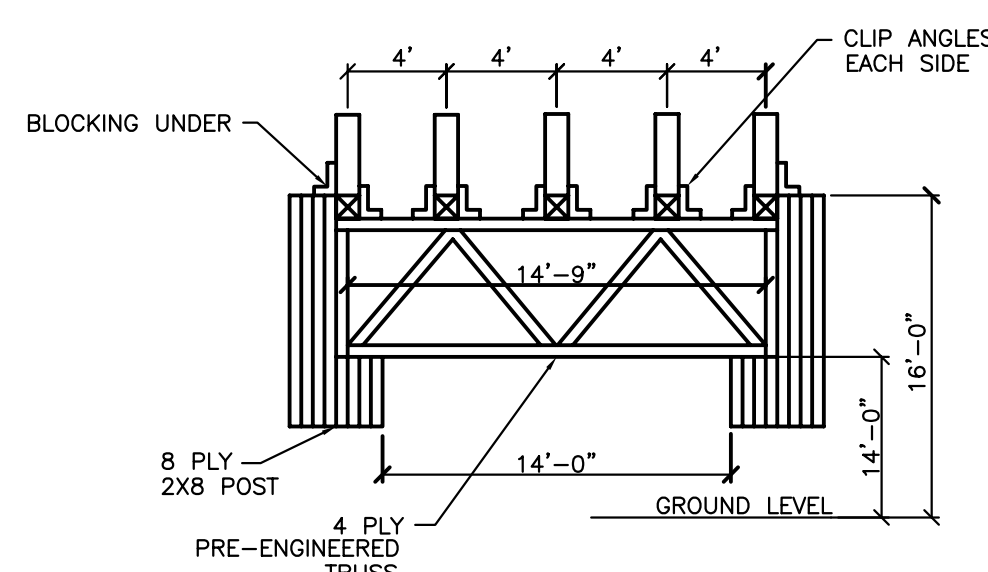
NAILING PATTERN FOR TRUSS TO POST CONNECTION.
NAILS ARE 4\"/>



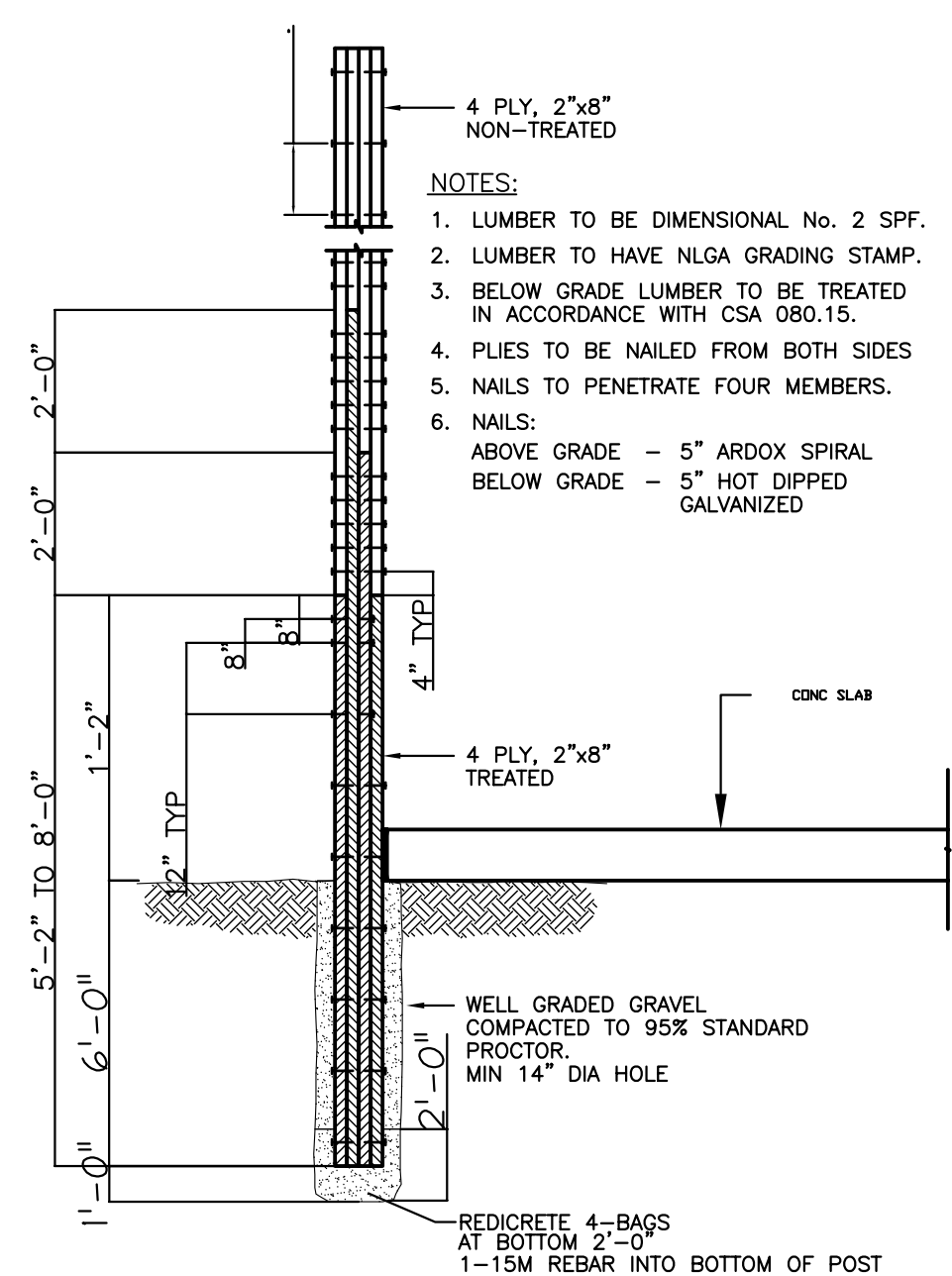
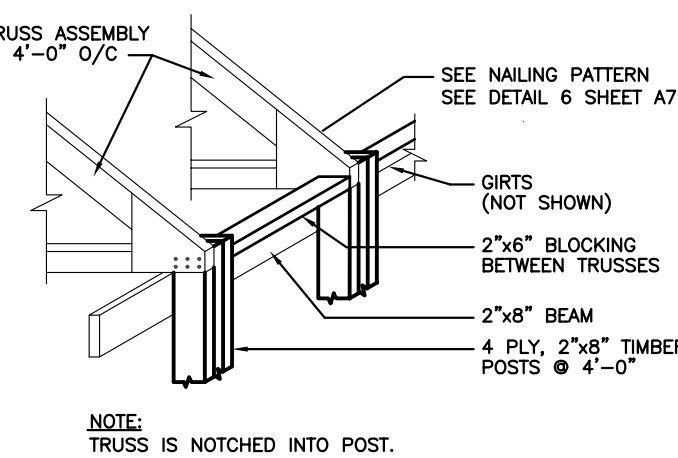
6 TRUSS TO SIDEWALL TIMBER DETAIL
A7 NTS



7 DETAIL
A7 NTS

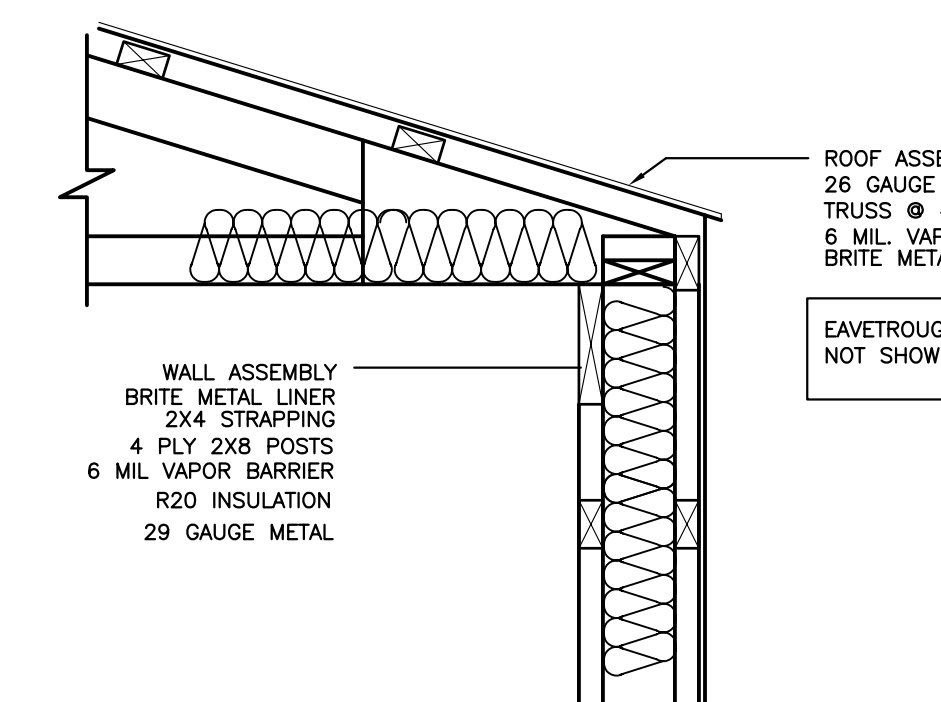


5 TRUSS BLOCKING DETAIL
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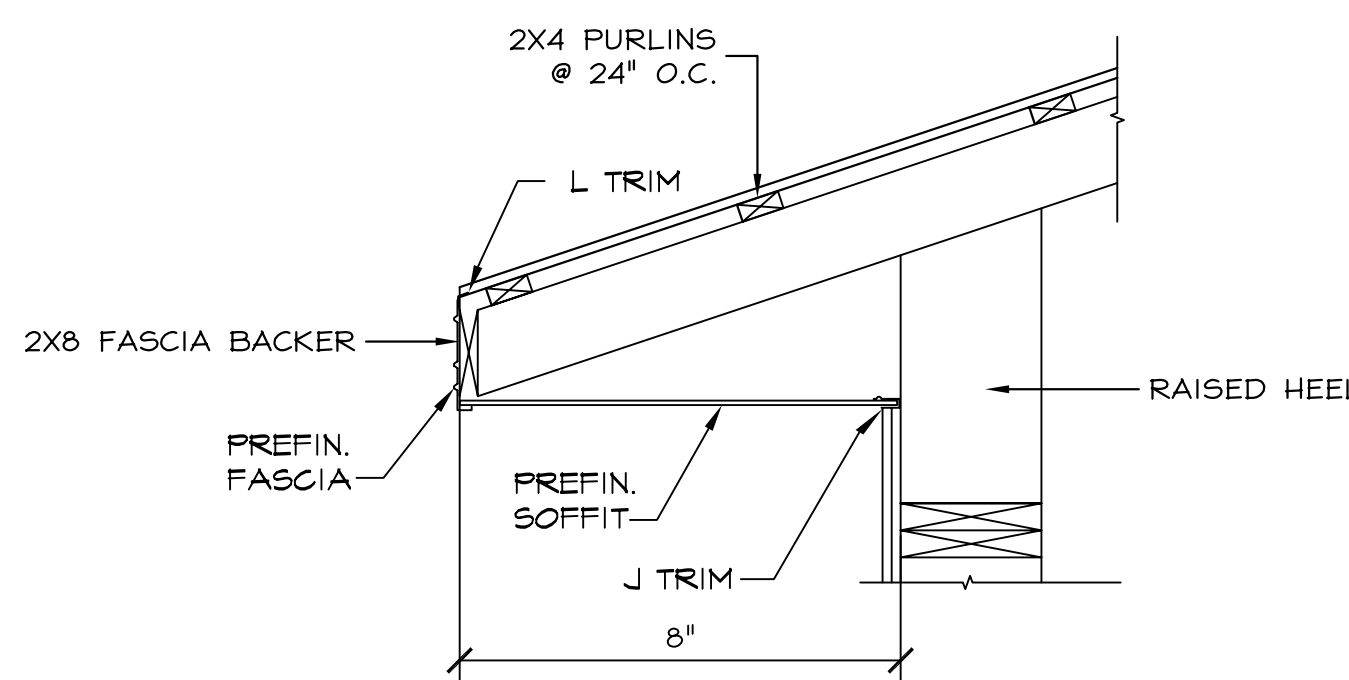


2 DETAIL
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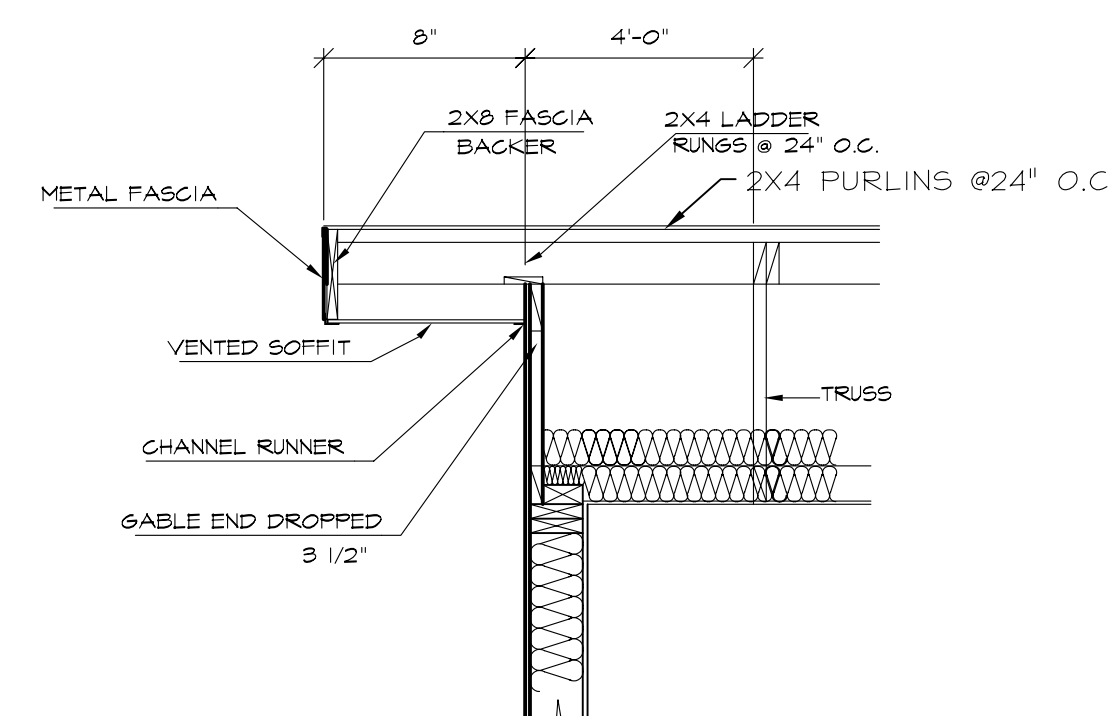
3 DETAIL
A7 NTS



4 DETAIL
A7 NTS



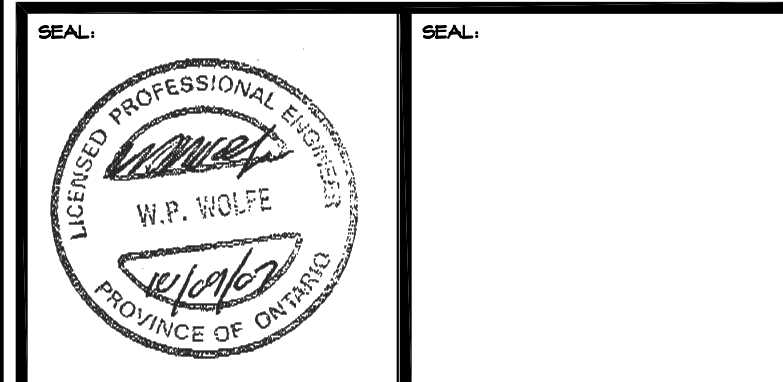
8 SOFFIT DETAIL
B12 NTS



9 TYPICAL SOFFIT GABLE END DETAIL
B12 NTS

REV	DESCRIPTION	DATE	BY
0	ISSUED FOR REVIEW	Sept 26 07	RS

DRAFTING SERVICES:
can+tec
ENGINEERING AND DRAFTING
1948 MAIN STREET
WINNIPEG, MANITOBA
Phone: (204) 943-7222 Fax: (204) 947-5717



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SECTIONS AND DETAILS

PROJECT:
**MINISTRY OF TRANSPORT
ONTARIO
GARAGE AND OFFICE
IGNACE**

newton enterprises (1983)
NEWTON, MANITOBA R0H D00
PHONE 267-2211

DRN	APP	WPN	MEC DWG No.	REV
CHK WPN	DATE	Sept 26, 2007	07238	

DRAWN BY:	CHECKED BY:	SHEET NO.	REV NO.
RS	WPN	A7R0	
DATE:	Sept 26 2007		
SCALE:	As Noted		
FILE:			