

TECHNICAL SPECIFICATIONS FOR:

PROJECT: **HOLY FAMILY CEMETERY CREMATORIUM**

2543 LOWER BASE LINE ROAD, MILTON, ONTARIO L9T 2X5

CLIENT: THE CATHOLIC CEMETERIES OF THE DIOCESE OF HAMILTON
BURLINGTON, ONTARIO

PROJECT NO.: 2019-08

DATE: September 22, 2023 ISSUED FOR TENDER

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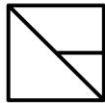
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1. Name of General Contractor

1. Name: _____
2. Address: _____
3. Phone: _____
4. Email: _____

2. Name of Project

Holy Family Cemetery Crematorium Building
2543 Lower Base Line Road
Milton, Ontario L9T 2X5

3. Addressed to Owner

Art Smith, CPA, CMA. B.Admin.
Director of Cemeteries
RCEC Diocese of Hamilton
The Catholic Cemeteries of the Diocese of Hamilton
600 Spring Gardens Road
Burlington, Ontario L7T 1J1

4. Tender Amount

We, the undersigned General Contractors, having visited the Site and examined all conditions affecting the work, propose to furnish all materials, labour and equipment required to construct project according to all Contract Documents including addenda numbered ____ to ____ for the stipulated price of:

General Trades: _____

Mechanical: _____

Electrical: _____

CONTRACT PRICE _____

The Contract Price includes all applicable taxes and duties but excludes the H.S.T. This price will remain in effect for a period of ninety (90) days after Tender Closing.

The H.S.T. (of 13%) payable by the Owner to the Contractor is:

_____dollars.

Signed by _____

Signature of Authorized Officer of Company _____

Dated, _____

5. Cash Allowance and Contingency Allowance

The Stipulated Sum includes the Cash Allowance and Contingency Allowance specified in Section 01020.

6. Bonds

Bonding not required.

7. Construction Schedule

Should this tender be accepted on or prior to November 13, 2023, the contract will be substantially performed no later than October 1, 2024, and the contract will be completed no later than October 21, 2024.

8. Unit Prices

The following unit prices are submitted in accordance with paragraph 10 of Section 00200.

The following unit prices will apply in connection with approved additions or deductions; unit prices shall include statutory charges, overhead and profit. The unit prices shall not include H.S.T. UNIT PRICES FOR ADDITIONS ARE NOT TO EXCEED PRICES FOR DEDUCTIONS BY MORE THAN 25%. The Owner reserves the right to accept or reject all unit prices; refer to ***Instruction to Bidders***.

	<u>Additions</u>	<u>Deductions</u>	
Excavations, including disposal off site	\$	\$	per m ³
Excavation for trenching including disposal			
By hand	\$	\$	per m ³
By machine	\$	\$	per m ³
Excavation in Rock	\$	\$	per m ³
Backfill, imported granular material, including compaction			
Type A - By hand	\$	\$	per m ³
By machine	\$	\$	per m ³
Type B - By hand	\$	\$	per m ³
By machine	\$	\$	per m ³
Backfill, on-site materials, including compaction			
By hand	\$	\$	per m ³
By machine	\$	\$	per m ³
25 Mpa concrete in place (excluding formwork and reinforcing)	\$	\$	per m ³
20 Mpa concrete in place (excluding formwork and reinforcing)	\$	\$	per m ³
Formwork on Foundation Walls	\$	\$	per m ²

Strip Footings	\$	\$	per m ²
Reinforcing for Foundation Walls	\$	\$	per kg
Lightweight blockwork, including all materials, mortar and labour for			
140 block	\$	\$	per block
190 block	\$	\$	per block
240 block	\$	\$	per block
290 block	\$	\$	per block
cast-in-place concrete curbing	\$	\$	per lin. m

9. Proposed Subcontractors

.1 The following is my List of Subcontractors:

EXCAVATION & BACKFILL _____

ASPHALT PAVING _____

MASONRY _____

CONCRETE _____

MISCELLANEOUS METAL _____

STRUCTURAL STEEL _____

MILLWORK _____

ALUMINUM COMPOSITE PANELS _____

ROOFING _____

SHEET METAL _____

CAULKING AND SEALING _____

METAL DOORS AND FRAMES _____

ALUMINUM WINDOWS, DOORS & FRAMES _____

DRYWALL _____

FLOORING _____

ACOUSTIC CEILINGS _____

PAINTING _____

LANDSCAPING _____

SITE SERVICES _____

MECHANICAL _____

ELECTRICAL _____

CIVIL WORKS _____

10. Signatures

We are submitting this Tender under Corporate Seal as a Limited Company or witnessed as an individual or partnership.

Printed Name and Official Position of Signature below

Signature of Authorized Officer of Company

Company Seal

Witness

Dated at _____ on _____, 2023

End of Tender Form

1. Tenders

1. Sealed Tenders are invited for the supply of all labour, materials, equipment and service to complete the above noted project, in accordance with the Drawings and Specifications as prepared by Architect.
2. Tenders for the work will only be accepted on the special forms provided for this purpose by the Architect. Tenderers must fill in duplicate the copies provided, retain one (1) copy for his own record and enclose and seal the other copy in an envelope.
3. In the receipt of Tenders for the work, no obligation is incurred to accept the lowest or any proposal. The Owner reserves the right to refuse any of all Tenders for any subdivision of the work. Each Bid must be construed to cover all of the work of the trade bid, for notwithstanding the fact, that the Bid in recapitulating the same may omit some parts.
4. The Owner reserves the power and right to reject Tenders received from parties who cannot show a reasonable acquaintance with, and preparation for the proper performance of the class of work herein specified and shown on the drawings. Evidence of such competency must be furnished by the Tenderers when requested to do so.
5. Tenders containing escalation clauses will not be considered.
6. Tenderers must furnish all information requested on the Tender Form and should any uncertainty arise as to the proper manner of completing the Form, the Architect will give the requisite information. Tender Forms must be completed in a legible manner without alterations or erasures. Incomplete Tenders will not be considered.
7. Tenders must remain open for acceptance for a period of ninety (90) days and until a formal Contract for the work is executed by the successful Tenderer, as approved by the Owner.
8. Incorporated Companies must attach Corporate Seal, and Signatures of proper Officers must be affixed.

2. Tender Closing Date

Tenders for the work must be delivered to:

Art Smith, CPA, CMA. B.Admin.
Director of Cemeteries
RCEC Diocese of Hamilton
The Catholic Cemeteries of the Diocese of Hamilton
600 Spring Gardens Road
Burlington, Ontario L7T 1J1

Not later than 2:00:00 pm local time, Thursday, October 19, 2023.

3. Bond

1. Bonding not required.

4. Subcontractor

1. The Tenderer must be responsible that all materials and labour called for in the Specifications and Drawings (and any Addenda or changes thereto) are included in the Tender. The Tenderer to state the names of all subcontractors and manufacturers as called for on the Tender Form. The List of Subcontractors and manufacturers set forth **are not to be altered or changed**, except as may be directed by the Architect who may require that an alternative subcontractor be employed at the time of the signing of the Contract, provided that the necessary adjustment is made to the Contract Amount.

5. Contract

1. The successful Tenderer is to be required to execute the "Canadian Standard Construction Document Stipulated Price Contract CCDC 2, 2008," revised to include amendments thereto, as set out in the Amendments to General Conditions.
2. The successful Tenderer is to execute the said formal contract as called for within ten (10) days after notification of the acceptance of his Tender.

6. Completion Date

1. The work is to be carried to completion as rapidly as possible, consistent with good building practice and reasonable economy ready for the Owner's full occupancy in the time stated in the Tender.
2. The term "Completion" is understood to mean that the work of the Contract has been completed, including all items of the Architect's Deficiency List, to the Architect's satisfaction and the work accepted by the Owner.

7. Sales Taxes

1. The Tender Amount shall include all Provincial Sales Taxes, Excise Taxes and Government Duties on all materials required for the completion of the work of the Contract, provided that same are in force at the time of Contract signing, but excludes the H.S.T.
2. In the event of a change being made in the amount of taxes or duties, after the execution of the Contract, the amount of the Contract will be adjusted either more or less in conformity with the changes.

8. Drawings & Specifications

1. The drawings hereinafter referred to will be those listed in this Specification, together with such other working drawings as may be issued by the Architect during the progress of the work.

2. Tenderers must examine the Architectural, Structural, Mechanical and Electrical Drawings and Specifications, and fully inform themselves regarding the requirements, conditions and limitations pertaining to the work of the Contract, and include and allow for accordingly in the preparation of their Tender.
3. Tenderers must check the set of Drawings and Specifications issued to them for Tendering purposes to ensure that they are complete and all drawings are included, as listed in the List of Drawings, and all Trades and Pages are included in the Specifications, as listed in the Index.

9. Questions Re: Drawings & Specifications

1. Tenderers finding discrepancies in, or omissions from the Drawings and Specifications, or in doubt as to the meaning and intent of any part thereof, may submit questions for clarification to the Architect and/or Consultants only through the General Contractors selected to bid on this project. Phone calls will not be entertained. If necessary, written instructions or explanations in the form of Addenda will be sent by the Architect to all General Contractors tendering. The Architect must receive questions not less than two (2) days before date set for receipt of Tenders.

If the General Contractor feels it necessary, emailed or faxed questions may be directed to the Consultants listed below, please copy architect office on all questions:

Architectural Questions: John Grguric, OAA
Grguric Architects Incorporated Fax No. 905-664-8737

Email: dwight@2gai.com

Structural Questions: Todor Doytchev, P.Eng.
Doytch & Filo Engineering Inc.

Email: todor@doytchandfilo.com

Mechanical Questions: Dave Filer, P.Eng.
Filer Engineering Ltd.

Email: dave@filereng.com

Electrical Questions: Steven Swing, P.Eng.
NRG Consultants Inc.

Email: steven@nrgconsultants.ca

Civil Questions: Steven Frankovich, P.Eng.
S. Llewellyn & Associates Limited

Email: SFrankovich@sla.on.ca

The information contained in the Addenda supersedes and amends the Drawings, Specifications and Schedules, as set forth therein. Tenderers must include and allow for addenda instructions and information accordingly. Tenderers must state on the Tender Form in the space provided, the numbers of all Addenda received and included for, by them in the preparation of the Tender.

10. Unit Prices

1. Tenderer must submit unit prices applicable to the various work, as specified.
2. **Unit prices in the Tender Form can be issued 1 hour after tender closing.**
3. Unit Prices to be submitted by email to the following
 - Grguric Architects office@2gai.com and to
 - the Diocese asmith@thecatholiccemeteries.ca

3. Subcontractors

- .1 Subcontractor bidders have been pre-qualified for Civil works.

	General Contractors	Location	Phone	Email
1	DeFaveri Construction Inc.	Stoney Creek	905-664-7046	lLarina@defaveri.ca
2	DESO Construction Limited	Caledonia	905-692-3388	estimating@desold.ca
3	King Paving & Construction Ltd.	Burlington	905-639-2995	tmckinnon@kingpaving.com rhutter@kingpaving.com
4	Rankin Construction Inc.	St. Catharines	905-684-1111	jmaki@rankinconstruction.ca
5	Trenchline and Roads Inc.	Beamsville	905-563-0075	tlr@trenchline.ca rob@trenchline.ca

- .2 The Owner reserves the right to reject a proposed subcontractor for reasonable cause. Upon such rejection, the bidder will be required to propose an alternative subcontractor with a resulting change to the Bid Price. This change can affect the status of the low bid, and may result in a different bid becoming low.

- .3 Refer to CCDC 2-2008, GC 3.8 – Subcontractor and Supplier

End of Section

1. General

A copy of a Geotechnical Investigation is enclosed following this page.

1. **Prepared by:** Terraprobe Limited
2. **Project Number:** 11-13-3165
October 9, 2014 revised
3. **Total Pages:** Total: 56 pages following this page.

2. Disclaimer:

1. The Geotechnical Report is not part of the Contract Documents prepared by the Architect or his subconsultants. It is bound into the Specifications set for convenient reference only. The Geotechnical report was not prepared by or under the supervision of the Architect. While every effort has been made to attempt to provide comprehensive geotechnical information for the purposes of design and tendering, the Architect claims no responsibility for the accuracy of the information contained in the report.

End of Section



Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

GEOTECHNICAL INVESTIGATION HOLY FAMILY CATHOLIC CEMETERY (Bronte Road and Lower Base Line West) MILTON, ONTARIO

Prepared for: The Catholic Cemeteries of the Diocese of Hamilton
600 Spring Gardens Road
Burlington, Ontario
L7T 1J1

Attention: Mr. John O'Brien

File No. 11-13-3165
Revised
October 9, 2014
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Distribution:

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1 Copy - Terraprobe Inc., Brampton

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1. INTRODUCTION

Terraprobe Inc. (Terraprobe) was retained by The Catholic Cemeteries of the Diocese of Hamilton to conduct a geotechnical investigation for a vacant parcel of land situated at the west corner of Bronte Road and Lower Base Line West in the Town of Milton, Ontario. The property is proposed to be developed as a cemetery site with internal roads, as well as open space and stormwater management pond blocks.

The initial first phase of development comprised the southern portion of the site, including four buildings, serviced privately, storm water management ponds and internal paved roads. This geotechnical report was prepared for the initial first phase. Subsequently, the first phase was changed to comprise a smaller land area including one building(cemetery office) and internal paved roads.

This report encompasses the geotechnical investigation conducted for the property to assess its geotechnical suitability for the intended development. The field investigation consisted of advancing a total of twenty (20) exploratory boreholes across the site. The objective of the geotechnical investigation was to determine the prevailing subsurface soil and groundwater conditions, in order to provide geotechnical engineering recommendations for the design of proposed building foundations, earthworks, earth pressure design parameters, pipe bedding, underground utilities and pavement structure component design. In addition, comments are also included on the pertinent project construction aspects including excavation, backfill and ground water control.

2. SITE AND PROJECT DESCRIPTION

The first phase of the development consists of the southern portion of the site located southwest of Bronte Road and northwest of Lower Base Line West, as shown on Figure 1.

The property is currently vacant and/or is under agricultural use. The surrounding lands are generally rural or rural-residential in nature. The majority of the site is characterized by generally flat to gently rolling topography, which typically slopes from northwest to southeast.

It is proposed to develop the site as a cemetery use comprising buildings, as well as park/open space and future storm water management pond blocks. The property would be serviced privately with internal paved roads.



3. FIELD PROCEDURE

The field investigation for the site was conducted on October 4, 7 and 8, 2013 and consisted of advancing a total of twenty (20) exploratory boreholes extending to depths of about 3.3 to 5 m below existing ground surface, as follows:

- four (4) boreholes (Boreholes 9, 14, 19 and 20) were advanced within the proposed storm water management ponds, extending to a depth of about 5 m below existing grade;
- two (2) boreholes (Boreholes 12 and 13) were advanced within the proposed office, extending to a depth of about 5 m below the existing grade;
- two (2) boreholes (Boreholes 16 and 17) were advanced within the proposed mausoleum, extending to a depth of about 5 m below the existing grade;
- two (2) boreholes (Boreholes 2 and 3) were advanced within the proposed maintenance facility/service centre, extending to a depth of about 5 m below the existing grade;
- two (2) boreholes (Boreholes 6 and 10) were advanced within the proposed crematory, extending to a depth of about 5 m below the existing grade; and
- eight (8) boreholes (Boreholes 1, 4, 5, 7, 8, 11, 15 and 18) were advanced along the proposed road alignment, extending to about 3 m depth.

The boreholes were staked in the field by Terraprobe and the ground surface elevations at these borehole locations were provided by the client. The approximate locations of the boreholes are presented on Figures 2 and 3.

Various utility locate agencies were contacted by Terraprobe to clear the borehole locations prior to the commencement of the field investigation.

The borings were drilled by a specialist drilling contractor using a track mounted drill rig power auger. The borings were advanced using continuous flight solid stem augers, and were sampled at regular intervals with a conventional 50 mm diameter split barrel samplers when the Standard Penetration Test (SPT) was carried out (ASTM D 1586). The field work (drilling, sampling and testing) was observed full time and recorded by a Terraprobe technician, who logged the boring and examined the samples as they were obtained.

All samples obtained during the investigation were sealed into plastic jars and transported to our geotechnical laboratory for detailed inspection and testing. The borehole samples were examined (tactile) in detail by a geotechnical engineer, and classified according to visual and index properties. Geotechnical laboratory testing consisted of water content determination on all samples, as well as a sieve and hydrometer analysis and Atterberg Limits test on nine (9) selected native soil samples (Borehole 1, Sample 2; Borehole 8, Sample 2; Borehole 9, Sample 6; Borehole 10, Sample 4; Borehole 13, Sample 5; Borehole 14, Sample 5; Borehole 17, Sample 4; Borehole 19, Sample 3; Borehole 20, Sample 6). The measured natural water contents for individual samples and the results of the sieve and hydrometer analyses as well as Atterberg Limits tests are plotted on the enclosed borehole logs at respective sampling depths. The results of sieve and hydrometer analyses and Atterberg Limits tests are also summarized in Section 4.3, and are appended.

Ground water levels were observed in the open boreholes upon completion of drilling. Standpipe piezometers were installed in Boreholes 3, 6, 9, 12, 14, 16 and 20 to facilitate shallow ground water monitoring. The results of the ground water monitoring are summarized in Section 4.4 of this report.

4. SUBSURFACE CONDITIONS

The results of the individual boreholes are summarized below and recorded on the accompanying Borehole Logs. This summary is intended to correlate this data to assist in the interpretation of the subsurface conditions at the site.

It should be noted that the soil conditions are confirmed at the borehole locations only and may vary between and beyond the boreholes. The stratigraphic boundaries shown on the logs are based on a non-continuous sampling. These boundaries represent an inferred transition between various strata, rather than a precise plane of geologic change.

In summary, the subsurface soil conditions encountered in the boreholes advanced across the site were fairly consistent. The boreholes encountered a topsoil layer/interlocking pavers at the ground surface underlain by a weathered/disturbed soil zone, which was in turn underlain by undisturbed native till soil deposit extending to the full depth of investigation at each borehole location.

4.1 Topsoil/Interlocking Pavers

A layer of topsoil/organic mixed materials was encountered at the ground surface in all boreholes except Borehole 13, varying in thickness from about 200 to 600 mm. The topsoil predominantly consisted of clayey silt matrix. A layer of 70 mm thick interlocking pavers underlain by 390 mm aggregate was encountered at the ground surface at Borehole 13.



The above information (topsoil thicknesses) is approximate and may vary between and beyond the borehole locations. The ground surface at the property appeared to have been ploughed/disturbed, therefore, the topsoil thickness data measured at borehole locations are approximate. This information is not considered sufficient for estimating material quantities/or associated costs. We recommend that a shallow test pit investigation should be carried out across the site to determine accurate topsoil/interlocking pavers thickness for material estimation purposes.

4.2 Glacial Till

Undisturbed native glacial till deposit was encountered in all boreholes beneath the topsoil layer/interlocking paver structure. The upper zone of native till soils underlying the surficial topsoil layer and extending to a depth of about 0.8 m below grade was noted to be weathered/disturbed. The composition of the weathered/disturbed soils was generally similar to that of the underlying undisturbed native soils, and included trace amounts of organics/rootlets. The glacial till deposit predominantly consisted of a clayey silt matrix, with some sand to sandy, and trace amounts of embedded gravel. Cobble/boulder inclusions were encountered in Boreholes 4, 7, 15, 16, 17 and 20. The till deposit extended to the full depth of investigation (up to 5.0 m below grade).

The Standard Penetration Test results ('N' Values) obtained from till deposit varied from 16 to 61 blows per 300 mm of penetration, 50 blows per 100 mm of penetration and 75 blows per 275 mm of penetration, indicating stiff to hard consistency. Atterberg Limits test results carried out on the till soil samples indicate that the till deposit is generally slightly to medium plastic.

Measured moisture contents of the glacial till soil samples ranged from 10 to 20 percent by weight, indicating a typically moist condition.

It should be noted that the native till deposit may contain larger size particles (cobbles and boulders) that are not specifically identified in the boreholes. The size and distribution of such obstructions cannot be predicted with borings, because the borehole sampler size is insufficient to secure representative samples for the particles of this size.

4.3 Geotechnical Laboratory Test Results

The geotechnical laboratory testing consisted of water content determination on all samples, and a sieve and hydrometer analysis, and Atterberg Limits tests on selected native soil samples.

A summary of the Sieve and Hydrometer (grain size) analysis results is presented below:

Borehole No. Sample No.	Sampling Depth below Grade	Percentage				Description (MIT System)
		Gravel	Sand	Silt	Clay	
Borehole 1 Sample 2	1.0 m	1	18	51	30	CLAYEY SILT, some sand, trace gravel
Borehole 8 Sample 2	1.0 m	2	32	45	21	CLAYEY SILT, some sand, trace gravel
Borehole 9 Sample 6	4.8 m	5	22	48	25	CLAYEY SILT, trace gravel
Borehole 10 Sample 4	2.5 m	5	19	50	26	CLAYEY SILT, some sand, trace gravel
Borehole 13 Sample 5	3.3 m	1	11	39	49	CLAYEY SILT, some sand, trace gravel
Borehole 14 Sample 5	3.3 m	4	21	46	29	CLAYEY SILT, trace gravel
Borehole 17 Sample 4	2.5 m	2	13	49	36	CLAYEY SILT, some sand, trace gravel
Borehole 19 Sample 3	1.8 m	2	17	50	31	CLAYEY SILT, some sand, trace gravel
Borehole 20 Sample 6	4.8 m	6	22	50	22	CLAYEY SILT, trace gravel

The results of Atterberg Limits tests were plotted on A-Line Graph (refer to enclosed figures, Atterberg Limits Test Results). The results of Atterberg Limits Tests are summarized below:

Borehole No. Sample No.	Sampling Depth below Grade	Liquid Limit (WL)	Plastic Limit (WP)	Plasticity Index (IP)	Natural Water Content (WN)	Plasticity
Borehole 1 Sample 2	1.0 m	31	18	13	14	Slightly Plastic
Borehole 8 Sample 2	1.0 m	25	15	10	13	Slightly Plastic
Borehole 9 Sample 6	4.8 m	25	16	9	12	Slightly Plastic
Borehole 10 Sample 4	2.5 m	29	17	12	12	Slightly Plastic
Borehole 13 Sample 5	3.3 m	37	18	19	18	Medium Plastic

Borehole No. Sample No.	Sampling Depth below Grade	Liquid Limit (WL)	Plastic Limit (WP)	Plasticity Index (IP)	Natural Water Content (WN)	Plasticity
Borehole 14 Sample 5	3.3 m	31	18	13	13	Slightly Plastic
Borehole 17 Sample 4	2.5 m	34	19	15	15	Slightly Plastic
Borehole 19 Sample 3	1.8 m	33	18	15	14	Slightly Plastic
Borehole 20 Sample 6	4.8 m	23	15	8	11	Slightly Plastic

4.4 Ground Water

Observations pertaining to the depth of water level and borehole caving were made in the open boreholes immediately after the completion of drilling, and are noted on the enclosed borehole logs. Standpipe piezometer were installed in Boreholes 3, 6, 9, 12, 14, 16 and 20, and the ground water levels measurement was taken on October 24 and November 12, 2013, approximately three to five weeks following the installation. A summary of these observations is provided below:

Borehole No.	Depth of Boring	Depth to Cave	Water level at the time of drilling	Water level in piezometer on Oct. 24, 2013	Water level in piezometer on Nov. 12, 2013
3	5.0 m BG	open	dry	3.6 m BG	2.4 m BG
6	5.0 m BG	open	dry	2.4 m BG	1.1 m BG
9	5.0 m BG	open	dry	4.3 m BG	3.8 m BG
12	5.0 m BG	open	dry	4.2 m BG	3.8 m BG
14	5.0 m BG	open	dry	4.3 m BG	3.9 m BG
16	5.0 m BG	open	dry	0.3 m BG	0.3 m BG
20	5.0 m BG	open	dry	4.2 m BG	3.7 m BG

BG = Below Grade
 NP = No Piezometer

The remaining boreholes without being installed piezometers were dry and open upon the completion of the drilling.

It should be noted that the ground water levels may fluctuate seasonally depending on the amount of precipitation and surface runoff.



5. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use of the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding construction methods and scheduling.

This report is provided on the basis of these terms of reference and on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice. If there are any changes to the site development features or there is any additional information available relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Terraprobe should be retained to review the implications of these changes with respect to the contents of this report.

5.1 Foundation

At the time of preparation of this report, there was no detailed information available regarding the proposed structures. It is understood that the only building in the new first phase will be the cemetery office to be converted from the existing house where Terraprobe's Boreholes 12 and 13 are located. However it is assumed that the proposed buildings including cemetery office, maintenance/service centre, crematory and mausoleum complex would consist of slab-on-grade structures (no basement) supported on conventional shallow spread footing foundations. A total of eight (8) boreholes (Boreholes 12 and 13 within the proposed office, Boreholes 2 and 3 within the proposed maintenance/service centre, Boreholes 6 and 10 within the proposed crematory and Boreholes 16 and 17 within the proposed mausoleum) were advanced within the footprints of the proposed buildings. The boreholes encountered a topsoil or interlocking paver structure at the ground surface underlain by a layer of weathered/disturbed soils at all borehole locations. The weathered/disturbed soils extended to a depth of about 0.8 m below existing grade. The weathered/disturbed soils were underlain by undisturbed native glacial till deposit extending to the full depth of investigation (up to at least 5.0 m below grade).

The existing topsoil/aggregate and weathered/disturbed soils are unsuitable for the support of the proposed building foundations. All foundations must be supported on the underlying competent undisturbed native till soils.

A net geotechnical reaction of 250 kPa at Serviceability Limit States (SLS) and a factored geotechnical resistance of 375 kPa at Ultimate Limit States (ULS) are recommended for the design of conventional spread footings foundations supported on the underlying stiff to hard undisturbed native glacial till soils at minimum depths noted in the following table. This table summarizes the recommended geotechnical resistance

available at varying depths at the borehole locations, advanced within the proposed building footprints (Boreholes 2, 3, 6, 10, 12, 13, 16 and 17).

Borehole No.	Minimum Founding Depth Below Existing Grade	Highest Founding Elevation	Net Geotechnical Reaction at S.L.S.	Factored Geotechnical Resistance at U.L.S.	Bearing Stratum
2	1.2 m	179.8 m	250 kPa	375 kPa	Clayey Silt Till
3	1.2 m	179.9 m	250 kPa	375 kPa	Clayey Silt Till
6	1.2 m	179.9 m	250 kPa	375 kPa	Clayey Silt Till
10	1.2 m	177.2 m	250 kPa	375 kPa	Clayey Silt Till
12	1.2 m	178.1 m	250 kPa	375 kPa	Clayey Silt Till
13	1.2 m	179.1 m	250 kPa	375 kPa	Clayey Silt Till
16	1.2 m	178.4 m	250 kPa	375 kPa	Clayey Silt Till
17	1.2 m	177.9 m	250 kPa	375 kPa	Clayey Silt Till

Higher bearing pressures are available and can be analyzed based on the development specific details, if required.

The underside of footing elevations must be designed to provide a minimum of 1.2 m of soil cover or equivalent insulation for the foundation subgrade for frost protection consideration in unheated areas. All footings must be designed to bear at least 0.3 m into the undisturbed native soil stratum. The minimum foundations depths provided in the above table include the recommended 0.3 m depth of embedment.

The minimum width of continuous strip footings must be 500 mm if supported on native till soil (600mm if supported on engineered fill) and the minimum size of isolated footings must be 800 mm x 800 mm if supported on native till soils (1000 mm x 1000 mm if supported on engineered fill) regardless of loading considerations, in conjunction with the above recommended geotechnical resistance. The geotechnical resistance(s) as recommended allow for up to 25 mm of total settlement. This settlement will occur as load is applied and is linear elastic and non-recoverable. Differential settlement is a function of spacing, loading and foundation size.

5.1.1 Foundation Installation

It is recommended that all excavated footing bases must be evaluated by a qualified geotechnical engineer to ensure that the founding soils exposed at the excavation base are consistent with the design bearing pressure intended by the geotechnical engineer.

Prior to pouring foundation concrete, the foundation subgrade should be cleaned of all deleterious materials such as topsoil, fill, softened, disturbed or caved materials, as well as any standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the foundation subgrade and concrete must be provided.

It is noted that the native soils tend to weather rapidly and deteriorate on exposure to the atmosphere or surface water. Hence, foundation base which remain open for an extended period of time should be protected by a skim coat of lean concrete.

5.2 Slab-on-Grade

Conventional lightly loaded concrete floor slab should be placed on at least 150 mm of granular base (OPSS 1010 Granular "A" or 19 mm crusher run limestone) compacted to a minimum of 98 percent SPMDD. The existing weathered/disturbed materials may remain to support the slab-on-grade provided they are assessed and approved by a geotechnical engineer at the time of construction. Any subgrade area containing excessive amount of deleterious materials must be subexcavated. The subgrade must be assessed by a geotechnical engineer prior to the placement of granular base. Any soft or wet subgrade areas identified, should be locally subexcavated and backfilled with clean earth fill compacted to a minimum of 95 percent SPMDD. Based on the borehole information, selection and sorting of the earth fill materials will be required. Above granular base thickness is considered adequate for a slab loading up to 12 kPa (about 250 psf). Recommendations for heavier slab loads can be provided if required.

The following subgrade parameters are recommended for the design of slab-on-grade supported on the undisturbed native till soil subgrade:

$$K_s = 30,000 \text{ kPa/m}$$

$$\phi = 32^\circ$$

If the slab is supported on earth fill subgrade, constructed by approved earth fill placed in maximum 150 mm thick lifts and compacted to a minimum of 95 percent SPMDD, the modulus of subgrade reaction may be

assumed as 10,000 kPa/m. A modulus of subgrade reaction of 18,000 kPa/m may be used for slab design for subgrade comprising engineered fill compacted to 98 percent SPMDD.

Provided the finish floor level of the slab-on-grade buildings is at least 200 mm above the outside design grade, and the site is graded to promote drainage away from the building; subfloor drainage provisions are not required.

Regardless of the approach to slab construction, the floor slabs that are to have bonded floor finishes (such as tiles with adhesives) should be provided with a capillary moisture/vapour barrier. The floor manufacturers have specific requirements for moisture/vapour barrier, therefore, the floor designer/architect must ensure that a provision of appropriate moisture/vapour barrier conforming to specific floor finish product requirements is incorporated in the project specifications. Adequate testing must be carried out to ensure acceptable levels of moisture/relative humidity in the concrete slab prior to the installation of floor finish. Studies indicate that a provision of 200 mm thick 19 mm clearstone base (OPSS 1004) under the slab helps provide a good capillary moisture break, provided the granular base is positively drained. However, this provision does not replace the floor manufacturers' specific requirement(s) for a moisture/vapour barrier.

5.3 Storm Water Management Pond

Based on the project design concept, the proposed Storm Water Management (SWM) Ponds would be located in the southwest portion of the site. Boreholes 9, 14, 19 and 20 were advanced within the general footprint of the proposed SWM ponds. These boreholes were advanced to a depth of about 5.0 m below existing grade. The boreholes encountered a layer of topsoil at the ground surface underlain by a zone of weathered/disturbed soils (extending up to a depth of about 0.8 m below grade) which was in turn underlain by undisturbed native glacial till deposit extending to the full depth of investigation. The native till soils encountered in these boreholes predominantly consisted of clayey silt matrix with embedded gravel particle.

Sieve and hydrometer (grain size) analyses of the selected native till soil samples (Borehole 9, Sample 6; Borehole 14, Sample 5; Borehole 19, Sample 3 and Borehole 20, Sample 6) were carried out. The results of the grain size analyses indicated that the native till soils consists of 46 to 50 percent silt and 22 to 31 percent clay by weight. The estimated permeability of the native till soils, based on the soil sample analyzed, is on the order of 10^{-7} cm/sec. These boreholes remained open and dry upon completion of drilling. The water level in the piezometers, in Boreholes 9, 14 and 20 on October 24, 2013, varied from about 4.2 to 4.3 m below grade, and on November 12, varied from about 3.7 to 3.9 m below grade. It is noted that the undisturbed native soils at the SWM pond locations consist of low permeability clayey silt till deposit which precludes significant amounts of free flow/seepage of the ground water. Therefore, it appears that the ground water levels in the piezometers are likely due to the perched water typically present within the earth

fill/weathered/disturbed soils and in the relatively permeable sand/silt lenses typically found embedded in the glacial till deposit due to its mode of deposition.

Based on the site design details, the pond base and side slopes are expected to consist of undisturbed native clayey silt till soils of relatively low permeability (on the order of 10^{-7} cm/sec). The relatively low permeability of the native till soils should preclude significant seepage or percolation into and from the pond, and therefore, a pond liner may not be required. As noted before, the measured water levels in the piezometer appear to be likely related to perched ground water condition rather than a static ground water table. The glacial till deposit typically contains intermittent relatively permeable silt/sand zones, with perched water, due to its mode of deposition.

The pond slopes and base must be inspected by a geotechnical engineer to assess the exposed soil conditions, and to identify presence of any relatively permeable silt or sand layers/pockets typically found within the till deposit, in order to provide recommendations for possible modification to the geotechnical design of the pond. These modifications may include local subexcavation of the relatively permeable soil zone(s) and backfilling with low permeable clay/silty clay soils.

Based on the subsurface soils conditions encountered in the boreholes, the recommended stable slope inclination for the pond side slope is 4 horiz. to 1 vert. above water level and 5 horiz. to 1 vert. below the pond water level. It must be noted that regulatory agencies may also have specific requirements with respect to pond design (including side slopes) in addition to the slope considerations noted above.

5.3.1 Earth Berm and Pond Slope Surface Treatment

The final pond design grades may require an earth-berm. The earth fill materials used for the berm construction must include a minimum of 15 percent clay (finer than 0.002 mm) and 35 percent silt sized (finer than 0.08 mm, i.e., passing No. 200 sieve) particles. This material must not include particles greater than 100 mm dimension, greater than 15 percent of the material larger than 4.8 mm size (No. 4 sieve), and greater than 5 percent organic content by weight, as well as visible roots, stumps and topsoil. The earth fill materials should be placed in lifts not exceeding 150 mm and be compacted to a minimum of 95 percent of the SPMDD. The materials shall be placed and compacted at a water content of between 2 percent dry and 3 percent wet of the optimum moisture content. In order to achieve required compaction of the berm fill soils at the pond slope surface, consideration should be given to over-build the berm (minimum 1.5 m beyond the design slope surface) and cut neatly to the final design slope configuration.

The subgrade area beneath berm fill and pond base should be stripped to remove all organics, topsoil and vegetation. The exposed subgrade should be proof-rolled and inspected by a qualified geotechnical engineer

to confirm the founding soil conditions. Any loose, soft or otherwise deleterious materials must be removed to their full extent and replaced with compacted earth fill (as specified) under the direction of a qualified geotechnical engineer. Similarly, pockets/areas of sand/silt soils must be identified, subexcavated and replaced with compacted and approved low permeability earth fill soils. The subgrade should be compacted to at least 95 percent SPMDD prior to the berm fill placement.

The recommended stable slope inclination for the outside slope of any fill berm should be 3 horiz. to 1 vert. or flatter. The final slope surface and all bare or exposed areas (where applicable) should be provided with suitable ground cover or erosion protection. The slope surface should be provided with a thin layer of topsoil (minimum 100 mm thick) and should be hydro-seeded with a grass mixture and mulch. If seeded, during the first 2 to 3 years, the surface cover of topsoil and seeding may require periodic maintenance until the vegetation becomes well established. It is recommended that erosion netting be staked on the outside slope (where applicable) for erosion protection (and inside slope which is above the water level).

It is understood that the inside slopes of the SWM pond(s) will likely be vegetated with aquatic vegetation species. It should be noted that periodic fluctuations in the pond water level will make inside slopes susceptible to minor sheet and rill erosion over extended periods of exposure if these slopes remain bare and without vegetation. Occasional maintenance and repair of the inside bare pond slopes (and removal of accumulated sediment in the base) will be required. A lining of the pond inside slopes would reduce the amount of maintenance. The lining may consist of rip-rap or local field stones.

The emergency spillway must be provided with a significant erosion resistant lining consisting of either rip-rap, gabion mattresses, buried and staked Geoweb or Duramat Concrete Units (or equivalent). The lining should extend from the design high water level to over the berm and down to the berm/pond slope toe. It is recommended that any piping or trenching in the area of the pond should be provided with seepage cut-off collars (clay plugs, concrete plugs, or other barriers) to protect against water seepage through the pipe bedding and backfill.

In case the relatively permeable zones (sand/silt) are encountered in the pond slope and base, these zones should be subexcavated and replaced with approved low permeability soils. The backfill soil should consist of a natural soil material (such as clay or clayey silt). Primary considerations for the design of the clay backfill will be low permeability, protection from frost damage, desiccation, and burrowing animals. The clay backfill should be a minimum of 1.0 m thick. The backfill soils must consist of low permeability materials (clayey silt or clay) in order to perform adequately and to provide a barrier to potential seepage. As noted before, the backfill material must include a minimum of 15 percent clay (finer than 0.002 mm) and 35 percent silt sized (finer than 0.08 mm, i.e., passing No. 200 sieve) particles. The backfill material must

not include particles greater than 100 mm dimension, greater than 15 percent of the material larger than 4.8 mm size (No. 4 sieve), and greater than 5 percent organic content by weight, as well as visible roots, stumps and topsoil.

It is required to ensure that the berm soils and backfill materials for the permeable zones (if encountered in the base and sides of the pond) are compacted to a homogenous mass, and does not remain as distinct "clods" or "clumps". The backfill should be constructed in thin lifts (not exceeding 150 mm thick) and heavily compacted to a minimum of 95 percent SPMDD. The soil should not contain any frozen material should the construction proceeds under winter conditions (ideally not recommended). Also, adequate protection against frost penetration must be provided as required (eg. straw bales, tarping, heating).

The delineation of the permeable soil zones, subexcavation and replacement must be conducted under the full time supervision of a qualified geotechnical engineer.

It is recognized that a broad range of soil materials may be suitable for the berm/backfill material (i.e., will meet the specifications noted above). It is recommended that contractors bidding on the project provide the results of testing, to indicate the following:

- The location (source) of the clay material.
- Verification of the uniformity of the material.
- Demonstration that sufficient material is available for the project.
- Laboratory testing to demonstrate that the material meets the minimum specifications noted above.

The berm/liner construction must be conducted under the full time supervision of a qualified geotechnical engineer. Periodic on-site samples should be collected and tested to ensure that the material placed conforms to the project specification.

5.3.2 Operational Considerations

The following general considerations are recommended with respect to the long-term operation and maintenance of the pond(s):

- A minimum operating freeboard of 0.3 m should be maintained between the high water level and the pond rim/berm. Overtopping of the pond, as a result of overfilling or flooding, would result in severe damage and possible breaching or failure of the earth berm and the

downstream slope. A provision of an overflow conveyance route/spillway is recommended to prevent pond overtopping.

- The flat surface (maintenance/access road) at the top of the pond/berm must be a minimum of 3.0 m wide to facilitate adequate compaction and to accommodate service vehicles for maintenance.
- The pond should be carefully inspected each season for including but not limited to the following:
 - (i) General condition of various pond components to identify areas of erosion, settlement, slump or deterioration.
 - (ii) Inspection of pond base and slope surface for discontinuities or holes as a result of burrowing animals, vandalism, settlement or the like.
 - (iii) Removal of unwanted vegetation (tree, seedlings and the like) from within the footprint of the pond area.

Any damaged or deteriorated areas must be repaired regularly.

It must be noted that regulatory agencies stipulate maximum pond slope inclinations and other requirements for stormwater management pond design. These specifications may have requirements above and beyond the geotechnical recommendations provided in this report.

5.4 Excavations and Groundwater Control

The borehole data indicate that the topsoil, weathered/disturbed soils and undisturbed native glacial till soils would be encountered in the excavations. Excavations must be carried out in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. These regulations designate four broad classifications of soils to stipulate appropriate measures for excavation safety.

TYPE 1 SOIL

- a. is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
- b. has a low natural moisture content and a high degree of internal strength;
- c. has no signs of water seepage; and
- d. can be excavated only by mechanical equipment.



TYPE 2 SOIL

- a. is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
- b. has a low to medium natural moisture content and a medium degree of internal strength; and
- c. has a damp appearance after it is excavated.

TYPE 3 SOIL

- a. is stiff to firm and compact to loose in consistency or is previously-excavated soil;
- b. exhibits signs of surface cracking;
- c. exhibits signs of water seepage;
- d. if it is dry, may run easily into a well-defined conical pile; and
- e. has a low degree of internal strength

TYPE 4 SOIL

- a. is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
- b. runs easily or flows, unless it is completely supported before excavating procedures;
- c. has almost no internal strength;
- d. is wet or muddy; and
- e. exerts substantial fluid pressure on its supporting system.

The weathered/disturbed soils encountered in the boreholes is classified as Type 3 Soil above and Type 4 Soil below the prevailing water table, respectively. The undisturbed native glacial till is classified as Type 2 Soil, under these regulations.

Where workmen must enter excavations advanced deeper than 1.2 m, the trench walls should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. The regulation stipulates steepest slopes of excavation by soil type as follows:

Soil Type	Base of Slope	steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in the Occupational Health and Safety Act and Regulations for Construction Projects, and include provisions for timbering, shoring and moveable trench boxes.

As noted before, glacial till deposit may contain larger particles (cobbles and boulders) that are not specifically identified in the boreholes. The size and distribution of such obstructions cannot be predicted with borings, because the borehole sampler size is insufficient to secure representative samples for particles

of this size. Provision should be made in excavation contract to allocate risks associated with the time spent and equipment utilized to remove or penetrate such obstructions when encountered.

All of the boreholes remained dry upon completion of drilling. The ground water level measured in the standpipe piezometers on October 24, 2013 varied from about 0.3 m (Borehole 16) to 4.3 m (Boreholes 9 and 14) below grade, and on November 12, 2013 varied from about 0.3 m (Borehole 16) to 3.9 m (Borehole 14). The ground water levels may fluctuate seasonally depending upon the precipitation and surface runoff.

The glacial till deposit underlying the site is expected to have a relatively low permeability and should preclude significant free-flowing ground water seepage into the excavation in the short-term. There may be perched ground water present within weathered/disturbed soils as well as in sand/silt lenses and seams typically found within the glacial till deposit due to its mode of deposition. This perched ground water seepage should diminish slowly and can be controlled by continuous pumping from a conventional sump and pump arrangement at the base of excavation. For excavations extending to depths greater than 0.3 m below the water table, it will be necessary to lower the ground water level below the excavation base prior to and during the subsurface construction, and therefore rigorous positive dewatering will likely be required. Dewatering of more than 50,000 litres/day will require a permit from the Ministry of Environment.

The flow of surface water at this site will likely have to be diverted away from the work area so that construction can proceed in sufficiently dry conditions. Depending on the flow conditions, it may be possible to accomplish this by containing the flow and diverting it via a solid pipe. An interceptor perimeter trench may also be required. The design of the dewatering system will be the responsibility of the Contractor.

5.5 Earth Pressure Design Parameters

Walls or bracings subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K [\gamma (h-h_w) + \gamma' h_w + q] + \gamma_w h_w$$

- where:
- P** = the horizontal pressure at depth, **h** (m)
 - K** = the earth pressure coefficient,
 - h_w** = the depth below the ground water level (m)
 - γ** = the bulk unit weight of soil, (kN/m³)
 - γ'** = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m³)
 - q** = the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall, this equation can be simplified to:

$$P = K[\gamma h + q]$$

This equation assumes that free-draining granular backfill is used and positive drainage is provided to ensure that there is no hydrostatic pressure acting in conjunction with the earth pressure.

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction (**R**) depends on the normal load on the soil contact (**N**) and the frictional resistance of the soil (**tan φ**) expressed as **R = N tan φ**. This is an ultimate resistance value and does not contain a factor of safety.

Passive earth pressure resistance is generally not considered as a resisting force against sliding for conventional retaining structure design because a structure must deflect significantly to develop the full passive resistance.

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site, are tabulated as follows:

<u>Parameter</u>	<u>Definition</u>	<u>Units</u>
φ	internal angle of friction	degrees
γ	bulk unit weight of soil	kN/ m ³
K _a	active earth pressure coefficient (Rankin)	dimensionless
K _o	at-rest earth pressure coefficient (Rankin)	dimensionless
K _p	passive earth pressure coefficient (Rankin)	dimensionless

<u>Stratum/Parameter</u>	<u>φ</u>	<u>γ</u>	<u>K_a</u>	<u>K_o</u>	<u>K_p</u>
Glacial Till	30	21	0.35	0.5	3
Weathered/Disturbed Soils	30	19	0.35	0.5	3
Compact Granular Fill	32	21	0.3	0.47	3.25

The values of the earth pressure coefficients noted above are for the horizontal backfill grade behind the wall. The earth pressure coefficients for inclined grade will vary based on the inclination of the retained ground surface.

5.6 Backfill

The topsoil and weathered/disturbed materials containing excessive amounts of organics should not be reused as backfill in settlement sensitive areas, such as beneath floor slabs, trench backfill and pavement areas. However, these materials may be stockpiled and reused for landscaping purpose.

The native soils are generally considered suitable for reuse as backfill provided these soils are not too wet to achieve specified compaction. It should be noted that there may be some relatively wet zones within subsurface soils. Any soil materials with in-situ moisture content of more than 3 percent above the optimum moisture content could be put aside to dry, or could be tilled to reduce the moisture content so that it can be effectively compacted. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted. It should be noted that the soils encountered on the site are not free draining, therefore, earthworks will be difficult to carry out in wet seasons such as spring and fall and may incur extra cost.

In settlement sensitive areas such as beneath floor slabs and pavements, the backfill should consist of clean earth and should be placed in lifts of 150 mm thickness or less, and heavily compacted to a minimum of 95 percent SPMDD at a water content close to optimum (within 3 percent of optimum). The soils encountered on the site will be best compacted with a heavy sheepfoot type roller.

5.7 Pipe Bedding

The engineered fill and undisturbed native materials will be suitable for support of buried services on conventional well graded granular base material. The utility subgrade may require stabilization as deemed necessary based on the subgrade assessment. Where disturbance of the trench base has occurred, such as due to groundwater seepage, or construction traffic, the disturbed soils should be subexcavated and replaced with suitably compacted granular fill.

Granular bedding material should consist of a well graded, free draining soil, such as OPSS Granular "A" or 19 mm Crusher Run Limestone or its equivalent as per the pertinent Town/Region specifications. The bedding material should be placed in 150 mm lifts and compacted to a minimum of 95 percent SPMDD or vibrated/tamped to a dense state in case of a clear stone material.

A clear stone type bedding may be considered, however, such bedding should only be used in conjunction with a suitable geotextile filter (Terrafix 270R or equivalent) where sand/silt subgrade is encountered. Otherwise, without proper filtering, there may be entry of fines from the native soils into the bedding. This loss of ground could result in loss of support to the pipes and possible future settlements. Where subgrade consists of clayey soils, a geotextile filter is not required.

If the invert of the trench is below the water table and local drawdown of the groundwater level cannot be tolerated for environmental reasons then clay plugs should be installed within the granular bedding and the granular zones of backfill material to help prevent migration of the ground water along the relatively free draining bedding material and/or backfill material due to the “French Drain” effect.

Clay plugs should be placed in the trenches at 50 m intervals (or less) along the full length of the trench, where the invert of the trench is below the water table. The plug should be at least 1.0 m thick measured along the pipe, and should completely replace the granular bedding and relatively pervious (sand, granular) backfill. The clay plugs must be compacted to a minimum of 95 percent SPMDD. The clay plug material should have a coefficient of permeability less than 10^{-6} cm/s and must include a minimum of 15 percent clay (finer than 0.002 mm) and 30 percent silt sized (finer than 0.08 mm, i.e., passing No. 200 sieve) particles. The backfill material must not include particles greater than 100 mm dimension, greater than 15 percent of the material larger than 4.8 mm size (No. 4 sieve), and greater than 5 percent organic content by weight, as well as visible roots or topsoil.

Alternatively, concrete cut-off collars can be installed around the pipe barrel to achieve the same effect. Collars should not be placed closer than 1.0 m to a pipe joint and precautions should be taken to ensure that a minimum of 95 percent compaction is achieved around the collars. Watertight connections are required between the collar and the pipe wall. The trench backfilling operations should be carried out with materials that are similar to the materials that have been excavated. In particular, the sand zones must not be truncated by backfilling of the trench using lower permeability materials.

5.8 Pavement Design

Based on the existing and proposed site grades, it is understood that both cut and fill may be required for grading design, therefore, the pavement subgrade may consist of undisturbed native soil or compacted earth fill. The pavement subgrade should be proof-rolled with a heavy rubber tire vehicle (such as a grader) and any loose, soft, wet or unstable areas should be sub-excavated, and backfilled with clean earth fill material placed in 150 mm thick lifts and compacted to a minimum of 98 percent SPMDD. Local subexcavation in some areas may be required due to loose/soft, wet and incompetent subgrade conditions or excessive topsoil/organic presence as identified during the proof-roll.

The existing weathered/disturbed soils encountered on the site may be utilized for subgrade preparation provided they do not contain excessive amounts of organics and deleterious materials, as well as their in-situ moisture content is within 3 percent of the optimum moisture content. The selection and sorting of these soils for reuse, should be conducted under the supervision of a geotechnical engineer. Pavement subgrade upfill material should be compacted to a minimum of 95 percent SPMDD, while the upper zone (within 1.2m of the design subgrade) should be compacted to a minimum of 98 percent SPMDD.

The following flexible pavement designs are recommended for the proposed development. These minimum depths are in accordance with the Town of Milton's current minimum standards (2010):

Material	Compaction Requirement	Minimum Component Thickness	
		Minor Local/Laneway (16 m ROW)	Local, Minor Collector (20 m ROW)
Surface Course Asphaltic Concrete: HL3 (OPSS 1150 and pertinent Town specifications)	as per OPSS 310	40 mm	40 mm
Binder Course Asphaltic Concrete: HL8 (OPSS 1150 and pertinent City specifications)	as per OPSS 310	50 mm	80 mm
Base Course: 19 mm Limestone (OPSS 1010 and pertinent Town specifications)	100 % Standard Proctor Maximum Dry Density	150 mm	150 mm
Sub Base Course: Granular B, Type II (OPSS 1010 and pertinent Town specifications)	98 % Standard Proctor Maximum Dry Density	300 mm	375 mm

The granular materials should be placed in lifts 150 mm thick or less and be compacted to a minimum of 100 percent and 98 percent SPMDD for granular base and granular sub-base, respectively. Asphalt materials should be rolled and compacted as per OPSS 310. The granular and asphalt pavement materials and their placement should conform to OPSS Forms 310, 501, 1010 and 1150 and pertinent Town/Region specifications. It is recommended that Town/Region and other pertinent specifications should be referred for use of higher grade of asphalt cement for asphaltic concrete where applicable.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage towards subgrade drains. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement. Continuous pavement subdrains should be provided along both sides of the roads and drained into respective catchbasins to facilitate drainage of the subgrade and

granular materials. The subdrain invert should be maintained at least 0.3 m below subgrade level (refer to Figure 5).

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures must be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as possible when fill is placed, and the natural subgrade is not disturbed or weakened after it is exposed.

The above pavement design thicknesses are considered adequate for the design traffic. However, if the pavement construction occurs in wet, winter or inclement weather, it may be necessary to provide additional subgrade support for heavy construction traffic by increasing the thickness of the granular sub-base, base or both. Further, traffic areas for construction equipment may experience unstable subgrade conditions. These areas may be stabilized utilizing additional thickness of the granular materials.

It should be noted that in addition to strict adherence to the above recommended pavement design, a close control on the pavement construction process will also be required in order to obtain the desired pavement life. Therefore, it is recommended that regular inspection and testing should be conducted during the construction to confirm material quality, thickness, and to ensure adequate compaction.

5.9 Earthquake Design Parameters

Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A. of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. Alternatively, the classification is estimated on the basis of rational analysis of undrained shear strength (s_u) or penetration resistance (N-values).

$$v_{s-avg} = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{v_{si}}} \quad S_{u-avg} = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{S_{ui}}} \quad N_{avg} = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{N_i}}$$

Shear wave velocity
Undrained shear strength
SPT N-values

The site is underlain by glacial soil deposit (clayey silt till) which extended to at least 5.0 m below grade.

Based on the above, for seismic design purposes, the weighted Average Standard Penetration Resistance can be taken as between 15 and 50 blows per 300 mm of penetration. On this basis, the site designation for seismic analysis is Class D, according to Table 4.1.8.4.A. of the Ontario Building Code (2012). According to Tables 4.1.8.4.B. and 4.1.8.4.C. of the same code the applicable acceleration and velocity based site coefficients are tabulated below:

Site Class	Values of F_a				
	$S_a(0.2) \leq 0.25$	$S_a(0.2) = 0.50$	$S_a(0.2) = 0.75$	$S_a(0.2) = 1.00$	$S_a(0.2) \geq 1.25$
D	1.3	1.2	1.1	1.1	1.0

Site Class	Values of F_v				
	$S_a(1.0) \leq 0.1$	$S_a(1.0) = 0.2$	$S_a(1.0) = 0.3$	$S_a(1.0) = 0.4$	$S_a(1.0) \geq 0.5$
D	1.4	1.3	1.2	1.1	1.1

It should be noted that the above site seismic designation is estimated on the basis of rational analysis of penetration resistance (N-Values) with assumed N-Values for the soil stratigraphy beneath the investigation depth. Alternatively, a site specific Multichannel Analysis of Surface Waves (MASW) may be conducted to determine the average shear wave velocity in the top 30 metres of the site stratigraphy to establish the site designation for seismic analysis.

6.0 LIMITATIONS AND USE OF REPORT

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. A comprehensive sampling and testing programme implemented in accordance with the most stringent level of care may fail to detect certain conditions. Terraprobe has

assumed for the purposes of providing advice, that the conditions that exist between sampling points are similar to those found at the sample locations. The conditions that Terraprobe has interpreted to exist between sampling points can differ from those that actually exist.

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions.

The discussion and recommendations are based on the factual data obtained from the investigation and are intended for use by the owner and its retained designers in the design phase of the project. Since the project is still in the design stage, all aspects of the project relative to the subsurface conditions cannot be anticipated. Terraprobe should review the design drawings and specifications prior to the construction. If there are changes to the project scope and development features, the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to constructibility issues and quality control may not be relevant to the revised project. Terraprobe should be retained to review the implications of changes with respect to the contents of this report.

The investigation at this site was conceived and executed to provide information for project design. It may not be possible to drill a sufficient number of boreholes or sample and report them in a way that would provide all the subsurface information that could have an effect on construction costs, techniques, equipment, and scheduling. Contractors bidding on or undertaking work on this project should therefore, in this light, be directed to decide on their own investigations, as well as their own interpretations of the factual investigation results. They should be cognizant of the risks implicit in subsurface investigation activities so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report was prepared for the express use of The Catholic Cemeteries of the Diocese of Hamilton and its retained design consultants. It is not for use by others. This report is copyright of Terraprobe Inc. and no part of this report may be reproduced by any means, in any form, without the prior written permission of Terraprobe Inc. and The Catholic Cemeteries of the Diocese of Hamilton, who are the authorized users.

It is recognized that the regulatory agencies in their capacities as the planning and building authorities under Provincial statutes, will make use of, and rely upon this report, cognizant of the limitations thereof, both expressed and implied.



We trust the foregoing information is sufficient for your present requirements. If you have any questions, or if we can be of further assistance, please do not hesitate to contact us.

Yours truly,

Terraprobe Inc.



W. Lei, P. Eng.
Project Engineer



Michael Tanos, P. Eng.
Principal



APPENDIX

TERRAPROBE INC.





SAMPLING METHODS		PENETRATION RESISTANCE
AS	auger sample	<p>Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).</p> <p>Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.)."</p>
CORE	cored sample	
DP	direct push	
FV	field vane	
GS	grab sample	
SS	split spoon	
ST	shelby tube	
WS	wash sample	

COHESIONLESS SOILS		COHESIVE SOILS			COMPOSITION	
Compactness	'N' value	Consistency	'N' value	Undrained Shear Strength (kPa)	Term (e.g)	% by weight
very loose	< 4	very soft	< 2	< 12	trace silt	< 10
loose	4 – 10	soft	2 – 4	12 – 25	some silt	10 – 20
compact	10 – 30	firm	4 – 8	25 – 50	silty	20 – 35
dense	30 – 50	stiff	8 – 15	50 – 100	sand and silt	> 35
very dense	> 50	very stiff	15 – 30	100 – 200		
		hard	> 30	> 200		

TESTS AND SYMBOLS

MH	mechanical sieve and hydrometer analysis	▽	Unstabilized water level
w, w _c	water content	▽	1 st water level measurement
w _L , LL	liquid limit	▽	2 nd water level measurement
w _P , PL	plastic limit	▽	Most recent water level measurement
I _P , PI	plasticity index	3.0+	Undrained shear strength from field vane (with sensitivity)
k	coefficient of permeability	C _c	compression index
γ	soil unit weight, bulk	c _v	coefficient of consolidation
G _s	specific gravity	m _v	coefficient of compressibility
φ'	internal friction angle	e	void ratio
c'	effective cohesion		
c _u	undrained shear strength		

FIELD MOISTURE DESCRIPTIONS

Damp	refers to a soil sample that does not exhibit any observable pore water from field/hand inspection.
Moist	refers to a soil sample that exhibits evidence of existing pore water (e.g. sample feels cool, cohesive soil is at plastic limit) but does not have visible pore water
Wet	refers to a soil sample that has visible pore water

BOREHOLE LOGS

TERRAPROBE INC.





Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

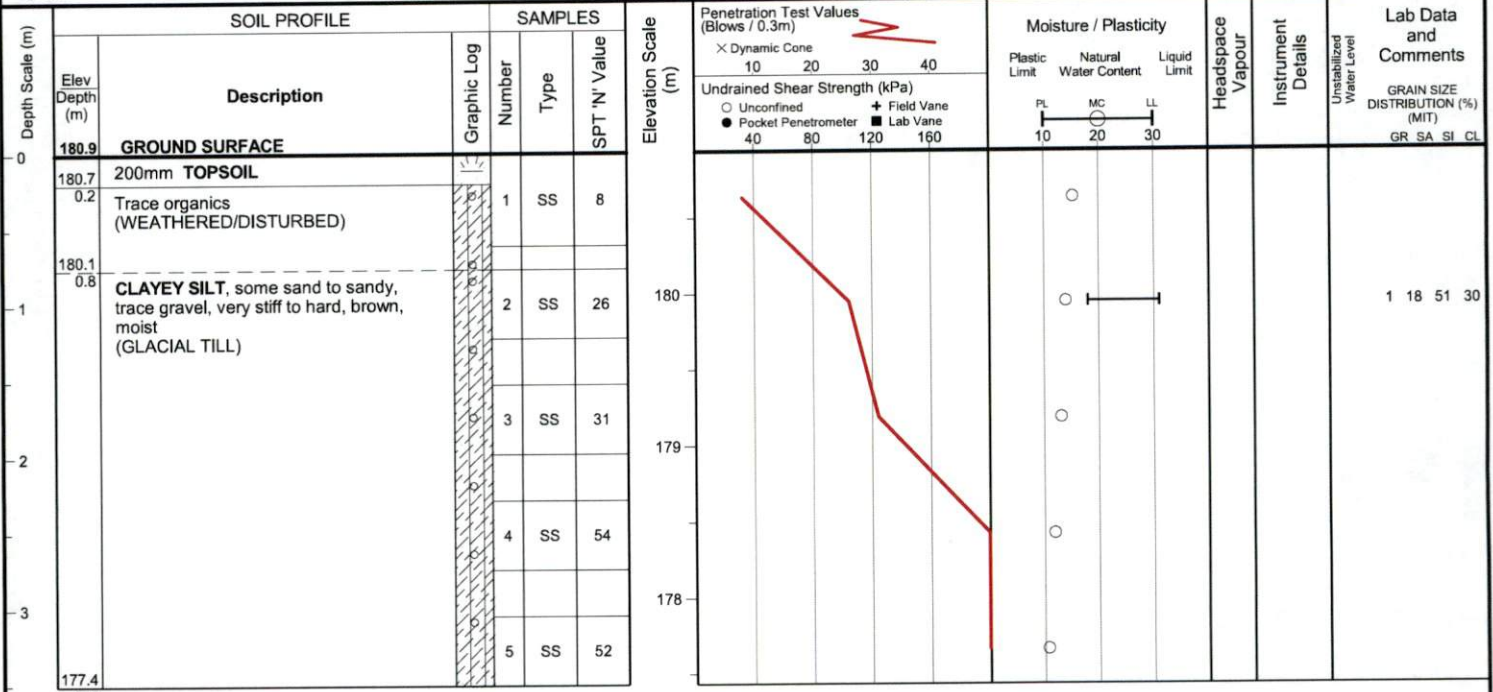
Sheet No. : 1 of 1

Position : E: 595985, N: 4812866 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No. : 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

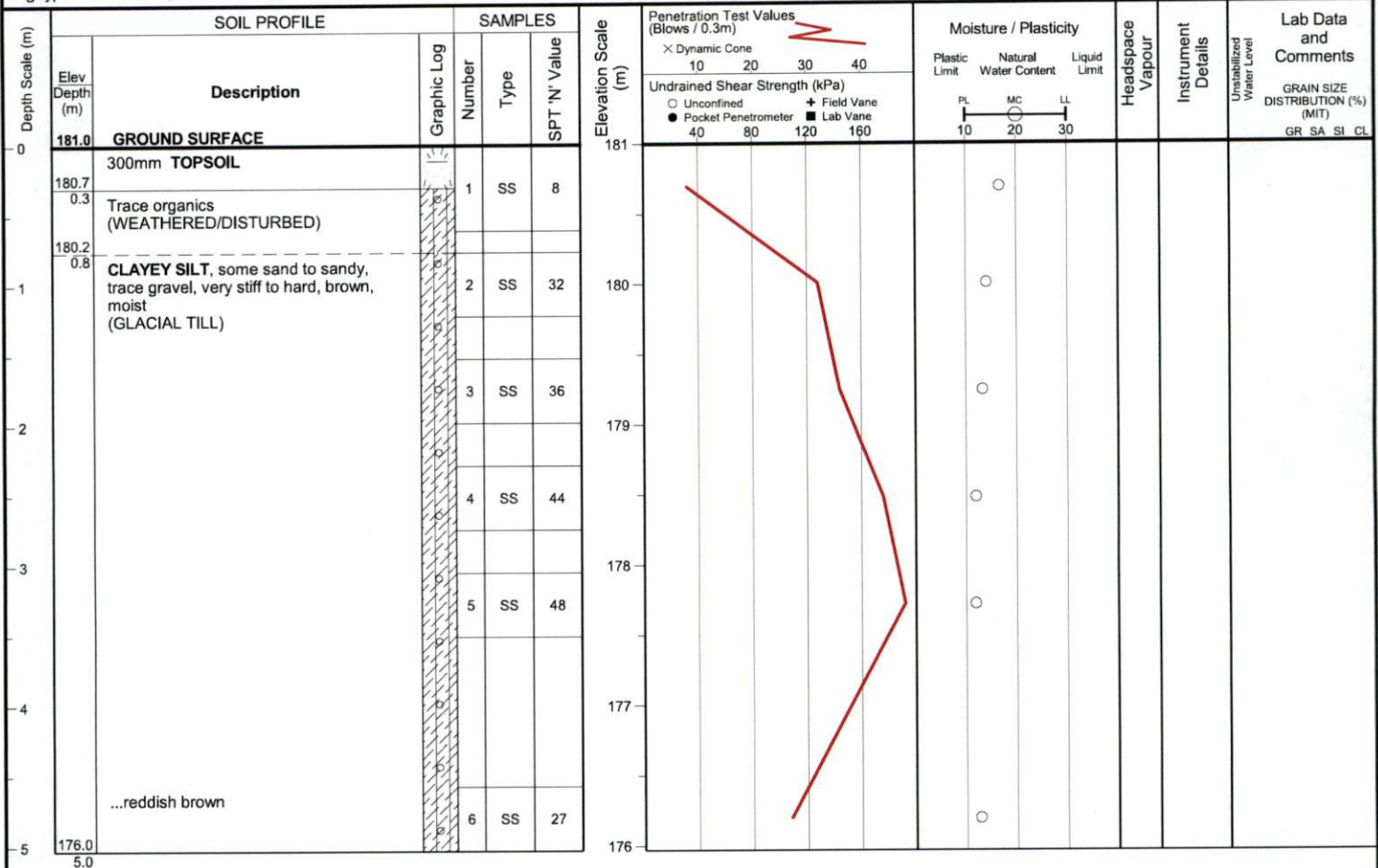
Sheet No. : 1 of 1

Position : E: 596008, N: 4812884 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant
 Project : Holy Family Catholic Cemetery
 Location : Milton, Ontario

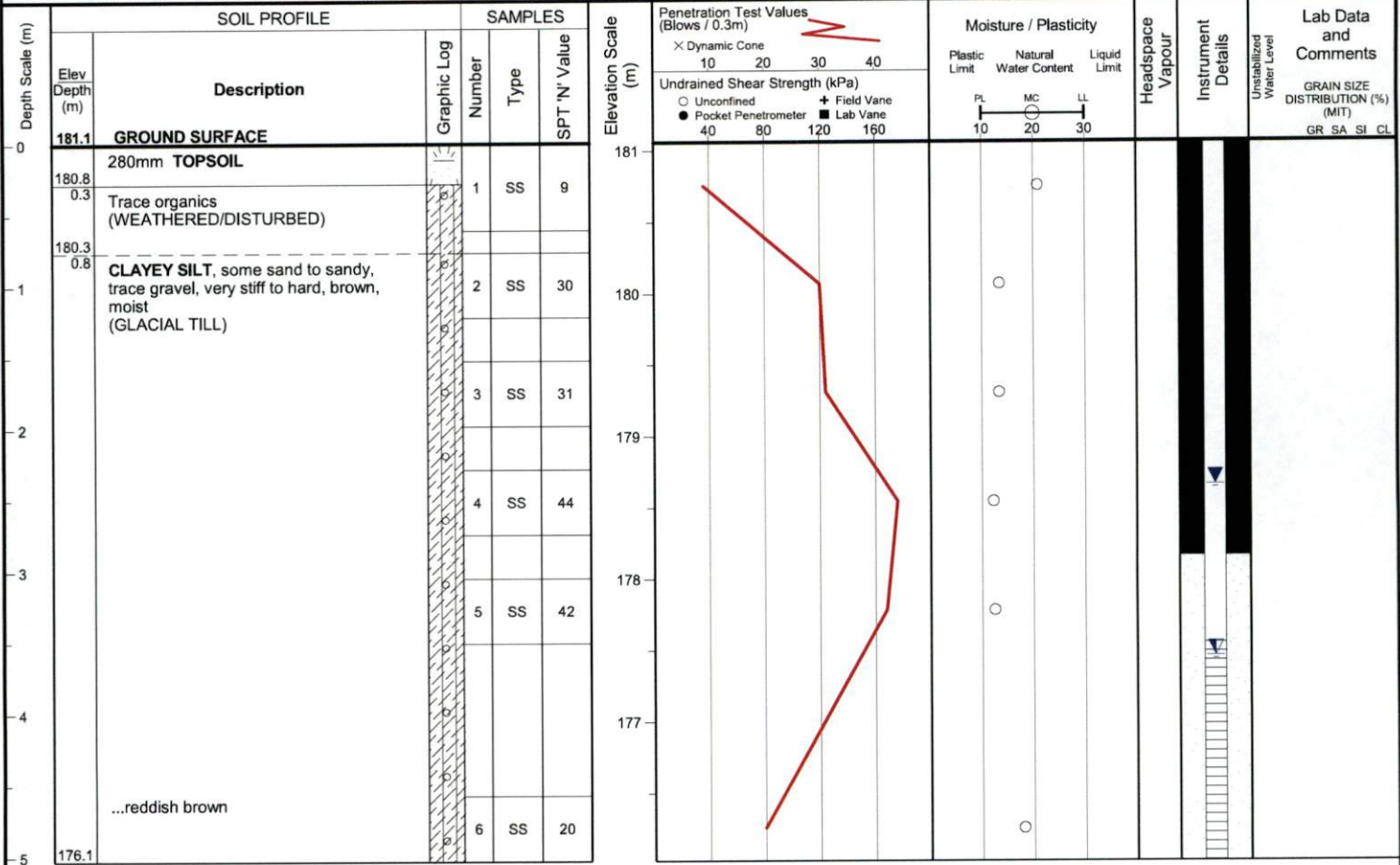
Project No. : 11-13-3165
 Date started : October 7, 2013
 Sheet No. : 1 of 1

Position : E: 596029, N: 4812913 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	3.6	177.5
Nov 12, 2013	2.4	178.7



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

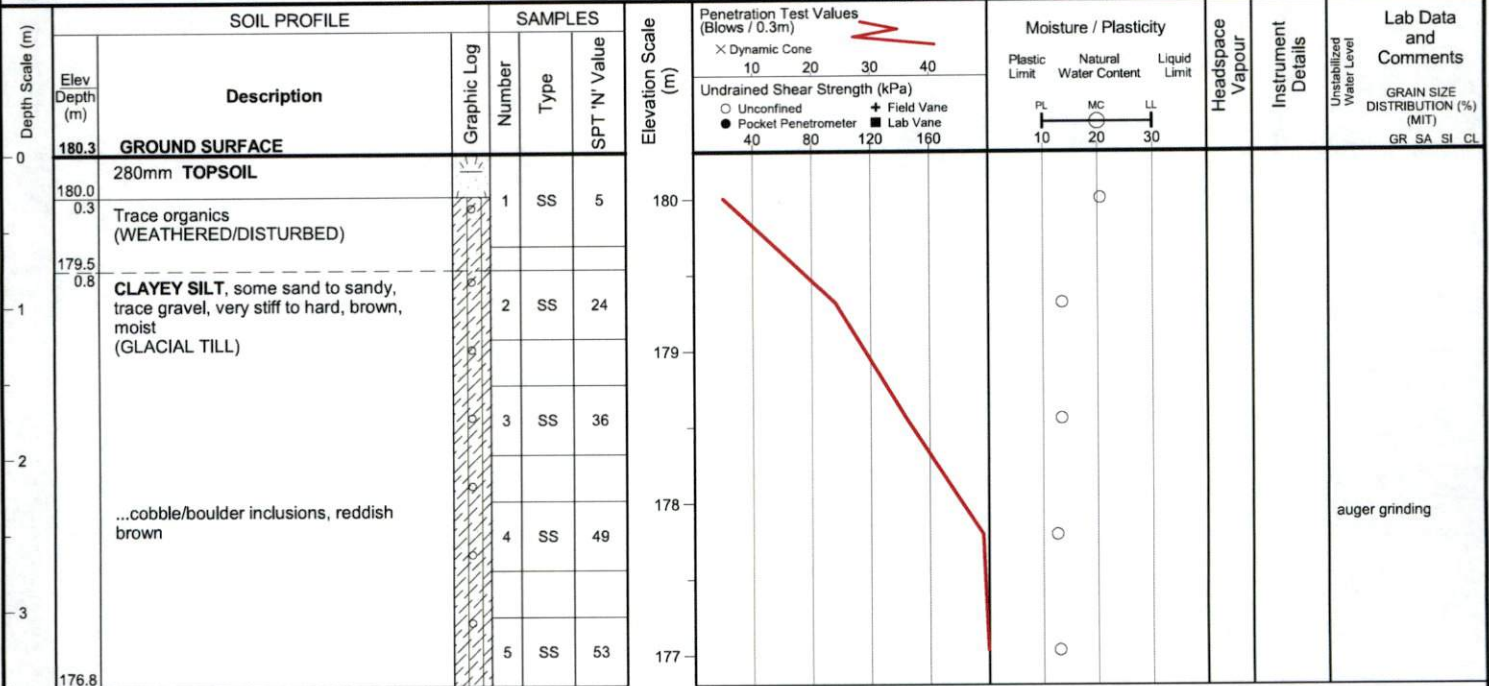
Sheet No. : 1 of 1

Position : E: 595992, N: 4812994 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant
 Project : Holy Family Catholic Cemetery
 Location : Milton, Ontario

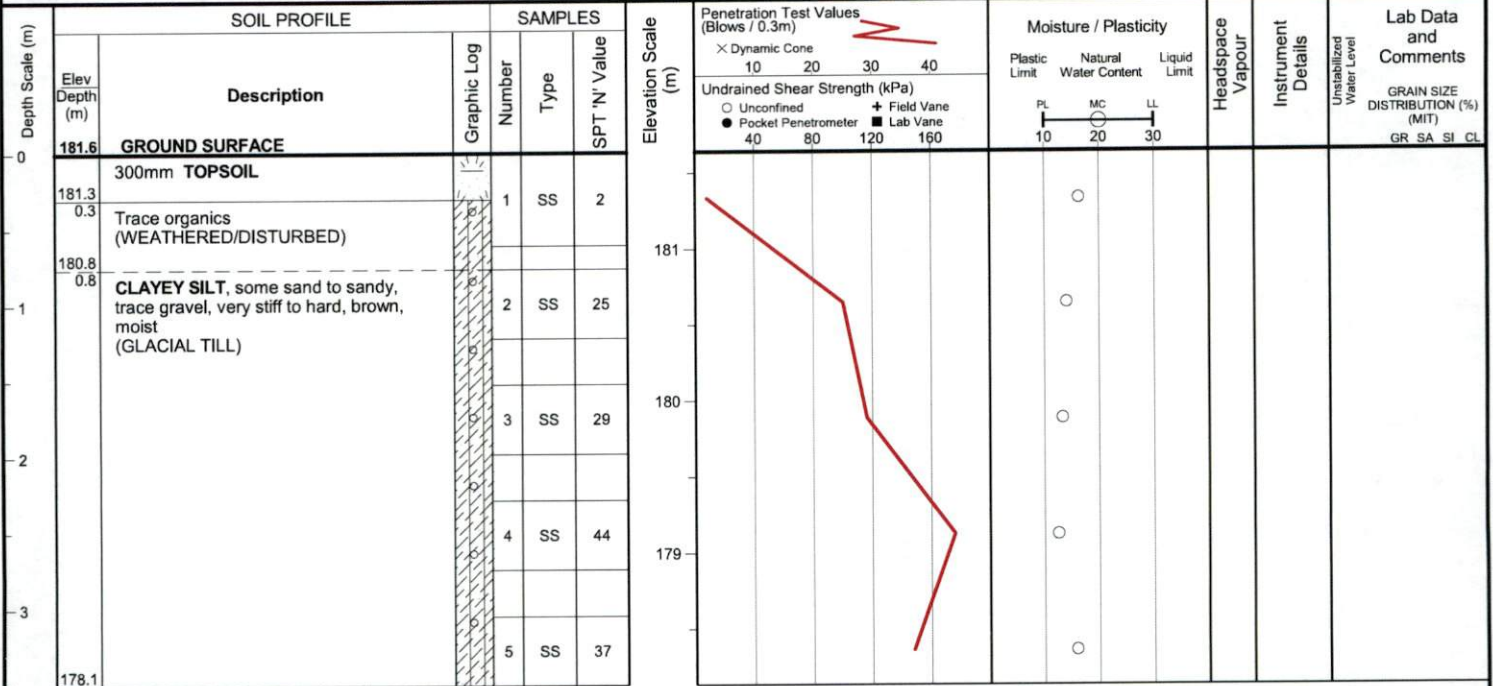
Project No.: 11-13-3165
 Date started : October 4, 2013
 Sheet No. : 1 of 1

Position : E: 595865, N: 4813157 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 4, 2013

Location : Milton, Ontario

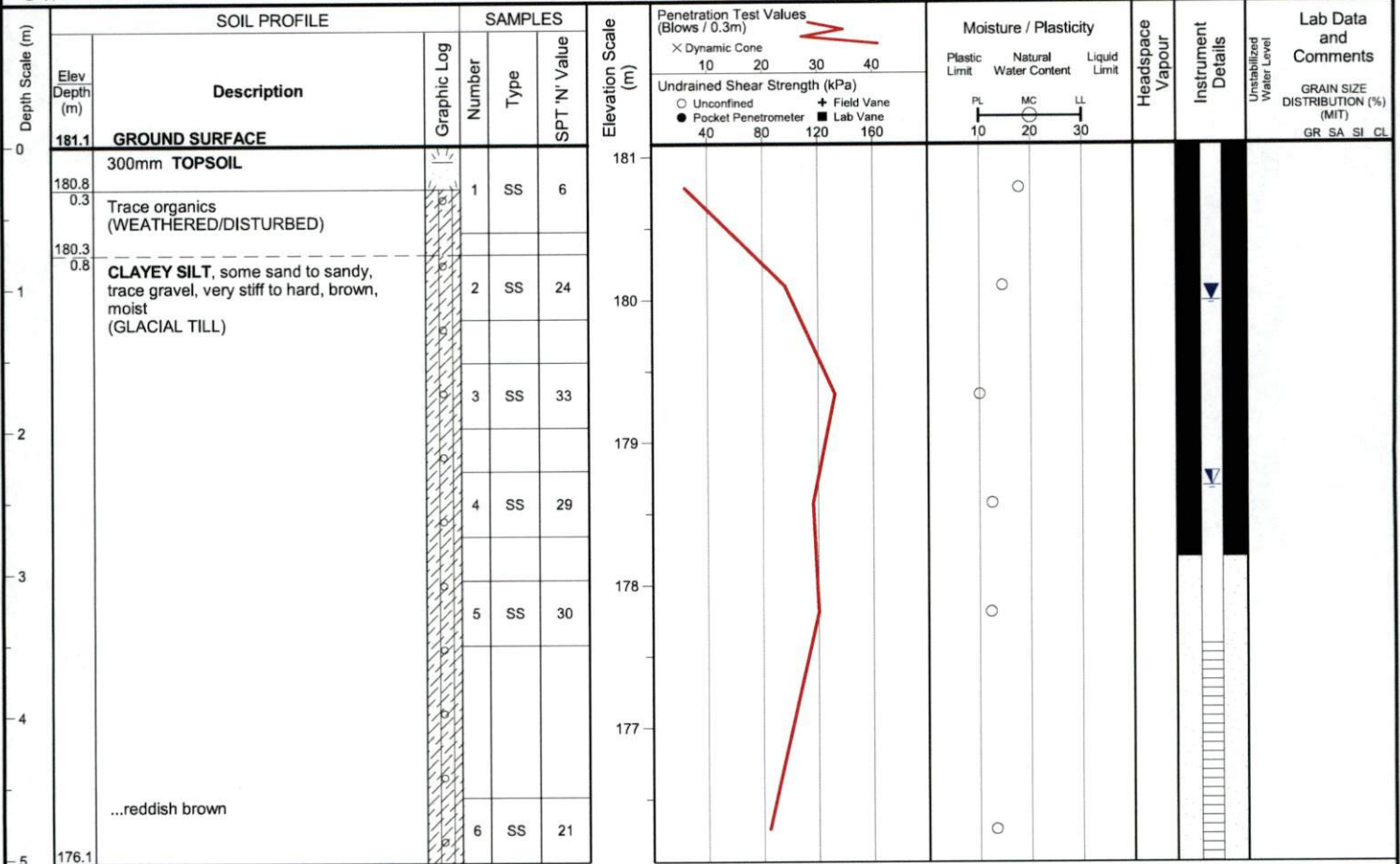
Sheet No. : 1 of 1

Position : E: 595815, N: 4813226 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	2.4	178.7
Nov 12, 2013	1.1	180.0



Client : Ken Dakin Land Use Planning Consultant
 Project : Holy Family Catholic Cemetery
 Location : Milton, Ontario

Project No. : 11-13-3165
 Date started : October 4, 2013
 Sheet No. : 1 of 1

Position : E: 595884, N: 4813274 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE		SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) × Dynamic Cone	Moisture / Plasticity			Headspace Vapour	Instrument Details	Lab Data and Comments
	Elev Depth (m)	Description	Graphic Log	Number	Type			SPT 'N' Value	Plastic Limit	Natural Water Content			
0	180.2	GROUND SURFACE											
		600mm TOPSOIL		1	SS	3							
	179.6	Trace organics (WEATHERED/DISTURBED)											
	179.4	CLAYEY SILT , some sand to sandy, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	26							
	0.8			3	SS	38							
		...cobble/boulder inclusions, reddish brown		4	SS	30							auger grinding
				5	SS	50 / 100mm							spoon bouncing
	176.9	END OF BOREHOLE											

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant
 Project : Holy Family Catholic Cemetery
 Location : Milton, Ontario

Project No. : 11-13-3165
 Date started : October 8, 2013
 Sheet No. : 1 of 1

Position : E: 595936, N: 4813286 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE		SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) × Dynamic Cone 10 20 30 40 Unconfined Shear Strength (kPa) ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane 40 80 120 160	Moisture / Plasticity			Headspace Vapour	Instrument Details	Lab Data and Comments <small>Unstabilized Water Level</small> GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
	Elev Depth (m)	Description	Graphic Log	Number	Type			SPT 'N' Value	Plastic Limit	Natural Water Content			
0	180.0	GROUND SURFACE											
	179.6	350mm TOPSOIL		1	SS	3							
	179.2	Trace organics (WEATHERED/DISTURBED)											
1	179.2	CLAYEY SILT , some sand to sandy, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	16						2 32 45 21	
				3	SS	37							
2				4	SS	35							
3				5	SS	33							
	176.5	END OF BOREHOLE											

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

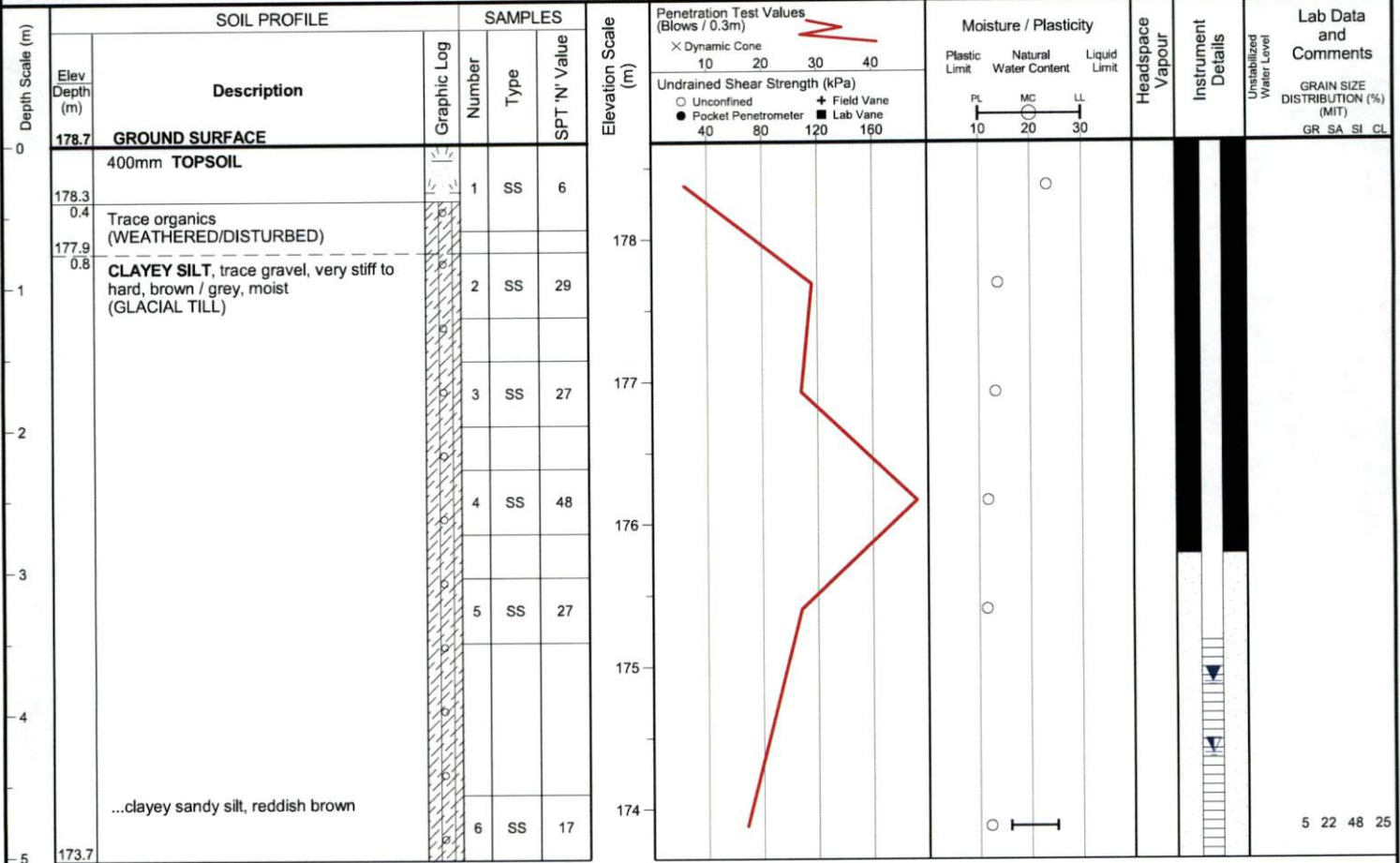
Sheet No. : 1 of 1

Position : E: 596073, N: 4813274 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	4.3	174.4
Nov 12, 2013	3.8	174.9



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

Sheet No. : 1 of 1

Position : E: 596287, N: 4813343 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers

Depth Scale (m)	SOIL PROFILE		SAMPLES			Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) × Dynamic Cone ○ Unconfined ● Pocket Penetrometer	Moisture / Plasticity			Headspace Vapour	Instrument Details	Lab Data and Comments Unstabilized Water Level GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
	Elev Depth (m)	Description	Graphic Log	Number	Type			SPT 'N' Value	Plastic Limit	Natural Water Content			
0	178.4	GROUND SURFACE											
	178.1	300mm TOPSOIL											
	0.3	Trace organics (WEATHERED/DISTURBED)		1	SS	7							
	177.6	CLAYEY SILT , some sand to sandy, trace gravel, very stiff to hard, brown, moist (GLACIAL TILL)		2	SS	22							
	0.8			3	SS	34							
				4	SS	35							
				5	SS	44							
				6	SS	16							5 19 50 26
		...reddish brown											
5	173.4	END OF BOREHOLE											
	5.0												

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

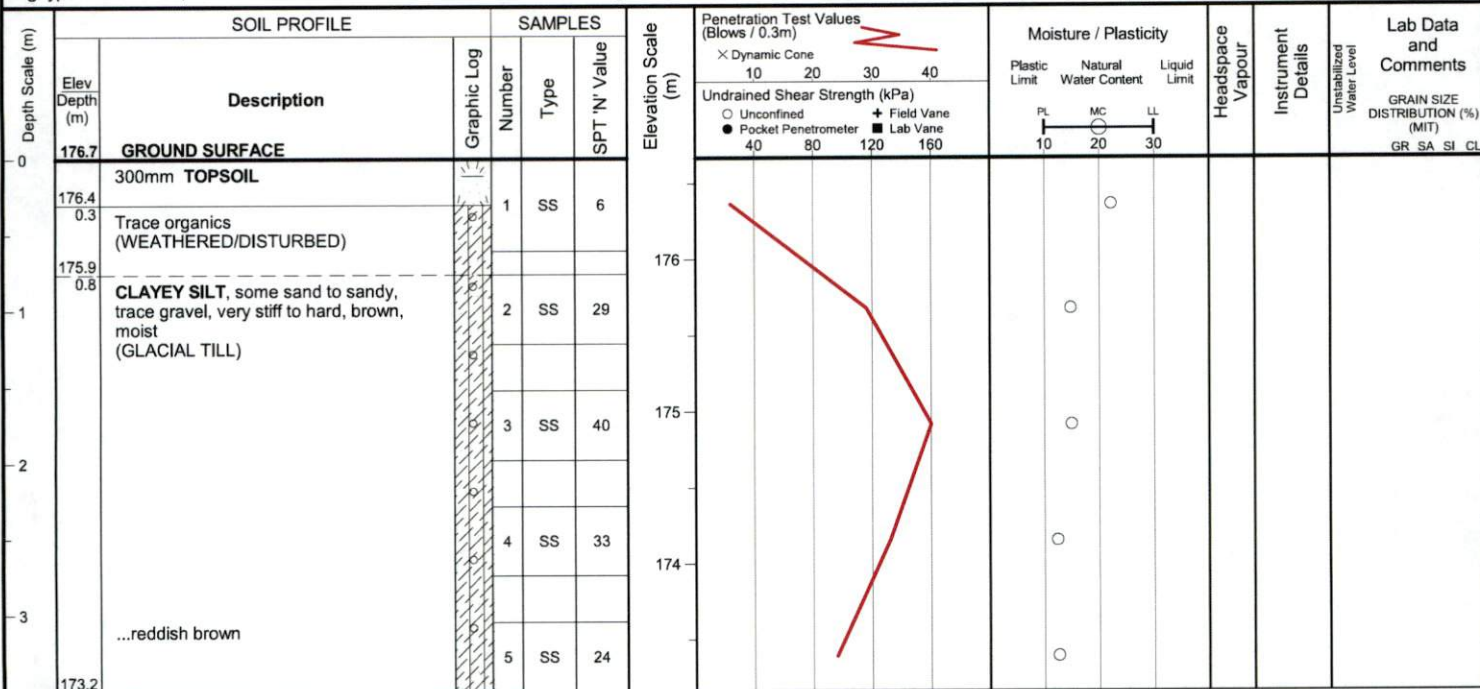
Sheet No. : 1 of 1

Position : E: 596147, N: 4813241 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

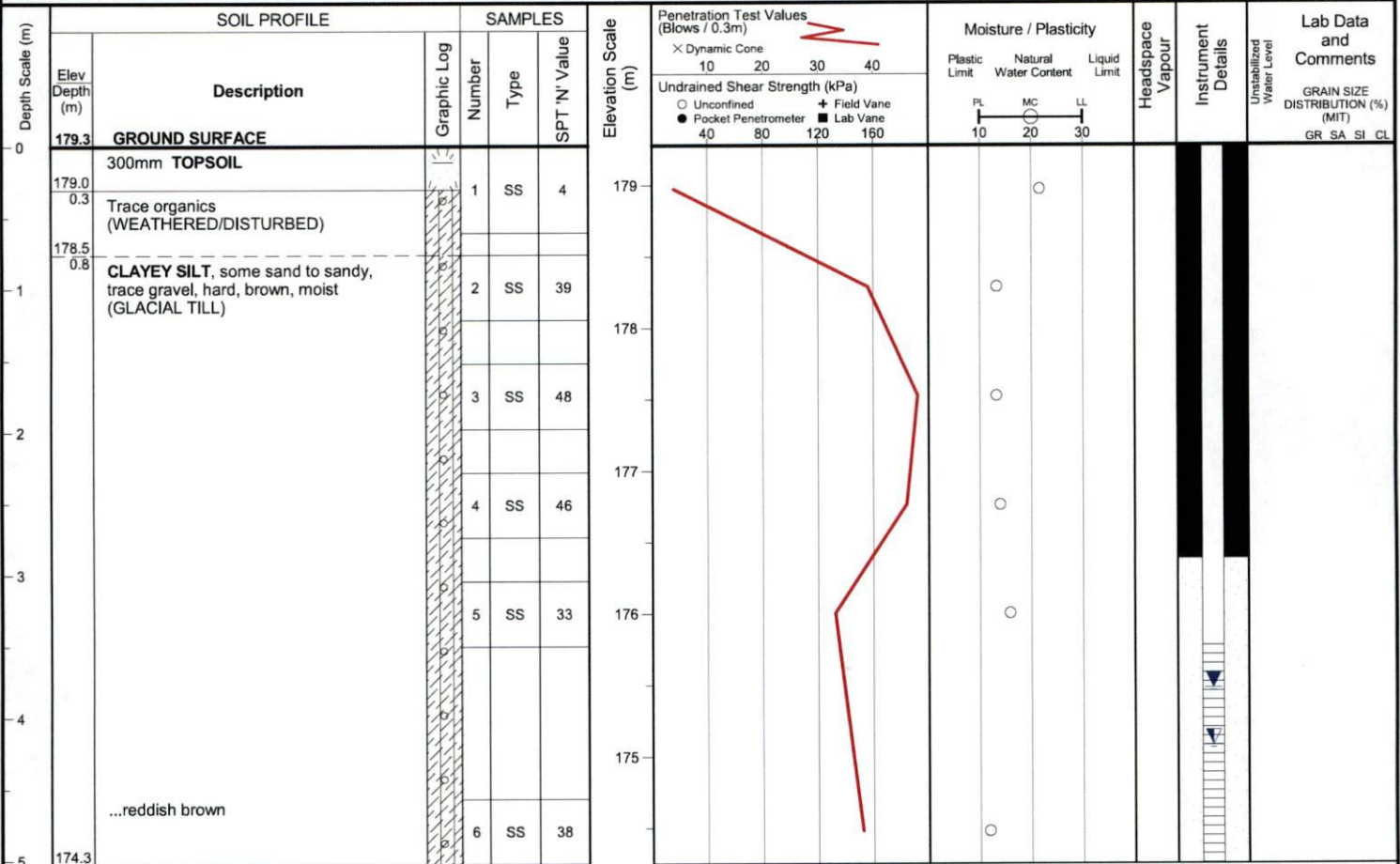
Sheet No. : 1 of 1

Position : E: 596138, N: 4813080 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	4.2	175.1
Nov 12, 2013	3.8	175.5



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 4, 2013

Location : Milton, Ontario

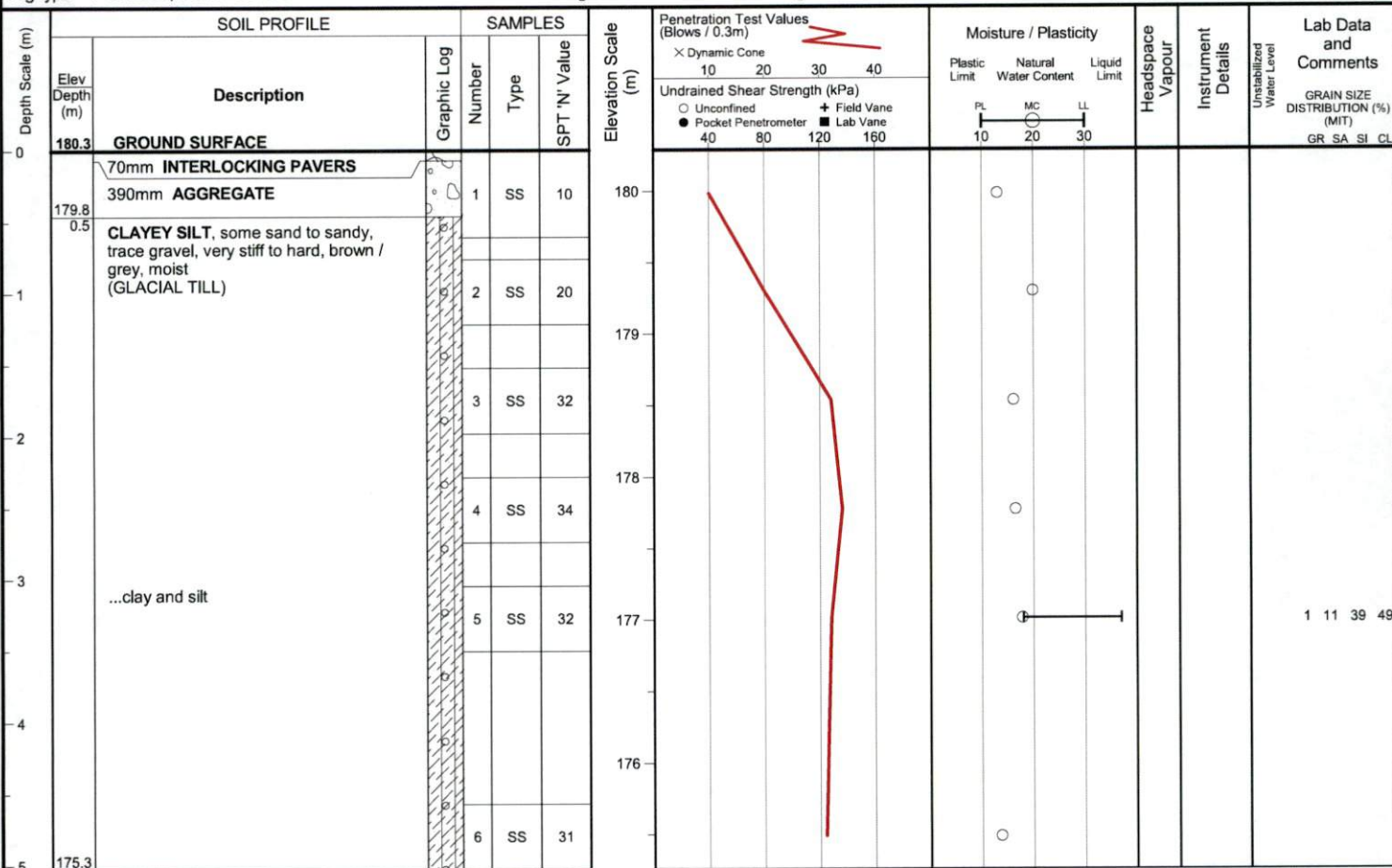
Sheet No. : 1 of 1

Position : E: 596139, N: 4813043 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 4, 2013

Location : Milton, Ontario

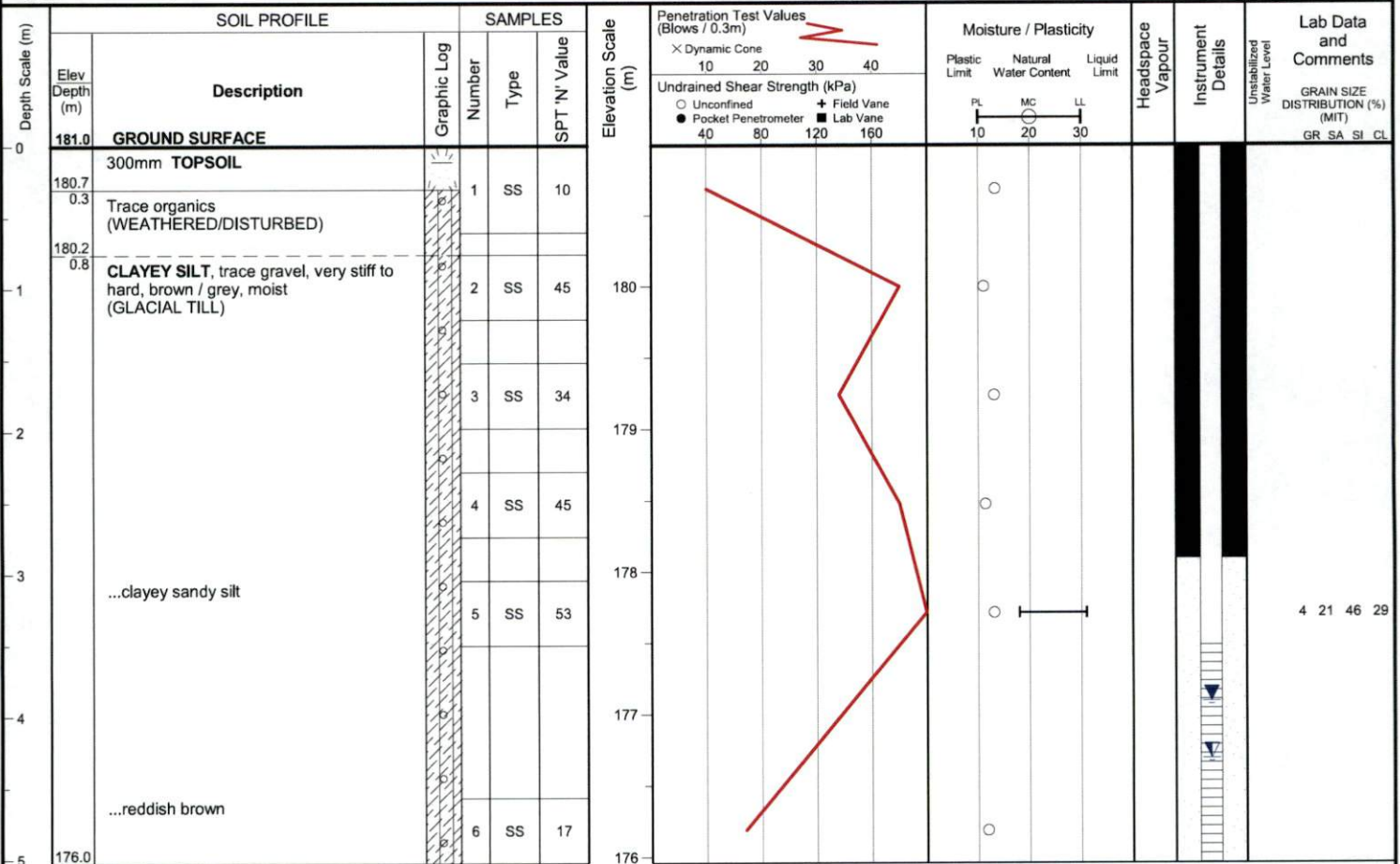
Sheet No. : 1 of 1

Position : E: 595980, N: 4813088 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	4.3	176.7
Nov 12, 2013	3.9	177.1



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 4, 2013

Location : Milton, Ontario

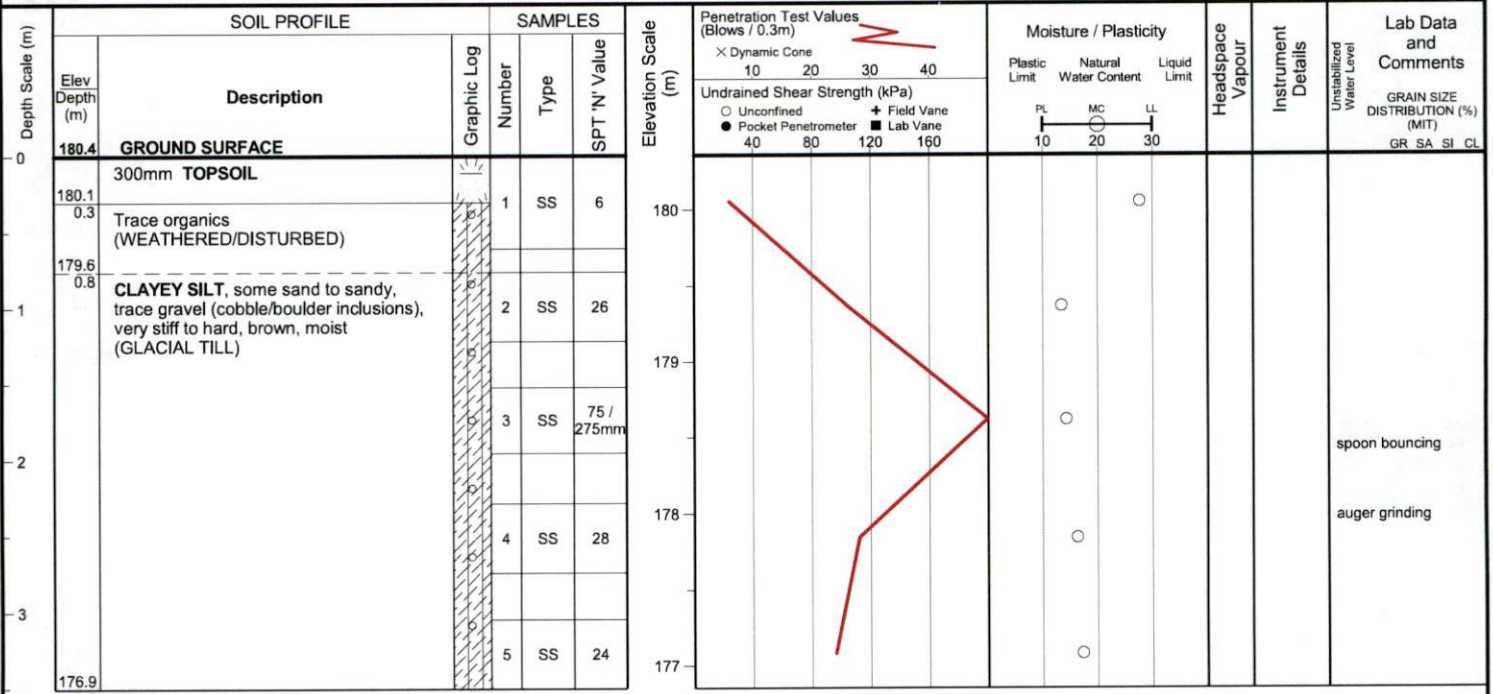
Sheet No. : 1 of 1

Position : E: 596000, N: 4813159 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

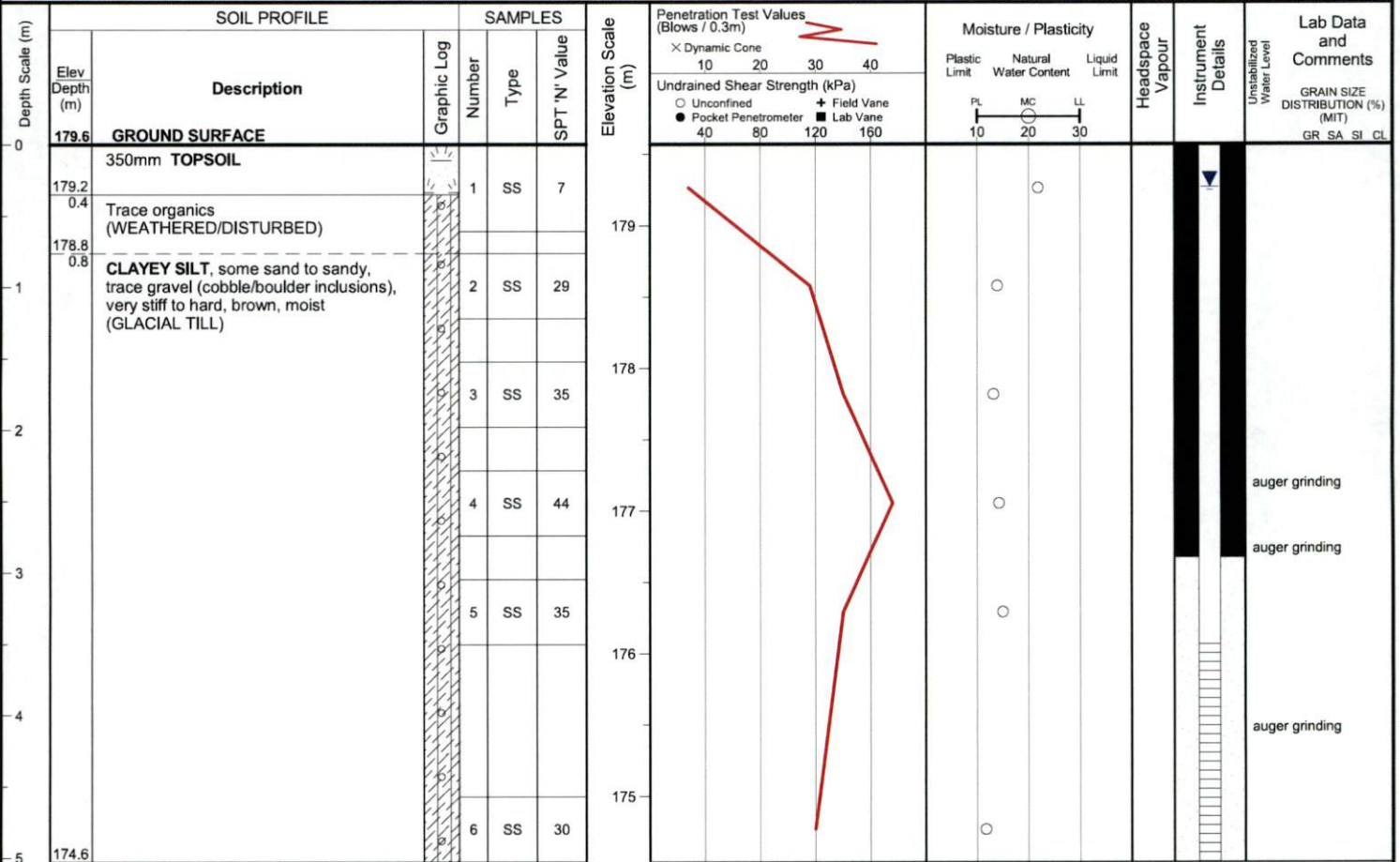
Sheet No. : 1 of 1

Position : E: 595959, N: 4813276 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.
19 mm piezometer installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	0.3	179.3
Nov 12, 2013	0.3	179.3



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

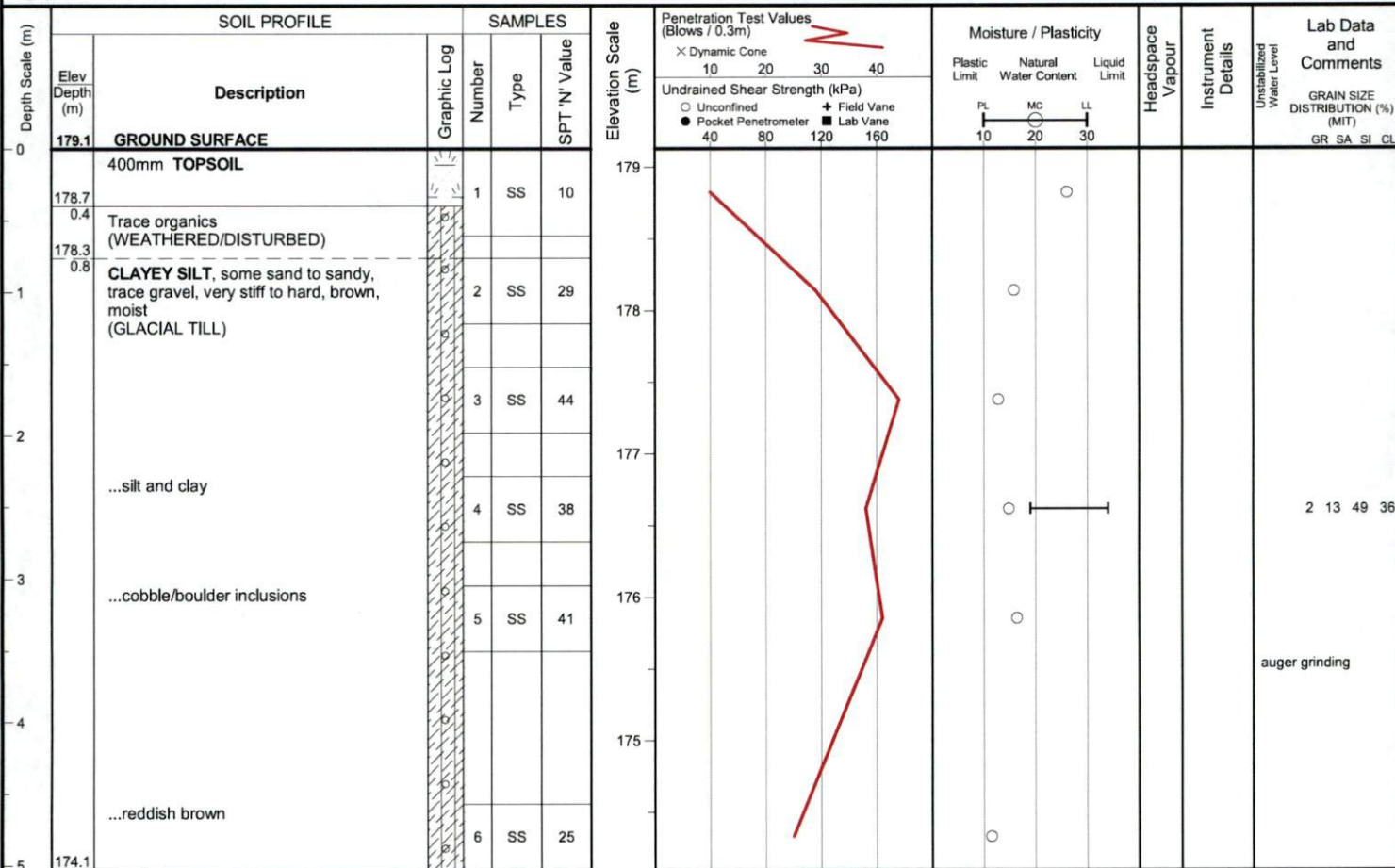
Sheet No. : 1 of 1

Position : E: 596045, N: 4813240 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No. : 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 8, 2013

Location : Milton, Ontario

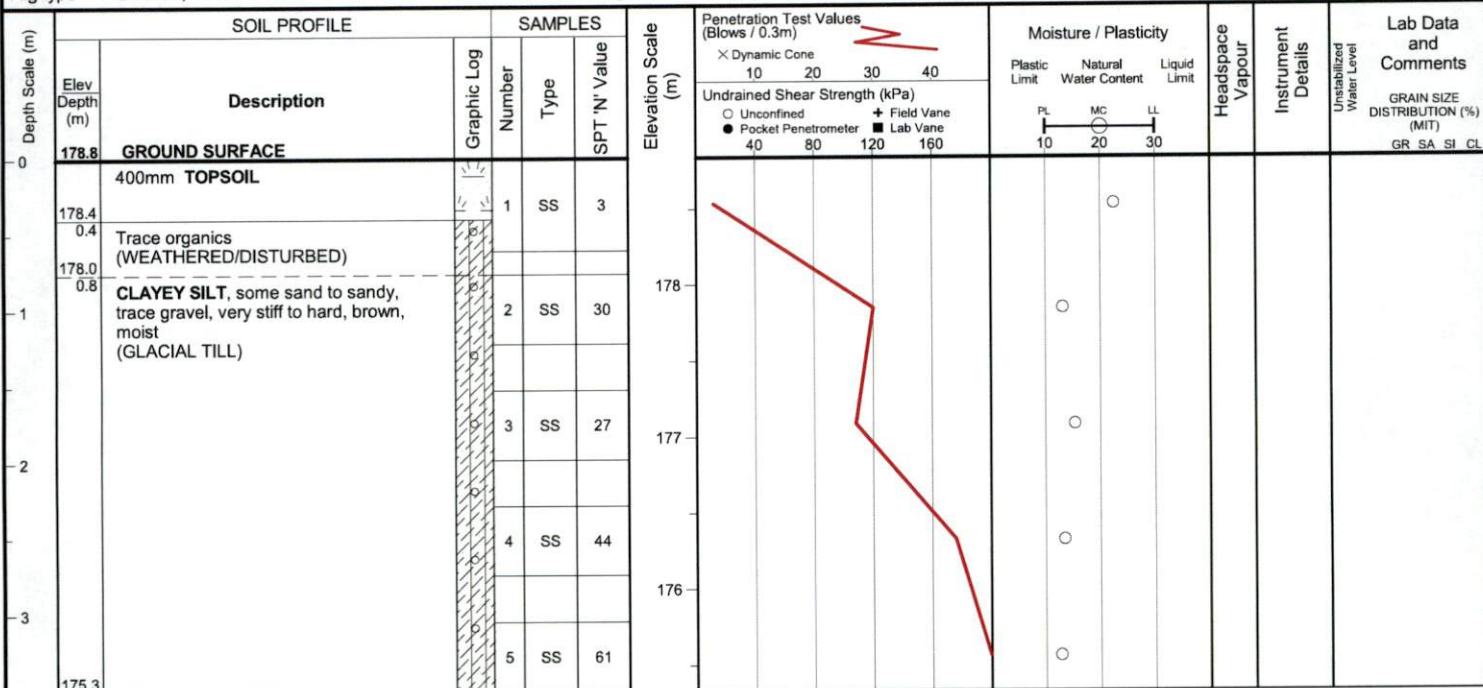
Sheet No. : 1 of 1

Position : E: 596080, N: 4813252 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

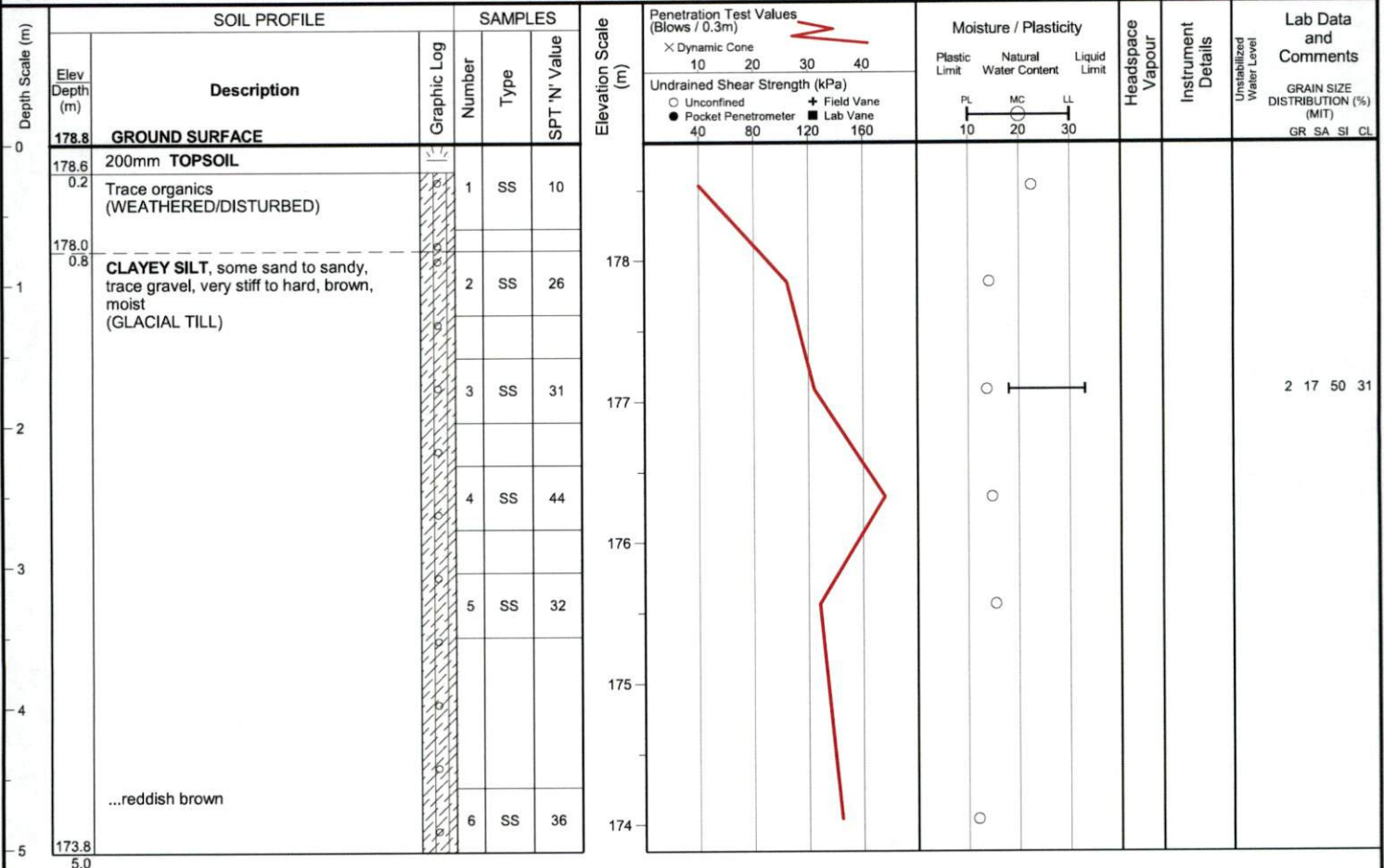
Sheet No. : 1 of 1

Position : E: 596087, N: 4813206 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.



Client : Ken Dakin Land Use Planning Consultant

Project No.: 11-13-3165

Project : Holy Family Catholic Cemetery

Date started : October 7, 2013

Location : Milton, Ontario

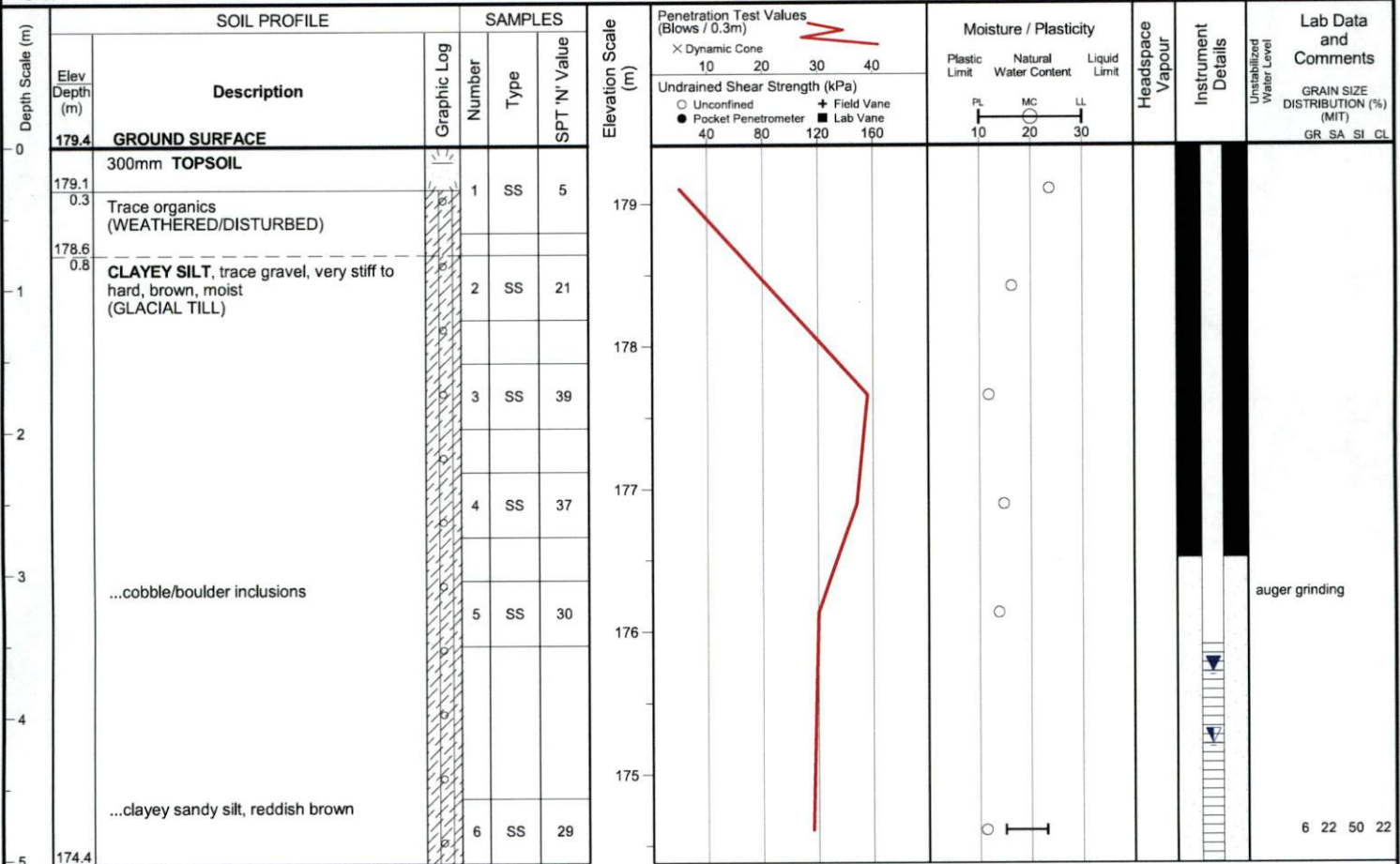
Sheet No. : 1 of 1

Position : E: 596069, N: 4813177 (UTM 17T)

Elevation Datum : Geodetic

Rig type : CME 55, track-mounted

Drilling Method : Solid stem augers



END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

19 mm piezometer installed.

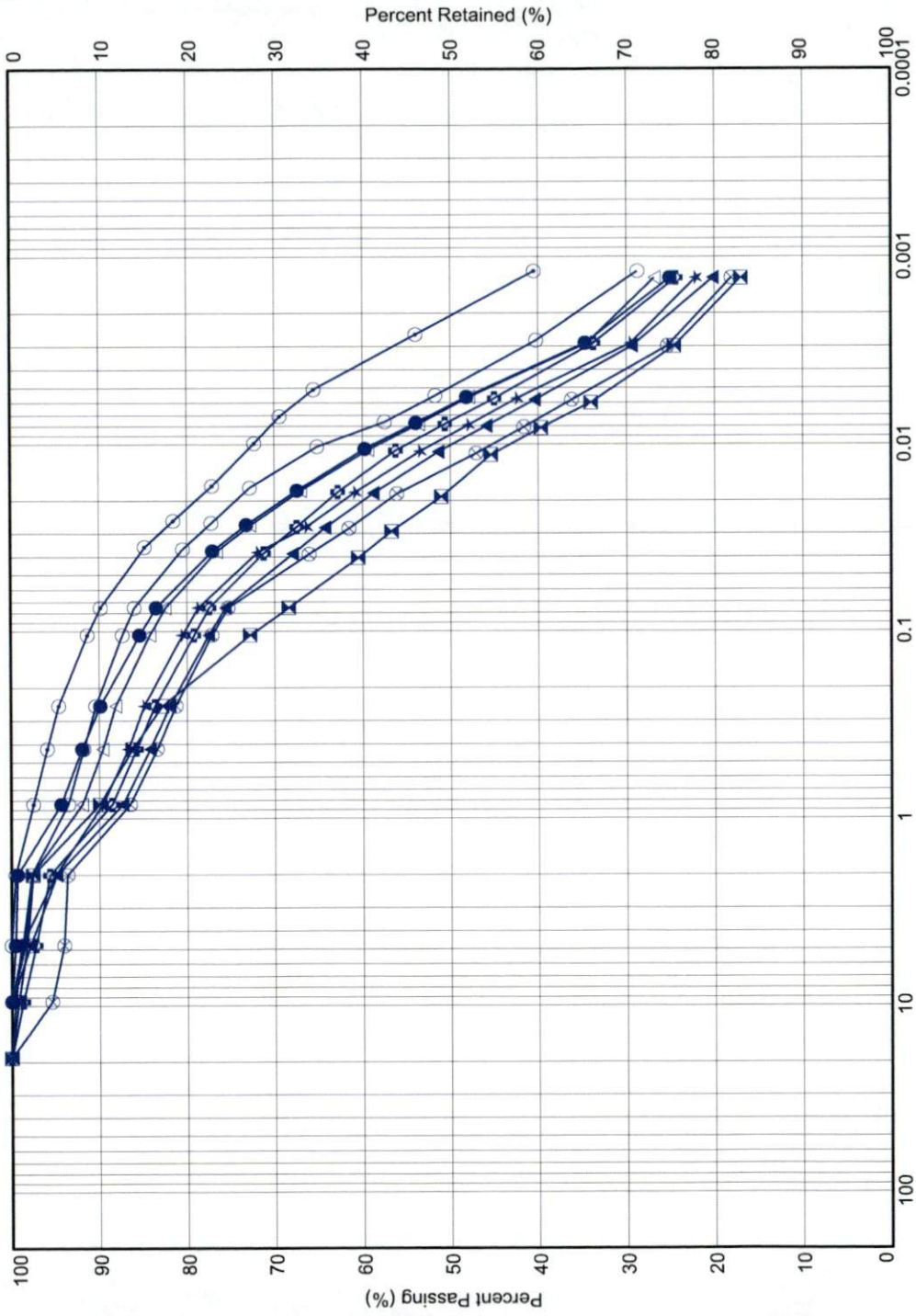
WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Oct 24, 2013	4.2	175.2
Nov 12, 2013	3.7	175.7

SIEVE AND HYDROMETER ANALYSIS

TERRAPROBE INC.





MIT SYSTEM	COBBLES		GRAVEL		SAND			SILT	CLAY
	COARSE	MEDIUM	COARSE	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	(Fines, %)
1	SS2	1.0	179.9	1	18	51	30	
8	SS2	1.0	179.0	2	32	45	21	
9	SS6	4.8	173.9	5	22	48	25	
10	SS4	2.5	175.9	5	19	50	26	
13	SS5	3.3	177.0	1	11	39	49	
14	SS5	3.3	177.7	4	21	46	29	
17	SS4	2.5	176.6	2	13	49	36	
19	SS3	1.8	177.1	2	17	50	31	
20	SS6	4.8	174.6	6	22	50	22	

Title:

**GRAIN SIZE DISTRIBUTION
CLAYEY SILT TO SILT AND CLAY TILL**



11 Indell Lane, Brampton, Ontario L6T 3Y3
(905) 796-2650

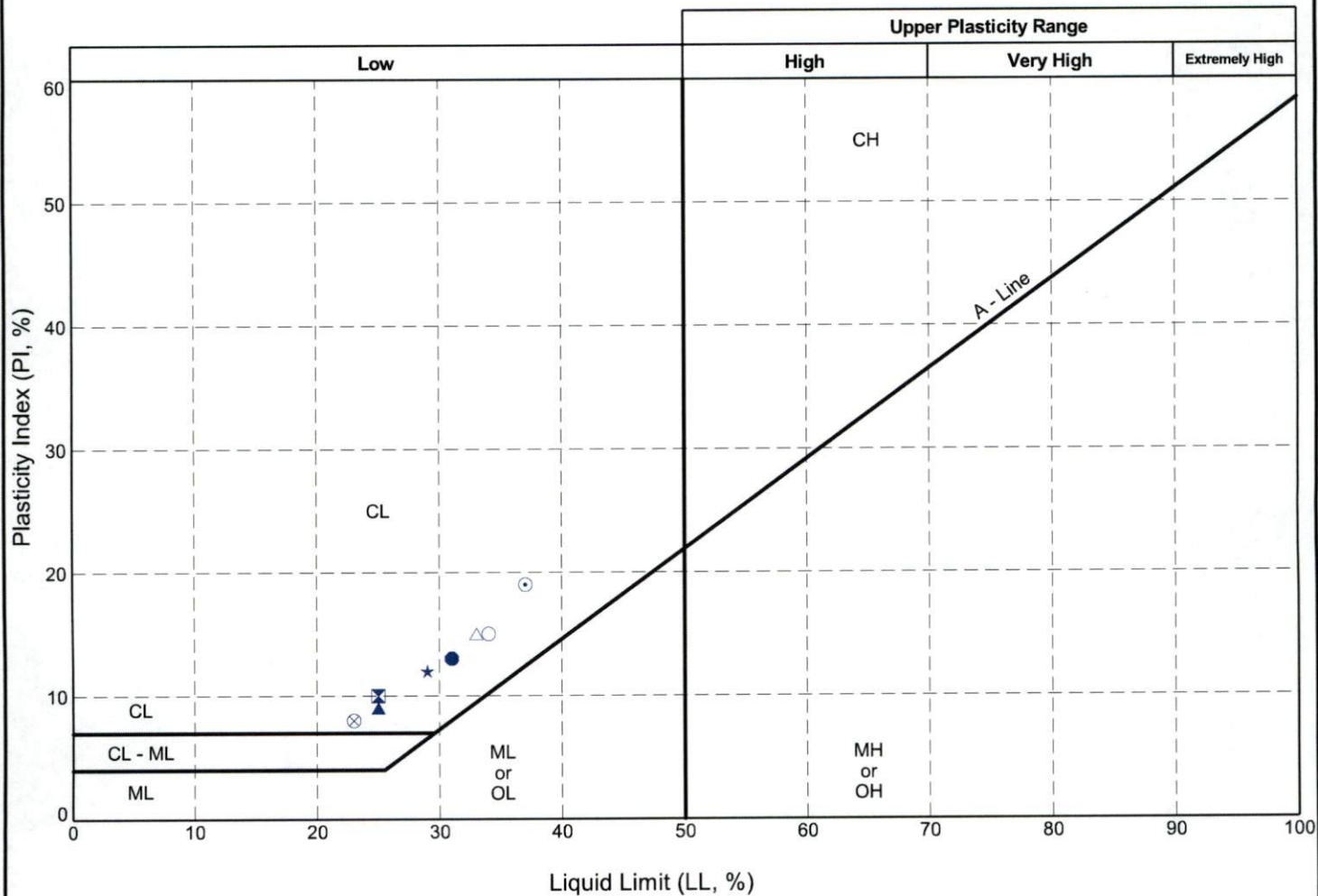
File No.:

11-13-3165

ATTERBERG LIMITS TEST RESULTS

TERRAPROBE INC.





Borehole	Sample	Depth (m)	Elev. (m)	LL (%)	PL (%)	PI (%)	Description
● 1	SS2	1.0	179.9	31	18	13	SLIGHTLY PLASTIC
⊠ 8	SS2	1.0	179.0	25	15	10	SLIGHTLY PLASTIC
▲ 9	SS6	4.8	173.9	25	16	9	SLIGHTLY PLASTIC
★ 10	SS4	2.5	175.9	29	17	12	SLIGHTLY PLASTIC
⊙ 13	SS5	3.3	177.0	37	18	19	MEDIUM PLASTIC
⊕ 14	SS5	3.3	177.7	31	18	13	SLIGHTLY PLASTIC
○ 17	SS4	2.5	176.6	34	19	15	SLIGHTLY PLASTIC
△ 19	SS3	1.8	177.1	33	18	15	SLIGHTLY PLASTIC
⊗ 20	SS6	4.8	174.6	23	15	8	SLIGHTLY PLASTIC



Terraprobe

11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

ATTERBERG LIMITS CHART

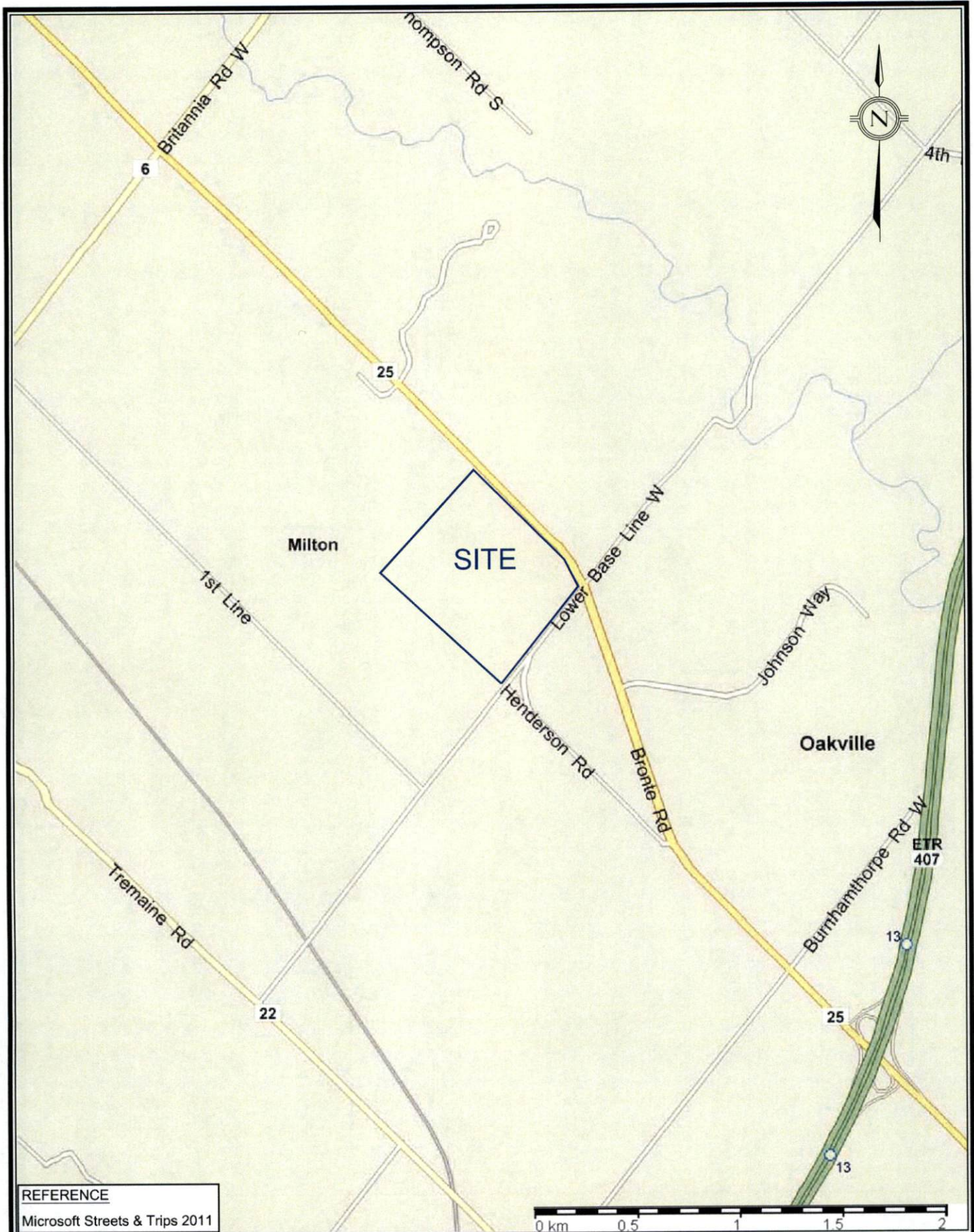
File No.:

11-13-3165

FIGURES

TERRAPROBE INC.





REFERENCE
Microsoft Streets & Trips 2011



Terraprobe
11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

Title:	SITE LOCATION PLAN
File No.	11-13-3165

FIGURE :
1

\\ppl\server\project\11-13-3165\11-13-3165.dwg, Logp\Auto\Auto\11-13-3165\11-13-3165.dwg, 11-13-3165.dwg, 11-13-3165.dwg

SUPPLEMENTARY CONDITIONS

The Standard Construction Document CCDC-2 2008 for Stipulated Price Contract, English version, consisting of the Agreement Between *Owner* and *Contractor*, Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, governing same is hereby made part of these *Contract Documents*, with the following amendments, additions and modifications.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-3 – CONTRACT DOCUMENTS

3.1 Add the following to the list of *Contract Documents* in paragraph 3.1:

- CCDC 2 – 2008, Supplementary Conditions
- *General Specifications*
- Technical Specifications
- Drawings
- Tender Addenda
- Tender

ARTICLE A-5 – PAYMENT

5.1 Amend the first sentence of paragraph 5.1, so that it reads as follows:

Subject to the provisions of the *Contract Documents*, and in accordance with legislation and statutory regulations respecting holdback percentages and where such legislation or regulations do not exist or apply, subject to a holdback of 10% and subject to a 2% deficiency holdback (if deficiency exists) to the Owner moneys shall be in Canadian funds.

5.1.3 Amended paragraph 5.1.3 so that it reads as follows:

Upon receipt of the Consultant's final certificate for payment, pay to the *Contractor* the unpaid balance of the Contract Price Less the 2% holdback for deficiency issues as per 5.1 accumulated from previous progress draws to the contract

5.3.1 Delete paragraph 5.3.1 and 5.3.2 in its entirety.

ARTICLE A-9 – CONFLICT OF INTEREST

Add new Article A-9 – Conflict of Interest:

9.1 The *Contractor*, all of the *Subcontractors*, and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the *Owner*) with the provision of the *Work* pursuant to the *Contract*. The

Contractor acknowledges and agrees that a conflict of interest includes the use of *Confidential Information* where the *Owner* has not specifically authorized such use.

- 9.2 The *Contractor* shall disclose to the *Owner*, in writing, without delay any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any *Subcontractor* or *Supplier* that is directly or indirectly affiliated with or related to the *Contractor*.
- 9.3 The *Contractor* covenants and agrees that it will not hire or retain the services of any employee or previous employee of the *Owner* where to do so constitutes a breach by such employee or previous employee of the employee or previous employee's employment contract or the previous employer's conflict of interest policy, as it may be amended from time to time.
- 9.4 A breach of this Article by the *Contractor*, any of the *Subcontractors*, or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the *Owner* to terminate the *Contract*, in addition to any other rights and remedies that the *Owner* has in the *Contract*, in law, or in equity.

ARTICLE A-10 – CONFIDENTIALITY

Add new Article A-10 – Confidentiality:

- 10.1 The *Contractor* agrees to ensure that it shall, both during or following the term of the *Contract*, maintain the confidentiality and security of all *Confidential Information* and *Personal Information*, and that it shall not directly or indirectly disclose, destroy, exploit, or use any *Confidential Information* or *Personal Information*, except where required by law, without first obtaining the written consent of the *Owner*. The *Contractor* may disclose any portion of the *Contract Documents* or any other information provided to the *Contractor* by the *Owner* to any *Subcontractor* or *Supplier* if the *Contractor* discloses only such information as is necessary to fulfill the purposes of the *Contract* and the *Contractor* has included a commensurate confidentiality provision in its contract with the *Subcontractor* or *Supplier*. The *Contractor* acknowledges that it will comply with all requirements at law with respect to the handling of *Personal Information* and *Confidential Information*. The *Contractor* acknowledges that the *Owner* is bound by the provisions of the *Municipal Freedom of Information and Protection of Privacy Act* ("MFIPPA"). The *Contractor* further acknowledges that the *Owner* may be required to disclose any or all of the *Confidential Information* and *Personal Information* in the event that it is compelled to do so by law, through a request under MFIPPA, or by the rules of any applicable regulatory authority.

DEFINITIONS

Add the following definitions:

- 0. As-Built Drawings**

As-Built Drawings means drawings prepared by the Contractor by marking on a copy of the Drawings the changes from the Drawings which occur during construction including, but are not limited to the exact location of major building components that were shown generally on the Drawings.

2a. Confidential Information

Confidential Information means all the information or material of the *Owner* that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description (such as drawings and move-lists) which is communicated to or comes into the possession or control of the *Contractor* at any time, but *Confidential Information* shall not include information that:

- 1) is or becomes generally available to the public without fault or breach on the part of the *Contractor*, including without limitation breach of any duty of confidentiality owed by the *Contractor* to the *Owner* or to any third party, but only after that information becomes generally available to the public;
- 2) the *Contractor* can demonstrate to have been rightfully obtained by the *Contractor* from a third party who had the right to transfer or disclose it to the *Contractor* free of any obligation of confidence;
- 3) the *Contractor* can demonstrate to have been rightfully known to or in the possession of the *Contractor* at the time of disclosure, free of any obligation of confidence; or
- 4) is independently developed by the *Contractor* without use of any *Confidential Information*.

12b. Personal Information

Personal Information has the same definition as in subsection 2(1) of *MFIPPA* and includes an individual's name, address, age, date of birth, sex, and religion, whether recorded in printed form, on film, by electronic means, or otherwise and disclosed to the *Contractor*.

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

1.1 Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

GC 1.1 CONTRACT DOCUMENTS

.1 Add new sentence to the end of paragraph 1.1.6:

The *Specifications* are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the *Contract Documents* will be construed to place

responsibility on the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* or as between them and the *Contractor* with respect to such divisions.

.2 Add new subparagraph 1.1.7.5:

1.1.7.5 noted materials and annotations shall take precedence over graphic indications.

.3 Delete paragraph 1.1.8 in its entirety and substitute new paragraph 1.1.8:

1.1.8 The *Owner* shall provide the *Contractor*, without charge, three (3) copies of the *Contract Documents*.

GC 1.3 RIGHTS AND REMEDIES

.1 Delete the word "No" from the beginning of paragraph 1.3.2 and substitute the words:

"Except with respect to the notice requirements set out in paragraphs 6.4.1, 6.5.4, and 6.6.1, no ...".

GC 1.4 ASSIGNMENT

.1 Delete paragraph 1.4.1 in its entirety and substitute new paragraph 1.4.1:

1.4.1 The *Owner* may assign the *Contract* or a portion thereof without the consent of the *Contractor*. The *Contractor* may not assign the *Contract* or a portion thereof without the consent of the *Owner*, and the granting of such consent shall be in the *Owner's* absolute discretion.

GC 2.4 DEFECTIVE WORK

.1 Add new subparagraphs 2.4.1.1 and 2.4.1.2:

2.4.1.1 The *Contractor* shall rectify, in a manner acceptable to the *Owner* and the *Consultant*, all defective work and deficiencies throughout the *Work*, whether or not they are specifically identified by the *Owner* or the *Consultant*.

2.4.1.2 When applicable, the *Contractor* shall give priority to the correction of any defective work or deficiencies which the *Owner* determines adversely affect its day-to-day operations.

GC 3.1 CONTROL OF THE WORK

.1 Add new paragraph 3.1.3:

3.1.3 Prior to commencing the *Work*, the *Contractor* shall verify, at the *Place of the Work*, all relevant measurements and levels necessary for the proper completion of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included or exact locations are not apparent in the *Contract Documents*, the *Contractor* shall immediately notify the *Consultant* in writing and obtain *Supplemental Instructions* from the *Consultant* before proceeding with any part of the affected work.

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

- .1 Delete subparagraph 3.2.2.1 in its entirety
- .2 Delete subparagraph 3.2.2.2 in its entirety
- .3 Add new subparagraph 3.2.3.4:

3.2.3.4 Subject to General Condition 9.4 - CONSTRUCTION SAFETY, where paragraph 3.2.4 of General Condition 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS applies, for the *Owner's* own forces and for other contractors performing work identified in the *Contract Documents*, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in the *Place of the Work*, including all of the responsibilities of the constructor as that term is defined in the *Occupational Health and Safety Act*.

GC 3.4 DOCUMENT REVIEW

- .1 Delete paragraph 3.4.1 in its entirety and substitute new paragraph 3.4.1:

3.4.1 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* shall be undertaken with the standard of care described in paragraph 3.14.1 of the *Contract*. The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered through the exercise of the required standard of care. If the *Contractor* does discover any error, inconsistency, or omission in the *Contract Documents*, the *Contractor* shall not proceed with the work affected until the *Contractor* has

received corrected or missing information from the *Consultant*.

.2 Add new paragraph 3.4.2:

3.4.2 If, at any time, the *Contractor* finds errors, inconsistencies, or omissions in the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, the *Contractor* shall immediately notify the *Consultant*, and request a *Supplemental Instruction, Change Order, or Change Directive*, as the case may require. Neither the *Owner* nor the *Consultant* will be responsible for the consequences of any action of the *Contractor* based on oral instructions.

GC 3.5 CONSTRUCTION SCHEDULE

.1 Delete paragraph 3.5.1 in its entirety and substitute new paragraph 3.5.1:

3.5.1 The *Contractor* shall,

.1 within 15 days following the award of the *Contract*, prepare and submit to the *Owner* and the *Consultant* for their review and acceptance, a construction schedule that indicates the timing of the activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time* and in accordance with the *Contract Documents*. Unless otherwise agreed to in writing, in advance by the *Owner* and the *Contractor*, when required by the *Specifications* to employ construction scheduling software, the *Contractor* shall employ the software Microsoft Project or a comparable software as acceptable to the *Consultant* or the *Owner*, in generating the construction schedule, which permits the progress of the *Work* to be monitored in relation to the critical path established in the schedule. The *Contractor* shall provide the construction schedule and any successor or revised schedules to the *Owner* in electronic format and paper copy. When required by the *Specifications* to employ construction scheduling software, the *Contractor* shall provide the construction schedule to the *Owner* in editable format, together with a record version in PDF format. Once accepted by the *Owner* and the *Consultant*, the construction schedule submitted by the *Contractor* shall become the baseline construction schedule;

- .2 provide the expertise and resources, such resources including manpower and equipment, as are necessary to maintain progress under the accepted baseline construction schedule or any successor or revised schedule accepted by the *Owner* pursuant to General Condition 3.5 – CONSTRUCTION SCHEDULE;
 - .3 monitor the progress of the *Work* on a weekly basis relative to the baseline construction schedule, or any successor or revised schedule accepted by the *Owner* pursuant to General Condition 3.5 – CONSTRUCTION SCHEDULE, update the schedule on a bi-weekly basis and advise the *Consultant* and the *Owner* in writing of any variation from the baseline or slippage in the schedule; and
 - .4 if, after applying the expertise and resources required under subparagraph 3.5.1.2, the *Contractor* forms the opinion that the variation or slippage in schedule reported pursuant to subparagraph 3.5.1.3 cannot be recovered by the *Contractor*, it shall, in the same notice, indicate to the *Consultant* and the *Owner* if the *Contractor* intends to apply for an extension of *Contract Time* as provided in PART 6 of the General Conditions - CHANGES IN THE WORK.
- .2 Add new paragraph 3.5.2:
- 3.5.2 If, at any time, it should appear to the *Owner* or the *Consultant* that the actual progress of the *Work* is behind schedule or is likely to become behind schedule, or if the *Contractor* has given notice of such to the *Owner* or the *Consultant* pursuant to subparagraph 3.5.1.3, the *Contractor* shall take appropriate steps to cause the actual progress of the *Work* to conform to the schedule or minimize the resulting delay and shall produce and present to the *Owner* and the *Consultant* a recovery plan demonstrating how the *Contractor* will achieve the recovery of the schedule. If the *Contractor* intends to apply for a change in the *Contract Price* in relation to a schedule recovery plan, then the *Contractor* shall proceed in accordance with General Condition 6.5 – DELAYS.

GC 3.6 SUPERVISION

- .1 Delete paragraph 3.6.1 in its entirety and substitute new paragraph 3.6.1:
- 3.6.1 The *Contractor* shall provide all necessary supervision and appoint competent representatives who shall be in attendance at the *Place of the Work* while work is being

performed. The appointed representatives shall not be changed except for valid reasons, and upon the *Contractor* obtaining the *Owner's* written consent, which consent will not be unreasonably withheld.

.2 Add new paragraph 3.6.3:

3.6.3 The *Owner* may, at any time during the course of the *Work*, request the replacement of the appointed representative(s), where the grounds for the request involve conduct which jeopardizes the safety and security of the site or the *Owner's* operations. Immediately upon receipt of the request, the *Contractor* shall make arrangements to appoint an acceptable replacement.

GC 3.8 LABOUR AND PRODUCTS

.1 Delete paragraph 3.8.2 and replace with new paragraph 3.8.2:

3.8.2 Unless otherwise specified in the Contract Documents, Products provided shall be new and as specified. The *Contractor* shall not provide substitutions for specified Products without the express written consent of the Consultant and the Owner.

GC 3.11 USE OF THE WORK

.1 Add new paragraph 3.11.3:

3.11.3 The *Contractor* shall abide by and enforce directives and policies of the *Owner* and the County of Brant, including any by-laws, regarding signs, advertisements, fires and smoking at the *Place of the Work* as directed by the *Owner* or required by law.

Add new General Conditions 3.14 and 3.15:

GC 3.14 PERFORMANCE BY CONTRACTOR

3.14.1 In performing its services and obligations under the *Contract*, the *Contractor* shall exercise the standard of care, skill, and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The *Contractor* acknowledges and agrees that throughout the *Contract*, the performance of the *Contractor's* obligations, duties, and responsibilities shall be judged against this standard. The *Contractor* shall exercise the same standard of care, skill, and diligence in

respect of any *Products*, personnel, or procedures which it may recommend to the *Owner*.

3.14.2 The *Contractor* further represents, covenants and warrants to the *Owner* that:

- .1 the personnel it assigns to the *Project* are appropriately experienced;
- .2 it has a sufficient staff of qualified and competent personnel to replace any of its appointed representatives, subject to the *Owner's* approval, in the event of death, incapacity, removal or resignation; and
- .3 there are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the *Contractor* to perform its work under the *Contract*.

GC 3.15 RIGHT OF ENTRY

3.15.1 The *Owner* shall have the right to enter or occupy the *Work* in whole or in part for the purpose of placing fittings and equipment or for other uses before *Substantial Performance of the Work*, if, in the reasonable opinion of the *Consultant* and *Contractor*, such entry or occupation does not prevent or substantially interfere with the *Contractor's* completion of the *Contract* within the *Contract Time*. Such entry or occupation shall not be considered as acceptance of the *Work* or in any way relieve the *Contractor* from responsibility to complete the *Contract*.

GC 4.1 CASH ALLOWANCES

.1 Delete paragraph 4.1.4 in its entirety and substitute new paragraph 4.1.4:

4.1.4 Where the actual cost of the *Work* under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, at the *Owner's* direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the *Contract Price* for overhead and profit. Only where the actual cost of the *Work* under all cash allowances exceeds the total amount of all cash allowances shall the *Contractor* be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the *Contract Documents*.

- .2 Delete paragraph 4.1.5 in its entirety and substitute new paragraph 4.1.5:
- 4.1.5 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the *Contract Price* by *Change Order* without any adjustment for the *Contractor's* overhead and profit on such amount.
- .3 Add new paragraph 4.1.8:
- 4.1.8 The *Owner* reserves the right to call, or to have the *Contractor* call, for competitive bids for portions of the *Work*, to be paid for from cash allowances.

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

- .1 Revise the heading, "**GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER**" to read, "**GC 5.1 FINANCING INFORMATION REQUIRED**".
- .2 Delete paragraph 5.1.1 in its entirety and substitute new paragraph 5.1.1:
- 5.1.1 The *Owner* and *Contractor* shall provide each other with timely *Notice in Writing* of any material change in their financial ability to fulfil their respective obligations under the *Contract*.
- .3 Delete paragraph 5.1.2 in its entirety.

GC 5.2 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Add to the end of paragraph 5.2.7 the following new sentence:
- Any Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall remain at the risk of the *Contractor* notwithstanding that title has passed to the *Owner* pursuant to General Condition 13.1 - OWNERSHIP OF MATERIALS.
- .2 Add new paragraphs 5.2.8, 5.2.9, and 5.2.10:
- 5.2.8 As a condition of receiving each progress payment after the first, the *Contractor* shall submit a Statutory Declaration on an original form CCDC Document 9A-2018, attesting to the truth of the statements made therein.
- 5.2.9 The *Contractor* shall submit a Workplace Safety & Insurance Board Clearance Certificate with each application for progress payment.

- 5.2.10 The *Contractor* shall prepare current *As-Built Drawings* during the course of the *Work*, which current *As-Built Drawings* shall be maintained by the *Contractor* and made available to the *Consultant* for review with each application for progress payment. The *Consultant* may retain a reasonable amount and up to a maximum of the amounts outlined in paragraph 5.4.6, from any progress payment for the value of the *As-Built Drawings* not presented for review until the *As-Built Drawings* are presented for review.

GC 5.3 PROGRESS PAYMENT

- .1 Delete subparagraph 5.3.1.3 in its entirety and substitute new subparagraph 5.3.1.3:
- .3 the *Owner* shall make payment to the *Contractor* on account as provided in Article A-5 of the Agreement – PAYMENT no later than 30 calendar days after the date of a certificate of payment issued by the *Consultant*.

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 Delete paragraph 5.4.3 in its entirety and substitute new paragraph 5.4.3:
- 5.4.3 Immediately prior to the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor*, in consultation with the *Consultant*, shall establish reasonable dates for finishing the *Work* and correcting deficiencies.
- .2 Add new paragraphs 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.4.8 and 5.4.9:
- 5.4.4 Within 7 calendar days of receiving a copy of the certificate of *Substantial Performance of the Work* signed by the *Consultant*, the *Contractor* shall publish a copy of the certificate in a construction trade newspaper (as that term is defined in the *Construction Lien Act*) and shall provide to the *Consultant* and the *Owner* the date of publication and the name of the construction trade newspaper in which the publication occurred. If the *Contractor* fails to comply with this provision, the *Owner* may publish a copy of the certificate and charge the *Contractor* with the costs so incurred.
- 5.4.5 Prior to submitting its written application for *Substantial Performance of the Work*, the *Contractor* shall submit to the *Consultant* all:

- .1 guarantees;
- .2 warranties;
- .3 certificates;
- .4 testing and balancing reports;
- .5 distribution system diagrams;
- .6 spare parts;
- .7 maintenance manuals;
- .8 samples;
- .9 existing reports and correspondence from authorities having jurisdiction in the *Place of the Work*; and other materials or documentation required to be submitted under the *Contract*, together with written proof acceptable to the *Owner* and the *Consultant* that the *Work* has been substantially performed in conformance with the requirements of municipal, governmental, and utility authorities having jurisdiction in the *Place of the Work*.

5.4.6.1 Where the *Contractor* is unable to deliver the documents and materials described in paragraph 5.4.5, then, provided that none of the missing documents and materials interferes with the use and occupancy of the *Project* in a material way, the failure to deliver shall not be grounds for the *Consultant* to refuse to certify *Substantial Performance of the Work*. If the *Contractor* fails to deliver any of the materials required in subparagraphs 5.4.5.7 or 5.4.5.8, the *Consultant* shall retain from the payment of holdback under General Condition 5.5 - PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK, the amount set out in paragraph 5.4.7., until the materials required pursuant to subparagraphs 5.4.5.7 or 5.4.5.8 are delivered.

5.4.6.2 Should the *As-Built Drawings* not be delivered in accordance with subparagraph 5.2.10 or any documents or materials not be delivered in accordance with paragraph 5.4.5 by the earlier of 60 days following publication of the certificate of Substantial Performance of the Work and the submission of the Contractor's application for final payment under paragraph 5.7.1 of General Condition 5.7 – FINAL PAYMENT, then the amount previously retained pursuant to paragraph 5.2.10 or 5.4.7 shall be forfeit to the *Owner* as compensation for the damages deemed to have been incurred by the *Owner*, and not as a penalty, arising from the failure to deliver the documents or materials, and the *Contract Price* shall be reduced accordingly.

- 5.4.9 Together with the submission of its written application for *Substantial Performance of the Work*, the *Contractor* shall submit to the *Consultant* and to the *Owner* a statutory declaration setting forth in reasonable detail any then outstanding and unresolved disputes or claims between the *Contractor* and any *Subcontractor* or *Supplier*, including any claims allegedly arising from delay, which are, directly or indirectly, related to any then outstanding or anticipated disputes or claims between the *Contractor* and the *Owner*, and this disclosure shall, at a minimum:
- .1 identify the parties involved;
 - .2 identify the amount in dispute;
 - .3 provide a brief statement summarizing the position of each party;
 - .4 include copies of any correspondence or documents in support of either party's position;
 - .5 include copies of any documents of any court or arbitration process related to the matter;
 - .6 identify the dispute or claim between the *Contractor* and the *Owner* to which the matter relates; and
 - .7 include a copy of any written agreement or a summary of any oral agreement between the parties related to resolution of the matter.

The disclosure requirements detailed herein are of a continuing nature and survive completion of the *Work*. Accordingly, the *Contractor* shall supplement the information provided with the original statutory declaration with additional materials pertaining to new or existing disputes or claims, as they become available. The *Contractor* shall not be entitled to recover from the *Owner* any amount pertaining to any claim or dispute referred to in this paragraph, if the provisions of this paragraph have not been fully complied with. For greater certainty, the *Contractor* is not obliged to make the aforementioned disclosure with respect to any dispute or claim that is not related to or does not touch upon any then outstanding and unresolved dispute or claim between the *Contractor* and the *Owner*.

GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

- .1 Add new subparagraph 5.5.1.3:
5.5.1.3 submit a statement that no written notices of lien have been received by it.
- .2 Delete from line 1 of paragraph 5.5.2, the words, “the statement” and substitute the words:
“the documents”.
- .3 Delete paragraph 5.5.3 in its entirety.

GC 5.7 FINAL PAYMENT

- .1 Delete paragraph 5.7.1 in its entirety and substitute new paragraph 5.7.1:
5.7.1 When the *Contractor* considers that the *Work* is completed, the *Contractor* shall submit an application for final payment. The *Contractor’s* application for final payment shall be accompanied by any documents or materials not yet delivered pursuant to paragraph 5.4.5. The *Work* shall be deemed not to be performed until all of the aforementioned documents have been delivered.
- .2 Delete from the first line of paragraph 5.7.2 the words, “calendar days” and substitute the words:
“*Working Days*”.
- .3 Delete from the second line of paragraph 5.7.4 the words, “calendar days” and substitute the words:
“*Working Days*”.
- .4 Add new paragraph 5.7.5:
5.7.5 Prior to the release of the finishing holdback provided for under the *Construction Lien Act*, the *Contractor* shall submit:
.1 *Contractor’s* written request for release of the finishing holdback, including a statement that no written notices of lien have been received by it;
.2 a Statutory Declaration CCDC 9A-2018;
.3 a final Workplace Safety & Insurance Board Clearance Certificate.

GC 6.2 CHANGE ORDER

- .1 Add new paragraph 6.2.3:

The *Contractor* may apply mark-ups for overhead and profit to approved changes to the *Contract Price* as follows:

- .1 compensation for overhead and profit shall be determined by multiplying the approved change in *Contract Price* by 0.10.

GC 6.3 CHANGE DIRECTIVE

- .1 Delete paragraph 6.3.3 in its entirety.

- .2 Delete subparagraph 6.3.7.1(1) and replace it with:

“(1) carrying out the work, including necessary supervisory services;”

- .3 Delete subparagraph 6.3.7.1(2) and replace it with

“(2) intentionally left blank.”

- .4 Amend subparagraph 6.3.7.1(3) so that, as amended, it reads:

“(3) engaged in the preparation of *Shop Drawings*, fabrication drawings, coordination drawings and *As-Built Drawings*: or...”

- .5 Amend subparagraph 6.3.7.1(4) so that, as amended, it reads:

“(4) including clerical staff engaged in processing changes in the *Work*.”

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

- .1 Add new paragraph 6.4.5:

6.4.5 If the *Contractor* was given access to the *Place of the Work* prior to the submission of the bid on which the *Contract* was awarded, then the *Contractor* confirms that it carefully investigated the *Place of the Work* and, in doing so, applied to that investigation the degree of care and skill required by paragraph 3.14.1. In those circumstances, notwithstanding the provisions of paragraph 6.4.1, the *Contractor* is not entitled to an adjustment to the *Contract Price* or to an extension of the *Contract Time* for conditions which could reasonably have been ascertained by the *Contractor* by such careful investigation, or which could have been reasonably inferred from the material provided with the *Contract Documents*. In those circumstances,

should a claim arise, the *Contractor* will have the burden of establishing that it could not have discovered the materially different conditions from a careful investigation, because of restrictions placed on its access or inferred the existence of the conditions from the material provided with the *Contract Documents*.

GC 6.5 DELAYS

- .1 Delete the period at the end of paragraph 6.5.1, and substitute the following words:
“, but excluding any consequential, indirect or special damages.”
- .2 Delete the period at the end of paragraph 6.5.2, and substitute the following words:
“, but excluding any consequential, indirect or special damages.”
- .3 Delete subparagraph 6.5.3.3 and place the word “or” at the end of 6.5.3.2.
- .4 Add new paragraph 6.5.6.

6.5.6 If the *Contractor* is delayed in the performance of the *Work* by abnormally adverse weather conditions beyond a period of 3 calendar days or, in any event, which has the effect or the possible effect of delaying the *Contract Time*, the *Contractor* shall immediately notify the *Consultant* in an attempt to mitigate any delays to the *Contract Time* as a result of the abnormally adverse weather conditions.
- .5 Add new paragraph 6.5.7.

6.5.7 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contractor* or anyone directly or indirectly employed or engaged by the *Contractor*, or by any cause within the *Contractor's* control, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may decide in consultation with the *Contractor*. The *Owner* shall be reimbursed by the *Contractor* for all reasonable costs incurred by the *Owner* as the result of such delay, including, but not limited to, the cost of all additional services required by the *Owner* from the *Consultant* or any subconsultants, project managers, or others employed or engaged by the *Owner*. The *Contractor* acknowledges that the *Contract Time* is a material component to the Contract and has relied upon the *Contract Time* as an enticement into this Contract. Reasonable costs and damages incurred by the *Owner* as a result of the delays identified in this Contract may also include, without limitation, student and staff relocation

costs and expenses, communication resources associated labour costs in dealing with *Owner's* staff relocation issues resulting from the delay and any and all other associated, consequential and reputational damages resulting therefrom.

GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

- .1 Revise the heading, "**OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT**" to read, "**OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT**"
- .2 Delete paragraph 7.1.6 and add new paragraphs 7.1.6, 7.1.7, 7.1.8, 7.1.9, 7.1.10, and 7.1.11:

7.1.6 In addition to its right to terminate the Contract set out herein, the *Owner* may terminate this *Contract* at any time for any other reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*, but in no event shall the *Contractor* be entitled to be compensated for any loss of profit on unperformed portions of the *Work*, or indirect, special, or consequential damages incurred.

7.1.7 The *Owner* may suspend *Work* under this *Contract* at any time for any reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of suspension and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the suspension of the *Work*, but in no event shall the *Contractor* be entitled to be compensated for any indirect, special, or consequential damages incurred. In the event that the suspension continues for more than 180 calendar days, the *Contract* shall be deemed to be terminated and the provisions of paragraph 7.1.6 shall apply.

- 7.1.8 In the case of either a termination of the *Contract* or a suspension of the *Work* under General Condition 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or General Condition 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall use its best commercial efforts to mitigate the financial consequences to the *Owner* arising out of the termination or suspension, as the case may be.

- 7.1.9 Upon the resumption of the *Work* following a suspension under General Condition 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or General Condition 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* will endeavour to minimize the delay and financial consequences arising out of the suspension.

- 7.1.10 The *Contractor's* obligation under the *Contract* as to quality, correction, and warranty of the *Work* performed by the *Contractor* up to the time of termination or suspension shall continue after such termination of the *Contract* or suspension of the *Work*.

GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

- .1 Delete paragraph 7.2.2 in its entirety.

- .2 Delete subparagraph 7.2.3.1 in its entirety.

- .3 Delete subparagraph 7.2.3.3 in its entirety and substitute new subparagraph 7.2.3.3:
 - 7.2.3.3 the *Owner* fails to pay the *Contractor* when due the amount certified by the *Consultant* or awarded by arbitration or a court, except where the *Owner* has a bona fide claim for set off, or

- .4 Delete from subparagraph 7.2.3.4, the words:
 - " , except for General Condition 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER, "

- .5 Delete from the end of paragraph 7.2.4 the words "or terminate the *Contract*" and substitute the words:

"until the default is corrected, provided, however, that in the event of such suspension, the provisions of subparagraph 7.1.10 shall apply. If the *Contractor's Notice in Writing* to the *Owner* was given pursuant to subparagraph 7.2.3.3, then, 180 days after the delivery of the *Notice in Writing*, the *Contractor* may terminate the *Contract*, provided, however, that in the event of such termination, the provisions of subparagraph 7.1.10 shall apply."

GC 8.1 AUTHORITY OF THE CONSULTANT

- .1 Delete last sentence of 8.1.3 and substitute the following sentence:

If it is subsequently determined that such instructions were at variance with the *Contract Documents*, the *Owner* shall pay the *Contractor* costs incurred by the *Contractor* in carrying out such instructions which the *Contractor* was required to do beyond the requirements of the *Contract Documents*, including costs resulting from interruption of the *Work*.

GC 8.2 NEGOTIATION, MEDIATION AND ARBITRATION

- .1 Delete paragraphs 8.2.6, 8.2.7, and 8.2.8 in their entirety and substitute new subparagraph 8.2.6:

8.2.6 When a dispute has not been resolved through negotiation or mediation, within 10 *Working Days* after the date of termination of the mediated negotiations under paragraph 8.2.5, either party may give a *Notice in Writing* to the other party and to the *Consultant* inviting the other party to agree to submit the dispute to be finally resolved by arbitration, pursuant to provisions of the *Arbitration Act, 1991*. If the other party wishes to accept the invitation to submit the dispute to arbitration, it shall so indicate by the delivery of a responding *Notice in Writing* within 10 *Working Days* of receipt of the invitation. If, within the required times, no invitation is made or, if made, is not accepted, either party may refer the dispute to the courts or to any other form of dispute resolution, including arbitration, which the parties may agree to use.

GC 9.1 PROTECTION OF WORK AND PROPERTY

- .1 Delete subparagraph 9.1.1.1 in its entirety and substitute new subparagraph 9.1.1.1:

9.1.1.1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.14.1;

- .2 Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2:

9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground utilities and structures indicated in or inferable from the *Contract Documents*, or that are inferable from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.14.1.

- .3 Add new paragraph 9.1.5:

9.1.5.1 With respect to any damage to which paragraph 9.1.4 applies, the *Contractor* shall neither undertake to repair or replace any damage whatsoever to the work of other contractors, or to adjoining property of the *Owner* or any third party, nor acknowledge that the same was caused or occasioned by the *Contractor*, without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant*. Where, however, there is danger to life, the environment, or public safety, the *Contractor* shall take such emergency action as it deems necessary to remove the danger.

- .4 Add new paragraph 9.1.6:

9.1.5.2 The *Contractor* shall be responsible for securing the *Place of Work* at all times and shall take all reasonable precautions necessary to protect the *Place of Work*, its contents, materials (including *Owner*-supplied materials) and the public from loss or damage during and after working hours. Where the *Consultant* or the *Owner* deems the provision of security guard services to be necessary, the *Contractor* shall provide those services at the *Contractor's* expense.

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

- .1 Add new subparagraph 9.2.5.5

9.2.5.5 take all reasonable steps to mitigate the impact on Contract Time and Contract Price

- .2 Delete subparagraph 9.2.7.4 in its entirety.

- .3 Add to subparagraph 9.2.8.3 immediately before the comma, the following new words:

"and as a result of the delay"

GC 9.4 CONSTRUCTION SAFETY

.1 Delete paragraph 9.4.1 in its entirety and substitute new paragraph 9.4.1

9.4.1 The *Contractor* shall be solely responsible for construction safety at the *Place of the Work* and for compliance with the rules, regulations, and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the *Work*.

.2 Add new paragraphs 9.4.2, 9.4.3 and 9.4.4:

9.4.2 Prior to the commencement of the *Work*, the *Contractor* shall submit to the *Owner*:

.1 a current Workplace Safety & Insurance Board Clearance Certificate;

.2 copies of the *Contractor's* insurance policies having application to the *Project* or certificates of insurance, at the option of the *Owner*;

.3 documentation setting out the *Contractor's* in-house safety programs;

.4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "constructor" under the *Occupational Health and Safety Act*.

9.4.3 The *Contractor* shall indemnify and save harmless the *Owner*, its agents, officers, directors, employees, consultants, successors, appointees, and assigns from and against the consequences of any and all safety infractions committed by the *Contractor* under the *Occupational Health and Safety Act*, including the payment of legal fees and disbursements on a solicitor and client basis. Such indemnity shall apply to the extent to which the *Owner* is not covered by insurance, provided that the indemnity contained in this paragraph shall be limited to costs and damages resulting directly from such infractions and shall not extend to any consequential, indirect or special damages.

9.4.4 The *Owner* undertakes to include in its contracts with other contractors and in its instructions to its own forces the

requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the *Contractor* with respect to occupational health and safety and related matters. Prior to admission to the *Place of the Work*, the *Contractor* may, as a condition of admission, require any other contractor or the *Owner's* own forces to sign a written acknowledgement in the following form:

Acknowledgement

The undersigned acknowledges that the *Work* it will perform on behalf of the *Owner* requires it to enter a *Place of the Work* which is under the total control of a *Contractor* that has a *Contract* with the *Owner*, pursuant to which the *Contractor* has assumed overall responsibility for compliance with all aspects of the applicable health and safety legislation, including all the responsibilities of the "constructor" under the *Occupational Health and Safety Act*, as well as responsibility to co-ordinate and schedule the activities of our *Work* with the *Work* of the *Contractor* under its *Contract*. The undersigned agrees to comply with the *Contractor's* directions and instructions with respect to health, safety, co-ordination, and scheduling and acknowledges that its failure to do so will be cause for termination of employment or of the undersigned's *Contract* with the *Owner*, as the case may be. The undersigned also agrees to have the *Contractor* named as an additional insured on any comprehensive liability insurance policy, where such insurance is required.

Name:
Title:
Date:

GC 9.5 MOULD

- .1 Add to subparagraph 9.5.2.3 immediately before the comma, the following new words:

"and as a result of the delay"
- .2 Delete subparagraph 9.5.3.4 in its entirety.

GC 10.1 TAXES AND DUTIES

- .1 Add new paragraph 10.1.3:

10.1.3 Where the *Owner* is entitled to an exemption, reduction or a recovery of sales taxes, customs duties, excise taxes or *Value Added Taxes* applicable to the *Contract*, the *Contractor* shall, at the request of the *Owner*, assist with application for any exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the *Owner*. The *Contractor* agrees to endorse over to the *Owner* any cheques received from the federal or provincial governments, or any other taxing authority, as may be required to give effect to this paragraph.

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

- .1 Add to the end of paragraph 10.2.4 the following words:

"The *Contractor* shall notify the Chief Building Official or the registered code agency, where applicable, of the readiness, substantial completion, and completion of the stages of construction set out in the *Ontario Building Code*. The *Contractor* shall be present at each site inspection by an inspector or registered code agency. If any laws, ordinances, rules, regulations, or codes conflict, the more stringent shall govern."

- .2 Delete from the first line of paragraph 10.2.5 the word, "The" and substitute the words:

"Subject to paragraph 3.4.1, the".

GC 10.3 PATENT FEES

- .1 Delete paragraph 10.3.2 in its entirety.

GC 10.4 WORKERS' COMPENSATION

- .1 Add to subparagraph 10.4.1 immediately after the first comma, the following new words:

"again with each application for progress payment, and"

- .2 Add to the beginning of subparagraph 10.4.2 the following new words:

"The *Contractor* shall ensure that each *Subcontractor* complies with the workers' compensation legislation at the *Place of the Work*."

- .3 Add new paragraph 10.4.3:

10.4.3 Where a *Subcontractor* is not required to participate in the insurance plan provided for under the workers' compensation legislation, the *Contractor* shall require the *Subcontractor* to provide a sworn declaration of its exemption as a condition of the *Subcontractor's* admission to the *Place of Work*. When requested by the *Owner*, the *Contractor* shall require the *Subcontractor* to provide a letter of exemption under the workers' compensation legislation.

GC 11.1 INSURANCE

- .1 Add new paragraphs 11.1.1(a), (b), (c), (d) and (e)
 - 11.1.1(a) Catholic Cemeteries of the Diocese of Hamilton (CCDH) will require the successful candidate to obtain and submit Comprehensive General Liability Insurance in the amount of no less than \$5,000,000 for each occurrence or accident and covering all sums which the Proponent may become legally obligate to pay for damages a result of bodily injury (including death at any time resulting there from) sustained by any person or persons or because of damage to, destruction of, or loss of use of property caused by an occurrence or accident arising out of any operations carried out in connection with this RFP or RFP Process.
 - 11.1.1(b) Vehicle Public Liability and Property Damage insurance, in the amount of \$2,000,000 per occurrence, for vehicle used by Proponents or Proponent Team Members (or their respective directors, officers, employees, consultants, Advisors and agents) while on or at the Site or on or at any facilities or premises owned by CCDH and proof of a current Errors and Omissions Insurance policy.
 - 11.1.1(c) To satisfy this requirement the Consultant must provide proof of coverage, by way of a Certificate of Insurance, naming the Roman Catholic Episcopal Corporation of the Diocese of Hamilton in Ontario operating as The Catholic Cemeteries of the Diocese of Hamilton as the insured, prior to commencement of the project.
 - 11.1.1(d) As a condition of allowing access to the Site, Existing Facilities or any facilities or premises of CCDH, CCDH reserves the right to require Proponents to provide evidence acceptable to CCDH that the insurance required is in place.
 - 11.1.1(e) If a Proponent proposes to perform any site investigations at the Site or Existing Facilities, the risk related to which

may not be fully insured under the above policies, CCDH may, in its sole discretion, require the Proponent at its own cost, to obtain insurance additional to that already specified.

- .2 Delete paragraph 11.1.2 in its entirety and substitute new paragraph 11.1.2:

11.1.2 In all instances in paragraph 11.1.1 where the *Contractor* is required to obtain insurance coverages naming or jointly naming the *Owner*. Each of the policies of insurance shall also contain a provision requiring not less than 60 days written notice to each named insured prior to cancellation or any change that would reduce coverage. At least 10 calendar days prior to commencement of the *Work* and upon any renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements applicable to the *Work*.

- .3 Add new subparagraph 11.1.9:

11.1.9 The parenthetical reference in CCDC 41 - INSURANCE REQUIREMENTS, paragraph 4 which reads: "(excluding flood and earthquake)" is deleted and replaced with the following: "(including flood, earthquake, testing, and commissioning)".

GC 11.2 CONTRACT SECURITY

- .1 Delete paragraph 11.2.1 in its entirety.
- .2 Delete paragraph 11.2.2 in its entirety.

GC 12.1 INDEMNIFICATION

- .1 Delete General Condition 12.1 – INDEMNIFICATION in its entirety and substitute:

12.1 The *Contractor* shall indemnify and hold harmless the *Owner*, the *Consultant*, and their respective agents, appointees, directors, trustees, officers, Project Managers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits or proceedings that arise out of or are attributable to the *Contractor's* performance of the *Contract*. Nothing in this

paragraph 12.1, shall limit any claim that the *Owner* may have under the insurance coverage to be provided under General Condition 11.1 - INSURANCE.

.2 Add new paragraph 12.2:

12.2 The indemnity given in paragraph 12.1 shall be honoured by the Contractor and may be asserted and claimed by the parties seeking the benefit of same for a period of six years following the date of Substantial Performance of the Work, as permitted under the Limitations Act, 2004.

GC 12.2 WAIVER OF CLAIMS

.1 Delete the reference to "395 calendar days" in the last line of paragraph 12.2.2 and substitute "120 calendar days".

.2 Delete the last sentence of subparagraph 12.2.3.4 and substitute:

"Substantial defects or deficiencies" mean those defects or deficiencies in the *Work* where the reasonable cost of repair of such defects or deficiencies exceeds:

.1 if the *Contract Price* is \$2 million or less, the sum of \$50,000, before *Value Added Taxes*;

.2 if the *Contract Price* exceeds \$2 million, the sum of \$100,000, before *Value Added Taxes*;

but, in any event, a defect or deficiency in the *Work* which affects the *Work* to such an extent or in such a manner that a significant part or the whole of the *Work* is unfit for the purpose intended by the *Contract Documents* shall be deemed to be a "substantial defects or deficiencies" regardless of the cost of repair.

.3 Amend paragraph 12.2.5 by adding ",12.2.3.4" immediately after the reference to paragraph 12.2.3.3.

GC 12.3 WARRANTY

.1 Delete from the first line of paragraph 12.3.2 the word, "The" and substitute the words:

"Subject to paragraph 3.4.1, the...".

Add new PART 13 as follows:

PART 13 OTHER PROVISIONS

GC 13.1 OWNERSHIP OF MATERIALS

13.1.1 All *Work* and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner*. The *Contractor* shall remove all surplus or rejected materials when notified in writing to do so by the *Consultant*. Notwithstanding that ownership of the *Work* and *Products* may vest in the *Owner*, the risk of all *Work* and *Products* shall remain with the *Contractor* until the *Work* and *Products* are accepted and assumed by the *Owner* as otherwise set out in the *Contract*.

GC 13.2 CONSTRUCTION LIENS

13.2.1 In the event that a claim for lien is registered against the *Project* by a *Subcontractor* or *Supplier*, and provided the *Owner* has paid all amounts properly owing under the *Contract*, then the *Contractor* shall, at its own expense within 10 calendar days, ensure that any and all claims for lien and certificates of action are discharged, released, or vacated by the posting of security or otherwise.

13.2.2 In the event that the *Contractor* fails to comply with the requirements of paragraph 13.2.1, the *Owner* may fulfil those requirements without *Notice in Writing* to the *Contractor* and set off and deduct from any amount owing to the *Contractor*, all costs and associated expenses, including the costs of posting security and all legal fees and disbursements associated with discharging or vacating the claim for lien or certificate of action and defending the action on a substantial indemnity basis. If there is no amount owing by the *Owner* to the *Contractor*, then the *Contractor* shall reimburse the *Owner* for all of the said costs and associated expenses.

GC 13.3 CONTRACTOR DISCHARGE OF LIABILITIES

13.3.1 In addition to the obligations assumed by the *Contractor* pursuant to General Condition 3.7 – SUBCONTRACTORS AND SUPPLIERS, the *Contractor* agrees to discharge all liabilities incurred by it for labour, materials, services, *Subcontractors* and *Products*, used or reasonably required for use in the performance of the *Work*, except for amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

GC 13.4 RECORDS/DAILY REPORTS/DAILY LOGS

13.4.1 The *Contractor* shall maintain and keep accurate *Project* records (which means all tangible records, documents, computer printouts, electronic information, books, plans, *Drawings*, *Specifications*,

accounts or other information relating to the *Work*) in its office in accordance with requirements of law, but in any event for not less than 6 years from *Substantial Performance of the Work* or until all claims have been settled. During this time, the *Contractor* shall allow the *Owner* and the *Consultant* access to the *Project* records during normal business hours upon the giving of reasonable notice. The *Contractor* shall ensure that equivalent provisions to those provided herein are made in each subcontract and shall require the *Subcontractors* and *Suppliers* to incorporate them into every level of contract thereunder for any part of the *Work*.

END OF DOCUMENT

1. Definitions

1. The following Section of this Specification are of the abbreviated type and include incomplete sentences, definite and indefinite articles have often been omitted and sentences are written in the form of direct instructions to the Contractor without using the phrase 'the Contractor shall.' Standard specifications and other quality references inserted govern materials and workmanship without using phrases 'conform with,' 'conformity therewith,' etc. Omitted words and phrases to be supplied in the same manner as they are when a note appears on the Drawings.
2. The Specifications are separated into Sections for reference convenience only. Such separation must in no instance make Owner or his Consultants arbiter to establish subcontract limits between Contractor and Subcontractor.
3. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on Drawings and/or in Specifications, including all labour, materials, equipment, tools, services, and incidentals necessary and required to complete the work. Responsibility for breakdown into and extension of subcontracts, including co-ordination of same, rests entirely with the Contractor.
4. Standard Specifications referred to are editions in force at Tender Closing Date.

2. Terminology

1. Consultants are the team of Architects, Engineers and other experts commissioned by the Owner, directly or indirectly, to execute design, contract documents and supervision for the project, including any of their agents or employees.
2. Prime Consultant is the Architect.
3. Contractor is the Firm or Corporation who, having signed the Agreement, has the sole legal responsibility to carry out the work shown or described in the Contract Documents for the Owner, whether contractually assigned to a Subcontractor or supplier, or not.

3. Minimum Standards

1. Unless otherwise specified, work and material to conform or exceed the minimum standards set out in the editions of the Canadian Government Specification Board, Canadian Standards Associations, the Ontario Building Code, Underwriters' Laboratories of Canada, the Canadian Electrical Code, the Local Building Code in force, whichever is applicable.
2. Copies of Standard Specifications referred to in this Specification to be kept on the site.
3. The use of the name (or its abbreviation) of any of the following bodies, accompanied by the reference number of a specification of that body to mean that the entire specification of the body to apply as noted:

AISC: American Institute of Steel Construction;

ASTM:	American Society for Testing Materials;
CEC:	Canadian Electric Code;
CGSB:	Canadian Government Specification Board;
CISC:	Canadian Institute of Steel Construction;
CRCA:	Canadian Roofing Contractors' Association;
CSA:	Canadian Standards Association;
OBC:	Ontario Building Code;
ULC:	Underwriters' Laboratories of Canada;
CLA:	Canadian Lumbermen's Association.

4. Cooperation

1. Each trade to co-operate with the trades of adjacent or affected work. Supply in good time requirements effecting adjacent and underlying work in writing and items to be set or built in. Similarly, heed requirements and build-in items provided by other trades.
2. Take necessary precautions to protect work of other trades from contamination, marring or other damage due to application or installation processes, methods and activities.
3. General Contractor and each trade to co-operate with Contractors which may be assigned or selected by the Owner to perform work under Cash Allowances. Owner reserves the right to assign non-unionized labour to perform work under Cash Allowances, at Owners discretion.

5. Coordination

1. Co-ordinate the work of all trades in such a manner that each trade co-operates with the trade of adjacent work.
2. Organize weekly jobsite meetings and send out notices stating time and place to Consultants, subcontractors, Suppliers and all others whose presence is required at the meetings.
3. Take note of all persons attending these meetings and submit to Consultants and Owner, Minutes of these Meetings showing any major decisions made and instructions or information required. Prime Consultant to receive duplicate copies.
4. Co-ordinate the Work in this Contract with the work of others awarded work under Cash Allowances.

6. Building Dimensions and Co-ordination

1. Ensure that all necessary job dimensions are taken and all trades are coordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.
2. Verify that all work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by

requirements of the drawings, and ensure that work installed in error is rectified before construction resumes.

3. Check and verify all dimensions referring to the work and the interfacing of all services. Verify all dimensions, with the trade concerned when pertaining to the work of other trades. Be responsible to see that Subcontractors for various trades co-operate for the proper performance of the Work.
4. Avoid scaling directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Be responsible for any change through the disregarding of this clause.
5. All details and measurements of any work which is to fit or to conform with work installed shall be taken at the building.
6. Advise Consultant of discrepancies and if there are omissions on drawings, particularly reflected ceiling plans and jointing patterns for paving, ceramic tile, or carpet tile layouts, which affect aesthetics, or which interfere with services, equipment or surfaces. **DO NOT PROCEED** without direction from the Consultant.
7. Ensure that each Subcontractor communicates requirements for site conditions and surfaces necessary for the execution of the Subcontractor's work, and that he provides setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, insets, anchors, accessories, fastenings, connections and access panels. Inform other Subcontractors whose work is affected by these requirements and preparatory work.
8. Prepare interference drawings to properly co-ordinate the work where necessitate. Refer to Section 01340.

7. Use of Premises Before Substantial Performance

1. The Owner shall have the right to enter and occupy the building, in whole or in part, for the purpose of placing fittings and equipment, or for other use, before completion of the Contract if, in the opinion of the Consultant, such entry and occupancy does not prevent or interfere with the Contractor in the performance of the Contract. Such entry shall in no way be considered as an acceptance of the Work in whole, or in part, nor shall it imply acknowledgment that terms of the Agreement are fulfilled.

8. Layout of Work

1. Layout work with respect to the work of all trades. Arrange mechanical and electrical work such as piping, ducts, conduits, panels, equipment and the like to suit the architectural and structural details.
2. Alterations necessary due to conflict and interference between trades, to be executed at no cost to the Owner unless notification is given in writing before Tender Closing Date.

9. By-Laws and Regulations

1. Nothing contained in the Drawings and Specifications are to be so construed as to be knowingly in conflict with any law, by-law or regulation of municipal, provincial or other authorities having jurisdiction.
2. Perform work in conformity with such laws, by-laws and regulations and make any necessary changes or deviations from the Drawings and Specifications subsequently required as directed and at no cost to the Owner unless notification is given in writing before Tender Closing Date.
3. Furnish inspection certificates and/or permits as may be applicable as evidence, that installed work conforms with laws, by-laws, and regulations of authorities having jurisdiction.

10. Protection

1. Take necessary precautions and provide and install required coverings to protect material, work and finishes from contamination, damage, the elements, water and frost.
2. Make good any damage or replace damaged materials, as directed. Repairs to be made by the trade having originally installed or fabricated the damaged material, finish or item. Protect electrical equipment from water and the elements.
3. Protect adjacent private and public property from damage and contamination.
4. Protect curbs and sidewalks from damage from trucking by means of boards and the like. Repair, or pay or repair of damage to existing roads and sidewalks.
5. Mark glass after glazing in an acceptable manner, and leave in place until final clean-up.
6. Protect floor finishes from construction traffic and transport of construction materials and equipment by means of 6 mm plywood panels.

11. Delivery, Handling and Storage of Materials

1. Schedule material delivery so as to keep storage at site to the absolute minimum, but without causing delays due to late delivery.
2. Store materials which will be damaged by weather in suitable dry accommodation. Provide heat, as required, to maintain temperatures recommended by material manufacturer.
3. Store highly combustible or volatile materials separately from other materials, and under no circumstances, within the building. Protect against open flame and other fire hazards. Limit volume of supply on the site to minimum required for one day's operations.
4. Handle and store material so as to prevent damage to material, structure and finishes. Avoid undue loading stresses in materials or overloading of floors.

5. Do not store material and equipment detrimental to finished surfaces within areas of the building where finishing has commenced or has been completed. All material storage within the building is subject to relocation, as directed.
6. Deliver package material in original, and Storage of unopened and undamaged containers with manufacturer's labels and seals intact.

12. Debris

1. Assign clean-up duties to a crew with own Foremen which will be of sufficient size to prevent accumulation of debris and dirt in any part of the structure or on the site.
2. Under no circumstances, should debris, rubbish or trash be burned or buried on the site.

13. Cutting, Fitting and Patching

1. Required cutting to be done by General Contractor. Patching and painting of work to be executed by the General Contractor.
2. All subtrades are to notify the General Contractors bidding as to the extent of the cutting, patching, and painting of their respective trades.
3. Drilling, cutting, fitting and patching necessary due to failure to deliver items to be built-in time, or installation in wrong location to be executed, as directed, at no cost to the Owner.
4. Give written notification prior to commencement of drilling and cutting of load bearing structural members and finished surfaces.
5. Cut holes with smooth, true, clean edges, after they are approved by applicable trade. Size holes and openings for hot water and steam pipes, so as to allow for expansion and contraction of such pipes.

14. Fastenings

1. Supply all fastenings, anchors and accessories required for fabrication and erection or work.
2. Metal fastenings to be of the same material as the metal component they are anchoring, or of a metal which will not set up an electrolysis action which would cause damage to the fastening or metal component under moist conditions.
3. Exposed metal fastenings and accessories to be of the same texture, color, and finish as base metal on which they occur. Keep to a minimum; evenly space and lay out.
4. Fastenings to be permanent, of such a type and size and installed in such a manner to provide positive anchorage of the unit to be secured. Wood plugs are not acceptable. Install anchors at required spacing to provide required load bearing or shear capacity.
5. Power actuated fastenings not to be used without prior written approval for specific use.

15. Snow and Ice Removal

1. Remove all snow and ice which may impair the progress of the work, be detrimental to workmen, or impair movement of material on the site.

16. Surplus Materials

1. Surplus materials specifically so specified, to remain property of the Owner and be neatly stockpiled or stored, as directed.
2. All other surplus materials to become property of the Contractor; to be removed from the site and legally disposed of.

17. Existing Trees

1. Preserve carefully all existing trees on the site, except those located in the area to be occupied by the building proper or those so designated for removal.
2. Erect and maintain barricade and protective strapping; prevent seepage and spilling of materials injurious to the root system and take all other precautions to preserve trees.

18. Setting of Work

1. Provide and pay for the services of a Land Surveyor, registered in the Province of Ontario to establish the building location and two (2) widely separated bench marks at the commencement of the work.
2. Lay out building lines for the work and provide substantial stakes, batterboards or monuments to preserve lines and levels.
3. Provide to the Consultant a Survey Plan on Cad indicating location of building on site.
4. Provide to the Consultant a survey certificate, verifying location of all foundation walls relative to property lines, before construction proceeds on the foundation walls.
5. Verify on the site all grades, lines, levels, dimensions and location of hydrants, existing structures, manholes, overhead and buried utilities, existing tress, roadways, sidewalks and the like, shown on the drawings, and report omissions, errors, or inconsistencies, before commencing work.
6. Upon completion of layout work and before commencement of any excavation, give ample notification to allow for inspection of lines and levels. Such inspection does not in any way mitigate the Contractor's responsibility for accuracy of layout.
7. Preserve and protect bench marks, elevation datum and monuments and check periodically for accuracy until all work is complete. Remove same and their protection, as directed, and make good site.

19. Documents Required and General Duties

1. At Commencement of Contract

- .1 Supply Public Liability and Property Damage Insurance Certificates.
- .2 Supply Certificates of good standing from Workers' Compensation Board for the General Contractor and all Subcontractors.
- .3 Supply Contract Sum Breakdown of all subtrades or parts of work and general expense items.
- .4 Supply Construction Schedule.
- .5 Supply Schedule of Shop Drawing Submissions.
- .6 The Owner has paid for the cost of the Building Permit. Mechanical Subcontractor will pay the cost of other Fees related to the Work Specified under Division 15. Electrical Subcontractor will pay the cost of all permits and fees related to the Work Specified under Division 16.
- .7 The General Contractor is to pay all other fees and refundable deposits if applicable.
- .8 Digital copies (in PDF format) of the approved building permit drawings and the building permit will be provided. The General Contractor shall provide and maintain one (1) hardcopy of the building permit drawings for use by the Building Inspector. The general contractor shall provide and display one (1) copy of the building permit.

2. During Construction

- .1 Adjust Allowances, as required.
- .2 Organize Job Meetings in accordance with Section 01200.
- .3 Supply Monthly Progress Reports and Construction Schedule in accordance with Section 01200.
- .4 Confirm that payments are being made to subcontractors and suppliers by submission of receipts with the second and subsequent Progress Payment Application. No payment will be made for unincorporated material on the site, unless Bill of Sale in proper format is provided.
- .5 Submit with each application for payment an "S" curve billing schedule chart indicating activities, billing items, % of work and forecast %, to monitor progress as related to billing. A sample chart will be provided to Contractor.

3. Upon Completion

- .1 Upon completion of work before the Final Certificate of Payment is issued, the following to be observed, executed and submitted:
 - .1 All deficiencies to have been completed in a satisfactory manner.
 - .2 All final clean-up to have been executed, as specified in Section 01710.
 - .3 Finishing Hardware, Inspection and Verification.
 - .4 Organize a Final Inspection tour at which to be present:
 - the Owner's authorized representative;
 - the Architectural, Structural, Mechanical and Electrical Consultants, and their supervisory personnel, if any;
 - the Contractor and his superintendent.
 - .5 Where the above procedure is impossible or where any deficiencies remain outstanding, the Owner's representative and the Consultant concerned, to inspect and accept the affected work and/or material upon notification by the Contractor, that all deficiencies involving this Consultant have been made good.

- .6 A complete release of all liens arising out of this Contract, other than his own. If a subcontractor or supplier refuses to furnish a release of such a lien, furnish a bond satisfactory to the Owner to indemnify him against any claim under such a lien.
- .7 Certificates of good standing from the Workers' Compensation board, for the General Contractor and all Subcontractors.
- .8 All reference records, as specified, under Section 01720.
- .9 Certificate of Inspection from Mechanical and Electrical Engineers.
- .10 Copies of all Lists of Deficiencies with each Deficiency verified when complete by only this project's job Superintendent. The Final List of Deficiencies to be signed, completed by all concerned, if accepted.
- .11 Statement of Completion from General Contractor.
- .12 Final adjustment of all Allowances.
- .13 H.E.P.C. Inspection Certificate and all other Inspection Certificates required by Provincial, Municipal and other authorities having jurisdiction.
- .14 Balancing Reports.
- .15 As-Built Drawings – digital marked up pdf files and AutoCAD c 2014 or higher.
- .16 Maintenance manuals – one (1) hardcopy plus a digital copy (pdf file) of all closeouts to be provided on USB.

20. Progress Reports

1. Submit to the Architect, Monthly Progress Reports consisting of a concise narrative and a marked-up summary schedule showing physical percentage complete by item and in total. These progress calculations must agree with the Progress Payment Claims. waterproofing; finishing trades and the like.
2. Keep permanent written daily records on the site on the progress of work. Record to be open to inspection at reasonable times and copies to be furnished upon request. Records to show notes of commencement and completion of different trades and parts of work; daily high and low temperatures and other weather particulars; number of men engaged on the site (including subtrades) broken down in groups for each type of construction work, and particulars about excavation and shoring; erection and removal of form work; pouring and curing of concrete; floor finishing; placing and compaction of backfill, masonry work; roofing;
3. Daily progress to give particulars on commencement and completion of each trade or part of work; form work erections and removal; concrete pouring and curing; floor finishing; masonry work; roofing; waterproofing; finishing trades, tests and inspection and the like.

21. Inspection and Testing

1. The Owner will retain the services of Inspection and Testing Companies. The cost of inspection and testing will be deducted from the Inspection and Testing Allowance specified under Section 01020, "Allowances".
2. Where tests or inspections reveal work not in accordance with Contract requirements, the Contractor shall pay costs for additional tests or inspections as the Architect may require to verify acceptability of corrected work.

3. The Inspection and Testing by the Owner's Testing Company does not relieve the Contractor of his responsibility to provide his own quality control in order to meet or exceed the requirements of specified standards, codes, design criteria and referenced documents.

End of Section

1. Selection of Products

1. If requested by the Consultant, provide the following services and/or information:
 - .1 Assist the Consultant in determining qualified suppliers.
 - .2 Obtain proposals from suppliers.
 - .3 Make appropriate recommendations for consideration of Consultant.
 - .4 Notify Consultant of any effect anticipated by selection of product or supplier under consideration, on construction schedule and contract sum.
2. On notification of selection, enter into purchase agreement with designated supplier.

2. Cash Allowance

1. Expend cash allowance only on the Consultant's written instructions.
2. Include in Bid Price the Contractor's charges for handling at site, including uncrating and storage, protection from elements and damage, labour, installation and finishing, testing, adjusting and balancing, and other expenses including overhead and profit on account of Cash Allowance in accordance with Article GC4.1 of the General Conditions of the Contract as amended.
3. Credit the Owner with any unused portion of Cash Allowances in the statement for final payment.
4. If a test made under payment by a specific allowance proves that the material or system is not in accordance with the Documents, then the subsequent testing including Owner's testing of replacement materials or systems shall be Contractor's expense and not taken from Cash Allowance.
5. Add or deduct any variation in cost from the Cash Allowance. No adjustment will be made to Contractor's expense.
6. The amount of each allowance includes the net cost of the product or service, delivery and unloading at the site.
7. All refunds, trade and/or quantity discounts which the Contractor may receive in the purchase of goods under allowances, to be extended to the Owner.
8. Receipted invoices covering all disbursements made by the Contractor under Allowances, to be submitted to the Consultant for audit.
9. Where the Cash Allowance stipulates "Supply Only," the Contract Price and not the Cash Allowances include the installation and hook-up costs. The installation and hook-up of some equipment and materials are specified under other Sections of the Specifications. The General Contract includes the installation and hook-up not specified elsewhere.
10. Contractor's profit and overhead on all Cash Allowances to be carried in his lump sum amount, not in the Cash Allowances.

11. All Cash Allowances will be dealt with in accordance with Article GC4.1 of the General Conditions.

12. All expenditures under Cash Allowances, must be approved by the Owner.

13. Include in the Stipulated Price quoted, a Cash Allowance in the amount of **Fifty Thousand Dollars, \$50,000**

To be allocated as follows:

- .1 Supply only of Hardware required. To include for installation of Automatic Door Operators as noted on plans.
- .2 For Inspections and Testing of backfill and compaction, concrete, steel, reinforcing, roofing, waterproofing, air barrier.

14. H.S.T. Goods and Services tax is not included in Cash Allowance amount and is to be carried in the General Contractor's Stipulated Sum Amount.

15. Refer to Section 01005 for co-operation with others assigned to this Section.

3. Contingency Allowance

1. Included in the Stipulated Price quoted, a Contingency Allowance in the amount of **Eighty Thousand Dollars, \$80,000**.

2. Costs of Change Orders taken from Contingency Allowance will be issued in accordance to Section 00800 Supplementary Conditions (CCDC2).

3. Credit the Owner with any unused portion of the Contingency Allowance in the statement for final payment.

End of Section

1. Project Meetings for Co-ordination

1. In consultation with the Consultant not later than the second week of construction, arrange for site meetings weekly or every 2 weeks as appropriate to the stage of construction, for project coordination. Such meetings shall fall at the same time each week the meeting is scheduled.
2. Responsible representatives of the Contractor's and Subcontractor's office and field forces and suppliers shall be obliged to attend.
3. Inform the Owner, Consultant, and those others whose attendance is obligatory, of the date of each meeting, in sufficient time to ensure their attendance.
4. Provide physical space for meetings, prepare an agenda, chair and record the minutes of each meeting. Relevant information must be made available to all concerned, in order that problems to be discussed may be expeditiously resolved. Identify "action by: _____".
5. Within three days after each meeting, distribute two copies of the minutes to each invited person.

2. Preconstruction Meeting

1. Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
2. Include in the agenda the following:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Scheduling of Work. Schedule to include a detailed breakdown of mechanical and electrical works.
 - .3 Interference with ongoing business.
 - .4 Work by other Contractors.
 - .5 Schedule of submission of shop drawings and samples.
 - .6 Requirements for temporary facilities, site sign, offices, storage sheds, utilities.
 - .7 Delivery schedule of specified equipment.
 - .8 Site security.
 - .9 Contemplated change notices, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .10 Record drawings.
 - .11 Maintenance manuals.
 - .12 Take-over procedures, acceptance, warranties.
 - .13 Monthly progress claims, administrative procedures, photographs, holdbacks.
 - .14 Appointments of inspection and testing agencies or firms.
 - .15 Insurances, transcript of policies.
 - .16 Schedule for progress meetings.

3. Project Meetings for Progress of Work

1. Conduct progress meetings in accordance with the schedule and/or decisions made at Preconstruction meeting.
2. Inform the Owner, Consultant, project consultants, Subcontractors and suppliers and those whose attendance is obligatory, of the date of the meeting, in sufficient time to ensure their attendance.
3. Include in the agenda the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revisions to construction schedule.
 - .8 Progress during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Pending changes and substitutions.
 - .12 Review proposed changes for effect on construction schedule and on completion date.
 - .13 Other business.

4. Progress Records

1. Maintain a permanent written record on the site of the progress of the work using standard OGCA form. This record shall be available to the Consultant at the site, and a copy shall be furnished to same on request. The record shall contain:
 - .1 Daily weather conditions, including maximum and minimum temperatures.
 - .2 Dates of the commencement and completion of stage or portion of the work of each trade in each area of the project.
 - .3 Conditions encountered during excavation.
 - .4 Dates of erection and removal of formwork, in each area of the project.
 - .5 Dates of pouring the concrete in each area of the project, with quantity and particulars of the concrete.
 - .6 Work force on project daily per trade.
 - .7 Visits to site by personnel of Consultant, Jurisdictional Authorities and testing companies.

End of Section

1. General

1. Submit to Architect, for review, shop drawings, product data and samples specified.
2. Until submission is reviewed, work involving relevant product must not proceed.

2. Shop Drawings

1. Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate Sections.
2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
3. Maximum sheet size 24" x 36" as a PDF file.

3. Project Data

1. Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.
2. Above will only be accepted if they conform to following:
 - .1 Delete information which is not applicable to project.
 - .2 Supplement standard information to provide additional information applicable to project.
 - .3 Show dimensions and clearances required.
 - .4 Show performance characteristics and capacities.
 - .5 Show wiring diagrams (when requested) and controls.

4. Coordination of Submissions

1. Review shop drawings, product data and samples prior to submission.
2. Verify:
 - .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
3. Coordinate each submission with requirement of work and Contract documents. Individual shop drawings will not be reviewed until all related drawings are available.
4. Contractor's responsibility for errors and omissions in submission is not relieved by Architect's review of submittals.
5. Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Architect's review of submission, unless Architect gives written acceptance of specified deviations.

6. Notify Architect, in writing at time of submission, of deviations from requirements of Contract documents.
7. After Architect's review, distribute copies.

5. Submission Requirements

1. Schedule submissions at least fourteen (14) days before dates that reviewed submissions will be required to be returned.
2. Submit a digital copy (PDF) of shop drawings, product data to Architect for review.
3. Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Number of each shop drawing, product data and sample submitted.
 - .5 Other pertinent data.
4. Submissions must include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name of:
 - .1 Contractor.
 - .2 Subcontractor.
 - .3 Supplier.
 - .4 Manufacturer.
 - .5 Separate detailer when pertinent.
5. Identification of product or material.
 - .1 Relation to adjacent structure or materials.
 - .2 Field dimensions, clearly identified as such.
 - .3 Specification Section number.
 - .4 Applicable standards, such as CSA or CGSB numbers.
 - .5 Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract documents.
6. Interference Drawings
 - .1 Prepare interference drawings for all work in confined space ie: ceiling space.

End of Section

1. Access

1. Provide and maintain adequate access to project site. (See Section 01005).

2. Contractor's Site Office

1. Provide office heated to 22°C, lighted 750 Lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table, telephone, and facsimile machine. Pay telephone not acceptable.
2. Maintain in clean condition.
3. Provide and maintain in clean condition: two separate plans layout tables, minimum 1200 x 1800 each. One table shall be used by the General Contractor and subcontractors at their discretion. The second shall be provided for use by subcontractors and by the consultant or Inspection and Testing Companies during site visits or project meetings.

3. Storage Sheds

1. Provide adequate weathertight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

4. Sanitary Facilities

1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
2. Post notices and take such precautions, as required, by local health authorities. Keep area and premises in sanitary condition.
3. When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval or Architect.

5. Parking

1. Provide, on site, sufficient temporary parking.

6. Site Enclosures

1. Site enclosure with modular fence hoarding.
2. Erect and maintain Public Way protection at sidewalks, including roof and side covers, complete with signs, as required by occupational health and Safety act and Regulations for Construction project Sections 64 and 65.
3. Paint public side of site enclosure in selected colors with one coat primer to CGSB 1-GP-55M and one coat exterior paint to CGSB 1-GP-59M+Amdt-Aug-84. Not applicable.

4. At least two (2) weeks prior to commencing work, submit design and supporting data.
5. Design and supporting data submitted to bear the stamp and signature of qualified professional engineer registered in the province of Ontario.
6. Professional engineer responsible for design of temporary structures to submit proof of insurance coverage for professional liability, except where engineer is employee of contractor, in which case contractor shall submit proof that work by professional engineer is included in contractor's insurance coverage.
7. General Contractor to engage qualified shoring contractor to perform all shoring work as designed by shoring engineer.

7. Enclosure of Structure

1. Provide temporary weathertight enclosures protection for exterior openings until permanently enclosed.
2. Erect enclosures to allow access for installation of materials and working inside enclosure.
3. Design enclosures to withstand wind pressure.

8. Power

1. Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.
2. Install temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.
3. Electrical power and lighting systems installed under this Contract may be used for construction requirements with prior approval of Architect, provided that guarantees are not affected. Make good damage. Replace lamps which have been used over period of three (3) months.

9. Water Supply

1. Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.

10. Drainage

1. Refer to Section 01575 for site drainage and pumping requirements.

11. Jobsite Sign

1. Supply and erect a 2400H x 1200W mm sign (W.P. Plywood Signboard).

2. Construct plumb and level in neat wood framework and securely anchored in ground by posts to withstand wind pressure of 160 km/h.
3. Architect will supply layout.

12. Heat and Ventilating

1. Pay for cost of temporary heat and ventilation used during construction, including costs of installation, fuel, operation, maintenance and removal of equipment. Use of direct-fired heaters discharging waste products into work areas will not be permitted unless prior approvals given by the Architect.
2. Furnish and install temporary heat and ventilation in enclosed areas, as required to:
 - .1 Facilitate progress of work.
 - .2 Protect work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity for storage, installation, curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
3. Maintain minimum temperature of 10 degrees C or higher where specified as soon as finishing work is commenced and maintained until acceptance of structure by Engineer.
4. Ventilating:
 - .1 Prevent hazardous accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.
5. Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct -fired combustion units to outside.
6. The Architect may permit the use of permanent system providing agreement can be reached on:
 - .1 Conditions of use, special equipment, protection and maintenance.
 - .2 Guarantees will not be affected.
 - .3 Approval of the Owner.

End of Section

1. Construction Safety Measures

1. Observe and enforce construction safety measures required by the National Building Code; the O.B.C.; The Provincial Government; Workers' Compensation Board; and, Municipal authorities.
2. In particular, the Occupational Health and Safety Act (Ont. Re. 213/91), the Occupational Health and Safety Act, the regulations of the Ontario Ministry of Labour and Ontario Hydro Safety requirements shall be strictly enforced.
3. Contractor shall ensure that copies of all applicable construction safety regulations, codes and standards are available on the job-site throughout the period of construction. All workers are to be informed that these documents are available for reference at any time.
4. The Contractor shall ensure that all supervisory personnel on the job-site are fully aware of the contents of the Occupational Health and safety Act (Ontario Regulation 213/91 - Construction Projects) the Workers' Compensation Act" and, Bill 208 (Chapter 7, Standards of Ontario) "An Act to Amend the Occupational Health & Safety Act and the Workers' Compensation Act", and, that they comply with all requirements and procedures prescribed therein. These documents include, but are not limited to, the following construction safety requirements:
 - .1 Contractor to register with the Director of the Occupational Health and Safety Division before or within 30 days of the commencement of the project, (O.Reg. 213/91, sec 5).
 - .2 File a notice of project with a Director before beginning work on the project, (O.Reg. 313/91, sec 6).
 - .3 Notification prior to trenching deeper than 1.2m, (O.Reg. 213/91, sec 7).
 - .4 Accident Notices and Reports, (O.Reg. 213/91, sec 8 through sec 12).
 - .5 General Safety Requirements, (O.Reg. 213/91, sec 13 through sec 19).
 - .6 General Construction Requirements, e.g. protective clothing, hygiene practices, housekeeping, temporary heat, fire safety, access to the job-site, machine and equipment guarding and coverings, scaffolds and platforms, electrical hazards, roofing, et al, (O.Reg. 213/91, sec 20 through sec 221).
 - .7 Establish a Joint Health and Safety Committee where more than 19 workers are employed for more than 3 months, (Bill 208, S.8(2) to S.8(14)).
 - .8 Establish a Worker Trades Committee for all projects employing more than 49 workers for more than 3 months, (Bill 208, S-8a(1) to S.8b(4)).
 - .9 Ensure that all activities arising out of (.07) and (.08) above are recorded and that minutes are available to an inspector of the Ontario Ministry of Labour.
5. The Contractor shall be considered as the "Constructor" in consideration of the rights and responsibilities for all construction safety requirements, procedures, facilities and inspection of all work performed by the Contractor, Subcontractors/Sub-trades and other Contractors engaged on this project.
6. In the event of a conflict between any of the provisions of the above authorities the most stringent provisions are to be applied.

2. Material Safety Data Sheet

1. Material safety Data Sheets (MSDS) must be available at the job-site for any product listed on the Hazardous Ingredients List prior to being used, installed or applied inside of the building.
2. A Material Safety Data Sheet is to be submitted to the Architect for any product which is known to create, or suspected of creating, a health hazard or discomfort during construction or upon commissioning of the project including, but not limited to, the following:
 - .1 adhesives
 - .2 solvents
 - .3 sealants, (caulking, vapour seals, etc.)
 - .4 sprayed-on fireproofing
 - .5 resilient flooring
 - .6 carpet, paint, varnish or other coatings
 - .7 exposed membrane waterproofing
 - .8 special coatings, (terrazo sealants, chafing coatings, etc.)
 - .9 solder, brazing and welding and other filler metal
 - .10 other products whose particles or vapours may become air borne after installation.
 - .11 any other product as directed by the Consultant.
3. Comply with WHMIS regulation, Workplace Hazardous Material Information System.

3. Fire Safety Requirements

1. Comply with requirements for Building Construction, the Ontario Building Code, the Ontario Fire Code, the requirements of Local Fire Authorities and of the requirements of the Office of the Fire Marshal.

4. Overloading

1. Ensure no part of Work is subjected to a load which will endanger its safety or will cause permanent deformation.

5. Falsework

1. Design and construct falsework in accordance with CSA S269.1-1975.

6. Scaffolding

1. Design and construct scaffolding in accordance with CSA S269.2-M1980.
2. Scaffolding to be designed by a Professional Engineer when required under the Occupational Health and Safety Act.

7. Materials Specifically Excluded

1. Asbestos and/or asbestos-containing products are not permitted. Submit Material Safety Data Sheets for any product suspected of containing asbestos if so requested by

Consultant. Examples of some materials requiring close scrutiny and/or confirmation include:

- .1 Transite drainage pipe - whether buried or above grade - not permitted.
 - .2 Composite floor tile containing asbestos - not permitted.
 - .3 Lay-in ceiling tiles containing asbestos - not permitted.
 - .4 Insulation and/or jacketing for pipes, ducts, motors, pumps, etc. - not permitted if any asbestos is present.
2. Solder for all piping is to be lead-free.
 - .1 "Lead Free" shall mean solder which contains less than 0.030% of lead when dissolved in fluoroboric and nitric acids and tested by inductively coupled argon plasma atomic emission spectroscopy. "Steelbond 281" and "Silverbrite" are acceptable solder products.
 - .2 The mechanical contractor shall provide an affidavit signed by the Principal of the company, on company letterhead, that all of the solder used on the project was either one of the two acceptable products or that the solder used (identified by brand name) meets or exceeds the testing criteria.
 - .3 The Owner shall undertake random testing of the soldered joints. Should testing prove that the solder used was not as specified, the Owner shall take action against the contractor to the full extent of the law.
 3. All paint and finish coatings are to be lead and mercury-free. Submit Material Safety Data Sheets confirming that these products are free of all lead and/or mercury compounds.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. These specifications apply to all 16 divisions of the project specification. It is the responsibility of the contractor to apply these provisions wherever practical within specification limits to all products and services used on this project.
2. Recognized that currently specified materials and methods may conflict with the basic intention of this section. Where reasonable alternate materials and methods exist that are not specified here, and that do not compromise quality or create additional cost for the owner, notify the Architect of such alternate materials or methods. Do not proceed to use alternate materials or methods to those specified without the express approval of the Architect.
3. Elsewhere, apply the provisions of this section to all work. Exceptions can only be made when signed off by the Architect. Suitability of all products used is the responsibility of the contractor.

1.2 Compliance Specifications

1. The contractor must comply with all applicable health, safety and environmental regulations.

1.3 Beyond Compliance Specifications

1. These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Owner's intention to develop a specification which maximizes environmentally "friendly" materials and methods wherever possible within current technical and budget limitations.
2. Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore these specifications cover both material and methods.
3. The primary goal of beyond compliance specification is to reduce the use of products or methods which have negative health and environmental impacts both during and after construction. These considerations may include full life cycle impacts, associated with raw materials, manufacturing, transport, deconstruction and their eventual fate.
4. These specifications will specifically address primary categories of readily identifiable products, ingredients and methods.
5. These provisions apply to both indoor and outdoor applications equally.

1.4. Exceptions

1. These specifications recognize that not all substitutes are equal and therefore exceptions can be made based on substantive evidence of necessary and superior performance. Special considerations may be given to restricted substances when secondary provisions are made such as sealed in place (contained) applications. All such exceptions must be approved in writing by the Architect.

PART 2 - MATERIALS

2.1 Products or Substances to be Avoided or Limited in Use

1. No product containing the following substances may be used on this project when an equivalent product without or with a lower concentration of this substance is suitable and available. All products containing substances which are known to cause health effects including but not limited to cancer, mutagenic, neurological, or behavioral effects should be avoided if suitable substitutes not containing or containing lower concentrations are available. This provision shall be limited to information contained on Material Safety Data Sheets, therefore MSDS sheets must be reviewed for all products for which such sheets are required. Applications for exceptions must be accompanied by related MSDS and product application and performance sheets, clearly showing a need for the exception.

2.2 Volatile Organic Compounds

1. No product containing volatile organic compounds (in over simplified terms volatile petro chemical or similar plant derived solvents) may be used on this project when a suitable non VOC or failing that a low VOC substitute is available. Manufacturers may refer to the U.S. EPA definition of VOC's for guidance or alternatively use the low molecular weight organic compound descriptor.

Example: Paints, Coatings, Primer, Adhesives, Chalks, Firestops, etc.

2. Waterborne equivalents are available for most of the solvent borne products used in construction and in most cases would be the preferred alternative. Waterborne products may in some instances have high VOC contents, therefore the fact that a product is waterborne does not automatically make it acceptable.

2.3 Chlorinated Substances

1. Poly Vinyl Chloride (vinyl) and other chlorinated products should be avoided if suitable substitutes are available.

2.4 Plasticizers

1. Plasticisers which offgass (low molecular weight) should be avoided.

2.5 Man Made Mineral Fibres

1. Products containing mineral fibres which can be emitted or abraded should be avoided.

Examples: duct liner, mineral fibre ceiling tiles, etc.

2.6 Radiation

1. Products or methods which result in the lowest emission of Electro Magnetic Fields are preferred.

2.7 Biocides

1. Products containing biocides (pesticides, miticides, mildewicides, fungicides, rodenticides, etc.) are not to be used if suitable alternatives are available. Highly stable, low human toxicity biocides such as Portercept may be acceptable substitutes. Biocide formulas which break down, emit powders or offgass should be avoided.

2.8 Heavy Metals

1. Heavy metals such as lead, cadmium, mercury etc. should be avoided.

2.9 Aluminum

1. Raw aluminum should be avoided, anodized or factory painted aluminum is acceptable. This is particularly applicable to surfaces which people can touch.

2.10 Ozone Depleting Substances

1. Products which contain or which use Ozone Depleting Substances such as Bromide, Chlorofluorocarbons (CFC) or Hydrofluorocarbons (HFC) etc. should be avoided if suitable substitutes are available.

2.11 Greenhouse Gasses

1. Products which contain, use or generate Greenhouse gasses such as CO₂ should be avoided if suitable substitutes are available.

2.12 Bituminous (tar) Products

1. Products containing tar compounds should not be used if suitable substitutes are available.

2.13 Chemical Compounds

1. Products containing the following chemical compounds should not be used if suitable substitutes are available: Neoprene, Latex, Butyl, ABS, Formaldehyde.

2.14 Adhesives

1. Adhesives containing solvents or other non preferred ingredients should be avoided if suitable substitutes are available, including systems designs which do not need adhesives or can use mechanical etc. fastening alternatives

2.15 Composite Products

1. Some composite products contain adhesives such as formaldehyde which are not preferred, and some composites such as Fibre Reinforced Plastics are not practical for recycling. These products should be avoided if suitable substitutes are available.

2.16 Cleaners and Solvents

1. Products, equipment, and methods which require the use of cleaners and solvents are not preferred if suitable substitutes are available. Examples of preferred products would include No Wax floors, or primerless caulks and adhesives, or products not requiring caulks and adhesives.

End of Section

1. Fires

1. Fires and burning of rubbish on site is not permitted.

2. Disposal of Wastes

1. Do not bury rubbish and waste materials on site.
2. Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

3. Drainage

1. Provide temporary drainage and pumping, as necessary to keep excavations and site free from water.
2. Do not pump water containing suspended materials into waterways, sewer or drainage systems.
3. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

4. Site Clearing and Plant Protection

1. Protect trees and plants on site and adjacent properties, which are to be retained.
2. Wrap in burlap trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
3. Protect roots of trees to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

End of Section

1. General

1. Refer also to Section 01005, item 5.12 'Period Cleaning' and coordinate with this section.
2. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
3. Store volatile wastes in covered metal containers, and remove from premises daily.
4. Prevent accumulation of wastes which create hazardous conditions.
5. Provide adequate ventilation during use of volatile or noxious substances.

2. Materials

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
2. Provide on-site dump containers for collection of waste materials, and rubbish.
3. Remove waste materials, and rubbish from site.
4. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.
5. Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

3. Cleaning During Construction

1. Maintain project grounds, and public properties free from accumulations of waste materials and rubbish. Clean streets as often as required by the local authorities.
2. Provide on-site containers for collection of waste materials, and rubbish.
3. Remove waste materials, and rubbish from site.
4. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.
5. Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

4. Final Cleaning

1. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all surfaces exposed to view; leave project clean and ready for occupancy.
2. Employ experienced workers, or professional cleaners, for final cleaning.
3. In preparation for Substantial Performance or Fitness for Occupancy, whichever occurs first, conduct final inspection of interior and exterior surfaces exposed to view, and of concealed spaces.
4. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all sight-exposed interior and exterior finished surfaces; polish resilient and ceramic surfaces so designated to shine finish. Vacuum carpet.
5. Clean and polish glass and mirrors.
6. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
7. Broom-clean paved surfaces; rake clean other surfaces of grounds.
8. Clean exposed ductwork, and structure.
9. Replace filters.
10. Clean bulbs and lamps and replace those burned out.
11. Clean diffusers and grilles.
12. Clean sinks, faucets, and water closets and controls.
13. Remove snow and ice from access to building, if applicable.
14. Maintain cleaning until project, or portion thereof, is occupied by Owner.

5. Removal of Temporary Facilities

1. Completely remove temporary facilities from site, including signs and foundations, making good any damage when no longer required.

End of Section

PART 1 - GENERAL

1. Requirements Included

1. Record documents, samples, specifications.
2. Equipment and systems.
3. Product data, materials and finishes, and related information.

2. Quality Assurance

1. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

3. Format

1. Organize data in the form of an instructional manual.
2. Binders: commercial quality, (8-1/2 x 11 inch) 219 x 279 mm maximum (2-1/2") 65 mm ring size.
3. When multiple binders are used, correlate data into related consistent groupings.
4. Cover: Identify each binder with type or printed title "Project Record Documents", list title of Project, identify subject matter of contents.
5. Arrange content under Section numbers and sequence of Table of Contents.
6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
7. Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

4. Contents, Each Volume

1. Table of Contents: Provide title of project; names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
2. For each Product or System: list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
3. Product Data: mark sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
4. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

5. Typed Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

5. Submission

1. Submit for review a digital pdf file of completed closeout documents in final form 15 days prior to substantial performance. For equipment put into use with Owner's permission during construction, submit Operating and Maintenance Manuals within 10 days after start-up. For items of Work delayed materially beyond date of Substantial Performance, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.
2. Consultant comments will be returned and the contractor is to revise content of documents as required prior to final submittal.
3. Submit one (1) hard copy of revised volumes of data in final form within 10 days after final inspection.
4. For contract drawings (architectural, landscaping, civil, structural, mechanical, and electrical), transfer neatly as-built notations onto second set and submit both sets.
5. Prepare digital pdf files for submission on USB of completed closeout documents.

6. Record Documents and Samples

1. In addition to requirements in Sections 00820 and 01005, maintain at the site for Owner one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
2. Store Record Documents and Samples in Field Office apart from documents used for construction. Provide files, racks, and secure storage.
3. Label and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "Project Record" in neat, large, printed letters.
4. Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.
5. Keep Record Documents and samples available for inspection by Consultant.

7. Recording As-Built Conditions

1. Consultant will provide electronic copies of project drawings in PDF format. Make one (1) hardcopy of the project drawings for the purpose of recording as-built conditions. Mark and record changes on an on-going basis as construction proceeds. **Near the end of the construction period transfer all marks to the supplied electronic documents, and submit for consultant review as project record as-built documents.** As an alternative, scan the record set in PDF format and submit for consultant review.
2. Refer to drawings/specifications for additional mechanical and electrical requirements.
3. Record information concurrently with construction progress. Do not conceal work until required information is recorded.
4. Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measure depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
5. Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalog number of each project actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and Change Orders.
6. Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

8. Digital As-Built Drawings

1. Retain the services of a CAD drafting company acceptable to the consultant to prepare digital CAD As-Built documents for all Architectural and Engineering drawings.
2. After the consultant has found the Redlined As-Built drawings to be acceptable, transfer to digital file all information recorded on As-Built drawings. Layering of information as per consultant's instructions.

9. Equipment and Systems

1. Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

2. Panelboard Circuit Directories: provide electrical service characteristics, controls, and communications.
3. Include installed colour coded wiring diagrams.
4. Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instruction. Include summer, winter, and any special operating instructions.
5. Maintain Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair and reassemble instructions; and alignment, adjusting, balancing, and checking instructions.
6. Provide servicing and lubrication schedule, and list of lubricants required.
7. Include manufacturer's printed operation and maintenance instructions.
8. Include sequence of operation by controls manufacturer.
9. Provide original manufacturer's parts lists, illustrations, assembly drawings, and diagrams required for maintenance.
10. Provide installed control diagrams by controls manufacturer.
11. Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
13. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
14. Include test balancing reports as specified in Mechanical Specifications.
15. Additional Requirements: As specified in individual specification sections.

10. Materials and Finishes

1. Building Products, Applied Materials, and Finishes: include product data, with catalog number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture-protection and weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommend schedule for cleaning and maintenance.

4. Additional Requirements: as specified in individual specifications sections.

11. Guarantees, Warranties and Bonds

1. Separate each warranty or bond with index tab sheets keyed to the List of Contents listing.
2. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal. Use Guarantee/Warranty Form as provided in Section 01721 whenever standard preprinted trade or manufacturer's Guarantee/Warranty forms are not available. Provide written form for each warranty specified in Section 01740.
3. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
4. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
5. Verify that documents are in proper form, contain full information, and are notarized.
6. Co-execute submittals when required.
7. Retain warranties and bonds until time specified for submittal.

End of Section

**Sample
Guarantee/Warranty
Form**

1. Notes

1. To be made out on the letterhead of Guarantor or Warrantor which usually is a Subcontractor.
2. This format is to be used only when standard preprinted trade or manufacturer's forms are not available. Preprinted forms are to include all elements of information shown on this sample or as a minimum.
3. Comply with Requirements for Guarantee/Warranty as specified in Section 01720, Article 10.

To:

Date: _____

SECTION _____

TITLE _____

GUARANTEE/WARRANTY TO:

OWNER THE CATHOLIC CEMETERIES OF THE DIOCESE OF HAMILTON

PROJECT Holy Family Cemetery Crematorium
2543 Lower Base Line Road, Milton, ON L9T 2X5

ARCHITECT Grguric Architects Incorporated

REFERENCE (to specifications or drawings)

TIME Period of Guarantee/Warranty: _____ years

GUARANTEE/ Starting Date: Substantial Performance as certified by Architect

WARRANTY

Date: _____

(Description of Guarantee/Warranty)

Upon written notification from the Owner or the Consultant that the above work is defective any repair or replacement work required shall be to the Consultant's satisfaction at no cost to the Owner.

This guarantee shall not apply to defects caused by the work of others, maltreatment of materials, negligence or Acts of God.

SUBCONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

Address:

Telephone Number

CONTRACTOR

Signature

Date

Authorized Signing
Officer:

(Name Printed)

Title

Name of Firm:

SEAL

Address:

Telephone Number

End of Section

1. Maintenance Manual

1. On completion of project, submit to Owner one (1) copy of Operations Data and Maintenance Manual in English, made up as follows:
 - .1 Bind data in vinyl hard covered, 3 ring loose leaf binder for 215 x 280 mm size paper.
 - .2 Enclose title sheet, labelled "Operation Data and Maintenance Manual", project name, date and list of contents.
 - .3 Organize contents into applicable sections of work to parallel project's specification break-down. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
 - .4 A digital copy of all documents in the operations and manuals must be provided on a USB, format to be PDF.

2. Include following information, plus data specified.
 - .1 Maintenance instruction for finished surface and materials.
 - .2 Copy of hardware and paint schedules.
 - .3 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.
 - .4 Names, addresses and phone numbers of sub-contractors and suppliers.
 - .5 Guarantees, Warranties and bonds showing:
 - .1 Name and address of project.
 - .2 Guarantee commencement date (date of Final Certificate of Completion).
 - .3 Duration of guarantee.
 - .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
 - .5 Signature and seal of Contractor.
 - .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

3. Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.

4. Include in the Manual a complete set of final shop drawings indicating corrections and changes made during fabrication and installation.

End of Section

1. Standard Warranty

1. Refer to Section 01721 'Sample Guarantee/Warranty Form for Warranty requirements and conditions for the standard warranty which is required for the work of this contract. Refer to Section 00820 Supplementary Conditions and to Standard Contract Document CCDC No. 2, 2008 for warranty requirements and conditions for the standard warranty which is required for the work of this contract.

2. Extended Warranties

1. Refer to individual specifications sections for requirements of extended warranties required for particular sections or items of work.
2. Extended warranties are required to be issued by manufacturers, fabricators, suppliers and/or installers, sometimes jointly, due to their unique position in the construction process and their ability to guarantee a particular section of work. Refer to individual requirements of extended warranties requested.
3. Unless specifically noted otherwise, all extended warranties shall commence on the date of Substantial Performance of the Work as certified by the Consultant.
4. Listed below is a summary of extended warranties required for individual Sections. This list, if inconsistent with the specified requirements of individual extended warranties, shall be deemed correct with respect to length of extended warranties. Extended warranties required shall include, but not be limited to, the following:

- .1 Extended warranties (total warranty period listed, including entire building warranty)
 - Asphalt Paving (02600) 2 years
 - Architectural Woodworking (06400) 2 years
 - Aluminum Composite Panels (07421) as noted in spec section
 - Roofing (07516) as noted in spec section
 - Preformed Metal Siding and Soffits (07615) 5 years
 - Prefinished Metal Flashing and Trim (07620) 5 years
 - Joint Sealer for Roofing (07901) 2 years
 - Caulking (07900) 2 years
 - Commercial Steel Doors & Frames (08100) as noted in spec section
 - Wood Doors (08211) 3 years
 - Aluminum Windows and Doors (08520) 10 years
 - Glazing (08800) 5 years
 - Wall Ceramic Tile (09310) 3 years
 - Floor Porcelain Tile (09330) 3 years
 - Acoustic grids and tiles (09510) 2 years
 - Carpet Tile (09680) as noted in spec section
 - Painting (09900) 2 years

End of Section

PART 1 - GENERAL

1.1 General Requirements

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 Related Work Specified Elsewhere

1. Site Grading Section 02210
2. Excavation, Backfilling and Rough Grading Section 02220

1.3 Examination

1. Examine the Drawings, Specifications, and Bore Hole data which shows soil conditions at boreholes in locations shown on Drawings. Visit the site and determine the work extent and nature of the existing conditions. In no circumstances will any claims against the Owner be allowed resulting from failure to ascertain the work herein described or implied.
2. Report to the Consultant in writing any conditions which will prejudice the proper completion of the work of this Section. Commencement of work constitutes acceptance of existing conditions.

1.4 Protection

1. Establish locations of all electrical, telephone, or other service installations existing in the areas of site preparation by contacting the service owners and obtaining their approval to work in such areas. Contact the County of Brant and local utilities, to review proposed scheduling, work activities and regulations pertaining to all work beyond the limits of the property including but not limited to parking areas, stormwater outlet and headwall and asphalt driveway entrances. Provide adequate markers or take protective measures to ensure that no damage will be caused under this Section. Repair or replace damaged work as required without cost to the Owner.
2. Electronically locate, map and record location of services prior to doing any excavation.

1.5 Dust Control

1. Provide and maintain to the Consultant's satisfaction, adequate system to avoid any nuisance caused by dust and dirt rising throughout the area of operations.

1.6 Silt Control

1. Provide and maintain to the Consultant's satisfaction, control systems to prevent silt from entering any storm drainage system.

PART 2 - PRODUCTS

2.1 Materials

1. Not Applicable.

PART 3 - EXECUTION

3.1 Disposal of Waste and Surplus Materials

1. Except where specified or indicated on Drawings to be retained on site, or to be reused, remove from the site, all waste and surplus materials resulting from site preparation work on a daily basis. Dispose of as required in accordance with local or provincial regulations. Under no circumstances shall the burning of rubbish be permitted on the site. Where items are to be reused, store on site where designated and provide temporary protection to same to prevent damage by construction operations.

End of Section

PART 1 - GENERAL

1. General Requirements

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

2. Related Work Specified Elsewhere

1. Environmental Protection Section 01575
2. Excavation, Backfilling and Rough Grading Section 02220

3. Site Conditions

1. Refer to Geotechnical Report bound into Section 00300.
2. Known underground and surface utility lines and buried objects are indicated on site plan. Confirm exact locations of utility lines and buried objects prior to machine excavation or grading.

4. Protection

1. Prevent damage to trees, natural features, bench marks, existing pavement, surface or underground utility lines which are to remain. Make good damage.

PART 2 - PRODUCTS

1. Materials

1. Fill materials: Types "B" and "C" in accordance with Part 2 of Section 02220 Excavation, Backfilling and Rough Grading.
2. Obtain approval of excavated or graded material used as fill for grading work. Protect approved material from contamination.

PART 3 - EXECUTION

1. Stripping of Topsoil

1. Examine the site and review the information bound into Section 00300, Geotechnical Data. Determine the extent of areas previously stripped and approximate depth of remaining topsoil.
2. Strip the remaining topsoil from the site as part of the work in this Section.
3. Remove top soil from areas to be excavated, paved and regraded.
4. Strip top soil when dry enough to prevent contamination of subgrade.

5. Stockpile top soil on site, where directed. Maintain the existing on-site stockpiled topsoil and relocate as required as part of the overall stockpile.
6. Top soil to be retained on site.

3. Grading

1. The Contractor shall use the information shown on Drawings, the Geotechnical Report bound into Section 00300, as well as the information observed during visits to the site during the Tender Period, as the basis for the "Existing Conditions" of the site.
2. Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. Ensure that rough grading operations to not promote water ponding in construction areas. Level depressions outside the building area with Type "C" fill if suitable compaction can be demonstrated.
3. Perform construction grading and/or pre-grading to allow proper construction access to the Work. Grade site to accommodate vehicle movement, materials, handling and storage and placement of granular base materials (to be used during the construction period).
4. Grade to prevent water ponding on site during construction period. Create additional ditches, swales, slopes, ponds, etc. as required by Contract Documents and Municipal Authorities for control of drainage, sedimentation and topsoil retention.
5. Rough grade to following depths below finish grades:
 - 150 mm for grassed areas.
 - 400 mm for flowerbeds.
 - 600 mm for shrub beds.
 - 550 mm for heavy duty asphalt paving.
 - 415 mm for medium duty asphalt paving
 - 200 mm for light duty paving
 - 275 mm for concrete walks.

Note that the rough grading elevations listed above are nominal.

6. Slope rough grade away from building 1:50 minimum.
7. Grade swales and ditches to profiles and depths indicated.
8. Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
9. Compact filled and disturbed areas to maximum dry density to ASTM D698-78, as follows:
 - 90% under landscape areas.
 - 98% under paved and walk areas and playing fields.
10. Do not disturb soil within branch spread of trees or shrubs to remain.

4. Testing

1. Inspection and testing of soil compaction will be carried out by designated testing laboratory as directed by Consultant.
2. Costs of tests will be paid by a Cash Allowance specified in Section 01020.

5. Surplus Material

1. Remove surplus material from site in a manner acceptable to Consultant and Municipal Authorities at no additional cost to the owner.
2. Remove material unsuitable for fill, grading or landscaping from site in a manner acceptable to Consultant and Municipal Authorities.

End of Section

PART 1 - GENERAL

1.1 Related Work Specified Elsewhere

- | | |
|---|-------------------|
| 1. Excavation and Backfill for Mechanical and Electrical: | refer to Drawings |
| 2. Safety Requirements: | Section 01545 |
| 3. Environmental Protection: | Section 01575 |
| 4. Site Grading: | Section 02210 |

1.2 Shoring, Bracing & Underpinning

1. Prevent movement or settlement, safeguard and maintain integrity of adjacent structures, earth, bench marks, services, walks, paving, trees, bearing piles, curbs, landscaping, adjacent grades. Provide bracing, shoring and underpinning required.
2. Shore and brace excavations to prevent failure in accordance with Canadian Construction Safety Code 1977 and applicable local regulations.
3. Make good and pay for any damage and be liable for any injury resulting from inadequate shoring, bracing or underpinning.
4. Comply with all Safety Requirements and applicable local regulations and to protect existing features.
5. Engage services of qualified professional engineer who is registered in the province or territory in which work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for work.

1.3 Utility Lines

1. Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Architect of findings.
2. Known underground and surface utility lines and buried objects are indicated on site plans. No guarantee is given of completeness and accuracy.
3. Make good and pay for damage to existing utility lines resulting from work.

1.4 Protection

1. Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with footing concrete.
2. Protect bottoms of excavations from freezing.
3. Construction banks in accordance with local by-laws.

4. Provide adequate protection around bench markers, layout markers, survey markers, and geodetic monuments.
5. Provide protection to ensure no damage to existing facilities and equipment situated on site.
6. Effect approved measures to minimize dust as a result of this work.
7. Do not stockpile excavated material to interfere with site operation or drainage.

1.5 Compaction Densities

1. Compaction densities are percentages of maximum densities obtainable from ASTM D698-70.

PART 2 - PRODUCTS

2.1 Materials

1. **Type 1 Fill:** Clean, graded 20 mm clear crushed stone.
2. **Type 2 Fill:** Clean, natural river sand and gravel material, free from silt, clay, loam friable or soluble materials and organic matter, graded within the limits of MTC granular class "B" material.
3. **Type 3 Fill:** Concrete backfill 15 Mpa strength at 28 days complying with the requirements of Section 03300.
4. **Type 4 Fill:** Excavated pervious soil free from roots, rocks larger than 75 mm and building debris. If sufficient quantity of material is not available from excavation, use imported fill having same or better characteristics.
5. **Type 5 Fill:** Fine grain material such as clay that is relatively impervious to the flow of water.

2.2 Stockpiling

1. Stockpile fill materials in areas designated by Architect. Stockpile granular materials in manner to prevent segregation. Protect stockpiled fill material from freezing.
2. Protect fill materials from contamination.

PART 3 - EXECUTION

3.1 Preparation

1. **Lines and Levels:** Establish accurate lines and levels as required. Supply batter board, line stakes and templates. Establish permanent reference lines and bench marks required.

3.2 Excavating

1. Excavate to elevations and dimensions indicated for installation, construction and inspection of work.
2. Excavate to well defined lines to minimize quantity of fill material required.
3. Earth bottoms of excavations to be dry, undisturbed soil, level, free from loose or organic matter.
4. Excavation must not interfere with normal 45 deg. splay of bearing from bottom of any footing.
5. When complete, have Architect inspect excavations to verify soil bearing capacity, depths and dimensions.
6. Excavation, exceeding that indicated in Contract Documents, if authorized in writing by Architect, will be paid as extra to Contract Price in accordance with General Conditions.
7. Correct unauthorized excavation at no extra cost as follows:
 - .1 Fill under bearing surfaces and footings with type 3 fill.
 - .2 Fill under other areas with Type 2 fill compacted to 98% density.
8. Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.
9. Remove paving, walks, rubble and other obstructions encountered in course of excavation.

3.3 Backfilling

1. Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Architect.
2. Areas to be backfilled must be free from debris, snow, ice, water or frozen ground.
3. Prior to placing fill under slabs on grade, compact existing subgrade to obtain same compaction, as specified for fill. Remove "soft" material and fill with approved material.
4. Prior to installation of foundations compact existing subgrade to obtain bearing capacity. Remove soft material and fill with approved material.
5. Backfill simultaneously each side of walls and other structures to equalize soil pressures.
6. Obtain Architect's approval prior to placing backfill against foundation walls.
7. Where temporary unbalanced earth pressures are liable to develop on walls or the structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Architect.

8. Place and compact fill materials in continuous horizontal layers not exceeding 200 mm loose depth. Do not disturb or damage buried services, drainage system, waterproofing and dampproofing. Make good any damage.
9. Do not use frozen material for backfilling or filling.

3.4 Fill Locations & Compaction

1. **Type 1 Fill:**
 - .1 Use under interior concrete slabs on grade to a minimum compacted depth of 200 mm.
 - .2 Use under all exterior concrete slab on grade to a minimum compacted depth of 150 mm.
 - .3 Compact to at least 98% standard proctor maximum dry density.
2. **Type 2 Fill:**
 - .1 Use within building area, in trenches, pits and fill for over-excavated areas to underside of type 1 Fill.
 - .2 Compact to at least 98% standard proctor maximum dry density.
3. **Type 3 Fill:**
 - .1 Use under foundations where specified.
4. **Type 4 Fill:**
 - .1 Use at exterior side of perimeter walls to subgrade level.
 - .2 Use on backside of retaining walls to subgrade level on high side for minimum 500 mm from wall. Compact to 85% standard proctor maximum dry density.
5. **Type 5 Fill:**
 - .1 Use at perimeter of building at weeping tile location, above type 2 fill, in landscaped areas prior to placing top soil – refer to Section 02411.

3.5 Grading

1. Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. Under paved areas, subgrade must be properly shaped and crowned to provide drainage of the sub-base to the catch basins and to the sub-drainage system. Cross fall to be 2% minimum.
2. Slope rough grade away from building 1:50 minimum.
3. Grade ditches to depth required for maximum run-off.
4. Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Moisture content of fill and existing surface to be approximately the same to facilitate bonding.
5. Compact filled and disturbed areas to standard proctor maximum dry density to ASTM D698-78 as follows:
 - .1 85% under landscaped area.

.2 98% under paved and walk areas and under sports field.

6. Do not disturb soil within branch spread of trees or shrubs to remain.

3.6 Inspection & Testing

1. Refer to Section 01005.

3.7 Surplus Material

1. Dispose of surplus material from site.

2. Dispose of material unsuitable for fill, grading or landscaping from site.

End of Section

PART 1 - GENERAL

1.1 Related Work Specified Elsewhere

1. Excavation, Backfilling and Rough Grading: Section 02220

1.2 Extended Warranty:

1. Submit a warranty for asphalt paving installation, covering materials and labour and the repair or replacement of defective work in accordance with Section 01740 Warranties and Bonds for two (2) years total.

PART 2 - PRODUCTS

2.1 Materials

1. **Sub-Base:** Generally, use Fill Type "4" where required to reach design elevations.
2. **Base:** 50 mm and 19 mm crusher run limestone.
3. **Heavy Duty Pavement for Parking and Driveways:** Hot mix, hot laid asphaltic concrete HL8 and HL3, mixture conforming to O.P.S.S. #1150.05.
4. **Joint Painting Material:** SS-1 emulsion in accordance with O.P.S.S. #1103.05.

PART 3 - EXECUTION

3.1 Preparation

1. Regard locations and instructions on drawings. Report any discrepancies or questions to the Consultant prior to proceeding with the work. In particular pay attention to the exact delineation of all edges of pavement and types of pavement;
2. Set out work in accordance with lines and levels shown on Drawings. Maintain such lines and levels through duration of work. Ensure positive drainage toward catch basins is maintained in all areas.
3. Compact sub-grade to a minimum of 98% Standard Proctor density.
4. Paint exposed edge of asphaltic joints, edge of manhole and catchbasin frames, curbs and similar items with SS-1 emulsion.

3.2 Installation

1. Inspect site grades prior to installation. Review the precise grade requirements required on the grading plan. Review with the Consultant prior to installation if any conditions exist that may cause deviations from grades shown on Drawings. Coordinate catchbasin elevations with those shown on Mechanical site plan.

2. Pavement Section:

.1 Heavy Duty:

- minimum 300 mm compacted thickness of 50 mm crusher run limestone compacted to 100% Standard Proctor Maximum Dry Density (SPMDD), ASTM-D698 .
- 150 mm compacted thickness Base course of 19 mm crusher run limestone compacted to 100% SPMDD.
- 50 mm compacted thickness of granular asphalt HL8.
- 40 mm compacted thickness of granular asphalt HL3.

3. Placing Granular Materials:

- .1 Exercise due care at all times to prevent granular materials from being contaminated by clay or other types of deleterious materials.
- .2 Place materials immediately after sub-grade is inspected by the Architect and as follows:
 - .1 To required width and thickness indicated on Drawings in layers not exceeding 100 mm compacted thickness crusher run limestone.
 - .2 Grade each layer and compact to a minimum 100% standard Proctor density to a smoother surface conforming to required cross-section.
- .3 Finished surface of granular material must not deviate more than 10 mm from designed grade.

4. Placing Asphaltic Pavement:

- .1 Obtain Consultant's inspection of compacted granular base before commencing asphalt paving.
- .2 Air temperature during placing of mixture must be minimum 7 deg. C and rising. Temperature of mixture when spread must be not less than 120 deg. C nor more than 150 deg. C. Do not increase temperature of mixture to offset long distance hauling.
- .3 Compact asphaltic mixture as soon as it can bear roller without undue displacement and hairline cracking and continue until all roller marks are eliminated. Speed of roller must at all times be slow enough to avoid displacement of mixture. Keep roller wheels slightly moistened by water to prevent adhesion of mixture. Excess water will not be permitted. Compact mixture with hot tampers in locations that are not easily accessible to machine roller.
- .4 Rolling Procedure:
 - .1 Initial and final rolling must be accomplished using self-propelled Class "B" roller.
 - .2 Intermediate rolling must be carried out using self-propelled Class "C" roller or "D" roller. Intermediate roller must follow breakdown roller as closely as possible.
- .5 Upon completion of compaction each pavement course must be:
 - .1 Smooth and true to crown and grade with variation not more than 6 mm from thickness shown on Drawing. Do not place any asphaltic course less than 25 mm thick nor more than 75 mm thick.
 - .2 Free from depressions exceeding 3 mm as measured with 3 m straight edge paralleling centre line of driveways/aisles.

.3 Compacted to a density not less than 97% Marshall.

5. Joints:

- .1 Cut back bituminous course to its full depth in straight or curved lines as required to expose fresh, straight, vertical surface. Remove broken and loose material.
- .2 Asphalt must be placed in such a manner that joint must not be allowed to cool before adjacent asphalt course is applied.
- .3 Where paving is comprised of two or more courses, joints must overlap by not less than 600 mm.
- .4 Carefully place and compact hot asphaltic material against joints. Correct any unsatisfactory joint before proceeding with work.
- .5 Feathering of joints will not be permitted.

3.3 Pavement Markings

1. Parking Spaces:

- .1 Lay out lines as indicated on drawings and apply 100mm yellow - wide for parking, use mechanical application equipment.
- .2 End limit of each line to have clean, sharp 90° corners with no over spray fogging.
- .3 Thickness of paint application to be consistent throughout.
- .4 Under-sprayed lines shall be repainted.

2. Handicapped Symbols, as indicated on the Drawings, and as follows:

- .1 1200mm x 1200mm - White symbol in blue box.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Excavation, Backfilling & Rough Grading Section 02220
2. Concrete Reinforcement refer to Structural Drawings
3. Cast-in-Place Concrete Section 03300

1.2 Reference Standards

1. CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction
2. CSA-A23.2-14 Test Methods and Standard Practices for Concrete
3. CSA S269.1-16 Falsework and Formwork for Construction Purposes
4. CSA-S269.3-M92 (R2013) Concrete Formwork for Construction Purposes

1.3 Co-ordination

1. Install anchors, sleeves, bolts, inserts, drains, expansion joint components and other items supplied under other sections of the specifications required to be built into, anchored to, or passing through concrete work, in co-ordination with the other trades.
2. Supply templates for setting all anchorages required for the buildings and shelters.

1.4 Design of Formwork

1. Assume full responsibility for the complete structural design and construction of formwork including shoring and bracing to resist vertical and horizontal loads due to the weight of wet concrete, self weight of forms, wind, fluid pressure of concrete, and other forces arising from equipment used in placing the concrete.

1.5 Waste Management and Disposal

1. Place materials defined as hazardous or toxic waste in designated containers.
2. Ensure emptied containers are sealed and stored safely for disposal away from children.
3. Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 Materials

1. Formwork Lumber: Plywood and wood formwork materials to CAN/CSA-A23.1-14/A23.2-14. Formwork materials used on site shall be new and acceptable to the Consultant, prior to erection. Panels shall be fabricated for use as form panels, finished one side, with

sealed edges and a minimum thickness of 19mm. Panels shall be smooth and free from defects which would show up on concrete surfaces exposed to view.

2. Formwork Liner: Plastic laminate, vinyl, polyethylene, neoprene or approved products new and acceptable to the Consultant to provide the surface texture and forms required for the design as shown.
3. Form Coating: for wood forms and as recommended by manufacturer for form liner.
4. Form stripping agent: CPD colourless non-staining odourless or as recommended by manufacturer of form liner.
5. Joint Tape: non staining, water impermeable, self releasing, where required.
6. Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface, and not leaving metal closer than 25 mm to the surface of the concrete for walls. Snap tie length shall suit wall thickness as noted on drawings.
7. Tie Hole Plugs: 25mm dia. tapered PVC hole plugs to be provided on all exposed walls.
8. Form Ties/Supports: External clamping devices to retain form tight, uniform and easily removable around all columns.

PART 3 - EXECUTION

3.1 Erection

1. Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings.
2. Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1-14, and to produce acceptable finish where exposed.
3. Construct falsework in accordance with CSA S269.1-6.
4. Obtain approval from soils testing engineer for bearing surfaces prior to erection of forms.
5. Obtain Consultant's approval for use of earth forms.
6. Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
7. Align form joints and make watertight. Keep form joints to minimum.
8. Use (25) mm chamfer strips on external corners of beams, joints, columns, walls etc., exposed to view.
9. Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

10. Provide blocking and anchorage for hollow metal frames set to be cast into forms.
11. Clean formwork in accordance with CAN/CSA-A23.1-14 before placing concrete.
12. Forms shall remain in place for a minimum duration of 48 hours for footings, curbs, etc. and all other non self-supporting structural components.
13. Forms shall remain in place for a minimum of 72 hours for all columns.
14. Re-use of formwork and falsework subject to requirements of CAN/CSA-A23.1-14.
15. Be responsible for the safety of the structure, both before and after the removal of forms, until the concrete has reached its specified 28 day strength.
16. When forms are stripped during the curing period, cure and protect the exposed concrete in accordance with Section 03300 Cast-in-Place Concrete.
17. Movement and displacement of formwork during construction, variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by specified methods will be considered defective work performed by this Section.
18. Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost to the Owner.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|--|------------------------------|
| 1. Excavation, Backfilling and Rough Grading | Section 02220 |
| 2. Asphalt Paving | Section 02600 |
| 3. Concrete Formwork & Accessories | Section 03100 |
| 4. Concrete Reinforcing | refer to structural Drawings |
| 5. Structural Metal Framing | refer to structural drawings |
| 6. Metal Fabrications | Section 05500 |
| 7. Rough Carpentry | Section 06100 |
| 8. Mechanical | refer to mechanical drawings |
| 9. Electrical | refer to electrical drawings |

1.2 Reference Standards

- | | |
|----------------------------|--|
| 1. CSA-A23.1-14 | Concrete Materials and Methods of Concrete Construction |
| 2. CSA A23.2-14 | Test Methods and Standard Practices for Concrete |
| 3. CAN/CSA-A3001 | Portland Cement |
| 4. CAN/CSA-A23.5-M86 | Supplementary Cementing Materials |
| 5. CAN/CSA-A362-93 | Blended Hydraulic Cement |
| 6. CSA G30.18-09 (R2014) | Carbon steel bars for concrete reinforcement |
| 7. CSA G30.3-M1983 (R1998) | Cold-Drawn Steel Wire for Concrete Reinforcement |
| 8. ASTM A820/A820M-16 | Standard Specification for Steel Fibres for Fibre Reinforced Concrete. |

1.3 Samples

1. At least (3) weeks prior to commencing work, inform the Consultant of the proposed mix design and proposed source of ready mixed concrete.
2. A sample of the finishes shall be prepared and remain as the minimum acceptable standard for the project.

1.4 Certificates

1. Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.
2. Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA-A23.1.

1.5 Quality Assurance

1. The Contractor shall employ an independent inspection and testing company to carry out all testing and inspection as required. The Consultant will appoint the inspection and testing company. The cost of inspection and testing shall be paid by the Contractor, out of the Cash Allowance carried for this testing under Division 1.
2. Samples and methods of moulding shall conform to the requirements of CSA-A23.2.
3. Additional testing shall be made if there is a distinct change in job conditions or if required by the Consultant or the authority having jurisdiction.
4. Compression tests shall be performed in accordance with CSA-A23.2 and good practice.
5. Failure to meet strength requirements will result in rejection of materials, strengthening or replacement of those portions that failed to develop the specified strength.
6. Concrete slump shall be tested at time that cylinders are cast and at such other times deemed necessary.
7. The addition of water and admixtures on the site is hereby prohibited and unacceptable for the project.

1.6 Submittals

1. Submit shop drawings in accordance with Section 01340 Submittals.

1.7 Waste Management And Disposal

1. Designate a cleaning area for tools to limit water use and runoff.
2. Carefully coordinate the specified concrete work with weather conditions.
3. Ensure emptied containers are sealed and stored safely for disposal away from children.
4. Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
5. Choose least harmful, appropriate cleaning method which will perform adequately.

PART 2 – PRODUCTS

2.1 Materials

1. Formwork: As specified in Section 03100.

-
2. Formwork Lumber:
 - .1 Plywood and wood formwork materials to CSA-A23.1. Formwork materials brought on site shall be new.
 - .2 Panels shall be fabricated for use as form panels, finished one side with form coating, with sealed edges and a minimum thickness of 17mm.
 3. Panels shall be smooth and free from defects which would show up on concrete surfaces exposed to view.
 4. Form Coating: Formaseal, as manufactured by Sika.
 5. Joint Tape: Non-staining, water impermeable, self-releasing.
 6. Form Ties: Removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface, and not leaving metal closer than 25mm to the surface of the concrete.
 7. Tie Hole Plugs: 25mm dia. tapered P.V.C. hole plugs.
 8. Reinforcing Steel: As specified in Section 03200.
 9. Reinforcing Steel: Billet steel, grade 400R, deformed bars to CAN/CSA-G30.18 to sizes shown on structural drawings. Where none is shown, provide 15M bars at 300mm centres as minimum steel.
 10. Wire Mesh: Welded Wire Fabric to sizes and locations shown on drawings. Where none is shown, provide 152x152xMW18.7xMW18.7 W.W.F. one layer as minimum.
 11. Portland Cement: to CAN/CSA-A3001, Type GU.
 12. Water: to CSA-A23.1.
 13. Aggregates: To CSA-A23.1. Coarse aggregates to be normal density. Use blend of 10mm and 20mm for coloured patterned concrete slabs.
 14. Air Entraining Admixture: To CAN/CSA3-A23.5.
 15. Chemical Admixtures: To CAN/CSA3-A23.5 water reducing type WN. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
 16. Colour Admixtures: Integral coloured pigments to C-979-86. Two (2) colours to be selected by Consultants from manufacturer's standard range.
 17. Non-Shrink Grout: Sternson M-Bed Superflow or approved equal.
 18. Floor Hardener: Surfex TR trap rock hardener, shake on, by Euclid Chemical Company. Application rate of 5kg/m² (1.0 lb/ft²).
 19. Interior Cure and Seal Compound: Interior slabs shall be W. R. Meadows "Intex". No resin-based compounds will be accepted.

20. Exterior Cure and Seal Compound: Exterior concrete slabs and gutters shall be W. R. Meadows "Sealtight CS-309".
21. Expansion Joint Filler: Shall be Sealtight asphalt expansion joint filler, W. R. Meadows.
22. Joint and Sawcut Filler: Shall be Loadflex by Sika or Jointflex by CPD.
23. Joint Tape: Shall be Sealtight Gusset Tape by W. R. Meadows.

2.2 Concrete Mixes

1. Proportion normal density concrete in accordance with CSA A23.1, to give following properties for concrete in foundation walls, footings and any other unspecified concrete:
 - .1 Cement: Type GU Portland cement
 - .2 Maximum 25% slag cement content
 - .3 Minimum compressive strength at 28 days: 25 MPa.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 50 to 100 mm.
 - .6 Air content: 0 to 3%.
2. Proportion normal density concrete in accordance with CSA-A23.1, Alternative 1 to give following properties: for concrete in slabs-on-grade:
 - .1 Cement: Type GU Portland cement
 - .2 Maximum 25% slag cement content
 - .3 Minimum compressive strength at 28 days: 25 MPa.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 60 to 100 mm.
 - .6 Air content: 0 - 3% maximum.
3. Proportion normal density concrete in accordance with CSA-A23.1, to give following properties: for concrete in exterior structural slabs and sidewalks/curbs:
 - .1 Cement: Type GU Portland cement
 - .2 Maximum 25% slag cement content
 - .3 Minimum compressive strength at 28 days: 32 MPa.
 - .4 Class of exposure: C-2.
 - .5 Nominal size of coarse aggregate: 20 mm.
 - .6 Slump at time and point of discharge: 60 to 100 mm.
 - .7 Air content: 5 to 8%.
4. Proportion normal density concrete in accordance with CSA-A23.1, to give following properties: for concrete in grouted masonry blocks.
 - .1 Cement: Type GU Portland cement
 - .2 Maximum 25% slag cement content
 - .3 Minimum compressive strength at 28 days: 20 MPa.
 - .4 Nominal size of coarse aggregate: 10 mm.
 - .5 Slump at time and point of discharge: 50 to 100 mm.
 - .6 Air content: 0 - 3% maximum.
5. Do not change job mix formula without prior approval of the Consultant.

6. In addition to 28 day strength tests, 7 days test may be carried out. If average strength at 7 days is less than 70% of specified 28 day strength, check mix at once and adjust to ensure required strength is obtained.

PART 3 - EXECUTION

3.1 Workmanship

1. All concrete shall be as set forth in CSA-A23.1 and shall be composed of cement, fine and coarse aggregates and water.
2. Concrete shall be delivered and discharged within 1½ hours after the introduction of the mixing water at the batch plant.
3. Mixing, placing, compaction, curing, hot and cold weather protection shall conform to CSA-A23.1. Use power vibrators in sufficient number and in location and duration to the Consultant's complete satisfaction as required.
4. Obtain the Consultant's approval before placing concrete. Provide 24 hour notice prior to placing of concrete.
5. Pumping of concrete is permitted only after approval of equipment and mix.
6. Ensure reinforcement and inserts are not disturbed during concrete placement in order to maintain proper coverage.
7. Prior to placing of concrete obtain the Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.
8. Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
9. Do not place load upon new concrete until authorized by the Consultant.

3.2 Formwork

1. Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings.
2. Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1.
3. Align form joints and make watertight. Keep form joints to minimum.
4. Use 25mm chamfer strips on all vertical and horizontal corners of exterior retaining walls as indicated on drawings.
5. All surfaces of formwork which face concrete, which will be exposed to view are to be coated with protective form coating to minimize transfer of wood grain to finished

concrete.

6. Clean formwork in accordance with CSA-A23.1 before placing concrete.
7. Re-use of formwork is subject to requirements of CSA-A23.1.
8. When forms are stripped during the curing period, cure and protect the exposed concrete.
9. Movement and displacement of formwork during construction, variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by specified methods will be considered defective work performed by this Section.
10. Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost to the Owner.

3.3 Inserts

1. Co-ordinate and verify that the Electrical Contractor has set all ducts, boxes and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated on structural or civil drawings must be approved by the Consultant.
2. Co-ordinate and verify that the Mechanical Contractor has set all floor drains, cleanouts, trench drains to provide a smooth, flush appearance with the **'FINISHED FLOOR SURFACE'** and to ensure a positive and uniform slope towards the drains.
3. Do not eliminate or displace reinforcement to accommodate inserts or hardware. If inserts cannot be located as specified, obtain approval of all modifications from the Consultant before placing of concrete.
4. Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete. With the Consultant's approval, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be at least 100 mm in diameter. Drilled holes to be minimum 25 mm larger in diameter than bolts used. Protect anchor bolt holes from water accumulations. Set bolts and fill holes with non-shrink grout or epoxy (as noted on drawings).
5. Set hollow metal frames, plumbed, squared and braced with blocking in locations shown on drawings.

3.4 Grouting

1. Grout underside of steel column bearing plates with non-shrinking grout to manufacturer's instructions. Place grout to cover steel shims left in place.

3.5 Finishing

1. Finish all concrete surfaces in accordance with Section 03350.

3.6 Expansion Control

1. **Expansion Joints**: Install expansion joint material between slabs on grade and masonry walls, for interior slabs and at max. 6000mm spacing for exterior slabs and curbs, and between slabs on grade and concrete curbs.
2. **Control Joints**: Sawcut control joints at a maximum spacing of 3000mm in each direction and where noted on drawings. Cut joints within 24 hours of placing and to a depth as detailed on drawings.

3.7 Water/Vapour Control

1. Butt joints tight together and tight to foundation wall. Seal all joints with gusset tape including foundation wall junctions.
2. Protect during placing of concrete to ensure the integrity of the barrier is maintained. Repair immediately any penetrations or areas damaged in accordance with the manufacturer's recommendations.

3.8 Curing and Protection

1. Cure and protect newly finished slabs and steps in accordance with CSA A23.1.
2. Coat exterior slabs, curbs with curing compound and leave for 30 days. Apply sealer after curing period has expired.
3. Cure finished concrete surfaces in a manner which will leave the surface with a uniform appearance and with a minimum of discolouration after drying. Ensure that curing compounds are compatible with adhesives for finishes to be applied later.
4. For all concrete slabs that are to remain exposed, curing compound is to be applied at a rate required for use as a sealer/hardener, in accordance with the manufacturer's instructions.

3.9 Field Quality Control

1. Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by the Consultant in accordance with CSA-A23.1.
2. The Consultant will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
3. Inspection or testing by Consultant will not augment or replace contractor quality control nor relieve him of his contractual responsibility.

3.10 Tolerances

1. Cast-in-Place concrete shall be constructed within the dimensional tolerances specified in CSA-A23.1, as specified elsewhere in this section. Concrete floor slabs shall be constructed as moderately flat slabs and within the tolerances listed below.

-
2. Conform in line, level and plumbness to the following tolerances. These are maximum values.
 3. Variation from vertical, in lines and surfaces of walls piers:
: In height of 3m (10') - 6mm (1/4")
 4. Variation from level or from grades shown in floors grade:
: In any 3m (10') - 3mm (1/8")
: In any bay up to 6m (20') - 6mm (1/4")
: In any 12m (40') - 12mm (1/2")
 5. Variation from straight or from correct position in walls:
: In length up to 6m (20') - 12mm (1/2")
: In any 12m (40') - 12mm (1/2")
 6. Variation in size and location of sleeves, floor open and the like and in location of bolts, inserts and fastenings: - 6mm (1/4")
 7. Variation in location of bolts, inserts, sleeves and fastenings when in group:
: - 3mm (1/8")
 8. Variation in cross-section of slabs, walls and piers:
: Maximum oversize - 12mm (1/2")
: Maximum undersize - 6mm (1/4")
 9. There shall be no variations from required level at junction of walls and floors.
 10. Where drains occur, floors shall be properly and uniformly sloped to allow complete drainage of the area.

3.11 Duct Bank (Interior)

1. Excavate to elevations shown and form duct bank as shown on electrical drawings.
2. Place reinforcing steel as shown. Electrical Contractor to place ducts.
3. Place coloured concrete and finish top surface with wood float.

3.12 Defective Concrete

1. Concrete is defective when:
 - .1 Containing visible honeycombing or embedded debris.
 - .2 Concrete damaged by freezing or which is unsatisfactory due to placement at too high a temperature.
 - .3 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.
 - .4 Any 28 day strength test result in less than 88% of specified minimum 28 day strength.
 - .5 Cracking occurs in locations other than at control and construction joints.

- .6 Curing is not carried out strictly according to the specifications.
2. Remove and reconstruct in entirety any defective concrete footing, slabs, walls as directed by the Consultant.

3.13 Cold Weather Protection

1. Refer to CSA Standards CSA-A23.1 and CSA-A23.2 Provisions and Publications. Include for tarped heated enclosures - no non-freeze additives such as calcium will be tolerated on this project.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|------------------------------------|------------------------------|
| 1. Concrete Formwork & Accessories | Section 03100 |
| 2. Cast-in-Place Concrete | Section 03300 |
| 3. Rough Carpentry | Section 06100 |
| 4. Fire Stopping and Smoke Seals | Section 07950 |
| 5. Floor Porcelain Tile | Section 09330 |
| 6. Resilient Tile Flooring | Section 09660 |
| 7. Painting | Section 09900 |
| 8. Mechanical | refer to mechanical drawings |
| 9. Electrical | refer to electrical drawings |

1.2 Reference Standards

- | | |
|-----------------|---|
| 1. CSA-A23.1-14 | Concrete Materials and Methods of Concrete Construction |
| 2. CSA-A23.2-14 | Test Methods and Standard Practices for Concrete |

1.3 Qualification

1. The work of this Section shall be carried out by an established concrete finishing company having a proven record of satisfactory workmanship for a period of at least 5 years prior to this contract and approved by the Consultant.

1.4 Scope of Work

1. Supply all materials, labour and service to provide acceptable finishes to all concrete floors, exterior slabs and exterior steps where indicated or required.
2. Supply all labour, materials and equipment necessary and as required to provide acceptable finishes for all concrete floor slabs, exterior concrete sidewalks, aprons, steps, traffic deck and exposed concrete retaining walls where noted on drawings and specified herein.

PART 2 - PRODUCTS

2.1 Materials

1. Concrete Mixes: As specified in Section 03300.
2. Curing and Sealing Compounds: As specified in Section 03300.
3. Concrete Hardeners: As specified in Section 03300.

4. Formwork: As specified in Section 03100.
5. Exposed Aggregate: As specified in Section 03300.
6. Admixtures: As specified in Section 03300.
7. Retarders: As specified in Section 03300.

PART 3 - EXECUTION

3.1 Curing and Protection

1. Cure, seal and protect newly finished slabs and steps in accordance with CSA-A23.1, Section 21, and as specified in Section 03300.

3.2 Concrete Finishing

1. General: Finish surfaces of all concrete in a manner acceptable for the installation of finished floor materials or if exposed in a manner acceptable to the Consultant.
2. Broom Finish: Concrete floor surfaces, which are to receive quarry, ceramic tile or precast terrazzo, and exterior sidewalks and concrete paving Type 1 shall have a fine broom finish after trowelling.
3. Steel Trowel Finish: All interior concrete floors, and concrete curbs which are to receive special flooring, resilient flooring or remain exposed, shall have steel trowel finish. After surfaces have been floated, steel trowel with machine trowels to produce a smooth, dense, hard surfaces with close surface tolerances.
4. Learning Steps Area: Provide all new formwork and smooth trowel finish for exposed concrete in this area.
5. Control Joints: Sawcut control joints as shown on drawings. Maximum spacing of control joints 3000mm in each direction. Co-ordinate locations with finished floor control joints. Sawcut joints within 24 hours of placing and to a depth as detailed on drawings.
6. Provide sample for approval by the Consultant. Make every effort to ensure that colour of materials is constant throughout. Bush hammering shall be sufficient to expose the coarse aggregate. Sample shall be applied to actual surface of concrete walls which shall remain as a minimum standard upon acceptance by the Consultant.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Not applicable.

1.2 Reference Standards

1. CAN3-A82.1-M87 Burned Clay Brick (Solid Masonry Units Made From Clay or Shale).
2. CAN3-S304-84 Masonry Design for Buildings.
3. CAN3-A370-M84 Connectors to Masonry.
4. CAN3-A371-M84 Masonry Construction for Buildings.
5. CAN/CGSB-37.2-M88 Emulsified Asphalt, Mineral Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
6. CAN3-A82.2-M78 (R1984) Methods of Sampling and Testing Brick.
7. CAN3-A165 Series-M85 CSA Standards on Concrete Masonry Units.
8. CSA A179-M1976 Mortar and Grout for Unity Masonry.
9. Conform to CAN3-S304 "Masonry Design for Buildings". Lay masonry to CAN3-A371.

1.3 Job Mock-Up

1. Construct mock-up panel of exterior masonry wall construction, 2000 mm x 2000 mm, showing all masonry materials and colors, fixtures, jointing, coursing, mortar and workmanship.

1.4 Source Quality Control

1. For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating initial rate of absorption for units proposed for use.

1.5 Product Delivery, Storage and Handling

1. Ensure that materials are delivered to job site in dry condition.
2. Except where wetting of bricks is specified, keep materials dry until use.
3. Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 Cold Weather Requirements

1. Comply with Clause 5.15.2 of CAN3-A371-M84.

1.7 Hot Water Requirements

1. Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

1.8 Protection

1. Until completed and protected by flashings or other permanent construction, keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain.
2. Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
3. Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

PART 2 - PRODUCTS

2.1 Materials

1. **Concrete Masonry Units:**
 - .1 Must be "Bubble Cure" or autoclave process, modular metric size conforming to CSA Standard A165 series.
 - .2 Normal Weight - H/15/A/M, S/15/A/M.
 - .3 Light Weight – Type (L)(2) 20S Standard Hollow. Use light-weight masonry units for all 2-hour fire resistance walls.
 - .4 All exposed corners to have bullnose units. All block to be uniform in color, shade and texture. Blocks having visual defects shall be rejected for exposed areas, but may be used for concealed areas.
2. **Architectural Stone:**
 - .1 **Architectural Stone:**
Size 90mm x 190mm x 390mm Pearl White Tapestry Texture SS Architectural Stone by Shouldice.
Approved equal by Arriscraft.
3. **Clay Masonry Units:**
 - .1 Type A –by Brampton Brick Contemporary Series – Royal Gray. Metric Modular size. Acceptable equal by, CANADA Brick, IXL Masonry, Cap Brick, Beldon Brick.
4. **Portland Cement:**
 - .1 To CAN3-A5-M83.

5. **Masonry Cement:**

- .1 To CSA A8-1970.

6. **Hydrated Lime:**

- .1 To ASTM C207-74.

7. **Aggregate:**

- .1 To CSA A82.56-M1976.

8. **Water:**

- .1 Ensure that water contains no salts which may cause efflorescence.

9. **Horizontal Masonry Reinforcing:**

Welded truss type or ladder type, as specified from wire to CSA-G30, 3M, hot dipped galvanized after fabrication to ASTM A153, Class B2, minimum coating 457 G/m², wire size 4.76 mm diameter. Reinforcing as per the following:

- Single wythe walls Dur-O-Wal DW 100;
- Double wythe walls (up to 390 in width) Dur-O-Wal DW 120;
- Double wythe walls (greater than 390) Dur-O-Wal DW 220;
- Cavity Walls Blok-Lok- Blok truss II - BL37 to accommodate a 90 mm cavity with 50 mm thick insulation.

Similar reinforcing by Dur-O-Wal, Blok-Lok, and Hohmann & Barnard Inc. is acceptable.

-Horizontal Masonry Reinforcing, Cavity Wall Alternate:

Fero Slotted Block ties (type 1) 16 gauge sheet metal, hot dipped galvanized, insulation support, 4.76 mm Ø, V-tie, hot dipped galvanized with welded truss type or ladder type reinforcing for back up block, as specified.

10. **Reinforcing Bars:** billet steel to grade 400, deformed bars to CSA-G30.12.

11. **Thru-wall Flashing and Air/Vapour Barrier Sheet Membrane Treatment:** Self-adhering SBS modified bitumen membrane reinforced with non-woven fibrous glass. Acceptable materials: Vedagard" by Bakor Inc., Mississauga or sheet air/vapour barrier membrane as specified as in Section 7216.

12. **Lateral Support Anchors:**

.1 **Vertical:**

- .1 At intersecting and abutting load bearing walls, use prefabricated corners and tees to match horizontal reinforcing.
- .2 At intersection of non-load bearing walls with load bearing or non-load bearing walls, use corrugated galvanized ties.
- .3 At wood parapet and similar conditions, use model BL404 with BLT9 ties, all by BlockLok. Ensure ties extend a minimum of 50 mm into the brick or block outer wythe.

.2 **Horizontal:**

- .1 Masonry walls extending to the underside of building structure: One piece 12 ga. hot dipped galvanized steel lateral clip supports as supplied by NCA/Acrow

Richmond, Rexdale, Ontario. For attachment of clip supports, use "Pos-i-Tie" fasteners.

13. **Bolts and Anchors:** To CAN3-A370.

14. **Natural Mortar:**

.1 **Generally:** Use materials only as specified in CSA A179. Ensure that weather and aggregate used in mortar, other than in walls buried in earth, will not cause efflorescence.

.2 **Bonding Agent:** Acrylic latex type by Sternson Limited, W.R. Meadows or Thoro Building Products. Use for all mortar except brick.

.3 **Mixes:** Mix mortars as specified in CSA A179 using the Proportion Specification. Add bonding agent in accordance with manufacturer's instructions.

.4 **Mortar Types:**

.1 For masonry walls in contact with earth and bedding for bearing plates and lintels: Mortar Type "M".

.2 For load-bearing walls: Mortar Type "S".

.3 For brick: Mortar Type "N" (1:1:6) premixed "Betomix 1-1-6" Type "S" portland cement hydrated lime as supplied by Daubois Inc., Jiffy Mortar Systems. Mix on site with sand, water, and colour pigment.

.4 For all other masonry walls, use regular Type "N" mortar.

.5 **Grout:** To CSA A179 Table 3.

15. **Colour Pigment:** As manufactured by Harcros Pigments. Make allowance for full loading of 2 kgs. per bag of 1-1-6. Colour as standard grey.

16. **Mortar Dropping Control Device:** "Mortar Net" manufactured by Mortar Net USA (Telephone: 1-800-664-6638).

17. **Weepholes:** 90 mm x 90 mm x 10 mm purpose made PVC, designed to drain cavities and with mesh to prevent insects from entering. Colour to be chosen by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 Workmanship

1. Build masonry plumb, level, and true to line, with joints in proper alignment.
2. Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.2 Tolerances

1. Clause 5.3 of CAN3-A371-M84 applies except as follows: Walls to receive thinset ceramic tile: plumb within 1:600.

3.3 Exposed Masonry

1. Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.

3.4 Jointing

1. Except where indicated otherwise on drawings or details or as below, make concave joints, allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, compressed, uniformly concave joints. Where joints are concealed in walls and where walls are to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating, strike flush.

3.5 Weepholes

1. Provide 10 x 90 x 90 mm PVC weepers at regular internals at both top and bottom of walls as indicated on Drawings. Ensure weepers are clear and not blocked by mortar or mortar droppings.

3.6 Joining of Work

1. Where necessary to temporarily stop horizontal runs of masonry, and in building corner, step-back masonry diagonally to lowest course previously laid. Do not "tooth" new masonry. Fill in adjacent course before heights of stepped masonry reach 1200 mm.

3.7 Cutting

1. Cut out neatly for electrical switches, outlet boxes, and other recessed or built-in objects.
2. Make cuts straight, clean, and free from uneven edges. Use masonry saw where necessary.

3.8 Building-In

1. Build in items required to be built into masonry by other trades.
2. Prevent displacement of built-in items during construction. Check for plumbness, alignment, and correctness of position, as work progresses.
3. Brace door jambs to maintain plumbness. Fill door frame with concrete.

3.9 Wetting of Bricks

1. Except during winter, wet clay brick having an initial rate of absorption exceeding 1g/min /100mm²; wet to uniform degree of saturation, to 24 hours before laying, and do not lay until surface is dry.
2. Similarly, wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

3.10 Support of Loads

1. Except where drawing requirements are more stringent, comply with Clause 6.3 of CAN3-S304-M84.
2. Where concrete fill is used in lieu of solid units, use minimum 20 MPa concrete to Section 03300.
3. Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

3.11 Provision for Movement

1. Leave 5 mm space below shelf angles.
2. Leave 6 mm space and do not use wedges between tops of non-load bearing walls and partitions and structural elements.

3.12 Loose Steel Lintels

1. Install loose steel lintels. Centre over opening width.

3.13 Control and Expansion Joints

1. Except as noted following, control joints required at maximum of 6000 mm o.c. in continuous walls having no openings, intersections or column locations. Refer to elevations for locations on exterior walls and advise Consultant of variances prior to executing the work. Control joints are not shown for clarity on the drawings for interior walls. If in doubt, request assistance from the Consultant.
2. At doorway locations, unless indicated otherwise on elevation drawings, use one side of doorway beyond lintel. Use building paper to prevent that end of lintel to bond.
3. Use standard block with concrete filled end core to form key. Line one side of core with building paper before filling core to prevent bonding. Complete vertical separation, full height and thickness of wall are required.
4. Stop masonry reinforcing at each side of the joints. Caulking specified in Section 07900.
5. At expansion joints in brick and block veneer, leave vertical joint free of mortar to allow for horizontal expansion.

3.14 Horizontal Reinforcing

1. Horizontal reinforcing at 400 mm o.c. (every 2nd course), except solid walls greater than, or equal to 340 mm in width. At 340 mm or greater, if applicable, horizontal reinforcing at 200 mm o.c. (every course). Use prefabricated corners and tees at all intersecting loadbearing walls.

2. Alternate: slotted block ties at 800 mm x 400 mm spacing, horizontal reinforcing, as specified.

3.15 Vertical Reinforcing

1. Install vertical reinforcing to size and spacing as shown on Drawings. Fill voids with minimum 20MPa concrete.

3.16 Bonding

1. Walls of two or more widths: bond using metal ties in accordance with subsection 5.6 of CAN3-A371-84.
2. Receive procedure with and obtain approval by Architect.
3. In cavity walls, keep all cavity spaces free of mortar and debris by placing a wood strip on the ties. Retain strip on a wire line and pull up level and clean off droppings prior to placing next course of ties. Install mortar control device at 300 mm o.c. horizontally, in a staggered pattern so as to overlap each other on each side. Install in every 2nd course above foundation and shelf angles.

3.17 Sound and Fire Separation

1. All loadbearing and non-load bearing partitions shall carry to the underside of structure above.
2. All openings in partitions, even above ceilings shall be patched to maintain sound and fire separation.
3. In partitions and walls not required to be fire separations, fill space between partitions and structural elements with rock wool compressible filler to maintain complete sound separation.
4. In all areas of exposed ceilings, especially at sloped precast concrete, ensure gaps no larger than 19 mm and pack gaps with rockwool, to allow for proper applications of backer rods and sealant.
5. In fire separations, spaces to be firestopped in accordance with Section 07270.
6. Use U.L.C. labelled mortar for all patching in fire separations.

3.18 Thru-Wall Flashing and Thru-Wall Building Paper @ Control Joints

1. Install thru-wall flashing at ground floor elevation in all walls on foundations.
2. Leave 2" (50 mm) of thru-wall flashing or building paper hanging, projecting off all lintels and all required locations. Architect will review prior to cutting.

3. Cutting protruding flashing: This procedure is to ensure that thru-wall flashing is installed where intended.

3.19 Inspection & Testing

1. Refer to Section 01005.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Finish painting: Section 09900

1.2 Scope

1. Provide all miscellaneous metal items except those listed above Under Article 1.1.

1.3 Reference Standards

1. ASTM A167-87 Specification for Stainless and Heat-Resisting Chromium - Nickel Steel Plate, Sheet and Strip.
2. ASTM A325-90 Specification for High Strength Bolts for Structural Steel Joints.
3. ASTM A143-74(1989) Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
4. ASTM A307-90 Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
5. ASTM A563M-90 Specification for carbon and Alloy Steel Nuts.
6. ASTM A780-90 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized coatings.
7. CAN/CSA-S16.1-M89 Limit States Design of Steel Structures.
8. CSA W59-M1989 Welded Steel Construction (Metal Arc Welding)
9. CAN/CSA-G40.20-M92 General Requirements for Rolled or Welded Structural Quality Steel.
10. CAN/CSA-G40.21-M92 Structural Quality Steels.
11. CAN/CSA-G164-M92 Hot-Dip Galvanizing of Irregularly Shaped Articles
12. CISC/CPMA 2-75 Canadian Institute of Steel Construction/Canadian Paint Manufacturers Association-A Quick Drying Primer for Use on Structural Steel.
13. CAN/CGSB-1.40-M89 Primer, Structural Steel, Oil Alkyd Type.
14. CAN/CGSB-1.108-M89 Bituminous Solvent Type Paint.

1.4 Shop Drawings

1. Submit shop drawings in accordance with Section 01340 prepared and stamped by a Professional Engineer licensed to design structures in the Province of Ontario.
2. Clearly indicate materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories.

PART 2 - PRODUCTS

2.1 Materials

1. Metals

- .1 **Steel sections and plates:** to CAN3 G40.21-M81, Grade 50W for tubes and Grade 44W for plates and flat shapes.
- .2 **Welding Materials:** to CSA W59-M1989.
- .3 **Bolts and anchor bolts:** to ASTM A307, A325, and A563 as applicable.
- .4 **Stainless Steel:** Type 302 or 304 alloy conforming to ASTM A167, No. 4 finish.

2. Primers, Coatings and Shop Painting

- .1 **Interior Steel in Dry Areas:** Quick drying oil alkyd conforming to CISC/CPMA 2.75.
- .2 **Exterior Steel, Interior Steel in Unheated Areas, Steel Embedded in Concrete:** Hot dip galvanized conforming to CSA G164, minimum Z275 coating.
- .3 **Galvanizing** of structural steel components and loose lintels: refer to Section 5120.
- .4 **Galvanized Coating Touch-Up:** W.R. Meadows "Galvafroid" or Kerry Industries "Z.R.C." zinc rich coating or similar manufacturer containing minimum 90% zinc by weight.
- .5 Apply one shop coat(s) of primer or coating as indicated above and according to manufacturers recommendations. Do not prime aluminum, stainless steel or those components to be galvanized or encased in concrete.
- .6 Use primer unadulterated, as provided by manufacturer. Paint on dry surfaces free from rust scale and grease. Do not paint when temperature is lower than 10 deg. Celsius and rising.
- .7 Clean surfaces to be field welded; do not paint.

3. Fastenings

- .1 Use nuts and bolts conforming to ASTM A307, A325, and A563 as applicable.

- .1 For interior work, use cadmium-plated fastenings where other protection is not specified.
- .2 For exterior work, use Type 300 or 400 stainless steel.

4. Anchors and Shims

- .1 For exposed anchorage of aluminum, if applicable, use stainless steel and otherwise to match metal anchored. For non-exposed work, anchors and shims may be galvanized steel.

5. Pipe

- .1 To ASTM A53, extra strong steel pipe for bollards.

6. Bituminous Paint

- .1 Alkali-resisting to meet specified requirements of CAN/CGSB-1.108, Type 2. Use to insulate contact between dissimilar metals.

2.2 Fabrication

1. Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
2. Weld all connections where possible, and bolt where not possible unless indicated otherwise on drawings.
3. Use self-tapping shake-proof countersunk flat headed screws on items required to be assembled by screws or as indicated.
4. Where possible, work to be fitted and shop assembled, ready for erection.
5. Exposed welds to be continuous for length of each joint. File or grind exposed welds smooth and flush.
6. Weld all stainless steel by the Argon Arc Process. Grind smooth and polish joints, crevice-free, and flush without seams.

2.3 List of Miscellaneous Metal Fabrications

1. This Section includes, but is not limited to the following list. Note: Galvanize all exterior items and other items noted. Prime paint all interior items.
 - .1 Anchors, Bolts, Inserts, Sleeves for work in this Section.
 - .2 Supports and Shelf Brackets.
 - .3 Hangers and Supports (for work in this Section).
 - .4 Lintels (if not by Structural Steel).
 - .5 Access ladders

PART 3 - EXECUTION

3.1 General

1. Supply and install all miscellaneous metal work indicated on the Drawings and not indicated in work of other Sections in addition to items listed below.

3.2 Fabrication & Erection

1. Erect metal work square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
2. Insulate metals, where necessary, to prevent corrosion due to contact between dissimilar metals and between metals and masonry or plaster. Use bituminous paint, butyl tape, building paper or other approved means.
3. Provide suitable and acceptable means of anchorage, such as dowels, anchor clips, bar anchors, expansion bolts and shields, toggles.
4. Make field connections with items specified in Articles 2.1.4 and 2.1.5 and 2.1.8 or weld to CSA S16-1969 and CSA S16S1-1975.
5. Hand items to be cast into concrete or built into masonry over to appropriate trades together with setting templates.
6. Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection.
7. Touch-up galvanized surfaces with zinc primer where burned by field welding. Spray or brush apply a minimum of three (3) coats of zinc-rich paint to achieve a dry film thickness of 8 mils. Apply a finish coat of aluminum paint to provide a colour blend with the surround galvanizing.

Note: Handrails, plumb, level, rigid and secure, as per details shown on Drawings.

3.3 Galvanized Steel

1. Galvanize steel members, fabrications, and assemblies after fabrication by the hot dip process in accordance with CSA G164, minimum Z275 coating.
2. Galvanize bolts, nuts and washers and iron and steel hardware components in accordance with CSA G164.
3. Safeguard products against steel embrittlement in conformance with ASTM A143.
4. Design features which may lead to difficulties during galvanizing shall be pointed out prior to dipping.
5. The composition of metal in the galvanizing bath shall be not less than 98.0% zinc.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Concrete Formwork: refer to Structural Drawings
2. Commercial Hollow Metal Doors and Frames Section 08100

1.2 Source Quality Control

1. Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

PART 2 - PRODUCTS

2.1 Materials

1. **Wood Materials:** Material, straight, sawn square, true, dressed four (4) sides properly sized, shaped to correct dimensions from nominal sizes indicated or specified.
2. **Lumber: Use only grade marked lumber. Where left exposed, use best brand of lumber available.** Lumber and moisture content to conform to official grading rules of NLGA, for particular lumber and grade, and structurally conform to latest requirements of Ontario Building Code. Conform to Grading Standards, CSA Standard 0141. Moist content not greater than 19% at time of installation.
3. **Blocking, Cants, Bucks, Grounds and Nailing Strips:** Douglas fir Graded 122-C, construction or No. 2 Pine, pressure treated in accordance with CSA 080M.
4. **Plywood:** Douglas fir plywood to CSA 0121-M1978, good one side with waterproof adhesive.
5. **Rough Hardware:** Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of all carpentry components. Use galvanized components where exposed to exterior atmosphere.

PART 3 - EXECUTION

3.1 General

1. Do all wood framing in accordance with the Ontario Building Code and Can3-086M-1983.
2. Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.
3. Frame materials with tight joints rigidly held in place.
4. Design construction methods for expansion and contraction of the materials.

5. Erect work plumb, level, square and to required lines.
6. Be responsible for methods of construction for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other trades.

3.2 Furring and Blocking

1. Supply and install furring and blocking, required.
2. Align and plumb faces of furring and blocking to tolerance of 1:600.

3.3 Rough Bucks, Nailers

1. Install wood bucks and nailers, as indicated, including wood bucks and linings around frames for doors and windows.
2. Except where indicated, otherwise, use material at least 38 mm thick secured with 9 mm bolts located within 300 mm from ends of members and uniformly spaced at 1200 mm between.
3. Countersink bolts where necessary to provide clearance for other work.

3.4 Roof Fascias, Cants, Nailers, Curbs

1. Install wood cants, fascia backing, nailers, curbs and other wood supports for roofing, sheet metal work, roof mounted equipment.
2. Secure with galvanized 9 mm bolts, where indicated, galvanized nails elsewhere. Locate fastenings within 300 mm from ends and uniformly spaced between. Space bolts at 1200 mm and nails at 600 mm centres, except where indicated otherwise.
3. Staple vapour retardant sheet strip to underside of nailers before installation. Apply strip continuous with 200 mm overlap at joints, free of wrinkles and tears, with at least 200 mm exposed for overlap on roof deck.
4. Install wood nailers for roof hoppers, dressed, tapered and recessed slightly below top surface of roof insulation.

3.5 Supports for Mechanical Units

1. Install wood blocking for prefabricated curbs for mechanical units to allow for a level installation on sloping roof.

3.6 Pressure Treated Wood

1. Use wood pressure treated in accordance with CSA 080M for all wood members in contact with exterior walls and roofs.
2. Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.7 Installation of Hollow Metal Frames

1. Set frames plumb and square in their exact location and at correct elevation. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment dimensions from finished floor to head of frame. Install temporary wood spreaders at mid-height.
2. Where pressed steel frames are installed in concrete walls, secure frames to concrete using lead expansion shields and anchor bolts through pipe sleeves. Perform drilling of concrete as required. Fill recessed bolt heads flush to frame face with approved metal filler and sand smooth.
3. Install fire rated door frames in accordance with requirements of National Fire Code Volume 4, produced by The National Fire Protection Association (NFPA 80).

3.8 General

1. Supply and install all other carpentry shown on drawings or as required for completion of work. Cooperate with other trades in installing items supplied by other sections, cut openings in woodwork when so required and make good disturbed surfaces.

End of Section

PART 1 - GENERAL

1.1 Section Includes

1. Section includes for provision of all labour, materials, equipment and services for new rough carpentry in accordance with Contract Documents.

1.2 Related Sections

1. Section 07520 SBS Modified Bituminous Membrane Roofing
2. Section 07620 Sheet Metal Flashing and Trim for Roofing
3. Section 07901 Joint Sealers for Roofing

1.3 References

1. CSA B111 / ASTM F1667 - Wire Nails, Spikes and Staples
2. ANSI/ASME B18.6.1 - Slotted and Recessed Wood Screws
3. ASTM A307-Carbon Steel Bolts & Studs
4. CSA O121 - Douglas Fir Plywood
5. CAN/CSA O141 – Softwood Lumber
6. CSA O151 – Canadian Softwood Plywood
7. CAN/CSA-080 Series - Wood Preservation
8. CAN/CSA-O325.0 – Construction Sheathing
9. Graded lumber must be in accordance with rules and regulations of the National Lumber Grades Authority (NLGA).

1.4 Operations

1. Do not interrupt or delay *Owner's* operations.
2. Perform operations, at times designated by the *Owner*, that will not adversely affect occupants of building and operations in and around site access and egress.

1.5 Protection

1. Provide perimeter barricades and tarpaulins, guardrails, overhead scaffolding and other necessary protection to ensure safety of occupants, public and site workers.
2. Temporarily protect interior spaces, where overhead work is proceeding, and provide dustproof and weatherproof partitions.

1.6 Shop Drawings

1. Submit shop drawings, stamped by a Professional Engineer, licensed in Province of Ontario, if members and securement are part of structural components.

1.7 Permits

1. If required, arrange and pay for all permits, notices and inspections necessary for the proper execution of work in this section.

1.8 Quality Assurance

1. Lumber shall be identified by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
2. Plywood shall be identified by grade mark in accordance with applicable CSA standards.

1.9 Lumber Requirements

1. Dimensions of lumber must conform to dressed sizes specified in CAN/CSA-0141. Dimensions specified and shown are nominal sizes.
2. Moisture content of lumber at time of installation must be S-DRY - maximum 19% moisture content.
3. Lumber must be sound and free of splits and deficiencies, which impair strength and durability.

1.10 Securement

1. Members shall be framed, anchored, fastened, tied and braced to provide necessary strength and rigidity.
2. All nails shall be long enough so that not less than half their required length penetrates into the second member.
3. Individual pieces must be secured with minimum of 2 fasteners at all corners.
4. Splitting of wood members shall be minimized by staggering nails in the direction of the grain and by keeping nails a minimum of 52 mm (2 in.) in from edges.

1.11 Waste Management and Disposal

1. Remove from site and dispose packaging materials at approved facilities.

PART 2 - PRODUCTS

2.1 Material

1. Wood Blocking: No.1 Exterior Grade, 52 x 52 mm (2 in. x 2 in.) 52 x 104 mm (2 x 4 in.), 52 x 152 mm (2 x 6 in.), 52 x 203 mm (2 x 8 in.), 52 x 254 mm (2 x 10 in.) and 52 x 305 mm (2 x 12 in.) and as noted on drawings/details.
2. Plywood Sheathing: 13 mm (1/2 in.) and 19 mm (3/4 in.), exterior grade, solid one side (G1S) unsanded, Veneer Grade B+. Moisture content of plywood shall not exceed 19% on a 'dry weight basis'.
3. Wood Cant: 75 x 75 mm (3 x 3 in.), No.1 Grade, Pressure Treated, exterior grade
4. Shims: Constructed from plywood sheathing or tapered wood blocking to provide minimum 10% slope to interior of roof surface, as indicated on drawings.
5. Wood Sleepers: Fabricated from wood blocking and plywood, configuration, sizes and length as detailed.
6. Fasteners: Are to be of sufficient length to penetrate concrete decks 52 mm (2 in.), metal decks 19 mm (3/4 in.) and wood decks 38 mm (1½ in.).
Acceptable Material:
 1. Nails: No. 10 spiral shank, hot dipped galvanized.
 2. Wood and Metal Deck Screws (Low profile head):
 1. Roofgrip #14 Buildex by ITW Construction Products
 2. #14 Heavy Duty Drill Point Fastener by Tru-Fast.
 3. Rawl #14 Deck Screw by Rawlplug Canada Ltd.
 3. Masonry anchors (Robertson head):
 1. Tapcon Plus, 6 mm (1/4 in.) diameter, Climaseal coated by ITW Construction Products.
 2. Tap-Grip heavy-duty self-tapping concrete anchors by Perma-Grip Fasteners.
 3. Rawl PERMA-SEAL TAPPER, 6 mm (1/4 in.) diameter by Rawlplug Canada Ltd.
 4. Steel: Flat head, self-tapping steel screw with coated finish, FM Approved. Fasteners to be of sufficient length to penetrate crest of metal deck 20 mm +/- 5 mm (3/4" +/- 1/4").
 5. Bolts, Washers and Nuts: Size as indicated on Drawings. Hot dipped galvanized, corrosion resistant finish, 12.5 mm (1/2") diameter unless otherwise noted.

PART 3 - EXECUTION

3.1 Preparation

1. Substrates shall be structurally sound to receive rough carpentry.
2. All wood framing shall be in accordance with Ontario Building Code or more stringent requirements noted within Contract Documents.

3.2 Installation

1. Cut and fit members accurately. Mitre all corners, leaving no space or unevenness greater than 3 mm (1/8 in.) between components. Lay out work to provide a uniform transition for insulation and membrane.
2. Install continuous plywood sheathing, wood blockings, cants, studs, nailers and continuous shims where required and detailed.
3. Shims to be of sufficient height to ensure a minimum ten percent (10%) positive slope is provided on all parapet walls and under cap flashings.
4. Erect members in position, align, level, square, plumb and secure permanently in place as specified. Brace work temporarily as required to maintain safely in place.

3.3 Fastening

1. Secure new wood with minimum of 2 fasteners at 457 mm (18 in.) on centre staggered, and as follows:
 1. Into masonry: masonry anchors.
 2. Into wood: wood screws.
 3. Into metal: metal screws.
2. Secure lumber as follows:
 1. All fasteners to be placed a minimum of 12 mm (1/2") from any edge. Install fasteners in two rows in direction of grain, with each fastener offset from one another not less than 457 mm (18") on centre.
 2. Offset and countersink all screw fasteners flush with surface of wood blocking being secured.
 3. Co-ordinate work to keep cutting and remedial work to a minimum.

3.4 Parapets/Perimeters/Walls/Curbs/Sleepers

1. Construct parapets, perimeters, walls, curbs and sleepers as detailed.
2. Provide new HVAC equipment wood sleeper supports. Width to be a minimum of 140 mm (5.5"). Length of sleeper to span between two framing members.

3. Where possible, maintain minimum height of 305 mm (12 in.) above finished roof surface for sleepers and curbs.
4. Install wood blocking for prefabricated curbs for mechanical units to allow for a level installation where deck is sloped.

3.5 Dividers and Movement joints

1. At dividers and movement joints, neatly cut plywood to required dimensions. Cutting shall be done by 'scoring' with carbide tipped utility tool/knife or circular saw with carbide blade. Smooth cut-edges with a wood rasp.
2. Secure plywood to substrate using appropriate fasteners, screws at 205 mm (8 in.) on centre each way and along perimeters. Maintain screws 13 mm (1/2 in.) from edges and maintain 3 mm (1/8 in.) gap between each piece of board.

3.6 Clean-up

1. Remove all excess materials, debris, tools and equipment as work proceeds and on completion, or sooner if requested by *Consultant*.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Rough Carpentry: Section 06100
2. Painting: Section 09900

1.2 Reference Standard

1. Do millwork to Millwork Standards of the Architectural Woodwork Manufacturers' Association of Canada (AWMAC) Premium Grade.

1.3 Samples

1. Submit duplicate 300 x 300 mm samples of each type of paneling laminate, melamine and each type of solid wood or plywood to receive stain or natural finish.
2. Submit sample of each type of hardware specified in accordance with Section 01340.
3. Submit a typical prototype unit representative of the work of this section.

1.4 Shop Drawings

1. Submit shop drawings in accordance with Section 01340.
2. Clearly indicate details of construction, profiles, jointing, fastening and other related details.

1.5 Qualification

1. Millwork manufacturer to have not less than 5 years proven first class experience in institutional millwork and shall be a member of AWMAC.

1.6 Warranty

1. Submit a two (2) year warranty for the work of this section against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 Materials

1. Softwood lumber: to CSA 0121-M1978 and National Lumber Grades Authority (NLGA) requirements, with maximum moisture content of 10% for interior work. Yard lumber select for natural finish of species, indicated to AWMAC premium grade.
2. Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 10% for interior work, of species indicated to AWMAC premium grade.

- .1 Species: Maple, unless otherwise noted.
3. Hardwood plywood: to CSA 0115-1967 of thickness indicated, rotary cut face veneer, birch plywood, veneer core. Select veneers to provide book match veneer strips to be 240 mm wide minimum. Grade: Select White.
4. Nails and staples: to CSA B111-1974 galvanized for exterior work, interior high-humidity areas and for treated lumber; plain finish elsewhere. Use spiral thread nails except where specified elsewhere.
5. Book Match Veneer: strips to be 240 mm wide minimum, grade: Birch Select White.

2.2 Plastic Laminate

1. Conforming to CAN3-A172, General Purpose - standard grade (GP-S), 1.25 mm thick for tops, Post Forming - standard grade (PF-S) 1.25 mm thick for post forming. Balance all panels with 0.5 mm backing sheet (BK) by same manufacturer as face panel. Use waterproof adhesive capable of holding materials together without failure. Provide acid resistant grade where shown. Finish shall be "Velvatex" or "Suede" by Arborite, or equivalent manufactured by Formica, Durolam Ltd., "Wilson Art" as distributed by Meteor Plywoods Ltd., "Micarta" distributed by Montego Forest Products Ltd., "Nevamar" distributed by Ceratec Inc., or approved equivalent by Octopus Products Limited. Allow for maximum of 4 colours chosen by Consultant.

2.3 Edge Banding

1. Solid polyvinyl chloride (PVC), 3 mm thickness x full width of panel edge, colour/pattern to match finished face of melamine panel or as selected by Consultant. All exposed edges of banding to be radiused to 2 mm radius after installation on panels. Submit sample of edge-banded panel with radiused edges to Consultant for approval prior to fabrication of architectural woodwork.
 - .1 Acceptable Material: Solid PVC edging as manufactured by "Woodtape" Edge-Banding.
 - .2 Acceptable Material: Solid PVC edging as manufactured by "Complast Inc."

2.4 Cabinet Hardware

1. Furnish and install all hardware to custom casework as follows:
 - .1 Cupboard Doors - 19 mm thick:

Hinges	200 Series 110° Salice
Roller Catches	807N 2G(SgDr) Onward
Elbow Catches	T03222 C15 (DhDr)
Door Pulls	CBH235-3 1/2" C32D
Cupboard Locks	8703/8704 14a National

.2 Drawers - 19 mm thk.:

Drawer Slides	KV1300X length to suit
Drawer Pulls	CBH235-3 1/2" C32D
Drawer Locks	8703 - 14a National

.3 Shelving:

Plaster strips	KV255 Zinc Knape & Vogt
Shelf Clips	KV256 Zinc Knape & Vogt

Keying:

1. This section shall also include accessories such as rubber door silencers (2 per drawer or door), and other items necessary for the completion of the millwork.
2. Cabinet Keying: Key all cabinet and drawer locks alike in each room, and different from other rooms.

2.5 Plastic Laminate and Melamine Clad Cabinetwork

1. All cabinet frames whether for base, wall or tall floor standing cases, shall be fabricated so each is a self-contained module. Front side top and bottom, exterior and interior surfaces shall be finished allowing future relocation of any module, into any bench arrangement, without need of any additional finishing.
2. Gables and panels shall be fabricated from 19 mm thick plastic laminate surfaced panels with a P.V.C. edging applied to exposed edges.
3. Bottoms shall be fabricated utilizing the same materials and edge finish as gables. Front edge will be edged with P.V.C. edging. All other edges will be thoroughly sealed and moisture proofed prior to attachment to gables.
4. Rails shall be fabricated and machined to join the gables and form a rigid cabinet frame.
5. Tops (applies to wall and tall units only) shall be fabricated utilizing the same material and edge finish as gables. Front edge will be edged with P.V.C. edging.
6. Toe kick rail shall have a 100 mm x 19 mm section, machined to receive four screw nails for attachment to bottom front edge of gables. Cabinet base shall be plywood attached to plastic laminate cabinet separately, ensuring the melamine plywood core gables do not come in contact with the floor.
7. Backs in base cupboards shall be fabricated from a 13 mm thick melamine surfaced panel.
8. Backs in wall and tall cabinets shall be fabricated from 13 mm thick melamine surfaced panels securely glued and screw nailed into the check out provided in the backs of gables, tops, and bottoms.

9. Shelves shall be fabricated from 19 mm plywood core with PVC edge and melamine finish. All shelves shall be adjustable at 13 mm increments, and each will be supported by a shelf support resting in four pilaster strips attached to the gables. Shelves at cabinet larger than 1000mm wide shall be same as above, except thickness to be 25 mm.
10. Doors shall be fabricated from 19 mm thick plastic laminate surfaced panels. All four edges shall be 3mm thick P.V.C. edging.
11. Drawer fronts shall be fabricated utilizing the same material and edge finish as doors. All four edges shall P.V.C. edging. Fronts will be secured to drawer bodies with five screw nails through the front of the drawer body into the core of the drawer front.
12. Drawer bodies shall consist of box construction fabricated from 16 mm solid core with melamine both sides, front, sides and back and bottom dadoed and glued into box members. Joint front, sides and back with carefully fitted glued and tenoned joints.
13. 25 mm thick doors shall be solid core with plastic laminate both sides and on all four edges, color and grain to match melamine.
14. **Finish:**
 - .1 Melamine interior surfaced panels shall be finished both sides in the same colours, patterns, and grain as selected by the Consultant.
 - .2 Plastic laminate exterior surfaced panels shall be finished both sides in the same colours, patterns, and grain as selected by the Consultant.

2.6 Shop Fabrication

1. Shop install cabinet hardware.
2. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
3. Shop assemble work for delivery to site in size easily handled and to insure passage through building openings.

2.7 Plastic Laminated Tops

1. 19 mm thick particle board core with post-forming grade plastic laminate finish bonded with resorginal formaldehyde resin glue to a particleboard core. All countertop front face to return vertically 35 mm \pm . All front and backsplash edges to be rounded.
2. Underside to receive a backing sheet, sanded one side and bonded same as surfacing material.
3. Exposed edges to be finished with same material as used for the top.
4. Drip grooves to be cut into underside of the top where exposed edges occur.
5. Splash backs, curbs and curb shelves are to be of similar construction as the tops.

6. Use acid resistant post-forming grade laminate, where indicated on drawings.
Colour: by Architect.
7. At all wall termination, provide backsplash return.

2.8 Moulding and Trims

1. Fabricate mouldings in maximum practical lengths to profile shown. Solid birch to receive varnish finish unless noted otherwise. Install with concealed fasteners.

2.9 Door Casings and Trim

1. Install wood 4" wood casings around all wood doors, paint grade.

PART 3 - EXECUTION

3.1 Installation

1. Set and secure all material and components in place, rigid, plumb and square.
2. Provide heavy duty fixture attachments for wall mounted cabinets.
3. Use draw bolts in countertop joints.
4. At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant.
5. Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.
6. After installation, fit and adjust operating hardware for wood and laminated plastic cabinet doors, drawers and shelves.

End of Section

PART 1 - GENERAL

1.1 Section Includes

1. Materials and installation methods of the primary air/vapour barrier membrane system.
2. Materials and installation methods of dampproof coursing and through-wall flashing membranes.
3. Materials and installation methods for the adhesion of rigid and semi-rigid insulating materials.

1.2 Related Sections

1. SBS Modified Bituminous Membrane Roofing: Section 07516

1.3 Submittals

1. Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapour permeance rates of the air/vapour barrier membranes, including primary membrane and transition sheets, exceed the requirements of the National Building Code.
2. Prior to commencing the Work submit copies of manufacturers' current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.
3. Prior to commencing the Work submit references clearly indicating that the membrane manufacturer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen years. Submit references for a minimum of ten projects.
4. Prior to commencing the Work submit manufacturers' complete set of standard details for the air/vapour barrier membrane systems showing a continuous plane of air tightness throughout the building envelope.

1.4 Quality Assurance

1. Submit in writing, a document stating that the applicator of the primary air/vapour barrier membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.
2. Perform Work in accordance with the manufacturer's written instructions of the air/vapour barrier membrane and this specification.
3. Maintain one copy of manufacturer's written instructions on site.
4. At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air/vapour barrier membrane manufacturers' representative.

5. Components used in this section shall be sourced from one manufacturer, including sheet membrane, air/vapour barrier sealants, primers, mastics and adhesives.

1.5 Mock-Up

1. Construct mock-up in accordance with Section 01340 - Shop Drawings, Product Data, Samples and Mock-ups.
2. Provide mock-up of air/vapour barrier materials under provisions of Division 1.
3. Where directed by consultant, construct typical exterior wall panel, 2 m long by 2 m wide, incorporating substrate, window frame, attachment of insulation, and; showing air/vapour barrier membrane application details.
4. Allow 24 h for inspection of mock-up by consultant before proceeding with air/vapour barrier work. Mock-up may remain as part of the Work.

1.6 Pre-Installation Conference

1. Convene one week prior to commencing work of this section, under provisions of Division 1.

1.7 Delivery, Storage and Handling

1. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
2. Store role materials on end in original packaging.
3. Store liquid air/vapour barrier material, adhesives and primers at temperatures of 5°C and above to facilitate handling.
4. Keep solvent away from open flame or excessive heat.
5. Protect rolls from direct sunlight until ready for use.

1.8 Coordination

1. Ensure continuity of the air/vapour barrier membrane system throughout the scope of this section.

1.9 Alternates

1. Submit requests for alternates in accordance with Division 1.
2. Alternate submission format to include:
 - .1 Submit evidence that alternate materials meet or exceed performance characteristics of Product requirements and documentation from an approved independent testing laboratory certifying that the air leakage and vapour

- permeance rates of the air/ vapour barrier membranes, including primary membrane and transition sheets, exceed the requirements of the National Building Code.
- .2 Submit copies of manufacturers' current ISO certification.
 - .3 Submit references clearly indicating that the membrane manufacturer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen years.
 - .4 Submit manufacturers' complete set of standard details for air/vapour barrier membrane systems showing a continuous plane of air tightness throughout the building envelope.
3. Submit requests for alternates to this specification a minimum of ten (10) working days prior to tender closing for evaluation. Include a list of ten projects executed over the past ten years.
 4. Acceptable alternates will be confirmed by addendum. Substitute materials not approved in writing prior to tender closing shall not be permitted for use on this project.

PART 2 - PRODUCTS

2.1 Membranes

1. Sheet air/vapour barrier: Blueskin® TG as manufactured by Bakor, a SBS modified bitumen, reinforced thermofusible membrane having the following physical properties:
 - .1 Thickness: 2.5 mm (100 mils) min.
 - .2 Air leakage: 0.000 L/s^om² @ 75 Pa;
 - .3 Water vapour permeance: 0.2 ng/Pa.m².s, (0.003 perms);
 - .4 Low temperature flexibility: -15°C to CGSB 37-GP-56M;
 - .5 Elongation: 40% md, 40% xd;
2. Transition membrane (Self-Adhering): Blueskin® SA as manufactured by Bakor, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. For application temperatures down to - 12°C use Blueskin® SA LT. Membrane shall have the following physical properties:
 - .1 Thickness: 1.0 mm (40 mils);
 - .2 Air leakage: <0.005 L/s□m² @ 75 Pa to ASTM E283-91;
 - .3 Water vapour permeance: 2.8 ng/Pa.m².s (0.05 perms) to ASTM E96;
 - .4 Low temperature flexibility: -30□C to CGSB 37-GP-56M;
 - .5 Elongation: 200% to ASTM D412-modified.
3. Through-wall flashing membrane and dampproof course (Self-Adhering): Blueskin® TWF as manufactured by Bakor, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, having the following physical properties:
 - .1 Film Thickness: 0.225mm (9.0 mils);
 - .2 Puncture Resistance (film); 180N minimum;

- .3 Tear Resistance (film); 58N MD;
- .4 Air leakage: $0.005 \text{ L/s}\cdot\text{m}^2$ @ 75 Pa to ASTM E283-91;
- .5 Water vapour permeance: 2.8 ng/Pa.m².s (0.05 perms) to ASTM E96;
- .6 Low temperature flexibility: -30°C to CGSB 37-GP-56M.

4. Air Barrier – Wall Type (W1) - Air Barrier is to be DuPont - Tyvek “Commercial wrap” or equal. Tape all edges with manufacturers approved tape.

2.2 Primers

1. Primer for thermofusible sheet membrane: 930-18 as manufactured by Bakor, a polymer modified primer having the following physical properties:

- .1 Colour: Blue;
- .2 Weight: 0.9 kg/l;
- .3 Solids by volume: 30%;
- .4 Application temp: no limit

2. Primer for self-adhering membranes: For all temperatures, Blueskin® Primer as manufactured by Bakor, a synthetic rubber based adhesive type, quick setting, having the following physical properties:

- .1 Colour: Blue;
- .2 Weight: 0.8 kg/l;
- .3 Solids by weight: 35%;
- .4 Drying time (initial set): 30 minutes.

3. Primer for self-adhering membranes: For temperatures above -4°C, Aquatac™ Primer as manufactured by Bakor, a polymer emulsion based adhesive type, quick setting, having the following physical properties:

- .1 Colour: Aqua;
- .2 Weight: 1.0 kg/l;
- .3 Solids by weight: 53%;
- .4 Water based, no solvent odours
- .5 Drying time (initial set): 30 minutes at 50%RH and 20°C.

2.3 Adhesive

1. Liquid air seal mastic and insulation adhesive: Air-Bloc 21 or 230-21 Insulation Adhesive as manufactured by Bakor, a synthetic, trowel applied, rubber based adhesive type, having the following characteristics:

- .1 Compatibility: With air/vapour barrier membrane, substrate and insulation.
- .2 Air leakage: 0.013 L/s·m² @ 100 Pa.;
- .3 Water vapour permeance: 1.7 ng/Pa.m².s. (0.03 perms);
- .4 Long term flexibility: CGSB 71-GP-24M;
- .5 Chemical resistance: Alkalis and salt.

PART 3 - EXECUTION

3.1 Examination

1. Verify that surfaces and conditions are ready to accept the Work of this section. Notify in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

3.2 Preparation

1. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spawled areas in substrate to provide an even plane. Strike masonry joints flush.
2. New concrete should be cured for a minimum of 14 days and must be dry before air/vapour barrier membranes are applied.
3. Where curing compounds are used they must be clear resin based without oil, wax or pigments.

3.3 Primer for Transition and Through-wall Flashing Membrane (Self-Adhering Type only)

1. Apply primer to poured concrete, metal and glass-faced wallboard substrates at rate recommended by manufacturer. Primer not required on concrete block.
2. Allow primer to dry prior to application of the membrane.

3.4 Primer (Thermofusible Membranes)

1. Apply primer to poured concrete, metal and glass-faced wallboard substrates at rate recommended by manufacturer. Primer not required on concrete block.
2. Allow primer to dry prior to application of the membrane.

3.5 Transition Membrane (Self-Adhering Type)

1. Align and position air-vapour membrane self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps.
2. Tie-in to window frames, aluminium screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings.
3. Promptly roll all laps and membrane with a counter top roller to effect seal.

3.6 Air Vapour Barrier Membrane

1. Air-vapour membrane TG membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger vertical joints.
2. Position air-vapour membrane TG for alignment and apply heat to the underside of the membrane by propane torch at the point of contact with the substrate.
3. Apply sufficient heat to make bitumen tacky and firmly press membrane onto substrate to ensure complete contact and bond for the full extent of the membrane.
4. Overlap sides and ends a minimum of 50 mm and use a heated trowel to fully seal laps.
5. Tie-in to window frames, doorframes and at the interface of dissimilar materials as indicated in drawings.
6. Ensure all projections, including wall ties, are properly sealed by using a heated trowel to butter compound at the interface.
7. Air/vapour barrier membrane to be complete and continuous from the wall to the roofing membrane system and waterproofing membrane system, around windows, aluminium screens, hollow metal door frames and spandrel panels.
8. Mechanically fasten membrane through securement bars to all window, door, louvers and curtain wall sections as recommended by membrane manufacturer where proper adhesion and bonding cannot be maintained.
9. Membrane applied to the underside of substrate surfaces shall receive special attention on application to ensure maximum surface area adhesion is obtained.

3.7 Through-wall Flashing Membrane (Self-Adhering Type)

1. Align and position the leading edge of air-vapour membrane TWF self-adhering through-wall flashing membrane with the front horizontal edge of the foundation walls or self angles, partially remove protective film and roll membrane over surface and up vertically.
2. Press firmly into place. Ensure minimum 50mm overlap at all end and side laps.
3. Promptly roll all laps and membrane to effect the seal.
4. Ensure all preparatory work is complete prior to applying air-vapour membrane TWF.
5. Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry veneer. Trim off excess as directed by the consultant.

6. Apply through-wall flashing membrane along the base of masonry veneer walls, over windows, doors and all other wall openings. Membrane shall form continuous flashing and shall extend up a minimum of 200 mm up the back-up wall.

3.8 Heat Sensitive Transition Membrane (Self-Adhering Type)

1. Align and position air-vapour membrane self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps.
2. Tie-in to window frames, aluminium screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings.
3. Promptly roll all laps and membrane with a counter top roller to effect seal.

3.9 Inspection

1. Notify consultant when sections of work are complete so as to allow for review prior to installing insulation.

3.10 Protection of Finished Work

1. Air-Vapour Barrier material is not designed for permanent exposure. Good practice calls for covering as soon as possible.

End of Section

PART 1 - GENERAL

1.1 Related Work Specified Elsewhere

- | | |
|--|---------------|
| 1. Masonry: | Section 04200 |
| 2. SBS Modified Bituminous Membrane Roofing: | Section 07516 |
| 3. Prefinished Metal Flashing & Trim: | Section 07620 |

PART 2 - PRODUCTS

2.1 Insulation

1. **Perimeter Foundation Insulation:** Extruded expanded polystyrene to CAN/ULC S701-01, Type 4, butt or shiplapped edges. For use at perimeter of building and at perimeter of foundation areas above and below grade as well as at miscellaneous detail locations calling for rigid insulation.
 - .1 Thickness 50 mm (2") (RSI 1.76/R 10.0) - where so indicated.
 - .2 Acceptable Material: "Styrofoam SM" as manufactured by Dow Chemical Canada Inc.
 - .3 Acceptable Material: "Celfort 300" as manufactured by Celfortec Inc.

2.2 Adhesive

1. Type A: to CGSB 71-GP-24M plus Amdt-Nov.-83, compatible with respective rigid insulation, air/vapour and waterproofing membranes and recommended by manufacturers of those products. Use Bakor 230-21 rigid insulation adhesive for rigid insulation in contact with Blueskin air vapour barrier.

2.3 Air Vapour Barrier Sheet Membrane

1. Self adhering SBS modified bitumen membrane reinforced with non-woven fibrous glass:
 - .1 Thickness: minimum 1.45 mm
 - .2 Water Vapour Permeance: 0.05 perms max value (2.8 ng/Pam².s)
 - .3 Air Permeance: less than 0.01 1/m² at 75 Pa pressure differential
 - .4 Adhesion: 7 day min. Peel adhesion at 5 deg. C:
 - .1 to primed concrete: >20 N/cm
 - .2 to selfedge: >20 N/cm.
 - .3 to primed plywood: >25 N/cm
 - .4 to metal: >30 N/cm
 - .5 Submit manufacturer's Material Data Safety Sheets in accordance with and Sections 01340 and 01570.
 - .6 Acceptable Material: "Mel-Rol (LM)" by W.R. Meadows or "Bituthane 5000" by Grace.

2. Perimeter Drainage Board: Acceptable Material: Mel-Drain Composite Soilsheetdrain system.
3. Use where rigid insulation is used in cavity walls.
4. Supply for installation by Section 06100 at wall/roof connection, as per detail.

PART 3 - EXECUTION

3.1 Workmanship

1. Install insulation after building substrata materials are dry, thoroughly clean and capable of providing a firm, uniform bonding surface.
2. Install insulation to maintain continuity of thermal protection to building elements and spaces.
3. Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
4. Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use longest possible lengths to reduce number of joints.
5. In multiple layer applications offset both vertical and horizontal joints.
6. Do not enclose insulation until it has been inspected.

3.2 Rigid Insulation

1. **Cavity Walls Below Grade**
Apply adhesive to insulation board by bead method with 4 mm diameter beads at 350 mm o.c.
2. **Perimeter Foundation Insulation**
Apply adhesive to insulation board by spot method with daubs 40 mm diameter x 25 mm high at 200 mm o.c. each way.

End of Section

PART 1 - GENERAL

1.1 Related Work Specified Elsewhere

1. Rigid Insulation: Section 07212

1.2 Samples

1. Submit duplicate 300 x 300 mm size representative samples of insulation materials in accordance with Section 01340.

PART 2 - PRODUCTS

2.1 Insulation

1. Mineral Fibre: to CSA A101-M83, Roxul AFB Stud Insulation - thickness as noted on drawings.
2. Acceptable alternate: Owens Corning sound attenuation batt insulation.

2.2 Vapour Barrier Film

1. Polyethylene film to CAN2-51.33-M77, 6 mil thick. Tape for sealing as recommended by manufacturer.

2.3 Accessories

1. Sealant: to CGSB 19-GP-21M.
2. Adhesive: compatible with Vapour Barrier Film.

PART 3 - EXECUTION

3.1 Insulation Installation

1. Install insulation to maintain continuity of thermal protection to building elements and spaces.
2. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
3. Do not compress insulation to fit into spaces.

3.2 Vapour Barrier Installation

1. Place polyethylene on warm side of insulation and tight to insulation.
2. Glue vapour barrier to framing members. Lap joints 150 mm minimum and tape seal. Ensure joints occur over framing members.

3. Tape seal areas where nails or staples penetrate vapour barrier.
4. Extend vapour barrier tight to perimeter of windows, door frames and other items interrupting continuity of membrane. Tape seal and seal with sealant.
5. Seal vapour barrier at points of penetration.
6. Vapour barrier to be continuous and pass in front of shear walls and precast concrete slabs.

End of Section

PART 1 - GENERAL

1.1 Test Reports

1. Submit Product Data including certified copies of test reports verifying that fireproofing applied to substrate as constructed on this project will meet or exceed the requirements of the Specifications.
2. Submit test results in accordance with CAN4-S101-M82 for fire endurance and CAN4-S102-M83 for surface burning characteristics.
3. For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.

1.2 Samples

1. Submit samples in accordance with Section 01340 - Shop Drawings, Product Data, Samples and Mock-ups.
2. Submit 300 x 300 mm size sample of exposed fireproofing for approval of texture and colour.
3. Submit Manufacturer's Material Safety Data Sheets in accordance with Section 01545 Safety Requirements.

1.3 Protection

1. At outdoor temperatures less than 5 degrees C, ensure that a 5 deg. C air and substrate temperature is maintained for minimum of 24 hours before, during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing (during and subsequent to its application) is provided. IN enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.
2. Provide temporary enclosures to prevent spray from contaminating air beyond application area.
3. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.

PART 2 - PRODUCTS

2.1 Materials

1. Sprayed fireproofing: ULC certified cementitious or asbestos-free mineral fibre fireproofing qualified for use in locations specified.
 - .1 Acceptable Material: "A/D Type FP" as manufactured by A/D Fire Protection Systems Inc.

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- .2 Acceptable Material: "Blaze-Shield DC/F" as manufactured by Cafco Industries Ltd. Product types DC/F and C/F are acceptable, as applicable to specific fireproofing locations.
 - .3 Acceptable Material: "Zonolite MONOKOTE Fireproofing" as manufactured by W.R. Grace & Co. of Canada Ltd.
2. Curing compound: type recommended by fireproofing manufacturer.
 3. Sealer: type recommended by fireproofing manufacturer. **All** exposed fireproofing is to be sealed.
 4. Film Intumescent Fireproofing: "Fire Finish 120+ CFP-SP-WB" thin intumescent coating system as manufactured/distributed by Hilti. Product is to be installed by licensed applicators.
 - .1 Product to be composed of fire protection intumescent coating of required thickness to provide the specified fire protection rating plus a decorative chlorinated rubber topcoat for damage resistance plus interprimer coating to allow finish paint to adhere to this product.
 - .2 Fireproofing System is to be ULC listed (Design No. Y633) certified in accordance with CAN4-S101 (ASTM-E119) for fire resistance ratings of up to 2 hours.
 - .3 Materials to be brush, roller or spray applied in multi-coat system as per ULC approval listings and manufacturer's printed instructions.
 - .4 Acceptable alternate: CAFCO spray film, ULC design No. Y615.

PART 3 - EXECUTION

3.1 Preparation

1. Discuss fireproofing methods and final product with principal building inspector prior to application to ensure that finished installation will be acceptable. Record in writing all materials and methods to be employed to achieve final approval of installation.
2. Substrate shall be free of material, which would impair bond.
3. Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
4. Remove incompatible materials.
5. Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
6. Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.2 Application

1. Apply bonding adhesive or primer to substrate if recommended by manufacturer.

2. Apply fireproofing to all structural steel supporting floor loads to provide one (1) and (2) hour fire resistance ratings. Refer to drawings for ratings and locations.
3. Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.
4. Tamp smooth, surfaces visible in finished work.
5. Apply curing compound to surface of cementitious fireproofing as required by manufacturer.

3.3 Inspection and Testing

1. Inspection and testing of fireproofing will be carried out by Inspection and Testing Agency designated by Consultant.
2. Cost of testing will be paid from Cash Allowance specified in Section 01020 "Cash Allowances".
3. Arrange for final inspection of the work of this section by municipal building inspector.

3.4 Patching

1. Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.5 Locations - Sprayed Fireproofing

1. Fireproofing is required on all structural steel supporting floor loads. Fireproofing is to be water dampened and board-tamped to provide a smooth, lump-free surface where fireproofing will not be enclosed with ceilings or other materials. Apply clear or pigmented sealer in accordance with manufacturer's printed instructions.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|---|---------------|
| 1. Masonry: | Section 04200 |
| 2. Rough Carpentry (Architectural) Plywood: | Section 06100 |
| 3. Gypsum Board: | Section 09250 |

Note: Firestopping and Smoke Seals within mechanical and electrical assemblies are specified on related specifications on drawings. All other firestopping and smoke seals are the responsibility of this Section.

1.2 Reference

1. ASTM E814 - Test Method of fire tests of through-penetration firestops, Factory Mutual.
2. CAN4-S101M - Standard Methods of Fire Endurance Tests of Building Construction and Materials.
3. CAN4-S115M - Standard Method of Fire Tests of Firestop Systems.
4. ULC - List of Equipment and Materials.

1.3 System Description

1. Firestopping Materials: CAN4-S115M ASTM E814 to achieve a fire protection rating as noted on Drawings.
2. It is the intent of this Section that in conjunction with Mechanical and Electrical scopes a competent, single source be responsible for the firestopping and smoke seals of the entire project.

1.4 Submittals

1. Submit a product data to requirements of Section 01340.
2. Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation, ULC design references.
3. Submit proposed type of fireproofing system for each location for approval by Architect. Fireproofing System must be appropriate to achieve expected appearance and finish.

1.5 Quality Assurance

1. Manufacturer: Company specializing in manufacturing products of this Section with minimum five years documented experience.
2. Applicator: Approved, licensed and supervised by the manufacturer of firestopping materials. Company with minimum five years documented experience.
3. Product: Manufactured under ULC Follow-up Program. Each container or package shall bear ULC label.

1.6 Regulatory Requirements

1. Conform to applicable code for fire protection ratings.
2. Provide certificate of compliance for authority having jurisdiction indicating approval.

1.7 Delivery, Storage & Handling

1. Deliver and store materials in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer's labels and seals intact.

1.8 Project & Site Conditions

1. Application temperature and ventilation as per Manufacturer's instructions.

1.9 Sequencing & Scheduling

1. Sequence work to permit installation of firestopping and smoke seal materials to be installed after adjacent work is complete and before closure of spaces.

PART 2 - PRODUCTS

2.1 Materials

1. A/D Firebarrier Firestop Systems, by A/D Fire Protection Systems Inc., capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115 and not to exceed opening sizes for which they are intended.
2. Mineral Wool Backing Insulation: ULC labelled, preformed non-combustible material (A/D Firebarrier Mineral Wool) by A/D Fire Protection Systems Inc.
3. Retainers: Clips to support mineral wool.
4. Firestopping Sealant: ULC labelled, single component silicone bases, A/D Silicone Firebarrier Sealant by A/D Fire Protection Systems Inc.

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5. Firestopping Seal: ULC labelled, single component water-base seal, A/D Firebarrier Seal by A/D Fire Protection Systems Inc.
 6. Firestopping Foam: ULC labelled, two components silicone foam, A/D Firebarrier RTV Foam by A/D Fire Protection Systems Inc.
 7. Firestopping Mortar: ULC labelled, non-combustible fibre reinforced, foamed cement mortar, A/D Firebarrier Mortar by A/D Fire Protection Systems Inc.
 8. Damming Material: In accordance with tested assembly being installed as applicable and as acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 Examination

1. Examine surfaces to receive work of this Section and report any defects which may affect the Work of this Section.
2. Verify that openings are ready to receive the Work of this Section.
3. Confirm compatibility of surfaces to receive firestopping and smoke seal materials.
4. Beginning of installation means acceptance of existing surfaces and substrate.

3.2 Preparation

1. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
2. Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instruction.

3.3 Application

1. Install firestopping and smoke seal material and components in accordance with ULC listing and manufacturer's instructions.
2. Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
3. Apply in sufficient thickness to achieve rating to uniform density and texture.
4. Provide temporary forming if required.
5. Tool or trowel exposed surfaces to a neat finish where required.

6. Remove excess material promptly as work progresses and upon completion.
7. Protect installed material until cured or set.

3.4 Cleaning

1. Clean adjacent surfaces of firestopping and smoke seal materials.

3.5 Field Quality Control

1. Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.6 Scheduling

1. Firestop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Top of fire-resistance rated masonry and gypsum board partitions.
 - .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs, if applicable.
 - .6 Openings and sleeves installed for future use through fire separations.

End of Section

PART 1 - GENERAL

1.1 Scope of Work

1. Work in this section shall include design, fabrication, supply and installation of a custom made, preformed, prefinished, aluminum composite, dry joint modular wall and soffit system, sub girt system, fastening hardware and flashings.

1.2 Related Work

1. Structural Steel Framing refer to structural drawings
2. Air Vapour Barrier Membrane Section 07112
3. Rigid Insulation Section 07212

1.3 Quality Assurance

1. Supplier/ installer shall have minimum 10 years proven experience and must have completed at least 5 major projects in the specified aluminum composite material panel system.

1.4 References

1. ASTM A653 "Standard Specification for Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process".
2. ASTM B209 Aluminum Sheet and Plate
3. ASTM B221 Extruded Aluminum Shapes.
4. ASTM E283-99 Air Infiltration and Exfiltration.
5. ASTM E331-00 Water Infiltration.
6. ASTM E330-02 Wind Load Resistance

1.5 Design and Performance Requirements

1. Design, fabricate and erect a pressure equalized wall panel system to meet the following requirements.
 - .1 Rain Penetration: prevent rain penetration through wall system. Design system based on "Rain Screen Principle" per the National Research Council. Incorporate means of draining to the exterior.
 - .2 Wind load: Design wall system to resist wind loads, positive and negative, expected in this geographical region (OBC climatic data, 100 years probability) without causing rattling, vibration or excessive deflection of panels, overstressing of fasteners, clips and other detrimental effects on system.

- .3 Structural and thermal movement: Accommodate movement of supporting structural framing and movement caused by thermal expansion and contraction of system component parts without causing bowing, buckling, delamination, oil canning, and failure of joint seals, excessive stress on fasteners or any other detrimental effects.
2. Panel flatness tolerance: Fabricate panels not exceeding the following tolerances:
 - .1 Rises and falls across the panel, (local bumps and depressions) will not be accepted.
 - .2 1.5 mm in a concave/ convex direction, measured perpendicular to the normal plane.
3. Panel removal: System/ procedure to allow removal of individual panels within wall system.
4. Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm in 6 m.
5. Testing: Provide wall assembly that has been tested and certified to conform to the following criteria:
 - .1 Structural: Provide systems that have been tested in accordance with ASTM E330 at a design pressure of 60 psf and have been certified to be without permanent deformation or failures of structural members.

1.6 Samples

1. Submit samples in accordance with Section 01340.
2. Submit duplicate, minimum 130 x 180 mm samples of each colour selected.

1.7 Shop Drawings

1. Submit shop drawings in accordance with Section 01340.
2. Indicate elevations, profiles, dimensions and thickness of panels and joint details.
3. Indicate attachment clips, system extrusions, fastening, anchor and installation details.

1.8 Maintenance Data

1. Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual.

1.9 Mock up

1. Submit mock-up in accordance with Section 01340.

2. Erect mock-up panel approximately 3m long x 2m high in location as directed by architect.
3. Mock-up panel shall include all components of the wall system and will be incorporated into work once approved.

1.10 Maintenance Data

1. Protect panel face with a plastic film adhered to panel in accordance with panel manufacturer's recommendation.
2. Store components and materials in accordance with panel manufacturer's recommendations.

1.11 Duranar XL Panel Finish Warranty

1. Provide a manufacturer's written warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish on composite metal panels within the warranty period; warrant finish per ASTM D 4214 for chalk not in excess of 8 NBS units and fade not in excess of 5 NBS units. Warranty period for finish: 10 years after the date of Substantial Completion.

1.12 Material and Workmanship Warranty

1. Warranty against defects or deficiencies shall be for a period of one year from date of substantial completion.

PART 2 - PRODUCTS

2.1 Panels

1. Aluminum Composite Material (ACM)
 - .1 Composition: Two sheets of aluminum sandwiching a core of extruded thermoplastic formed in a continuous process without the use of glues or adhesives between dissimilar materials. Bond integrity testing to adhere to ASTM D1781-76
 - .2 Aluminum face sheets: Aluminum alloy 3003, thickness: 0.51 mm
 - .3 Panel thickness: 4 mm
 - .4 Panel weight: 5.28 kg/sq.m.
 - .5 Tolerances:
 - .1 Panel bow: Maximum 0.8% of panel dimension (width or length).
 - .2 Panel Dimensions: Take site measurements before proceeding with production unless dimensions can be guaranteed by General Contractor.
 - .3 Panel lines, breaks and angles to be sharp and true; panel surfaces to be free from warp or buckle.
 - .6 Panel System: rout and return dry vented joints, pressure-equalized rainscreen design, with 12.5 mm wide panel joints with splines, using proprietary aluminum extrusions.
 - .7 Acceptable material and manufacturer:

- .1 Accumet 2000 supplied by Flynn Canada
 - .2 Reynobond ACM supplied by Kanalco Ltd.
 - .3 Alucobond SL-2000 supplied by Sobotec Ltd.
 - .4 Alpolic ACM, supplied by ACM Panelworx.
 - .5 Alcotex ACM by Ontario Panelization.
 - .6 AM-2000 System - AMNA – Architectural Metals North America
2. Panel finish: Duranar XL, three coat, coil-coated finish containing Kynar 500 polyvinylidene fluoride resin. Colours: to consultant's selection. Allow for two different colour selections including one wood grain look.
 3. Panel and Wall Accessories
 - .1 Provide proprietary aluminum extrusions to manufacturer's standard profiles for a complete installation.
 4. Fasteners: as recommended by panel manufacturer, concealed and non-corrosive. No Exposed fasteners permitted.
 5. Extrusions and extrusion clips for attaching panels to the sub-structure: Purpose made aluminum.
 6. Extrusions shall be full length around panel perimeter for panel reinforcement and alignment. Intermittent clips are unacceptable.
 7. Joint filler strip: Same material and color as panels. Use of caulking at joints is not acceptable.
 8. Plastic shims, shall be used as thermal separator between extrusions and sub-girts.
 9. Sub-girts: To be manufactured from G-90 galvanized steel and shall be designed to accommodate expansion and contraction, dynamic movements and design load requirements.
 10. Flashing: Pre-finished aluminum to match panels.

PART 3 – INSTALLATION EXECUTION

3.1 Panel System

1. Before proceeding, examine work of other sections upon which this section depends.
2. Erect panels and joint filler strip in accordance with manufacturer's details to meet specified design criteria and performance.
3. Finished work shall be securely anchored, free of distortion, free of surface imperfections and uniform in colour.
4. Use concealed fastenings only.

5. Install panels plumb, true, level and in alignment to established lines and elevations.

3.2 Clean up

1. Remove protective plastic film from panels.
2. Repair and touch-up with colour matching high grade enamel minor surface damage.
3. Replace damaged panels and components which cannot be satisfactorily repaired.

End of Section

1. GENERAL

1.1 Section Includes

1. Section includes for provision of all labour, materials, equipment and services for SBS Modified Bituminous Membrane Roofing in accordance with Contract Documents.

1.2 Related Sections

1. Section 06100 Rough Carpentry
2. Section 07620 Prefinished Metal Flashing and Trim
3. Section 07901 Joint Sealers for Roofing

1.3 References

1. CAN/CSA A123.4 - Bitumen for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
2. CGSB-37-GP-56 - Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing.
3. CGSB 37-GP-9 - Primer, Asphalt for Asphalt Roofing, Dampproofing and Waterproofing.
4. CAN/ULC-S701 Thermal Insulation, Polystyrene, Boards and Pipe Covering
5. CAN/ULC-S702 – Mineral Fibre Thermal Insulation for Buildings.
6. CAN/ULC-S704 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
7. CAN/ULC S770 - Standard Test Method for Determination of Long-term Thermal Resistance of Closed-cell Thermal Insulating Foams
8. CAN/ULC-S706 – Wood Fibre Thermal Insulation for Buildings.
9. CAN/ULC-S107-03 – Fire Test of Roof Covering
10. CAN/ULC-S126-06 – Fire Spread Under Roof Deck Assemblies
11. ASTM E108 – Standard Test Methods for Fire Tests of Roof Coverings
12. ASTM D312 - Standard Specification for Asphalt Used in Roofing
13. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
14. Canadian Roofing Contractors Association (CRCA) – Specification Manual.

1.4 Operations

1. Perform operations, at times designated by the *Owner*, that will not adversely affect occupants of building and operations in and around site access and egress.

2. *Contractor* shall undertake all reasonable measures to reduce vibration and noise level on the roof decks during work hours.
3. Should specific complaints be issued by *Owner* to this matter, *Consultant* reserves the right to have *Contractor* proceed with other facets of the Work.

1.5 Shop Drawings and Other Submittals

1. Submit to *Consultant* for review, shop drawings, prior to commencement of work. Provide six (6) copies of the shop drawings. Indicate on shop drawings all insulation layers, slopes, crickets, insulation sumps and drainage patterns.
2. Submit Shop Drawings for: Tapered Insulation indicating all insulation layers, slopes, crickets, insulation sumps and drainage patterns.
3. **Submit Material List and Shop Drawings to *Consultant* for review prior to ordering materials and commencing Work.**
4. Construction Schedule: Submit required within 10 days of contract award.

1.6 Quality Assurance

1. Skilled trades and *Contractors* having a minimum of five (5) years related experience shall execute roofing Work.
2. *Contractors* shall be approved applicators of system specified. Documentation shall be provided prior to commencing Work.

1.7 Roof System Compliance

1. Submit a document issued by Authorities having jurisdiction certifying that roof system meets requirements of CAN/ULC-S107 'Fire Tests of Roof Coverings', Class A, B or C.
2. The membrane system is based on a 2-ply SBS Modified Bituminous Membrane System by Soprema Inc. Alternates by Henry Company Canada (Bakor) or IKO Industries Ltd. are acceptable.

1.8 Insulation Requirements

1. Polyisocyanurate Roof Insulation Manufacturers shall be members of Polyisocyanurate Insulation Manufacturers Association (PIMA). Manufacturers shall submit documentation listing their LTTR values based on CAN/ULC and ASTM test methods for 2014.
2. When insulation thickness exceeds 69 mm (2.7 in.), it shall be installed in multiple layers. Minimum thickness for bottom layer shall be 33 mm (1.3 in.) and 38 mm (1.5 in.) for top layer.
3. In multiple layer applications, if thicknesses greater than 38 mm (1.5 in.) are required, thicker layer shall be installed in bottom followed by minimum 38 mm (1.5 in.) top layer.

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4. Tapered Insulation. Product: Posi-Slope, Accu-plane Inc. or asphalt application equal.
 - .1 Tapered insulation shall be applied under overlay board in accordance with reviewed shop drawings.
 - .2 **Tapered sump shall be installed in its entirety same day.** Under no circumstance shall sump be installed in more than one application as to build-in a high point within sump area. At low point of sump, the 13mm (1/2 in.) edge is to be shaved down to 0 mm (0 in.)
 - .3 Layout insulation for a '**dry fit/alignment**' prior to proceeding with hot asphalt applications. If required, use chalk lines to mark layout.
 - .4 Apply tapered sumps, crickets and backslope in a full mopping of hot asphalt, applied at a rate of 1.25 kg/m² (25 lbs. per square) in accordance with reviewed shop drawings.
 - .5 Install insulation ensuring that panels are tightly butted and walk insulation into asphalt to achieve solid bond, immediately after placement.
 - .6 Do not lay more insulation/board than can be covered with roof membrane on same day. Insulation, which is damaged by moisture, shall be marked and promptly removed from site.

1.9 Warranty

1. Provide Standard Form of Warranty including all labour, material and workmanship and a Preventative Maintenance Manual.
2. Warranty shall be for a **period of two (2) years** from date of Substantial Performance, as certified by *Consultant*.
3. Provide **ten (10) year** roof membrane manufacturer's Warranty for labour, materials and workmanship with a No Dollar Limit from date of Substantial Performance.
4. Repair leaks into building or roofing assembly within 24 hours of notification. Repair all roof membrane deficiencies, including ridges, blisters, splits and bare spots.
5. Carry out all repair work during the warranty period as directed by the *Consultant* and at no additional cost to the *Owner*. *Contractor* shall extend Warranty on replaced parts and workmanship for a period of two (2) years from date of acceptance of replacement parts and workmanship.
6. Defects shall include but will not be limited to: leaking; failure to stay in place; lifting; blow off; deformation; and breaking of weathertight seals.

1.10 Delivery, Storage and Handling

1. All Products shall be delivered, stored and handled in accordance with the Contract Documents, be in original manufacturer wrapping with labels intact and clearly identifying the product.
2. All modified bitumen membranes that will be used for installation on a daily basis must be stored at a minimum of 15°C (58°F) for a period of at least 4 hours prior to application. Stand rolled materials on end and protect edges.

3. Products transported, stored or handled in a manner that contradicts the Contract Documents, shall not be installed at the Place of the Work, shall be marked and removed from site.
4. Bills of lading for bulk loads of liquid asphalt shall be submitted to *Consultant* showing; Type of Asphalt, Quantity of Asphalt, Equiviscous temperature (EVT), Final Blowing Temperature (FBT) and Flash Point Temperature (FPT) of Bitumen.
5. Insulation, bituminous felts, vapour retarders and roofing membranes must be kept dry under protective coverings or stored in trailers.
6. **Plastic wrapping installed at the factory is not to be used as an outside storage cover.** Emulsions must be maintained at temperatures above freezing.
7. Immediately remove and dispose of wet materials off site. Do not hoist materials with straps/ropes that damage materials. Use specialty supports.
8. Hoist material to roof surface on a daily basis, for same day use. **Do not 'drop' materials during handling and installation.**

1.11 Environmental Requirements

1. Do not install roofing when temperature remains below 0°F (-18°C) for torch applications and 23°F (-5°C) for asphalt applications.
2. Removal and installation of any roof components during inclement weather is not permitted.

1.12 Scaffolding, Ladders and Conveyances

1. Provide scaffolding, ladders and conveyances required for execution of Work and in accordance with the Contract Documents. Provide all hoisting equipment and barricades required to complete the Work.
2. Construct and maintain scaffolding in accordance with authorities having jurisdiction. If required, have scaffolding designed and stamped by Professional Engineer licensed in Province of Ontario.

1.13 Safety Requirements and Barriers

1. *Contractor* shall provide upstanding barrier protection at all perimeters, eaves and parapets. **Mesh, screen and tarpaulins shall also be provided to prevent debris from blowing or falling over edge.** Barriers shall be adequately constructed and secured to prevent toppling over.
2. Fire extinguishers must be on site within 3 m (10 ft.) and at same level as torch applicator. Maintain adequate fire watch (as recommended by membrane manufacturer) after each days roofing operations cease.
3. **Prior to leaving site, use digital thermometer to scan roof surface temperature for 'any hot spots' and address them accordingly.**

1.14 Protection

1. On a daily basis, provide interior protection to equipment, services, material, floors and walls by use of polyethylene or drop sheets, tape, tarps, plywood sheathing or other means to effectively protect contents.
2. Protect work of this section from damage. Damaged work which cannot be satisfactorily repaired, restored or cleaned shall be replaced at no cost to *Owner*.
3. Protect work of other sections from damage while performing roofing work. Provide tarpaulins and other coverings, as required, to protect lower and adjacent walls, finishes and surfaces. Additional protection shall be provided if instructed by *Consultant*.
4. Prevent bitumen, precipitation and debris entering openings and drains during work. Prevent damage to site, roads, curbs and building elements.
5. Protect finished roof surfaces with minimum 13 mm (1/2 in.) plywood sheathing with 25 mm (1 in.) polystyrene insulation board on underside.
6. Damaged areas and surfaces shall be repaired to satisfaction of *Consultant* at no additional cost to *Owner*.

1.15 Temporary Facilities

1. Provide temporary storage facilities for materials, tools and equipment. Location to be approved by *Owner*.
2. Provide temporary washroom facilities for workers. Secure portable washrooms to adjacent fences or walls to prevent toppling over.
3. Ground work stations shall be fully enclosed by temporary fencing and be manned at all times. Where possible, disposal bins shall be located minimum 2m (6'-6") away from building walls.
4. Disposal bins shall be located minimum 2 m (6'-6") away from building walls.

1.16 Fastenings

1. Fasteners, anchors and adhesives shall be of appropriate size and type and must be used in sufficient quantity to provide positive and permanent anchorage of component.
2. Fastenings which cause spalling or cracking of material to which anchorage is being made are not permitted.
3. **Powder-actuated** fastening devices are not permitted on this project. Only low velocity plunger-type devices are permitted.

2. PRODUCTS

2.1 Material

1. Primer:
 1. Asphalt Cutback Primer
 2. Self-Adhesive Membrane Primer: Elastocol Stick by Soprema Inc.
 3. Modified Membrane Primer: Elastocol 500 by Soprema Inc.
 4. Metal Deck Primer: Rustguard Q.D. Shop Coat Primer by Devoe Coatings.
2. Thermal Barrier: Fibreglass mat faced panel with a specially treated gypsum core that resists moisture. Minimum 13 mm (1/2") thickness. Accepted products:
 1. Dens-Deck Prime Roofboard by Georgia-Pacific
 2. Approved Alternate
3. Mechanical Fasteners For Thermal Barrier and Base Layer Insulation:
Factory Mutual (FM) Class 1, No.12 coated screws and 75 mm (3 in.) galvanized metal plate. Fasteners to be of sufficient length to penetrate through crests of metal deck 19 mm (3/4 in.).
4. Vapour Retarder:
 1. On Metal Decks: Soprapap'r and Elastocol Stick Primer by Soprema Inc.
5. **Base Insulation (2 layers):** 50 x 1220 x 1220 mm (2.5 in. x 4 ft. x 4 ft.), comprising of rigid closed cell polyisocyanurate foam core, bonded with **all fibre glass reinforced facer on each side**. Minimum long-term thermal resistance for 2014 material (LTTR) of RSI 0.99 (R 5.6) per 25 mm (1 in.) thickness. Provide 63 mm & 50 mm (2-1/2 in. & 2 in.) for 1220 x 1220 mm (48 x 48 in.) to create sump at drain.
 1. AC Foam III by Atlas Corporation Ltd.
 2. H-Shield CG by Hunter Panels
 3. Approved Alternate – Must be acceptable as part of system warranty

Note: All polyisocyanurate insulation boards shall be provided by one manufacturer with same production dates and lot numbers.
6. Tapered Insulation, Crickets, Backslope and Sumps: Fabricated from rigid closed cell polyisocyanurate foam core, bonded with **all fibre glass reinforced facer on each side** to layouts and slopes (0.5%, 0.75%, 1.0%, 2.0% or 4.0%) as indicated on drawings. Minimum thickness 13 mm (1/2 in.). 1220 x 1220 mm (4 x 4 ft.).
Provide 2440 x 2440 (8 x 8 ft.) tapered sump at 1% at all drain locations

Acceptable Suppliers:

1. Accu-Plane Enterprises Inc.
2. Posi-Slope Enterprises Inc.

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3. SOPRA-ISO Tapered by Soprema Inc.]\
 4. IKOTerm III Tapered by IKO Industries
- Filler pieces shall not exceed 63 mm (2.5 in.) per layer and same as tapered.**
7. Overlay Board: 6.4 x 1220 x 1525 mm (1/4 in. x 4 ft. x 5 ft.) semi-rigid protection board composed of a mineral fortified asphaltic core formed between two saturated fibreglass felts,
 1. Sopraboard' by Soprema Inc.;
 2. Approved Alternate – Must be acceptable as part of system warranty
 8. Protection Board for Flashings: 6.4 x 1220 x 1524 mm (1/4 in. x 4 ft. x 5 ft.) semi-rigid protection board composed of a mineral fortified asphaltic core formed between two saturated fibreglass felts.
 1. Sopraboard by Soprema Inc.
 2. Approved Alternate – Must be acceptable as part of system warranty
 9. Insulation / Overlay Board Adhesive: A high elastomeric, two part component, one step low rise foamable adhesive that contains no solvents.
 1. Duotack by Soprema Inc.
 10. Modified Bituminous Membrane Base Sheet:
 1. Sopralene Flam 180 by Soprema Inc.
 11. Modified Bituminous Membrane Base Sheet Flashings:
 1. Sopralene Flam 180 by Soprema Inc.
 2. Sopralene Flam Stick and Elastocol Stick Primer).
 12. Modified Bituminous Membrane Liquid Flashings: Polyurethane/bitumen resin 'Alsan Flash' and fabric reinforcement by Soprema Inc.
 13. Modified Bituminous Membrane Cap Sheet **(White Granules)**: Sopralene Flam 250 GR by Soprema Inc.
 14. Modified Bituminous Membrane Cap Sheet Flashings **(White Granules)**: Sopralene Flam 250 GR by Soprema Inc.
 15. Mastic: Sopramastic by Soprema Inc.
 16. Pitch-Pans: Inter Clip System by Soprema Inc. or Approved Alternate
 17. Sopraguard Tape: Self-adhesive, flame-stop tape with glass mat reinforcement.

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18. Round Top Cap Nails: Ardox spiral shank with 25 mm (1 in.) steel washer
 19. Bulk Granules: Coloured granules in bulk to match cap sheet.
 20. Rough Carpentry: As per Section 06100 – Rough Carpentry.
 21. Metal Flashing: As per Section 07620 – Sheet Metal Flashing and Trim.
 22. Sealants: As per Section 07901 – Joint Sealers for Roofing.

2.2 Roofing Accessories

1. Vent (Soil) Pipe Sleeves: 1.6 mm (0.64 in.) thick, 75 or 100 mm (3 or 4 in.), one piece spun aluminum pre-insulated stack jack. To be minimum of 305 mm (12 in.) above finished roof surface. Diameter to suit site conditions. Acceptable Material:
 1. SJ-38 Insulated Stack Jack Flashing by Thaler Roofing Specialty Products Inc.
2. Storm Collars and Clamps: Fabricated from same material as exhaust stacks and sleeves, with continuously soldered seams and extending a minimum of 50 mm (2 in.) down face of sleeve. Allow 6 mm (1/4 in.) gap between storm collar and sleeve.
3. Exhaust / Hot Stack Sleeve Flashing: One piece spun aluminum, to be a minimum of 305 mm (12 in.) above finished roof surface with storm collar. Diameter to suit site conditions. Acceptable Material:
 1. BVF Seamless Spun Aluminum B-Vent Flashing with Rain Collar by Altra Metal Specialties Inc.
 2. Fabricated from 0.56 mm (16 oz.) Copper or 0.71 mm (24 gauge) stainless steel. Provide a continuous sleeve with a minimum height of 305 mm (12 in.) above finished roof surface complete with a storm collar. Sleeve flange shall have a 150 mm (6 in.) wide apron with continuously soldered seams.
4. Conduit / Gas Penetration Sleeve Flashing: Size, number and type to suit existing conduit / pipe penetrations and configuration. Acceptable Material:
 1. “MEF Series” Aluminum Pre-Insulated Flashing for Multiple Conduits by Thaler Metal Industries Ltd.
 2. MEF-9 Modcom Gas Pipe Flashing by Thaler Metal Industries Ltd.
 3. MEFA by ALTRA Metal Specialties Inc.
 4. Multiple / Custom: Fabricated from 0.56 mm (16 oz.) Copper or 0.71 mm (24 gauge) stainless steel. Provide a continuous sleeve with a minimum height of 305 mm (12 in.) above finished roof surface complete with a storm collar. Sleeve flange shall have a 150 mm (6 in.) wide apron with continuously soldered seams.

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5. Closure Plates:
 1. Metal Deck: For openings larger than 610 mm (24 in.) use metal fluted decking having same thickness and profile as existing. Deck must span over minimum of three joist supports. Secure to supports with appropriate fasteners at 305 mm (12 in.) on centre.
 2. Minimum 1.6 mm (16 gauge) galvanized steel plates for openings up to 250 mm (10 in.) or less in width and length and minimum 150 mm (6 in.) wider than opening on all sides.
 3. For openings up to 610 mm (24 in.), provide adequate structural supports from beneath and provide 5 mm (3/16 in.) galvanized steel plate secured to supports with appropriate fasteners. Plates to be a minimum 125 mm (5 in.) wider than opening on all sides.
 4. A Professional Engineer registered in the Province of Ontario shall design openings greater than noted above.
 6. Sprayed polyurethane foam insulation: one component polyurethane foam insulating sealant to CAN/ULC-S705,
 1. ENERFOAM by Abisko Manufacturing Inc.
 2. Duotack by Soprema Inc.
 7. Flexible Insulation: 'Roxul' Mineral Batt, of size and thickness to suit site requirements.
 8. Butyl Tape: 3 mm x 13 mm (1/8 x 1/2 in.) wide elastomeric butyl rubber.
 9. Termination Bar: Extruded Aluminum, 3 mm (11 gauge) core nominal thickness, 25 mm (1 in.) wide.

3. EXECUTION

3.1 Workmanship

1. Do work in accordance with Canadian Roofing Contractors Association Roofing Specifications Manual (CRCA) and Manufacturer's requirements except as specified within Contract Documents and to approval of *Consultant*.
2. More stringent requirements shall govern.

3.2 Examination and Preparation

1. Examine site conditions and surfaces to ensure that they are in satisfactory condition for the commencement of Work of this section.
2. Ensure that substrates are smooth, clean and dry. Clean surfaces of all substances, which may be detrimental to new roof system. Clean adhesives with solvent and allow vapours to dissipate prior to membrane application.

3. Application of the Work, or any part of it will constitute acceptance of conditions upon which work is to proceed.

3.3 Abandoned Equipment

1. All unused and abandoned curbs and stacks are to be removed and disposed of.

3.4 Deck Closures

1. Provide new deck closures over abandoned openings, as specified in this section.
2. Secure new deck closures to existing substrate with appropriate fasteners at maximum 305 mm (12 in.) on centre.
3. Metal deck of a structural component shall extend over minimum three joists.

3.5 Primer

1. Apply primer to curbs, wall, wood and metal at a minimum rate of 0.3 to 0.5 litres/m² (0.96 to 1.6 fl.oz./sq.ft) with roller or spray. Do not allow primer to puddle.
2. Prevent primer from entering building interior through openings and joints in metal decks, by installing self-adhesive membrane at roof perimeters, walls, curbs and other roof openings.
3. Allow primer to cure prior to application of new roofing membrane or membrane flashings as detailed. Do not accelerate drying time by use of flame.
4. Self-adhesive membrane must be applied same day as primer.

3.6 Metal Deck Corrosion

1. Where required by Consultant, clean existing superficial corrosion from metal deck by scraping, abrasive brushes or grinding, to expose clean metal and apply two coats of primer.

3.7 Vapour Retarder on Metal Decks

1. At all roof perimeters, walls, curbs, dividers, movement and control joints, **provide 200 mm (8 in.) self-adhesive reinforcing vapour retarder to seal openings/gaps at junction of wall and deck, to prevent primer/asphalt seepage into building.**
2. **Roll out vapour retarder on clean and primed surface.** Peel back first 1 m (3 ft.) of release paper and adhere vapour retarder in place. Hold vapour retarder tight and peel off remaining release film diagonally.
3. Apply additional rolls in similar fashion and maintain 75 mm (3 in.) side laps and 150 mm (6 in.) end laps. **Side laps shall bear on crest of deck.** Roll vapour retarder onto deck and ensure all laps are sealed.

4. **Seal vapour retarder to all penetrations by use of self-adhesive vapour retarder for all occasions. Prime surfaces as required.**

3.8 Base Insulation MECHANICALLY SECURED OVER Vapour Retarder ON DECK

1. Install first layer base insulation over vapour retarder and mechanically secure into substrate to Factory Mutual FM 1-90 requirement layout pattern of five (5) fasteners per 1220 x 1220 mm (4 x 4 ft.) board, as per details on drawing.
2. Maintain fasteners a minimum of 150 to 305mm (6 to 12 in.) from all perimeters and corners. Provide 50% more fasteners for 2440 mm (8 ft.) perimeters and 75% more at corners for 3660 mm (12 ft.) each way.
3. Ensure fasteners adequately engage and penetrate crest of plywood deck 16 mm or embedded 25 mm (1 in.). Fasteners that do not engage the substrate, shall be removed and re-installed. **Do not overdrive or underdrive fasteners.**
4. Install second layer of base insulation and succeeding layers in a full mopping of hot asphalt, applied at a rate of 1.25 kg/m² (25 lbs. per square) and embed board into asphalt while still fluid.
5. Base insulation shall be reduced 13 mm (1/2 in.) for 1220 mm (4 ft.) centred at drain sump as noted on drawings. Transition shall be 'shaved' to provide a smooth surface for tapered insulation or overlay board.
6. At junction with wood blocking at parapets, walls and curbs, neatly trim insulation to suit profile of wood assembly and to provide a tight/butt joint.
7. Stagger all joints in insulation boards within each adjacent layer and between lower and upper layers. Walk insulation into hot asphalt to achieve solid bond, immediately after placement.
8. Install insulation boards ensuring panels are tightly butted and end joints between panels are staggered 610 mm (24 in.), each way.
9. Do not lay more insulation/board than can be covered with roof membrane on same day. Insulation, which is damaged by moisture, shall be marked and promptly removed from site.

3.9 Tapered Insulation

1. Tapered insulation shall be applied under overlay board in accordance with reviewed shop drawings.
2. Install tapered insulation, sumps, crickets and backslope in urethane adhesive. Use designed applicator and apply adhesive at 20 mm (3/4 in.) wide ribbons at 305 mm (12 in.) on centre in field of roof and at 150 mm (6 in.) for 2440 mm (8 ft.) perimeters and at 100 mm (4 in.) at 3050 mm (10 ft.) corners.

3. **Tapered sump shall be installed in its entirety the same day.** Under no circumstance shall sump be installed in more than one application as to build-in a high point within sump area.
4. Install insulation ensuring panels are tightly butted and walk insulation into hot asphalt to achieve solid bond, immediately after placement.
5. Do not lay more insulation/board than can be covered with roof membrane base sheet on same day.
6. Insulation, which is damaged by moisture, shall be marked and promptly removed from site.

3.10 Overlay Board

1. Apply overlay board in urethane adhesive. Use designed applicator and apply Duotack at 20 mm (3/4 in.) wide ribbons at 305 mm (12 in.) on centre in field of roof and at 150 mm (6 in.) for 2440 mm (8 ft. perimeters) and at 100 mm, (4 in.) at 3050 mm (10 ft.) corners.
2. Allow adhesive to slightly rise and then embed protection board into place and weigh down till good adhesion is attained.
3. Do not lay more boards than can be covered with roof membrane on same day. Boards that are damaged shall be marked and promptly removed from site.
4. Stagger side and end joints to adjacent boards and to underlying insulation joints.

3.11 Roof Membrane Base Sheet

1. Unroll modified base sheet and allow sheets to relax minimum 15 minutes and burn plastic film in zigzag fashion as per manufacturer's requirements and approval of *Consultant*.
2. Align base sheet dry with laps centred over drain area and working upslope with laps to shed water. Position membrane with minimum 75 mm (3 in.) side laps and 150 mm (6 in.) end laps. Cut-off corners at end laps to be covered by next roll. Stagger end joints in sheets minimum 305 mm (12 in.).
3. **Fully torch base sheet to overlay board.**
4. Provide 3 mm (1/8 in.) 'bitumen bleed-out' at all side and end laps. Maintain minimum 75 mm (3 in.) side and 150 mm (6 in.) end laps.

3.12 Roof Membrane Base Sheet Flashings

General Application Guidelines

1. Existing metal counter flashing and membrane flashings are to be removed to expose sound substrate.
2. Apply appropriate primer to surfaces that are to receive membrane flashings at rates

recommended by manufacturer. Allow primer to 'flash off' prior to membrane flashing application.

3. Apply membrane base sheet flashings in general conformance with details commencing from low point and working up-slope. Maintain minimum 75 mm (3 in.) side and 150 mm (6 in.) end laps. Laps shall be installed to shed water.
4. Apply base sheet in maximum 1 m (3.25 ft.) wide strips. Extend base sheet a minimum of 150mm (6 in.) beyond toe of cant (or vertical transition) and onto field of roof.
5. At wall and curbs, provide mechanical fasteners within laps of base sheet flashing, prior to applying succeeding sheet. Fasteners shall be installed at maximum 100 mm (4 in.) on centre commencing from 200 mm (8 in.) above roof membrane.
6. Extend modified bituminous base sheet over parapet, perimeter and eaves down outside face of walls 38 mm (1 ½ in.) onto the lower substrate. Secure membrane flashing with large head galvanized nails at 150 mm (6 in.) on centre.
7. At exterior face of parapets / perimeters, apply self-adhesive base sheet flashing, to provide continuous cover over exposed wood and joints between substrates as detailed. Overlap self-adhesive base sheet under overhang of membrane base/cap sheet flashings at top edge of parapets / perimeters.
8. Repair defects in applications with additional piece of self-adhesive base sheet. Carry out repairs to satisfaction of Consultant.

Hot Asphalt Applications

9. **Base sheet flashing shall be applied using the 'mop and flop' technique.** Place base sheet with back side facing up and apply hot asphalt to base sheet and substrate, and adhere base sheet to substrate prior to asphalt cooling.
10. Apply base sheet flashing in full application of hot asphalt at a rate of 1.2 kg/m² (25 lbs. per square). Maintain asphalt 25 mm (1 in.) back from all laps.
11. Heat weld exterior 25 mm (1 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out. Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.

Torching Applications

12. **Fully torch base sheet flashing.** Provide 3 mm (1/8 in.) 'bitumen bleed-out' at all side and end laps. Maintain minimum 75 mm (3 in.) side and 150 mm (6 in.) end laps.
13. Heat weld exterior 25 mm (1 in.) of all side and end laps providing a 3 mm (1/8 in.) bitumen bleed out. Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.

Self-Adhesive Applications

14. Apply self-adhesive base sheet flashing into primed surfaces and roll into place with adequate pressure to ensure full contact and adhesion with substrate. Membrane must be rolled into place using manufacturer's approved roller.
15. Peel back 100 to 150 mm (4 to 6 in.) of the silicone release paper to hold membrane in place. Gradually peel back remaining silicone release paper, pressing down on membrane with aluminum applicator to ensure good contact and adhesion.
16. Heat weld exterior 25 mm (1 in.) of all side and end laps, maintaining a 3 mm (1/8 in.) bitumen bleed out.
17. Thoroughly and effectively roll membrane (using manufacturer's recommended steel roller) to attain full contact and adhesion.

3.13 Reinforcement Gussets

1. Apply gussets at every angle, on inside and outside corners in accordance with manufacturer's requirements.
2. Install self-adhesive or thermofusible gussets before application of membrane base sheet flashing,
3. Install self-adhesive or thermofusible gussets over base sheet flashing and before application of membrane cap sheet flashing.

3.14 Roof Membrane Cap Sheet – Torched

1. Base sheet application shall be reviewed by manufacturer and *Consultant* prior to proceeding with membrane cap sheet.
2. Apply membrane cap sheet commencing from centre of drain or low end and working upslope. **Fully torch cap sheet** to base sheet and extend to edge of perimeter, after base sheet flashing has been completed.
3. Provide 3 mm (1/8 in.) 'bitumen bleed-out' at all side and end laps. Maintain minimum 75 mm (3 in.) side and 150 mm (6 in.) end laps. Laps shall be installed to shed water.
4. Maintain minimum 50% stagger from base sheet. Use chalklines to maintain neat and straight lines. Do not walk on or step into newly applied membrane.
5. Apply loose granules in areas where excess heat welding has occurred. Apply heat to affected area, place granules and embed them into warm membrane.
6. Apply membrane cap sheet without voids, wrinkles, buckles, fishmouths or any evidence of a lack of full adhesion. Repair defects to satisfaction of *Consultant*.

3.15 Roof Membrane Cap Sheet Flashings - Torched

1. Apply membrane cap sheet flashings in general conformance with details commencing from low point and working up-slope.
2. Membrane base sheets/flashings with a poly on top face shall have poly burned off prior to applying cap sheet flashings. Maintain minimum 50% stagger from base sheet flashing. Use chalk lines to maintain neat and straight lines. Do not walk on or step into newly applied membrane.
3. Fully torch modified bituminous cap sheet flashing to attain full bond.
4. Terminate cap sheet 13 mm (1/2 in.) back from outside edge of parapet blocking and past base sheet flashing 50 mm (2 in) onto flat of roof.
5. Provide 3 mm (1/8 in.) bleed out at all side laps. Maintain minimum 75 mm (3 in.) side and 150 mm (6 in.) end laps. Laps shall be installed to shed water.
6. At wall terminations, install and secure termination bar to adequately restrain the flashings. Secure termination bar at maximum 305 mm (12 in.) on centre. Apply sealant bead along entire length of termination bar.
7. Repair defects in applications with additional piece of torch grade base sheet. Carry out repairs to satisfaction of Consultant.

3.16 Drains

1. Cut opening through membrane base sheet, insulation, thermal barrier, vapour retarder and centre drain over pipe. Apply mastic on underside of flange.
2. **Note: Overlay board to be completely cut-out under drain flange**
3. Insert drain body until flange is flush with roof membrane. Secure new drains with mechanical (MJ) connection and underside with deck clamp.
4. Flash drain flange with one ply of torch grade base sheet. Extend membrane a minimum of 305 mm (12 in.) beyond the edge of drain flange.
5. Install clamping ring and aluminum strainer over raised bosses and install screws to tighten ring against membrane and flashings until secure and apply gravel.
6. Ensure roof drains are clear of debris and free draining at project completion.

3.17 Sleeves

1. Provide all required vents, stacks and conduit sleeves and supports to suit site conditions.
2. Prime stack flanges, top and bottom and set underside of flange in bed of mastic on membrane and position evenly around projection.

3. Flash in flanges with one ply of torch grade base sheet. Extend membrane a minimum of 305 mm (12 in.) beyond the edge of drain flange.
4. Where stacks are installed on top of curbs, entire 'boxed curb' shall be covered with adequately secured overlay board and completely covered with torch grade membrane base sheet and cap sheet.

3.18 Parapets/Perimeters/Walls/Sleepers/Curbs

1. Provide new wood sleepers as detailed (or that extend over minimum 3 joist supports) to maximum length required to support units. Butt new insulation to sleepers by neatly cutting perimeter to fit profile of sleeper.
2. Provide 2-ply membrane flashings over all sleepers to fully encapsulate wood and in accordance with this section.
3. Construct parapet, perimeters, wall and curbs as detailed with new wood framing in accordance with Section 06 10 00 – Rough Carpentry.
4. Provide 2-ply membrane flashings at all noted locations in accordance with this section and as detailed.
5. Provide metal cap flashings at sleepers and curbs prior to re-installing units.

3.19 Dividers/Movement/Control Joints

1. At all roof dividers, movement and control joints, construct as detailed with new wood framing in accordance with Section 06 10 00 – Rough Carpentry.
2. At tie-ins with existing and adjacent roof areas, extend new membrane flashings onto existing side as detailed.
3. Provide 2-ply membrane flashings at all noted locations in accordance with this section and as detailed.

3.20 Overflow Scuppers

1. Where indicated on drawings, install new scuppers and secure to substrate.
2. Scuppers shall be set no higher than 100-150 mm (2-4 in.) above lowest point of roof area or at membrane level if low point is greater than 150 mm (6 in.) than perimeter.
3. Flash in scupper flanges with one-ply of self-adhesive torch grade base and one ply torch grade cap sheet.

3.21 Storm Collars

1. Install storm collars complete with clamping ring and sealant over stacks where caps cannot be installed.

3.22 Electrical/Mechanical and Gas Line Penetrations

1. At pipe/conduit penetrations, provide prefabricated pitch-pan system, adhesive and mastic or insulated sleeve.
2. Adhere inter-clip system to roof membrane, seal all joints and fill pitch-pan with required pourable sealer with high mid-point and sloped to exterior and apply granules, as per manufacturer's requirements.

3.23 Quality Control

1. *Owner* may retain an independent *Consultant* to carry out periodic supervision during construction.
2. If requested by *Consultant*, take cut-test samples of roofing membrane and membrane flashings, wrap and label samples, identify locations and submit to *Consultant* for review and testing.
3. *Contractor* shall make an allowance for **minimum of one cut test per day** and all required patching to match existing assembly. Samples must be a minimum 305 x 305 mm (12 x 12 in.) and include all new roof components including asphalt pour and gravel.
4. Failed test results will require remedial work acceptable to *Consultant* and may entail complete removal and replacement of failed areas.

3.24 Clean-up

1. Remove all excess materials, debris, tools and equipment as work proceeds and on completion, or sooner if requested by *Consultant*.
2. Remove all stains, asphalt, caulking or other adhesive from all surfaces.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|--|---------------|
| 1. Rough Carpentry: | Section 06100 |
| 2. Masonry: | Section 04200 |
| 3. Air Vapour Barrier Membrane: | Section 07112 |
| 4. SBS Modified Bituminous Membrane Roofing: | Section 07516 |
| 5. Rigid Insulation | Section 07212 |

1.2 Design Criteria

1. Design metal siding system to provide for thermal movement of component materials caused by ambient temperature range of 100 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
2. Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.
3. Design members to withstand dead load and wind loads calculated in accordance with NBC and applicable local regulations, to maximum allowable deflection of /180th of span.
4. Provide all necessary interior reinforcing girts to withstand all loads as described in item .3.
5. Design wall system to accommodate specified erection tolerances of structure.
6. Maintain following installation tolerances:
 - .1 Maximum variation from plane or location shown on approved shop drawings: 10mm/10m of length and up to 20mm/100m.
 - .2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75mm.

1.3 Samples

1. Submit duplicate 300 x 300 mm samples of each siding wall system, representative of materials, finishes and colors, in accordance with Section 01340.

1.4 Shop Drawings

1. Submit shop drawings in accordance with Section 01340.

2. Indicate arrangement of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural support members or support wall.
3. Clearly detail and indicate locations of all Z clips, J-closures and edge trims.
4. Describe in shop drawing details, suitable accommodation for the removal and joining of future cladding as described in 1.2.7 of this section and on drawings.

1.5 Acceptable Manufacturers

1. VicWest Steel Inc., Peerless Enterprises, Flynn or Agway Metals Inc.

1.6 Extended Warranty

1. Submit a warranty for metal siding system, covering materials and labour and the repair or replacement of defective work, but for five (5) years total.

PART 2 - PRODUCTS

2.1 Materials

1. Prepainted Steel: Galvanized sheet steel minimum 0.76 mm (22 ga) thickness, complying with ASTM A526-80 with Z275 designation for zinc coating. Prepainted in 8000 Series Colour: from standard colour selection group.
2. Soffit profile VicWest Steel Ballara - Colour by Architect from standard colour range: locations as per drawings. **No minimum quantities for order will be accepted.**

Acceptable alternate: 150mm 'V'- groove - Longboard System – by AMNA
3. For copings and flashings, provide prefinished metal 24 gauge thickness, colour from standard colour selection group.
4. Screws: to CSA B35.3-1962, head color same as exterior sheet, dished to CSA B35.3-1962.
5. Powder actuated fasteners: galvanized, peened ballistic point, plastic cap of same color as exterior sheet.
6. Sealants: in accordance with Section 07900, paragraph 2.1.4, colour selected by Architect. Allow for one (1) colour from manufacturers full range to match adjacent metal.
7. Gaskets: soft pliable arctic grade vinyl, extruded profile.
8. Touch-up paint: as recommended by panel manufacturer and Baycoat, compatible with prefinished coating.
9. Isolation coating: alkali resistant bituminous paint or epoxy resin solution.

10. Insulation: Semi-rigid. Fiberglass AF 530.

2.2 Components

1. Exterior sheet: factory preformed coated metal, to profiles and thicknesses as indicated.
2. Exterior corners: of same profile, material and finish as adjacent siding material, shop cut and brake formed to required angle, concealed corner brace, hairline exposed joint, pop rivet connections with painted head to match siding.
3. Exposed joint ends of siding sheet shop cut clean and square, backed with tight fitting filler lapping back if joint, exposed components color matched to siding.
4. Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, eaves, soffits sill and corners, of same material and finish as exterior siding, brake formed to shape. Exposed cut edges of metal profiles will not be accepted.
5. Sub-girts: zinc coated to ASTM A525-78a, G90 coating designation, profile as indicated to accept exterior sheet with structural attachment to building frame.

PART 3 - EXECUTION

3.1 Preparation

1. Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

3.2 Installation

1. Install sub-girts to masonry walls through air vapour barrier membrane.
2. Install exterior finish siding to internal sub-girts with concealed fasteners.
3. Install insulation using adhesive and ensure a continuous thermal barrier.
4. Provide notched and formed closures, sealed to arrest direct weather penetration at vertical profiles for exterior siding. Ensure continuity of "pressure equalization" of rain screen principle.
5. Provide alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to building structure.
6. Supply and install flashing at connection between roof and preformed metal siding.

3.3 Control Joints

1. Construct control joints, as indicated.

2. Use cover sheets, of brake formed profile, of same material and finish as adjacent material.
3. Use mechanical fasteners to secure sheet Expansion Joints materials.
4. Assemble and secure wall system to structural frame so stresses on sealants are within manufacturer's recommended limits.

3.4 Cleaning

1. Wash down exposed surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.
2. Remove excess sealant with recommended solvent.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Rough Carpentry Section 06100
2. SMS Modified Bituminous Membrane Roofing Section 07516

1.2 Qualifications

1. Applicator to be of local recognized standing with proven record of satisfactory installations and to be approved by the Architect. Applicator must have, at least, five (5) years of proven experience in this work.
2. Supply and install sheet metal flashings in accordance with, and to the standards of the CRCA FL Series details.

1.3 Shop Drawings

1. Submit Shop Drawings in accordance with Section 01340.

1.4 Extended Warranty:

1. Submit a warranty for metal flashing and trim, covering materials and labour and the repair or replacement of defective work in accordance with Division 1, but for five (5) years total.

PART 2 - PRODUCTS

2.1 Materials

1. Galvanized steel sheet with factory applied 8000 Series coating. Allow for the selection of two (2) colours. Colours to be selected by Architect from full range. One colour is to be used at all flashing/parapet cap areas. One colour is to be used at parapet cap area of the feature wall. All prefinished metal to be of same colour and from same run to match siding.
2. Metal thickness to be 0.76 (22 ga.) for siding. Where exposed face of flat faced flashing and trim exceeds 250 mm, provide details to lap two layers providing on intermediate lock joint to achieve total depth required for exposed surface.
3. Isolation coating to CGSB 1-GP-108C.
4. Plastic cement to CGSB 37-GP-5M.
5. Sealant compound of one (1) part polysulphide polymer base.
6. Cleats of same material, and temper as sheet metal, minimum 50 mm wide, 45 mm thick.

7. Fasteners: of same material as sheet metal to CSA B111-1974. Flat head roofing nails of length and thickness suitable for metal flashing application.
8. Washers: of same material as sheet metal, 1 mm thick with rubber packings.

PART 3 - EXECUTION

3.1 Installation

1. Install sheet metal work to CRCA Specifications and complete as soon as possible following application of roof membrane.
2. Use concealed fastenings except where approved before installation.
3. Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, except where otherwise shown.
4. Lock end joints and caulk with sealant.
5. Flashings to be anchored into reglets or folded over continuous strips at maximum 300 mm centers.
6. Supply and assist in the installation of reglets where required for metal flashings.
7. Use isolation coating where galvanized metal is in contact with concrete, masonry or mortar.
8. Form flashing over control and expansion joints to Architect's approval.
9. Install plastic pans, where shown around items projecting through roof membrane to CRCA Specification FL-119. Fill pans with plastic cement.
10. Install fasteners and cleats in sufficient numbers and proper size to prevent metal from lifting or tearing under 125 km/h winds.
11. Contractor must inform roofing inspector 48 h prior to start of any work. Roofing inspector has authority to reject incorrect procedure, inferior work and materials.

End of Section

PART 1 – GENERAL

1.1 General Requirements

1. Comply with requirements of Division 1.

1.2 Related Work

- | | |
|--|---------------|
| 1. SBS Modified Bituminous Membrane Roofing: | Section 07516 |
| 2. Metal flashings: | Section 07620 |
| 3. Painting: | Section 09900 |
| 4. Miscellaneous Metal Fabrication: | Section 05510 |

1.3 Design and Performance Requirements

1. Structural design: hatch cover shall safely support a minimum live load of 2 kN/m².
2. Air and water control: closed hatch shall be weatherproof. Design hatch to prevent passage and leakage of water and air infiltration and exfiltration.
3. Operation: hatch cover shall be hinged single leaf type. Operation shall be manual, with opening and closing mechanism operable from outside and inside.

1.4 Shop Drawings

1. Prepare and submit detailed shop drawings showing fabrication and installation requirements.

PART 2 - PRODUCTS

2.1 Materials and Fabrication

1. Acceptable Products:
 - .1 Bilco Type S-50TB with "Ladderup" Safety Post.
 - .2 Lexcor R-110G/SR/R20 with Safety Rail System.
 - .3 Acudor G3862 with RHSR Safety Rail System.
2. Material: galvanized sheet steel to ASTM 653 Grade A zinc coating designation Z275.
3. Size: 762 mm x 914 mm clear opening, 400 mm high curb, unless otherwise indicated.
4. Optional Locking: Provide manufacturer's standard exterior, concealed, deadbolt, cylinder lock, with keyed access.

5. Fabrication:

- .1 Hatch must be thermally-broken construction.
- .2 Weld and grind smooth all corners and connections. No sharp edges.
- .3 Provide angle shaped curb with predrilled holes for fastening to curb and continuous integral cap flashings. Provide trim as detailed.
- .4 Provide sandwich-construction hatch cover with continuous neoprene perimeter draft seal.
- .5 Insulate curb and hatch cover with minimum R20 rigid fibre insulation.
- .6 Provide heavy duty pintle hinges, compression spring type lifting mechanism enclosed in telescopic tubes, automatic hold open arms with vinyl covered handle, two point spring latch, inside and outside handles and padlock hasps. All hardware shall be zinc coated.

6. Safety device: provide the following:

- .1 Safety Railing System: externally mounted 35 mm diameter, PVC coated safety railing system.

PART 3 – EXECUTION

3.1 Installation

1. Securely fasten roof hatches to roof deck.
2. Provide 1.2 mm thick angle shaped galvanized sheet steel closure to cover exposed roof deck edges below roof hatch curb.
3. Install safety device at ladder, or on outside of hatch, as directed by manufacturer.
4. After installation, adjust operable parts as required to ensure proper operation.

End of Section

PART 1 - GENERAL

1.1 Related Work Specified Elsewhere

1. Caulking in connection with metal, trim and roof flashing: Section 07620
2. Caulking between members of hollow metal frames and screens: Section 08100
3. Caulking of all masonry joints: Section 04200

1.2 Environmental Conditions

1. Sealant and substrata materials to be minimum 5 deg. C.
2. Should it become necessary to apply sealants below 5 deg. C, consult sealant manufacturer and follow their recommendations.

1.3 Warranty

1. Contractor hereby warrants that caulking work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces, in accordance with Section 01740 for two (2) years total.

PART 2 - PRODUCTS

2.1 Materials

1. Primers: type recommended by sealant manufacturer.
2. Joint Fillers:
 - .1 General: compatible with primers and sealants, oversized 30 to 50%.
 - .2 Polyethylene, urethane, neoprene or vinyl: extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa.
 - .3 Neoprene or butyl rubber: round solid rod, Shore A hardness 70.
 - .4 Polyvinyl chloride or neoprene: extruded tubing with 6 mm minimum thick walls.
 - .5 Bond breaker: pressure sensitive plastic tape which will not bond to sealants.
 - .6 Sealant Type A: One component, chemical curing, conforming to CAN2-19.13-M82, Class C-2-25-B-N; multi-component, chemical curing, conforming to CAN2-19.24-M80, Type 2, Class B.
 - .7 Sealant Type B: Multi-component, chemical curing mildew resistant conforming to CGSB 19-GP-22M.
 - .8 Sealant Type C: Multi-component, acrylic emulsion base, conforming to CGSB 19-GP-17M.
 - .9 Sealant Type D: One component, polyurethane base, chemical curing, conforming to CAN2-19.13-M82, Class C-1-25-B-N; or multi-component, chemical curing, conforming to CAN2-19.24-M80, type 1.

3. Color of Sealants: to be selected by Consultant. Allow for a total of two (2) colours for Type A, two colours for Type B, two colours for Type C and one colour for Type D. Locations as directed on site by Consultant.
4. Joint cleaner: xylol, methylethyl-ketone or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.
5. Vent tubing: 6 mm inside diameter extruded polyvinyl chloride tubing.

PART 3 - EXECUTION

3.1 New Work

1. Caulk where specified in Item 3.4 and everywhere required.
2. Remove dust, paint, loose mortar and other foreign matter. Dry joint surfaces.
3. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.
4. Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.
5. Prepare concrete, masonry, glazed and vitreous surfaces to sealant manufacturer's instructions.
6. Examine joint sizes and correct to achieve depth ratio 1/2 of joint width with minimum width and depth of 6 mm, maximum width 25 mm.
7. Install joint filler to achieve correct joint depth.
8. Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
9. Apply bond breaker tape where required to manufacturer's instructions.
10. Prime sides of joints to sealant manufacturer's instructions immediately prior to caulking.

3.3 Application

1. Apply sealants, primers, joint fillers, bond breakers, to manufacturer's instructions. Apply sealant using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.
2. Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.
3. Apply sealant to joints between window or door frames to adjacent building components around perimeter of every external window or door opening, to control joints in masonry walls and where indicated. In masonry cavity construction, vent caulked joints from

cavity to 3 mm beyond external face of wall by inserting vent tubing at bottom of each joint and maximum to 1500 mm o.c. vertically. Position tube to drain to exterior.

4. Apply sealant to close gaps at all junctures of all interior walls meeting exposed ceilings. Provide required foam backer rods to ensure integrity of sealant bead when applied to juncture. Tool finish smooth to receive paint finish.
5. Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.
6. Use sealants specified in the following locations:

Type A:

Joints between windows or door frames and adjacent building components; control and expansion joints and all other locations where sealing is required, except in locations designated for Type B, C and D. Ensure that sealant chosen (from the several specified under "MATERIALS") for each location is recommended by manufacturer for use on surfaces encountered.

Type B:

Joints between splash backs and walls.

Type C:

Joints between interior metal door frames and partitions.

Type D:

Joints in horizontal surfaces between concrete slabs.

3.4 Work Included

1. Work shall include but not limited to the following areas :
 - .1 exterior and interior hollow metal frames and screens; both sides;
 - .2 exposed control and expansion joints in masonry walls, masonry corners, joints in front of steel lintels bearing on exterior brick jambs;
 - .3 joints at all washroom vanities, hair dryers, hand dryers, electrical panels, access doors, tub/showers and adjacent surfaces. (Use sanitary caulking.)
 - .4 joints between masonry and concrete surfaces.
 - .5 joints between gypsum board and masonry, or other dissimilar materials.
 - .6 joints between louvres and other surfaces.
 - .7 exterior siding, prefinished metal fascia, flashing and trim.
 - .8 penetrations through roofs, floors and walls other than firestopping
 - .9 at all other locations on drawings, except as noted below.
2. Sealing of joints to the underside of exposed precast slab to be by precast installer.
3. Sealing of all joints at top of walls meeting exposed flat or sloped precast ceilings to be included in this section.

4. Sealing of all interior and exterior joints between existing buildings and new construction is the responsibility of this Section.

End of Section

1. GENERAL

1.1 Section Includes

1. Section includes for provision of all labour, materials, equipment and services for joint sealers in accordance with Contract Documents.

1.2 Related Sections

1. Section 06100 Rough Carpentry
2. Section 07516 SBS Modified Bituminous Membrane Roofing
3. Section 07620 Prefinished Metal Flashing and Trim

1.3 References

1. Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualifications Board for Joint Sealant.
2. CAN/CGSB-19.24 - Multi-Component, chemical curing sealing compound.
3. CAN/CGSB-19.13 - Single Component, elastomeric, chemical curing sealing compound.
4. CGSB 19-GP-14 - Sealing Compound, One-Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
5. CAN/ULC-S115-05 Standard Method of Fire Tests of Firestop Systems.
6. ULC List of Equipment and Materials, Firestop Systems and Components.

1.4 Operations

1. Perform operations, at times designated by the *Owner*, that will not adversely affect occupants of building and operations in and around site access and egress.

1.5 Protection

1. Protect work of this section from damage. Damaged work which cannot be satisfactorily repaired, restored or cleaned, shall be replaced at no cost to *Owner*.

1.6 Submittals

1. Submit samples of sealant type and colour to *Consultant* and *Owner* for review prior to commencing work.

1.7 Quality Assurance

1. Skilled trades with minimum five years related experience shall execute Work.

1.8 Mock-Up

1. Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, sealant and tooling. Mock-up may be included as part of finished work.

1.9 Warranty

1. Provide minimum two (2) year Warranty from date of Substantial Performance, as certified by *Consultant*. Guarantee shall be submitted against defects in workmanship and materials.
2. *Contractor* must extend Warranty on replaced parts and workmanship for a period of two (2) years from date of acceptance of replacement parts and workmanship. Defects will include but will not be limited to; joint leakage, hardening, cracking, crumbling, melting, bubbling, shrinkage, running, sagging, change of colour, loss of adhesion, loss of cohesion and staining of adjoining or adjacent materials on surfaces.
3. Provide all additional Warranties that may be available from manufacturer.

1.10 Environmental Requirements

1. Conform to manufacturer's recommended temperatures, relative humidity and substrate moisture content for application and curing of sealants.
2. Materials must be stored at minimum of 20°C (68°F) immediately prior to application. Sealant applications must be carried out when ambient temperature is above 0°C (32°F).

2. PRODUCTS

2.1 Material

1. All materials in a sealant system shall be compatible with each other and with substrate.
2. Colour(s) of sealants shall be selected to match adjacent substrate and shall be approved by *Consultant* or *Owner*.
3. Elastomeric Sealants: One part elastomeric, non-sag urethane based sealant, for masonry to masonry, masonry to metal junctions. Acceptable Material:
 1. Dymonic as manufactured by Tremco Incorporated.
 2. Vertical Wall Joints - Three-component, chemically curing, epoxidized polyurethane sealant, 'Dymeric 240' by Tremco Incorporated.
4. Silicone sealants: Silicone based sealant, for metal to metal junctions and glazing. Acceptable Material:
 1. Spectrum 2 as manufactured by Tremco Incorporated.

2. Dow Corning 999-A Silicone Building & Glazing Sealant by Dow Corning Canada Inc.
5. Butyl sealants: Butyl rubber and polyisobutylene blend sealant. Butyl sealant to be compatible with modified bituminous membrane flashings. Acceptable Material:
 1. Tremco Butyl Sealant as manufactured by Tremco Incorporated.
 2. Modified Membrane manufacturer's approved sealant.
6. Firestop Sealant: By Tremco, Dow Corning Canada Inc., GE Silicone, 3M Corporation or approved equal, to CAN/ULC-S115-05.
7. Joint Backing: Polyethylene, urethane, neoprene or vinyl, extruded foam recommended by sealant manufacturer. Circular shape with diameter 25% greater than joint width before installation.
8. Primer: As recommended by sealant manufacturer to assure adhesion of compound and to prevent staining of substrate materials.
9. Joint Cleaner: Non-corrosive and non-staining type, compatible with joint forming materials and sealant as recommended by sealant manufacturer.
10. Bond Breaker Tape: Polyethylene bond breaker tape, which will not bond to sealant.

3. EXECUTION

3.1 Removal of Existing Sealants

1. Remove existing sealants, backing material, dust, oil, grease, oxidation, millscale, coatings and all other loose material by cutting, brushing, scrubbing, scraping and grinding.
2. Rake out joints, cracks and crevices to receive sealant, to a depth measuring half the joint width. Clean out existing reglets to satisfaction of *Consultant*.

3.2 Preparation

1. Examine joint sizes and conditions to establish correct depth to width ratio for joint backing and sealant. Clean joint surfaces of deleterious material and substances including dust, rust, oil grease, and other matter that may impair work.
2. Ensure joint surfaces are dry and frost free. Prepare substrate as recommended by sealant manufacturer ensuring adjacent surfaces are not damaged.
3. Commencement of Work implies acceptance of existing conditions and assuming full responsibility for finished condition of the Work.

3.3 Priming

1. To prevent staining, mask adjacent surfaces prior to priming and caulking.

2. Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
3. Prime copper, concrete and masonry surfaces to receive sealant.

3.4 Application

1. Install joint backing all joints prior to applying sealants. Diameter of backing material shall be 25% more than width of joint.
2. **Maintain minimum 2:1 width to depth ratio for sealant.**
3. Apply bond breaker tape where joints are of insufficient size to install joint backing or at 90° junctions or where required by sealant manufacturer or *Consultant*. Ensure bond surface area meets the minimum required size recommended by sealant manufacturer.
4. Where required, mix materials in strict accordance with sealant manufacturer's instructions. Apply sealant using appropriate gun with proper size nozzle.
5. Apply sealant in continuous beads, in solid contact to underlying surfaces with sufficient pressure to fill voids and joints solid.
6. Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities. Superficial skin bead is not acceptable.
7. Tool exposed surfaces before skinning occurs to attain concave shape using approved tools.
8. Cure sealant in accordance with the manufacturer's requirements. Do not cover up sealants until proper curing has taken place.

3.5 Clean-up

1. Clean adjacent surfaces immediately and leave work neat and clean.
2. Remove excess and droppings using recommended cleaners as work progresses.
3. Remove bonding tape after initial set of sealant.
4. Remove all excess material, debris, tools and equipment as work proceeds and on completion, or sooner if requested by *Consultant*.

End of Section

PART 1 - GENERAL

1.1 Work Included

1. A single manufacturer shall fabricate products included within the scope of this Section.
2. Manufacturer shall be a member in good standing of the Canadian Steel Door Manufacturers Association (CSDMA).
3. Supply only of steel frame products including frames, transom frames, sidelight and window assemblies with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled or detailed by the Architect.
4. Supply only of flush steel doors with provision for glazed, paneled or louvered openings, insulated and un-insulated, fire labeled, with or without temperature rise ratings and non-labeled, as scheduled or detailed by the Architect.
5. Supply only of steel panels, similar in construction to steel doors, with flush or abetted bottoms for steel frames, transom frames, sidelight and window assemblies, fire labeled and non-labeled, as scheduled or detailed by the Architect.
6. Doors and frames shall be prepared for, but not limited to, preparation for continuous hinges, heavy weight hinges, cylindrical locks, rim and concealed vertical rod/ mortise lock case exit devices, surface door closers and concealed overhead stops.

1.2 Related Work

1. Building-in of frame product into unit masonry, previously placed concrete, structural or steel or wood stud walls.
2. Supply and installation of wood, plastic or composite core doors.
3. Supply and installation of builders' hardware except as specified for acoustic assemblies.
4. Drilling and tapping for surface mounted or non-templated builders' hardware.
5. Caulking of joints between frame product and other building components.
6. Supply and installation of gaskets or weather-strip.
7. Supply and installation of louvers or vents.
8. Supply and installation of glazing materials.
9. Site touch-up and painting.
10. Wiring for electronic or electric hardware.

11. Field measurements.
12. Fasteners for frame product in previously placed concrete, masonry or structural steel.
13. Steel lintels, posts, columns or other load-bearing elements.
14. Field welding.

1.3 Requirements of regulatory agencies

1. Install fire labeled steel door and frame product in accordance with NFPA-80, current edition, unless specified otherwise.

1.4 References

1. ANSI A115.IG-1994 Installation Guide for Doors and Hardware
2. ANSI A250.4-1994 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
3. ASTM A653-M97 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM A924-M97 Standard Specification for General Requirements for Sheet, Metallic-Coated by the Hot-Dip Process.
5. ASTM B117-95 Method of Salt Spray (Fog) Testing.
6. ASTM C177-97 Test Method for Steady-State heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
7. ASTM C518-91 Test method for Steady State Heat Flux Measurements and Thermal Transmission properties by means of the heat Flow Meter Apparatus.
8. ASTM C578-95 Specification for Rigid, Cellular polystyrene Thermal Insulation.
9. ASTM C665-95 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
10. ASTM D1735-92 Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
11. CAN4-S104-M80 Fire Tests of Door Assemblies.
12. CAN4-S105-M85 Standard Specification for Fire Door Frames Meeting the performance required by CAN4-S104.

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| 13. CAN4-S106-M80 | Standard Method for Fire Tests of Window and Glass Block Assemblies. |
| 14. CGSB 41-Gp-19Ma | Rigid Vinyl Extrusions for Windows and Doors |
| 15. CGSB 82.5-M88 | Insulated Steel Doors. |
| 16. CSA A101-M83 | Mineral Fiber Thermal insulation for Buildings. |
| 17. CSA W59-M89 | Welded Steel Construction (Metal Arc Welding) |
| 18. ISO 9001:1994 | Quality Systems – Model for Quality Assurance. |
| 19. NFPA-80, 1999 | Fire Doors and Windows |
| 20. CSDMA | Dimensional Standards for Commercial Steel Doors and Frames. |
| 21. Manufacturers Standard and Galvanized Sheet Gauges | |
| 22. Fleming Fire Labeling Specifications | |
| 23. ULC List of Equipment and Materials, Volume 2 | |

1.5 Testing and Performance

1. Door constructions covered by this specification shall be certified as meeting Level “A” (1,000,000 cycles) and Twist Test Acceptance Criteria (deflection not to exceed 6.4 mm /13.6kg force, total deflection at 136.1kg force not to exceed 63.5 mm and permanent deflection not to exceed 3.2 mm) when tested in strict conformance with ANSI-A250.4-1994. Test shall be conducted by an independent nationally recognized accredited laboratory.
2. Fire labeled product shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by the Architect. Doors, frames, transom frames and sidelight assemblies shall be tested in strict accordance with CAN4-S106. Product shall be listed by Underwriters Laboratories of Canada under an active Factory Inspection Program and shall be constructed as detailed in Follow-Up Service procedures issued to the manufacturer.
3. Should any door or frame specified by the Architect to be fire rated, not qualify for labeling due to design, hardware, glazing or any other reason, the Architect shall be so advised before manufacturing commences.
4. Core materials for exterior doors shall attain a thermal resistance rating of RSI 1.06 (R6.0) when tested in accordance with ASTM C177 or ASTM C518.
5. Product shall be manufactured by a firm experienced in the design and production of standard and custom commercial steel door and frame assemblies, the integration of

builders' or electronic hardware and glazing materials and their impact on the scope of work.

6. Manufacturer shall be assessed and registered as meeting the requirements of Quality Systems under ISO 9001.
7. Product quality shall meet standards set by the Canadian Steel Door Manufacturers Association.

1.6 Test Reports

1. All alternates to this specification shall be submitted to the Architect for acceptance ten (10) days prior to bid date, complete with test reports from independent, nationally recognized testing authorities, certifying that:
 - .1 Steel door and frame assemblies furnished under this section meet the acceptance criteria of ANSI-A250.4-1994, Level "A".
 - .2 Insulated door cores furnished in exterior doors under this Section meet the specified thermal resistance rating.
2. All reports shall include name of testing authority, date of test, location of test facility, descriptions of test specimens, procedures used in testing and indicate compliance with acceptance criteria of the test.

1.7 Submittals

1. Submit shop drawings in accordance with the General Conditions of the Contract.
2. Indicate each type of door, frame, steel, core, material thickness, mortises, reinforcements, anchorages, locations of exposed fasteners, openings (glazed, paneled or louvered) and arrangement of standard builders' hardware.
3. Include a schedule identifying each unit, with door marks or numbers referencing the numbering in Architect's schedules or drawings.
4. Provide confirmation in writing that all aspects to reinforcing, construction, and gauge of metal are met as written in this section.

1.8 Warranty

1. All steel door and frame product shall be warranted from defects in workmanship for a period of one (1) year from date of shipment.
2. All steel door and frame product shall be warranted against rust perforation for a period of five (5) years when the installed and finish painted with a commercial quality paint to the manufacturers recommendations.
3. Finish paint adhesion on all door and frame product shall be warranted for a period of five (5) years when the product has been properly cleaned and finish painted with a

commercial quality paint applied as recommended by the paint manufacturer. This warranty shall not exceed that provided by the paint manufacturer.

PART 2 - PRODUCTS

2.1 Doors

2.1.1 Materials

1. Doors shall be fabricated from tension leveled steel to ASTM A924-M97, galvanized to ASTM A653-M97, Commercial Steel (CS), Type B, coating designation ZF75, known commercially as paintable Galvanneal.
2. Door Cores:
Honeycomb:
Structural small cell (25.4 mm maximum) kraft paper "honeycomb". Weight: 36.3 kg per ream (minimum), density: 16.5 kg/m³ (minimum), sanded to the required thickness.
 - .1 Polystyrene:
Rigid extruded, fire retardant, closed cell board, density 16kg/m², thermal values: RSI 1.06 minimum, conforming to ASTM C578.
 - .2 Temperature Rise Rated (TRR):
Solid slab core of non-combustible, inorganic composite to limit temperature rise on the "unexposed" side of door to 250°C at 30 or 60 minutes, as required by governing building code requirements and determined and scheduled by the Architect.
3. Adhesives:
 - .1 Honeycomb Cores and Steel Components:
Heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement or ULC approved equivalent.
 - .2 Interlocking Edge Seams:
Resin reinforced polychloroprene (RRPC), fire resistant, high viscosity, sealant/adhesive or UL approved equivalent.
 - .3 Polystyrene Cores:
Heat resistant, epoxy based, low viscosity, contact cement.
4. Primer:
Rust inhibitive touch-up only.
5. Exterior Top Caps:
Rigid polyvinylchloride (PVC) extrusion.

2.1.2 Construction

1. General:
 - .1 This section is based on doors and frames as manufactured by Fleming. Doors and frames by other manufacturers are acceptable subject to be similar to the one specified and meeting the terms of this section.

- .2 Doors shall be swinging, 44.4 mm thick of the types and sizes indicated on the Architect's schedules or drawings.
 - .3 Exterior doors shall be lock seam, flush.
 - .4 Face sheets for exterior doors shall be fabricated from (16) gauge steel.
 - .5 Longitudinal edges of exterior doors shall be mechanically interlocked, fully welded, ground smooth with no visible seams. Do not fill seams.
 - .6 Face sheets of interior doors shall be fabricated from 18 gauge steel, except for heavy traffic doors (noted **HT** in Door Schedule) face sheet to be 16 gauge.
 - .7 Longitudinal edge of heavy traffic doors (noted **HT** in Door Schedule) shall be mechanically interlocked, fully welded, ground smooth with no visible seams. Do not fill seams.
 - .8 Interior doors shall be stiffened, insulated and sound deadened with honeycomb core laminated under pressure to each face sheet.
 - .9 Stiffened, insulated and sound deadened with Fleming's propriety core where Temperature Rise Rated (TRR) fire labeled doors are specified on the Architect's schedules.
 - .10 Longitudinal edges of interior doors shall be mechanically interlocked, adhesive assisted with edge seams visible.
 - .11 Door faces of all steel doors shall be fabricated without visible seams, free of scale, pitting, coil brakes, buckles and waves.
 - .12 Formed edges shall be true and straight with a minimum radius for the thickness of steel used.
 - .13 Lock and hinge edges shall be beveled 3 mm in 50 mm unless builders' hardware or door swing dictates otherwise.
 - .14 Top and bottom of doors shall be provided with inverted, recessed, 16 gauge steel end channels, welded to each face sheet at 150 mm on center maximum.
 - .15 Exterior doors shall be provided with factory installed flush PVC top caps. Fire labeled exterior doors shall be provided with factory installed flush steel top caps.
 - .16 Unless ineligible due to design, size, hardware or glazing specified on the Architects' or hardware Suppliers' schedules or details, fire labeled doors shall be provided for those openings requiring fire protection ratings and temperature rise ratings, as determined and scheduled by the Architect.
 17. Exterior doors shall be internally reinforced with 20 gauge continuous; interlocking steel stiffeners at 150mm O.C. max, with voids between stiffeners filled and insulated with 24kg/m³ density loose batt type fiberglass material to suit fully welded design.
2. Hardware Preparations:
- .1 Doors shall be factory blanked, reinforced, drilled and tapped for fully templated mortised hardware only, in accordance with the final approved schedule and templates provided by the hardware supplier.
 - .2 Doors shall be factory blanked and reinforced only for mortised hardware that is not fully templated.
 - .3 Doors shall be factory reinforced only for surface mounted hardware.
 - .4 Templated holes 12.7mm diameter and larger shall be factory prepared, except mounting and through bolt holes, which shall be by the contractor responsible for installation on site, at the time of application. Templated holes less than 12.7mm diameter shall be factory prepared only when required for the function of the

- device (for knobs, levers, cylinders, thumb or turn pieces) or when these holes over-lap function holes.
- .5 Drilling and tapping for surface mounted hardware or mortised hardware that is not fully templated shall be by the contractor responsible for installation on site, at the time of application.
 - .6 Hinge and pivot reinforcements shall be 10 gauge steel minimum high frequency type reinforcing.
 - .7 Hinge reinforcements for acoustic doors and doors in excess of 2450mm rabbet height shall be 10 gauge minimum with each cutout provided with 114.3mm heavy weight (4.6mm) high frequency type.
 - .8 Lock, strike and flush bolt reinforcements shall be 12 gauge steel minimum.
 - .9 Reinforcements for concealed closers and holders shall be 12 gauge steel minimum.
 - .10 For surface mounted hardware, reinforcements shall be 16 gauge steel minimum.
 - .11 All pairs of fire labeled doors shall be provided with 12 gauge steel surface mounted flat bar astragal, shipped loose for application on site, by the contractor responsible for installation.
 - .12 Pairs of doors up to 2450mm x 2450mm, to 1½ hour fire rating maximum shall be provided without astragals. Lock edge seam of such doors shall be tacked-welded and ground smooth. All other fire labeled pairs shall be provided with 12 gauge steel surface mounted flat bar astragal, shipped loose for application on site, by the contractor responsible for installation.
 - .13 Where electrically or electronically operated hardware is specified on the Architects' schedules or details of the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes, where indicated on the templates, shall be provided and interconnected with CSA Approved 12.7mm diameter conduit and connectors.
 - .14 Prepare doors to receive security door contacts – refer to electrical drawings for locations. Door contacts to be installed at 100 mm from the latch side door edge.
 - .15 Doors and Frames shall be prepared for, but not limited to preparations for heavy weight Butt Hinges, Continuous Hinges, Cylindrical Locksets, Concealed Vertical Rod and Mortise Lock Case Exit Devices, Surface Door Closer and Concealed Overhead Stops.
3. Glazing:
- .1 Where 6mm thick glazing materials are specified on the Architects schedules or details, doors shall be provided with 20 gauge steel glazing trim and snap-in glazing stops.
 - .2 Where other than 6mm glazing is specified on the Architect's schedules or details, doors shall receive 20 gauge steel trim and screw fixed glazing stops. Screws shall be #6 x 32mm oval head scrulox (self-drilling) type at 300mm on center maximum.
 - .3 Glazing trim and stops shall be accurately fitted, butted at corners, with removable glazing stops located on the 'push' side of the door.
4. Louver Preparations:
- .1 Where specified on the Architect's schedules or details, non-labeled doors shall be prepared on accordance with the louver manufacturer's details.

- .2 Where specified on the Architect's schedules or details, fire labeled doors shall be prepared for UL listed sight-proof fusible link louvers in accordance with the louver manufacturer's details.
 - .3 Louvers shall be supplied and installed by others.
5. Finishing:
- .1 Remove weld slag and splatter from exposed surfaces.
 - .2 All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth uniform surfaces.
 - .3 On exposed surfaces where zinc coating has been removed during fabrication, doors shall receive a factory applied touch-up primer.
 - .4 Primer shall be fully cured prior to shipment.

2.2 Panels

1. Panels shall be fabricated from the same materials, construction and finished in the same manner as doors as specified in Section 2.1.

2.3 Frame Product

2.3.1 Materials

1. Steel:
Frame product shall be fabricated from tension leveled steel to ASTM A924-M97, galvanized to ASTM A653-M97, Commercial Steel (CS), Type B, coating designated ZF75, known commercially as paintable Galvanneal.
2. Primer:
Rust inhibitive touch up only.
3. Miscellaneous:
 - .1 Door Silencers:
GJ-64, Single Stud rubber/neoprene type
 - .2 Thermal Breaks:
Rigid polyvinylchloride (PVC) extrusion
 - .3 Fiberglass:
Loose batt type, density: 24kg/m³ (minimum), conforming to ASTM C665

2.3.2 Construction

1. General:
 - .1 All steel frame product shall be as manufactured by Fleming of the types, sizes and profiles indicated on the Architects' schedules or details.
 - .2 Exterior frames shall be thermally broken, Fleming *Therma-Frame* Series, fabricated from 16 gauge steel.
 - .3 Exterior frame product shall be supplied profile welded (PW)
 - .4 Interior and exterior sections of thermally broken frames shall be separated by a continuous PVC thermal break.

1. Thermally broken sections shall not be assembled by means of screws, grommets or other fasteners and welds shall not cause thermal transfers between interior and exterior surfaces of the frame sections.
2. Closed sections (mullions and center rails) of thermally broken frames shall be factory insulated with 24kg/m³ loose batt type fiberglass material.
- .5 Insulation of open sections (jamb, heads and sills) on exterior frame product shall be provided and installed by the contractor responsible for installation.
- .6 Interior frames shall be Fleming F-Series, fabricated from 16 gauge steel.
- .7 Interior frame product shall be supplied profile welded (PW)
- .8 Knocked-down and knocked-down drywall frames shall not be acceptable.
- .9 Jamb, heads, mullions, sills and center rails shall be straight and uniform throughout their lengths.
- .10 Frame product shall be square, free of defects, wraps or buckles.
- .11 Corner joints shall be profile welded (PW) (continuously welded on the inside of the profiles' faces, rabbets, returns and soffit intersections with exposed faces filled and ground to a smooth, uniform, seamless surface)"
- .12 Joints at mullions, transom bars, sills or center rails shall be coped accurately, butted and tightly fitted, with faces securely welded, matching corner joint faces.
- .13 All steel mullions will be fabricated from the same materials as specified for the steel frames. Steel mullions will be fabricated as a fully assembled three piece unit consisting of a front, back and full height one piece attachment clip as per Fleming F Series. The attachment clip will completely fill the stop area of the mullion on both sides and span the void between each side forming a grid channel like structure. Mullions used as hinge mullions or strike mullions between doors will be filled with grout by the general contractor either prior to or following installation of the frame. The head of the frame shall have an opening sufficient for the grout to be poured in to the mullion.
- .14 Mullions shall be fabricated with continuous 20 gauge galvanized steel internal reinforcing clips.
- .15 Frame product shall be fabricated with integral door stops having a minimum height of 16mm.
- .16 Glazing stops shall be formed 20 gauge steel, 16mm height channel, accurately fitted, butted at corners and fastened to frame sections with #6 x 32mm oval head scrulox (self-drilling) type screws at 300mm on center maximum.
- .17 Where required due to site access, as indicated on the Architects' schedules or details, when advised by the contractor responsible for co-ordination or installation, or when shipping limitations so dictate, frame product shall be fabricated in sections for splicing in the field.
 1. Field spliced jamb, heads and sills shall be provided with 16 gauge steel splice plates securely welded into one section, extending 100mm minimum each side of splice joint.
 2. Field splices at closed sections (mullions or center rails) shall be 16 gauge steel splice angles securely welded to the abutting member. Face of splice angle shall extend 100mm minimum into closed sections when assembled.
 3. Field splice joints shall be welded, filled and ground to present a smooth uniform surface by the contractor responsible for installation after assembly.
- .18 Each door opening shall be provided with two (2) temporary steel jamb spreaders welded to the base of the jamb or mullions to maintain proper alignment during

shipping and handling. Spreaders shall be removed by the contractor responsible for installation prior to anchoring of frame to floor.

- .19 Each door opening shall be prepared for GJ-64 or equivalent, single stud door silencers, three (3) for single door openings, two (2) for double door openings. Silencers shall be shipped loose for installation by the contractor after finish painting.
- .20 Unless ineligible due to design, size, hardware or glazing specified on the Architects' or Hardware Suppliers' schedules or details, fire labeled frame product shall be provided for those openings required fire protection ratings as determined and scheduled by the Architect.

2. Hardware Preparations:

- .1 Frame product shall be blanked, reinforced, drilled and tapped for fully templated mortised hardware only, in accordance with the final approved schedule and templated provided by the hardware supplier.
- .2 Frame product shall be factory blanked and reinforced only for mortised hardware that is not fully templated.
- .3 Frame product shall be reinforced only for surface mounted hardware.
- .4 Drilling and tapping for surface mounted hardware or mortised hardware that is not fully templated shall be by the contractor responsible for installation on site, at the time of application.
- .5 Frames shall be prepared for 114.3mm standard weight hinges (minimum).
- .6 Hinge and pivot reinforcements shall be 10 gauge steel minimum reinforcing, high frequency type shall be provided.
- .7 Hinge reinforcements for acoustic frames and frames in excess of 2450mm rabbet height shall be 10 gauge minimum with each cutout provided with 114.3mm heavy weight (4.6mm) high frequency type.
- .8 Strike reinforcements shall be 16 gauge steel minimum.
- .9 Reinforcements for surface mounted hardware, concealed closers and holders and flush bolts shall be 12 gauge steel minimum.
- .10 Mortised cutouts shall be protected with 22 gauge steel minimum guard boxes.
- .11 Where electrically or electronically operated hardware is specified on the Architects schedules or details or the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes, where indicated on templates, shall be provided and inter-connected with CSA Approved 12.7mm diameter conduit and connectors.
- .12 Prepare frames to receive security door contacts – refer to electrical drawings for locations. Door contacts to be installed at 100 mm from the latch side door edge.

3. Anchorage:

- .1 Frame product shall be provided with anchorage appropriate to floor, wall and frame construction.
- .2 Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb, except as indicated below.
- .3 Frame product installed in unit masonry partitions shall be provided with 4.0mm diameter steel wire anchors, 18 gauge steel adjustable stirrup and strap or "T" type anchors as conditions dictate.

- .4 Where frame product is installed prior to construction of the adjacent wall, each jamb shall be provided with 16 gauge steel floor anchors. Each anchor shall be provided with two (2) holes for mounting to the floor and shall be securely welded to the inside of the jamb.
- .5 Floor anchors for thermally broken exterior frames shall be designed so as not to permit thermal transfers from exterior to interior surfaces of the frame sections.
- .6 Frame product installed in drywall partitions shall be provided with 20 gauge steel snap-in or "Z" type stud type anchor.
- .7 Jamb of frames in previously placed concrete, masonry or structural steel shall be punched and dimpled to accept machine bolt anchors, 6.4mm diameter, located not more than 150mm from the top and bottom of each jamb. Anchor preparations and guides shall also be located immediately above or below the intermediate hinge reinforcements and directly opposite on the strike jamb. Each preparation shall be provided with 16 gauge anchor bolt guides.
- .8 Anchor bolts and expansion shell anchors for the above preparations shall be provided by the contractor responsible for installation.
- .9 After sufficient tightening of the anchor bolts, the heads shall be welded do as to provide a non-removable application. Welded bolt head and dimple shall be filled and ground to present a smooth uniform surface by the contractor responsible for installation, prior to finish painting.
- .10 Where indicated on the Architects' schedules or details, channel extensions shall be provided from the top of the frame assembly to the underside of the structure above. Extensions shall be fabricated from 12 gauge steel formed channel, mounting angles welded to inside of frame head and adjusting brackets. Formed channels, adjusting brackets and fasteners shall be shipped loose. Channels shall be mechanically connected to mounting angles and adjusting brackets with supplied fasteners, on site, by contractor responsible for installation.

4. Finishing:

- .1 Remove weld slag and spatter from exposed surfaces.
- .2 All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth and uniform surfaces.
- .3 On exposed surfaces where zinc has been removed during fabrication, frame product shall receive a factory applied touch-up primer.
- .4 Primer shall be fully cured prior to shipment.

2.4 Sizes and Tolerances

1. All sizes and tolerances shall be in accordance with the Canadian Steel Door Manufacturers Association "Recommended Dimensional Standards for Commercial Steel Doors and Frames" as follows:
 - .1 Widths of door openings shall be measured from inside of frame jamb rabbet with a tolerance of +1.6mm, -0.8mm.
 - .2 Heights of door openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame with a tolerance of ± 1.2 mm.
 - .3 Unless builders' hardware dictates otherwise, doors shall be sized so as to fit the above openings and allow a 3mm clearance at jambs and head. A clearance of

- 19mm between the bottom of the door and the finished floor (exclusive of floor coverings) shall be provided. Tolerances on door sizes shall be $\pm 1.2\text{mm}$.
- .4 Manufacturing tolerances on formed frame profiles shall be $\pm 0.8\text{mm}$ for faces, door stop heights and jamb depths. Tolerances for throat openings and door rabbet shall be $\pm 1.6\text{mm}$ and $\pm 0.4\text{mm}$ respectively. Hardware cutout dimensions shall be as per template dimensions, +0.4mm, -0.

2.5 Hardware Locations

1. Hardware preparations in frame product shall be as noted below and locations on doors shall be adjusted for clearances specified in 2.4.
2. Top of upper hinge preparation for 114.3mm hinges shall be located 180mm down from head, transom mullion or panel as appropriate. The top of the bottom hinge preparation for 114.3mm hinges shall be located 310mm from finished floor as defined in 2.4.3. Intermediate hinge preparations shall be spaced equally between top and bottom cutouts. For dutch door frames, top and bottom hinge locations shall be as above, with the tops of intermediate hinges located at 930mm and 1403mm from finished floor.
3. Strike preparations for unit, integral, cylindrical and mortise locks and roller latches shall be centered 1033mm from finished floor. Strikes for deadlocks shall be centered at 1200mm from finished floor. Strikes for panic or fire exit hardware shall be located as per device manufacturer's templates.
4. Push and/or pulls on doors shall be centered 10701mm from finished floor.
5. Preparations not noted above shall be as per hardware manufacturer's templates.
6. Hardware preparation tolerances shall comply with the ANSI A115 series standards.

PART 3 - EXECUTION

3.1 Site and Protection of Materials

1. The contractor responsible for installation shall remove wraps or covers from door and frame product upon delivery at building site.
2. All materials shall be thoroughly inspected upon receipt and all discrepancies, deficiencies and/or damages shall be immediately reported in writing to the supplier. All damage shall be noted on the carriers' Bill of Landing.
3. Contractor responsible for installation shall ensure all materials are properly stored on planks or dunnage in a dry location. Product shall be stored in a vertical position, spaced with blocking to permit air circulation between them. Materials shall be covered to protect them from damage from any cause.
4. Contractor shall notify the supplier in writing of any errors or deficiencies in the product itself before initiating any corrective work.

3.2 Installation

1. Install doors and frames in accordance with the Door and Hardware Institute "Installation guide for doors and hardware".
2. Set frame product plumb, square, aligned, without twist at correct elevation.
3. Frame Product Installation Tolerances:
 - .1 Plumbness tolerance, measured through a line from the intersecting corner of vertical members and the head to the floor, shall be $\pm 1.6\text{mm}$.
 - .2 Squareness tolerance, measured through a line 90° from one jamb at the upper corner of the product, to the opposite jamb, shall be $\pm 1.6\text{mm}$.
 - .3 Alignment tolerance, measured on jambs, through a horizontal line parallel to the plane of the wall, shall be $\pm 1.6\text{mm}$.
 - .4 Twist tolerance, measured at face corners of jambs, on parallel lines perpendicular to the plane of the wall, shall be $\pm 1.6\text{mm}$.
4. Fire labeled product shall be installed in accordance with NFPA-80.
5. Secure anchorages and connections to adjacent construction.
6. Brace frame product rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at mid points of frame rabbet height and at floor level to maintain frame widths. Provide vertical support at center of head for openings exceeding 1250mm in width. Remove wood spreaders after product has been built-in.
7. Frame product in unit masonry shall be fully grouted in place.
8. Install doors maintaining clearances outlined in Section 2.4.
9. Install louvers and vents.
10. Adjust operable parts for correct clearances and function.
11. Steel surfaces shall be kept free of grout, tar or other bonding materials or sealers.
12. Any grout or other bonding material shall be cleaned from products immediately following installation.
13. Exposed field welds shall be finished to present a smooth uniform surface and shall be touched-up with a rust inhibitive primer.
14. Exposed surfaces that have been scratched or otherwise marred during shipment, installation or handling shall be touched-up with a rust inhibitive primer.
15. Finish paint in accordance with Section 09900.
16. Install glazing materials and door silencers.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|---------------------------------------|---------------|
| 1. Commercial Steel Doors and Frames: | Section 08100 |
| 2. Glazing: | Section 08800 |
| 3. Painting: | Section 09900 |
| 4. Finish Hardware (Supply) | Section 01020 |

1.2 Samples

1. Submit one (1) 300 x 300 mm corner cutaway sample of each type of wood door and each colour of door facing material.
2. Show door construction, core, glazing detail and faces.

1.3 Shop Drawings

1. Submit shop drawings in accordance with Section 01340.
2. Clearly indicate door types and cutouts for lights.

1.4 Warranty

1. Contractor hereby warrants that wood doors will not warp, twist, show core lines, split, delaminate or sag in accordance with General Conditions, but for three (3) years.

PART 2 - PRODUCTS

2.1 Manufacturers

1. Manufacturers of wood doors having Product acceptable for use:
 - .1 Baillargeon.
 - .2 Cambridge Door Co.
 - .3 Door-Lam.
 - .4 VT Industries (Harrison Doors Limited).
 - .5 Weyerhaeuser.

2.2 Materials

1. Solid Core Flush Doors – Non-Rated: to CAN/CSA-O132.2; 44 mm thick; constructed as follows:
 - .1 Core: AWMAC Particleboard Core Type; 448 kg/m³ solid lumber stiles and rails bonded to core.
 - .2 Face Assembly Adhesive: Type 1 – Waterproof
 - .3 Core Assembly Adhesive: Type 11 – Water-resistant.
 - .4 Door Faces: Standard decorative laminate to ANSI / NEMA LD 3, Grade VGS;

0.7 mm thick; colours and patterns as selected by Consultant from manufacturer's complete range. Finish to be suede finish by Wilsonart, Formica, Nevemar Arborite or Equivalent.

2. Solid Core Flush Doors – Fire Rated: to CAN/CSA-O132.2; 44 mm thick; fire rated as indicated; constructed as follows:
 - .1 Core: homogeneous incombustible mineral core; ULC labeled; solid lumber stiles and rails bonded to core with reinforced inner blocking for hardware mounting 140 mm top and bottom, 250 mm at center.
 - .2 Face Assembly Adhesive: Type 1 – Waterproof
 - .3 Core Assembly Adhesive: Type 11 – Water-resistant.
 - .4 Door Faces: Standard decorative laminate to ANSI / NEMA LD 3, Grade VGS; 0.7 mm thick; colours and patterns as selected by Consultant from manufacturer's complete range. Finish to be suede finish by Wilsonart, Formica, Nevemar Arborite or Equivalent.

2.3 Fabrication

1. Fabricate doors and panels to CSA 0132.2.
2. Provide 13 mm minimum thick edge strips of wood factory painted or stained and varnished to match plastic laminate.
3. Prepare doors for glass. Provide glazing stops factory painted or stained and varnished to match plastic laminate.
4. Prepare doors to receive hardware. Provide sufficient blocking and reinforcing to accommodate heavy weight oversize butt hinges, cylindrical locksets, rim and concealed vertical rod / mortise lock case exit devices, magnetic locks, surface door closers and concealed overhead stops. Coordinate with Finish Hardware.
5. Doors to be undercut to accommodate continuous hinges where required.
6. Apply laminate facings in accordance with AWMAC Quality Standards and as specified in Section 06400.

PART 3 - EXECUTION

3.1 Installation

1. Install doors and hardware in accordance with manufacturer's instructions and AWMAC standards.
2. Adjust hardware for correct function.

3.2 Adjustment

1. Re-adjust doors and hardware just prior to completion of building to function freely and properly.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

1. Structural Steel Refer to drawings.
2. Rough Carpentry Section 06100
3. Sealants Section 07900
4. Wiring Connections: Electrical service to door operator. Refer to drawings

1.2 REFERENCES

1. ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B209M-10 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (ASTM B209-10 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate).
3. ASTM B221M-12 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (ASTM B221-12 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes).
4. ASTM E330-02 - Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
5. CSA-C22.1-12 - Canadian Electrical Code, Part I (22th Edition), Safety Standard for Electrical Installations.
6. CAN/CSA-C22.2 No. 100-04 (R2009) - Motors and Generators.
7. NEMA MG1-2011 - Motors and Generators.

1.3 SUBMITTALS

1. Submit under provisions of Section 01340.
2. Product Data: Manufacturer's data sheets on each product to be used, including:
Preparation instructions and recommendations.
Storage and handling requirements and recommendations.
Installation methods.
3. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
4. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

5. Operation and Maintenance Data.

1.4 QUALITY ASSURANCE

1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
2. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity, and trained and authorized by the door dealer to perform the work of this section.
3. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 DELIVERY, STORAGE, AND HANDLING

1. Store products in manufacturer's unopened labeled packaging until ready for installation.
2. Protect materials from exposure to moisture until ready for installation.
3. Store materials in a dry, ventilated weathertight location.

1.6 PROJECT CONDITIONS

1. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Examples of acceptable Manufacturers: Richards-Wilcox, Raynor, Overhead Door Corp.

2.2 Materials

1. Sheet Steel: ASTM A653/A653M galvanized to Z180 (G60), plain or stucco embossed surface.
2. Aluminum Sheet: ASTM B209M (ASTM B209), stucco embossed surface; clear anodized aluminum.
3. Aluminum Extrusions: ASTM B221M (ASTM B221), 6063-T6 alloy and temper, clear anodized aluminum.

2.3 SECTIONAL OVERHEAD DOORS:

1. Description: standard-lift insulated sectional overhead door, motor-operated with push button operational controls on the interior and keypad operation on the exterior; size as scheduled.
2. Material: Sections shall be steel sandwich construction, 2" (50.8 mm) thick, roll-formed from commercial draw quality, hot-dipped galvanized steel per ASTM A-924 and A-653. Exterior and interior section skins to be constructed of 25 gauge (.015" minimum steel thickness)
 1. embossed stucco texture, mechanically interlocked and pressure bonded to a 1 7/8" (48mm) thick, expanded polystyrene core. Hinge reinforcement plates shall be 16 gauge edge plates and 16 gauge center plates, located within section interior at every hinge location. End stiles to be 18 gauge. Example: TC200 by Raynor.
2. Mounting: Sections shall be mounted in the door opening using:
 1. Lap Jamb Angle Mounting: sections shall overlap the door jambs by 1" (25mm) on each side of the door opening.
3. Insulation: Sections will have an R-value of 10.25 and U-value of .097.
4. Seals: Interior and exterior skins to be separated by a continuous dual durometer vinyl seal held in place by a mechanical interlock to form an effective thermal break and a complete weatherseal along the section joint. Top of door to be provided with dual durometer vinyl standard. Bottom of door to have flexible U-shaped vinyl seal in an extruded aluminum retainer.
5. Trussing: Doors shall be designed to withstand a windload of 12 P.S.F. Deflection of door in horizontal position to be a maximum of 1/120th

2.4 HARDWARE

1. Vertical Tracks: 75mm size, 2.66mm thick galvanized steel track; pre-punched with slots for bolting; complete with 2.28mm thick formed vertical track angle plate with 75mm return leg bolted to track and welded to door opening frames.
2. Horizontal Tracks: 75mm size, 2.66mm thick galvanized steel track; single piece with 400mm radius curve; reinforced with a 2.3m long, 78x31x2.66mm galvanized steel angle bolted to track and drum bearing plate.
3. Vertical Supports for Horizontal Tracks: 31x31x1.9mm galvanized steel angle, perforated at 25mm OC for 7.95mm OD bolts; braced with diagonal perforated angle with a contained angle of 30-45 degrees; bolted connections; two supports per track required.
4. Track Fasteners: 7.95mm OD bolts, flat head design, complete with self-locking flange-type nuts.

5. Shaft and Counterbalance Springs: Helically wound torsion springs manufactured from oil tempered spring wire stress relieved, minimum 10,000 cycles. Aluminum die cast grooved drums and flexible galvanized aircraft cables, 7 x 19 construction, mounted on minimum 25 mm CRS solid steel shaft, keyed full length, rolling on flange bearings.
6. Rollers: Steel rollers 73 mm diameter, with ten (10), 8 mm diameter ball bearings, 11 mm diameter roller axles and both inner and outer ball races of hardened steel. Length of roller stem as required.
7. Linear Roller Brackets: Fabricated from 2.7 mm (12 ga) galvanized steel.

2.5 OPERATION

1. Manual Operation: Chain hoist.
2. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
 - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - b. Operator Controls:
 - i. Interior location: Push-button control stations with open, close, and stop buttons; surface mounting
 - ii. Exterior location: Wireless access control keypad; programmable; surface mounting

PART 3 – EXECUTION

1. EXAMINATION

1. Do not begin installation until openings have been properly prepared.
2. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
3. Verify electric power is available and of correct characteristics.
4. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2. PREPARATION

1. Clean surfaces thoroughly prior to installation.
2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3. INSTALLATION

1. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
2. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
3. Anchor assembly to wall construction and building framing without distortion or stress.
4. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
5. Fit and align door assembly including hardware.
6. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

4. CLEANING AND ADJUSTING

1. Adjust door assembly to smooth operation and in full contact with weatherstripping.
2. Clean doors, frames and glass.
3. Remove temporary labels and visible markings.

5. PROTECTION

1. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
2. Protect installed products until completion of project.
3. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|---------------------------------|---------------|
| 1. Final cleaning: | Section 01710 |
| 2. Sealants: | Section 07900 |
| 3. Glazing: | Section 08800 |
| 4. Air Vapour Barrier Membrane: | Section 07112 |

1.2 Design Requirements

1. This specification section is based on following aluminum glazing types:
 - .1 Bullnose fixed window - typical unit:
 - .1 E.g. Alumicor 970 Series, Kawneer 518 Isoport.
 - .2 Typical for punched openings fixed windows.
 - .2 Curtain wall frame entrances and opening infills:
 - .1 E.g. Kawneer 1600, Alumicor 2500 Series, Oldcastle CW250,
2. Design all framing and glazing to withstand design loads as per the Ontario Building Code and regulations of authorities having jurisdiction.
3. Work of this Section must be designed by a Professional Engineer licensed to design structures in the Province of Ontario.
4. Design and locate all sealants, gaskets, air/vapour seals, thermal barriers and separations, drainage slots and holes, as shown or specified or as required to obtain design requirements. Ensure all components and assemblies exterior to air barrier drain to building exterior.
5. Provide aluminum closer angles and trims to suit.
6. Interior Aluminum Screens are non-thermally broken, 45 mm x minimum 100 mm aluminum frame, 6.4 mm single glazed; eg. Alumicor 800 Series with Canadiana Entrance Doors or Kawneer Trifab 400 with standard entrances.
7. Aluminum Exterior Doors - Aluminum Doors and Frames:
 - .1 This specification is based upon Alumicor Limited doors – Canadiana Series 600A
 - .2 Doors to be **thermally broken** and to have insulated sealed glazed units at exterior location only
 - .3 Acceptable Equal Alternates: Kawneer and Windspec

1.3 Shop Drawings

1. Submit shop drawings in accordance with Section 01340 and to be prepared and stamped by a Professional Engineer licensed to design structures in the Province of Ontario.

2. Clearly indicate materials and large scale details for head, jamb and sill, profiles of components, elevations of unit, fully dimensioned layouts positioning brackets and anchorage details, glazing details, and location of isolation coating, description of related components and exposed finishes and fasteners.

1.4 Certificates

1. Submit manufacturer's certificate, certifying compliance with specification requirements, for:
 - .1 windows.
 - .2 finishes.
 - .3 insect screens.
 - .4 infiltration/exfiltration rates.
 - .5 thermal transfer resistance of frames.
 - .6 locking hardware.

1.5 Performance

1. In addition to all requirements of these specifications, the design of glazing shall take into consideration the characteristics of the mullions and effects of the connection and sealants at the frame junctions. Provide thermal breaks between exterior and interior components and sufficient metal on interior side of glass.
2. Fenestration shall meet CAN/CSA – A440 windows:
 - .1 Air Leakage: A3
 - .2 Water Leakage: B7
 - .3 Wind Load Resistance: C5
 - .4 Condensation Resistance: fixed frame: 53 minimum
glass: 53 minimum
 - .5 Window shall also meet the requirements for blocked operation, ease of operation, sash strength, stiffness and resistance to forced entry.
3. Submit manufacturer's certificate, certifying compliance with the above-noted requirements.

1.6 Quality Assurance

1. All design, fabrication and installation of this work to be carried out by qualified workers and trades experienced in the application and erection of the products, systems and assemblies specified.
2. Make provisions to drain to the exterior face any water entering in at joints and any condensation occurring within curtain wall construction while maintaining air seal between interior and exterior. Drain holes shall adequately drain all water.
3. At design conditions, no water penetration to interior side of assembly shall occur.
4. Curtain wall systems shall be designed, fabricated, and installed under design conditions to be watertight in combination with movements occurring due to wind loads imposed on the system.

5. Formed aluminum components shall be sheet of alloy and temper suitable for their purpose and finish.

1.7 Warranty

1. Provide written warranty stating that aluminum windows are guaranteed against leakage, defects and malfunction under normal usage for a period of ten (10) years from the date of completion.

1.8 Maintenance Material

1. Provide data for maintenance and cleaning in accordance with general conditions.

PART 2 – PRODUCTS

2.1 Manufacturers

1. Equivalent Manufacturers for the work of this sections:
 - .1 Kawneer Company Canada
 - .2 Alumicor Limited
 - .3 Oldcastle Glass
 - .4 Sherwood Windows Ltd.
 - .5 Windspec

2.2 Materials

1. Extrusions shall be 6063 T54 alloy and temper.
2. Formed aluminum components shall be sheet of alloy and temper suitable for their purpose and finish.
3. Fasteners shall be 300 series stainless steel or 400 series stainless steel cadmium plated and of sufficient size and quantity to perform their intended function.
4. Weathering and glazing gaskets shall be extruded, black, closed cell or dense elastomer of durometer appropriate to the function.
5. Glazing tapes shall be macro-polyisobutylene, highly adhesive and elastic with built in shim.
6. Exterior Sills: extruded aluminum, minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors, anchoring devices. All lower level sills to have exterior corners rounded to 6mm radius.
7. Sealants: in accordance with Section 07900, paragraph 2.1.3. Color to match window frame.
8. Foam Sealants: Urethane expanding foam sealant.
9. Bedding Compound: to CGSB 19-GP-14M.
10. Isolation Coating: alkali resistant bituminous paint.

2.3 Finish

1. Exposed aluminum sections shall be given an anodic oxide treatment in accordance with Aluminum Association specification AA-M12C22A31. Kawneer Medium Bronzed Anodized

2.4 Fabrication

1. Fabricate framing from extrusions of size and shape shown on shop drawings. Interior and exterior extruded aluminum framing sections shall be integrated with a glass reinforced nylon thermal break to form a rigid composite assembly without the use of fasteners or other thermal bridging elements.
2. Composite frame assembly shall have a minimum of 1100 lbf/4 in. (4815N/ 100 mm) resistance to shear between the aluminum and the thermal break materials.
3. Dry shrinkage of the thermal break shall not exceed 0.10% of the framing member length.
4. Fixed framing shall be designed for screw spline corner construction. 518 ISOPORT frameless vent operating sash extrusions shall be tubular with mitred, clip, adhesive, and stake joint construction.
5. All framing joints shall be accurately machined, assembled, and sealed to provide neat weathertight connections. Coupling mullions shall be designed to provide a functional split to permit modular construction and allow for thermal expansion. Glass stops shall be lock-in screwless type.
6. All glazing pockets shall be vented, pressure equalized and drained to the exterior.
7. Elastomeric air seal gasket shall be installed around the full perimeter of glass and sealed at corners with silicone sealant. Air seal gasket must provide adhesion with silicone sealant.

2.5 Isolation Coating

1. Isolate aluminum from following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze or small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.6 Glazing

1. Prepare windows to receive 25 mm thick double glazed insulating glass specified under Section 08800.

PART 3 - EXECUTION

3.1 Preparation

1. Protect adjacent surfaces from damage resulting from work under this specification.

3.2 Installation

1. Install the windows in accordance with the manufacturer's instructions. Install the windows plumb, level and true relative to building structure. Do not exceed 3mm in 3050 mm (1/8" in 10'0") variation from plumb and level. Foam insulate between the frame members and the window opening using a single component polyurethane foam, insulating sealant.

3.3 Sill Installation

1. Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces.

3.4 Caulking

1. Seal joints between frame members and other non-operating components with sealant to provide weathertight seal at outside.
2. Seal joints between windows and windowsills with sealant. Bed sill expansion joint cover plates and drip reflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

3.5 Clean Up

1. Clean glass at the factory. Final cleaning of glass to remove job site soiling shall be the responsibility of the owner. Leave all surfaces reasonably clean, free from sealants, caulking or other foreign material. Remove all surplus materials and debris resulting from the work of this Trade.

3.6 Protection and Cleaning

1. Aluminum shall be isolated from concrete, mortar, plaster or dissimilar metals with bituminous paint or epoxy solution. Framing shall be protected from other building materials during and after installation until acceptance.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Final Cleaning: Section 01710
2. Commercial Steel Doors and Frames: Section 08100
3. Aluminum Windows and Doors: Section 08520

1.2 Submittals

1. Submit a 300 x 300 sample of all glass products in accordance with Section 01340.

1.3 Warranty

1. Contractor hereby warrants glass against defects and failure, including leakage, under normal conditions of use, in accordance with Division 1, but for five (5) years total

PART 2 - PRODUCTS

2.1 Material

1. Exterior Tempered Safety Glass: All exterior Vision Glass to exterior doors, windows and screens to be sealed insulating units conforming to CAN/CGSB-12.8. Exterior lite 6 mm tempered **grey** float glass, 12 mm air filled space, inner lite 6 mm clear tempered float glass conforming to CAN/CGSB-12.3. All units to receive Low Emissivity coating on inner pane (3rd surface).
2. Interior Tempered Safety Glass: 6 mm tempered clear float glass complete with etched tempered glass designation visible.
3. Polished Plate or Float Glass: To CAN/CGSB-12.3 clear.
4. **Wired Glass:** to CAN2-12.11-M76, Georgian-wired, polished, 6 mm, wires running parallel to frames. Locations: all fire rated doors and screens and where indicated on drawings.
5. **Fire Rated Glass:** To CAN 4 S-104 and CAN 4 S-106 to meet ANSI Z97.1. Shall be 3/16" (5mm) thick FireLite supplied by Technical Glass Products (TGP).
6. Low E Glass: to CAN/CGSB-12.4; tempered clear, sputtered coating; eg. AGC Glass Comfort TI-PB; Solarban 60 Solar Control Low-E Glass by Vitro Architectural Glass
7. Setting blocks: neoprene, 80 durometer hardness, 102 mm x 6 mm width to suit glass.
8. Glazing tape: preformed butyl with continuous spacer, 10-15 durometer, hardness, paper release, black color, 3 x 10 mm.
9. Gasket: black neoprene "U" cavity type with lock strip.

PART 3 - EXECUTION

3.1 Installation

1. Double Sealed Units

- .1 Install glass as per aluminum window manufacturer's instruction to provide complete rain screen and air/ water barrier.

2. Other Glass

- .1 Clean and dry surfaces.
- .2 Apply glazing tape to fixed stops. Place setting blocks at 1/3 points.
- .3 Set glass on setting blocks against tape.
- .4 Apply glazing tape to glass.
- .5 Install stops.
- .6 Install glass in doors and screens with neoprene gasket.
- .7 Clean glass prior to building occupancy in accordance with Section 01710.

End of Section

PART 1 - GENERAL

1.1 General Finish Notes

1. The Material and Colour Schedule will be issued by the Consultant after tender. It shall be read in conjunction with the Drawings, Specifications, Room Schedule and Door Schedule. Colour and material references named will be based on one manufacturer, as carried by the Contractor or, in the case that no specific manufacturer is carried, based on the Consultant's choice.
2. Approved alternative manufacturers will be acceptable only as indicated in the specifications. However, approved alternate products submitted must match the products named in the Specification to the Consultant's selection. Alternate products other than those named in the specifications will not be allowed unless previously approved by the Consultant.
3. Consult Architect prior to painting any surface not included in the formulae as listed.
4. Final colour for exterior painted surfaces and prominent interior areas shall be approved on the job site by the Architect.
5. Paint samples: Contractor to submit paint samples for all areas required to "Match Adjacent Finish".
6. All similar paint formulations are to be identical when dry. Variations in tone, texture or sheen shall not be accepted.
7. Submit two 300 mm x 300 mm paint samples of each colour required for approval by the Architect.
8. Exact locations of accent paint called for in the Material and Colour Schedule, to be issued after Contract award, not specifically identified on the drawings are to be verified on site with the Architect.

1.2 Exterior Finish Notes

1. All exposed metal (doors, frames, lintels, stairs, handrails, mechanical equipment, etc.) to be painted except for prefinished metal louvres, stainless steel, and aluminum. Mechanical equipment is to be painted whether delivered to the site prepainted or not (exhaust fans, goosenecks, exhaust stacks, supports, HVAC units, HRU units, etc.). Colours to match adjacent material-generally either to match brick or tan to match flashing or siding material. Do not paint exposed white PVC pipe covers on interior. Architect will advise on jobsite which other items mentioned above, if any, do not require painting.
2. All unfinished metal work provided by landscaping is to be painted by Section 09900.

1.3 Interior Finish Notes:

1. All heating units, recessed convectors, grilles, pipes, access panels, hangers and miscellaneous exposed metal work (except stainless steel or anodized aluminum) to be painted to match the surfaces on which they occur unless noted otherwise on the colour schedule, prefinished in suitable colour or directed by the Architect. If prefinished equipment is damaged, it shall be re-painted. Painting to be by formulations specified in Section 09900.
2. All interior fitments, casework, millwork, etc. to be melamine unless otherwise noted. Refer to Sections for specific requirements regarding materials, construction, finishes and hardware. Note that drawer and cupboard interiors are to be considered as exposed surfaces and will therefore be finished.
3. Do not paint over nameplates, identification tags, etc.
4. Make good all existing surfaces and finishes that are damaged during construction.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|--------------------|---------------|
| 1. Gypsum Board: | Section 09250 |
| 2. Rough Carpentry | Section 06100 |

1.2 Reference Standards

1. Do work to CSA A82.31-1977, except where specified otherwise.

PART 2 - PRODUCTS

2.1 Materials

1. Metal Studs: non-load bearing channel stud framing to ASTM C645-09a, roll formed from 0.59 mm thickness electro-galvanized steel sheet for screw attachment of gypsum lath and metal lath, and with service access holes.
2. Structural Metal Studs: CSA-S13-01 and hot-dipped galvanized to ASTM A525M-87, minimum 1.22 (18ga.) use thicker materials where required to suit structural requirements. Framing shall be designed by a licensed professional engineer registered in the province of Ontario. Follow fabrication standards ASTM C955.
3. Floor and ceiling tracks: to ASTM C645-09a in width to suit stud sizes, 30 mm legs for floor track, 50 mm for ceiling track.
4. Metal channel stiffener: 38 mm size, 2 mm thick cold rolled galvanized steel.
5. Furring channels (channels, hangers, tie wire, insert, anchor): CGSB 7.1-98-CAN/CGSB.
6. Touch-up Zinc Rich Paint: CAN/CGSB-1.181-92.

PART 3 - EXECUTION

3.1 Stud Partitions

1. Align partition tracks at floor and underside of structure above and secure at 24" o.c. maximum. All partitions to extend to underside of structure above.
2. Place studs vertically at 16" o.c. and not more than 2" from abutting walls and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs, as required, to provide rigid installation to manufacturer's instructions.
3. Erect metal studding to tolerance 1:1000.
4. Attach studs to bottom track using screws.
5. Coordinate simultaneous erection of studs with installation of service lines. When erecting studs, ensure web openings are aligned.

6. Install steel frames and anchor frames securely to studs using minimum of three (3) anchors per jamb for jambs up to 84" high and a minimum of four (4) anchors per jambs for jambs over 84" high.
7. Provide two (2) studs at each side of openings wider than stud centre specified.
8. Install, cut to length, piece of runner horizontally over door frames.
9. Provide 38 mm x 89 mm vertical and horizontal wood studs secured between metal studs for attachments of bathroom fixtures, accessories, cabinet work, and other fixtures, including grab bars, towel rails, attached to steel stud partitions.
10. Install steel stud or furring channel between studs for attaching electrical and other boxes.
11. Extend all partitions to underside of structure above for sound and fire separation, unless otherwise noted on drawings.
12. Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

3.2 Ceiling Furring

1. Install runners level to tolerance of 1/8" over 11'-8". Provide runners at interruptions of continuity and change in direction.
2. Frame with furring channels, perimeter of openings to accommodate access panels, light fixtures, diffusers, grilles, etc.
3. Furring for bulkheads within or at termination or ceilings.
4. Install furring channels at 16" o.c. maximum.

3.3 Wall Furring

1. Install steel furring, as indicated.
2. Frame opening and around built-in equipment on four (4) sides with channels.
3. Box-in beads, columns, pipes, and around exposed services.

3.4 Fire-rated Assemblies

1. Where required, install Metal Stud System and Furring in accordance with appropriate ULC Design and with supplement to the National Building Code of Canada 2015.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Masonry: Section 04200
2. Supply of access doors for mechanical and electrical devices refer to Drawings

1.2 Reference Standards

1. Do work to CSA A82.31-1977, except where specified otherwise.

PART 2 - PRODUCTS

2.1 Gypsum Board

1. Plain: to CSA A82.27-M1977 standard, 13mm, 16 mm or 19 mm thick or as indicated, tapered edges.
2. Plain: to CSA A82.27-M1977, Fire-rated Type X, 16 mm thick or as indicated, tapered edges.
3. Plain: to CSA A82.27-M1977 standard, 13 mm Denshield board where finished surface to be ceramic wall/ceiling tile.

2.2 Fastenings and Adhesives

1. Screws: to CSA A82.31-1977.
2. Adhesive: to CGSB 71 GP 25M.
3. Laminating Compound: to CSA A82.31-1077.
4. Concrete Anchors: Phillips Red Head TW-614 or equivalent. Do not use powder activated fasteners for ceiling support.
5. Tie Wire: #16 ga. galvanized soft annealed steel wire.

2.3 Accessories

1. Casing Beads and Corner Beads: 0.5 mm base thickness commercial sheet steel with G90 zinc finish to ASTM A 525-78 A.
2. Joint compound and tape: Compound to CSA A82.31-1977, asbestos-free. Perforated 50 mm gypsum board joint tape.
3. Caulking: Acoustical sealant.

2.4 Insulation Blanket

1. Ruxol sound attenuation blankets.

PART 3 - EXECUTION

3.1 Gypsum Board Application

1. Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
2. Install metal studs plumb and true to sizes and locations indicated on drawings.
3. Apply single and double layers gypsum board to metal furring or framing, using screw fasteners and laminating adhesive. Maximum spacing of screw 300 mm oc.
4. Apply gypsum board to concrete block surfaces, where indicated, using laminating adhesive.
5. Apply type X gypsum board where indicated, in accordance with U.L.C. requirements and with supplement to the National Building Code of Canada to obtain the required fire protection, fire rating and fire separation.

3.2 Insulation and Blanket Application

1. Where indicated on drawings, staple blanket to wallboard in accordance with ULC design requirements. Blanket shall be continuous and tightly fitted between studs and at perimeter.

3.3 Accessories

1. Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces, where practical. Make joints tight, accurately aligned and rigidly secure. Mitre and fit corners accurately, free from rough edges.
2. Install casing beads around perimeter of suspended ceilings.
3. Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

3.4 Access Doors

1. Install access doors to electrical and mechanical fixtures specified in respective Sections.
2. Rigidly secure frames to furring or framing systems.

3.5 Taping and Filling and Sound Seal

1. Seal with acoustical sealant at ceilings, floors, wall intersections and all penetrations such as electrical outlets.
2. Finish face panel joint and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
3. Finish corner beads, control joints and trim as required with two (2) coats of joint compound and one (1) coat of taping compound, feathered out onto panel faces.
4. Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.
5. Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
6. Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Sealants Section 07900
2. Gypsum Board Section 09250

1.2 Reference Standards

1. Do tile work to Installation Manual 200-1979, "Ceramic Tile," produced by Terrazzo Tile and Marble Association of Canada (TTMAC).

1.3 Environmental Conditions

1. Main minimum 13 deg. C air temperature at tile installation area for 24 hr. prior to, during and 48 hr. after installation. Do not proceed without the correct tiles or if substrate conditions are not suitable.

1.4 Maintenance Material

1. Provide one full box of each type and color of tile required for project for maintenance use. Store where directed. Clearly identify each box.
2. Maintenance material to be of same production area as installed material.

1.5 Extended Warranty:

1. Submit a warranty for entire wall tile installation, covering materials and labour and the repair or replacement of defective work for a period of three (3) years total.

PART 2 - PRODUCTS

2.1 Thin-Set Mortar

1. Mortarcrete Latex Mortar conforming to ANS1A118.4-1973, manufactured by L & M Ceramo Inc.

2.2 Wall Tile

1. **Ceramic Wall Tile (CWT):** to CAN2-75, Glazed Wall Tile –Colour & Dimension Series by Olympia Tile , Type 5, Class MR-4, 100 x 400 x 6 mm size, cushion edges, glazed surface. Colours as selected by consultant up to a maximum of TWO (2) colours.
 - .1 Acceptable Alternatives: Belite Rainbow series as supplied by Centura, Equal as supplied by Daltile – Semi-Gloss Group 1 and American Olean equal.
2. Tile walls – see drawings for extent. Patterns and accent stripes to be selected by Architect.

3. Tile colors to be selected by Architect from Standard Color List. Total of TWO (2) colours. Accent stripes colors to be selected separately by Architect from "Accent Color" List.

2.4 Grout

1. Epoxy Grout: "Latapoxy SP-100" Stainless, chemical resistant epoxy grout by Laticrete International. Colour from manufacturer's full range.

PART 3 - EXECUTION

3.1 Workmanship

1. Apply tile to clean and sound surfaces.
2. Fit tile around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance. Cut edges smooth, even and free from chipping. Edges resulting from splitting, not acceptable.
3. Maximum surface tolerance 1:800 for walls, floors.
4. Make joints between tile uniform, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.
5. Lay out tiles so perimeter tiles are minimum 1/2 size.
6. Sound tiles after setting and replace hollow-sounding units to obtain full bond.
7. Make internal angles square, external angles rounded.
8. Use round edged tiles at termination of wall tile panels, except where panel butts projecting surface or differing plane.
9. Install soap dishes into block recess. Fit tiles around soap dishes.
10. Allow minimum 24 h after installation of tiles, before grouting.
11. Clean installed tile surfaces after installation and grouting cured.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Sealants: Caulking Section 07900

1.2 Reference Standards

1. Do tile work to Installation Manual 200-1979, "Ceramic Tile," produced by Terrazzo Tile and Marble Association of Canada (TTMAC), except where specified otherwise.

1.3 Maintenance Material

1. Provide maintenance data for tile work for incorporation into Maintenance Manual specified in Section 01720.
2. Provide 12 additional tiles of each type and color of tile required for project for maintenance use. Store where directed. Clearly identify each box.
3. Maintenance material to be of same production area as installed material.

1.4 Environmental Requirements

1. Air temperature and structural base temperature at tile installation area must be above 13 degrees C for 24 hours before, during and 24 hours after installation.

1.5 Extended Warranty:

- .1 Submit a warranty for entire flooring tile installation, covering materials and labour and the repair or replacement of defective work for a period of three (3) years total.

PART 2 - PRODUCTS

2.1 Tiles

1. Designation **PT**: 600 mm x 600 mm porcelain tile to CAN 2-75-1M77.
 - .1 Acceptable material: Graniti Fiandre – Urban Active, distributed by American Olean. Size 600 mm x 600 mm, plus trim and 600 mm x 100 mm bullnosed base, slate finish. Allow 2 colors from manufacturer's full line.
Acceptable equal: Vitra Pro Nature Cement Mix as supplied by Centura and Chord Series as supplied by Daltile.

2.2 Setting Materials

1. Cement Mortar: Mixture of 1 part Portland cement, 4 parts dry sand and 1/10 hydraulic lime. Materials shall conform to the following:
2. Portland Cement: To CAN3-A, Type 10.

3. Hydrated Lime: To ASTM C-206 or 207, Type 5.
4. Sand: To CSA A82.56, passing 1.6 mm sieve.
5. Water: Potable, containing no contaminants which cause efflorescence.
6. Thin Set Mortar: premium grade "Kerabond/Keralastic" high performance two part system with flexible acrylic latex additive, by Mapei.
 - .1 Acceptable Alternates: "Laticrete 254 Platinum., or Flextile 52 premium grade.

2.3 Grout

1. Sanded, Portland cement based with Plastijoints acrylic additive, Ultra/colour by Mapei. Colour as selected by Architect.

2.4 Accessories

1. Divider strips and Corner strips: 3 mm thick stainless steel angle with depth to suit tile thickness.

PART 3 - EXECUTION

3.1 Workmanship

1. Apply tile to clean and sound surfaces.
2. Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance. Make cut edges smooth, even and free from chipping. Edges resulting from splitting not acceptable.
3. Maximum surface tolerance: 1:800.
4. Make joints between tiles uniform and approximately 3 mm wide, (maximum 4 mm) plumb, straight, true, even and with adjacent units flush. Align patterns.
5. Lay out units so perimeter tile are minimum 1/2 size.
6. Sound tiles after setting and replace hollow sounding units to obtain full bond.
7. Make internal angles square, external angles rounded.
8. Construct base, as indicated on drawings, with rounded top edge.
9. Use stainless steel corner edges at termination of wall tiles, except where tiles abute projecting surface or differing plane.
10. Seal grouted joints with sealer.

11. Clean installed tile surfaces after installation cured.
12. Keep building expansion joints free of mortar or grout.

3.2 Setting System

1. Install porcelain wall tile at floors in accordance with TTMAC applicable thinset details.
2. Install **Ditra Tile System** over area where wood floor is located.
3. Install control joint at connection of wood sub floor and concrete slab on grade connection.
4. Make tiles flush at control joint where wood and slab on grade is connected.

3.3 Control Joints

1. Provide control joints 3 mm wide at connection of existing with new at concrete slab pour joints, unless shown otherwise.
2. Provide control joints around perimeter of large areas, around columns, in locations where area changes direction and where tile abuts other hard material. Place control joints directly over subfloor expansion/control joints.
3. Fill joints with sealants in accordance with Section 07900.

End of Section

PART 1 - GENERAL

1.1 Reference Standards

1. Fabrication: to ASTM 365-78 and CAN/GSB-92.1-M77.
2. Installation: to ASTM C636-76, except where specified otherwise.

1.2 Design Criteria

1. Maximum deflection 1/360 of span to ASTM 365-78 deflection test.

1.3 Samples

1. Submit two each 300 x 300 mm samples of each individual tile and grid type in accordance with Section 01340.

1.4 Extended Warranty:

1. Submit a warranty for installation, covering materials and labour and the repair or replacement of defective work for two (2) years total.

PART 2 - PRODUCTS

2.1 Materials

1. **Typical Ceiling Tile (ACT-1):** Panels: 610 mm x 610 mm x 15mm, medium textured non-directional fissured, angled tegular, #1717 by Armstrong.
Suspension system: 15/16" Prelude ML, white, by Armstrong.
2. **Typical Ceiling Tile (ACT-2):** Panels: 610 mm x 1220 mm x 15mm, medium textured non-directional fissured, angled tegular, #1717 by Armstrong.
Suspension system: 15/16" Prelude ML, white, by Armstrong.
3. **Ceiling Tile (ACT-3):** Panels: 610 mm x 1220 mm x 15mm, smooth textured, square lay-in, #870 by Armstrong.
Suspension system: 15/16" Prelude XL, white, by Armstrong.
4. **Hangers:** 2.6 mm galvanized soft annealed steel wire.
5. **Accessories:** splices, clips, retainers, etc., to complement suspension system components.

2.2 Installation

1. Co-ordinate suspension system with related components.
2. Install acoustic units parallel to building lines with edge unit not less than 50% of unit width.
3. Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

4. Support suspension system main runners at 1200 oc maximum with hangers from structure. Assembly shall support super-imposed loads. Maximum permissible deflection, 1/360 of span.
5. Attach cross member to main runner to provide rigid assembly.
6. Install suspension assembly to manufacturer's written instructions.
7. Install flush edge moulding at junction of acoustic unit ceiling and other materials around entire length of joint. Secure to construction. Butt joints neatly, square and true in alignment.
8. Set acoustic units in place.
9. Set all ceiling levels by the use of transit or laser level.
10. Provide for Owner one (1) complete carton of each type of ceiling tile.

End of Section

PART 1 - GENERAL

1.1 Related Work

1. Concrete floors refer to structural drawings

1.2 Maintenance Data

1. Provide data for maintenance of resilient flooring for incorporation into Maintenance Manual.

1.3 Environmental Requirements

1. Maintain minimum 20 deg. C air temperature at flooring installation area for three (3) days before, during and for seven (7) days after installation.

PART 2 - PRODUCTS

2.1 Materials

1. **Luxury Vinyl composition tile (LVT):** wear layer: urethane aluminum oxide topcoat cured by UV process, 0.76 mm wear layer thickness. Tile size per selection. ASTM F1700, Class III, Type B. To meet ASTM F-1514 and ASTM F-925. 10 Year Commercial Warranty.
 - a. Basis of Design: Mannington Commercial, Access –Wood or Spacia First 20 – Wood series, full selection. **Tile thickness 3 mm min.**
 - b. **Acceptable Alternates:**
 - Polyflor LVT – Commercial Wood Series
 - Armstrong Flooring – LVT Natural Creations – Classics
 - Centura – AmericanBilrite – Sonata Series - Full line of wood grains.
 - Interface – Criterion Classic Collection
2. **Resilient rubber base (RB):** top set coved, 3 mm thick, rubber, 100 mm high minimum 1200 mm long, including premoulded end stops and external corners. Acceptable materials: non-shrink Rubber Wall Base with toe as manufactured by Johnsonite. Colours: Three (3) from full Johnsonite "Coloright" colour line. Use straight base at carpet flooring.
3. **Base Accessories:** Pre-moulded end stops and external corners, of same material, size, and colour as base.
4. **Transition Strips:** thermoset vulcanized rubber, smooth, purpose made to accommodate wheeled traffic and prevent tripping; tapered designs to suit nature of transition; colour as selected by Consultant.
5. **Primers and adhesives:** waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade. Use Johnsonite 990 Solvent Free Environmentally Safe White Acrylic Cove Base Adhesive for rubber base.

PART 3 - EXECUTION

3.1 Inspection

1. Ensure concrete floors are dry, by using test methods recommended by tile manufacturer, and inspect for negative alkalinity, carbonization or dusting.
2. Commencement of work indicates acceptance of conditions by flooring installer.

3.2 Subfloor Treatment

1. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with subfloor filler.
2. Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured.

3.3 Tile

1. Apply adhesive uniformly using recommended notched trowel in accordance with Flooring Manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
2. Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles - minimum half tile width or as indicated by drawings and Finish Schedule.
3. Cut tile and fit neatly around fixed or excessively heavy objects.
4. Install flooring in pan type floor access covers and all clean out covers, where applicable. Maintain floor pattern.
5. Terminate flooring at center line of door in openings where adjacent floor finish or color is dissimilar.
6. Install metal edge strips at unprotected or exposed edges where flooring terminates.
7. At doorways to incrapack units, extend tile and base fully into door opening to incrapak classroom.

3.4 Base Application

1. Set base in adhesive tightly against wall and floor surfaces. Use lengths as long as practicable and not less than minimum 500 mm long.
2. Install straight and level to variation of 1:1000.
3. Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
4. Miter internal corners. Use premoulded corner pieces at all external corners and ensure full adhesion through to ends of corner pieces. See detail for termination at door frames.

5. Leave in the building one (1) complete carton of each of two (2) colours of floor tile and twelve (12) tiles of each of the remaining colours. Colours of extra tile to be specified by Architect.

3.5 Initial Maintenance after Installation

1. Broom sweep or vacuum thoroughly.
2. Do not wet mop, wash, scrub, or strip the floor. These procedures will be done by the Owner.

3.6 Protection of Work

1. Following broom sweeping, protect new floors with 0.15 mm thick Polyethylene cover and lay planking in all necessary traffic areas to minimize damage by other trades. Maintain until just before final inspection.

3.7 Preparation for Inspection

1. Only if so notified by Architect, and in the presence of the Owner, scrub the floor using a neutral detergent and a floor machine of 170-250 rpm capability equipped with a scrub brush or a scrubbing pad (3M blue or equal).
2. Lightly rinse and allow to dry. Note: Do not flood the floor with rinse water, scrubbing, or stripping solutions. Final re-washing, if required, and waxing will be done by owner.

End of Section

PART 1 - GENERAL

1.1 Related Documents

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

1. Definitions: Resinous flooring includes penetrating two-component epoxy primer and body coat, curing agent and finely graded quartz silica aggregate, two-component, epoxy undercoat, brightly colored, quartz silica aggregate broadcast and a high performance, two-component, clear epoxy sealer.

1.3 Submittals

1. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with requirements.
2. Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring required, applied to a rigid backing, in color and finish indicated.
 - .1 For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.4 Quality Assurance

1. Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity; Stonhard or approved equal. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.
2. Pre-Installation Meeting:
 - .1 General contractor shall arrange a meeting not less than thirty days prior to starting work.
 - .2 Attendance
 - .1 General Contractor
 - .2 Architect/Owner's Representative
 - .3 Manufacturer/Installer's Representative
3. ISO 9002: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9002 registered quality system.

1.5 Delivery, Storage and Handling

1. Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
2. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.
3. Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

1.6 Project Conditions

1. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.
2. Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor.
3. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.
4. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.7 Warranty

1. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

PART 2 - PRODUCTS

2.1 Manufacturer

1. Basis-of-Design Manufacturer: Sika Canada Inc.
2. Alternative Manufacturers: Stonehard Inc, Florock Resinous Flooring

2.2 System

1. Resinous flooring system: broadcast and sealed decorative epoxy floor, composed of multi-coloured decorative flakes and as follows:
 - .1 Compressive Strength: 70 MPa (10,152 psi) at 28 days in accordance with ASTM C579
 - .2 Flexural Strength: 83 MPa (12,038 psi) at 28 days in accordance with ASTM C580.
 - .3 Hardness: 85 Shore D at 7 days in accordance with ASTM D2240

- .4 VOC Content: ≤ 50 g/L in accordance with ASTM D2369
- .5 Pull-off Strength: >2.0 MPa (290 psi) with 100% concrete failure in accordance with ASTM D4541
- .6 Flammability: Self-extinguishing in accordance with ASTM D635
- .7 System Thickness: minimum 3mm
- .8 Basis-of-Design system: Sika Canada Inc., Sikafloor Decoflake System.

2.3 Components

1. Primer and Body Coat: two component, solid colour, high solid, silicone free, low viscosity, self-priming, glossy epoxy finish:
 - .1 Applied Thickness
 - .1 Prime Coat: 203 μm (8 mils) wet film thickness (w.f.t.)
 - .2 Body Coat: 726 μm (30 mils) w.f.t.
 - .2 Compressive Strength: 56 MPa (8,122 psi) in accordance with ASTM D695
 - .3 Tensile Strength: 7.4 MPa (1,073 psi) in accordance with ASTM D638
 - .4 Pull-off Strength: 2 MPa (290 psi) in accordance with ASTM D4541
 - .5 Hardness: 76 Shore D in accordance with ASTM D2240
 - .6 VOC Content: ≤ 50 g/L in accordance with ASTM D2369
 - .7 Impact Resistance: 5.88 joules in accordance with ASTM D2794
 - .8 Abrasion Resistance: 0.11g loss in accordance with ASTM D4060 (CS17 / 1000 cycles/ 1000g).
 - .9 Basis-of-Design Product: Sika Canada Inc., Sikafloor 261.
2. Broadcast Quartz Aggregates: use mono colour quartz aggregates that best match the predominate colour of flake blend
 - .1 Basis-of-Design Product: Sika Canada Inc., Sikafloor Broadcast Quartz Aggregate
3. Decorative Colour Flakes: 3MM vinyl chips finished with transparent top coats.
4. Grout Coat and Finish Coat: two component, high solids, low odour, low VOC, high strength, high gloss, clear epoxy resin formulated for improved resistance to clarity change over time.
 - .1 Applied Thickness:
 - .1 Grout Coat: 254 μm (10 mils) w.f.t.
 - .2 Finish Coat: 127 μm (5 mils) w.f.t.
 - .2 Compressive Strength: 70 MPa (10,521 psi) in accordance with ASTM C579
 - .3 Tensile Strength: 28 MPa (4,061 psi) in accordance with ASTM D 638
 - .4 Flexural Strength: 83 MPa (12,038 psi) in accordance with ASTM C580
 - .5 VOC Content: ≤ 25 g/L in accordance with ASTM D2369
 - .6 Modulus of Elasticity: 1287 MPa (186,663 psi) in accordance with ASTM C580
 - .7 Elongation: 4% in accordance with ASTM D638
 - .8 Hardness: 85 Shore D in accordance with ASTM D2240
 - .9 Resistance to Mold Growth: Rated 0 (no growth) in accordance with ASTM D3273
 - .10 Resistance to Fungi Growth: Rated 10 (highest resistance) in accordance with ASTM G21.
 - .11 Flammability: Self-extinguishing in accordance with ASTM D635
 - .12 Basis-of-Design Product: Sika Canada Inc., Sikafloor 2002

5. Finish Coat: Basis-of-Design Product: Sikafloor 510 LPL is a clear two-component, high solids, low VOC, low-viscosity, high strength, fast-curing, UV resistant, polyaspartic urethane coating system with texture applied using Sika Duochem 6 aggregate
 - .1 Applied Thickness:
 - .1 Prime Coat: 3.9-4.9 m²/L at 0.20-0.25 mm (8-10 mils) w.f.t.
 - .2 Wear Coat: 2.6-3.3 m²/L at 0.30-0.38 mm (12-15 mils) w.f.t.
 - .2 VOC Content: ≤ 50 g/L in accordance with ASTM D2369
 - .3 Abrasion Resistance: Taber Abraser ASTM D4046 (CS-17 wheel, 1,000 cycles / 1,000 g load) ~ 50 mg loss
 - .4 Pull-off Strength: >2.7 MPa (>4000 psi) in accordance with ASTM D7234
 - .5 Hardness: ~75 Shore D in accordance with ASTM D2240

2.4 Accessories

1. Provide all cleaning agents, cleaning cloths, sanding materials, and clean-up materials required per manufacturer's specifications.

2.5 Colors

1. Colors: As selected by Architect from manufacturer's standard colors.
2. Pattern: As provided by Architect using two standard colors.

PART 3 - EXECUTION

3.1 Preparation

1. Substrate: Concrete preparation shall be by mechanical means and include use of a scabblers, scarifier or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.
2. Proper substrate preparation is crucial to ensure adequate bond. Substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance. Laitance and unbonded cement particles must be removed by mechanical methods. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent and rinsing with clean water. The surface must show open pores throughout and have a sandpaper texture.
3. Cove base substrate: existing or new gypsum board to be properly prepared including sanding and priming, to manufacturer's requirement.

3.2 Application

1. General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.

2. Follow manufacturer's written recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.
3. Do not apply while ambient and substrate temperatures are rising.
4. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible. Apply to achieve appearance of uniform colour, sheen and texture; all within limitations of materials and area concerned.
5. Broadcast: Immediately broadcast quartz silica aggregate into the body coat until saturation. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.
6. Match colours and textures of Consultants accepted samples.

3.3 Field Quality Control

1. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.
2. The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
3. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
4. If test results show materials being used do not comply with specified requirements, Contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.4 Curing, Protection and Cleaning

1. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.
2. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.
3. Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

End of Section

PART 1 – GENERAL

1.1 Related Work

1. Resilient Tile Flooring and Rubber Base Section 09660

1.2 Samples

1. Submit duplicate 1 m square pieces of each type of carpet specified, duplicate 125 x 75 mm pieces for each color selected, 150 mm lengths of binder bars, in accordance with Section 01340.

1.3 Maintenance Data

1. Provide maintenance data for carpet maintenance for incorporation into Maintenance Manual specified in Section 01730.

1.4 Warranty

1. Carpet manufacturer lifetime warranties: wear, static protection, delamination, tuftbind failure, edge ravel and zippering and dimensional stability. Provide one full box of carpet tile of each colour to Owner.

PART 2 – MATERIALS

2.1 Modular Carpet (CT)

1. Fibre: 100% solution dyed nylon.
2. Construction: textured dense pattern loop
3. Standard Backing System: PVC modular – containing recycled content.
4. Pile Density: 5300 FHA minimum.
5. Gauge: 1/12; 47.2 rows/10 cm, minimum.
6. Stitches: 11.2 spi; 45.3 stitches/10 cm, minimum.
7. Flammability: Radiant Panel ASTM E648 – Class I
8. Protections: anti-microbial, anti-zippering, anti-static and stain protection
9. Manufacturers: Caliber Series – BT282 by Mohawk Group Carpet Tile
Size: 600mm x 600mm P with T3 Back
Colours: By Architect
Equal Modular Tile by: Tarkett Essentialist Collection
Centura Carpet – Venture Carpets – Tapis – Motion
Interface – Retrofit Collection

Colours: Allow for tile pattern from full range of colors. Selection by Consultant TBD.

2.2 Binder Bars

1. As recommended by carpet manufacturer. Color to match carpet.
2. Use binder bars at exposed carpet edges. Install binder bars at doorways centered under doors.

2.3 Adhesive

1. Full spread premium pressure sensitive adhesive as recommended by carpet manufacturer to suit carpet and subfloor conditions, and allow repositioning.

PART 3 - EXECUTION

3.1 Examination

1. New concrete must be fully cured and free of moisture. New concrete requires a curing period of approximately 90 days. Tests for moisture and alkalinity must be performed as detailed under moisture testing.
2. Work of others in areas where carpet is installed has been completed.

3.2 Preparation

1. Dust, dirt, debris, and noncompatible adhesive must be removed before installation begins. Surfaces must be smooth and level with all holes and cracks filled with latex based Portland cement patching compound.

3.3 Installation

1. Establish measurement and layout per manufacturer's recommendations. Follow manufacturer's pallet and box sequencing.
2. Install starting in the corner of one quadrant and in a pyramid fashion. Install by butting edges together evenly and do not compress modules compress modules. Fit carpet neatly around architectural, mechanical, electrical and furniture fitments.
3. Cut carpet modules at perimeters, floor electrical outlets, and door openings. Apply adhesive whenever modules are cut. Loop pile modules may require trimming or clipping of tufts.
4. Finish seams level, flat and inconspicuous.

3.4 Protection of Finished Work

1. Vacuum carpets clean. Protect traffic areas of carpeted floor with polyethylene drop sheets. Tape joints to prevent shifting.
2. After installation, and until project completion, coordinate work to ensure that carpeting is not damaged by traffic or by subsequent work.

End of Section

PART 1 - GENERAL

1.1 Related Work

- | | |
|---|-------------------|
| 1. Masonry | Section 04200 |
| 2. Shop painting Miscellaneous Metals | Section 05510 |
| 3. Commercial Steel Door and Frames | Section 08100 |
| 4. Door Schedule Notes and Room Finishes Schedule | refer to drawings |
| 5. Finish and Colour Notes | Section 09010 |

1.2 Reference Standard

1. Ontario Painting Contractors Association (OPCA) Architectural Specification Manual - referenced as OPCA Manual, latest Edition. Paint formulations and methods referred to herein refer to this Manual. If contractor is unfamiliar with this reference standard, contact the OPCA.

1.3 Environmental Requirements

1. Do not apply paint finishes in areas where dust is being generated.
2. Conform to requirements of OPCA Manual.
3. Comply with the requirements of Section 01570 - Health and Environmental Specifications.

1.4 Finishes and Colours

1. Review the requirements outlined in Section 09010 - Finish and Colour Notes. A separate colour schedule will be issued after contract award.

1.5 Warranty

1. Provide a two (2) year warranty on completion stating that the work has been performed with respect to the standards and requirements incorporated in the OPCA specification manual latest edition.

PART 2 - PRODUCTS

2.1 Materials

1. Acceptable products: Per Chapter 5 OPCA Manual and as listed.
2. Paint materials for each paint system to be products of a single manufacturer.

3. Use low-VOC and low-odour paints only.

PART 3 - EXECUTION

3.1 Preparation of Surfaces

1. Prepare surfaces to receive paint per Chapter 3 OPCA Manual.

3.2 Application

1. Sand and dust between each coat to remove defects visible from distance up to 1.5 m.
2. Finish closets and alcoves as specified for adjoining rooms.
3. Apply each coat at the proper consistency. Each coat of finish should be fully dry and hard before applying the next coat, unless the manufacturer's instructions state otherwise.

3.3 Mechanical and Electrical Equipment

1. Refer also to Finish Notes in Section 09010.
2. Paint exposed conduits, pipes, hangers and other mechanical and electrical equipment occurring in finished areas as well as inside cupboards and cabinet work. Colour and texture to match adjacent surfaces, except as noted otherwise. Coordinate with mechanical trades applying banding and labeling after pipes have been painted. Do not paint white PVC covers on exposed mechanical water, drain and other lines.
3. Paint gas piping standard yellow where visible on roof or in service spaces. Do not paint gas meter or gas equipment in wall niche yellow—colour to later selection by Architect.
4. Paint surfaces inside of ductwork and elsewhere behind grilles where visible using primer and one coat of matte black paint.
5. Paint both sides and edges of plywood backboards for equipment before installation.
6. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.4 Paint Systems

1. System references listed are based on Chapters 4A and 4B of OPCA Manual and are OPCA Premium Grade, unless noted otherwise.

3.5 Interior Finishes

1. Wood, where applicable:
 - .1 Doors, miscellaneous trim: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
 - .2 Casework and miscellaneous wood items:

- .1 Exterior surfaces: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
 - .2 Interior surfaces: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
 - .3 Wood Benches and Upper Shelves: INT. 2-F, Stained Alkyd Satin Finish, Premium Grade.
2. Gypsum board: INT.4-B, Latex Eggshell Finish, Premium Grade.
 3. Concrete Block: INT. 8-A, Latex Semi-Gloss Finish, Premium Grade;
 4. Concrete Block: Alkyd Gloss Finish, Premium Grade
 5. Concrete Floors, refer to Section 03346 - Concrete Floor Hardeners and Sealers for liquid sealer.
 6. Exposed Cast in Place Concrete ceilings: INT. 8-A, Latex Flat Finish, Premium Grade
 7. Exposed Precast Concrete ceilings: INT. 8-A, Latex Flat Finish, Custom Grade
 8. Structural Steel and Miscellaneous Metal:
 - .1 Primed: INT. 12-A, Alkyd Semi-Gloss Finish, Premium Grade
 - .2 Galvanized: INT. 13-A, Alkyd Semi-Gloss Finish, Premium Grade
 9. Galvanized metal: INT. 13-A, Alkyd Semi-Gloss Finish, Premium Grade
 10. Galvanized steel deck: INT 13E, Alkyd dry fall.

3.6 Exterior Finishes

1. Wood: EXT. 1-A-Gloss, Premium Grade
2. Pavement markings: EXT. 7-A, Zone Marking Alkyd Finish, Premium Grade.
3. Miscellaneous metal:
 - .1 Primed: EXT. 11-A-Gloss, Premium Grade
 - .2 Galvanized: EXT. 12-A-Gloss, Premium Grade
4. Galvanized metal: EXT. 12-A-Gloss, Premium Grade.
5. Steel - high heat: EXT. 15-A

End of Section

PART 1 - GENERAL

1.1 Shop Drawings

1. Submit shop drawings in accordance with Section 01340.

PART 2 - PRODUCTS

1. **Insulated Metal Panel (IMP)** – Quadcore KS Flat interior panel ss manufactured by Kingspan. Acceptable Alternatives: CF Partition Wall by Metl-Span with light mesa profile; Mesa DM44 by Vicwest with mesa profile
 - .1 Profile:
 - a. Exterior: Flat
 - b. Interior: Flat
 - .2 Embossing:
 - a. Exterior: Smooth
 - b. Interior: Smooth
 - .3 Gauge:
 - a. Exterior: 22ga
 - b. Interior: 22ga
 - .4 Width: 1150mm
 - .5 Thickness: 100mm
 - .6 Length: 2440mm
 - .7 Ceiling Suspension System: 100mm x 75mm x 5mm extruded aluminum tee with white powder coat finish.
2. **Insulated Cold Storage Door (ICS)** – Glace-Guard Entrance Door model ET-400 as manufactured by Thermostop Inc, 3775 Losch Blvd., Longueuil, (Quebec), J3Y 5T7, Tel: 450-678-8666, Fax: 450-678-7765
 - .1 Size: 1220mm wide X 2135mm high
 - .2 Thickness and insulation value: 100mm thick. R-32.
 - .3 Panel manufacturing process: The inner core consists of rigid polyurethane, foamed in place under high pressure between two metal skins. To avoid mouldiness, no wood material is used in the construction of the panel.
 - .4 Insulation: CFC-free rigid foamed-in-place polyurethane. 41.0 kg/m³ minimum density.
 - .5 Metal skins and finish: Standard 26ga. steel skins, White.
 - .6 Single Door. Door panel framing is made of aluminum extrusions equipped with non-conductive thermal break material.
 - .7 Door frame and thermal barrier: Entrance door frame is made shock-proof 4 mm exterior and interior extruded aluminum angles. The exterior extruded aluminum angle has a built-in nonconductive resin thermal break and is ready to receive hardware and others components.
 - .8 Perimeter magnetic gasket : A full perimeter magnetic vinyl gasket insures the door is airtight and vapour-proof on the perimeter joint.
 - .9 Bottom door gasket: Extruded aluminum retainer with double blade seal gasket to assure airtight joints.
 - .10 Hinges : Heavy duty self-closing and reversible high pressure die-cast zinc flanges, 5 mm) thick galvanized steel strap. Silver grey finish.

- .11 Pull handle : High pressure die-cast zinc cylinder locking handle, complete with emergency inside release system. Brushed chrome finish.
- .12 Mechanical door closer: Heavy gauge steel mechanical door closer, complete with extra-wide hook. Chrome finish.

PART 3 – EXECUTION

3.1 Installation

- 1. Install where indicated on drawings and as per manufacturer's instructions.

3.2 Demonstration and Training

- 1. Provide demonstration of operation to the Owner and his representatives.
- 2. Provide training for operation, maintenance and repairs.

End of Section

PART 1 - GENERAL

1.1 General Requirements

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 Related Work Specified Elsewhere

1. Section 05500: Miscellaneous Metal Fabrications: structural steel supports.

1.3 Referenced Standards

1. ASTM E90-90: Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions
2. ASTM E336-90: Method for Measurement of Airborne Sound Insulation in Buildings
3. CSA W59-M1989: Welded Steel Construction (Metal Arc Welding)
4. CAN/CSA-G40.20-M92: General Requirements for Rolled or Welded Structural Quality Steel
5. CAN/CSA-G40.21-M92: Structural Quality Steels

1.4 Welding

1. Welding of structural components shall be done only by fabricators certified by CSA Welding Qualification Codes, CSA W47 or W55.3 as applicable, for welding of steel, and who shall perform welding to meet specified requirements of CSA W55.2 or W59.1, as may apply.
2. Weld all connections where possible, and bolt where not possible. Provide method to prevent loosening of nuts. Ream holes drilled for fastenings. Make welded joints tight, flush, and in true planes with base metals. Make welds continuous at joints. Grind welds in exposed locations smooth in a manner that will not leave blemishes on exposed surfaces. Join members generally by inert metal arc welding where practicable, using materials recommended by manufacturers of metals being welded. Remove flux completely following welding, and grind and polish joints smooth and clean.

1.5 Submittals

1. Shop Drawings: Submit shop drawings for Consultant's review, in accordance with Section 01340. Details of attachment to the building structure must bear the stamp of a professional engineer licensed to design structures in the province of Ontario, certifying their strength and safety. At completion of installation provide written certification from professional engineer that the installation is structurally safe and in accordance with approved shop drawings.

2. Samples: Submit samples of carpet or vinyl fabric for Consultant's approval, in accordance with Section 01340.
Maintenance Data and Operating Instructions: Provide maintenance and operating instructions for incorporation into maintenance manual in accordance with Section 01730.
3. Test Reports
 - .1 Submit test reports to the Consultant from ULC confirming that carpet and vinyl fabric conforms to these Specifications.
 - .2 Submit tests to confirm STC ratings based on ASTM E90-81.
 - .3 Submit test reports from an independent laboratory confirming that the partition meets the flame spread and STC ratings specified.

PART 2 - PRODUCTS

2.1 Design Criteria

1. Use finish for partition covering with maximum flame spread 25; fuel contributed 35; smoke developed 50; when tested to ASTM E84-81a.
2. Specifications in this Section are based upon products and systems as manufactured by Modernfold. It is understood that certain aspects of partition systems by other manufacturers are slightly different than those specified. The Consultant will make some allowances for differing designs when reviewing shop drawings but will insist that the overall system present features and performance which are at least equal to those specified.

2.2 Description of Partition

1. Accordion Door / Partition
 - .1 Type: Soundmaster 8M accordion door, STC 39 and #5 Track by Modernfold or approved equivalent by Moderco, Hufcor or Coreflex.
 - .2 Features: manual operation. Shall consist of steel hinge plates welded to 3/16-inch (5mm) diameter vertical steel rods, with a single row of plates at the bottom and top with intermediate rows at approximately 42-inch (1067mm) on center. Finish: Class "A" rated reinforced heavy duty vinyl. Sound Seals: shall be pairs of three-layer flexible sweep strips at top and bottom with trapped air release. Sound Insulation: 24-gauge, V-grooved steel panels and heavy duty flame resistant acoustical membrane. grip type hand pulls shall be die cast zinc, satin chrome finish. Manufacturer's aluminum Suspension System. Track is recessed with ceiling guard continuous "C" channel shaped track and trolley sizes matched to the size of the partition.
 - .3 Location: Viewing Room 109.
 - a. Opening Size: total opening is approximately 3560 mm x 2745 mm. - site verify. Partition to be configured as a single segment.
 - .4 Location: Circulation Area 110.
 - a. Opening Size: total opening is approximately 3625 mm x 3000 mm. - site verify. Partition to be configured as a single segment.
 - b. Number required: Two (2)

2.3 Materials

1. General: Metals shall be free from defects which impair strength or durability, or which are visible. Metals shall be new, of best quality, and free from rust, or waves, or buckles, clean, straight, and with sharply defined profiles.
2. Metals: Steel: Structural: hot rolled to meet requirements of CAN3-G40.21, Grade 50W for tubes and Grade 44W for flat shapes. Sheet: cold-rolled furniture steel, double annealed, mill stretched and levelled, and fully pickled. Otherwise, steel shall be hot-rolled or cold-rolled of alloy to suit needs of fabrication, use, and appearance.
3. Vinyl Fabric: Reinforced vinyl with woven backing weighing a minimum 27 ounces per lineal yard. Fabric shall have a flamespread rating of not more than 25 and listed by ULC. Colour as selected by the Consultant from manufacturer's standard range.

2.4 Overhead Suspension System

1. Track: Manufacturer's standard cold rolled steel, channel housing designed to support partitions.
2. Equip track with brackets for hanger attachment.
3. Provide threaded steel rods and nuts type hangers and stabilizers.
4. Trolley: low friction polymer discs, equipped with thrust bearing and steel pendant bolt at each wheel assembly for height adjustment.

2.5 Hardware

1. Equip partition with manufacturer's standard hardware. Hardware finish selected from manufacturer's standard finishes.

2.6 Sound Seals

1. Provide sound seals to manufacturer's standard, as indicated in Part 2.
2. Use head and floor retractable compression type floor and head seals.
3. Design retractable seals to secure panel in position.
4. Use manufacturer's standard astragal inserts for jamb and panel joint seal. Finish in satin black.

2.7 Accessories

1. Provide manufacturer's standard closure panel with lever operator.

PART 3 - EXECUTION

3.1 Installation

1. Secure and level track.
2. Install folding partitions in accordance with manufacturer's printed instructions.
3. Touch up damaged finishes, repair damage to partitions to match original finish.
4. Clean folding partition system and protect from damage.
5. Adjust and leave partitions in smooth operating condition.

3.2 Demonstration and Training

1. Provide demonstration of operation to the Owner and his representatives.
2. Provide training for operation, maintenance and repairs.

End of Section

PART 1 - GENERAL

1.1 General Requirements

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 Related Work Specified Elsewhere

1. Electrical conduit and wiring to junction boxes: refer to Electrical Drawings

1.3 Referenced Standards

1. ASTM A167-87: Specification for Stainless and Heat Resisting Chromium -Nickel Steel Plate, Sheet and Strip
2. ASTM A525: Standard Specification for General Requirements for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process (Metric)
3. CAN/CSA-G164-M92: Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Shop Drawings

1. Submit shop drawings in accordance with Section 01340, for Consultant's review before fabrication. Shop drawings of units for use by the handicapped shall be distinctly marked and cross-referenced to the corresponding article in the specifications.

1.5 Quality Standard

1. This specification section is based generally on Bobrick equipment. Similar equipment and accessories by Watrous and Bradley are also acceptable.

PART 2 - PRODUCTS

2.1 Materials - Generally

1. Ferrous Steel: Sheet, cold-rolled furniture steel, double annealed, mill stretched and leveled, and fully pickled. Otherwise, steel shall be hot-rolled or cold-rolled of alloy to suit needs of fabrication, use, and appearance.
2. Stainless Steel: Type 304, conforming to ASTM A167-87, No. 4 finish.
3. Galvanized Steel: For sheet, Z275 zinc coating designation in accordance with ASTM Specification A525. For irregular sections, hot dip galvanized to comply with CSA G164.
4. Anchors and Fastenings: Where exposed, use stainless steel and otherwise to match metal anchored. Where non-exposed, use the same as that specified for exposed, or use galvanized steel. Anchors and fastenings shall be of the type appropriate for the substrate to which accessory unit is secured.

2.2 Products

1. **Toilet Tissue Dispenser (TPD):** Model Frost Cabinet #166JRT JR white enamel for 2000 roll 1 ply tissue, 10" roll.
 - .1 Quantity: 1 per new toilets
2. **Paper Towel Dispensers (PTD):** Supplied by owner and installed by General Contractor.
3. **Soap Dispensers (SD):** Supplied by Owner and installed by General Contractor.
4. **Mirrors:**
 1. **(M-1)** - B290 series by Bobrick, stainless steel frame, vandal resistant mounting, 6mm glass mirror with 15 year guaranty against silver spoilage.
 - .1 Size: 600 x 910mm.
 - .2 Quantity: Two (2) - refer to drawings for locations
 2. **(M-2)** - B293 series by Bobrick, tilt mirror, stainless steel frame, vandal resistant mounting, 6mm glass mirror with 15 year guaranty against silver spoilage.
 - .1 Size: 600 x 910mm.
 - .2 Quantity: One (1) – one in Universal Washroom
5. **Sanitary Napkin Disposal (ND):** Model B 5270 by Bobrick - Acceptable alternates: Watrous and Bradley
 - .1 Stainless steel, surface mounted
 - .2 Quantity: Three (3) – one in each washroom
6. **Clothes Hook (CH):** Model B-6717 by Bobrick - Acceptable alternates: Watrous and Bradley
 - .1 Stainless steel
 - .2 Quantity: Four (4) – refer to drawings for locations.
7. **Mop and Broom Holder (MH):** Model B-223 x 24
 - .1 Quantity: One (1) – one in Janitor's Closet
8. **Steel Shelf (WSH):** Model B-295 x 18
 - .1 Stainless steel
 - .2 Quantity: One (1) – one in Universal Washroom. Mounting height to be 1200 max.
9. **Handicapped Grab Bars (GB):** Example: Series B5806 by Bobrick
 - .1 **GB-1:** 750 mm x 750 mm "L" shaped grab bar beside water closet mounted as per OBC requirements.
GB-2: 600 mm long bar behind water closet. Installed as per drawings.
 - .2 All bars to have concealed mounting hardware.
 - .3 Quantity: refer to drawings.
 - .4 All bars to withstand horizontal and vertical pull of 2.2 Kn

10. Shower Rod and Curtain (SR+C):

- .1 Rod: extra heavy duty 18 gauge stainless steel, Example: No. B6047 by Bobrick
- .2 Curtain: 8 gauge vinyl fabric, Example: No. 204-3 by Bobrick and 12 hooks Example: No. 204-1 by Bobrick; 1830 mm high, 1780 mm wide.
- .3 Location: as per drawings

11. Recessed Shower Soap Dish (RSD): Example: Model B439 by Bobrick,

- .1 Quantity: One (1) required

2.3 Component Minimum Requirements

1. **Construction** Fabricate with materials, component sizes, metal gauges, reinforcing, anchors and fasteners of adequate strength to withstand intended use.
2. Where specified as frameless, provide stainless steel accessories with one-piece fronts having 90 degree formed returns at their edges and openings.
3. Where accessory fronts are framed, frame edges, both inside and outside, with 90 degree formed returns continuously welded and ground smooth at the corners. Doors shall also have 90 degree formed returns as specified.
4. Unless otherwise specified, hinges shall be semi-concealed stainless steel piano hinges extending full-length of hinged element. Provide hinged elements with concealed, mechanically-retained rubber bumpers for silent closing, and shall close flush with faces of fronts or frames.
5. Ensure that work will remain free of warping, buckling, opening of joints and seams, distortion and permanent deformation.
6. No exposed fixings permitted. Cut edges and openings square and smooth. Chamfer corners of edges and cut-outs 1.6 mm.
7. **Assembly** Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.
8. Fasten work with concealed methods, unless otherwise indicated on Drawings.
9. Weld all connections where possible, bolt where not possible and cut off bolts flush with nuts. Countersunk bolt heads, and provide method to prevent loosening of nuts. Ream holes drilled for fastening.
10. Welded joints shall be tight, flush, and in true planes with base metals. Make welds continuous at joints where entry of water into voids of members or assemblies is possible.
11. Provide for differential movements within assemblies and at junctions of assemblies with surrounding work.

12. Welds in exposed locations shall be ground and polished smooth.
13. **Finish Work** Provide holes and connections for related work installed under other Sections of this specification, if applicable.
14. Cleanly and smoothly finish exposed edges of materials, including holes.

PART 3 - EXECUTION

3.1 Inspection of Site

1. Take site measurements to ensure that work is fabricated to fit surrounding construction around obstructions and projects in place, or as shown on drawings, and to suit service locations.

3.2 Installation

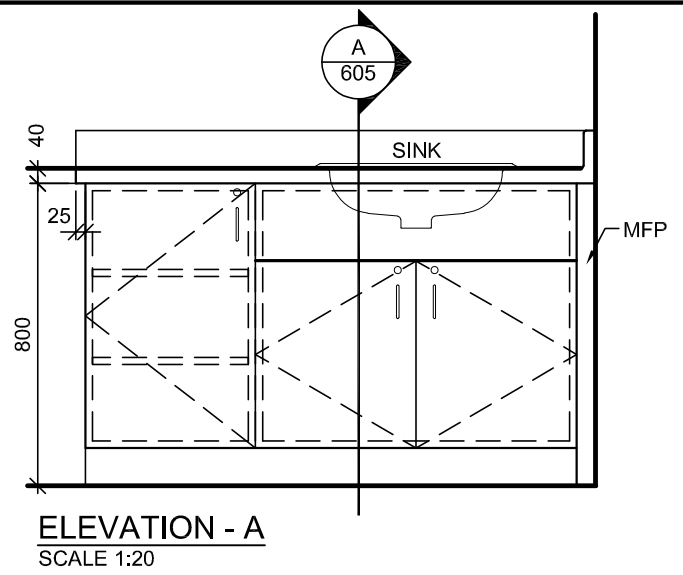
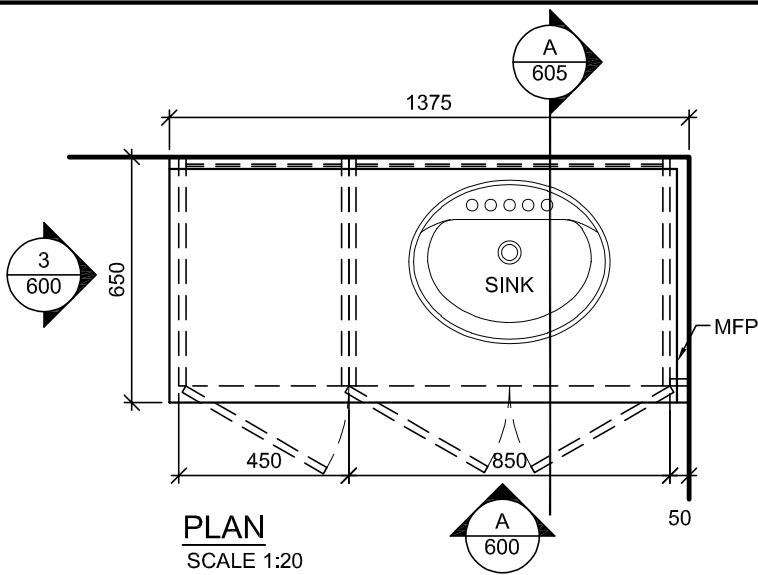
1. Install all accessories in accordance with manufacturer's instructions at their recommended mounting heights unless noted otherwise on drawings.
2. Securely fasten accessories plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding work. Install in locations shown and specified herein. Mounting heights as shown or in accordance with the OBC in the case of barrier-free accessories.
3. Work shall include anchor bolts, bolts, washers and nuts, lag screws, expansion shields, toggles, straps, sleeve brackets, clips, and other items necessary for secure installation, as required by loading and by Jurisdictional Authorities.
4. Attach work at wood by screws through countersunk holes in metal.
5. Attach work to masonry with lead plugs and non-corrosive fastenings, to support load with a safety factor of 3. Perform all drilling necessary to install the work.
6. Insulate between dissimilar metals or between metals and masonry or concrete with bituminous paint, to prevent electrolysis.
7. Coordinate installation with the work of other trades adjacent to accessories to achieve the reveals or other edge conditions shown, where their front faces are flush with the finished wall surfaces.
8. Owner to supply and install remainder of washroom accessories not specified here (toilet paper dispensers, etc.). Cooperate with Owner as required.

3.3 Cleaning Up and Adjustment

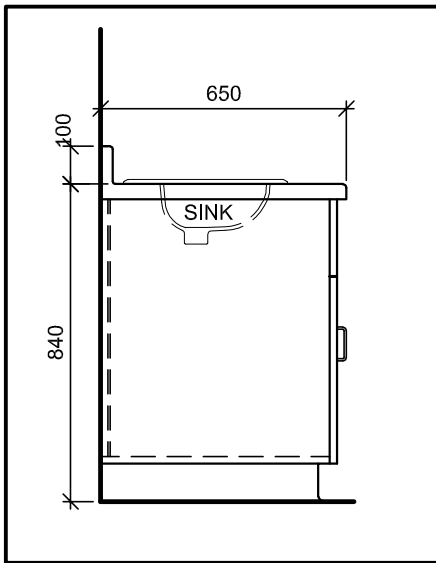
1. Upon completion of the work, or when directed, remove all traces of protective coatings or paper.

2. Test mechanisms, hinges, locks and latches, and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

End of Section

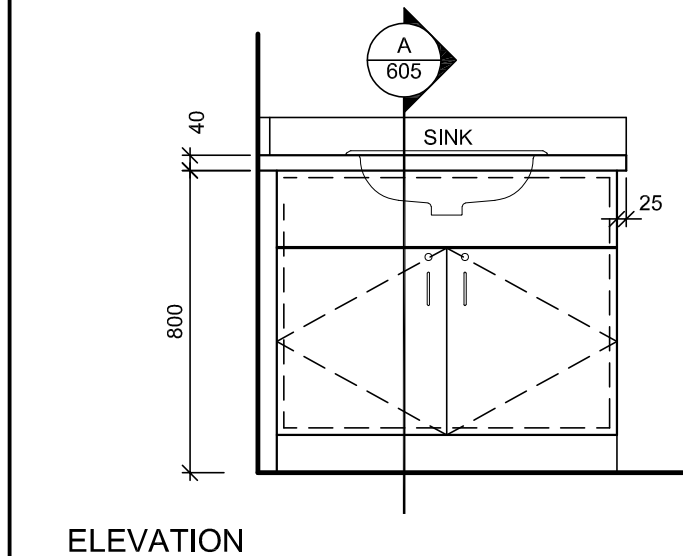
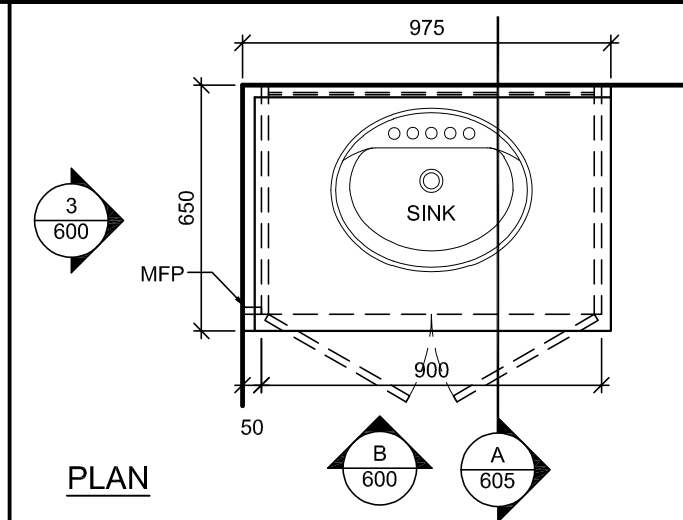


1
600 **SINK - S1**
SCALE 1:20



3
600 **SIDE ELEVATION**
SCALE 1:20

NOTE:
MFP - MILLWORK FILLER PANEL
-TO BE CONTINUOUS ALONG ALL
EXPOSED EDGES (TOP, BOTTOM
AND SIDES) WHERE INDICATED



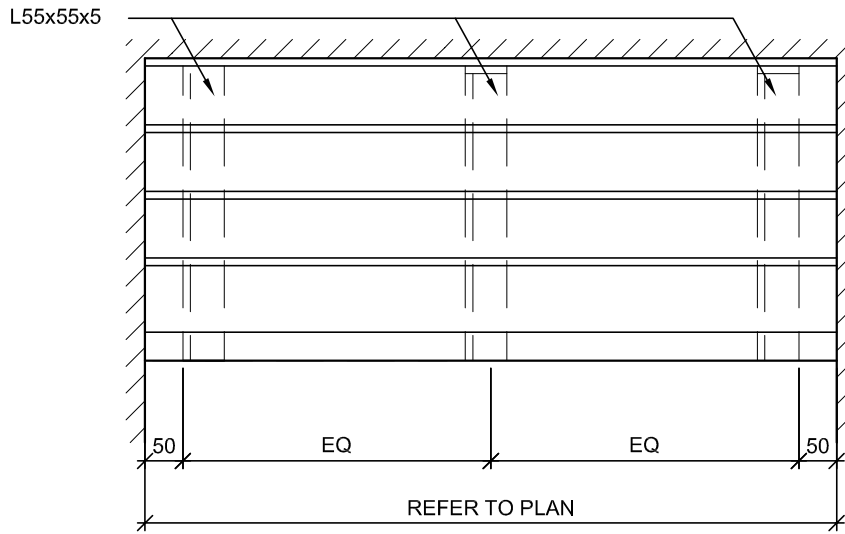
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600 **SINK - S2**
SCALE 1:20

HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK TYPE S1 & S2

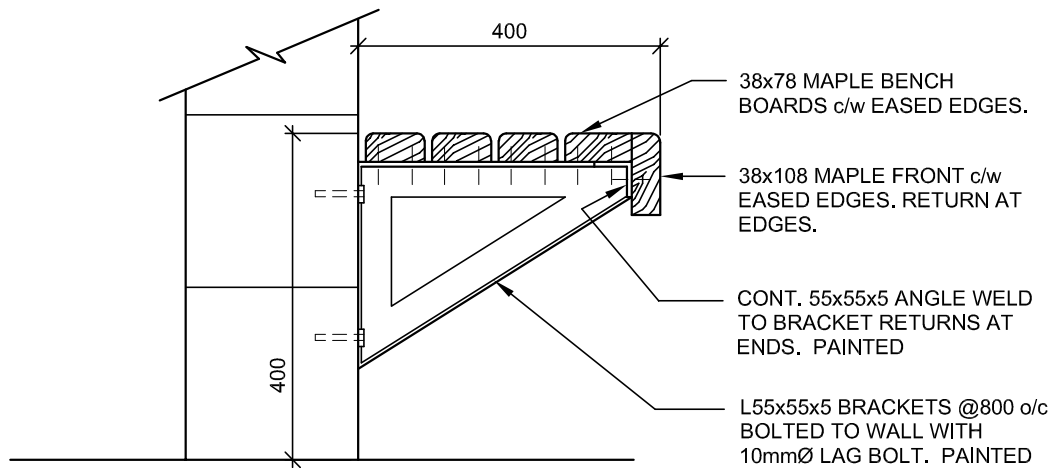
PROJ: 2019-08
SCALE: AS NOTED
DRAWN: DW
DATE: 2023-06-29

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**AD
600**



PLAN
SCALE 1: 10



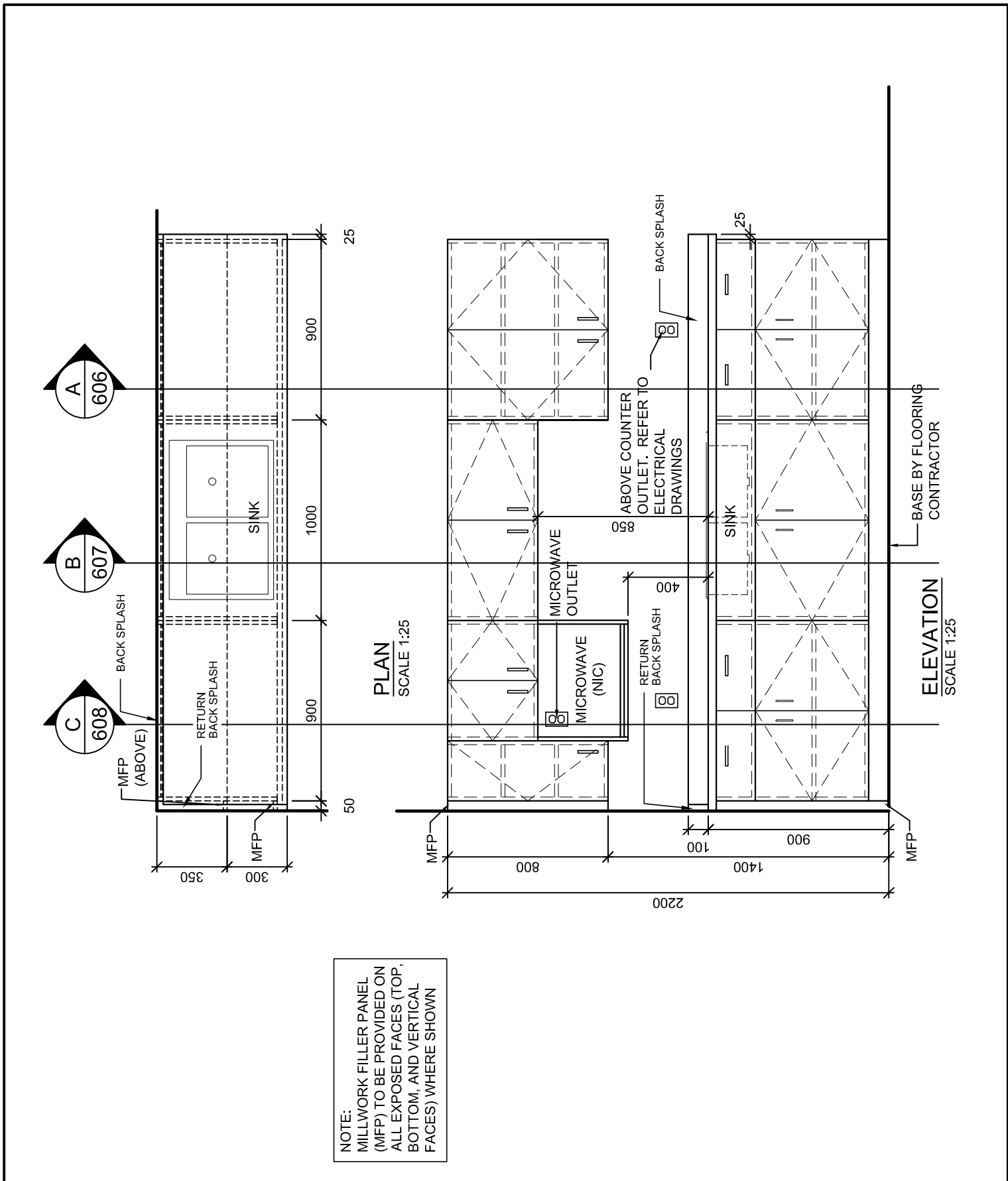
SECTION MM-05
SCALE 1: 10

HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK TYPE MM-05
CHANGE ROOM BENCH

PROJ: 2019-08
SCALE: AS NOTED
DRAWN: DW
DATE: 2023-06-29

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HOLY FAMILY CEMETERY CREMATORIUM
 MILLWORK TYPE MM01
 STAFF ROOM

PROJ:	2019-08
SCALE:	AS NOTED
DRAWN:	DW
DATE:	2023-06-29

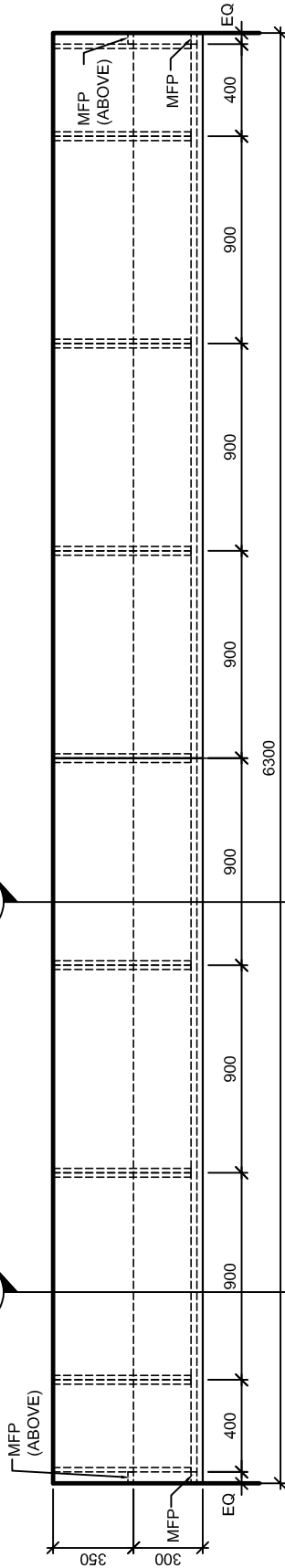
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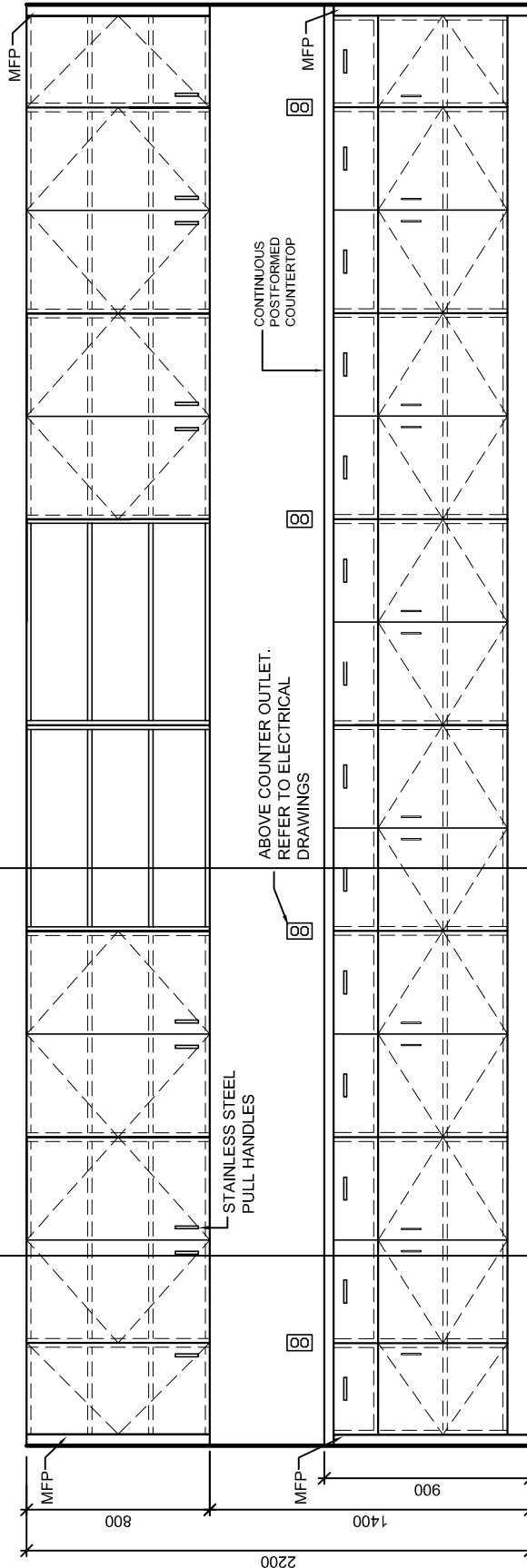
NOTE:
MILLWORK FILLER PANEL
(MFP) TO BE PROVIDED ON
ALL EXPOSED FACES (TOP,
BOTTOM, AND VERTICAL
FACES) WHERE SHOWN

B
610

A
609



PLAN
SCALE 1:25



ELEVATION
SCALE 1:25

HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK TYPE MM02
WORK ROOM

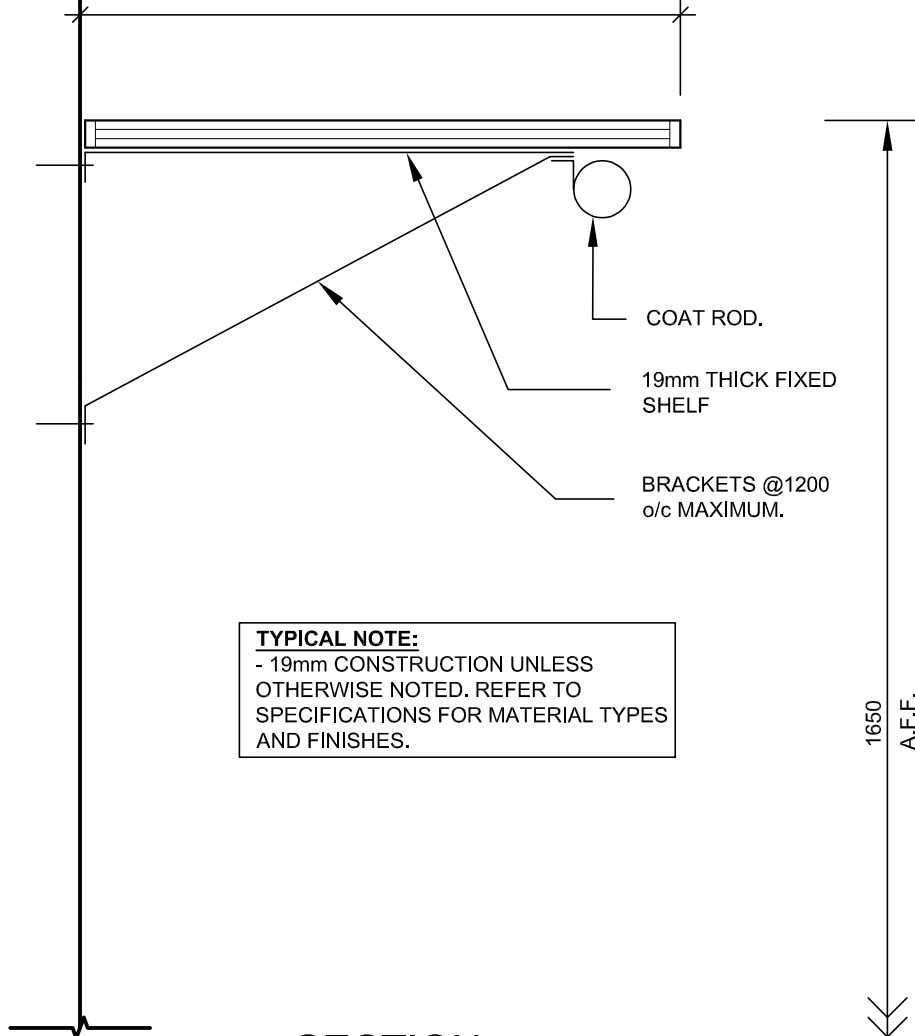
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SCALE: AS NOTED
DRAWN: DW
DATE: 2023-06-29

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LENGTH:
MM-03 - 2235mm
MM-04 - 2950mm

400



TYPICAL NOTE:
- 19mm CONSTRUCTION UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR MATERIAL TYPES AND FINISHES.

SECTION
SCALE 1:5

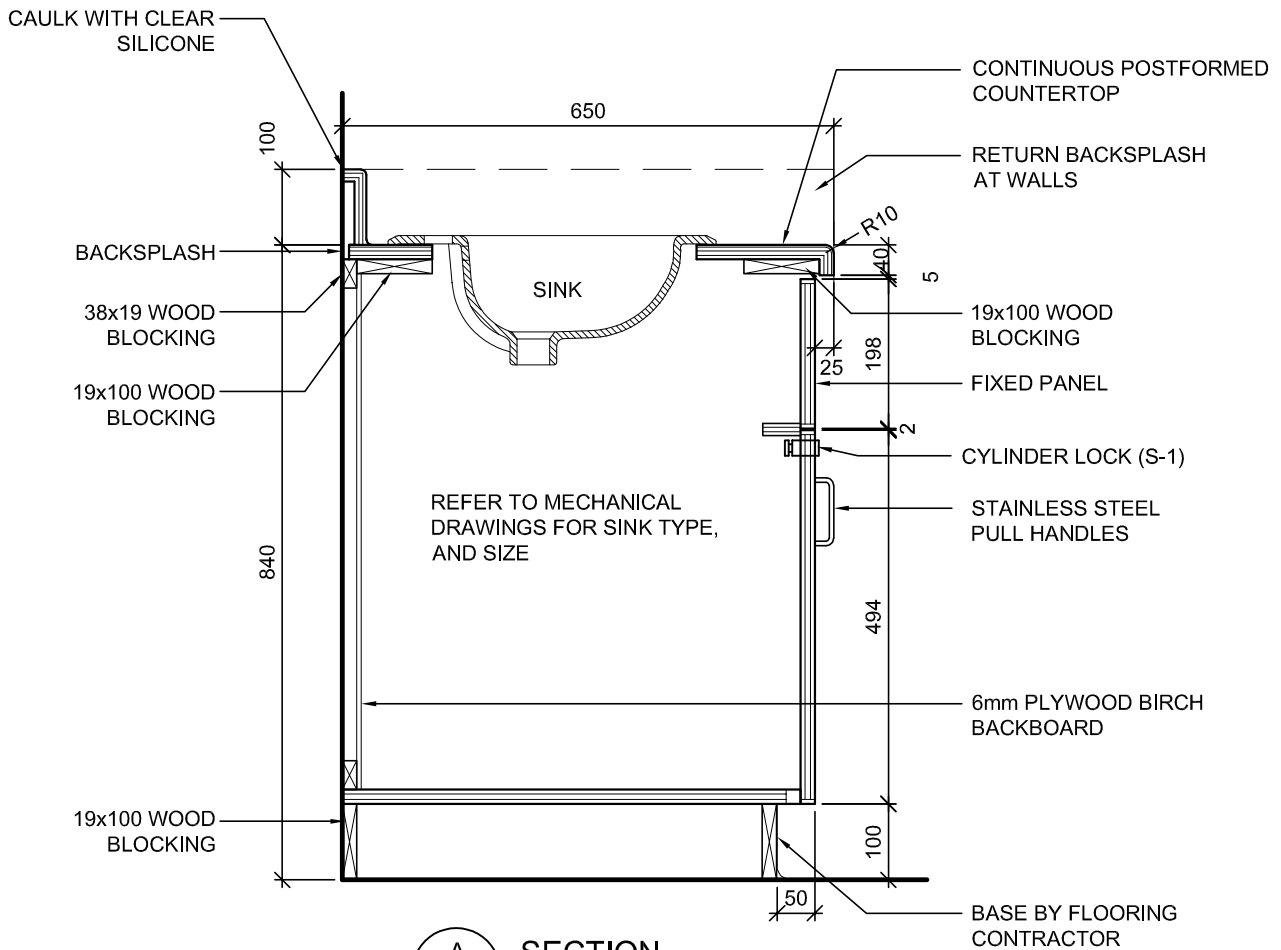
HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK TYPE MM03 & MM04
COAT ROD AND SHELF

PROJ: 2019-08
SCALE: AS NOTED
DRAWN: DW
DATE: 2023-06-29

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TYPICAL NOTE:
 - 19mm CONSTRUCTION UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR MATERIAL TYPES AND FINISHES.



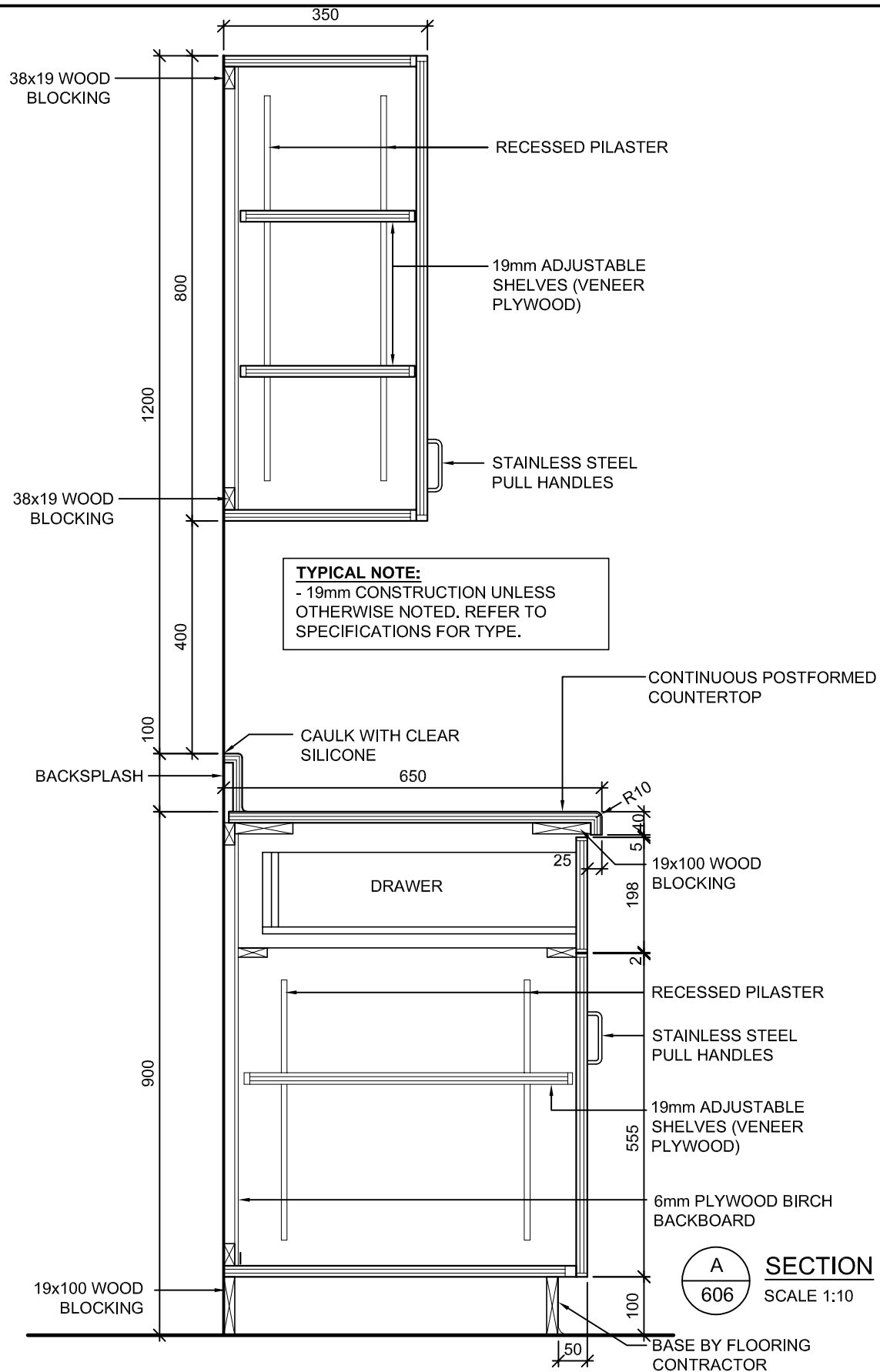
A SECTION
 605 SCALE 1:10

HOLY FAMILY CEMETERY CREMATORIUM
 MILLWORK SECTION DETAIL

PROJ: 2019-08
 SCALE: AS NOTED
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 DATE: 2023-06-29

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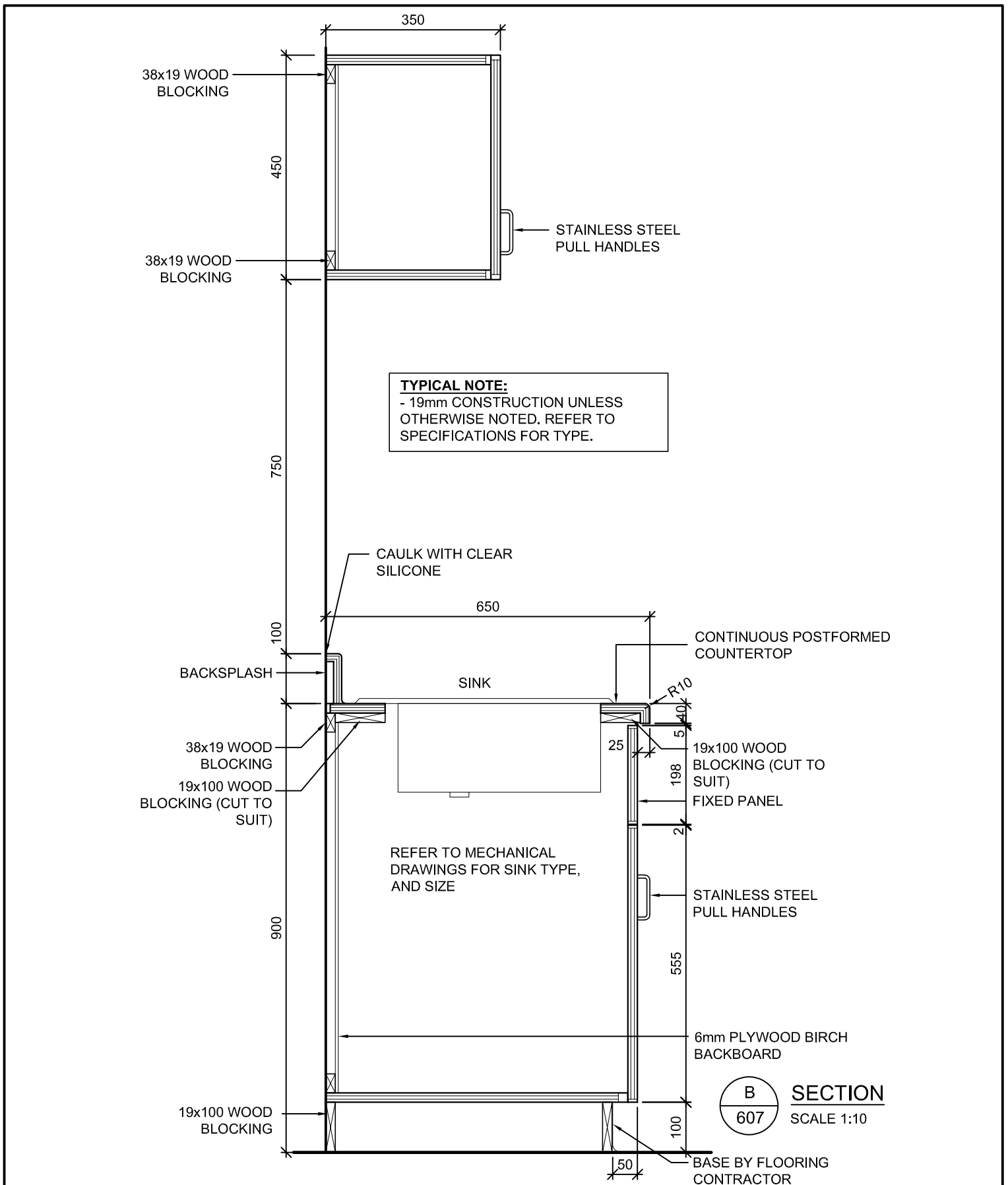


HOLY FAMILY CEMETERY CREMATORIUM
 MILLWORK SECTION DETAIL

PROJ: 2019-08
 SCALE: AS NOTED
 DRAWN: DW
 DATE: 2023-06-29

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 606

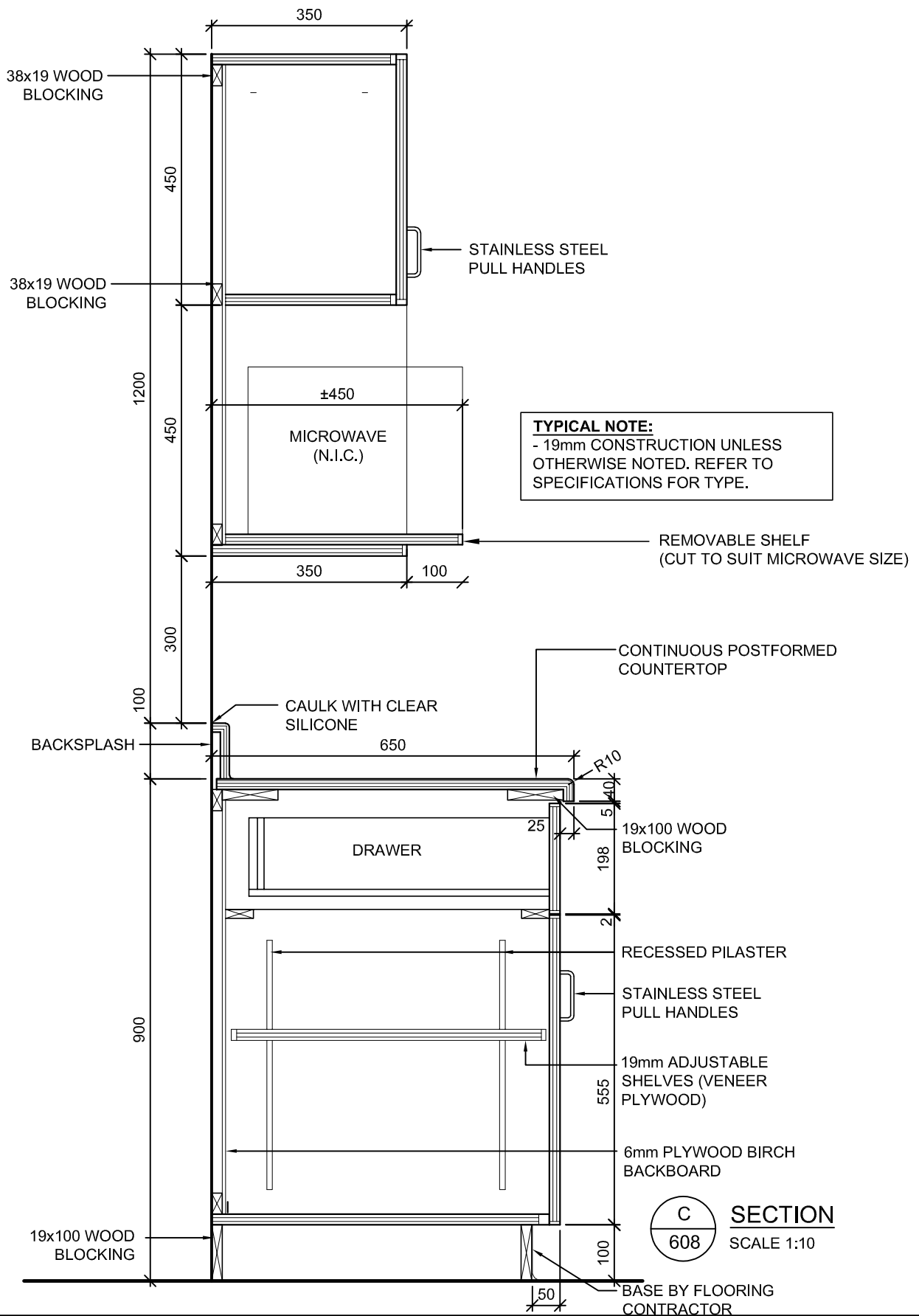


HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK SECTION DETAIL

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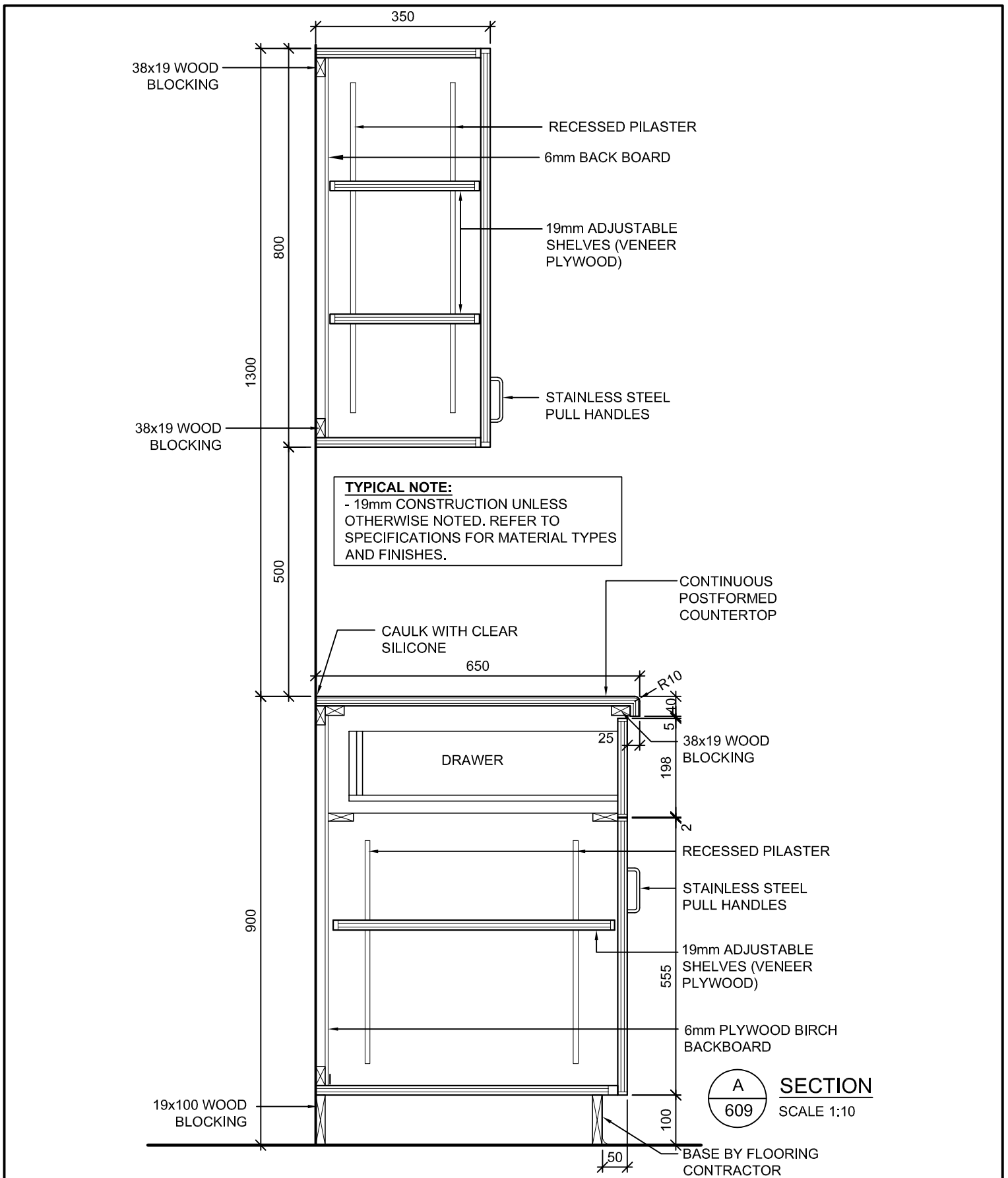


HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK SECTION DETAIL

PROJ: 2019-08
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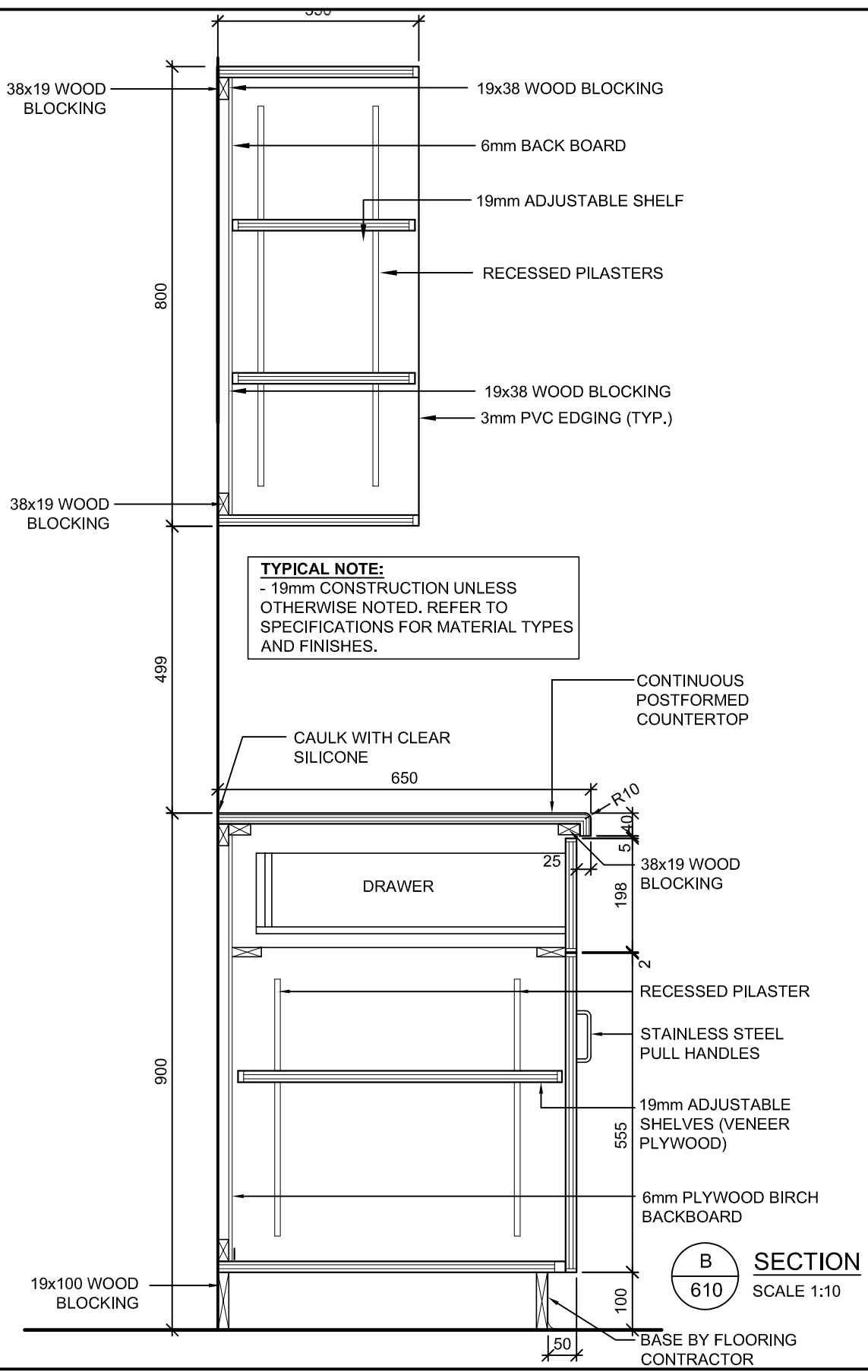


HOLY FAMILY CEMETERY CREMATORIUM
MILLWORK SECTION DETAIL

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HOLY FAMILY CEMETERY CREMATORIUM
 MILLWORK SECTION DETAIL

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