Dovercourt Recreational Centre

Addition & Renovations

City of Ottawa

Specifications

Issued for Construction

ISSUED OCTOBER 5, 2017

HOBIN

ARCHITECTURE

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 31 - EARTHWORK

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REPORT

July 2015

REPORT ON

Geotechnical Investigation Dovercourt Recreational Centre Expansion Phase II

Submitted to:
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4 copies - Dovercourt Recreation Association
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1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out at the site of a proposed Phase II expansion at the Dovercourt Recreational Centre located at 411 Dovercourt Avenue in Ottawa, Ontario. The work was carried out in general conformance with our proposal dated March 16, 2015 and authorised by Mike Tait from the Dovercourt Recreational Association on May 26, 2015.

The purpose of the geotechnical investigation was to assess the subsurface conditions at the site of the proposed expansion by means of three boreholes from the current investigation as well as available subsurface information from past studies, a past geophysical survey, and a limited number of laboratory tests.

Based on an interpretation of the factual information available for this site, a general description of the subsurface conditions across the site is presented. The interpreted subsurface conditions and available project details were used to prepare engineering guidelines on the geotechnical design aspects of the project, including construction considerations which could influence design decisions.

The reader is referred to the "Important Information and Limitations of This Report" which follows the text but forms an integral part of this document.

2.0 BACKGROUND

2.1 Description of Site

The main entrance to the Dovercourt Centre is located approximately in the centre of the south side of the existing building. A canopy with a semi-circle drop-off roadway with two accesses onto Dovercourt Avenue is currently located in front of the main entrance. To the west of the main entrance roadway, bicycle racks and a garbage enclosure are located on a large concrete pad/sidewalk. To the east of the main entrance roadway, several large mature trees are located in a grass covered area with large beds of flowers and bushes.

In general, the topography at the site of the proposed expansion is relatively flat, sloping slightly down and away from the existing building and towards Dovercourt Avenue. At the west end of the proposed expansion and to the west of the existing garbage enclosure, the ground slopes down more steeply to the lower walk-out basement and parking lot level.

Previous subsurface investigations were carried out by Golder Associates (Golder) in 1986 and 2013. The following reports were used for this study:

1) Report to Barry Hobin/Richard Limmert, Architects by Golder titled: "Additional Subsurface Investigation, Westboro Community Centre, Ottawa, Ontario", dated February 1986 (Report No. 861-2020).

2) Report to the City of Ottawa by Golder titled: "Phase 1 of the Dovercourt Recreational Centre Expansion, 411 Dovercourt Avenue, Ottawa, Ontario", dated December 2013 (Report No. 13-1121-0256).

From those previous Golder studies, the depth to the bedrock surface was found to vary significantly across the site resulting in foundations consisting of spread footings in some areas, and driven steel piles in others. A combination of slab on grade construction and a structural slab is also expected in the existing structure.

From the existing information and geological mapping, the subsurface conditions at this site are expected to consist of fill, over peat, silty clay and/or organic silt, over glacial till, over bedrock. The bedrock in this area consists of limestone, dolostone and sandstone of the Gull River formation. The depth to the surface of the bedrock is expected to be about 2 to 6 metres.

2.2 Description of Project

Plans are being prepared for an expansion on the south side of the Dovercourt Recreational Centre in Ottawa, Ontario (see Key Plan, Figure 1).

The Dovercourt Recreation Centre is located at 411 Dovercourt Avenue, on the north-west corner of Roosevelt Avenue and Dovercourt Avenue in Ottawa, Ontario. The current recreational centre is mostly rectangular shaped, two storeys with a lower walk-out basement. The main floor is at about elevation 76.5 metres, and the basement floor is at about elevation 73.17 metres. The main level of the recreational centre currently consists of a pool area to the east, reception, offices, a foyer, a social café and washroom in the center of the building and in front of the main entrance, and an assembly hall and a multipurpose room to the west. A gym and childcare facilities are understood to occupy the lower levels.

The currently proposed Phase II expansion includes a one (1) storey, slab at grade addition to be built onto most of the south side of the existing building. The expansion will be approximately rectangular in shape, and measure about 45 metres in length by about 3.5 to 7.0 metres in width in plan view. The new addition will extend from the existing garbage area at the west end, to the east side of the existing building at the east end.

2.3 Shear Wave Velocities

The results of the Vertical Seismic Profile (VSP) testing carried out in borehole 13-1 put down as part of the Golder 2013 study are presented in Appendix D. The results indicate that the harmonic average shear wave velocity for a depth of 30 metres below the foundations at that location (i.e., Phase I expansion built in 2014) is about 626 metres per second.

3.0 PROCEDURE

The field work for the current study was carried out between June 10 and 11, 2015. During that period, three boreholes numbered 15-1, 15-2 and 15-3 were put down at the locations shown on Figure 2. The boreholes were advanced using a truck-mounted hollow-stem auger drill rig supplied and operated by Marathon Drilling Co. Ltd. of Greely, Ontario. The boreholes were advanced to depths ranging from about 3.7 to 5.5 metres below the present ground surface.

Within the boreholes, standard penetration tests (ASTM D1586) were carried out at regular intervals of depth, and samples of the soils encountered were recovered using drive-open sampling equipment.

Bedrock was proven for depths ranging from approximately 1.6 to 1.7 metres in boreholes 15-1 and 15-2, respectively, while obtaining NQ size rock cores using rotary diamond drilling.

The field work was supervised by an experienced technician from our staff who located the boreholes, directed the drilling operation, logged the boreholes, took custody of the samples, and directed the in situ testing.

The borehole locations were selected by Golder Associates personnel, and located in the field using existing site features. The elevation of the boreholes was established using GPS technology, and the locations were referenced to the existing building.

Upon completion of the drilling operations, samples of the soils and bedrock obtained from the boreholes were transported to our laboratory for examination by the project engineer and for laboratory testing on selected samples.

4.0 SUBSURFACE CONDITIONS

4.1 General

The subsurface conditions encountered in boreholes 15-1, 15-2 and 15-3, put down as part of the current study, are shown on the Record of Borehole sheets in Appendix A. Photos taken of the bedrock cores from boreholes 15-1 and 15-3 are shown in Appendix B. The relevant boreholes from the past 1986 and 2013 Golder studies are shown on the Record of Borehole sheets in Appendix C.

The subsurface conditions encountered during the current study consist of pavement (i.e. sidewalk/concrete) or topsoil, over fill, over silty clay over weathered to fresh limestone and sandstone bedrock.

The following sections present a more detailed overview of the subsurface conditions encountered in the borehole from the current study only.

4.2 Concrete, Topsoil and Fill

Concrete pavement was encountered in boreholes 15-1 and 15-2. The concrete is about 130 millimetres in thickness and is underlain by a grey crushed stone granular base about 100 to 150 millimetres in thickness. Below the granular base at boreholes 15-1 and 15-2, about 2.3 to 3.6 metres of brown gravelly silty sand to silty sand fill was encountered.

Silty sand topsoil about 100 millimetres thick was encountered in borehole 15-3. Below the topsoil, about 2.3 metres of gravelly silty sand fill was encountered.

Standard Penetration Test (SPT) 'N' values ranging from 12 to 34 blows per 0.3 metres of penetration obtained in the fill indicate that this layer is generally compact to dense.

4.3 Silty Clay and Organics

Below the fill, a layer of silty clay was encountered in boreholes 15-1 and 15-2 directly over the bedrock bedrock. The silty clay is about 100 to 160 millimetres thick. In both boreholes, the silty clay was found to have trace amounts of organics and/or rootlets. The silty clay deposit is too thin to obtain reliable SPT 'N' values, or field shear vanes. However, based on visual observations only this layer seems to be very stiff in consistency.

In borehole 15-1, an approximately 100 millimetre thick layer of organic silt mixed with silty clay exists between the upper fill and the lower silty clay layers, which could indicate the presence of the previous native topsoil layer.

4.4 Bedrock

Practical refusal to augering was encountered in all boreholes at about 2.6 to 4.0 metres depth below existing ground surface. Auger refusal may indicate the bedrock surface; however, it could also represent cobbles and/or boulders above the bedrock.

Boreholes 15-1 and 15-3 were advanced into bedrock using rotary coring techniques. The depths and elevations of the bedrock surface, as well as the ground surface elevations at the boreholes are shown in the following table.

Borehole No.	Ground Surface Elevation in Borehole (m)	Refusal or Bedrock Depth (m)	Bedrock Surface Elevation (m), Geodetic[1]
15-1	76.0	4.0	72.0
15-2	76.2	3.7	72.5[R]
15-3	76.5	2.6	73.9

[1] – Indicates elevation of sound bedrock surface below the upper weathered zone.
[R] – Auger refusal.

The bedrock encountered in the boreholes consists of thin to medium-bedded grey limestone with black shale interbeds. In borehole 15-2 very thinly-bedded grey sandstone with shale interbeds was encountered below the limestone at about 3.8 metres depth. The upper zone of the limestone is weathered and fractured becoming slightly weathered to fresh below the weathered zone.

The Rock Quality Designation (RQD) values ranged from 39 to 94 percent indicating poor to excellent quality rock. In general the RQD values increase with depth.

4.5 Groundwater

Piezometers or monitoring wells were not installed as part of the current investigation. However, the groundwater conditions were observed and documented for the short period of time that the boreholes remained open. Groundwater was not observed in any of the boreholes.

Groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

5.0 DISCUSSION

5.1 General

This section of the report provides engineering guidelines on specific geotechnical design aspects of the project based on our interpretation of the previous and current borehole information and project requirements.

The results and guidelines presented herein are subject to the limitations in the "Important Information and Limitations of this Report" attachment which follows the text of this report but forms an integral part of this document.

5.2 Foundation Seismic Design

The National Building Code 2012 (NBC 2010) requires the use of time-averaged (harmonic) shear wave velocity (V_s) in the upper 30 metres for assigning the appropriate site class. The measured shear wave velocities are to be averaged over 30 metres immediately below the bottom of the basement, spread footing foundation or pile cap.

Due to the general similarities in subsurface properties from the 2013 and the 2015 investigation, the seismic class for this site was assigned by extrapolating the 2013 VSP (see Appendix D) results in borehole 13-1. The values of shear wave velocity for the fill, organics and bedrock layers from the 2013 study were extrapolated to the profile of the 2015 boreholes. Where there were outliers in subsurface similarities (i.e. the silty clay and organics), a conservative value of 100 metres/second was assumed.

The harmonic mean shear wave velocity of the subsurface soil and bedrock in the upper 30 metres depth was calculated by the following equation:

$$V_s = \text{total thickness of all layers} / \sum (\text{each layer thickness/each layer shear wave velocity})$$

The harmonic mean shear wave velocity in the upper 30 metres below the expected foundation level (i.e., below the pile caps) was thus calculated at be 839 metres per second in the area of the proposed addition. On this basis, the site is classified as "Site Class B" as per Table 4.1.8.4.A given in Part 4 of OBC 2012, provided that there is less than 3 metres of overburden between the foundations and the bedrock surface. However, the response of the site is also dependant on the location of the lateral resisting structural members (i.e., shear walls). In the event that the new addition is being tied into the new building for lateral support, then the site response must consider the response of the entire building footprint. At the location of the previous 2014 addition at the northwest corner of the community centre, the average shear wave velocities were calculated to be about 626 metres per second. On this basis, the site would be classified as "Site Class C" in accordance with OBC 2012.

5.3 Excavations

The slab on grade of the new addition will be built to match the existing building ground floor slab at about elevation 76.5 metres. Considering that the excavation will likely need to extend a further 1.5 to 1.8 metres below the proposed slab on grade level to accommodate the foundations for frost protection, excavations would be required to extend to about elevation 74.7 to 75.0 metres.

The excavation will therefore extend through the surficial pavement/topsoil and into the fill.

No unusual problems are anticipated in excavating in the overburden using conventional hydraulic excavating equipment, recognizing that some large pieces of deleterious material (i.e., steel, concrete or asphalt, old construction debris) could be present in the fill.

The Occupational Health and Safety Act (OHSA) of Ontario indicates that side slopes in the overburden above the water table should be sloped no steeper than 1 horizontal to 1 vertical (i.e. Type 3 soils). Steeper side slopes would require shoring to meet the requirements of the OHSA. Based on our understanding of this project, it is considered that shoring will likely not be required for the construction of foundations. Additional guidelines on temporary shoring could be provided if required.

Based on the nearby walk-out basement level at a much lower elevation (i.e., about 73.2 metres), groundwater inflow into the excavation is not anticipated to be significant. On this basis, it should be possible to handle the limited amount of groundwater inflow or rainwater into the excavation by pumping from well filtered sumps established in the floor of the excavations. Based on the size of the proposed addition and the depth of the excavation and water table, it is considered that a Permit To Take Water (PTTW) will not be required for this project. A PTTW is required if the water pumping rates from the excavation exceed 50,000 litres per day.

5.4 Foundation Options

In general, the subsurface conditions encountered in the boreholes from the current investigation consist of pavement or topsoil, over fill, over a limited thickness of silty clay over bedrock. The depth to bedrock from the anticipated foundation elevation of about 75 metres ranges from about 0.8 metres at borehole 15-3 to about 3.0 metres at borehole 15-1.

Based on these ground conditions, the proposed addition could be supported on one or a combination of the following foundation options:

1) Spread footing on engineered fill or on the deeper bedrock surface;

2) Helical piers; or,

3) Micro piles.

As indicated previously, up to about 3 metres of uncontrolled fill is anticipated below the foundations, assuming a founding level of about elevation 75.0 metres. This thickness of fill is considered the break-even point where other foundation options become more economical, such as the use of helical piers.

Driven pipe piles were also considered, but due to the limited depth to bedrock, as well as the noise and vibration impacts on the nearby centre, they were not considered suitable for this project.

5.4.1 Spread Footing on Engineered Fill

The SLS net bearing resistance for spread footings founded on engineered fill (placed over the bedrock) may be taken as 300 kilopascals and the ULS factored bearing resistance may be taken as 500 kilopascals. The post-construction total and differential settlements of footings sized using the above SLS bearing resistance should be less than about 25 and 12 millimetres, respectively.

The engineered fill should extend out and down from the edge of the footings at a slope not steeper than 1 horizontal to 1 vertical. The engineered fill should consist of Ontario Provincial Standard Specification (OPSS) Granular A or Granular B Type II, placed in maximum 300 millimetre thick lifts, and compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

The rock bearing surface should be inspected by qualified geotechnical personnel to confirm that the surface has been acceptably cleaned of soil/fill prior to engineered fill placement.

5.4.2 Spread Footing on Bedrock

Provided there are no continuous soil-filled seams (i.e., 'mud seams') present at shallow depth in the bedrock below the founding level, footings on the bedrock surface, or on a platform of lean concrete (compressive strength of greater than 5 megapascals) extending down to the bedrock surface, may be designed using an Ultimate Limit States (ULS) factored bearing resistance of 2,000 kilopascals. This bearing resistance value is also appropriate for slightly weathered bedrock.

Provided the bedrock surface is properly cleaned of soil and weathered material at the time of construction, the settlement of footings sized using the above factored bearing resistance should be negligible, and therefore Serviceability Limit States (SLS) need not be considered.

Highly weathered or fractured bedrock, which includes bedrock which can be excavated using hydraulic excavating equipment with only moderate effort, would either need to be removed or alternatively a lower bearing resistance value used. If the weathered bedrock is left in place, then a SLS bearing resistance of 300 kilopascals and a ULS factored bearing resistance of 500 kilopascals can be used.

The rock bearing surface should be inspected by qualified geotechnical personnel to confirm that the surface has been acceptably cleaned of soil and, depending on the design bearing resistances, that weathered or excessively fractured bedrock has been removed.

5.4.3 Helical Piers

As an alternative to conventional spread footings at this site on either engineered fill or lowered onto the bedrock, a helical pier foundation could also be considered to transfer the foundation loads through the fill and organic soil to more competent bearing at depth.

Helical piers (typically proprietary to each supplier) would be augered into the ground, advanced through the fill and native overburden to refusal on the underlying bedrock.

The design capacity of the helical piers should be confirmed by the supplier of the units. However, based on information from a local supplier, for preliminary design purposes, a pier with an 89 millimetre diameter shaft and end-bearing on bedrock could have a SLS bearing resistance of 205 kilonewtons and an ULS bearing resistance of 245 kilonewtons. The capacity of the piers should be confirmed at the time of installation with in-situ load tests.

Helical piers, however, might be difficult to install through the fill. Experience on similar sites overlain with fill has shown that obstructions, such as large pieces of concrete/boulders can prevent the helical piers from reaching the more competent bearing at depth (i.e., bedrock).

Based on the limited amount of overburden to provide lateral restrain to the pile, additional structural fixity at the pile cap could be required.

5.4.4 Micro Piles

Consideration could also be given to using a micro pile foundation system to transfer the foundation loads through the fill and organic soil to more competent bearing at depth. The foundation loads would then be transferred to the bedrock and the settlements would result largely from elastic shortening of the micro piles.

These piles typically consist of a minimum 25 millimetre diameter steel bar which is installed in a borehole drilled with rotary diamond drilling equipment with water circulation. A cased hole would be drilled through the overburden, and be socketed into the bedrock, the borehole flushed and filled with grout, and the steel bar inserted.

The design capacity of the micro piles should be confirmed by the supplier of the units, however for preliminary design purposes, a 25 diameter threaded Dywidag Bar could have an ultimate unfactored *structural* load capacity in the order of 550 kilonewtons; a 57 millimetre Gewi pile could have an ultimate unfactored *structural* load capacity in the order of 1,300 kilonewtons. The settlements would result almost entirely from elastic shortening of the piles. A factored grout to bedrock bond strength of 750 kilopascals can be used for design of the micropiles in the limestone and sandstone bedrock.

Micro piles are typically more expensive than helical piers, and are not considered the preferred option.

5.5 Floor Slab

For predictable performance of the floor slab, the existing topsoil and surficial loose fill material should be removed from within the proposed addition area.

Provision should be made for at least 200 millimetres of Ontario Provincial Standard Specification (OPSS) Granular A to form the base for the floor slab. Any bulk fill required to raise the grade to the underside of the Granular A should consist of OPSS Granular B Type II. The underslab engineered fill should be placed in maximum 300-millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

Prior to the placement of engineered granular fill, the exposed existing fill should be compacted and proof rolled using suitable vibratory compaction equipment. Any soft or weak areas exposed during the proof rolling should be removed and replaced with engineered fill.

If the floor slabs are to be surface covered with non-breathable floor coverings, a vapour barrier should be provided above the Granular A base. The concrete slab should then be poured on a 50 millimetre thick layer of concrete sand to promote uniform curing, control the frequency of shrinkage cracks, and control the curling of the formed and saw cut edges of the concrete slab.

5.6 Frost Protection

All exterior foundation elements (e.g., footing, foundation walls, pile caps, grade beams, etc.) or foundation elements in unheated areas should be provided with a minimum of 1.5 metres of earth cover for frost protection purposes. Isolated, unheated foundation elements adjacent to surfaces which are cleared of snow cover during winter months should be provided with a minimum of 1.8 metres of earth cover.

Insulation of the bearing surface with high density polystyrene rigid foam insulation could be considered as an alternative to earth cover for frost protection. The details for footing insulation could be provided if and when required.

5.7 Foundation Backfill

The soils at this site are frost susceptible and should not be used as backfill against exterior or unheated foundation elements (e.g., foundation walls, pile caps, grade beams, etc.). To avoid problems with frost adhesion and heaving, these foundation elements should be backfilled with non-frost-susceptible granular material which meets the gradation requirements for OPSS Granular B Type I.

In areas where pavement or other hard surfacing will about the building, differential frost heaving could occur between the granular fill (if sand or crushed stone is used) and other areas. To reduce this differential heaving, the backfill adjacent to the wall should be placed to form a frost taper. The frost taper should be brought up to pavement subgrade level from 1.5 metres below finished exterior grade at a slope of 3 horizontal to 1 vertical, or flatter, away from the wall. The fill should be placed in maximum 300-millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment. If the top end of the frost taper is located under a sidewalk, the frost taper should be extended to the edge of the concrete. This will prevent a differential frost heave crack forming through the sidewalk.

The pavement could be expected to perform better in the long term if the granular backfill against the foundation walls is drained by means of a perforated pipe subdrain in a surround of 19 millimetre clear stone, fully wrapped in geotextile, which leads by gravity drainage to a positive outlet.

The passive resistance offered by the foundation wall backfill soils could also be considered in evaluating the lateral resistance applied to the foundations. The magnitude of that lateral resistance will depend on the backfill materials and backfill conditions adjacent to the foundation walls. To utilise the lateral resistance from the backfill soils, the weathered silty clay should not be used as backfill against the foundation walls. If the backfill materials consist of compacted granular material (OPSS Granular B Type I) as discussed herein, then the passive resistance acting on the foundation wall may be taken as:

$$\sigma_h(Z) = K_P \gamma Z$$

Where: $\sigma_h(z)$ = Lateral earth resistance applied to the foundation wall at depth z, kilopascals;

K_p = Passive earth pressure coefficient, use 3.0;

γ = Unit weight of retained soil, use 20 kilonewtons per cubic metre; and,

Z = Depth below top of wall, metres.

This resistance is provided in unfactored format. Factoring of the calculated resistance value will be required if the design is being carried out using Limit States Design.

Movement of the backfill and wall is required to mobilize the passive resistance. Movement of about 2% of the height of the wall would be required to mobilize the maximum passive resistance of well compacted OPSS Granular B Type I. For movement less than 2 percent, the passive resistance can be estimated based on linear interpolation.

It is understood that the existing building has a full basement adjacent to the proposed addition that will not have a basement. As such, backfill placed within 1 metre of the existing building's foundation walls should be compacted with smaller walk-behind compaction equipment to avoid overstressing the existing basement walls.

5.8 Site Servicing

Excavations for the installation of site services will be mostly through fill. Excavations in the bedrock are not anticipated for this project.

At least 150 millimetres of OPSS Granular A should be used as pipe bedding for sewer and water pipes. Where unavoidable disturbance to the subgrade surface does occur, it may be necessary to place a sub-bedding layer consisting of compacted OPSS Granular B Type II beneath the Granular A or to thicken the Granular A bedding. The bedding material should in all cases extend to the spring line of the pipe and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density.

Cover material, from spring line of the pipe to at least 300 millimetres above the top of pipe, should consist of OPSS Granular A or Granular B Type I with a maximum particle size of 25 millimetres. The cover material should be compacted to at least 95 percent of the material's standard Proctor maximum dry density.

It should generally be possible to re-use the existing silty sand fill as trench backfill. Where the trench will be covered with hard surfaced areas, the type of material placed in the frost zone (between subgrade level and 1.8 metres depth) should match the soil exposed on the trench walls for frost heave compatibility. Trench backfill should be placed in maximum 300 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable compaction equipment.

The high water content, compressibility and long term degradation of the organic silt layer makes this material difficult to handle and compact and, if used, long-term settlement of the pavement or hard surfaces can be expected. If organic silt is excavated during installation of the site services, this material should be wasted.

5.9 Flexible Asphaltic Concrete Pavement Design

It is understood that a new drop off area in front of the main entrance will be built as part of the new addition. Due to the anticipated heavy bus traffic on this drop-off roadway, a heavy duty pavement is recommended. The following sections provide guidance on the construction of a flexible asphaltic concrete heavy duty pavement for the new drop off roadway structure.

5.9.1 Hot Mix Asphaltic Concrete

Superpave 12.5 (Level B) surface course and Superpave 19.0 (Level B) base course asphaltic concrete should be used on this project. The hot mix asphaltic concrete should meet the requirements of OPSS 301.

5.9.2 Asphalt Cement

The asphaltic concrete used on this project should be made with PG 58-34 asphalt cement on all lifts.

5.9.3 Granular Base and Subbase

The granular base and subbase for new construction should consist of Granular A and Granular B Type II, respectively. The granular materials used on site should meet the requirements of OPSS.MUNI 1010.

5.9.4 Compaction

Compaction of the granular base, subbase and grade raise fill should be carried out in accordance with OPSS 501 Method A. The asphaltic concrete should be compacted in acceptance with Table 10 of OPSS 310.

5.9.5 Pavement Structure

The heavy duty pavement structure for roadways should consist of:

Pavement Component	Thickness (mm)
Asphaltic Concrete	90
OPSS Granular A Base	150
OPSS Granular B Type II Subbase	450 over recompacted fill subgrade

The composition of the asphaltic concrete pavement should be as follows:

Heavy Duty Pavement:

- Superpave 12.5 – 40 millimetres; and,
- Superpave 19.0 – 50 millimetres.

The above pavement design is based on the assumption that the pavement subgrade has been acceptably prepared (i.e., where the trench backfill and grade raise fill have been adequately compacted to the required density and the subgrade surface not disturbed by construction operations or precipitation). Depending on the actual conditions of the pavement subgrade at the time of construction, it could be necessary to increase the thickness of the subbase and/or to place a woven geotextile beneath the granular materials. Special transition treatments could also be required where the new drop-off roadway ties into the existing pavement at Dovercourt Avenue.

5.10 Corrosion and Cement Type

One sample of soil from borehole 15-2 was submitted to Exova Laboratories Ltd. for chemical analysis related to potential corrosion of exposed buried steel and concrete elements (corrosion and sulphate attack). The results of this testing are provided in Appendix E. The results indicate that concrete made with Type GU Portland cement should be acceptable for substructures. The results also indicate a very high potential for corrosion of exposed ferrous metal.

6.0 ADDITIONAL CONSIDERATIONS

The soils at this site are sensitive to disturbance from ponded water, construction traffic and frost.

All subgrade areas should be observed by experienced geotechnical personnel prior to filling to confirm that soil having adequate bearing capacity (for roadways and parking lots) has been reached and that the bearing surfaces have been properly prepared. Furthermore, the installation of the helical pier or micro-pile foundations should be monitored by qualified geotechnical personnel. The placing and compaction of any engineered fill as well as sewer bedding and backfill should be observed by geotechnical personnel to confirm that the materials used conform to the specifications from both a grading and compaction view point. In addition, hot mix asphalt should be sampled and tested to document compliance with material specifications.

Golder should be retained to review the final grading plans and foundations plans to ensure that the guidelines in this report have been adequately interpreted.

7.0 CLOSURE

We trust that this report contains sufficient information for your present purposes. If you have any questions regarding this report or if we can be of further service to you on this project, please call us.

Yours truly,

GOLDER ASSOCIATES LTD.

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Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client, **Dovercourt Recreation Association**. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

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The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT (cont'd)

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. **The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

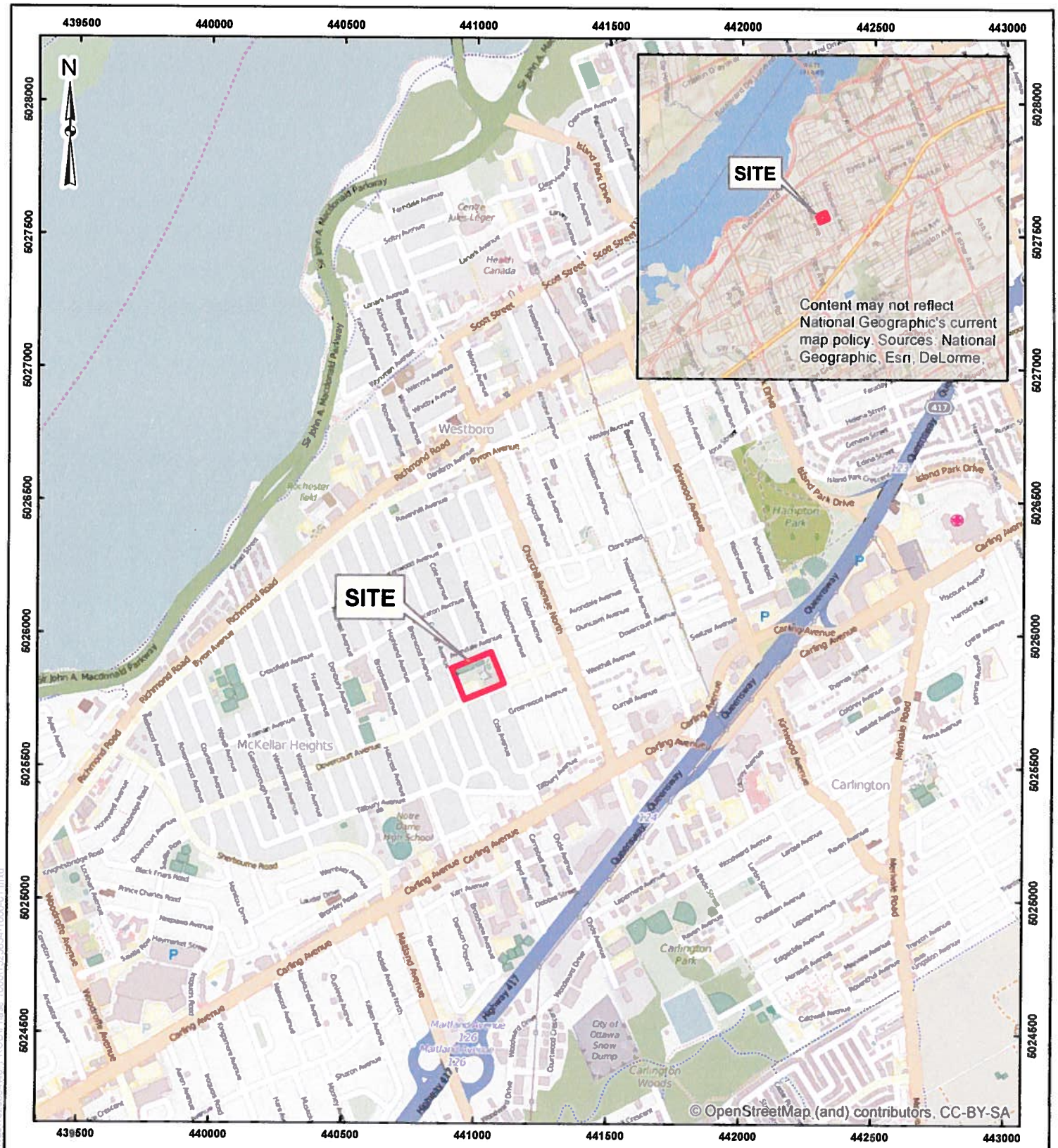
Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



LEGEND

SITE

0 200 400 600 800 1,000 Metres

SCALE 1:20,000

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT No. 1525834

REFERENCE

DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18

PROJECT: GEOTECHNICAL INVESTIGATION
DOVERCOURT RECREATIONAL CENTRE EXPANSION PHASE 2
411 DOVERCOURT AVENUE, OTTAWA, ONTARIO

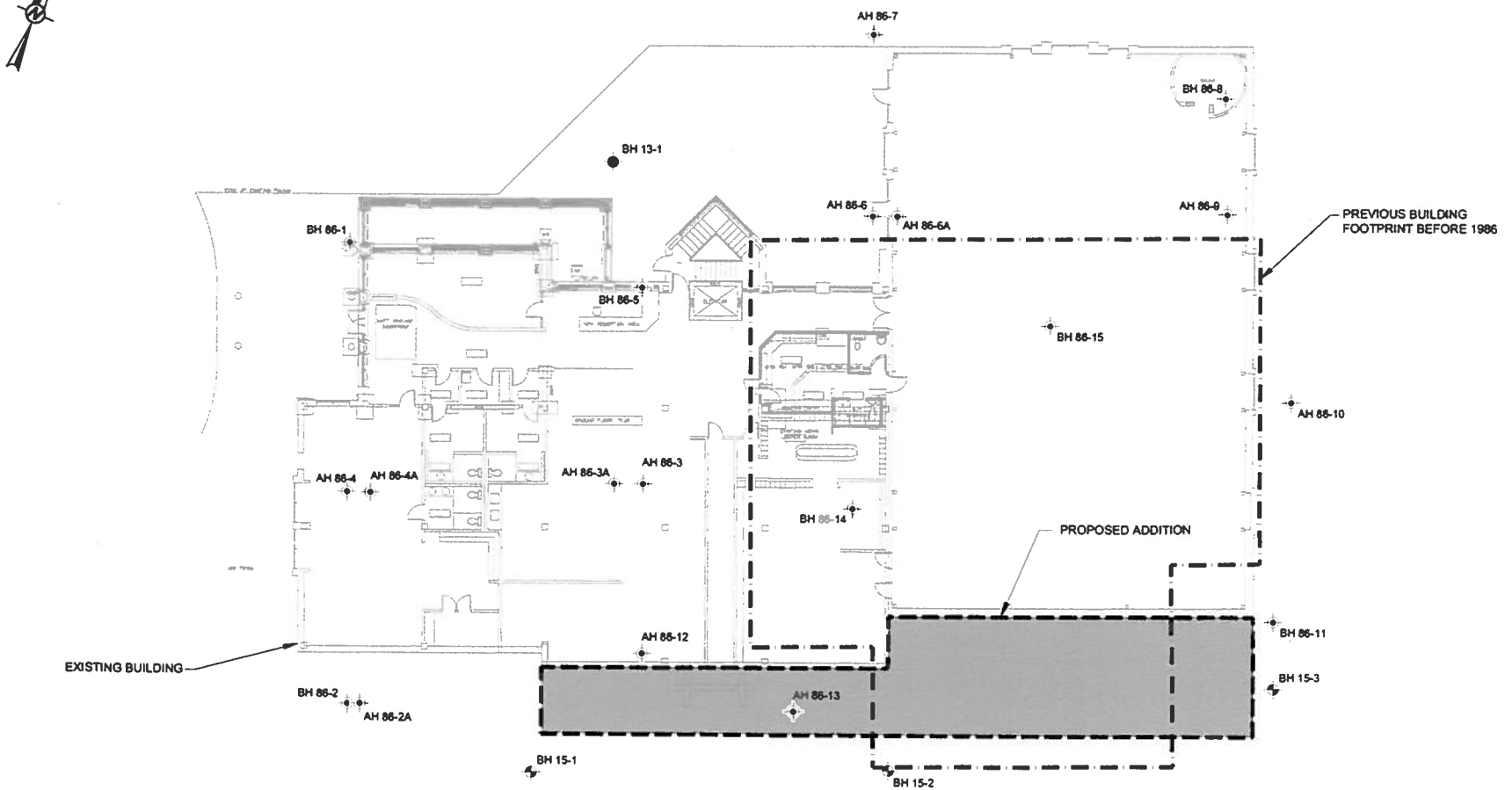
TITLE: **KEY PLAN**

Golder Associates

PROJECT No. 1525834			SCALE AS SHOWN	REV 0.0
DESIGN	NRL	2015-06-19		
GIS	JEM	2015-06-19		
CHECK	NRL	2015-07-09		
REVIEW	MSS	2015-07-09		

FIGURE 1

N:\Active\Spatial\MXD\Ottawa\Dovercourt Addition\99_PRO\1525834\000_PRO\Phase 1000\1525834-1000-01.mxd



LEGEND

- APPROXIMATE BOREHOLE LOCATION, CURRENT INVESTIGATION
- APPROXIMATE BOREHOLE LOCATION, PREVIOUS INVESTIGATION BY GOLDER ASSOCIATES LTD., REPORT No 13-1121-0258
- APPROXIMATE BOREHOLE/AUGERHOLE LOCATION, PREVIOUS INVESTIGATION BY GOLDER ASSOCIATES LTD., REPORT No 881-2020

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT No. 1525824

REFERENCE(S)

1. BASE PLAN PROVIDED IN ELECTRONIC FORMAT BY BARRY J. HOBIN & ASSOCIATES ARCHITECTS INCORPORATED, PROJECT "DOVERCOURT RENOVATION - A01", 01/01/15
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

0 5 10
1:250 METRES

CLIENT
CITY OF OTTAWA
DOVERCOURT RECREATION ASSOCIATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-23
PREPARED	SGLUM
DESIGN	---
REVIEW	NRL
APPROVED	MSS

PROJECT
GEOTECHNICAL INVESTIGATION
DOVERCOURT RECREATIONAL CENTRE EXPANSION PHASE 2
411 DOVERCOURT AVENUE, OTTAWA, ONTARIO

TITLE
SITE PLAN

PROJECT No.	PHASE	Rev	FIGURE
1525834	1000	A	2

APPENDIX A

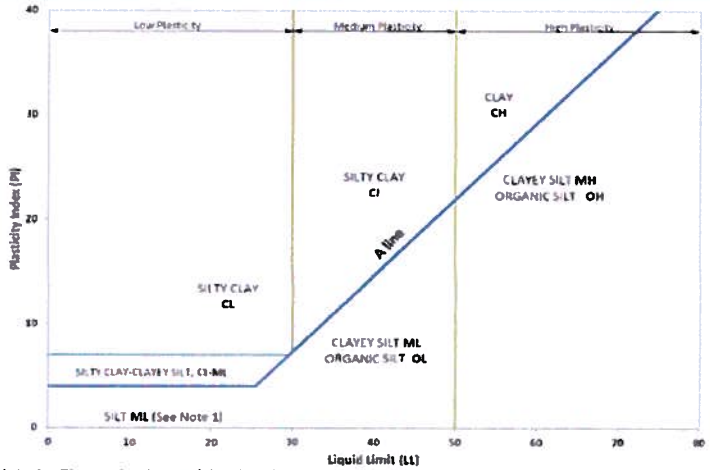
Method of Soil Classification
Abbreviations and Terms Used on Record of Boreholes and Test Pits
List of Symbols
Record of Boreholes from Current Investigation

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.

Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.

For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.

For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.

A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to ~~or~~ indicates a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.*, SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_P	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
σ_1, σ_2, σ_3	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation
w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 1525834

RECORD OF BOREHOLE: 15-1

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: June 10, 2015

DATUM: Geodetic

SAMPLER HAMMER, 64kg, DROP, 760mm

PENETRATION TEST HAMMER, 64kg, DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m
		GROUND SURFACE		75.98			
0		CONCRETE		0.00			
		FILL - (SW) gravelly SAND; angular; grey; (PAVEMENT STRUCTURE)		0.13 75.70			
		FILL - (SP) SAND, fine; brown; non-cohesive, moist		0.28 75.37			
		FILL - (SM) gravelly SILTY SAND, fine to medium; angular; brown; non-cohesive, moist		0.61 75.17			
		FILL - (CL) SILTY CLAY, trace to some gravel, trace to some sand; dark brown; cobbles; organic matter; rootlets; gravelly silty sand pockets/layers; cohesive, w>PL, very stiff		0.81	1	SS	18
1							
	Power Auger 200 mm Diam (Hollow Stem)				2	SS	30
2							
					3	SS	12
3							
					4	SS	34
				72.32			
		(OL) Organic SILT mixed with SILTY CLAY; dark brown; non-cohesive to cohesive, w>PL, very stiff		3.66 72.17			
				3.81	5	SS	>50
4		(CI/CH) SILTY CLAY to CLAY; grey brown; rootlets; cohesive, w>PL, very stiff		3.95			
	Rotary Drill NQ Core	Fresh, medium to thinly bedded, grey, fine to medium grained, non-porous, medium strong, LIMESTONE, with thin laminations to very thin beds of black shale			C1	RC	DD
5							
					C2	RC	DD
				70.44			
		End of Borehole		5.54			
6							
7							
8							

SAMPLES

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)

SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})

WATER CONTENT PERCENT Wp I ⊖W I Wl (20 40 60 80)

ADDITIONAL LAB TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 40

LOGGED: RI

CHECKED: NRL

Golder Associates

MIS-BHS 001 1525834.GPJ GAL-MIS.GDT 07/09/15 SGL

PROJECT: 1525834

RECORD OF DRILLHOLE: 15-1

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: June 10, 2015

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Co. Ltd.

JN - Joint; FLT - Fault; SHR - Shear; VN - Vein; CJ - Conjugate; BD - Bedding; FO - Foliation; CO - Contact; OR - Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO - Polished; K - Slickensided; SM - Smooth; RO - Rough; MB - Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	COLOUR % RETURN	FLUSH	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG
		BEDROCK SURFACE		72.03																
4	Rotary Drill / NQ Core	Fresh, medium to thinly bedded, grey, fine to medium grained, non-porous, medium strong, LIMESTONE, with thin laminations to very thin beds of black shale		3.95	1															
5					2															
				70.44																
		End of Borehole		5.54																
6																				
7																				
8																				
9																				
10																				
11																				

DEPTH SCALE

1 : 40

LOGGED: RI

CHECKED: NRL

Golder Associates

MIS-RCK 004 1525834.GPJ GAL-MISS.GDT 07/09/15 SGL

PROJECT: 1525834

RECORD OF BOREHOLE: 15-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: June 10, 2015

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp I ⊙ W I Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger 200 mm Diam (Hollow Stem)	GROUND SURFACE		76.23							
		CONCRETE		0.00							
		FILL (SW) gravelly AND; angular grey (PAV MENT STRUCTURE)		0.13							
		FILL (SW) gravelly SAND; medium to coarse; dark brown non-cohesive moist		0.23							
		FILL (SM) gravelly SILTY SAND with pockets of silty clay dark brown to brown; cobbles non-cohesive moist compact		75.70 0.53							
1					1	SS	17				
2					2	SS	12				
					3	SS	20				
3				72.88	4	SS	14				
		(CL) SILTY CLAY trace to some sand, trace gravel, brown rootlets organic matter (on top) cohesive w>PL, very stiff		72. 51							
		Broken up rock and silty sand (WEATH RED BEDROCK)		72.52 71							
4		End of Borehole Auger Refusal									
5											
6											
7											
8											

MIS-BHS 001 1525834.GPJ GAL-MIS.GDT 07/0 1 SGL

DEPTH SCALE
1 : 40

Golder Associates

LOGGED: RI

CHECKED: NRL

PROJECT: 1525834

RECORD OF BOREHOLE: 15-3

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: June 11, 2015

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		76.54				SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; 20 40 60 80)	WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)		
0	Power Auger 200 mm Diam (Hollow Stem)	TOPSOIL - (SM) SILTY SAND, trace gravel; dark brown; organic matter, rootlets; non-cohesive, moist		0.00 / 0.10							
		FILL (SW) gravelly SILTY SAND; dark brown, organic matter, pieces of asphaltic concrete, rootlets, cobbles; non-cohesive, moist, compact			1	SS	28				
1											
					2	SS	21				
2				74.25							
		FILL - (SM) gravelly SAND, fine to coarse, trace to some non-plastic fines; brown; non-cohesive, moist, compact		2.28 / 2.36	3	SS	>50				
		Weathered ROCK		73.93 / 2.61							
3	Rotary Drill NQ Core	Fresh to slightly weathered, thinly bedded, grey, fine to medium grained, non-porous, medium strong to weak, LIMESTONE, with thin laminations to very thin beds of black shale			C1	RC	DD				
				72.72							
4		Fresh, very thinly bedded, grey, fine to medium grained, slightly porous, medium strong SANDSTONE, with thin laminations to thick laminations of black shale		3.82 / 72.20	C2	RC	DD				
		End of Borehole		4.34							
5											
6											
7											
8											

DEPTH SCALE
1 : 40

Golder Associates

LOGGED: RI
CHECKED: NRL

MIS-BHS 001 1525834.GPJ GAL-MIS.GDT 07/09/15 SGL

PROJECT: 1525834

RECORD OF DRILLHOLE: 15-3

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: June 11, 2015

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Co. Ltd.

JN - Joint; FLT - Fault; SHR - Shear; VN - Vein; CJ - Conjugate; BD - Bedding; FO - Foliation; CO - Contact; OR - Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO - Polished; K - Slickensided; SM - Smooth; Ro - Rough; MB - Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	COLOUR SECTION / FLUSH	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: D Angle	DISCONTINUITY DATA: DIP w.r.t CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC - Q' AVG
		BEDROCK SURFACE		73.93															
3	Rotary Drill / NQ Core	Fresh to slighlly weathered thinly bedded grey fine to medium grained non-porous medium strong to weak LIMESTONE with thin laminations to very thin beds of black shale		2.61	1														
				72.72															
4		Fresh very thinly bedded, grey fine to medium grained slighlly porous medium strong SANDSTONE with thin laminations to thick laminations of black shale		3.82	2														
				72.20															
		End of Drillhole		4.34															
5																			
6																			
7																			
8																			
9																			
10																			

DEPTH SCALE

1 : 40

LOGGED: RI

CHECKED: NRL

Golder Associates

MIS-ROCK 004 1525834.GPJ GAL-MISS.GDT 07/09/15 SGL

APPENDIX B

Photographs of Bedrock Cores

Bedrock core from BH 15-1 (dry)
3.95 m to 5.54 m depth

Bedrock core from BH 15-1 (wet)
3.95 m to 5.54 m depth

Golder Associates	**Geotechnical Investigation** **Dovercourt Recreational Centre Expansion (Phase II)** **411 Dovercourt Avenue, Ottawa, Ontario**	Project No. 1525834 Drawn: NRL Date: 03/07/2015 Checked: NRL Review:	**B-1**

Bedrock core from BH 15-3 (dry)
2.61 m to 4.34 m depth

Bedrock core from BH 15-3 (wet)
2.61 m to 4.34 m depth

Golder Associates	**Geotechnical Investigation** **Dovercourt Recreational Centre Expansion (Phase II)** **411 Dovercourt Avenue, Ottawa, Ontario**	Project No. 1525834 Drawn: NRL Date: 03/07/2015 Checked: NRL Review:	**B-2**

APPENDIX C

Record of Boreholes from Previous Investigations

PROJECT: 13-1121-0256

RECORD OF BOREHOLE: 13-1

SHEET 1 OF 3

LOCATION: See Site Plan

BORING DATE: November 13, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (200 400 600 800) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger 200 mm Diam. (Hollow Stem)	GROUND SURFACE		73.07							
		ASPHALTIC CONCRETE		0.00							
		FILL - (GW/SW) fine to coarse SAND and GRAVEL, well graded, angular; grey; non-cohesive, moist, compact		0.10							
		FILL - (SM) SILTY SAND, fine, trace to some gravel; grey to brown; non-cohesive, moist, compact to loose		0.25	1	50 DO	17				
1											
2		(PT) Fibrous PEAT; brown		71.24 1.83	2	50 DO	4			190.7	
		(PT) Fibrous PEAT, with seams of marl with white shells		70.48 2.59	3	50 DO	1			329 OC = 64.4% 316	
3					4	50 DO	1			OC = 127.3 15.7%	
4					5	50 DO	3				
		(SM) SILTY SAND, fine, trace gravel; grey; non-cohesive, wet, very loose		68.80 4.27							
		(SM) SILTY SAND, some gravel, well graded; grey, (GLACIAL TILL); non-cohesive, wet, compact		68.50 4.57	6	50 DO	>50				
5	RD HW										70 mm Diam. VSP Pipe
		Slightly weathered to fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK, with white calcite veins		67.76 5.31	7	HQ RC	DD				
6											
7					8	HQ RC	DD				
	Rotary Drill HQ Core	Fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK, with black shale partings and laminated to thin black shale interbeds		65.75 7.32							
8					9	HQ RC	DD				
9											
					10	HQ RC	DD				
10		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: NRL

Golder Associates

MIS-BHS 001 1311210256-1000.GPJ GAL-MIS.GDT 12/19/13 JEM

PROJECT: 13-1121-0256

RECORD OF BOREHOLE: 13-1

SHEET 2 OF 3

LOCATION: See Site Plan

BORING DATE: November 13, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (200 400 600 800) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10	Rotary Drill HQ Core	— CONTINUED FROM PREVIOUS PAGE —									
				62.68	10	HQ RC	DD				
		Fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK with black shale partings		10.39							
11					11	HQ RC	DD				70 mm Diam. VSP Pipe
				61.18							
12		Fresh, thinly to medium bedded, greyish green, fine grained, non-porous LIMESTONE BEDROCK, with thin vertical white calcite veins		11.89	12	HQ RC	DD				
13				59.96							
		End of Borehole		13.11							
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: NRL

Golder Associates

PROJECT: 13-1121-0256

RECORD OF DRILLHOLE: 13-1

SHEET 3 OF 3

LOCATION: See Site Plan

DRILLING DATE: November 13, 2013

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME-75

DRILLING CONTRACTOR: Downing Drilling

JN - Joint; FLT - Fault; SHR - Shear; VN - Vein; CJ - Conjugate; BD - Bedding; FO - Foliation; CO - Contact; OR - Orthogonal; CL - Cleavage; PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular; PO - Polished; K - Slickensided; SM - Smooth; RO - Rough; MB - Mechanical Break; BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC Q' AVG	NOTES WATER LEVELS INSTRUMENTATION
	RD HW	BEDROCK SURFACE		67.76															
		Slightly weathered to fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK, with white calcite veins		5.31	7														
6																			
7					8														
				65.75															
		Fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK, with black shale partings and laminated to thin black shale interbeds		7.32															
8					9														
9	Rotary Drill HQ Core																		70 mm Diam. VSP Pipe
10					10														
				62.68															
		Fresh, thinly to medium bedded, grey, fine grained, non-porous LIMESTONE BEDROCK with black shale partings		10.39															
11					11														
				61.16															
12		Fresh, thinly to medium bedded, greyish green, fine grained, non-porous LIMESTONE BEDROCK, with thin vertical white calcite veins		11.89	12														
13				59.96															
		End of Drillhole		13.11															
14																			
15																			

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: NRL

MIS-RCK 004 1311210256-1000.GPJ GAL-MISS.GDT 12/19/13 JEM

PROJECT 861-2020

RECORD OF BOREHOLE 86-1

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

DEPTH SCALE, METRES	BORING METHOD	ELEV'N / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 200 mm DIAM. (HOLLOW STEM)	73.53 / 0.00	GROUND SURFACE					74
		73.26 / 0.27	0.00 - 0.06 TOPSOIL 0.06 - 0.15 BROWN FINE TO MEDIUM SAND (FILL) 0.15 - 0.27 TOPSOIL					
1			COMPACT BROWN SANDY SILT, SOME GRAVEL, CLAY AND COBBLES (FILL)		1	50 mm DIA.	20	73
2					2	"	20	72
		71.21 / 2.32	DARK BROWN PEAT		3	"	5	71
3					4	"	1 / 5	
		69.87 / 3.66	VERY LOOSE DARK BROWN ORGANIC SILT, TRACE SHELLS		5	"	2	70
4		69.17 / 4.36	VERY LOOSE GREY SANDY SILT, SOME GRAVEL AND CLAY (GLACIAL TILL)		6	"	2	69
5		68.20 / 5.33	PROBABLY WEATHERED BEDROCK					68
		5.49	END OF HOLE AUGER REFUSAL					
6								67

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. - + Q - ● rem. V. - ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W Wl 20 40 60 80

○ 188 ○ 305 ○ 308 ○ MH

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUND SURFACE
SURFACE SEAL
PLASTIC TUBING
NATIVE BACKFILL
STANDPIPE

WL IN STANDPIPE AT ELEV 72.04 JAN 25, 1986

0 5 10 15 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN ...
CHECKED ...

FORM G.A. - D. - 1G (metric) (REDUCE TO 72 % OF ORIGINAL SIZE)

RECORD OF BOREHOLES 86-2 & 86-2A

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg.; DROP, 760mm PENETRATION TEST HAMMER, 63.6 kg; DROP, 760mm

PROJECT 861-2020

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 200 mm DIAM. (HOLLOW STEM)		GREY BROWN CRUSHED STONE (FILL)					74
		74.46 / 0.00	GROUND SURFACE					
		0.12	COMPACT BROWN SILTY SAND, SOME GRAVEL AND OCC. COBBLE, TRACE ORGANIC MATTER (FILL)					
1		73.45 / 1.01			1	50 / 3 / 0.0	11	73
			COMPACT GREY SANDY SILT, SOME GRAVEL AND COBBLES, TRACE WOOD AND ORGANIC MATTER (FILL)		2	"	10	
2		71.87 / 2.59			3	"	43	72
			DARK BROWN PEAT					
3		70.95 / 3.51	DARK BROWN ORGANIC SILT, TRACE SHELLS		4	"	3	71
		3.66	PROB. WEATHERED BEDROCK					
4		3.87	END OF HOLE AUGER REFUSAL					70

BH. 86-2

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEVATION SCALE
0	POWER AUGER 200 mm DIAM. (HOLLOW STEM)		GREY BROWN CRUSHED STONE (FILL)		74
		74.40 / 0.00	GROUND SURFACE		
		0.12	BROWN SILTY SAND, SOME GRAVEL (FILL)		
1		73.39 / 1.01			73
			GREY SANDY SILT, SOME GRAVEL AND COBBLES (FILL)		
2		71.81 / 2.6±			72
			PEAT		
3		70.50			71
4		3.90	END OF HOLE AUGER REFUSAL		70

AH. 86-2A

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. – + Q. – ● rem. V. – ⊕ U. – ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W Wl 20 40 60 80

172

229

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUND SURFACE

SURFACE SEAL

PLASTIC TUBING

NATIVE BACKFILL

STANDPIPE

W.L. IN STANDPIPE AT ELEV. 72.51 FEB. 6, 1986

δ 1% 5% 10% PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN

CHECKED

FORM: G.A. - D. - 10 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

PROJECT 861.2020

RECORD OF AUGERHOLES 86-3 & 86-3A

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg.; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg; DROP, 760 mm

AH. 86-3

DEPTH SCALE, METRES	BORING METHOD	ELEV/DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER / TYPE / BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 150mm DIAM. (UNCASED)	73.53 / 0.00	GROUND SURFACE			74
		0.15	BROWN AND GREY SANDY SILT, SOME GRAVEL, CLAY, COBBLES AND BOULDERS (FILL)			73
1						72
2		71.58 / 1.95	END OF HOLE AUGER REFUSAL			71

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. - + Q. - ● rem. V. - ⊕ U. - ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL

ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	0.00 - 0.06 ASPHALT 0.06 - 0.15 CRUSHED STONE (FILL)

AH. 86-3A

DEPTH SCALE, METRES	BORING METHOD	ELEV/DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER / TYPE / BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 150 mm DIAM. (UNCASED)	73.56 / 0.00	GROUND SURFACE			74
1			FILL			73
2		71.27 / 2.3±				72
3			PEAT			71
4		69.25 / 4.3±				70
5			SILTY CLAY			69
		68.38 / 5.2±				
		68.13 / 5.43	GLACIAL TILL			68
			END OF HOLE AUGER REFUSAL			

15 / 10 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DN

CHECKED

FORM: G.A. - D. - 16 (metric) (REDUCE TO 72 % OF ORIGINAL SIZE)

RECORD OF AUGERHOLES 86-4 & 86-4A

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg.; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg; DROP, 760 mm

86-2020

PROJECT - 16 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

FORM G.A.-D

AH. 86-4

DEPTH SCALE, METRES	BORING METHOD	ELEV'N. / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 150mm DIAM. (UNCASED)	73.59	GROUND SURFACE					73
		0.00 / 73.35	TOPSOIL					
		0.24 / 72.69	BROWN SILTY SAND, SOME GRAVEL AND CLAY (FILL)					
1		0.91	SANDY SILT, SOME GRAVEL AND BOULDERS (FILL)					72
		71.70						
2		1.89	END OF HOLE AUGER REFUSAL					71

AH. 86-4A

DEPTH SCALE, METRES	BORING METHOD	ELEV'N. / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 150mm DIAM. (UNCASED)	73.58	GROUND SURFACE					74
		0.00 / 73.34	TOPSOIL					
		0.24 / 72.68	BROWN SILTY SAND, SOME GRAVEL AND CLAY (FILL)					73
1		0.91	SANDY SILT, SOME GRAVEL AND BOULDERS (FILL)					
2		71.28						72
		2.31	DARK BROWN PEAT					
3								71
4		69.28						70
		4.31	GLACIAL TILL					
5		68.12						69
		5.46	END OF HOLE AUGER REFUSAL					68
6								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. - + Q. - ● rem. V. - ⊕ U. - ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W Wl

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

15 10 5 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DN

CHECKED

PROJECT 861-2020

RECORD OF AUGERHOLE 86-5

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat. V. - + Q. - ●; rem. V. - ⊕ U. - ○	HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10; WATER CONTENT, PERCENT Wp W WL	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	POWER AUGER 150 mm DIAM. (UNCASED)	73.48 GROUND SURFACE						74				
		0.00			3				0.00 - 0.06 ASPHALT 0.06 - 0.15 CRUSHED STONE (FILL)			
		0.15	BROWN TO GREY SANDY SILT, SOME GRAVEL, BOULDERS AND COBBLES, TRACE CLAY (FILL)									
1								73				
2		71.18						72				
		2.3±	DARK BROWN PEAT									
3		70.08						71				
		3.4±	GLACIAL TILL									
4		69.18						70				
		4.30	END OF HOLE AUGER REFUSAL					69				
5												

15 ◆ 5 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DM

CHECKED GA

FORM: G.A.-D.-16.(metric) (REDUCE TO 72 % OF ORIGINAL SIZE)

PROJECT 860-2020

RECORD OF AUGERHOLES 86-6 & 86-6A

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

AH. 86-6

DEPTH SCALE, METRES	BORING METHOD	ELEV'N. / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER / TYPE / BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER — 150 mm DIAM. (UNCASED)	73.56	GROUND SURFACE			74
		0.00				
		73.29				
		0.27	BROWN SANDY SILT, SOME GRAVEL, CLAY, COBBLES AND BOULDERS (FILL)			73
1		72.52				
		1.04	END OF HOLE AUGER REFUSAL			72
2						

0.00 - 0.09 CONCRETE
0.09 - 0.27 BROWN SAND AND GRAVEL (FILL)

AH. 86-6A

DEPTH SCALE, METRES	BORING METHOD	ELEV'N. / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER / TYPE / BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER — 150 mm DIAM. (UNCASED)	73.55	GROUND SURFACE			74
		0.00				
		73.28				
		0.27	BROWN SANDY SILT, SOME GRAVEL AND BOULDERS (FILL)			73
1		72.05				
		1.5±	DARK BROWN PEAT			72
2		71.55				
		2.0±	GREY SILTY CLAY			71
		71.05				
		2.5±	GLACIAL TILL			
3		2.65	END OF HOLE AUGER REFUSAL			70
4						

0.00 - 0.09 CONCRETE
0.09 - 0.27 BROWN SAND AND GRAVEL (FILL)

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. - + 0 - ● rem. V. - ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W Wl

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

0 ◆ 5 PERCENT AXIAL STRAIN AT FAILURE
15
10

Golder Associates

DRAWN DJ

CHECKED

FORM: G.A. - D. - 10 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

PROJECT 861-2020

RECORD OF AUGERHOLE 86-7 AND BOREHOLE 86-8

LOCATION See Figure 2 BORING DATE JAN. 21 & 22, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 150 mm DIAM. (UNCASED)	73.53 / 0.00	GROUND SURFACE					73
1		72.33 / 1.2±	BROWN SANDY SILT, SOME GRAVEL AND COBBLES (FILL)					72
2		71.23 / 2.3±	DARK BROWN PEAT					71
3		71.06 / 2.47	PROBABLY GLACIAL TILL END OF HOLE AUGER REFUSAL					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. – + 0.– ● rem. V. – ⊕ u.– ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL 20 40 60 80

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

AH. 86-7

BH. 86-8

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	POWER AUGER 200 mm DIAM. (HOLLOW STEM)	76.39 / 0.00	GROUND SURFACE					76
		76.24 / 0.15	TOPSOIL					
1			COMPACT BROWN SANDY SILT, SOME GRAVEL, SILTY CLAY LAYERS, OCC. COBBLE AND BOULDER, TRACE BRICK AND ORGANIC MATTER (FILL)		1	50 mm D.O.	28	75
2					2	"	28	74
3					3	"	11	73
		73.04 / 3.35	DARK BROWN ORGANIC SANDY SILT		4	"	10	
4		72.68 / 3.71	COMPACT BROWN SANDY SILT WITH OCC. SAND AND GRAVEL POCKET (GLACIAL TILL)		5	"	12	72
5		71.97 / 4.42	END OF HOLE AUGER REFUSAL					71

GROUND SURFACE

SURFACE SEAL

PLASTIC TUBING

NATIVE BACKFILL

STANDPIPE

W.L. IN STANDPIPE AT ELEV 72.25 JAN. 25, 1986

15 0 10 5 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN

CHECKED

FORM: G.A. – O. – 16 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

RECORD OF AUGERHOLES 86-9 & 86-10

LOCATION See Figure 2 BORING DATE JAN. 22, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760mm

PROJECT 861-2020

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEVN. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat. V. – + Q. – ●; rem. V. – ⊕ U. – ○	HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10; WATER CONTENT, PERCENT Wp W Wl	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
									AH 86-9			
0	POWER AUGER 150mm DIAM. (UNCASED)	76.55	GROUND SURFACE					76				
		0.00	TOPSOIL									
1		0.15	BROWN SANDY SILT, SOME GRAVEL AND CLAY, OCC. COBBLE (FILL)					75				
2								74				
3		72.65						73				
4		3.90	END OF HOLE AUGER REFUSAL					72				
									AH 86-10			
0	POWER AUGER 150mm DIAM. (UNCASED)	76.83	GROUND SURFACE					76	0.00 – 0.06 ASPHALT; 0.06 – 0.24 CRUSHED STONE (FILL)			
		0.00										
		76.59										
1		0.24	BROWN SANDY SILT, SOME GRAVEL AND CLAY, OCC. COBBLE, TRACE BRICK (FILL)					75				
2								74				
3		74.36						73				
4		2.47	END OF HOLE AUGER REFUSAL									

15 Q 10 ◆ 5 PERCENT AXIAL STRAIN AT FAILURE

DRAWN DN

CHECKED GGL

Golder Associates

FORM: G.A. – D. – 10 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

PROJECT 861-2020

RECORD OF BOREHOLE 86-11

LOCATION See Figure 2 BORING DATE JAN. 22, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat. V. – + 0.– ●; rem. V. – ⊕ U.– ○)	HYDRAULIC CONDUCTIVITY, k, cm/sec (1x10 1x10 1x10 1x10); WATER CONTENT, PERCENT (Wp W Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	POWER AUGER 200mm DIAM. (HOLLOW STEM)	76.96 GROUND SURFACE						97				
		0.00							0.00 – 0.03 ASPHALT			
		0.15	COMPACT TO LOOSE BROWN TO GREY SANDY SILT, SOME GRAVEL AND CLAY, TRACE ORGANIC MATTER (FILL)						0.03 – 0.15 CRUSHED STONE (FILL)			
1					1	50 mm D.D.	15	96		O		
2					2	"	5	95		O		
		74.49			3	"	>100			O		
		2.47	END OF HOLE AUGER REFUSAL									
3								94				

15 – 5 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DN

CHECKED

FORM: O.A.-D.-1G (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

PROJECT 861-2022

RECORD OF AUGERHOLES 86-12 & 86-13

LOCATION See Figure 2 BORING DATE JAN. 21, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3 m	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat. V. – + Q. – ●; rem. V. – ⊕ U. – ○	HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10; WATER CONTENT, PERCENT Wp W Wl	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
			AH. 86-12									
0	POWER AUGER 150 mm DIAM. (UNCASED)	73.74	GROUND SURFACE					74				
		0.00	BROWN SAND AND GRAVEL (FILL)									
		0.12	BROWN SANDY SILT, SOME GRAVEL AND CLAY, OCC. COBBLE (FILL)									
1								73				
		72.04										
		1.7±	DARK BROWN PEAT									
2		71.14						72				
		2.6±	GREY SILTY CLAY									
		70.64						71				
3		3.1±	GLACIAL TILL									
4		69.32						70				
		4.42	END OF HOLE AUGER REFUSAL									
5								69				
			AH. 86-13									
0	POWER AUGER 150 mm DIAM. (UNCASED)	73.66	GROUND SURFACE					74				
		0.00	CONCRETE									
		0.12	BROWN SAND AND GRAVEL (FILL)									
1		73.05						73				
		0.6±	BROWN TO GREY SANDY SILT, SOME GRAVEL, CLAY, WOOD, WIRE AND COBBLES (FILL)									
		71.65						72				
2		2.0±	GREY SILTY CLAY									
		71.16						71				
		2.59	GLACIAL TILL / END OF HOLE AUGER REFUSAL									
3												

Q/U 10 ◆ 5 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DN

CHECKED

FORM: G.A. – D. – 10 (metric) (REDUCE TO 72 % OF ORIGINAL SIZE)

RECORD OF BOREHOLE 86-14

LOCATION See Figure 2 BORING DATE FEB. 4, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

PROJECT 861:2020

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEV'N. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/sec.	SHEAR STRENGTH Cu, kPa (nat. V. – + Q. – ● rem. V. – ⊕ U. – ○)	WATER CONTENT, PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	ROTARY DRILLING, BW CASING	73.54	FLOOR SURFACE					74						
		0.00	CONCRETE											
1		0.12	MEDIUM BROWN SANDY FILL					73						
2								72						
3								71						
4		69.36						70						
	NW CASING	4.21	CONCRETE		1	AW CA	—		92 50					
			SLIGHTLY FRACTURED DARK GREY SHALEY LIMESTONE		2	"	—	69	100 35					
5		68.51	BEDROCK		3	"	—		100 0					
		5.03	END OF HOLE						R.Q.D. (%) CORE RECOVERY (%)					
6								68						

0 5 10 15 PERCENT AXIAL STRAIN AT FAILURE

Golder Associates

DRAWN DN

CHECKED

FORM: G.A. – D. – 16 (metric) (REDUCE TO 72 % OF ORIGINAL SIZE)

RECORD OF BOREHOLE 86-15

LOCATION See Figure 2 BORING DATE FEB. 3, 1986 DATUM GEODETIC

SAMPLER HAMMER, 63.6 kg ; DROP, 760 mm PENETRATION TEST HAMMER, 63.6 kg ; DROP, 760 mm

PROJECT 861-2020

DEPTH SCALE, METRES	BORING METHOD	SOIL PROFILE: ELEVN. / DEPTH (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION SCALE
0	ROTARY DRILLING; BW CASING	73.56 / 0.00	FLOOR SURFACE; CONCRETE					74
1		0.15	MEDIUM BROWN SANDY FILL					73
2		71.52 / 2.04	SOUND DARK GREY SHALEY LIMESTONE BEDROCK		1	AW CA	—	72
3	AW CASING	70.20						71
4		3.36	END OF HOLE					70
								69

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH Cu, kPa nat. V. – + Q. – ● rem. V. – ⊕ U. – ○

HYDRAULIC CONDUCTIVITY, k, cm/sec. 1x10 1x10 1x10 1x10

WATER CONTENT, PERCENT Wp W WL

98 62

R.Q.D. (%)

CORE RECOVERY (%)

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

15 5 PERCENT AXIAL STRAIN AT FAILURE 10

Golder Associates

DRAWN DN

CHECKED

FORM G.A. - D. - 10 (metric) (REDUCE TO 72% OF ORIGINAL SIZE)

APPENDIX D

Geophysical Technical Memorandum (No. 13-1121-0256)

TECHNICAL MEMORANDUM

DATE November 25, 2013 **PROJECT No.** 13-1121-0256

TO Nicolas LeBlanc
Golder Associates Ltd.

FROM Patrick Finlay and Brian Byerley **EMAIL** pfinlay@golder.com
bbyerley@golder.com

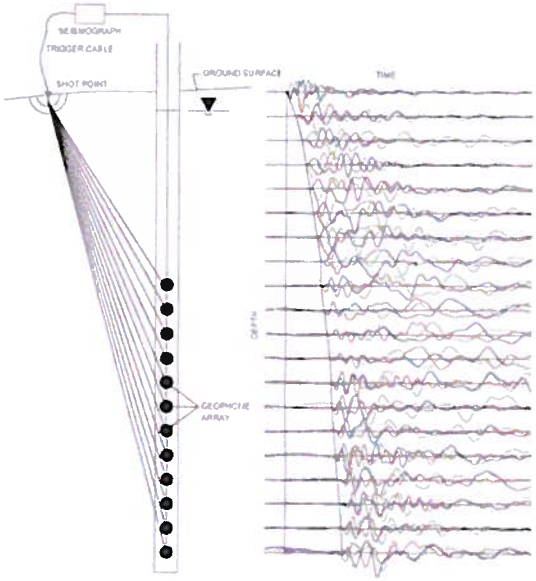
VSP TEST RESULTS
411 DOVERCOURT AVENUE, OTTAWA, ONTARIO

This memorandum presents the results of the vertical seismic profile (VSP) testing performed at 411 Dovercourt Avenue in Ottawa, Ontario. VSP testing was completed in BH13-1 on November 18, 2013. Borehole BH13-1 is cased with a PVC pipe grouted in place.

Methodology

For the VSP method, seismic energy is generated at the ground surface by an active seismic source and recorded by a geophone located in a nearby borehole at a known depth. The active seismic source can be either compression or shear wave. The time required for the energy to travel from the source to the receiver (geophone) provides a measurement of the average compression or shear wave seismic velocity of the medium between the source and the receiver. Data obtained from different geophone depths are used to calculate a detailed vertical seismic velocity profile of the subsurface in the immediate vicinity of the test borehole.

The high resolution results of a VSP survey are often used for earthquake engineering site classification, as per the National Building Code of Canada, 2010.



Example 1: Layout and resulting time traces from a VSP survey.

Field Work

The field work was completed on November 18, 2013, by personnel from the Golder Associates Ltd. (Golder) Ottawa office.

Both compression and shear wave seismic sources were used and both were located in close vicinity to the borehole. The seismic source for the compression wave test consisted of a 9.9 kilogram sledge hammer vertically impacted on a metal plate. The plate was located 2 metres from the borehole on pavement. The seismic source for the shear wave test consisted of a 3.0 metres long, 150 millimetres by 150 millimetres wooden beam, weighted by a vehicle and horizontally struck with a 9.9 kilogram sledge hammer on alternate ends of the beam to induce polarized shear waves. The shear source was also located 2 metres from the borehole BH13-1, and coupled to the ground surface by parking a vehicle on top of it. Test measurements started at 0.5 metres below the surface. Data were recorded in the borehole with a 3-component receiver spaced at 0.5-metre intervals below the ground surface, to the maximum depth of the borehole (12.5 metres).

The seismic records collected for each source location were stacked a minimum of ten times to minimize the effects of ambient background seismic noise on the collected data. The data was sampled at 0.020833 millisecond intervals and a total time window of 0.341 seconds was collected for each seismic shot.

Data Processing

Processing of the VSP test results consisted of the following main steps:

1) Combination of seismic records to present seismic traces for all depth intervals on a single plot for each seismic source and for each component;

2) Low Pass Filtering of data to remove spurious high frequency noise;

3) First break picking of the compression and shear wave arrivals; and,

4) Calculation of the average compression and shear wave velocity to each tested depth interval.

Processing of the VSP data was completed using the SeisImager/SW software package (Geometrics Inc.). The seismic records are presented on the following two plots and show the first break picks of the compression wave and shear wave arrivals overlaid on the seismic waveform traces recorded at the different geophone depths (Figures 1 and 2). The arrivals were picked on the vertical component for the compression source and on the two horizontal components for the shear source.

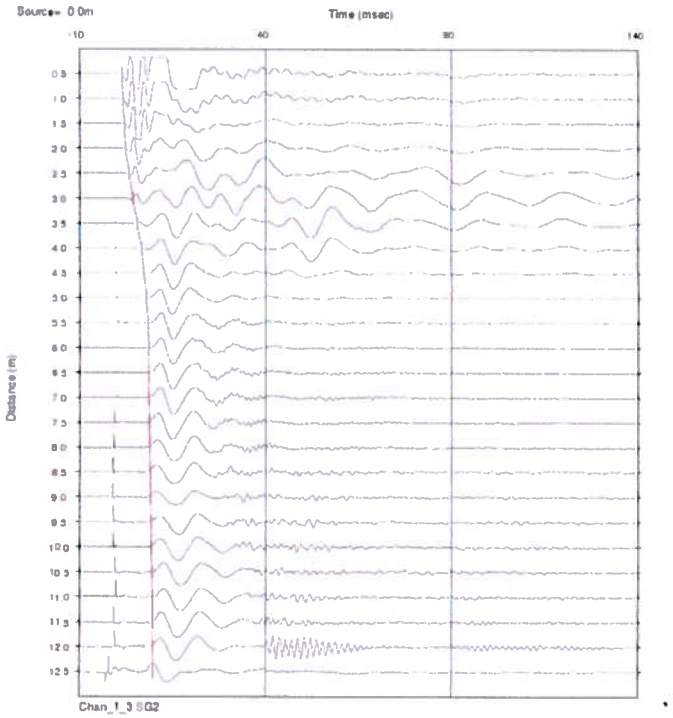


Figure 1: First break picking of compression wave arrivals (red) along the seismic traces recorded at each receiver depth.

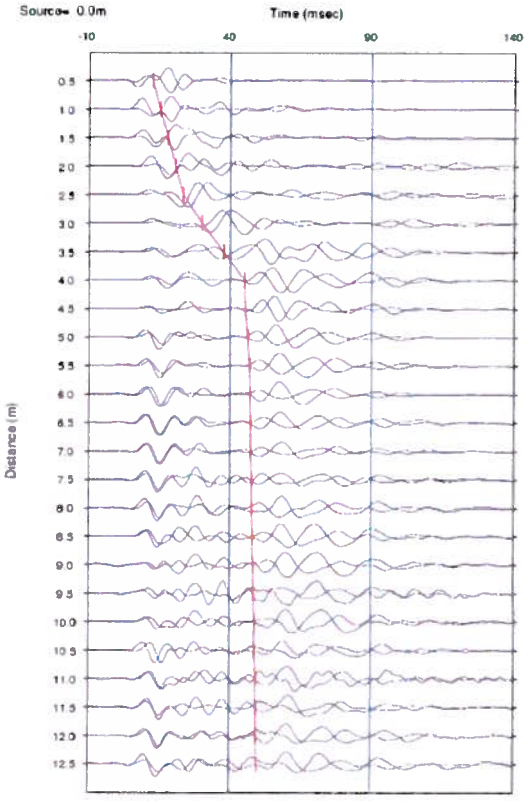


Figure 2: First break picking of shear wave arrivals (red) along the seismic traces recorded at each receiver depth.

Results

The VSP results are summarized in Table 1 (attached). The shear wave and compression-wave layer velocities, at the field collected metre intervals, were calculated by best fitting a theoretical travel time model to the field data collected at half-metre intervals. The depths presented on the table are relative to ground surface.

The estimated dynamic engineering moduli, based on the calculated wave velocities, are also presented on Table 1. The engineering moduli were calculated using an estimated bulk density, based on the borehole log, but a more detailed geotechnical investigation would be necessary to determine a more exact density for each layer. For the silt, sand and till soils, existing from surface to a depth of approximately 2 metres below ground surface and from 5 to 5.5 metres below ground surface, a bulk density of 1,750 kg/m^3 was estimated. For the peat layer, from 2 to 5 metres below ground surface, a bulk density of 1200 kg/m^3 was estimated. For the bedrock, from a depth of approximately 5.5 to 12.5 metres below ground surface, the bulk density was estimated at 2,300 kg/m^3.

The average velocity was calculated assuming that the velocity from 12.5 metres to a depth of 30 metres was constant with an average shear wave velocity value of 2,000 m/s which is equal to the velocity of the bedrock at the bottom of the borehole.

The average shear wave velocity from ground surface to a depth of 30 metres was calculated to be 520 m/s.

Based on the proposed construction design, it is assumed that a portion of the foundation in the vicinity of the VSP testing location will be at approximately 1.5 metres below the ground surface. The average shear wave velocity from a depth of 1.5 metres below ground surface to a depth of 31.5 metres below ground surface was calculated to be 626 m/s.

Closure

We trust that these results meet your current needs. If you have any questions or require clarification, please contact the undersigned at your convenience.

GOLDER ASSOCIATES LTD.

PROFESSIONAL GEOSCIENTIST
PATRICK I. FINLAY
PRACTISING MEMBER
1860
NOV 25 2013
ONTARIO

Patrick Finlay, P.Geo.
Geophysicist

Brian Byerley, M.Sc., P.Eng.
Senior Hydrogeologist, Principal

SS/PF/BTB/sg
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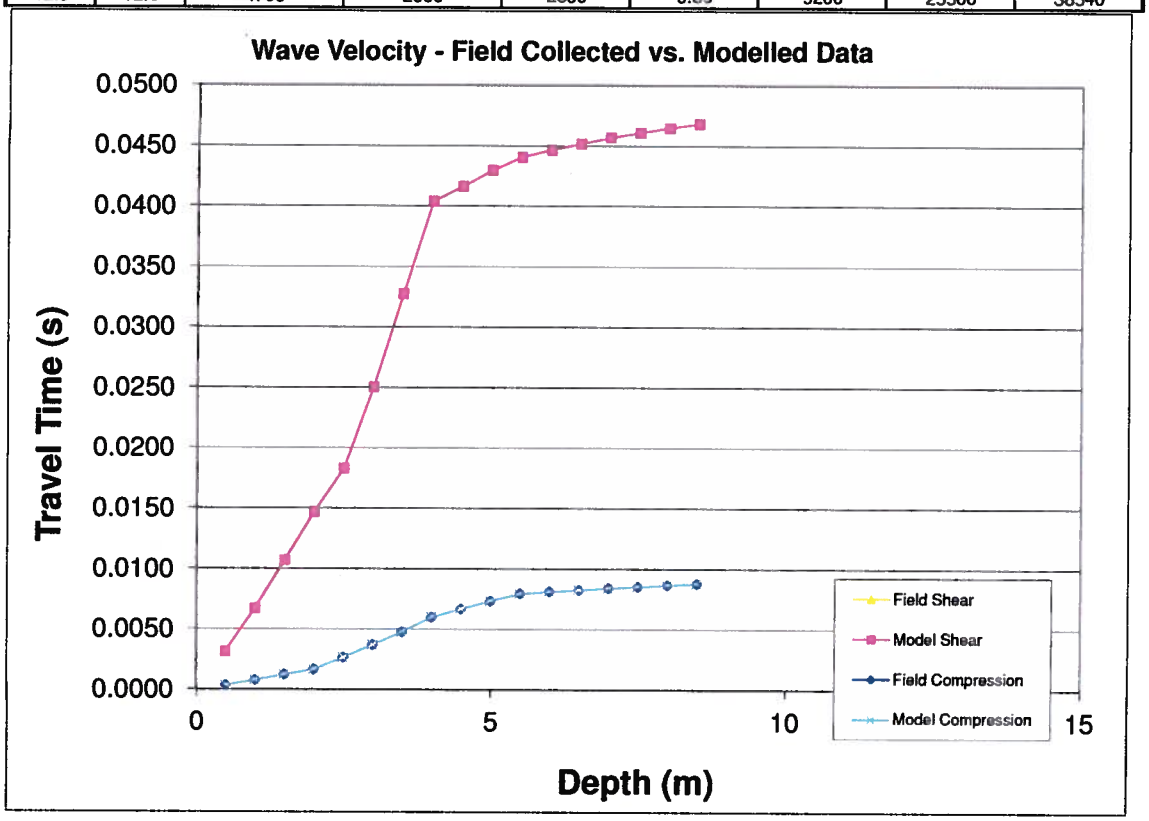
Attachments: Table 1 VSP Results – Borehole 13-1

TABLE 1
VSP SURVEY RESULTS - BOREHOLE 13-1
DOVERCOURT AVENUE, OTTAWA, ONTARIO

Layer Depth (m)				Estimated Bulk Density (kg/m^3)	Dynamic Engineering Properties			
Top	Bottom	Compressional Wave (m/s)	Shear Wave (m/s)		Poissons Ratio	Shear Modulus (MPa)	Deformation Modulus (MPa)	Bulk Modulus (MPa)
0.0	0.5	1480	160	1750	0.49	45	134	3773
0.5	1	1160	140	1750	0.49	34	102	2309
1.0	1.5	1080	125	1750	0.49	27	82	2005
1.5	2	1150	125	1750	0.49	27	82	2278
2.0	2.5	505	140	1200	0.46	24	69	275
2.5	3	480	74	1200	0.49	7	20	268
3.0	3.5	470	65	1200	0.49	5	15	258
3.5	4	405	65	1200	0.49	5	15	190
4.0	4.5	750	410	1200	0.29	202	519	406
4.5	5	750	380	1200	0.33	173	460	444
5.0	5.5	810	450	1750	0.28	354	905	676
5.5	6	3100	850	2300	0.46	1662	4850	19887
6.0	6.5	3300	950	2300	0.45	2076	6040	22279
6.5	7	3700	1000	2300	0.46	2300	6719	28420
7.0	7.5	3800	1200	2300	0.44	3312	9569	28796
7.5	8	3700	1300	2300	0.43	3887	11114	26304
8.0	8.5	3900	1400	2300	0.43	4508	12857	28972
8.5	9	4200	1600	2300	0.42	5888	16664	32721
9.0	9.5	4200	1600	2300	0.42	5888	16664	32721
9.5	10	4500	1600	2300	0.43	5888	16812	38724
10.0	10.5	4500	1800	2300	0.40	7452	20937	36639
10.5	11	4500	1800	2300	0.40	7452	20937	36639
11.0	11.5	4700	1900	2300	0.40	8303	23287	39736
11.5	12	4700	1900	2300	0.40	8303	23287	39736
12.0	12.5	4700	2000	2300	0.39	9200	25566	38540



Notes
1. Depth Presented relative to ground surface.
2. This Table to be analyzed in conjunction with the accompanying report.

APPENDIX E

Results of Chemical Analysis - Exova Report No. 1510914

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Mr. Nicolas Leblanc
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1510914
Date Submitted: 2015-06-18
Date Reported: 2015-06-30
Project: 15-25834
COC #: 797934

Dear Nicolas Leblanc:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

APPROVAL: _____

Nadine Pinsonneault
Team Leader, Inorganics

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf

Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Exova recommends consulting the official provincial or federal guideline as required.

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Mr. Nicolas Leblanc
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1510914
Date Submitted: 2015-06-18
Date Reported: 2015-06-30
Project: 15-25834
COC #: 797934

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.
					1181941 / Soil / / 2015-06-10 / BH15-2 Sa2
Agri. - Soil	pH	2.0			7.6
General Chemistry	Cl	0.002	%		0.156
	Electrical Conductivity	0.05	mS/cm		2.25
	Resistivity	1	ohm-cm		413
	SO4	0.01	%		0.05

Guideline = *** = Guideline Exceedence**
All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates analysis was completed in Mississauga, Ontario).
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
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Attention: Mr. Nicolas Leblanc
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1510914
Date Submitted: 2015-06-18
Date Reported: 2015-06-30
Project: 15-25834
COC #: 797934

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 289158 **Analysis/Extraction Date** 2015-06-22 **Analyst** NP			
Method C CSA A23.2-4B			
Chloride	<0.002 %	101	90-110
Run No 289222 **Analysis/Extraction Date** 2015-06-22 **Analyst** NP			
Method C SM4500-SO4--D			
SO4	<0.01 %	111	70-130
Run No 289590 **Analysis/Extraction Date** 2015-06-30 **Analyst** SCM			
Method Ag Soil			
pH	<2.0	99	90-110
Method Cond-Soil			
Electrical Conductivity	<0.05 mS/cm	100	85-115
Method Resistivity - soil			
Resistivity			

Guideline = *** = Guideline Exceedence**
All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates analysis was completed in Mississauga, Ontario).
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

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Golder Associates

May 12, 2017

Proposal No. 1525834-01

Sandy Davis
Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
K1S 3K7

ADDENDUM NO. 1 - ADDITIONAL GEOTECHNICAL INPUT
DOVERCOURT RECREATIONAL CENTRE – PHASE II EXPANSION
411 DOVERCOURT AVENUE
OTTAWA, ONTARIO

Dear Mr. Davis:

This letter provides the results of additional test pits excavated at the site, and geotechnical guidance in addition to that provided in our July 2015 geotechnical investigation report, in support of the new Phase II expansion to the Dovercourt Recreational Centre located at 411 Dovercourt Avenue in Ottawa, Ontario. In this regard, this letter should be read in conjunction with the contents of the original geotechnical report including the Important Information and Limitations document included as part of that report.

Background

Golder completed a geotechnical investigation as part of the Phase II expansion to the Dovercourt Recreational Centre, which included an expansion to the south of the existing facility towards Dovercourt Avenue. The results of that study were provided in Golder report no. 1525834 titled: "Geotechnical Investigation, Dovercourt Recreational Centre, Expansion Phase II", dated July 2015.

Following the completion of the geotechnical report, it is understood that the footprint of the new Phase II addition was modified slightly to extend further south (i.e., closer to Dovercourt Avenue) and ending immediately east of the main entrance. As such, the main entrance and corresponding canopy will not be affected by the new expansion, and will remain unchanged from its current configuration. No works are proposed to the west of the main entrance. The approximate footprint of the newly proposed Phase II addition is shown on the update Figure 1 attached to this letter.

It is understood that the new structure will be supported on grade beams resting on pier foundations for the north side of the new addition. The piers will extend to the existing building spread footing or pile cap. On the south side of the new addition, the grade beams will be located about 1 to 2 metres above the bedrock surface. It is understood that additional geotechnical guidance is required by the structural engineer for the support of the grade beams in this area.

Although the backfill conditions on the south foundation wall of the existing structure will not change following the construction of the new addition, it is understood that the wall will be upgraded by structurally connecting it to the grade beams in order for it to resist seismic lateral earth pressures in accordance with the Ontario Building Code of 2012.

Fieldwork

To better understand the subsurface conditions at the hydro duct bank currently located within the footprint of the new addition, against the foundation wall of the existing building, and at the southeast corner of the new building where previous boreholes were not put down, additional test pits were carried out within the building footprint. The contractor retained to construct the new Phase II addition (Tal-Co) carried out three additional test pits at these locations of interest, as shown on the attached Figure 1.

The test pits, numbered 17-1 to 17-3, inclusively, were excavated on May 1, 2017, using a rubber tire backhoe supplied by Tal-Co, and operated by D&G Landscaping (subcontractor to Tal-Co). The test pits were excavated to depths of between about 1.6 and 3.1 metres in depth from the existing ground surface.

Prior to the excavation of the test pits, Tal-Co obtain utility locates for buried services within the work area.

The excavation of the test pits was carried out in the presence of one of our experienced technicians, who documented the subsurface conditions on the sides of the test pits and took custody of the samples.

The test pit locations were chosen by Tal-Co in discussions with the structural engineer (Cunliffe and Associates). The locations of the test pits were referenced to existing site features. The test pit elevations were not recorded by Golder.

Upon completion of the test pit excavations, the test pits were loosely backfilled with the excavated soil, and the soil samples were transported to our laboratory for further examination by the project engineer.

Subsurface Conditions

Based on the results of the 2015 study, the subsurface conditions in the boreholes put down in the area of the proposed addition consists of fill over limestone bedrock. A thin deposit of silty clay between the fill and the bedrock was encountered in the borehole advanced near the southwest corner. In general, the bedrock surface increases in elevation towards the east.

A summary of the subsurface conditions observed in test pits 17-1 to 17-3, inclusively are provided on the attached Table 1 - Record of Test Pits.

The subsurface conditions encountered as part of the current investigation are similar to those encountered in the 2015 geotechnical investigation. A topsoil layer with a thickness of between 50 to 300 millimetres exists at the ground surface at all test pit locations. Below the surficial topsoil layer at all test pit locations, a layer of sand fill with variable amounts of silt and gravel was encountered. In test pit 17-1, the fill extends to the limestone bedrock surface at a depth of about 2.35 metres, where practical refusal to excavation with the backhoe was encountered. In test pit 17-2 excavated adjacent to the existing foundation wall, the test pit was terminated at 3.05 metres prior to reaching the top of the footing because of concerns with undermining the nearby hydro duct bank. Therefore, the full extent of the fill layer was not confirmed at this location, but this layer is anticipated to extend to at least the level of the spread footing foundation or pile cap. The as-built plans could be consulted to determine the elevation of the footings in this area.

In test pit 17-3, the fill extends to a depth of about 0.6 metres, and a 150 millimetre layer of dark brown silty clay with organic matter is present between the fill and the bedrock surface, which is located at about 0.75 metres in depth. The upper portion of the bedrock in test pit 17-3 consists of weathered and fractured sandstone, about 0.85 metres in thickness, over limestone bedrock. Practical refusal to excavation with the backhoe was encountered at the surface of the limestone bedrock in test pit 17-3.

Recommendations

Foundations

In addition to the foundation options presented in Section 5.4 - Foundation Options of the 2015 Golder geotechnical report, the grade beams could also be supported on concrete placed directly on the bedrock surface to a maximum depth of 3 metres. This could be achieved by excavating down to the bedrock surface in the areas where the grade beams require bearing support, and filling the excavation with concrete. The concrete should project vertically from the edge of the footing / grade beam bearing surface down to the bedrock surface.

As stated in the 2015 geotechnical report, the fills at this site are considered Type 3 soils as per OHSA, and excavation side slopes should be no steeper than 1 horizontal to 1 vertical if workers are to enter the excavation. Based on the compact nature of the gravelly sand to silty sand fill in the area of the new addition, and the groundwater table that appears to be located below the bedrock surface, it may be possible to locally excavate limited areas (i.e., no larger than 2 metres square) down to the bedrock surface with steeper side slopes provided that workers do not enter the unsupported excavation. These localized excavations will likely not stand unsupported for an extended period of time. In areas where sidewalks or utilities could be at risk of being undermined by sloughing of these localized steeper excavations (i.e., within 1 horizontal to 1 vertical from the floor of the excavation), the use of temporary shoring should be considered (i.e., trench box, internally braced steel plates, etc.). The shoring could be removed after concrete placement while the concrete is still plastic.

The bedrock should be adequately cleaned of soil and viewed by experienced geotechnical personnel prior to placing the concrete. In unsupported excavations, consideration could be given to using a vacuum truck and/or an air lance to clean the surface of the bedrock so that workers do not have to enter the excavation. Workers working at heights (i.e., adjacent to excavations more than 1.2 metres deep) must have appropriate training and equipment.

Provided that the concrete is placed on the undisturbed and cleaned bedrock surface, the footings / grade beam bearing surface may be designed using a Serviceability Limit State (SLS) bearing resistance of 500 kilopascals and a factored Ultimate Limit State (ULS) bearing resistance of 1,000 kilopascals. The post-construction total and differential settlements of footings sized using the above SLS bearing resistance should be less than about 25 and 12 millimetres, respectively.

Floor Slab

Based on the observed subsurface conditions in the new 2017 test pits, the recommendations provided in the 2015 Golder geotechnical report, in Section 5.5 – Floor Slab remain unchanged.

Lateral Earth Pressures

It is understood that the existing basement walls of the Dovercourt Recreational Centre adjacent to the new addition will be provided with additional lateral support by tying them structurally into the new addition grade beam foundations. In order to design these new grade beams and their connections to the existing basement walls, the lateral earth pressures under static and seismic conditions are required.

The magnitude of the lateral earth pressures will depend on the backfill materials and backfill conditions adjacent to the foundation walls. If the backfill materials against the existing foundation walls consist of compacted sand or sand and gravel (OPSS Granular 'B' Type I or II), then the lateral earth pressures may be taken as:

$$\sigma_h(z) = K_o (\gamma z + q)$$

Where: $\sigma_h(z)$ = Lateral earth pressure on the wall at depth z, kilopascals;

K_o = At-rest earth pressure coefficient, use 0.5;

γ = Unit weight of retained soil, use 22 kilonewtons per cubic metre;

z = Depth below top of wall, metres; and

q = Uniform surcharge at ground surface to account for traffic and equipment (not less than 15 kilopascals), plus any surcharge due to adjacent foundation loads.

These lateral earth pressures would increase under seismic loading conditions. The earthquake-induced dynamic pressure distribution, which is to be added to the static earth pressure distribution, is a linear distribution with maximum pressure at the top of the wall and minimum pressure at its toe (i.e., an inverted triangular pressure distribution). The total pressure distribution (static plus seismic) for design may be determined as follows:

$$\sigma_h(z) = K_o \gamma z + (K_{AE} - K_o) \gamma (H-z)$$

Where: $\sigma_h(d)$ = Lateral earth pressure at depth z, kilopascals;

K_{AE} = Seismic earth pressure coefficient, use 0.8; and

H = Total height of the wall, metres.

It should also be noted that the above lateral earth pressure equations assume that the foundation walls will be drained.

For unrestrained retaining walls, where the wall support and structure allow lateral yielding, active earth pressures from the 2015 Golder report may be used in lieu of at-rest pressures. For retaining walls backfilled with level granular backfill, a coefficient of active earth pressure, Ka, of 0.33, and a seismic lateral earth pressure coefficient, K_{AE}, of 0.44 can be used for design. This K_{AE} value for yielding walls is applicable provided that the wall can move up to 250A (mm), where A is the design PGA of 0.32. This corresponds to displacements of up to approximately 80 millimetres at this site.

It should be noted that all of the lateral earth pressure equations are given in an unfactored format and will need to be factored for ULS design purposes.

Closure

We trust that this letter contains sufficient information for your present purposes. If you have any questions regarding this report, or if we can be of further service to you on this project, please call us.

Yours truly,

GOLDER ASSOCIATES LTD.

Nicolas LeBlanc, P.Eng.
Geotechnical Engineer

Erin O'Neill, P.Eng.
Associate, Senior Geotechnical Engineer

NRL/ESO/mvrd
n \active\2015\3 proj\1525834 dovercourt rec center expansion phase ii ottawa\letters and memos\1525834 let-001 geotech addendum 1 2017 05 12 docx

Attachments: Table 1 – Record of Test Pits
Figure 1 – Site Plan

TABLE 1

RECORD OF TEST PITS

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
17-1	0.00 – 0.05 0.05 – 1.10 1.10 – 2.35 2.35	TOPSOIL – (CL) SILTY CLAY; brown FILL– (SM) SILTY SAND, some gravel; brown, contains rootlets; non cohesive, moist FILL– (SM) gravelly SILTY SAND; grey brown; non cohesive, moist END OF TEST PIT – Refusal to excavating on limestone bedrock Sample 1 Depth (m) 0.10 Sample 2 Depth (m) 1.35
17-2	0.00 – 0.30 0.30 – 0.60 0.60 – 3.05 3.05	TOPSOIL – (CL) SILTY CLAY; brown FILL– (SM) SAND, trace gravel; grey brown; non cohesive, moist FILL– (SM) gravelly SAND; grey brown, contains cobbles and boulders ; non cohesive, moist END OF TEST PIT Sample 1 Depth (m) 0.25 Sample 2 Depth (m) 0.40 Sample 3 Depth (m) 0.85
17-3	0.00 – 0.30 0.30 – 0.60 0.60 – 0.75 0.75 – 1.60 1.60	TOPSOIL – (CL) SILTY CLAY; brown FILL– (SM) SAND, trace gravel; grey brown; non cohesive, moist (CL) SILTY CLAY with organic material; dark brown WEATHERED SANDSTONE END OF TEST PIT – Refusal to excavating on limestone bedrock Sample 1 Depth (m) 0.90

EXECUTIVE SUMMARY – DOVERCOURT RECREATION COMPLEX

Photo 1: Exterior of Facility 00341, Dovercourt Recreation Complex (August 21, 2009)

DST Consulting Engineers Inc. (DST) completed a designated substance survey of the Dovercourt Recreation Complex facility (City of Ottawa facility number 00341), located at 411 Dovercourt Ave, Ottawa on August 21, 2009. This survey was completed in support of the *Audit/Survey Program: Designated Substance Review* for the City of Ottawa. This two-storey building has a basement and is approximately 25,364 square feet (ft^2) based on City of Ottawa records. This building is currently being used as a community centre.

DST has completed a designated substance survey of the subject facility to evaluate the presence and condition of designated substances including asbestos-containing materials (ACMs) and to collect and analyze bulk samples to comply with applicable regulations. The locations of samples are indicated on the attached figure(s), as applicable. The laboratory certificates are attached for reference, as applicable.

A detailed inventory of ACMs and other designated substances identified in the subject building has been entered into electronic databases. Only rooms and materials that were considered to contain designated substances or ACMs are included in the databases. These electronic databases outline the location, description, condition, action level, and type of designated substance encountered during the survey program, as applicable.

Asbestos was not identified at the subject facility through laboratory analysis; however, ACMs are suspected to be present in the refractory linings of the two kilns located in the kiln room (Room 18); however, these materials were not sampled in order to prevent excessive damage.

In accordance with the City of Ottawa "Action Matrix", ACMs have been identified within the facility for clean-up, removal, repair or routine surveillance (Actions 1 to 4, as applicable) based on the condition and accessibility of the materials. These materials should be evaluated for inclusion in an abatement program. Any disturbance of identified ACMs must follow appropriate work procedures in compliance with Ontario Regulation 278/05.

Lead has been identified at the subject facility and is present in several areas, as outlined within the electronic database. Paint sample locations are illustrated on the attached figure(s). Painted finishes sampled at the facility were identified as having a lead content of less than 600 ppm and are not considered to be lead-based paints. Suspected lead containing materials include emergency light batteries, ceramic tiles glazing and solder on copper pipes. At the present time, remedial action is not required for lead-containing materials at the facility.

Mercury has been identified at the subject facility and is present in several areas, as outlined within the electronic database. Suspected mercury containing materials include thermometers and fluorescent light tubes. At the present time, remedial action is not required for mercury-containing materials at the facility.

Silica has been identified at the subject facility and is present in several areas, as outlined within the electronic database. Silica containing materials include ceiling tiles, ceramic tiles, concrete building materials, brick and mortar and thirteen (13) silica sand bags totalling 295 kg. At the present time, remedial action is not required for silica-containing materials at the facility.

The following designated substances were neither observed nor suspected to as being present within the facility in forms or quantities that would impact future work:

- Acrylonitrile;
- Arsenic;
- Benzene;
- Coke Oven Emissions;
- Ethylene Oxide;
- Isocyanates; and
- Vinyl Chloride.

ACMs and other designated substances may potentially exist within inaccessible areas including wall, ceiling, and floor cavities of the building. Should any previously unidentified suspect

designated substances be encountered as part of future works, these materials are to be treated as containing and handled accordingly unless sampling proves otherwise.

Photo 2: Suspected ACMs in the refractory linings of the two (2) kilns located in the kiln room (Room 18) at the Dovercourt Recreation Complex. (August 21, 2009).

City of Ottawa
RPAM Asbestos Management Program
Facility ACM Datasheet

FACILITY NAME			Facility 341 - Dovercourt Recreation Complex							Asbestos Containing Materials Database			
REF NO	ROOM NO	ROOM NAME/DESCRIPTION	SYSTEM	COMPONENT	MATERIAL	ITEM	COVERING MATERIAL	ASBESTOS TYPE	CONDITION	ACCESSIBILITY	PRIORITY	STATUS	DATE
1	18	Kiln Room	kiln	insulation	refractory linings			Not Sampled	GOOD	A	4		21-Aug-09

THIS DATASHEET TO BE PROMINENTLY DISPLAYED AND ACCESSIBLE TO OPERATIONS, MAINTENANCE AND SERVICE PERSONNEL

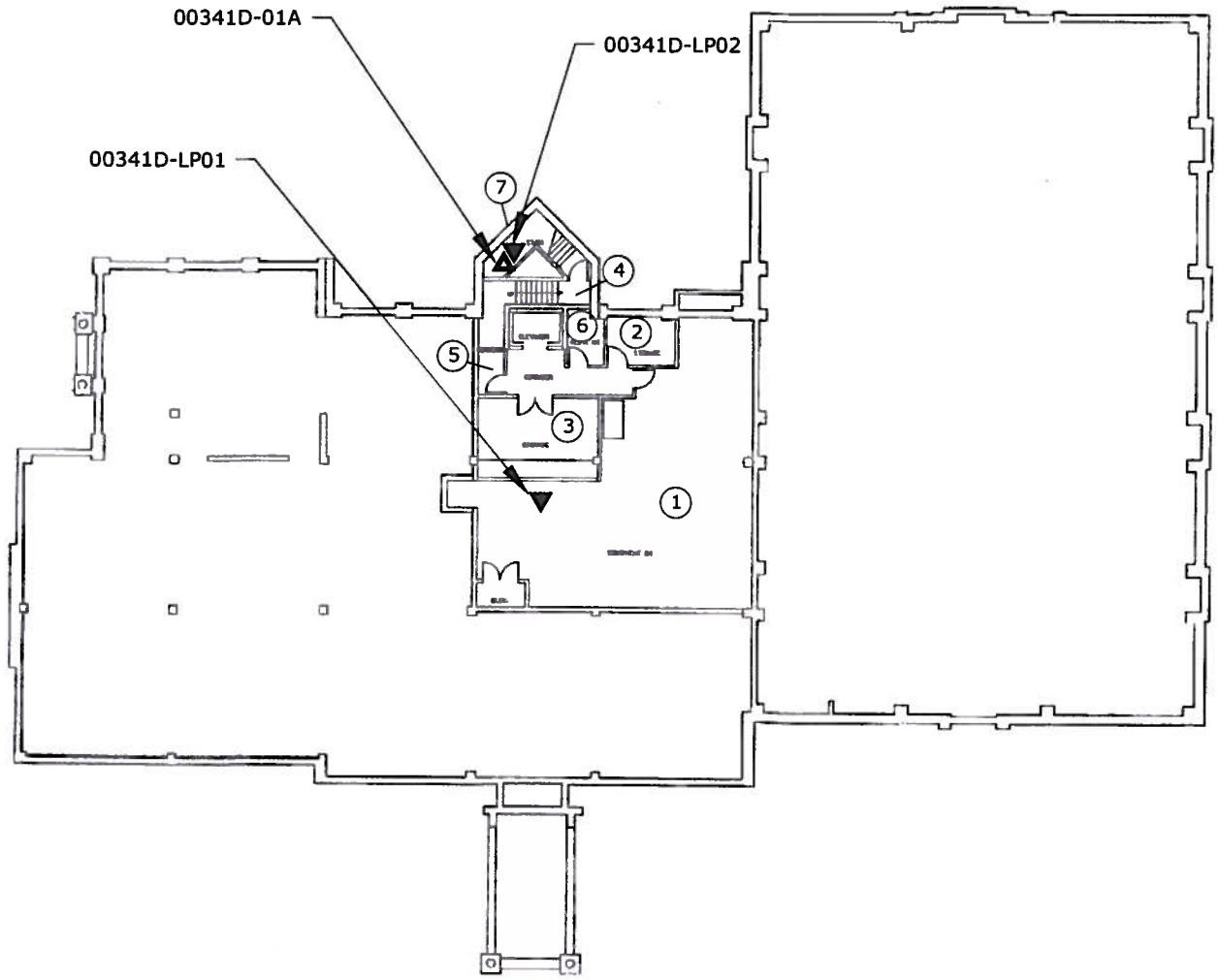
CONDITION:
GOOD - Completely encapsulated, no deterioration.
FAIR - Minor damage or penetration or ACM that has never been covered.
POOR - Orginal cover or jacket is damaged or missing. ACM is exposed and amount of missing material is moderate to severe.
DEBRIS - Presence of fallen ACM. Major damage and no longer attached to its original component.

PRIORITY (ACTION LEVEL):
1 - IMMEDIATE CLEAN UP OF DEBRIS LIKELY TO BE DISTURBED.
2 - ACM REMOVAL
3 - ACM REPAIR
4 - ROUTINE SURVEILLANCE

ACCESSIBILITY:
A - Areas of the building that are accessible to all building occupants. Includes, for example, such areas as hallways, meeting rooms, hockey rinks, gymnasiums and public storage areas.
B - Areas of the building that are accessible to Maintenance and Operations staff only, without the need of a ladder. Includes, for example, such areas as zamboni rooms, boiler room and compressor room, where accessibility is within reach from the floor level only.
C - Areas of the building that are accessible to Maintenance and Operations staff only, with the use of a ladder. Includes, for example, such areas as zamboni rooms, boiler room and compressor room ceilings, where accessibility is within reach only from a ladder.
D - Areas of the building that are behind solid ceilings systems or within wall and ceiling cavities. Includes, for example, areas of the building where building material demolition is required to obtain access.

City of Ottawa
Facility Designated Substance Datasheet

FACILITY NAME		DOVERCOURT RECREATION COMPLEX		Designated Substance Database		
Facility Number	Designated Substance Type	General Location of Substance	Condition (Good, Fair, Poor, Abated, N/A)	Recommended Action and Comments	Quantity	Inspection Date
341	Lead	emergency light batteries	Good	No Immediate Action Recommended		August 21, 2009
341	Lead	solder on copper pipes	Good	No Immediate Action Recommended		August 21, 2009
341	Lead	ceramic tile glazing	Good	No Immediate Action Recommended		August 21, 2009
341	Mercury	thermometers	Good	No Immediate Action Recommended		August 21, 2009
341	Mercury	fluorescent light tubes	Good	No Immediate Action Recommended		August 21, 2009
341	Silica	ceiling tiles	Good	No Immediate Action Recommended		August 21, 2009
341	Silica	ceramic tiles	Good	No Immediate Action Recommended		August 21, 2009
341	Silica	concrete materials	Good	No Immediate Action Recommended		August 21, 2009
341	Silica	brick and mortar	Good	No Immediate Action Recommended		August 21, 2009
341	Silica	silica-sand bags	Good	No Immediate Action Recommended	295 kg	August 21, 2009



DST CONSULTING ENGINEERS
2150 THURSTON DRIVE, SUITE 203
OTTAWA, ONTARIO, K1G 5T9
TEL (613) 748-1415 FAX (613) 748-1356
www.dstgroup.com

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE ASSOCIATED TECHNICAL REPORT.
2. DO NOT SCALE DRAWING.

LEGEND:

- 01A-C — APPROXIMATE ASBESTOS SAMPLE LOCATION, AS APPLICABLE
- LP-01 — APPROXIMATE PAINT SAMPLE LOCATION, LEAD TESTING (LP-#), AS APPLICABLE
- (1) — SURVEY LOCATION REFERENCE

REV	DATE	ISSUE	APPROVAL
0	05/11/09	ORIGINAL	B.H.

PROJECT TITLE

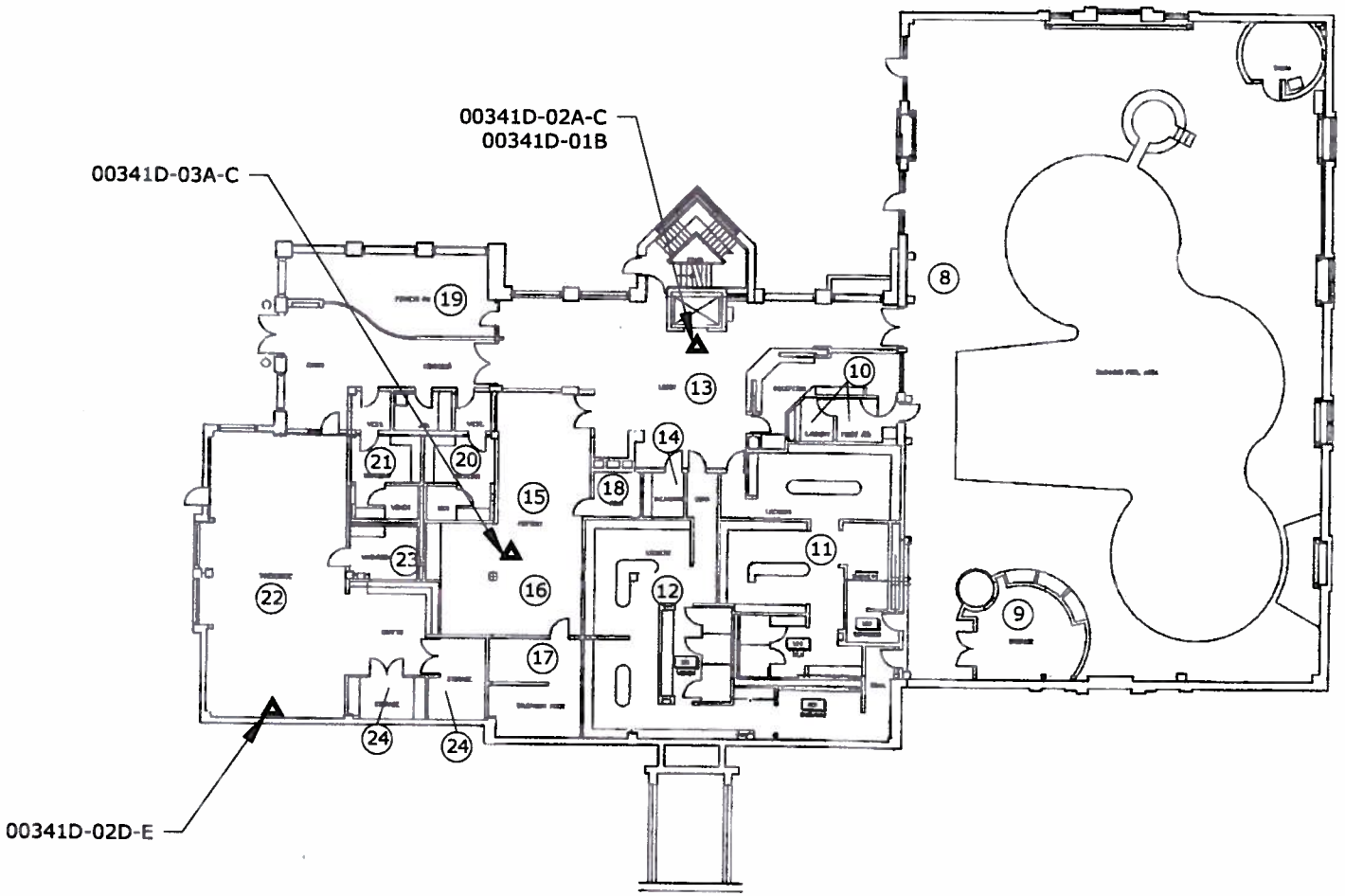
DESIGNATED SUBSTANCE SURVEY
DOVERCOURT RECREATION COMPLEX
411 DOVERCOURT AVENUE
OTTAWA, ONTARIO

DRAWING TITLE

SAMPLE LOCATION PLAN
BASEMENT LEVEL

DESIGNED BY: S.B.	SCALE: NTS
DRAWN BY: V.C.	DATE: November 2009
APPROVED BY: B.H.	PROJECT NO.: BE-OT-010674

FIGURE 1



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(1)	SURVEY LOCATION REFERENCE

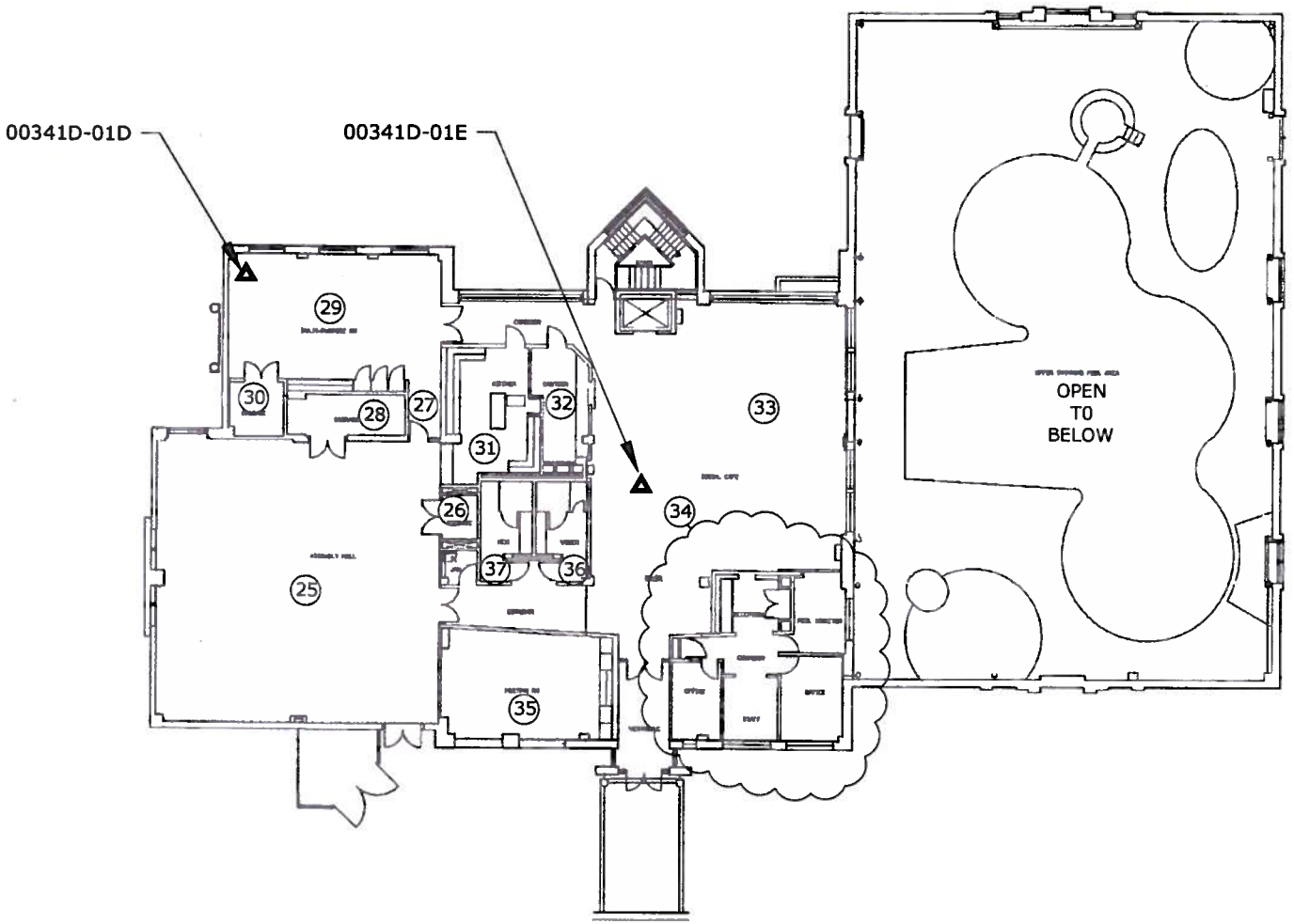
REV	DATE	ISSUE	APPROVAL
0	05/11/09	ORIGINAL	B.H.

PROJECT TITLE
DESIGNATED SUBSTANCE SURVEY
DOVERCOURT RECREATION COMPLEX
411 DOVERCOURT AVENUE
OTTAWA, ONTARIO

DRAWING TITLE
SAMPLE LOCATION PLAN
GROUND LEVEL

DESIGNED BY: S.B.	SCALE: NTS
DRAWN BY: V.C.	DATE: November 2009
APPROVED BY: B.H.	PROJECT NO.: BE-OT-010674

FIGURE 2



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NOTES:
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2. DO NOT SCALE DRAWING.

LEGEND:
- 01A-C — APPROXIMATE ASBESTOS SAMPLE LOCATION, AS APPLICABLE
- LP-01 — APPROXIMATE PAINT SAMPLE LOCATION, LEAD TESTING (LP-#), AS APPLICABLE
- (1) — SURVEY LOCATION REFERENCE

REV	DATE	ISSUE	APPROVAL
0	05/11/09	ORIGINAL	B.H.

PROJECT TITLE
DESIGNATED SUBSTANCE SURVEY
DOVERCOURT RECREATION COMPLEX
411 DOVERCOURT AVENUE
OTTAWA, ONTARIO

DRAWING TITLE
SAMPLE LOCATION PLAN
SECOND LEVEL

DESIGNED BY: S.B.	SCALE: NTS
DRAWN BY: V.C.	DATE: November 2009
APPROVED BY: B.H.	PROJECT NO.: BE-OT-010674

FIGURE 3

PLM Summary Report

Steve Moody Micro Services, LLC
2051 Valley View Lane
Farmers Branch, TX 75234 (Phone 972-241-8460)

NVLAP Lab No. 102056
TDSHS License No. 30-0084

Client : DST Consulting Engineers Inc - Ottawa, ON
Project : City of Ottawa DSS, Building 341D
Project # : BE-OT-010674 Sample Date : 08/21/2009
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 09B-10480
Report Date : 08/26/2009

On 8/24/2009, thirteen (13) bulk material samples were submitted by Stephanie Beach of DST Consulting Engineers Inc - Ottawa, ON for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
00341D-01A	Drywall Joint Compound	None Detected - Joint Compound
00341D-01B	Drywall Joint Compound	None Detected - Joint Compound
00341D-01C	Drywall Joint Compound	None Detected - Joint Compound
00341D-01D	Drywall Joint Compound	None Detected - Joint Compound
00341D-01E	Drywall Joint Compound	None Detected - Joint Compound
00341D-02A	Stipple	None Detected - Texture
00341D-02B	Stipple	None Detected - Texture
00341D-02C	Stipple	None Detected - Texture
00341D-02D	Stipple	None Detected - Texture
00341D-02E	Stipple	None Detected - Texture
00341D-03A	Vinyl Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic
00341D-03B	Vinyl Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic
00341D-03C	Vinyl Floor Tile	None Detected - Floor Tile None Detected - Yellow Mastic

These samples were analyzed by layers. Quantification, unless otherwise noted, is performed by calibrated visual estimate. Results may not be reproduced except in full. This test report relates only to the samples tested. These test results do not imply endorsement by NVLAP or any agency of the U.S. Government. Accredited by the National Voluntary Laboratory Accreditation Program for Bulk Asbestos Fiber Analysis under Lab Code 102056.

NVLAP

Analyst(s): Debra O'Sullivan
Lab Manager : Bruce Crabb
Lab Director : Steve Moody

Approved Signatory : Bruce Crabb
Approved Signatory : Steve Moody

Thank you for choosing Steve Moody Micro Services

Steve Moody Micro Services, LLC
2051 Valley View Lane
Farmers Branch, TX 75234

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab No. 102056
TDSHS License No. 30-0084

Client : DST Consulting Engineers Inc - Ottawa, ON
Project : City of Ottawa DSS, Building 341D
Project # : BE-OT-010674

Lab Job No. : 09B-10480
Report Date : 08/26/2009

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
00341D-01A	Joint Compound (White)	100%	Calcite / Talc / Binders	100%	08/26	DO
00341D-01B	Joint Compound (White)	100%	Calcite / Talc / Binders	100%	08/26	DO
00341D-01C	Joint Compound (White)	100%	Calcite / Talc / Binders	100%	08/26	DO
00341D-01D	Joint Compound (White)	100%	Calcite / Talc / Binders	100%	08/26	DO
00341D-01E	Joint Compound (White)	100%	Calcite / Talc / Binders	100%	08/26	DO
00341D-02A	DW Tape (White)	50%	Cellulose Fibers	100%	08/26	DO
		50%				
00341D-02B	DW Tape (White)	50%	Cellulose Fibers	100%	08/26	DO
		50%				
00341D-02C	DW Tape (White)	50%	Cellulose Fibers	100%	08/26	DO
		50%				
00341D-02D	DW Tape (White)	50%	Cellulose Fibers	100%	08/26	DO
		50%				
00341D-02E	DW Tape (White)	50%	Cellulose Fibers	100%	08/26	DO
		50%				
00341D-03A	Floor Tile (Grey)	95%	Calcite / Vinyl Binders	100%	08/26	DO
	Yellow Mastic (Yellow)	5%	Calcite	40%		
			Glue Binders	60%		
00341D-03B	Floor Tile (Grey)	99%	Calcite / Vinyl Binders	100%	08/26	DO
	Yellow Mastic (Yellow)	1%	Calcite	40%		
			Glue Binders	60%		
00341D-03C	Floor Tile (Grey)	100%	Calcite / Vinyl Binders	100%	08/26	DO
	Yellow Mastic (Yellow)	<1%	Calcite	40%		
			Glue Binders	60%		

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: DST Consulting Engineers Inc.
203-2150 Thurston Drive
Ottawa ON K1G 5T9

Report Date: 10/1/2009
Report Number: 1009000252
Project: CityofOttawaDSS; Fac. 341D
Project No.: BE-OT-010674

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3747539	00341D-LP01	Grey Floor Paint Bldg No. 341D	0.0081***
3747540	00341D-LP02	White Wall Paint Bldg No. 341D	<0.0067

NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)

AIHA No. 100188 / NYSDOH-ELAP No. 11021

Analysis Methods: ASTM D3335-85A "Standard Method To Test For Low Concentrations Of Lead In Paint By Atomic Absorption Spectrophotometry"
EPA SW846-(7420/7421) "Standard Method To Test For Low Concentrations Of Lead In Soils, Sludges and Sediments By AAS"

Comments: Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm MDL=0.0024% by weight. RL= 0.010% by weight (based upon 100 mg sampled). * Insufficient sample provided to perform QC reanalysis (<200 mg) ** Not enough sample provided to analyze (<50 mg) *** Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analytical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be reproduced except in full, without written approval of the laboratory.

Date Received: 9/25/2009
Date Analyzed: 10/1/2009
Analyst: C. Shaffer

Approved By:

Frank E. Ehrenfeld, III
Laboratory Director

1 General

1.1 Description of Work

.1 The Work includes but is not limited to the construction of an addition of a Multipurpose Room and related support facilities and various interior renovations to the Dovercourt Recreation Centre, includes related site works and landscaping. All new work will relate to the "as found conditions" as recorded on drawings included.
Construction Manager is advised that the facilities will be occupied and active at all times. All construction staff, material handling and phased work must be managed by the Construction Manager to ensure that public and user safety is without compromise. All activities should be thoroughly reviewed with the Dovercourt Director or assigned staff.

1.2 EXAMINATION

.1 The Construction Manager and all Sub-Contractors shall familiarize themselves with conditions at the site. Each one shall bear complete responsibility for familiarization with conditions and the affect that same may have on work. *Construction Manager and Contractor will be used interchangeably throughout this specification.*

.2 Every Sub-Contractor and the Construction Manager shall examine the contract documents, the conditions on site and the Work in place prior to commencing the various portions of his work. Contract Documents are to be read as a set and all trades are responsible to co-ordinate with work of other trades.

.3 Each Sub-Contractor and the Construction Manager shall report in writing to the Consultant and the Contractor, any defects affecting the work of that trade.

.4 Commencement of work shall be construed as evidence of acceptance of underlying surfaces, conditions, arrangement and location as satisfactory.

1.3 PROJECT CO-ORDINATION

.1 Co-ordinate progress of the Work, including Owner's forces, progress schedules, submittals, use of site, temporary utilities, construction facilities and controls, site access.

.2 The overall superintendence of the project, ensuring the complete performance of all Sub-Contractors and suppliers as laid down in the specifications, is the responsibility of the Construction Manager. A fully competent Foreman/ Superintendent acceptable to the Architect shall be in charge of the work at all times throughout the contract. The Superintendent shall study the plans and specifications in detail and be completely familiar with the project at the outset. Once conversant with the documents, he shall relate them to the existing conditions. Any errors or discrepancies in dimensions, details, etc., in the plans and specifications or their relationship to the existing conditions, shall be reported to the Architect for clarification or correction before beginning the work. Allow Architect time for clarification or correction as required.

.3 Ensure that all necessary job dimensions are taken and all trades are co-ordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.

.4 Verify that all work as it proceeds, is executed in accordance with dimensions and positions indicated, with 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 continues.

.5 Check and verify all dimensions referring to the work and the interfacing of all services. Verify with the trade concerned, all dimensions pertaining to the work of other trades.

.6 Any errors, discrepancies, or trade conflicts arising during construction shall, when necessary, be referred to the Architect for clarification and/or decision. Allow Architect time for deliberation as required.

.7 Co-ordinate all Sub-Contractors and suppliers so that work proceeds smoothly without interruption and in strict accordance with approved schedules. Co-operation so that work is executed in proper sequence, items to be built-in are built-in on time, erected work is protected against damage from the work of other trades and defective work is removed and made good to the satisfaction of the Architect.

.8 Study all documents which describe, or are related to, any operation before commencement of that operation. Report discrepancies discovered between elements of documentation and obtain ruling on required interpretation before beginning work. Allow Architect time to make ruling as required.

.9 Ensure that material , equipment, services and operatives are brought to site at proper times, in sufficient quantity and quality and in accordance with requirements of work.

.10 Construction Manager shall ensure that each Sub-Contractor informs him of requirements for site conditions and surfaces necessary for the execution of the work and that he provides setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels. The Construction Manager shall inform other Sub-Contractors whose work is affected by these requirements and preparatory work. Commencement of work shall imply complete acceptance of all work done by other Sub-Contractors.

.11 Construction Manager is responsible to co-ordinate the staging of all trades in sequence to minimize interferences between trades. Mechanical trade shall produce interference drawings to confirm all duct runs are clear of structure and any other obstructions.

.12 Construction Manager and Sub-Contractors shall co-operate fully with other Contractors and Sub-Contractors working on this project. Perform necessary co-ordination to install equipment supplied, or supplied and installed by Owners.

.13 Remove and replace ceilings as required to accommodate the installation of phone lines and other services in ceiling installed by other Contractors. Replace damaged ceiling tiles due to such work.

1.4 CONTRACTOR'S USE OF SITE

.1 Refer to specifications, plans and drawings for limits of contract.

.2 Use of Site: Exclusive and complete for execution of the work **within the limits of the defined and hoarded "limits of Contract"**. Construction Manager recognizes that the facility will be actively used at all times by the owner and throughout construction. Coordinated efforts will be required to ensure occupied use is guaranteed for the owner/ operator..

.3 Do not unreasonably encumber site with materials or equipment.

.4 Move stored products or equipment which interfere with operations of Owner or other Contractors.

.5 Obtain and pay for use of additional storage or work areas needed for operations.

.6 Maintain project grounds and public properties free from accumulation of waste materials and rubbish.

1.5 CUTTING AND PATCHING

.1 Approvals:
- .1 Submit written request in advance of cutting or alteration which affects:
  - .1 Structural integrity of any element of Project.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of any operational element.
  - .4 Visual qualities of sight-exposed elements.
  - .5 Work of Owner or separate contractor.

.2 Inspection:
- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.

.3 Execution:
- .1 Perform cutting, fitting, and patching including excavation and fill, to complete the Work.
- .2 Remove and replace defective and non-conforming work.
- .3 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical work.
- .4 Perform work to avoid damage to other work.
- .5 Prepare proper surfaces to receive patching and finishing.
- .6 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .7 Cut rigid materials using power saw or core drill. Pneumatic or impact tools not allowed.
- .8 Restore work with new products in accordance with Contract Documents.
- .9 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .10 At penetration of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, full thickness of construction element.
- .11 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

1.6 FIELD ENGINEERING

.1 Construction Manager shall confirm all elevations and/or dimensions of existing conditions on site and allow for same in tendering price.

.2 Employ qualified Ontario Land Surveyor to establish and layout in the field all grid lines, exterior wall and other main lines all curves and levels, verify known geodetic elevation, establish bench marks or permanent monuments, correlate geodetic elevations with public utility elevations.

.3 Verify and record on the record drawings, elevations of footing bearing surfaces, top of footings, new services and existing utilities encountered, all related to finished floor or geodetic elevations.

.4 Install substantial batter boards, lines, stakes, etc., as required during the progress of the work.

.5 Within one week of completion of foundations, provide six (6) copies of legal survey showing discrepancies and setting out distances of foundations from each other and from property lines.

Such survey to include appropriate elevations as required to verify the finished floor elevation of the Ground Floor.

.6 Sub-Surface Conditions:
- .1 Promptly notify consultant in writing if sub-surface conditions at Place of the Work differ materially from those indicated in Contract Documents, or reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in the Work as provided in Part 6 - Changes in the Work.

.7 Provide and pay for preparation of a post-construction survey drawing by a qualified land surveyor registered with the Province of Ontario. The survey drawing will show and dimension the locations of the building, underground services, asphalt and concrete paving, curbs, fencing, trees and shrubs, and any other elements, to the satisfaction of the Architect. Provide one mylar copy and six white prints.

1.7 CONCEALMENT

.1 Conceal pipes, ducts, and wiring in floor, wall and ceiling construction, except where indicated otherwise on architectural drawings.

1.8 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum useable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Architect of impending installation and obtain his approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment.

1.9 PUBLIC AND PRIVATE UTILITIES AND SERVICES

.1 Verify limitations imposed on project work by presence of utilities and services, and ensure no damage occurs to them.

.2 Notify service authorities concerned so that they protect, remove, relocate, or disconnect them as they may require.

.3 Make arrangements and pay for connection charges for services required for project work.

.4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

1.10 RUBBISH

.1 Do not burn or bury rubbish and work materials on site.

.2 Dispose of rubbish and surplus material off site. Recycle where facilities exist.

.3 Do not dispose of volatile or corrosive materials in sewers and drains.

.4 Except if expressly stated otherwise, materials indicated for removal become the Contractor's property and shall be taken from the site.

.5 Dispose of rubbish and waste in accordance with governing regulations.

1.11 OWNER FURNISHED PRODUCTS

.1 Products furnished and paid for by the Owner are indicated in the contract documents.

.2 Owner's responsibilities:
- .1 Arrange and pay for product delivery to the site, in accordance with the Construction Schedule (except as noted).
- .2 Deliver supplier's bill of material to Contractor.
- .3 Inspect deliveries jointly with Contractor.
- .4 Submit claims for transportation damage.
- .5 Arrange for the replacement of damaged, defective, or missing items.
- .6 Arrange for manufacturer's warranties, bonds, service, inspections, as required.

.3 Construction Manager responsibilities:
- .1 Designate delivery date for each product in the Construction Schedule.
- .2 Received products at the site. Verify that number of packages received matches freight bill. Check packages for external damage, report damage and loss on freight bill and notify Owner.
- .3 Promptly inspect products jointly with Owner, record shortages, damaged or defective items.
- .4 Handle products at the site, including uncrating and storage.
- .5 Protect products from exposure to the elements and from damage.
- .6 Assemble, install, connect, adjust and finish products, ready for use.
- .7 Repair or replace items damaged by Contractor.

1.12 PROJECT MEETINGS – Refer also to Section 01 31 19/Project Meetings

.1 Administrative:
- .1 Schedule and administer project progress meetings bi-weekly or more frequently as required.
- .2 Distribute written notice of each meeting four days in advance of meeting date to Owner and all consultants.
- .3 Provide physical space on site, for the duration of the project, complete with heat and air conditioning and make arrangements for meetings. Provide table with a minimum of 14 fabric covered chairs. Facilities shall be equipped with phone, fax and data hook-up for use by the Contractor and Consultants. **Owner may provide space for this use.**
- .4 Owner will record and distribute Minutes of Meetings.

1.13 INSPECTION, TESTS AND APPROVAL

.1 At least twenty-four hours notice shall be given to the Architect in order that all inspections and tests called for by these specifications may be implemented. Failure to give such notice will result in complete retesting if deemed necessary by the Architect. No work shall be covered up until inspection and approval by the Architect or Inspector.

1.14 DOCUMENTS

.1 Maintain at job site copies of contract drawings, specifications, addenda, regulatory authority approved drawings, permits and certificates, reviewed shop drawings, contemplated change orders, change orders, site instructions, other modifications to contract, field test reports,

inspection reports, job minutes, approved schedule, manufacturers' installation and application instructions, Material Safety Data Sheets, set of drawings for as-builts, latest copy of Ontario Building Code and regulations for construction projects.

1.15 SCHEDULE

.1 Schedules Required
- .1 Construction Progress Schedule.
- .2 Submittal Schedule for Shop Drawings, Product Data and Samples.
- .3 Update must accompany each billing submission - including commentary with respect to schedule.
- .4 CO/ CCO summary and status
- .5 RFI summary and status
- .6 Cash allowance status
- .7 Schedule dates for specified mock-ups.
- .8 Submit 6 copies within fourteen (14) days of authorization to proceed and maintain construction schedule as indicated in GC 3.5 and Supplementary Conditions.
- .9 Schedule shall be in format acceptable to the architect and the owner. Show clearly proposed progress of all main items. Indicate each trade or operation separately. Order chronologically for beginning of each item or work. Identify first workday of each week. Identify critical sequence of work.
- .10 Include or show separately shop drawing review, decision dates for allowances, fabrication and delivery lead time. Show dates for beginning and completion of each element of construction including sub-trade work, concrete placement, equipment installation and testing.
- .11 Include or show separately delivery dates for equipment and materials which have a critical delivery period.
- .12 Identify work of separate blocks or other phases or other logically grouped activities. Break items into blocks no greater than 2 weeks in duration. Show project percentage of completion for each item of work as of first day of each month.
- .13 Predicate schedule on basis of substantial performance prior to date stated in agreement.
- .14 Revise or elaborate on schedule if requested by owner or architect and submit six (6) copies of approved schedule for distribution to owner.
- .15 Revise and update schedule on a monthly basis. Release of progress payment will be subject to receipt of schedule.

.2 Test Reports
- .1 Provide copies of all test reports including materials, geotechnical and technical reviews.

.3 Site Visit Reports
- .1 Review status of consultant reports at each meeting to confirm status of deficient work and progress of current work.

1.16 DIMENSIONS

.1 It shall be understood that wall thickness shown on the drawings may be nominal only, and the actual sizes shall, in all cases, be ascertained at the work.

.2 Each Sub-Contractor shall verify the dimensions of all shop fabricated portions of the Work on the site before commencing shop drawings and fabrication.

.3 Each Sub-Contractor shall fabricate all items fitting to structural parts from measurements taken on the Work or verified and be fully responsible for co-ordination of this respect.

1.17 STREETS AND TRAFFIC

.1 Provide all necessary flagmen, detour signs, warning lights, signs and barricades, necessary to direct and protect pedestrian and vehicular traffic during the work. **Safety of general public and regular users is paramount for this project.**

.2 Conform to all Provincial, Regional, and Municipal Regulations and requirements.

.3 Provide adequate dust and mud control.

.4 Provide and maintain adequate access to project site.

.5 Supplement snow clearing operations as required to keep access and work areas and adjacent walkways free of snow and ice.

1.18 MATERIAL AND EQUIPMENT

.1 Product and Material Quality
- .1 Products, materials, equipment and articles (referred to as Products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective Products, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.2 Storage, Handling and Protection
- .1 Handle and store Products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled Products in original and undamaged condition with manufacturer's seals and labels intact.
- .3 Store products subject to damage from weather in weatherproof enclosures or as directed by the Consultants.

.3 Manufacturer's Instructions
- .1 Unless otherwise indicated in specifications, install or erect Products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.
- .2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.
- .3 Improper installation of erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and reinstallation at no increase in Contract Price or delay in schedule.

.4 Workmanship
- .1 Workmanship shall be best quality, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required work is such as to make it impractical to produce required results.
- .2 Do not employ any unfit person or anyone unskilled in their required duties.
- .3 Decisions as to quality or fitness of workmanship in cases of dispute rest solely with Consultant, whose decision is final.

.5 Concealment
.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
.2 Before installation, inform Consultant if there is a contradictory situation. Install as directed by Consultant.

.6 Trade Names
.1 Wherever an item or class of material is specified exclusively by trade names or by names of the maker by catalogue reference, only such items shall be used, unless Architect's approval for a substitution is secured in writing during tender period.
.2 In no case will the substitution of a product manufactured outside Canada for a Canadian-made product be considered.

1.19 SAFETY REQUIREMENTS

.1 The Contractor shall comply with the **latest edition** and amending regulations of the following documents, and in the case of conflicts between documents, the more stringent shall apply:

.1 The Occupational Health and Safety Act - Revised Statutes of Ontario, R.S.O. 1990,c.0.1., current statute.

.2 The Work Place Safety and Insurance Act,1997,S.O. 1997,c.16, Schedule A, current statute

.3 Ontario Building Code Act , 1992, S.O. 1992,c. 23 current statute.

.4 Fire Protection and Prevention Act, 1997, S.O. 1997, c.4 - Fire Code.

.5 Environmental Protection Act, R.S.O.,c.E.19 revised Ontario

.6 National Building Code 2015, Safety Measures at Construction and Demolition Sites.

.7 **This is not a complete list and the contractor is responsible to conform to all relevant codes, legislation in the place of work.**

1.20 FINISHING STANDARDS

.1 When the project is nearing completion, arrange to have one designated area completed prior to finishing the remaining areas. When this area is fully completed with all materials, fixtures, cabinets, hardware, etc., in accordance with the contract and the approved colour schedule, request an inspection.

1.21 PROGRESS REPORTS

.1 Construction Manager shall prepare daily reports of his operations. Daily report shall contain at least the following information:
.1 Weather conditions.
.2 Manpower on the job in each trade.
.3 Major items of equipment on the job.
.4 A brief summary of work accomplished that day.
.5 Materials, equipment, or owner-furnished items arriving or leaving site.
.6 Inspection reports.
.7 Significant events.

.8 Any tests made and their final results, if known.
.9 Any oral instructions received.
.10 Visitors to the job.

.2 Construction Manager shall maintain a file of copies of all daily reports on the site and make it available to Consultant or Owner upon request.

2 Products (not applicable)

3 Execution (not applicable)

END OF SECTION

PART 1 - GENERAL

Dovercourt Recreational Centre is fully occupied and will be in use during all normal construction hours. Access to occupied areas must be coordinated with the Executive Director John Rapp. An intended access schedule is required for one (1) week look aheads.

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Owner to facilitate work as stated. Provide updates as required with the school representative to advise of proposed activities that may generate objectionable or worrisome noises.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises.

1.4 EXISTING SERVICES

.1 Notify Consultant and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Owner 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work.

.3 Provide for personnel and pedestrian and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS	.1	Submit schedule in accordance with 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
	.2	Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
	.3	Keep within limits of work and avenues of ingress and egress.
	.4	Ingress and egress of Contractor vehicles at site should be limited to areas designated by the school board where possible.
	.5	Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved.
1.6 OTHER DATES	.1	Refer to 00 21 31 Instructions to Bidders for start and completion dates. Note date of Substantial Completion is before the hand over date.
1.7 SECURITY	.1	Where security has been reduced by Work of Contract, provide temporary means to maintain security.
1.8 BUILDING SMOKING ENVIRONMENT	.1	**Comply with smoking restrictions. Smoking is not permitted on City of Ottawa property.**

PART 2 - PRODUCTS

2.1 NOT USED	.1	Not Used.

PART 3 - EXECUTION

3.1 NOT USED	.1	Not Used.

END of SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Owner, and/or Consultant are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

.1 The Owner will appoint and pay for services of testing laboratory for specific quality control tests and inspections as identified in the documents as being paid for by the Owner, except as follows:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.

.4 Mill tests and certificates of compliance.

.5 Tests specified to be carried out by Contractor under the supervision of Consultant.

.6 Additional tests specified under 1.2.2

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant to verify acceptability of corrected work.

.3 The testing organization appointed by the Owner will be co-ordinated by the General Contractor .

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

.1 Provide access to Work for inspection and testing.

.2 Facilitate inspections and tests.

.3 Make good Work disturbed by inspection and test.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Consultant sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is

covered before required inspection or testing is completed and approved by Consultant.

.5 Employment of inspection/testing agencies and the reviews by the Consultants does not relieve the Contractor's responsibility to perform work in accordance with the Contract Documents.

1.4 PROCEDURES

.1 Notify the appropriate agency and Consultants in advance of the requirements for tests, in order that attendance arrangements can be made. Provide 48 hours notice.

.2 Submit samples and/or materials required for testing, as specifically requested in specification. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work on a bi-weekly basis

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Consultant team.

.4 Provide physical space and make arrangements for meetings. **Dovercourt may provide space for site office and meetings. Review with John Rapp, Executive Director.**

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETINGS

.1 Within ten days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of the Owner, Consultants, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum five days before meeting.

.4 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment critical to maintaining Construction Schedule.
.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
.7 Proposed changes, change orders, procedures, approvals required.
.8 Owner provided products and designated sub-contractors.
.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
.12 Commissioning requirements in accordance with Section 01 91 13 – General Commissioning Requirements
.13 Monthly progress claims, administrative procedures, photographs, hold backs.
.14 Appointment of inspection and testing agencies or firms.
.15 Insurances, transcript of policies.

1.2 PROGRESS MEETINGS

.1 During course of Work and prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work Consultant team and Owner are to be in attendance.

.3 Notify parties minimum 2 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 2 days after meeting.

.5 Agenda to include 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 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system, Microsoft Project.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 14 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Consultant within 15 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

1.4 PROJECT MILESTONES

.1 Project milestones for Project Schedule are identified in Section 00 20 00 – Instruction to Tenderers, item 23 and Section 01 00 50 – General Requirements, item 1.5

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Consultant will review and return revised schedules within [5] working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award
.2 Shop Drawings, Samples
.3 Permits
.4 Mobilization
.5 Excavation
.6 Backfill
.7 Building foundations
.8 Slab on grade
.9 Structural Concrete
.10 Structural Steel
.11 Roofing
.12 Exterior cladding
.13 Doors and Windows
.14 Exterior Stairs & Ladders
.15 Plumbing
.16 Lighting
.17 Electrical
.18 Piping
.19 Controls
.20 Heating, Ventilating, and Air Conditioning
.21 Fire Systems
.22 Testing and Commissioning
.23 Supplied equipment long delivery items
.24 Engineer supplied equipment required dates

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Where items or information is not produced in SI Metric units converted values are acceptable.

.4 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work are co-ordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

.9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to CCDC 2-2008

.2 Accompany submissions with transmittal letter, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.3 Submissions include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.4 After Consultant's review, distribute copies.

.5 Shop drawings may be submitted electronically in PDF format, or

.6 Submit 2 paper copies of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.7 Submit 2 paper copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.8 Submit 2 paper copies of test reports for requirements requested in specification Sections and as requested by Consultant.
- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or

system to be provided has been tested in accord with specified requirements.
.2 Testing must have been within 3 three years of date of contract award for project.

.9 Submit 2 paper copies of certificates for requirements requested in specification Sections and as requested by Consultant.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.10 Submit 2 paper copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Consultant.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.11 Submit 2 paper copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.
.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.12 Submit 2 paper copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.

.13 Delete information not applicable to project.

.14 Supplement standard information to provide details applicable to project.

.15 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, one copy will be returned for contractor distribution & fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant re not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

END OF SECTION

PART 1 - GENERAL

1.0 SCOPE

.1 The City of Ottawa and Dovercourt Recreational Centre are committed to ensuring a clean and safe environment for all its employees and for the employees of the construction companies that will renovate the recreational facility. The requirements outlined in this section are provided to ensure that the principals, owners and management of the companies accept this completely.

1.1 RELATED REQUIREMENTS

.1 Section 01 52 00 Construction Facilities

1.2 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario
- .1 Occupational Health and Safety Act, R.S.O. 1990 Updated 2011.

.4 Ministry of Labour, Construction Safety Association of Ontario, Electrical Safety Association of Ontario, Industrial Accident Prevention Association and the Technical Standards and Safety Authority latest standards and publications shall apply.

.5 Latest version of any noted document shall govern.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant weekly.

.4 Submit copies of incident and accident reports.

.5 Acceptance of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.6 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
.1 Include responses to fuel spills or damage existing fuel or oil dispensing systems

1.4 FILING OF NOTICE
.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.5 SAFETY ASSESSMENT
.1 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS
.1 Schedule and administer Health and Safety meetings with prior to commencement of Work.

1.7 GENERAL REQUIREMENTS
.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

1.8 RESPONSIBILITY
.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 COMPLIANCE REQUIREMENTS
.1 Comply with Ontario Health and Safety Act, R.S.O.
.2 Ontario Regulation 213/91 Construction Projects
.3 Construction Safety Association of Ontario - B037 Contractor's Guide: Effective Health and Safety Programs
.4 Construction Safety Association of Ontario D5030 - Health and Safety Program Planning for Construction.

1.10 UNFORSEEN HAZARDS
.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise

Consultant verbally and in writing.

1.11 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction.

1.12 CORRECTION OF NON-COMPLIANCE

.1 Immediately address any health and safety non-compliance issues identified by authority having jurisdiction or by any other party.

.2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.14 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 All Sections

1.2 REFERENCES

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.2 Reference Standards:

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2008 Stipulated Price Contract.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review by Consultant.

.3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.5 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for

training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.

.6 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.8 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.11 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.12 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.13 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.14 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

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

1.5 DRAINAGE

.1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated. Refer to landscape drawings and specifications. Review procedures with Landscape Architect on site.

.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 minimum.

.3 Protect roots of designated trees to dripline or as directed by landscape architect during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area.

.1 Provide temporary enclosures where directed.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 HISTORICAL/ ARCHAEOLOGICAL CONTROL

.1 Protect historical and archaeological resources found on the project site: and identify procedures to be followed if historical or archeological resources not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of discovered resources and identify lines of communication between Contractor personnel and Consultant.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .

.3 Ensure storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
- .1 CCDC-2-2008 Stipulated Price Contract.
- .2 CCDC 5B Construction Manager Contract

1.2 INSPECTION

.1 Refer to CCDC-2-2008, and CCDC 5B

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.

.2 Allocated costs: to Section 01 21 00 - Allowances.

.3 Provide equipment required for executing inspection and testing by appointed agencies.

.4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

.1 Notify appropriate agency and Consultant 2 days in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

.1 Refer to CCDC-2-2008

1.7 REPORTS

.1 Submit 4 four copies of inspection and test reports to Consultant.

.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Consultant as specified in specific Section.

.3 Prepare mock-ups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.11 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 52 00: Construction Facilities

1.2 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL .1 Provide temporary utilities controls in order to execute work expeditiously. Owner may provide temporary utilities at owners cost. CM to assume all costs for connection and removal.

.2 Remove from site all such work after use.

1.4 HOARDING .1 Supply and erect construction fencing around perimeter of individual buildings and other construction areas as required. Contractor to co-ordinate hoarding installation with Authorities Having Jurisdiction prior to construction.

.2 Contractor to present layout of hoarding and obtain approved of by Project Manager prior to construction. Any changes to hoarding layouts to be presented prior to adjustments.

.4 Contractor to provide lockable truck entrances(s) with lockable gates and at least one pedestrian door conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

1.5 DEWATERING .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.6 WATER SUPPLY .1 Contractor to arrange and pay for continuous supply of potable water for construction use.

1.7 TEMPORARY HEATING AND VENTILATION .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel. The Contractor may use natural gas supplied to site during construction, but shall be responsible for arranging with gas supplier to suit his requirements.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide 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 levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.5 Ventilating:
.1 Prevent 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 contaminants.

.6 Permanent heating system of building, not to be used unless authorized by Consultant and Owner. Be responsible for damage to heating system if use is permitted.

.7 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.

.8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.8 TEMPORARY POWER AND LIGHT

.1 Contractor shall be responsible for temporary power during construction. The Contractor may use permanent power supplied to site during construction, but shall be responsible for arranging with supplier to suit his requirements. .

.2 Provide and maintain adequate temporary lighting throughout project. Ensure level of illumination on all floors and stairs

meets requirements of Authority Having Jurisdiction.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Owner's Project Manager and Consultant provided that guarantees are not affected. Guarantees will not be initiated until the date of substantial completion. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.9 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone fax data hook up, lines equipment necessary for own use.

1.10 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

1.11 GUARD RAILS AND BARRICADES

.1 Contractor to provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs. Guard rails and barricades shall be designed by a Professional Engineer in the Province of Ontario.

.2 Contractor to provide as required by Authorities Having Jurisdiction.

1.12 WEATHER ENCLOSURES

.1 Contractor to provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.13 DUST TIGHT SCREENS

.1 Contractor to provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
- .1 CCDC 2-2008

.2 Canadian Standards Association (CSA International)
- .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-0121-M1978(R2003), Douglas Fir Plywood.
- .3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
- .4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be graveled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding ramps ladders swing staging platforms and temporary stairs.

1.5 HOISTING

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists cranes to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

.1 Refer to CCDC 2-2008

.2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

1.8 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

.4 .1 Equip office with 1 x 2.4 m table, 8 chairs, 8 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
.1 Maintain in clean condition.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.10 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Consultant

1.12 PROTECTION AND MAINTENANCE OF

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

TRAFFIC

.2 Maintain and protect traffic on affected roads during construction period.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.9 Dust control: adequate to ensure safe operation at all times.

.10 Provide snow removal during period of Work.

1.13 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily or as required by Authorities Having Jurisdiction.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff

SEDIMENTATION CONTROL

or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
- .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosures using 1800 high sectional mesh self-supporting rental fencing.

.2 Provide lockable truck entrance gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.3 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.5 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand local seasonal wind pressure.

1.6 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.7 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.8 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.10 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Product quality, availability, storage, handling, protection, and transportation.
.2 Manufacturer's instructions.
.3 Quality of Work, coordination and fastenings.
.4 Existing facilities.

1.2 Related Sections

.1 Section 01 45 00 – Quality Control
.2 Section 01 73 00 - Execution.

1.3 Reference Standards

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-2008
.2 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 01 42 00 - References.
.3 Conform to these reference standards, in whole or in part as specifically requested in specifications.
.4 If there is question as to whether any product or system is in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.
.5 Cost for such testing will be borne by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.
.6 Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.

1.4 Quality

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products,

decision rests strictly with Consultant based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

.6 Where a product is noted as "or approved equal" approval must be obtained prior to close of tenders.

1.5 Availability

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.6 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber and trusses on flat, solid

supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

.9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 Transportation

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.8 Manufacturer's Instructions

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.9 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.10 Co-Ordination

.1 Ensure cooperation of workers in laying out Work. Maintain

efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.11 Concealment

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.12 Remedial Work

.1 Refer to Section 01 73 00 - Execution Requirements.

.2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

1.14 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material as specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.15 Fastenings -

.1 Use fastenings of standard commercial sizes and patterns with

Equipment		material and finish suitable for service.
	.2	Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
	.3	Bolts may not project more than one diameter beyond nuts.
	.4	Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
1.16 Protection of Work in Progress	.1	Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.
1.17 Existing Utilities	.1	When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and pedestrian and vehicular traffic.
	.2	Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.
PART 2 - PRODUCTS	1	Not Used.
PART 3 - EXECUTION	1	Not Used

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Instruction to Bidders and General Requirements

.2 Section 01 45 00 - Quality Control

.3 Section 31 23 33 - Excavating, Trenching and Backfilling

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-2008

1.3 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Consultant.

1.4 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 The Contractor shall confirm all elevations and/or dimensions on site prior to proceeding with any work.

.3 The Contractor will provide one (1) reference line in each direction and a reference benchmark on each level. All Sub-contractors shall employ qualified Ontario Land Surveyor to establish and layout all remaining required lines and levels of the project and assume the responsibility for their accuracy and well being and by such procedure will absolve the Consultant and Owner from any costs whatsoever to rectify from any cause.

.4 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.5 Inform the Consultant immediately if bench marks or reference points are disturbed or damaged by any work and pay for their repair and/or replacement.

.6 Locate and fix grid lines and locations of walls, partitions, shafts and all parts of the construction as work proceeds including exposed work.

.7 Make no changes or relocations without prior written notice to Consultant.

1.5 SURVEY REQUIREMENTS

.1 Verify grades, lines, levels and dimensions. Indicate and report any errors or inconsistencies to the construction manager in writing before commencing work.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 Establish foundation column locations and floor elevations.

.7 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.

.2 Submit schedule to and obtain approval from governing authorities and the Consultant for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties. Provide a minimum five (5) working days notice of pre-scheduled interface activities affecting utility services or adjacent use of properties.

.3 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.4 Verify limitations imposed on Project work by presence of utilities and services and ensure no damage occurs to them

.5 Notify service authorities concerned so that they protect, remove, relocate or disconnect them as they may require.

.6 Make arrangements and pay for connection charges for services required for Project Work.

.7 Make arrangements to protect personnel and equipment from danger from utilities and services.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Submit field drawings to indicate relative position of various services and equipment when required.

1.8 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work. Survey shall indicate distances from foundations to property lines.

.3 Record locations of maintained, re-routed and abandoned service lines.

.4 Verify and record on the record drawings, elevations of footing bearing surfaces, top of footings, new surfaces and existing utilities encountered, all related finish floor or geodetic elevations.

1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with Contract Documents.

1.10 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 30 - Safety Requirements

.2 Section 01 45 00 - Quality Control

.3 Section 01 51 00 - Temporary Utilities

.4 Section 01 52 00 - Construction Facilities

.5 Section 01 61 00 - Common Product Requirements

.6 Section 01 71 00 - Examination and Preparation

.7 Section 01 74 21 - Construction Demolition Waste Management and Disposal

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:
.1 Structural integrity of elements of project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of operational elements.
.4 Visual qualities of sight-exposed elements.

.3 Include in request:
.1 Identification of project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to

damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.5 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction,

completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-2008

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling..

.7 Dispose of waste materials and debris off site.

.8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

.1 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.2 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.3 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors and.

.4 Clean lighting reflectors, lenses, and other lighting surfaces.

.5 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.8 Remove dirt and other disfiguration from exterior surfaces.

.9 Clean and sweep roofs, gutters, areaways, and sunken wells.

.10 Sweep and wash clean paved areas.

.11 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.12 Clean roofs, downspouts, and drainage systems.

.13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.14 Remove snow and ice from access to building.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Waste Management Goal 75 percent of total Project Waste to be diverted from landfill sites. Provide documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.2 Accomplish maximum control of solid construction waste.

.3 Preserve environment and prevent pollution and environment damage.

1.2 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

.2 Cost/Revenue Analysis Workplan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

.3 Inert Fill: inert waste - exclusively asphalt and concrete.

.4 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.5 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.6 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.7 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.8 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modeling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.9 Separate Condition: refers to waste sorted into individual types.

.10 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

.11 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.12 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.13 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:
.1 Waste Audit.
.2 Waste Reduction Workplan.
.3 Material Source Separation Plan.
.4 Schedules A B C D E completed for project.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare and submit following prior to project start-up:
.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.3 Submit 2 copies of Materials Source Separation Program (MSSP) description.

.3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
.1 Failure to submit could result in hold back of final payment.
.2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.

.3 For each material reused, sold or recycled from project, include amount in tonnes quantities by number, type and size of

items and the destination.
.4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:
.1 Destination of materials listed.
.2 Deconstruction/disassembly techniques and sequencing.
.3 Schedule for deconstruction/disassembly.
.4 Location.
.5 Security.
.6 Protection.
.7 Clear labelling of storage areas.
.8 Details on materials handling and removal procedures.
.9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.4 Describe management of waste.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.6 Post WRW or summary where workers at site are able to review content.

.7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.7 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance

with approved methods.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
.1 Transport to approved and authorized recycling facility or to users of material for recycling.

1.8 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Provide waybills for separated materials.

1.9 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.10 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Provide temporary security measures as required.

1.11 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Do Work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, consistent with applicable fire regulations.
- .1 Mark containers or stockpile areas.
- .2 Provide instruction on disposal practices.

.2 On-site sale of salvaged recovered reusable recyclable materials is not permitted.

.3 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Cardboard	100	

Plastic Packaging	100
Rubble	100
Steel	100
Wood (uncontaminated)	100
Other	

3.4 WASTE AUDIT (WA) .1 Schedule A - Waste Audit (WA):

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood and Plastics Material Description						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
Doors and Windows Material Description						
Painted Frames						
Glass						
Wood						

Metal

Other

3.5 WASTE REDUCTION WORKPLAN (WRW) .1 Schedule B:

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7)% Reused
Wood and Plastics Material Description						
Chutes						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
Doors and Windows Material Description						
Painted Frames						
Glass						
Wood						

Metal

Other

3.67 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E - Government Chief Responsibility

Ontario Ministry of Environment and Energy
135 St. Claire Avenue West
Toronto, ON M4V 1P5
General Inquiries
416-323-4321
800-565-4923
Fax:
416-323-4682
Environment Canada Toronto Ontario
General Inquiries
416-734-4494

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 01 91 00 - Commissioning.

1.3 References

.1 Canadian Construction Documents Committee (CCDC)
- .1 CCDC 2-2008
- .2 OAA/OGLA Document 100

1.4 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request Consultant's Inspection.

.2 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
- .4 Certificates required by Branch Fire Commissioner Utility companies and the Authorities Having Jurisdiction have been submitted.
- .5 Operation of systems have been demonstrated to Owner's personnel.
- .6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant, and Contractor. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

.5 Declaration of Substantial Performance: when Owner and

Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2-2008, General Conditions Article for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Owner and Engineer Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2-2008. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request re-inspection.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2-2008.

PART 2 - PRODUCTS .1 Not Used.

PART 3 - EXECUTION .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties and bonds.

.7 Final site survey.

1.2 Related Sections

.1 Section 01 45 00 - Quality Control.

.2 Section 01 77 00 - Closeout Procedures.

.3 Section 01 91 00 - Commissioning.

.4 Section 01 79 00 - Demonstration and Training.

1.3 Submission

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

.2 Copy will be returned after final inspection, with Consultant's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, four final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous

inspections. Replace products at own expense.

.8 Pay costs of transportation.

1.4 Format

.1 Organize data in the form of an instructional manual.

.2 Binders: solid vinyl, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, 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 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in format on diskettes CD.

1.5 Contents - Each Volume

.1 Table of Contents: provide title of project;
.1 date of submission; names,
.2 addresses, and telephone numbers of Consultant and Contractor with name of responsible parties;
.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each 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 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 As-builts and Samples

.1 In addition to requirements in General Conditions, 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 record documents 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 clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.7 Recording Actual Site Conditions

.1 Record information on set of black line opaque drawings, and in copy of Project Manual.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.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 Measured 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 catalogue number of each product 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.

1.8 Final Survey

.1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 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 Panel board 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 instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly 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 list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination 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 and balancing reports as specified in Section 01 45 00 - Quality Control.

.15 Additional requirements: As specified in individual specification sections.

1.10 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue 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 recommended schedule for cleaning and maintenance.

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

1.11 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.12 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.13 Warranties and Bonds

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.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.

PART 2 - PRODUCTS

.1 Not Used.

PART 3 - EXECUTION

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 91 13 - General Commissioning CX Requirements

.3 Section 01 91 51 - Building Management Manual(BMM)

.5 Division 21 through to 28

1.2 DESCRIPTION

.1 The Owner will engage the services of an independent commissioning Authority to work with the Contractor to co-ordinate and verify the Commissioning activities. Co-operate fully with the Owner's Commissioning Authority.

.2 Appointment of Commissioning Authority does not in any way relieve the Contractor of any commissioning duties. The Commissioning Authorities role is quality control, performance verification and supervision of training delivery.

.3 Demonstrate operation and maintenance of equipment and systems to Owner's Commissioning Authority and personnel two weeks prior to date of substantial performance.

.4 Owner will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.3 QUALITY CONTROL

.1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Consultant's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

1.5 CONDITIONS FOR

.1 Equipment has been inspected and put into operation in

DEMONSTRATIONS

accordance with Division 21 through 28.

.2 Testing, adjusting, and balancing has been performed in accordance with appropriate specifications division.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.6 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.7 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting,, servicing, and maintenance of each item of equipment at scheduled times, at the designated location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

1.8 TIME ALLOCATED FOR INSTRUCTIONS

.1 .1 Section 08 71 10 – Security Hardware/ access system – electric strikes: 1 hour of instruction

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 Related Work

.1 Concrete Reinforcement Section 03 20 00

.2 Cast-in-Place Concrete Section 03 30 00

.3 Concrete Floor Finishes Section 03 35 00

1.2 Reference Standards

1 Do concrete formwork in accordance with CAN/CSA-A23.1-14 and CSA Standard S269.3 (M92), except where specified otherwise.

2 Products

2.1 Materials

.1 Formwork materials: Use wood and wood product formwork materials to CSA-0121, CAN/CSA-086-09, CSA 0437 Series and CSA-0153-M1980.

.2 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

3 Execution

3.1 Erection

.1 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1-14.

.2 Obtain Engineer's permission before framing openings not indicated in concrete slabs, walls, piers and footings.

.3 Align form joints and make watertight. Keep form joints to a minimum.

.4 Form chases, slots, openings, drips, recesses expansion and control joints as indicated.

.5 Clean formwork in accordance with CAN/CSA-A23.1-14, before placing concrete.

.6 Leave formwork in place for following minimum periods of time after placing concrete.

.1 24 hours for footings.

.2 48 hours for piers and exposed concrete.

.7 Re-use of formwork subject to requirements of CAN/CSA-A23.1-14.

END OF SECTION

1 General

1.1 Related Work

.1 Cast-in-Place Concrete Section 03 30 00

1.2 References

.1 ANSI/ACI 315-80, Details of Concrete Reinforcement.

.2 Reinforcing steel manual of standard practice - Reinforcing Steel Institute of Ontario.

.4 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.

.5 CSA-A23.3-14, Design of Concrete Structures for Buildings.

.6 CSA G30.18-09, Cold Drawn Steel Wire for Concrete Reinforcement.

.7 CSA G30.18-09, Welded Steel Wire Fabric for Concrete Reinforcement.

.8 CSA G30.12-M1977, Billett-Steel Bars for Concrete Reinforcement.

.9 CSA G30.16-M1977, Weldable Low Alloy Steel Deformed Bars for Concrete Reinforcement.

1.3 Source Quality Control

.1 Upon request, provide Engineer with certificate copy of mill test report of reinforcing steel, showing physical and chemical analysis.

.2 Upon request inform Engineer of proposed source of material to be supplied.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 30 00.

.2 Shop drawings consist of bar bending details, lists and placing drawings.

.3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and mechanical splices, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and location of chairs, spacers and hangers. Do drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Ontario.

.4 Design and detail lap lengths and bar development lengths to CSA-A23.3-14, unless otherwise indicated.

.5 Approval applies to general arrangement and does not relieve responsibility for making this work complete, accurate and conforming to drawings and specifications.

1.5 Substitutes

.1 Substitution of different size bars permitted only upon written approval of Engineer.

2 Products

2.1 Materials

.1 Reinforcing steel: billet steel, grade 400, deformed bars to CSA G30.12-M1977.

.2 Welded steel wire fabric: to CSA G30.15-M1983. Provide in flat sheets only

.3 Chairs, bolsters, bar supports, spacers: to CSA A23.1-14.

.4 Mechanical splices: subject to approval of Engineer.

2.2 Fabrication

.1 Fabricate reinforcing in accordance with CSA-A23.1-14 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Obtain Engineer's approval for locations of reinforcement splices other than shown on placing drawings.

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

3 Execution

3.1 Field Bending

.1 Do not field bend reinforcement except where indicated or authorized by Engineer.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 Placing Reinforcement

.1 Place reinforcing steel as indicated on approved placing drawings and in accordance with CSA-A23.1-14.

.2 Prior to placing concrete, obtain Engineer's approval of reinforcing steel and position.

END OF SECTION

1 General

1.1 Related Work

.1	Concrete Formwork	Section 03 10 00
.2	Concrete Reinforcement	Section 03 20 00
.3	Concrete Floor Finishes	Section 03 35 00
.4	Vapour Barriers	Section 07 26 00

1.2 Reference Standards

.1 Do cast-in-place concrete work in accordance with CSA-A23.1-14, and testing in accordance with CSA-A23.2-14 except where specified otherwise.

.2 CAN-A266.4-M78, Guidelines for use of admixtures in concrete.

2 Products

2.1 Materials

.1 Portland cement: to CAN/CSA-A3000-13

.2 Water: to CSA-A23.1-14.

.3 Aggregates: to CAN/CSA-A23.1-14. Coarse aggregates to be normal density.

.4 Air entraining admixture: to CAN3-A266.1-M78.

.5 Chemical admixtures: to CAN3-A266.2-M78. Engineer to approve accelerating or set retarding admixtures during cold weather placing.

.6 Non premixed dry pack grout: composition on non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into a ball by hand and capable of development compression strength of 50 MPa at 28 days.

.7 Curing Compound: To CSA-A23.1-14.

.8 Premoulded joint fillers:

.1 Bituminous impregnated fibreboard: to ASTM D1751-91.

2.2 Concrete Mixes

.1 Proportion normal density concrete in accordance with CAN3-A23.1-14, to give the following properties for exterior concrete, including curbs and sidewalks.

.1 Type GU or GUb Portland cement.

.2 Minimum compressive strength at 28 days: 32 MPa.

.3 Class of exposure: C-2

.4 Nominal size of coarse aggregate: 20mm

.5 Slump at time and point of discharge: 80mm

.6 Air Content: 5 to 8%.

.2 Proportion normal density concrete in accordance with CAN3-A23.1-14, to give the following properties for mass concrete fill on bedrock and below grade:

.1 Type GU or GUb Portland cement.

.2 Minimum compressive strength at 28 days: 15 MPa.

.3 Nominal size of coarse aggregate: 20mm

.4 Slump at time and point of discharge: 80mm

.3 Proportion normal density concrete in accordance with CAN3-A23.1-14, to give the following properties for concrete brick veneer plinths.

.1 Type GU or GUb Portland cement.

.2 Minimum compressive strength at 28 days: 25 MPa.

.3 Class of exposure: F-2

.4 Nominal size of coarse aggregate: 20mm

.5 Slump at time and point of discharge: 80mm

.6 Air Content: 4 to 7%.

.4 Proportion normal density concrete in accordance with CSA-A23.1-14, to give the following properties for all other concrete.

.1 Cement: use Type GU or GUb Portland cement.

.2 Minimum compressive strength at 28 days: 25 MPa.

.3 Nominal size of coarse aggregate: 20 mm.

.4 Slump at time and point of discharge: 75 mm.

.5 Use of calcium chloride or admixtures containing calcium chloride, not permitted.

3 Execution

3.1 Workmanship

.1 Obtain Engineer's approval before placing concrete. Provide 24 h notice prior to placing of concrete.

.2 Pumping of concrete is permitted only after approval of equipment and mix.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.6 Do not place load upon new concrete until authorized by Engineer.

3.2 Inserts

.1 Set sleeves, ties, and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 mm X 100 mm not indicated on structural drawings must be approved by Engineer.

.2 No sleeves, ducts, pipes or other openings shall pass through piers, except where expressly detailed on structural drawings or approved by Engineer.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.

.4 Check locations and sizes of sleeves and openings shown on structural drawings with architectural, mechanical and electrical drawings.

.5 Anchor bolts:

.1 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete.

3.3 Placing Grout

.1 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

3.4 Finishing

.1 Finish concrete in accordance with CAN/CSA-A23.1-14.

.2 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

.3 Concrete exposed to public view to have a smooth-form finish unless specified otherwise.

3.5 Joint Fillers

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Engineer. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.2 Locate and form isolation joints as indicated. Install joint filler.

.3 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 1/2 in. of finished slab surface unless indicated otherwise.

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Owner in accordance with CSA-A23.1-14.

.2 Costs of tests will be paid for as specified in Sections 01 40 00.

.3 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.6 Sawcutting Of Control Joints

.1 In slab-on-grade construction, perform and complete sawcutting of all control joints within 12 hours after concrete placement. Sawcutting shall begin as soon as concrete can support the workers and equipment.

.2 Configuration and extent of sawcut control joints shall be as shown on the drawings.

.3 Sawcutting to be performed using power driven abrasive or diamond blades. Depth of sawcuts shall be as indicated on drawings.

3.7 Defective Concrete Finish

.1 Remove and replace excessive honeycomb or embedded debris in concrete as directed by Consultant.

END OF SECTION

1 General

1.1 Related Work

.1	Concrete Reinforcement	Section 03 20 00
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Sealants	Section 07 92 00

1.2 Reference Standards

.1 Do concrete floor finishing work in accordance with CAN/CSA-A23.1-14 except where specified otherwise.

2 Products

2.1 Materials

.1 Concrete materials to Section 03 30 00 - Cast-in-Place Concrete; and reinforcement to Section 03 20 00 - Concrete Reinforcement.

.2 Curing and sealing compound: to ASTM C309 Type 1 Class B, clear.

3 Execution

3.1 Floor Finish

.1 Floor slab surfaces shall be finished to Class A classification as defined in CAN/CSA-A23.1-14, Table 22.

.2 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

.3 Apply floor curing and sealing compounds to manufacturer's instructions. Cure to manufacturer's recommendations.

.4 Cure concrete in accordance with CAN/CSA-A23.1-14 except where specified otherwise.

.5 Provide any housekeeping pads for electrical and mechanical equipment.

.6 Slope floor to drain at 5mm/m. except as indicated otherwise. Floors to be level around walls.

.7 Provide non-slip light broom finish to exposed steps and landings.

3.2 Protection

.1 Protect concrete to be left exposed throughout the course of construction. Make good damaged areas to the approval of the Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 45 00 - Quality Control.

.4 Section 01 61 00 - Common Product Requirements.

.5 Section 04 05 12 - Mortar and Masonry Grout.

.6 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.7 Section 04 05 23 - Masonry Accessories.

.8 Section 04 22 00 - Concrete Unit Masonry.

.9 Section 05 50 00 - Metal Fabrications.

.10 Section 07 27 00 - Air Barriers.

.11 Section 07 21 13 - Board Insulation.

.12 Section 07 21 29 - Sprayed Insulation Polyurethane Foam

.13 Section 07 84 00 - Fire Stopping

.14 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
- .1 CSA-A165 Series-94(R2000), Standards on Concrete Masonry Units.
- .2 CSA A179-94(R1999), Mortar and Grout for Unit Masonry.
- .3 CSA-A371-94 (R1999), Masonry Construction for Buildings.

1.3 SUBMITTALS

.1 Product Data.
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Samples.
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit samples.

.1 Two of each type of masonry unit specified.
.2 Two of each type of masonry accessory specified.
.3 Two of each type of masonry reinforcement, tie and connector proposed for use.
.4 A minimum of six for testing purposes.

.3 Manufacturer's Instructions.
.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports.
.1 Certified test reports showing compliance with specified performance characteristics and physical properties.
.2 Submit laboratory test reports in accordance Section 01 29 83 - Payment Procedures: Testing Laboratory Services.
.3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Mock-ups.
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up panel of exterior masonry wall construction 3m x 3m showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.
.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.
.4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.
.5 When accepted by Consultant, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

.4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to job site in dry condition.

.3 Storage and Protection.
.1 Keep materials dry until use except where wetting of bricks is specified.
.2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, pallets, packaging material for recycling in accordance with Waste Management Plan.

.3 Unused metal materials are to be diverted from landfill to a metal recycling facility as approved by Consultant.

.4 Unused or damaged masonry materials must be diverted from landfill to a local facility as approved by Consultant.

1.7 SITE CONDITIONS

.1 Site Environmental Requirements.
.1 Cold weather requirements.
.1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.
.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.
.2 Maintain ambient temperature between 5 degrees C and 50 degrees C and protect site from windchill.
.2 Hot weather requirements.
.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified in Related Sections.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 PREPARATION

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

3.3 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.4 Assume complete responsibility for dimensions, plumbs and levels of this work and constantly check same with graduated rod.

.5 Carry up walls in uniform manner. Raise no one portion more than 1.2m or less to avoid excessive loads on un-set joints. Ensure no impact to plumbness and alignment of wall as work progresses.

3.4 CONSTRUCTION

.1 Exposed masonry.

.1 Remove chipped, cracked, and otherwise damaged units, in accordance with CSA A-165, Clause 82.1, in exposed masonry and replace with undamaged units.

.2 Jointing.

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints.

.2 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Joints in exposed masonry units to be tooled with round jointer to provide smooth joints, true to line, compressed, uniformly concave.

.3 Cutting.
.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In.
.1 Build in items required to be built into masonry.
.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks.
.1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute/1000 mm^2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.6 Support of loads.
.1 Use 21 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
.2 Use grout to CSA A179 where grout is used in lieu of solid units.
.3 Install building paper below voids to be filled with concrete grout; keep paper 25 mm back from faces of units.

.7 Provision for movement.
.1 Leave 5 mm space below shelf angles.
.2 Leave 15 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
.3 Built masonry to tie in with stabilizers, with provision for vertical movement.

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

.9 Control joints.
.1 Construct continuous control joints as indicated or as follows.
.2 Maximum spacing is 9M. Provide control joints between masonry veneer which is supported on different structural levels (ie brick returns on balconies)
.3 Provide shop drawings indicating location of proposed control joints.

.10 Expansion joints.
.1 Build-in continuous expansion joints as indicated

3.5 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing will be carried out by Testing Laboratory designated by Consultant.

3.7 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.8 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.2 Keep masonry dry using waterproof non-staining coverings. Drape over walls and extend down sufficient to protect walls from wind driven rain until masonry wall is complete and protected by flashings or other permanent construction.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 03 45 00 - Precast Architectural Concrete

.3 Section 04 05 00 - Common Work Results for Masonry.

.4 Section 04 05 19 - Masonry Anchorage and Reinforcing

.5 Section 04 05 23 - Masonry Accessories

.6 Section 04 22 00 - Concrete Unit Masonry

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CSA A179-94(R1999), Mortar and Grout for Unit Masonry.

1.3 SUBMITTALS

.1 Product Data.
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's mortar, grout, parging, colour additives and admixtures.

.2 Samples.
.1 Sample to be part of mock-up review.

.3 Manufacturer's Instructions.
.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.1 Submit laboratory test reports in accordance Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Mortar and grout: CSA A179.

.3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.

.4 Mortar for brick veneer: Non-Loadbearing: type N based on Proportion specifications.

.5 Mortar for concrete masonry.
.1 type S based on Proportion specifications.

.6 White mortar: use white Portland cement, and lime white masonry cement to produce mortar type specified.

.7 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

.8 Grout: to CSA A179, Table 3.

2.2 MIXES

.1 Colour and Admixtures: mix grout to semi-fluid consistency with slump between 200 and 250 mm.

.2 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour nor more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.3 Colour of Mortar to the approval of the consultant. One mortar colour to be selected for each type of exterior masonry/stone veneer cladding. Submit samples for approval.

PART 3 - . EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS	.1	Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
3.2 CONSTRUCTION	.1	Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.
3.3 CLEANING	.1	Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 04 05 00 - Common Work Results for Masonry.

.4 Section 04 05 12 - Mortar and Masonry Grout

.5 Section 04 05 23 - Masonry Accessories

.6 Section 04 22 00 - Concrete Unit Masonry

.7 Section 05 41 00 - Structural Metal Stud Framing

.8 Section 05 50 00 - Metal Fabrications

.9 Section 06 10 00 – Rough Carpentry

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
.1 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CSA-A370-04(R2009), Connectors for Masonry.

.3 CSA-A371-04(R2009), Masonry Construction for Buildings.

.4 CAN/CSA G30.18-M92(R2007), Billet-Steel Bars for Concrete Reinforcement.

.5 CSA-S304.1-04(R2010), Masonry Design for Buildings.

.6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.7 CSA A179-04, Mortar and Grout For Unit Masonry.

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.

.2 Shop Drawings :
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Shop drawings consist of bar bending details, lists and placing drawings.
.3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.3 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.4 Samples:
.1 Samples to be part of mock-up sample for review.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.4 Masonry trade is to coordinate to accommodate required masonry veneer tie spacing.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Bar reinforcement: to CSA-A371 and CAN/CSA G30.18, Grade 400.

.2 Wire reinforcement: to CSA-A371 and CSA G30.14, ladder type, for cavity walls, with min. 4.76 mm side rods but heavier rods where required, galvanized without a drip, 50 mm narrower than wall.

.3 Connectors: to CSA-A370 and CSA-S304.

.4 Corrosion protection: to CSA-S304, galvanized to CSA-S304 and CSA-A370. Hot dip galvanized with min. 0.46 kg. zinc /m2.

.5 At back up metal studs, Fero Slotted stud Tie with brick connector tie wire. Incorpoarte ties in masonry wall coursing to suit brick veneer module. All material to be hot dipped galvanized complete with insulation support clip and 4.76mm galvanized V-tie wire to centerline of brick Veneer. Select Block Connector to suit thickness of wall insulation thickness.

.6 Back up concrete block Fero Slotted block Tie. Connectors to be hot dipped galvanized complete with insulation support clip.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Fabricate connectors in accordance with CSA-A370.

.3 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.

.4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.

.2 Upon request inform Consultant of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 GENERAL

.1 Supply and install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 As part of mock-up assembly obtain Consultant's review of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.3 HORIZONTAL REINFORCING

.1 Provide horizontal reinforcing in all masonry work in accordance with drawings. Refer to structural drawings.

.2 Install continuous horizontal reinforcing in each wythe of every concrete block wall at vertical spacing intervals 400mm maximum or 200mm where called for. Lap 150mm at each splice.

.3 Utilize "L" and "T" shaped horizontal reinforcement at corners and abutting partitions.

.4 Additionally place reinforcement in the first and second bed joints above and below openings extending 600mm beyond each side of opening.

.5 Reinforce masonry where thickness is reduced by a column or chase with a length of horizontal reinforcing in the joint of every block course and extending 1.2m beyond each end of the column or chase.

3.4 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CSA-A371 and as indicated and specified.

.2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371 and as indicated.

.3 Minimum 400mm horizontal x 600mm vertical spacing and 300mm around wall openings, top, base and corners or as noted

.4 V-tie length to provide placement of tie legs to the centre line of the veneer.

3.5 EARTHQUAKE

.1 Reinforce masonry elements in accordance with most recent issue of Ontario Building Code and National Building Code.

.2 Reinforce masonry elements in accordance with CSA-A371, and as indicated, supplemented as follows:

.1 Loadbearing and lateral load-resisting masonry and

.2 Masonry enclosing elevator shafts and stairways or used as exterior cladding, and

.3 Masonry partitions exceeding 200 kg/m² or 3m in height.

.3 Set dowels in foundations and floor slabs at cores of block to be reinforced. Set clips into U/S of slab as required for all masonry partitions.

.4 Install vertical rod reinforcing in cores, sized and spaced as shown on drawings.

.5 Anchor reinforcing to floor of foundation and to structure above.

.6 Anchor masonry to structural beams, columns, and walls at maximum 400mm o.c. vertically and max. 12.m. o.c. horizontally.

.7 Lap reinforcing bars min. 36 bar diameters at splices.

.8 Embed bolts and anchors solidly in mortar or grout to develop maximum resistance to design forces.

.9 Tie intersecting new bearing walls together with reinforcing in every second course.

.10 Provide lateral support and anchorage in accordance with CSA-A371 and as indicated and specified.
.1 Locate box anchors in cavity walls at max. 400mm o.c. vertically and maximum 600mm o.c. horizontally.
.2 Secure special ties to framing: locate at maximum 400mm o.c. horizontally and max. 600mm o.c. vertically to metal studs.
.3 Additionally reinforce brick to steel stud framing:
.1 At max. 3 brick courses below top of any wall or wall opening.
.2 At max. 5 brick courses above steel lintels and shelf angles.

.11 Consult drawings for additional reinforcing.

3.6 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA-S304.1, CSA-A371, and CSA-A179.

3.7 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CSA-A371 and CSA-A179 and as indicated.

3.8 ANCHORS

.1 Supply and install metal anchors as indicated.

.2 Embed metal anchors solidly in mortar or grout to develop maximum resistance to design forces.

.3 Anchor masonry to structural beams, columns, and walls max. 400mm o.c. vertically and max. 1.2m o.c. horizontally.

.1 Anchor concrete block steel columns and beams with 250mm long x 38mm wide x 3mm thick "L" shaped straps at 400mm o.c. with 200mm leg in block and 50mm leg welded to column or beam.

.2 Anchor new concrete block to existing concrete block with corrugated ties at 400mm o.c.

3.9 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.10 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

.2 Stop reinforcing 25mm on each side of control joints unless otherwise indicated.

3.11 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors which develop cracks or splits.

3.12 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.13 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 04 05 00 – Common Work Results for Masonry.
.2 Section 04 05 12 – Mortar and Masonry Grout
.3 Section 04 05 19 – Masonry Anchorage and Reinforcing.
.4 Section 04 21 13 – Brick Masonry.
.5 Section 04 22 00 – Concrete Unit Masonry

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM D 2240-[05], Standard Test Method for Rubber Property - Durometer Hardness.

.2 Canadian Standards Association (CSA International).
.1 CAN/CSA A371-04, Masonry Construction for Buildings.
.2 CAN/CSA-ISO 14021-00(R2204), Environmental Labels and Declarations - Self Declared Environmental Claims (Type II Environmental Labelling).

.3 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTIVE AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for joint fillers and lap adhesives.

.3 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.4 Shop Drawings:
.1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Provide shop drawings consist of flashing and installation details. Indicate sizes, spacing, location and quantities of fasteners.

.5 Samples:
.1 Provide samples in accordance with Section 01 33 00 - Submittal Procedures, supplemented as follows:.
.1 Materials: two, cured, and coloured samples, illustrating colour and colour range. Include:
.1 Movement joint filler.
.2 Lap adhesive.
.3 Mechanical fasteners.
.4 Reglets.
.5 Brick vents.
.2 Two moisture control material samples, illustrating colour and colour range, size, and shape. Include:
.1 Weep hole vents.
.2 Mortar diverters.
.3 Grout screens.
.3 Two flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
.1 Sheet metal flashings.
.2 Composite flashings.

.6 Quality Assurance Submittals:
.1 Test reports: submit certified test reports in accordance with Section 04 05 00 - Common Work Results for Masonry.
.2 Certificates: submit in accordance with Section 04 05 00 - Common Work Results for Masonry.
.3 Manufacturer's Instructions: submit in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:
.1 Submit installation instructions for fillers, adhesives, reglets, brick vents, weeps, vents, diverters, screens, and flashings.

.7 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.8 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.9 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 04 05 00 - Common Work Results for Masonry.

1.4 FIELD MEASUREMENTS

.1 Make field measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle masonry anchorage and reinforcing materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
.1 Deliver reinforcement and connectors, identified in shop and placement drawings.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Control joint filler: purpose-made elastomer 654-4 (85+ or -5)durometer hardness to ASTM D 2240.

.2 Lap adhesive: recommended by masonry flashing manufacturer. Use low VOC products in compliance with the SCAQMD Rule 1168

.3 Nailing inserts: 0.6mm thick purpose made galvanized steel inserts for setting in mortar joints.

.4 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements

2.2 MOISTURE CONTROL

.1 Weep Hole Vents: Purpose made PVC.

.2 Cell vents: polypropylene plastic, honeycomb design.
.1 Size: 9.5 mm x 63.5 mm x 85.7 mm

.3 Colour: brown or black.

.4 Mortar diverters: shaped and sized to suit cavity spaces. "Mortarstop" cavity drainage board manufactured by Polytite Manufacturing Corporation.

.5 Grout Screens: 6 mm square monofilament screen is fabricated form high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.

2.3 FLASHINGS

.1 Through-wall Flashings: Perm-a-Barrier wall flashing membrane by W.R.Grace, Blueksin AG by Bakor or Sopraseal Stick 1100T by Soprema. Complete with adhesive and primer recommended by Manufacturer of flashing. Provide metal support over cavities larger than 50mm of 26GA (0.55 mm) zinc coated steel commercial quality to ASTM A526M with Z275 designated zinc coating.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION: MATERIALS

.1 Install continuous control joint fillers in control joints at locations indicated on drawings. Provide control joints at 9m maximum spacing. .

.2 Install vent holes in vertical joints at top of veneer cavity in exterior wythes of cavity wall and masonry veneer wall construction at maximum horizontal spacing of 800mm. Do not place directly below weep holes above.

.3 Install inserts in mortar joints at 400mm centres each way, for attachment of wall strapping. install fasteners to suit application and in accordance with manufacturer's written installation instructions.

.4 Reglets: install reglets at locations indicated on drawings.

.5 Lap adhesive: apply adhesive to flashing lap joints.

3.4 INSTALLATION: MOISTURE CONTROL

.1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

.2 Install cavity drainage board within cavity wall directly behind weep holes, immediately over flashings.

.3 Grout screens: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.5 INSTALLATION: FLASHINGS

.1 Build in flashings in masonry in accordance with CSA-A371.
.1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. and at base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.

.2 In double wythe masonry walls, veneered walls, and siding clad walls carry flashings from front edge of masonry or siding under outer wythe, then up backing not less than 200mm, bond to backing using manufacturer's recommended adhesive.

.3 Where required and detailed provide metal flashing support to adhere through wall flashing to and span over suspended steel angle vertical framing.

.4 Lap joints 150mm and seal full overlap with adhesive.

.5 Turn up ends of flashings at ends to form end dams at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.(i.e. at sills of openings/windows).

.6 Install over horizontal firestops within exterior wall cavities.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 01 74 21 - Construction Demolition Waste Management and Disposal
.3 Section 04 05 00 - Common Work Results for Masonry
.4 Section 05 05 12 - Mortar and Masonry Grout
.5 Section 04 05 19 - Masonry Anchorage and Reinforcing
.6 Section 04 05 23 - Masonry Accessories
.7 Section 04 22 00 - Concrete Unit Masonry

1.2 REFERENCES

.1 ASTM International Inc.
.1 ASTM C 216-07a, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).

.2 Brick Industry Association (BIA)
.1 Technical Note No. 20-2006, Cleaning Brick Work.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA A82-06, Fired Masonry Brick Made From Clay or Shale).
.2 CAN/CSA-A165 Series-2004, CSA Standards on Concrete Masonry Units.
.3 CAN/CSA A371-04, Masonry Construction for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.3 Manufacturer's Instructions:
.1 Provide manufacturer's installation instructions in accordance with Section 04 05 00 - Common Work Results for Masonry.

.4 Samples:
.1 Provide unit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE SUBMITTALS

.1 Provide Certificates: in accordance with Section 04 05 00 - Common Work Results for Masonry.

.2 Test and Evaluation Reports: submit certified test reports in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:
.1 Mortar Test

.3 Pre-Installation Meetings: conduct pre-installation meeting in accordance with Section 04 05 00 - Common Work Results for Masonry to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. **Provide samples for comparison and colour matching on site. Colour range to be represent full product variation from light to dark(light, medium, dark 2 of each)**

.4 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
.1 Construct mock-up panel of exterior brick construction 1200 x 1800 mm. Include both brick colours.

.5 Delivery, Storage, and Handling:
.1 Deliver, store and handle brick unit masonry in accordance with Section 01 61 00 - Common Product Requirements.

.6 Packaging Waste Management:
.1 Separate and recycle waste materials.

1.5 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components only when temperature is above 4 degrees C.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

.1 Face brick:

.1 Fired clay brick: to CAN/CSA A82.
.1 Type: FBX
.2 Grade: SW
.3 Size:
.1 90mm x 190mm x 57mm high Metric Modular
.4 Colour and texture: to match approved sample.
.5 Solid.

.6 Brick
.1 **MV-1** – Hanson Brick 'Louisiane'
Contact Ken Merkley Merkley Supplies
.2 **MV-2** – Hanson Brick 'Locas Royal'
Contact Ken Merkley, Merkley Supplies

.2 The following adjustments to the permitted tolerances indicated in CAN/CSA A82-06 shall be applied to all face brick for this project:
.1 Size: The maximum permissible variation from the specified dimension shall be 2.0mm.
.2 Distortion: The maximum permissible distortion of surfaces or edges intended to be exposed in place from a plane surface and from a straight line shall be 1.5mm.
.3 Out of Square: The maximum permitted deviation from square of an exposed face shall be not more than 1.5mm.
.4 Manufacturer of brick shall sort bricks prior to delivery to site to ensure compliance with CANCSA 82-06 standards and adjusted to tolerances noted in 1, 2. & 3. above.

.3 Masonry to be manufactured minimum 90 days prior to installation.

.4 Reinforcement:
.1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.5 Connectors:
.1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing .

.6 Flashings:
.1 Flashing: in accordance with Section 04 05 23 - Masonry Accessories.

.7 Mortar Mixes:
.1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

.8 Grout Mixes:
.1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

.9 Cleaning Compounds:

.1 Compatible with substrate and acceptable to masonry manufacturer for use on products.

.2 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify surfaces and conditions are ready to accept work of this Section.

.2 Commencing installation means acceptance of existing substrates.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.4 INSTALLATION

.1 Construction to conform to CAN/CSA A371.

.2 Bond: stretcher.

.3 Coursing height: 200 mm for three bricks and three joints or as indicated.

.4 Jointing: concave where exposed or where paint or similar thin finish coating is specified.

.1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.2 Clean unglazed clay masonry as work progresses.

.3 Reinforcement:

.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Connectors:

.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.5 Flashings:

.1 Install flashings in accordance with Section 04 05 23 - Masonry Accessories.

.6 Mortar Placement:

.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.

.7 Grout Placement:
.1 Place grout in accordance with Section 04 05 12 - Masonry Mortar and Grout.

.8 Repair/Restoration:
.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

.9 Field Quality Control:
.1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry
.2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

.10 Tolerances:
.1 To CAN/CSA A371 and as noted in 2.1 Manufactured Units -.2 Adjustments to Permitted Tolerances.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Clean unglazed clay masonry: mock up panel specified in Section 04 05 00 - Common Work Results for Masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry no sooner than one week prior to completion no longer than 30 days following completion of any brick area.
.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
.2 Scrub with solution of 25 ml trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
.3 Repeat cleaning process as often as necessary to remove mortar and other stains.
.4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.

.4 Clean concrete brick masonry as work progresses.

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.

.5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

.6 Waste Management: separate waste materials for reuse and recycling.

3.6 PROTECTION

.1 Brace and protect brick masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 04 05 00 - Common Work Results for Masonry.

.2 Section 04 05 12 - Mortar and Masonry Grout.

.3 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Section 04 05 23 - Masonry Accessories.

.5 Section 04 43 26 – Dimension Stone Veneer Cladding

.6 Section 07 84 00 - Fire Stopping

.7 Section 08 11 00 - Metal Doors and Frames

1.2 References

.1 Canadian Standards Association (CSA International)
.1 CAN3 A165 SERIES-94(R2000), CSA Standards on Concrete Masonry Units covers: A165.1, A165.2, A165.3.

1.3 Waste Management and Disposal

1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.

.3 Divert damaged or unused concrete materials from landfill to local facility approved by Consultant.

PART 2 - PRODUCTS

2.1 Materials

.1 Standard concrete block units: to CAN3-A165 Series (CAN3-A165.1).
.1 Classification: H / 15/ A / M as noted.
.2 Size: modular.
.3 Special shapes: provide bull-nosed units for wall exposed corners and at exposed corners at door frames. Provide purpose-made shapes for lintels and bond beams. Provide additional special shapes as indicated.

PART 3 - EXECUTION

3.1 Installation

.1 Concrete block units:
.1 Bond: running.
.2 Coursing height: 200 mm for one block and one joint.
.3 Jointing: concave where exposed or where paint or other finish coating is specified. Flush where not exposed by finish material.
.4 Use 190mm, 140mm and 90mm face veneers as indicated on drawings.

.2 Concrete block lintels.
.1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
.2 End bearing: not less than 200 mm and as indicated on drawings.
.3 Refer to structural drawings for general requirements

.3 Install blocks with bullnose corners at all exterior corners of walls except where walls are finished with covering material of gypsum board, wood panelling or ceramic tile.

3.2 Cleaning

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

END OF SECTION

1 General

1.1 Related Work

.1	Cast-in-Place Concrete	Section 03 30 00
.2	Painting	Section 09 91 00
.3	Steel Deck	Section 05 31 00

1.2 Reference Standards

.1 Do structural steel work in accordance with CAN/CSA-S16-09 and CAN3-S136-07except where specified otherwise.

.2 Do welding in accordance with CSA W59-13, by companies certified by and welders qualified in accordance with CSA W47.1-14, except where specified otherwise.

1.3 Source Quality Control

.1 Prior to commencing of work, if required by Engineer, submit 3 certified copies of mill reports covering chemical and physical properties of steel used in this work.

1.4 Design of Details And Connections

.1 Design details and connections in accordance with requirements of CAN/CSA-S16-09 and CAN3-S136-07 to resist forces, moments and shears indicated.

.2 For all connections, submit sketches and design calculations stamped and signed by qualified professional engineer licensed in the Province of Ontario or submit shop drawings stamped and signed by a qualified professional engineer licensed in the Province of Ontario with the proviso "for connections only".

1.5 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 30 00.

.2 Indicate shop and erection details including cuts, copes, connections, holes, bolts and welds. Indicate welds by welding symbols defined in CSA W59-13.

2 Products

2.1 Materials

.1 Structural steel: to CAN3-G40.21-13 Grade as indicated on structural drawings.

.2 Anchor bolts: to CAN3-G40.21-13, Grade 300W.

.3 Bolts, nuts and washers: to ASTM A325M.

.4 Welding materials: to CSA W59-13.

.5 Shop paint primer: to CISC/CPMA standard 1-73a.

.6 Hot Dip Galvanizing: to CAN/CSA-G164-M92.

3 Execution

3.1 Fabrication

.1 Fabricate structural steel, as indicated, in accordance with CAN/CSA-S16-09 and in accordance with approved shop drawings.

3.2 Shop Painting

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16-09 except where members are to be encased in concrete.

.2 Apply primer paint to architecturally exposed surfaces without sags or runs. Sand down and repaint areas not acceptable to the Architect.

3.3 Marking

.1 Mark materials in accordance with CAN3-G40.20-13 and CAN/CSA-G40.21-13. Do not use die stamping. If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark for fit and match.

3.4 Erection

.1 Erect structural steel, as indicated and in accordance with CAN3-S16-09 and in accordance with shop drawings.

.2 Obtain written permission of Engineer prior to field cutting or altering of structural members not shown on shop drawings.

.3 Clean mechanical brush and touch up primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

3.5 Field Quality Control

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Owner.

.2 Costs of tests will be paid for as specified in Section 01 45 00 Quality Control.

3.6 Hot Dip Galvanizing

.1 All steel lintels supporting masonry veneer and exterior steel elements are to be hot dip galvanized.

.

END OF SECTION

1 GENERAL

1.1 Related Work

.1 Structural Steel Section 05 12 00

1.2 Reference Standards

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A653/A653M-08, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A792/A792M-08, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.79-1978(R1999), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.

.2 CAN/CSA-S16-09 Design of Steel Structures.

.3 CSA-S136-07, Cold Formed Steel Structural Members.

.4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

.5 CSA W55.3-08(R2013), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.6 CSA W59-13, Welded Steel Construction, (Metal Arc Welding) Metric.

.4 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 10M-96, Standard for Steel Roof Deck.

2 PRODUCTS

2.1 Materials

.1 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade A with Z275, coating, 1.21 mm minimum base steel thickness.

.2 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 1.21 mm. Metallic coating same as deck material.

.3 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 Types of Decking

.1 High Roof Deck: 1.21 mm minimum base steel thickness, 76mm deep profile, acoustic, fluted, @152 o/c, non-cellular, overlapping side laps fiberglass insulation pads to AF-110.

.2 Low Roof Deck: 1.21 mm minimum base steel thickness, 38mm deep profile, fluted, @152 o/c, non-cellular, overlapping side laps.

.3 Typical Floor Deck: 0.76mm minimum base steel thickness, 38 mm deep profile, composite, fluted, @152 o/c, non-cellular, interlocking side laps unless noted on drawing.

3 EXECUTION

3.1 General

.1 Structural steel work: in accordance with CAN/CSA-S136-07 and CSSBI 10M and CSSBI 12M.

.2 Welding: in accordance with CSA W59-13, except where specified otherwise.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1-09(R2014) for fusion welding of steel and/or CSA W55.3-08(R2013) for resistance welding.

3.2 Erection

.1 Erect metal decking as indicated to manufacturer's instructions

.2 Immediately after decking is permanently secured in place touch-up galvanized surface with zinc rich primer where burned by welding.

.3 Fastening requirements shall be as noted on structural drawings.

.4 The decking shall be continuous over at least 3 spans with ends lapped 50mm minimum over supports.

3.3 Storage

.1 Decking shall be stored on wood supports above the grade and sloped so as to allow runoff along down flutes.

3.4 Accessories

.1 Provide all required closures, reinforcing sheet steel and flashing.

3.5 Openings and Areas of Concentrated Loads

.1 Framing of deck openings 100 to 300 mm shall be as recommended by manufacturer except as otherwise indicated on structural drawings. No reinforcement required for openings cut in deck, which are smaller than 100 mm where minimum distance between unreinforced openings is 1200 mm transverse and one span longitudinally

3.6 Field Quality Control

.1 Inspection and testing of material and workmanship will be carried out by testing laboratory.

.2 Quality assurance shall be in conformance with Section 01 45 00.

.3 Damaged decking shall be replaced at Consultants discretion.

3.7 Review of Construction

.1 Review of construction by the Consultant and inspection and testing by an independent inspection is to ascertain general conformity with design documents. The review does not relieve contractor from carrying out his own quality control and making the work accurate and in conformity with the drawings and specification.

.2 Exercise care when welding to avoid piercing the deck or damage to the supporting joists. Any damage to supporting structure is to be reported to Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 03 30 00 - Cast-in-Place Concrete.

.4 Section 04 05 00 - Common Work Results for Masonry.

.5 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.6 Section 05 12 00 - Structural Steel.

.7 Section 05 31 00 - Steel Deck.

.8 Section 09 91 23 - Interior Painting.

.9 Section 09 91 13 - Exterior Painting.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A 53/A 53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)
- .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
- .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-1989(R2001),Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.4 The Environmental Choice Program
.1 CCD-047a-98, Paints, Surface Coatings.
.2 CCD-048-98, Surface Coatings - Recycled Water-borne.
.5 2012 OBC – Subsection 4.1.5.14 – Loads Acting on Guards.
.6 2012 OBC – SB-13 – Glass in Guards.

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
.1 For finishes, coatings, primers and paints.

.2 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
.3 Each shop drawing submitted shall bear the stamp and signature of a qualified Professional Engineer registered in the Province of Ontario.

1.4 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Protection:
.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Steel pipe: to ASTM A 53/A 53M standard weight , galvanized finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A 307.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.7 Stainless steel tubing: to ASTM A269, Type 304L commercial grade. Seamless welded with AISI No. 4 finish.

.8 Aluminum plate: ASTM B209, thickness and size as indicated..

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar and masonry.
.3 Wood.

2.5 SHOP PAINTING

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

2.6 ANGLE LINTELS

.1 Steel angles: galvanized, sizes indicated for openings. Provide 150 mm minimum bearing at ends.

.2 Weld or bolt back-to-back angles to profiles as indicated.

.3 Finish: galvanized.

.4 Refer to structural drawings for size and details of angle lintels, hangers and corner lintels and suspended lintels.

2.7 RAILINGS

.1 As per details.

.2 Steel interior railings to stairs refer to Section 05 51 29. Shop coat prime interior railings after fabrication.

.3 Exterior railings: hot dip galvanized and primed and painted colour as directed by architect.

2.8 PIT COVERS AND FRAMES

.1 Sump Pit covers: Steel fabricate from 6 mm thick raised pattern plate set in L 55 x 55 x 6 frame. Include anchors 600 mm on centre for embedding in concrete. Supply trench covers in 1200 mm removable lengths. Provide gaskets all around.
.1 Provide recessed handles for each cover.
.2 Finish: galvanized.

2.10 LATERAL SUPPORT CLIPS FOR MASONRY

.1 See Structural and Architectural drawings for requirements and as per CSA-A371. Required at the top of all masonry partitions.

.2 Finish: Shop primed.

2.11 SUSPENDED STEEL FRAMING FOR INTERIOR FIT-UP ELEMENTS

.1 Fabricate of suspended steel framing and angle bracing hung from structure above complete with continuous channels and adjustable height mounting plates for support of the following interior elements.
.1 Framing as required to support PC-350 wall system.

2.12 SERVICE BOLLARDS

.1 HSS 150 dia. x 4.8 x 1500 minimum below grade x 1200 above galvanized steel bollards filled with concrete c/w reinforcing bars as detailed.

.2 Finish: Galvanized.

2.13 MILLWORK STEEL SUPPORTS

.1 Miscellaneous steel supports as detailed on millwork drawings. Co-ordinate with Millwork sub-contractor and provide all necessary steel support components. Incorporate work of this section into millwork installations in shop and on site as required.

.2 Steel support angles and framing as detailed for radiant heater enclosures. Co-ordinate work with mechanical contractor.

PART 3 - EXECUTION

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 INSTALLATION

.1 Install all items listed under Part 2 of this Section and as indicated on drawings as per the reviewed shop drawings.

3.3 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 FIELD QUALITY CONTROL

.1 Prior to project's substantial completion, engineer responsible for stamped and signed shop drawings shall submit site visit report confirming all items of this section have been fabricated and installed in accordance with reviewed shop drawings. Site visit report shall bear the stamp and signature of the engineer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Formwork
.2 Section 05 41 00 - Structural Metal Stud Framing
.3 Section 06 20 00 - Finish Carpentry
.4 Section 07 52 00 - Modified Bituminous Membrane Roofing
.5 Section 08 11 00 - Metal Doors and Frames
.6 Section 08 71 00 - Door Hardware
.7 Section 10 28 10 - Toilet and Bath Accessories

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
.1 ANSI/NPA A208.1-1999, Particleboard, Mat Formed Wood.

.2 American Society for Testing and Materials International (ASTM)
.1 ASTM A 653/A 653M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
.2 ASTM D 1761-88(2000), Standard Test Methods for Mechanical Fasteners in Wood.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-11.3-M87, Hardboard.

.4 Canadian Standards Association (CSA International)
.1 CAN/CSA-A247-M86, Insulating Fiberboard.
.2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.3 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.4 CSA O112 Series-M1977(R2006), CSA Standards for Wood Adhesives.
.5 CSA O121-M1978(R2003), Douglas Fir Plywood.
.6 CSA O141-05, Softwood Lumber.
.7 CSA O151-04, Canadian Softwood Plywood.
.8 CSA O153-M1980(R2003), Poplar Plywood.

.5 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2005.

1.3 SUBMITTALS

.1 Submit Submittal submissions: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 FRAMING AND STRUCTURAL MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed), are not acceptable for use on this project without written approval from the consultant.

.3 Composite wood products and laminate adhesives to contain no added ureaformadelhyde.

.4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
.1 S2S is acceptable.
.2 Board sizes: "Standard" or better grade.
.3 Dimension sizes: "Standard" light framing or better grade.
.4 Post and timbers sizes: "Standard" or better grade.
.5 Materials noted PT are to be pressure treated type wood to sizes noted. CAN/CSA-080-08. All exterior blocking and framing to be pressure treated on walls, parapets and roofing

2.2 PANEL MATERIALS

.1 Composite wood products and laminate adhesives to contain no added urea formadelhyde.

.2 Plywood, OSB and wood based composite panels: to be CAN/CSA-0325.0. Pressure treated products on all exterior applications to CSA 080-08

.3 Douglas fir plywood (DFP): to CSA O121, standard construction.

.4 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.5 Poplar plywood (PP): to CSA O153, standard construction.

.6 Interior mat-formed wood particleboard: to ANSI 208.1.

.7 Mat-formed structural panelboards (OSB wafer): to CAN3-O437.0.

2.3 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 10 - Joint Sealants.
.1 Maximum allowable VOC limit 250 g/L as per 01 35 21.

.2 Nails, spikes and staples: to CSA B111.

.3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

2.4 FASTENER FINISHES

.1 Galvanizing: to CAN/CSA-G164 ASTM A 653, use galvanized fasteners for exterior work pressure-preservative treated lumber.

.2 Stainless steel: use stainless steel where indicated.

2.5 WOOD PRESERVATIVE

.1 Wood preservatives applied on site to meet the VOC limits not to exceed 50g/L.
.2 Apply preservative to all cut faces and ends.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Store wood products.

3.2 INSTALLATION

.1 Comply with requirements of OBC 2012, Part 3 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
.1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.10 Install sleepers as indicated. Anchor wood roof sleepers to building structure to meet seismic requirements of O.B.C.

.11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

3.4 SCHEDULES

.1 Electrical equipment mounting boards:
.1 Plywood, DFP or CSP grade, square edge 19 mm thick, fire treated pressure impregnated fire retardant material for all electrical / IT/Building, Security Mounting boards as required for installation of other trades work. Co-ordinate locations with other trades.

.2 Provide wood blocking and backing to areas to receive wall mounted speakers, wall-mounted sconces, grab bars, wall mounted appliances and fixtures, washroom accessories, recessed cabinets, surface mounted cabinets, corner guards, hardware wall stops and as indicated on drawings.

.3 Frame window and door rough openings using exterior grade plywood mounted to bent steel angle supports specified in Section 05 41 00 Structural Metal Stud Framing.

.4 Install pressure treated wood sleepers to roof areas as detailed for support and anchoring of roof top equipment and piping. Anchor sleepers to building structure to meet O.B.C. seismic requirements.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Surface Preparation

.2 Wood blocking and reinforcing.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.2-09, Medium Density Fibreboard (MDF) for Interior Applications.
- .2 ANSI/HPVA HP-1-2004, American National Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards, 1st edition, 2009.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.

.4 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O141-05, Softwood Lumber.
- .4 CSA O151-09, Canadian Softwood Plywood.

.5 National Lumber Grades Authority (NLGA)
- .1 NLGA Standard Grading Rules for Canadian Lumber 2008.

.6 Underwriters Laboratories of Canada (ULC)
- .1 CAN4-S104-80(R1985), Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for plywood, MDF and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by millwork trade.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
- .3 Indicate materials, thicknesses, finishes and hardware.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate 300 x 300 mm samples of veneer and finish.

.5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

.6 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties if requested.

.7 Construction Waste Management:
- 1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.2 Plywood and wood based composite panels to CSA and ANSI standards.

.3 Wood fire rated frames and panels: listed and labeled by an organization accredited by Standards Council of Canada to CAN4-S104 and CAN/ULC-S105.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wood products from any damage.
.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 AWMAC custom grade, moisture content as specified.
.4 Machine stress-rated lumber is acceptable.
.5 Hardwood lumber: moisture content 8 % or less in accordance:
.1 National Hardwood Lumber Association (NHLA).
.2 AWMAC custom grade, moisture content as specified.

.2 Panel Material: Urea-formaldehyde free
.1 Canadian softwood plywood (CSP): to CSA O151, standard construction.
.2 Hardwood plywood: to ANSI/HPVA HP-1.
.3 Hardboard: to CAN/CGSB-11.3.
.4 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m^3.
.5 Decorative overlaid composite panels.
.1 Decorative overlay, heat and pressure laminated with suitable resin to thickness indicated 15.9 mm thick MDF urea-formaldehyde free core.
.2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain (buff) balancing sheet.
.3 Furniture finish: wood grain, pattern or solid colour selected by Consultant.
.4 Edge finishing: Refer to drawings.

2.2 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: electroplated or stainless steel, type and size to suit application.

.3 Splines: wood.

.4 Adhesive and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Inform of unacceptable conditions immediately upon discovery.
.1 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Do finish carpentry to Quality Standards of (AWMAC).

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:
.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Standing and running trim:
.1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
.2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
.3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
.4 Install door and window trim in single lengths without splicing.

.3 Interior and exterior frames:
.1 Set frames with plumb sides and level heads and sills and secure.

.4 Handrails, wall rails and bumper rails.
.1 Install handrails, wall rails and bumper rails in locations indicated.
.2 Make joints hair line, dowelled and glued.
.3 Install support brackets as indicated.
.4 Install metal backing plates between studs at bracket locations to ensure proper support for brackets and bolts or self-tapping screws.
.5 Secure using counter sunk screws plugged with matching wood plugs.

.5 Shelving:
.1 Install shelving on as indicated.

3.4 INSTALLATION OF WINDOW SILLS & SEATS

.1 Window sills:
.1 Maple species, grade select, solid stock, per details.

3.5 INSTALLATION OF SHELVING

.1 Hardwood plywood:
.1 Thickness: 19 mm.
.2 Number of plies:7.
.3 Face veneer: Maple species, A grade, rotary cut.
.4 Back veneer: Maple species, A grade, rotary cut.
.5 Core: Veneer.
.6 Bond: Type II.
.7 Sanding: touch sanding.
.8 Grain direction: long direction.

.2 Edge banding: provide 12mm thick solid matching wood strip on plywood edges 12 mm or thicker, exposed in final assembly. Strips same width as plywood.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by finish carpentry installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1	Section 01 33 00	Submittal Procedures
.2	Section 01 45 00	Quality Control
.3		Section 01 74 21 Construction / Demolition Waste Management and Disposal
.4	Section 01 61 00	Common Product Requirements
.5	Section 06 10 00	Rough Carpentry
.6	Section 06 20 00	Finish Carpentry
.7	Section 06 47 00	Plastic Laminate
.8	Section 07 92 00	Joint Sealing
.9	Section 08 70 05	Cabinet Hardware
.10	Section 10 00 00	Manufactured Specialties

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM E 1333-96(2002), Standard Test method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products using a Large Chamber.
- .2 ASTM D 2832-92 (R2005), Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-06, Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials / Products.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
- .1 AWMAC Quality Standards for Architectural Woodwork, 2009.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesives, Contact, Brushable.

.4 Canadian Standards Association (CSA)
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O112.4-M1997(R2006), Standards for Wood Adhesives.
- .3 CSA O115-M1982 (R2001) Hardwood and Decorative Plywood.

.4 CSA O121-08 Douglas Fir Plywood.
.5 CAN/CSA O141-05, Softwood Lumber.
.6 CAN/CSA O151-09 Canadian Softwood Plywood
.7 CSA O153-M1980(R2008) Poplar Plywood

.5 ANSI A208.2-1994 Medium Density Fiberboard for Interior Use.

.6 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber 2000.

.7 National Hardwood Lumber Association (NHLA) Rules for the Measurement and Inspection of Hardwood and Cypress January 1996.

.8 Environmental Choice Program (EPC)
.1 ECP-44-92, Adhesives.
.2 ECP-45-92, Sealants and Caulking Compounds.
.3 ECP-78-98, Surface Coatings.

.9 Green Seal Environmental Standards(GS)
.1 GS-11-2008,2nd Edition, Paints and Coatings
.2 GS-36-00, Commercial Adhesives

1.3 WORK INCLUDED

.1 The work of this section includes the provision of all labour, material, equipment and services required to fabricate and install all shop fabricated finished cabinetwork and millwork items, as indicated on the drawings and specified herein and as required for a complete project.

.2 The work of this section includes the provisions of all labour, material, equipment, and services required to finish shop fabricated finished cabinetwork and millwork as specified in Section 06 47 00, Plastic Laminate and Section 09 91 23 Painting.

.3 The work includes, but is not necessarily limited to the following:
.1 Laminated plastic faced cabinetwork and millwork.
.2 Hardwood veneer faced cabinetwork and millwork.
.3 Flat countertops, faced with laminated plastic.
.4 Countertops as specified in Section 06 47 00

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.

.2 Indicate details of construction, profiles, jointing, fastening and other related details.
.1 Scale: profiles full size.

.3 Indicate all materials, thicknesses, finishes and hardware.

.4 Indicate locations of all service outlets in casework, typical and special installation conditions, and all connections, attachments, anchorage and location of exposed fastenings.

1.5 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittals.

1.6 MOCK-UPS

.1 Construct mock-ups in accordance with Section 01 33 00 – Submittals.

.2 Shop prepare one base cabinet unit with counter top, complete with hardware and shop applied finishes, and install on project at designated location.

.3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with this work.

.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may not remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store, and protect materials of this Section in accordance with Section 01 61 00 – Common Product Requirements.

.2 Protect millwork against dampness and damage during and after delivery.

.3 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 WARRANTY

. 1 Warrant the work of this Section in accordance with GC12.3 but for the time periods specified following.

.2 Contractor's Warranty: Warrant that the cabinetwork and millwork against defects in fabrication and or finish caused by poor workmanship or materials for a period of two (2) years from the date of Substantial Completion of the contract. Make all necessary repairs and replacements at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 AWMAC premium grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Douglas fir plywood (DFP): to CSA O121, standard construction.

.4 Hardwood Lumber: moisture content 7% or less in accordance with the following standards:
- .1 National Hardwood Lumber Association (NHLA).
- .2 AWMAC custom grade, moisture content as specified.

.5 Hardboard: To CGSB 11-GP-3M.
- .1 Type 2 (tempered), density 496 kg/m3. thickness 5 mm unless otherwise indicated, prefinished one side, colour white.
- .2 Manufactured such that formaldehyde emissions do not exceed 0.15 ppm (180 microg/m^3) when tested in accordance with ASTM E 1333.

.6 Medium density fibreboard (MDF): to ANSI A208.2, density 769 kg/m3.
- .1 Be manufactured such that formaldehyde emissions do not exceed 0.15 ppm (180 g/m) when tested in accordance with ASTM E 1333.
- .2 Contain at least 15 % recycled materials by weight.

.7 Canadian Softwood plywood: to CSA 0151, standard construction.

.8 Hardwood Plywood: to CSA 0115, standard construction.

.9 Plywood Core: to CSA 0121 Solid two sides, 19mm thick minimum.

.10 Laminated Plastic: in accordance with Section 06 66 60

.11 Sealant: in accordance with Section 07 92 00.

.12 Nails and Staples: to CSA B111, galvanized.

.13 Wood screws: steel type and size to suit application.

.14 Splines: wood.

.15 Sealant: as per section 07 90 00.

.16 Aluminum profiles, plate and extrusions, aluminium alloy AA6061-T6, clear anodised finish AA-M12-C22-A41.

.17 Stainless Steel: Stainless Steel: to CSA G110.6 and ASTM A167, Type 304, No. 4 finish.

2.2 MANUFACTURED UNITS

.1 Casework.
- .1 Fabricate caseworks to AWMAC custom quality grade.

.2 Furring, blocking, nailing strips, grounds, and rough bucks and sleepers.
- .1 S2S is acceptable.
- .2 Board sizes: Standard or better grade.
- .3 Dimension sizes: Standard light framing or better grade.

.3 Framing Maple species, NLGA and NHLA grade

.4 Case Bodies: (ends, gables, divisions and bottoms).
- .1 Hardwood plywood:
  - .1 Thickness: 16 and 19 mm.
  - .2 Number of plies: 7.
  - .3 Face veneer: Maple species, select grade, rotary cut, matching requirement.
  - .4 Back veneer: Maple species, select grade, rotary cut, matching requirement.
  - .5 Core: veneer.
  - .6 Bond: Type II.
  - .7 Sanding: touch sanding.
  - .8 Grain direction longitudinal.
- .2 Solid wood: ash species, select grade, 19 mm thick.

.5 Backs:
- .1 Hardwood plywood:
  - .1 Thickness: 6 mm.
  - .2 Number of plies: 4.
  - .3 Face veneer: Maple species, select grade, rotary cut, matching requirement.
  - .4 Back veneer: Maple species, natural grade, rotary cut, matching requirement.
  - .5 Core: veneer.
  - .6 Bond: Type II.
  - .7 Sanding: touch sanding.
  - .8 Grain direction vertical.

.6 Doors:
- .1 Fabricate doors to AWMAC premium grade supplemented as follows:
- .2 Hardwood plywood:
  - .1 Thickness: 19mm.
  - .2 Number of plies: 7.
  - .3 Face veneer: Maple species, grade, cut, matching requirement bookmatch.
  - .4 Back veneer: Maple species, select grade, rotary cut,.
  - .5 Core: veneer.
  - .6 Bond: Type II.
  - .7 Sanding: touch sanding
  - .8 Grain direction vertical.
- .3 Full height casework doors, use MDF core with matching face veneer, 19mm thick.
- .4 Edge banding: provide 10mm thick solid matching wood strip on plywood edges 12mm or thicker, exposed in final assembly. Strips same width as plywood.

.7 Shelves:
- .1 Hardwood plywood:
  - .1 Thickness: 19 mm.
  - .2 Number of plies: 7.
  - .3 Face veneer: Maple species, select grade, rotary cut, bookmatch.
  - .4 Back veneer: Maple species, select grade, rotary cut, matching requirement.
  - .5 Core: veneer.
  - .6 Bond: Type II.
  - .7 Sanding: touch sanding.
  - .8 Grain direction longitudinal.
- .2 Edge banding: provide 10 mm thick solid matching wood strip on plywood edges 12 mm or thicker, exposed in final assembly. Strips same width as plywood.

.8 Drawers:
- .1 Fabricate drawers to AWMAC premium grade supplemented as follows:
- .2 Sides and Backs.
  - .1 Hardwood plywood:
    - .1 Thickness: 12 mm.
    - .2 Number of plies: 7.

.3 Face veneer : Maple species, select grade, rotary cut,.
.4 Back veneer: maple species, select grade, rotary cut, matching requirement.
.5 Core: veneer.
.6 Bond: Type II.
.7 Sanding: touch sanding.
.8 Grain direction longitudinal.

.3 Bottoms.
.1 Hardwood plywood:
.1 Thickness: 12 mm drawers >than 1000mm wide.6mm hardboard < than 900mm
.2 Number of plies: 3 or hardboard smooth face up.
.3 Face veneer: Maple species, select grade, rotary cut, matching requirement.
.4 Back veneer: Maple species, stain grade, rotary cut, matching requirement.
.5 Core: veneer.
.6 Bond: Type II captured 4 sides.
.7 Sanding: touch sanding.
.8 Grain directionlongitudinal.

.4 Fronts.
.1 Hardwood plywood:
.1 Thickness: 19 mm.
.2 Number of plies: 7.
.3 Face veneer: Maple species, select grade, rotary cut, bookmatch.
.4 Back veneer: Maple species, stain grade, rotary cut, matching requirement.
.5 Core: veneer.
.6 Bond: Type II.
.7 Sanding: touch sanding.
.8 Grain direction vertical.

.2 Solid wood: Maple species, select grade, 19 mm thick.

2.3FABRICATION OF CABINETWORK

.1 Fabricate all cabinet/millwork units as follows and in accordance with the detailed drawings.

.2 Fabricate cabinetwork to applicable AWMAC quality standards except where otherwise indicated on the drawings.

.3 Fabricate and assemble cabinetwork items in fabricator's shop. Deliver to site in size easily handled and to ensure passage through building openings.

.4 Verify dimensions on site before commencing fabrication.

.5 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive shop finish.

.6 Provide for built-in mechanical and electrical services and other equipment. Verify locations before cutting or drilling and allow suitable tolerances where required. Check shop drawings for such items. Where design requires services built-in during fabrication, employ a qualified technician and provide appropriate materials. Comply with governing codes.

.7 Shop install cabinet hardware for doors, shelves and drawers, Use countersunk screws.

.8 Shelving to cabinetwork to be adjustable unless otherwise noted. Recess shelf support standards unless noted otherwise.

2.4 FINISHING

.1 Factory finish all cabinetwork prior to delivery to site.

.2 Appearance of finish of stained finish to be visibly free of flow lines, streaks, sags, blisters and other surface imperfections.

.3 Clear finish wood to have concealed fastenings where possible, otherwise recess screws and bolts and plug holes with 6mm th. Matching wood plug. Plugged areas to be sanded smooth, ready to finish. Where finishing nails are used, nails are to be in straight lines and set-in for neat appearance. Apply coloured filler to match wood and leave ready to receive finish.

.4 Provide temporary protection to factory finished cabinetwork during shipment. Ensure that method of protection does not damage finish.

.5 Touch up marked or abraded finish to Consultants approval. Units which are damaged beyond acceptance standard shall be replaced at no extra cost to the owner.

PART 3 - EXECUTION

3.INSTALLATION

.1 Do architectural woodwork to quality standards of AWMAC, except where specified otherwise. .

.2 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

.3 Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts in countertop joints.

.5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant.

.7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.8 Fit hardware accurately and securely in accordance with manufacturer's directions

3.4 CLEANING

.1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.

3.5 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1	Section 01 33 00	Submittal Procedures
.2	Section 01 45 00	Quality Control
.3	Section 01 74 21	Construction / Demolition Waste Management and Disposal
.4	Section 01 61 00	Common Product Requirements
.5	Section 06 10 00	Rough Carpentry
.6	Section 06 20 00	Finish Carpentry
.7	Section 06 40 00	Architectural Woodwork: Cabinet and base units.
.8	Section 07 92 00	Joint Sealing
.9	Section 08 70 05	Cabinet Hardware
.10	Section 09 00 00	Interior Finishes Colour Schedule
.11	Section 10 00 00	Manufactured Specialties

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.2-02, Medium Density Fibreboard (MDF) for Interior Applications.

.2 American Society for Testing and Materials International, (ASTM)
- .1 ASTM D 2832-92(R1999), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .2 ASTM D 5116-97, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.4 Canadian Standards Association (CSA International)
- .1 CSA O112-M1977(R2001), Standards for Wood Adhesives.
- .2 CSA O112.5-1.1-Series-M-1977(R2001), Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).

.3 CSA O112.7-1.1-Series M-1977(R2001), Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing).
.4 CSA O121-M1978(R1998), Douglas Fir Plywood.
.5 CAN/CSA O141-91(R1999), Softwood Lumber.
.6 CSA O151-M1978(R1998), Canadian Softwood Plywood.
.7 CSA O153-M1980(R1998),Poplar Plywood.

.5 Environmental Choice Program (EPC)
.1 CCD-044-95, Adhesives.
.2 CCD-045-95, Sealants and Caulking Compounds.
.3 CCD-048-95, Surface Coatings Recycled Water-borne.
.4 CCD-047a-98, Paints - Surface Coatings.
.5 CCD-048b-98, Stains - Surface Coatings.
.6 CCD-048c-98, Varnishes - Surface Coatings.

.6 National Electrical Manufacturers Association (NEMA)
.1 NEMA LD3-2000, High Pressure Decorative Laminates

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 – Submittal Procedures.
.2 Submit two copies of WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures, Indicate VOC limits for adhesives, solvents and cleaners.

.2 Samples:
.1 Sumbit samples in accordance with Section 01 33 00 – Submittal Procedures.
.2 Submit duplicate samples of joints, edging, cutouts and postformed profiles.

.3 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 STORAGE AND PROTECTION

.1 Deliver, handle, store and protect material of this Section in accordance with Section 01 61 00 – Common Product Requirements.

.2 Maintain relative humidity between 25% and 60% at 22°C during storage and installation.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Divert wood cut-offs from landfill by disposal into on-site wood recycling bin

.2 Divert reusable materials for reuse at nearest used building materials facility or similar type facility.

.3 Divert unused caulking, sealants, surface coatings and adhesive materials from landfill through disposal at a special wastes depot

1.8 WARRANTY

1 Warrant the work of this Section in accordance with GC12.3 but for the time periods specified following.

.2 Contractor's Warranty: Warrant that the work of this section will not warp or delaminate for a period of two (2) years from the date of Substantial Completion of the contract. Make all necessary repairs and replacements at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIALS

1 Laminated plastic for flatwork: to NEMA LD 3.
- .1 Type: General purpose.
- .2 Grade: HGS.
- .3 Size: 1.27 mm thick.
- .4 Colour: multilayered,allow for 3 separate colours/patterns.
- .5 Pattern: solid or printed pattern.
- .6 Finish: furniture or textured.

.2 Laminated plastic for postforming work: to NEMA LD 3.
- .1 Type: Postforming.
- .2 Grade: HGP.
- .3 Size: 1.016 mm thick.
- .4 Colour: multilayered,allow for 3 separate colours/patterns.
- .5 Pattern: solid or printed pattern.
- .6 Finish: furniture or textured

.3 Laminated plastic for backing sheet: to NEMA LD 3.
.1 Type: Backer.
.2 Grade: BKH.
.3 Size: not less then 0.5 mm thick or same thickness as face laminate.
.4 Colour: same colour as face laminate.

.4 Plywood core: Douglas Fir Plywood to CSA O151 Softwood Plywoods solid two sides, only where indicated.
.1 Douglas Fir plywood for countertops with sinks.

.5 Core: meeting CAN3.0.188.1-M78 Grade R DH, sanded faces, of thickness indicated.
.1 Particleboard Type DH for countertops without sinks.

.6 Laminated plastic adhesive: urea resin adhesive to CSA O112.5, contact adhesive to CAN/CGSB-71.20, resorcinol resin adhesive to CSA O112.7or polyvinyl adhesive to CSA O112.4

.7 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.

.8 Sealants:Section 07900/ Sealants.

.9 Draw bolts and splines: as recommended by fabricator.

.10 Solid Surfaces:
.1 Formica solid Surfacing or Quartz Ceasarstone as noted in Section 09 00 00 Interior Finishes Colour Schedule and as per drawings. All substitutions must be approved by Architect prior to tender close.

2.2 FABRICATION

.1 Comply with NEMA LD 3, Annex A.

.2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.3 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.

.5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.

.6 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.7 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.8 Apply plastic laminate to cover underside of countertop edge to match countertop.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Install work plumb, true and square, neatly scribed to adjoining surfaces.

.2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm oc, 75 mm from edge. Make flush hairline joints.

.4 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.

.6 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved.

.7 For site application, offset joints in plastic laminate facing from joints in core.

3.3 PROTECTION

.1 Cover finished laminated plastic veneered surfaces with heavy kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove until immediately before final inspection.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Perform care and cleaning with NEMA LD 3, Annex B.

.3 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames .

3.5 SCHEDULE

.1 Plastic Laminate to Consultant's selection as noted in Section 09 00 00 Interior Finishes Colour Legend

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Requirements
.2 Section 04 05 19 - Masonry Anchorage and Reinforcing
.3 Section 05 41 00 - Structural Metal Stud Framing
.4 Section 07 27 00 - Air Barriers
.5 Section 07 52 00 - Modified Bituminous Membrane Roofing

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM E 96/E 96M-05, Standard Test Methods for Water Vapour Transmission of Materials.
.2 ASTM C 612-04 Standard Specification for Mineral Fibre Block and Board Thermal Insulation

.2 Canadian General Standards Board (CGSB)
.1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

.3 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
.2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre for Buildings.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.

.2 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer

certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Convene pre-installation meeting one week prior to beginning on-site installations.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordinate with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Cavity Wall Insulation:
.1 Mineral fibreboard Thermal Insulation to CAN/ULC-S702, ASTM C612.
.2 Type: 2.
.3 Density: 70 kg/m3
.4 Thickness: as indicated.
.5 Size: 610 x 1219 mm.
.6 Edges: square.
.7 Thermal Resistance: 4.2 R Value/inch
.8 Acceptable Product: Roxul Cavity Rock

.2 Foundation insulation:
.1 Extruded polystyrene (XPS) to CAN/ULC-S701, ASTM C578.
.2 Type: 4.
.3 Compressive strength: 30 psi.
.4 Thickness: 50 mm.
.5 Size: 600 x 2400mm.
.6 Edges: shiplapped.
.7 Thermal Resistance: 5.0 Value/inch
.8 Acceptable Product: Dow, Styrofoam SM

2.2 ADHESIVE

.1 Adhesive (for polystyrene): to CGSB 71-GP-24, Type 1, compatible to and as recommended by manufacturer of insulating board.

.2 VOC limits as per 01 35 21.

2.3 ACCESSORIES

.1 Mechanical Wall Fasteners: Purpose made plastic, friction fit type designed to hold insulation in place as part of masonry wall tie system. Refer to Section 04 05 19.

.2 Insulation clips: impale type, preformed 50 x 50 mm Cold Rolled Carbon Steel 0.8mm thick, adhesive back, spindle of 2.5 mm dia. annealed steel, length to suit insulation, 25mm dia. washers of self locking type.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 EXAMINATION

.1 Examine substrates and immediately inform Consultant in writing of defects.

.2 Prior to commencement of work ensure:
.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.3 WORKMANSHIP

.1 Install insulation after building substrate materials are dry and after installation of air vapour barrier.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.

.5 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 largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been inspected and approved by Consultant.

3.4 PERIMETER FOUNDATION INSULATION

.1 Exterior application: extend boards 1500 mm minimum below finish grade as indicated. Install on exterior face of perimeter foundation wall with adhesive.

.2 Under slab application: extend boards as indicated in from perimeter foundation wall where indicated. Lay boards on level compacted fill. Horizontal return is a minimum of 600mm if not noted.

3.5 CAVITY WALL INSULATION

.1 Install mineral fibre insulation boards on outer surface of inner wythe wall cavity over air vapour barrier membrane.

.2 Place boards in a method to maximize contact with bedding. Stagger end joints. Butt edges and ends tight to adjacent boards and to protrusions.

.3 Fit insulation boards neatly around wall ties and Z girts.

.4 Fit insulation boards neatly within perimeter roof beam flanges as detailed.

.4 At perimeter of windows install additional layers of insulation as indicated to provide minimum R value of 8.4 to curtain wall thermal break and back aluminum section framing.

.5 Install over impaling clips to securely hold boards in place.

3.6 SOFFIT INSULATION

.1 Install boards as noted in 3.5 above.

.2 Mechanically fasten with mechanical fasteners complete with plastic washers.

3.7 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 07 21 13 – Board Insulation
.3 Section 07 21 19 – Foamed-in-Place Insulation
.4 Section 07 26 00 - Vapour Retarders
.5 Section 07 27 00 - Air Barriers - Performance
.6 Section 07 84 00 - Fire Stopping
.7 Section 09 21 16 - Gypsum Board Assemblies
.8 Section 09 22 16 - Non-structural Metal Framing
.9 Division 23 - Insulation for Mechanical Work

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 Canadian Standards Association (CSA International)
.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.3 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S604-M1991, Type A Chimneys.
.2 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Convene pre-installation meeting one week prior to beginning on-site installations.
.1 Verify project requirements.
.2 Review installation and substrate conditions.

.3 Co-ordinate with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Acoustic Insulation
.1 Batt and blanket mineral fibre ASTM C665 CAN/ULCS702
.2 Type: 1.
.3 Thickness: to suit steel stud dimensions
.4 Non Combustible in accordance with CAN/ULC S114 and ASTM E136
.5 Flame spread less than 25, smoke development 50
.6 Width purpose made for fitting between studs.
.7 Acceptable Products:
.1 CGC Thermafibre SAFB
.2 Roxul AFB
.3 Certainteed Certasound
.4 Owens Corning Quietzone

2.2 ACCESSORIES

.1 Insulation clips:
.1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSULATION INSTALLATION

.1 Install insulation to maintain continuity acoustic protection to building elements and spaces and to ASTM C 1320.

.2 Install insulation within framing members tightly fit but not compressed.

.3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.4 Do not compress insulation to fit into spaces.

.5 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.

.6 Do not enclose insulation until it has been inspected and approved by Consultant.

3.3 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections
.1 Section 01 45 00 - Quality Control.
.2 Section 01 51 00 - Temporary Utilities.

1.2 References
.1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)
.2 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S101-1989, Fire Endurance Tests of Building Construction and Materials.
.2 CAN/ULC-S102-1988(R2000), Surface Burning Characteristics of Building Materials and Assemblies.
.3 CAN/ULC-S705.1-01, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.
.4 CAN/ULC-S705.2-02, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

1.3 Quality Assurance
.1 Applicators to conform to CUFCA Quality Assurance Program.

1.4 Mock-up
.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up of spray in place foam insulation including one inside corner and one window. Mock-up may be part of finished work.
.3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with work.

1.5 Protection
.1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.
.2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and after application to maintain non-toxic, unpolluted, safe working conditions.
.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
.4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

1.6 Waste Management and
.1 Remove from site and dispose of all packaging materials at

Disposal

appropriate recycling facilities.

.2 Fold up metal banding, flatten and place in designated area for recycling.

.3 Divert metal drums from landfill to metal recycling facility.

1.7 Environmental Requirements .1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

PART 2 - PRODUCTS

2.1 Materials .1 Insulation: spray polyurethane to CAN/ULC-S705.1.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

PART 3 - EXECUTION

3.1 Application .1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.

.2 Apply sprayed foam insulation in thickness as indicated.

.3 All spray foam insulation exposed within intended tenant ceiling plenum shall be protected with fire-rated spray applied fireproofing complying with CAN4-S124M standard or fully concealed behind gypsum board finish. Do not expose spray foam insulation within ceiling plenum.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 05 41 00 – Structural Metal Stud Framing
.3 Section 07 21 13 – Blanket Insulation
.4 Section 07 21 19 – Foamed-in-Place Insulation
.5 Section 07 21 29.03 – Sprayed Insulation - Polyurethane Foam
.6 Section 07 27 00 – Air Barriers
.7 Section 07 52 00 – Modified Bituminous Membrane Roofing
.8 Section 07 92 00 – Joint Sealants
.9 Section 09 21 16 – Gypsum Board Assemblies

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
  .2 American Society for Testing and Materials (ASTM)
    .1 ASTM E1745 Standard Specifications for Plastic Water Vapour Retarders Used in Contact with Soil or Granular Full Under Concrete Slabs
    .2 ASTM E154 Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs
    .3 ASTM E96 Standard Test Methods for Water Vapour Transmission of Materials
    .4 ASTM E1643 Standard Practice for Installation of Water Vapour Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
    .5 ASTM F1249-01 Standard Test Method for Water Vapour Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include:
    .1 Product characteristics.
    .2 Performance criteria.
    .3 Limitations.

.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.4 Quality assurance submittals:
.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.2 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

1.3 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

.2 Mock-Ups:
.1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up of sheet vapour barrier installation including one lap joint, and termination at perimeter. Mock-up may be part of finished work.
.3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
.4 Locate where directed.
.5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with vapour barrier work.

.3 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SHEET VAPOUR BARRIER

.1 Plastic Vapour Retarder:
- .1 Performance Based Specification: Vapour Retarder Membrane must meet or exceed all requirements of ASTM E1745 Classes A, B and C
  - .1 Maximum Permeance ASTM E96: 0.018 Pe Perms
  - .2 Water Vapour Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.007 grains/ft2/hr
  - .3 Resistance to Organisms and Substrates in Contact with Soil ASTM E154, Section 13: 0.027 Perms
  - .4 Tensile Strength ASTM E154, Section 9: 84 lbs force/inch
  - .5 Puncture Resistance ASTM D1709, Method B: 4,335 grams
  - .6 Water Vapour Retarder ASTM E1745: meets or exceeds Class A, B, & C
  - .7 Thickness of retarder (plastic) ACI 302.1R-96: Not less than 10 mils

.2 Acceptable Material
- .1 Perminator/10 mil by W.R. Meadows.

2.2 ACCESSORIES

.1 Joint sealing tape: air resistant pressure sensitive adhesive tape,high density polyethylene tape type recommended by vapour barrier manufacturer, minimum 100mm wide for lap joints and perimeter seals.

.2 Pipe Boots: Construct pipe boots from vapour barrier material and pressure sensitive tape per manufacturer's instruction.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

.1 Prepare surfaces in accordance with manufacturer's instructions.

3.3 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Installation shall be in accordance with manufacturer's instructions and ASTM E1643-98.

.3 Install sheet vapour retarder to form continuous retarder. All joints, penetrations and perimeter to be sealed in strict accordance to manufacturer's recommendations.

.4 Use sheets of largest practical size to minimize joints.

.5 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.6 Seal all penetrations (including pipes) with manufacturer's pipe boot.

.7 No penetration of the vapour barrier is allowed except for permanent utilities.

.8 Repair damaged areas by cutting patches of vapour barrier, overlapping damaged area 6 inches and taping all four sides with tape.

3.4 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:
.1 Return vapour retarder membrane up foundation and secure in place with continuous bead of caulking.
.2 Install insulating break continuous to suit depth of perimeter slab.
.3 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:
.1 Overlay adjacent sheets by 150mm and apply continuous length of manufacturer's proprietary 100mmwide lap tape.
.2 Smooth out folds and ripples occurring in sheet and repair any penetration with patch of membrane material and proprietary tape.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

7PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and requirements for wall air/ vapour barrier systems.
- .1 Applied to exterior face of exterior wall sheathing, concrete block and poured concrete back-up walls to provide a continuous air/vapour barrier membrane.
- .2 Thru-wall flashings in masonry veneer walls.
- .3 Underlayment for sheet metal flashing work, and aluminum window sills.
- .4 Perimeter membrane to window and door openings applied over wood blocking to provide transition membrane between wall and windows and doors.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 04 05 00 - Common Work Results for Masonry
.3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
.4 Section 04 05 23 - Masonry Accessories
.5 Section 07 21 13 - Board Insulation
.6 Section 07 21 19 – Foamed-in-Place Insulation
.7 Section 07 26 00 – Vapour Retarder-Floor Slab
.8 Section 07 52 00 - Modified Bituminous Membrane Roofing
.9 Section 07 62 00 - Sheet Metal Flashing and Trim

1.3 REFERENCES

.1 Canadian Construction Documents Committee
- .1 CCDC 2-2008, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.3 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Consultant.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Applicator: company specializing in performing work of this section with minimum five years documented experience with installation of air/vapour barrier systems.

.1 Completed installation must be approved by the material manufacturer.

.2 Applicator: company:

.1 Currently licensed by National Air Barrier Association.

.2 Must maintain their license throughout the duration of the project.

.3 The Owner may appoint an independent Air Barrier/Building Envelope Inspector. The cost of inspection shall be paid by the Owner.

.2 Mock-Up:

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct typical exterior wall panel, 3 m long by 3 m wide, incorporating window, insulation, building corner condition, junction with roof system thru wall flashing and masonry wall tie; illustrating materials interface and seals.

.3 Locate where directed.

.4 Mock-up may not remain as part of finished work.

.5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with air/vapour barrier Work.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Consultant if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.8 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

.4 Perform moisture testing of concrete surfaces to confirm substrate meets requirements of manufacturer prior to application.

1.9 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals. All envelope trades are to cooperate in the coordination and realization of a complete integrated air barrier membrane.

1.10 WARRANTY

.1 Provide three year warranty under provisions of Section 01 78 00 - Closeout Submittals and in accordance with General Conditions (GC) CCDC 2 GC 12.3 .

.2 Warranty: include coverage of installed sealant and sheet materials which:

.1 Fail to achieve air tight and watertight seal.

.2 Exhibit loss of adhesion or cohesion.

.3 Do not cure.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

.1 Air Barrier Membrane: Reinforced SBS Modified Bitumen self-adhesive composite membrane, nom. 1.5mm thick or rubberized asphalt self-adhesive composite membrane nom. 1 mm thick.
.1 Acceptable products: Non Vapour Type Membrane self adhesive as follows: Blueskin SA by Bakor, Perm-A-Barrier by W.R. Grace, Sopraseal Stick 1100 by Soprema, ExoAir 110 by Tremco.

.2 Thru-Wall Flashing Membrane: Reinforced SBS Modified Bitumen self-adhesive composite membrane, laminated to a cross-laminate, high-density polyethylene film with a siliconized release liner. nom. 1.0mm thick
.1 Acceptable products: Blueskin TWF.

.3 Primer: synthetic rubber primer and one-part thermoplastic rubber based sealant for Self-Adhesive membrane as recommended by manufacturer of membrane.
.1 Maximum VOC's as per 01 35 21.

.4 Adhesive: compatible with sheet seal membrane and substrate, permanently non-curing.
.1 Maximum VOC's 50g/L.

.5 Sealant around Brick Tie Penetrations: Butyl Sealant or trowel applied liquid air/vapour barrier membrane synthetic, rubber based adhesive compatible with sheet seal membrane and substrate, permanently non-curing.
.1 Sealants as per 07 92 00 Joint Sealants.

.6 Metal flashing supports: 26 GA (0.55mm) zinc coated steel commercial quality to ASTM A526M with Z275 designated zinc coating.

.7 Provide the above materials in either summer grade (above 5 degrees C) or winter grade (between -5 to 5 degrees C) applications to suit installation temperatures.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Consultant in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Prime substrate to manufacturer's recommendations and allow to dry sufficiently. Two coats of primer may be required to achieve proper adhesion of membrane. Ensure all primed surfaces receive membrane application in the same day. Apply primer beyond edges of sheet to be installed minimum 150mm and re-coat edge when applying adjacent sheets.

.3 Apply membrane complete and continuous to prepared substrate in an overlapping shingle fashion and in according to manufacturer's recommendations. Lap membrane joints min. 150 mm at end and side laps. Stagger all vertical joints.

.4 Position membrane for alignment with protective film in place. Roll back, remove protective film and press firmly in place. When membrane is entirely in place, roll firmly into substrate to ensure full contact. Cut membrane neatly around ties to form a tight seal. Seal area around ties and any projections with sealant and seal end of membrane to substrate at end of the days work.

.5 Maintain environmental conditions recommended by manufacturer.

.6 Return membrane over wood blocking at windows and doors into opening prior to window / door installation. Extend membrane into window and door openings as indicated. Lap joints to shed water to the exterior starting at the sill flashing.

7 At curtain wall window framing, Window contractor to provide membrane strip sealed into window perimeter framing. The work of this section shall included sealing window membrane to wall membrane for continuous seal.

.8 At the end of each days work seal the top edge of the membrane where it meets the substrate using liquid air seal mastic. Trowel apply a feathered edge to seal termination and shed water.

.9 Membrane applied to the underside of substrate surfaces shall receive special attention on application to ensure maximum surface area adhesion is obtained.

3.6 THRU-WALL FLASHING

.1 Install materials in accordance with manufacturer's instructions.

.2 Install flashings over openings in exterior walls.

.3 Install flashings in masonry in accordance with CAN3-A371-M84 and as specified herein.

.4 Install flashings under exterior masonry and siding resting on foundation walls, slabs, shelf angles, and steel angles over openings.

.5 Install flashings under weep hole courses and as indicated.

.6 In double wythe masonry walls, veneered walls, and siding clad walls carry flashings from front edge of masonry or siding under outer wythe, then up backing not less than 200mm, bond to backing using manufacturer's recommended adhesive.

.7 Where required and detailed provide metal flashing support to adhere thru wall flashing to and span over gaps and voids.

.8 Lap joints 150mm and seal full overlap with adhesive.

.9 Turn up ends of flashings at ends to form end dams (ie. at sills of openings/windows).

.10 Install over horizontal firestops.

.11 Install flashings in other locations indicated.

3.7 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.9 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for modified bituminous roof assemblies as indicated on drawings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 45 00 - Quality Control.
.3 Section 01 78 00 - Closeout Submittals.
.4 Section 06 10 00 - Rough Carpentry
.5 Section 07 62 00 - Sheet Metal Flashing and Trim.
.6 Section 07 72 69 - Roof Anchors and Safety Restraints.
.7 Section 07 92 00 - Joint Sealants.
.8 Division 22 - Plumbing Specialties and Accessories: drains

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM C 1177/C 1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  .2 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  .3 ASTM D 312-00 (2006), Asphalt Used in Roofing.
  .4 ASTM D 2178-04, Asphalt Glass Felt Used in Roofing and Waterproofing.
  .5 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  .6 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  .7 ASTM D 6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  .2 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  .3 CGSB 37-GP-15M-84, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
  .4 CGSB 37-GP-19M-85, Cement, Plastic, Cutback Tar.
  .5 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.
  .6 CGSB 37-GP-56M-80b (A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
  .7 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA).
.1 CRCA Roofing Specifications Manual-1997.

.4 Canadian Standards Association (CSA International).
.1 CAN/CSA-A123.3-98, Asphalt Saturated Organic Roofing Felt.
.2 CAN/CSA-A123.4-98, Asphalt for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
.3 CSA A231.1-06, Precast Concrete Paving Slabs.
.4 CSA O121-08, Douglas Fir Plywood.
.5 CSA O151-04 Canadian Softwood Plywood.
.6 CSA A123.21-14 Standard Test Method for Wind Uplift Resistance of Membrane Roofing Systems

.5 Department of Justice Canada (Jus).
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.6 Factory Mutual (FM Global).
.1 FM Approvals - Roofing Products.
.2 FM 4470 for Fastener Types and sizes

.7 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
.1 Material Safety Data Sheets (MSDS).

.8 Transport Canada (TC).
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.9 Underwriters Laboratories' of Canada (ULC).
.1 CAN/ULC-S701-05, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S704-03, Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.3 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 PERFORMANCE REQUIREMENTS

.1 Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.

.3 Submit WHMIS MSDS - Material Safety Data Sheets.

.4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.5 Indicate flashing, control joints, tapered insulation details.

.6 Provide layout for tapered insulation.

.7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.8 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.9 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.

.10 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

.11 Submit product data highlighting the SRI value of roofing materials as per 01 35 21.

1.6 QUALITY ASSURANCE

.1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.

.2 Submit laboratory test reports certifying compliance of bitumens and membrane with specification requirements.

.3 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Consultant to:

.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.4 Contractors must be members in good standing of the Ontario or Canadian Roofing Contractor's Association (ORCA or CRCA) and/or have been established as a roofing contractor for a minimum of 5 years, and shall be recognized as a qualified SBS Modified Bitumen Membrane installer.

.5 Roofing work shall be performed only by experienced and qualified applicators in accordance with Manufacturer's recommendations and best trade practices. Replace all work that results from inferior products or workmanship as directed by the Consultant.

.6 Installer qualifications: Engage an experienced installer to perform work of this section who is specialized in installing roofing similar to that required for this project, who is approved, authorized or licensed by the roofing system manufacturer to install the manufacturer's product and who is eligible to receive the standard roofing manufacturer's warranty.

.7 The roofing contractor and his subcontractors, throughout the bid and installation periods, must own a business license and must be officially recognized as an approved contractor by the roofing product manufacturer. Only skilled tradespersons, officially employed by a roofing contractor operating adequate and necessary equipment, will be authorized to perform all roofing work.

.8 Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.

.9 Upon request by the Consultant, submit evidence of previously completed projects of a similar nature.

1.7 FIELD QUALITY CONTROL

.1 The Owner may appoint an independent Waterproofing/Roofing inspector to conduct inspections and tests to ensure compliance with specification requirements. The cost of the inspection and testing shall be paid by the Owner.

.2 Provide a minimum two working days notice to the Consultant and Roofing Inspector of commencement of each phase of the work and provide them with manufacturer's literature on materials and installation upon request.

.3 On completion of the roofing, conduct in the presence of and under the direction of the Roofing Inspector, a flood test of that portion of the work.

.4 After installation, provide certification, signed by the roofing material manufacturer, that all items have been installed in accordance with the shop drawings and the manufacturer's specifications and details.

.5 Cooperate with the Roofing Inspector and Consultant and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period.

1.8 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.9 STORAGE AND HANDLING

.1 Provide and maintain dry, off-ground weatherproof storage.

.2 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.

.3 Remove only in quantities required for same day use.

.4 Place plywood runways over completed Work to enable movement of material and other traffic.

.5 Store sealants at +5 degrees C minimum.

.6 Store insulation protected from daylight and weather and deleterious materials.

.7 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.

.8 Store and manage hazardous materials in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

.9 All materials will be delivered and stored in conformance with the requirements described in the manufacturer's product manual; they must remain in their original packaging with manufacturer's name and product standards.

1.10 PROTECTION

.1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.7 Ensure emptied containers are sealed and stored safely.

.8 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.9 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.10 Dispose of unused adhesive material at official hazardous material collections site approved by Consultant.

.11 Dispose of unused sealant material at official hazardous material collections site approved by Consultant.

.12 Dispose of unused asphalt material at official hazardous material collections site approved by Consultant.

.13 Divert unused gypsum materials from landfill to recycling facility as reviewed by Consultant.

.14 Fold up metal banding, flatten and place in designated area for recycling.

1.12 ENVIRONMENTAL REQUIREMENTS

.1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.

.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.4 Conduct moisture tests of concrete slabs prior to application to confirm subsurface is acceptable to membrane manufacturer.

1.13 WARRANTY

.1 Provide manufacturer's warranty stating that the membrane and membrane flashing will remain in a watertight condition and will not leak as a result of faulty materials for a period of 10 years from the date of substantial performance of the contract. The scope of the warranty shall include all material and labour to return the membrane to a weathertight condition.

.2 Contractor hereby warrants that modified bituminous roofing and membrane flashings will stay in place and remain leakproof in accordance with the Subcontract Conditions (SCC), but for two years from the date of substantial performance of the contract. Make all necessary repairs and replacements within 48 hours of receipt of written notification.

PART 2 – PRODUCTS

2.1 DECK COVERING

.1 Glass mat gypsum sheathing board to ASTM C 1177, exterior grade sheathing formulated to be water-resistant, thickness 6mm, board size 1220 x 2440mm.
.1 Acceptable materials:
- .1 “Dens-Deck” by Georgia Pacific.
- .2 “Securoc” by CGC or approved equal.

2.2 ADHESIVES

.1 Two component, quick setting, low expansion foam urethane adhesive that can be applied at any temperature. DUOTACK 365

2.3 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9Ma.

2.4 VAPOUR BARRIER

.1 Self adhesive air/vapour barrier modified bitumen membrane.
- .1 W.R. MEADOWS - AIR SHIELD LM
- .2 SOPREMA/SOPRAVAP 'R'
- .3 BAKOR/VAPOUR BLOC SA

2.5 MEMBRANE

.1 Base sheet: SOPRAFIX BASE 630 or approved equal
- .1 Type 1, mechanically fastened.
- .2 Class C - plain surfaced.
- .3 Grade heavy duty service.
- .4 Top and bottom surfaces:
  - .1 Thermofusible plastic film/sanded.

.2 Cap sheet membrane: SOPRAFIX CAP 660.
- .1 Type 1,torch applied.
- .2 Class A-granule surfaced.
  - .1 Colour for granular surface: Light gray.
- .3 Grade heavy duty service.
- .4 Bottom surface thermofusible.

.3 Roof Membrane Base & Cap Flashing:
- .1 SOPRAFLASH/FLAM STICK & SOPRALENE FLAM 250GR or approved equal
- .2 Heavy duty.
- .3 Thermofusible plastic film /top silicone plastic release film.

2.6 ISOCYANURATE (URETHANE) INSULATION

.1 To CAN/ULC-S704.
- .1 SOPRAISO 150-R5.56/inch closed cell polyisocyanurate foam flat insulation board laminated on both sides w/fiberglass yarn reinforced organic paper. Provide tapered insulation and crickets to suit slopes on drawings. Provide prefab sump board drains where required. Soprema as Standard of Acceptance.

Option 1: closed cell zero ODP polyisocyanurate foam core integrally laminated to perforated glass reinforced mat. Johns Manville Energy 3 R5.7/inch.

2.7 SEALERS

.1 Sealants: Caulking - see Section 07 92 00 - Joint Sealing.

2.8 WALKWAYS

.1 Walkways to consist of one additional ply of cap sheet membrane. Contrasting colour from field membrane as selected by Consultant.

2.9 FASTENERS

.1 Covering to steel deck: No. 14 flat head, self tapping, Type A or AB, cadmium plated screws complete with 50 mm diameter washers. SOPRAFIX FASTENERS/PLATES

.2 Base sheet to deck: coated insulation fasteners and galvanized plates must meet CSA a-123.21(14) and FM 4470 Standard Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer. SOPRAFIX FASTENER/PLATES.

PART 3 - EXECUTION

3.1 WORKMANSHIP

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual Provincial Roofing Association Manual, particularly for fire safety precautions, and to FM ULC.

.2 Do priming for asphalt roofing in accordance with manufacturer's requirements.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

3.2 EXAMINATION OF ROOF DECKS

.1 Inspect with Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.2 Curbs have been built.

.3 Roof drains have been installed at proper elevations relative to finished roof surface.

.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 DECK COVERING

.1 Adhesive apply glass mat gypsum to steel deck.

.2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

3.5 VAPOUR BARRIER

.1 Adhere self adhesive air vapour barriers as per manufacturer's instructions.

.2 A/V barrier as per Section 07 27 00 or as per proprietary roofing system components.

3.6 EXPOSED MEMBRANE ROOFING APPLICATION

.1 Insulation: mechanically fastened application:
- .1 Mechanically fasten insulation using screws and pressure distribution plates sufficient to secure boards in place during build up of roof profile.
- .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .3 Cut end boards to suit.

.2 Tapered insulation application:
- .1 Install tapered insulation as second insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.4 Base sheet application:
- .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
- .2 Unroll and embed base sheet and secure with screws and pressure plates to suit CSA A123.21(14) for the specific region. Comply with FM 4470 for fastener type and size.

.5 Cap sheet application:
- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
- .2 Unroll and torch embed cap sheet.

.6 Flashings:
- .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Refer to manufacturers instructions for sequence and installation requirements specific to self adhesive or weldable base sheet on flashings and parapets.

.3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by self adhering or torch welding.

.4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.

.5 Provide 75 mm minimum side lap and seal.

.6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.7 Seal overlaps at the end of each workday.

.8 Do work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.

.7 Roof penetrations:

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.7 WALKWAYS

.1 Walkways to consist of one additional ply of cap sheet membrane. Contrasting colour: Dark Grey.

3.8 FIELD QUALITY CONTROL

.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.

.2 Costs of tests will be paid by Owner.

3.9 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for modified bituminous roofing as indicated on drawings. The system noted is a Soprema Adhered System using one manufacturers product line to provide a complete proprietary roof system. All alternatives must provide a similarly complete proprietary system and provide a single system warranty.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 45 00 - Quality Control.
.3 Section 01 78 00 - Closeout Submittals.
.4 Section 06 10 00 - Rough Carpentry
.5 Section 07 62 00 - Sheet Metal Flashing and Trim.
.6 Section 07 72 69 - Roof Anchors and Safety Restraints.
.7 Section 01 81 19 - Indoor Air Quality Requirements
.8 Section 07 92 00 - Joint Sealants.
.9 Division 22 - Plumbing Specialties and Accessories: drains

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM C 1177/C 1177M-01, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
.2 ASTM D 41-94(2002)e1, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
.3 ASTM D 312-00, Asphalt Used in Roofing.
.4 ASTM D 448-03, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
.5 ASTM D 2178-97a, Asphalt Glass Felt Used in Roofing and Waterproofing.
.6 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
.7 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
.8 ASTM D 6164-00, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
.2 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
.3 CGSB 37-GP-15M-84, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
.4 CGSB 37-GP-19M-85, Cement, Plastic, Cutback Tar.
.5 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.

.6 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
.7 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA).
.1 CRCA Roofing Specifications Manual-1997.

.4 Canadian Standards Association (CSA International).
.1 CAN/CSA-A123.3-98, Asphalt Saturated Organic Roofing Felt.
.2 CAN/CSA-A123.4-98, Asphalt for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
.3 CSA A231.1-99, Precast Concrete Paving Slabs.
.4 CSA O121-M1978(R1998), Douglas Fir Plywood.
.5 CSA O151-M1978(R1998), Canadian Softwood Plywood.
.6 CSA A123.21-14 Standard Test Method for Wind Uplift Resistance of Membrane Roofing Systems

.5 Department of Justice Canada (Jus).
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.6 Factory Mutual (FM Global).
.1 FM Approvals - Roofing Products.
.2 FM 4470 for Fastener Types and sizes

.7 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
.1 Material Safety Data Sheets (MSDS).

.8 Transport Canada (TC).
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.9 Underwriters Laboratories' of Canada (ULC).
.1 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S704-2001, Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.3 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 PERFORMANCE REQUIREMENTS

.1 Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

.2 Environmental Requirements:
- .1 Provide roof insulation containing a combined minimum post-consumer and pre-consumer recycled content of 40%
- .2 Provide adhesives, sealants, and sealant primers with VOC quantities lower than stated in SCAQMD Rule#1168, current edition
- .3 Provide primers, paints, sealers, coatings and wood finishes with VOC quantities lower than limits stated in Green Seal's Standards GS-3 and GS-11 and SCAQMD Rule#1113, current editions

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.

.3 Submit WHMIS MSDS - Material Safety Data Sheets.

.4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.5 Indicate flashing, control joints, tapered insulation details.

.6 Provide layout for tapered insulation.

.7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.8 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.9 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.

.10 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.6 QUALITY ASSURANCE

.1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.

.2 Submit laboratory test reports certifying compliance of bitumens and membrane with specification requirements.

.3 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Consultant to:
- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Co-ordination with other building subtrades.
- .4 Review manufacturer's installation instructions and warranty requirements.

.4 Contractors must be an established as a commercial/industrial roofing contractor for a minimum of 5 years, and shall be recognized as a qualified SBS Modified Bitumen Membrane installer. Provide the 2 year standard form of warranty available through the Association.

.5 Roofing work shall be performed only by experienced and qualified applicators in accordance with Manufacturer's recommendations and best trade practices. Replace all work that results from inferior products or workmanship as directed by the Consultant.

.6 Installer qualifications: Engage an experienced installer to perform work of this section who is specialized in installing roofing similar to that required for this project, who is approved, authorized or licensed by the roofing system manufacturer to install the manufacturer's product and who is eligible to receive the standard roofing manufacturer's warranty.

.7 The roofing contractor and his subcontractors, throughout the bid and installation periods, must own a business license and must be officially recognized as an approved contractor by the roofing product manufacturer. Only skilled tradespersons, officially employed by a roofing contractor operating adequate and necessary equipment, will be authorized to perform all roofing work.

.8 Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.

.9 Upon request by the Consultant, submit evidence of previously completed projects of a similar nature.

1.7 FIELD QUALITY CONTROL

.1 The Owner may appoint an independent Waterproofing/Roofing inspector to conduct inspections and tests to ensure compliance with specification requirements. The cost of the inspection and testing shall be paid by the Owner.

.2 Provide a minimum two working days notice to the Consultant and Roofing Inspector of commencement of each phase of the work and provide them with manufacturer's literature on materials and installation upon request.

.3 On completion of the roofing, conduct in the presence of and under the direction of the Roofing Inspector, a flood test of that portion of the work.

.4 After installation, provide certification, signed by the roofing material manufacturer, that all items have been installed in accordance with the shop drawings and the manufacturer's specifications and details.

.5 Cooperate with the Roofing Inspector and Consultant and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period.

1.8 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.9 STORAGE AND HANDLING

.1 Provide and maintain dry, off-ground weatherproof storage.

.2 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.

.3 Remove only in quantities required for same day use.

.4 Place plywood runways over completed Work to enable movement of material and other traffic.

.5 Store sealants at +5 degrees C minimum.

.6 Store insulation protected from daylight and weather and deleterious materials.

.7 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.

.8 Store and manage hazardous materials in accordance with Section 01 requirements.

.9 All materials will be delivered and stored in conformance with the requirements described in the manufacturer's product manual; they must remain in their original packaging with manufacturer's name and product standards.

1.10 PROTECTION

.1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste.

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.7 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.8 Ensure emptied containers are sealed and stored safely.

.9 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.10 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.11 Dispose of unused adhesive material at official hazardous material collections site approved by Consultant.

.12 Dispose of unused sealant material at official hazardous material collections site approved by Consultant.

.13 Dispose of unused asphalt material at official hazardous material collections site approved by Consultant.

.14 Divert unused gypsum materials from landfill to recycling facility as reviewed by Consultant.

.15 Fold up metal banding, flatten and place in designated area for recycling.

1.12 ENVIRONMENTAL REQUIREMENTS

.1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.

.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.4 Conduct moisture tests of concrete slabs prior to application to confirm subsurface is acceptable to membrane manufacturer.

1.13 WARRANTY

.1 Provide manufacturer's warranty stating that the membrane and membrane flashing will remain in a watertight condition and will not leak as a result of faulty materials for a period of 10 years from the date of substantial performance of the contract. The scope of the warranty shall include all material and labour to return the membrane to a weathertight condition.

.2 Contractor hereby warrants that modified bituminous roofing and membrane flashings will stay in place and remain leakproof in accordance with General Conditions (GC) - CCDC GC 12.3, but for two years from the date of substantial performance of the contract. Make all necessary repairs and replacements within 48 hours of receipt of written notification.

PART 2 - PRODUCTS

2.1 ADHESIVES

.1 Insulation Adhesive , two component, quick setting, low expansion foam urethane adhesive that can be applied in any temperature as specified by the manufacturer
.2 Acceptable Product; Duotack365 by Soprema.

2.4 INSULATION SUBSTRATE OVERLAY

.1 Bituminous Board,Semi rigid roofing support panelcomposed of mineral-reinforced asphaltic core between two asphalt saturated fiberglass liners. Length 1.2 m (3.9ft.) width of 1.5 m (4.92 ft) and thisckness of 3.2 mm(.12in)
.2 Acceptable product SopraBoard by Soprema.

2.5 VAPOUR RETARDER

.1 Self adhesive air/vapour barrier modified bitumen membrane composed of SBS modified bitumen. The top surface is a tri-laminated woven polyethylene. A silicone release film covers the self adhesive underface. Width of membrane 1140mm, water vapour permeability 0.016 perm.

.1 Acceptable Products: Sopravap'R by Soprema for steel decks and

2.6 MEMBRANE

.1 Base sheet: Sopralene Flam 180 from Soprema
- .1 Type 1, for exposed roofing applications.
- .2 Class C - plain surfaced.
- .3 Grade heavy duty service.
- .4 Top and bottom surfaces:
  - .1 polyethylene /polyethylene.
- .5 ULC certification: Class A.

.2 Cap sheet membrane: Sopralene Flam 250 GR
- .1 Type 1, for exposed roofing applications
- .2 Class A-granule surfaced.
  - .1 Colour for granular surface: White or light grey.
- .3 Grade heavy duty service.
- .4 Bottom surface polyethylene.
- .5 ULC certification: Class A.

.3 Roof Membrane Base Flashings:
- .1 Sopraflash/Flam Stick & Sopralene Flam250 GR HD GR or approved equal.
- .2 Heavy Duty
- .3 Thermofusible plastic film /top silicone plastic release film.

2.7 INSULATION

.1 Roof Insulation: Polyisocyanurate Insulation Boards: to ASTM C 1289-02 Type II, Class I, Grade 2 and CAN/ULC S 704, Type 3, Class 2 (See CCMC Evaluation Report 13058-L). Board Size: 1220mm x 2440mm, R value of 7.3 per 38mm 2 layers for a total thickness indicated on drawings.

.1 Insulation manufacturing shall utilizes an environmentally compliant blowing agent containing pentane hydrocarbon to enhance the thermal performance of the foam insulation. This hydrocarbon shall have zero ozone depletion potential and conform to the Montreal Protocol established in 1987.

..2 **Acceptable Product**: SOPRA-ISO 150 or as noted-R5.56/inch as Standard of Acceptance.

.2 Tapered Insulation: Polyisocyanurate Insulation Boards or rigid mineral wool as per Roof Insulation Boards, tapered to provide drainage slopes as indicated on drawings.

.3 Parapet Insulation:

.1 Polyisocyanurate Insulation Boards complete with a protection board mechanically fastened over the vertical insulation. as per Roof Insulation Board Size: 1220mm x 2440mm, 75mm thickness, R value of 16.4

.4 If alternative insulation is proposed for approval provide recover board as part of assembly to permit application of bituminous membrane roofing over such as Sopraboard -3.2mm insulation coverboard

2.8 SEALERS

.1 Plastic cement: asphalt, to CAN/CGSB-37.5.

.2 Sealing compound: to CAN/CGSB-37.29, rubber asphalt type.

.3 Sealants:. Caulking - see Section 07 92 00 - Joint Sealants.

2.9 WALKWAYS

.1 Walkways to consist of one additional ply of cap sheet membrane. Colour to be different from field membrane as selected by Consultant.

2.10 CARPENTRY

.1 Refer to Section 06 10 00 - Rough Carpentry.

PART 3 – EXECUTION

3.1 WORKMANSHIP

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual and Ontario Roofing Association Manual, particularly for fire safety precautions.

.2 Do priming for asphalt roofing in accordance with CGSB 37-GP-15M.

.3 The interface of the walls and roof steel deck assemblies will be fitted with durable rigid material plywood providing connection point for continuity of air barrier at roof chute enclosures.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

.1 Inspect with Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.2 Curbs have been built.

.3 Roof drains have been installed at proper elevations relative to finished roof surface.

.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Consultant.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 VAPOUR BARRIER

.1 Apply self adhering vapour barrier membrane to primed wood, steel and concrete surfaces as per manufacturer's instructions.

3.5 INSULATION

.1 Installation of Insulation

.1 Adhere insulation by using specified adhesive in continuous strips spaced as per CSA calculation for Wind Uplift.
.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
.3 Cut end boards to suit.

.2 Tapered insulation application:
.1 Install tapered insulation as top insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

3.8 BITUMINOUS BOARD

.1 Installation of Bituminous Boards:
.1 Adhere bituminous boards by using specified adhesive in continuous strips spaced as per CSA calculation for Wind Uplift.
.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
.3 Cut end boards to suit.

3.9 EXPOSED MEMBRANE ROOFING APPLICATION

.1 Base sheet application:
- .1 Starting at low point on roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
- .2 Unroll and torch base sheet onto bituminous board taking care not to burn membrane or its reinforcement.
- .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
- .4 Application to be free of blisters, fishmouths and wrinkles.
- .5 Do membrane application in accordance with manufacturer's recommendations.

.2 Cap sheet application:
- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
- .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
- .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
- .4 Application to be free of blisters, fishmouths and wrinkles.
- .5 Do membrane application in accordance with manufacturer's recommendations.

.3 Flashings:
- .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
- .2 Refer to manufacturers instructions for sequence and installation requirements specific to self adhesive or weldable base sheet on flashings and parapets.
- .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by torch welding.
- .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
- .5 Provide 75 mm minimum side lap and seal.
- .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
- .7 Do work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.

.6 Roof penetrations:
- .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.10 WALKWAYS

.1 Install contrast colour walkway membrane in accordance with manufacturer's instructions and as indicated.
- .1 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

3.11 FIELD QUALITY CONTROL

.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.

.2 Costs of tests will be paid by Owner.

3.12 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 04 21 13 – Brick Masonry
.3 Section 06 10 00 - Rough Carpentry
.4 Section 07 21 29.03 – Sprayed Insulation Polyurethane Foam
.5 Section 07 27 00 – Air Barriers
.3 Section 07 52 00 - Modified Bituminous Membrane Roofing

1.2 References

.1 The Aluminum Association Inc. (AA)
  .1 The Aluminum Sheet Metal Work in Building Construction-2000
  .2 AA DAF45-97, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials (ASTM International)

.3 Canadian Roofing Contractors Association (CRCA)
  .1 Roofing Specifications Manual 1997.

.4 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.5 Canadian Standards Association (CSA International)
  .1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
  .2 CSA B111-1974(R1998), Wire Nails, Spikes and Staples.

1.3 Samples

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, colour and finish.

1.4 Waste Management and Disposal

2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Ensure emptied containers are sealed and stored safely for disposal away from children.

.6 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.7 Unused paint and sealant material must be disposed of at an official hazardous material collections site as approved by Consultant.

.8 Unused paint and sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.9 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Prefinished Steel Sheet

.1 Prefinished steel with factory applied silicone modified polyester.
.1 Class F1S.
.2 Colour from standard colour range. Allow for a maximum of three (3) separate colours throughout.
.3 Specular gloss: 30 units +/- 5 in accordance with ASTM D 523.
.4 Coating thickness: not less than 25 micrometres.
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D 822 as follows:
.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

2.3 Accessories

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing:self adhesive membrane composed of SBS modified bitumene and a polyethylene woven complex c/w primer.
.1 Acceptable products: Sopraseal stick 1100 by Soprema or Blueskin SA by Bakor.

.4 Sealants: as per Section 07 92 00.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

2.4 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance

with applicable CRCA 'FL' series details and as indicated.

.2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 Metal Flashings

.1 Form flashings, copings and fascias to profiles indicated of 26 gauge, 0.457mm thick prefinished galvanized steel.

.1 Prefinished steel for parapet caps, window sills and upstand noted as **MFL** on drawings.

.1 **MFL-1:** Ideal Roofing 10,000 Series Kynar, 'Cordovan' QC-3643

2.6 Reglets and Cap Flashings

.1 Form recessed reglets sheet metal to be built-in concrete masonry work for base flashings as detailed in accordance with CRCA FL series details, Provide slotted fixing holes and steel/plastic washer fasteners. Cover face and ends with plastic tape.

PART 3 - EXECUTION

3.1 Installation

.1 Install sheet metal work in accordance with CRCA FL series details, and as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed.

.5 Lock end joints and caulk with sealant.

.6 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.7 Caulk flashing at reglet with sealant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 04 22 00 - Concrete Unit Masonry
.3 Section 05 41 00 - Structural Metal Stud Framing
.4 Section 07 21 13 - Board Insulation
.5 Section 07 21 16 - Blanket Insulation
.6 Section 07 21 19 – Foamed-in-Place Insulation
.7 Section 07 92 00 - Joint Sealants
.8 Section 08 44 13 - Glazed Aluminum Curtain Walls
.9 Section 09 21 16 - Gypsum Board Assemblies
.10 Section 09 22 16 - Non-structural Metal Framing

1.2 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

.2 Underwriter's Laboratories of Canada (ULC)
  .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

1.3 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: OBC Part 3.1.9.1.1b): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
  .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.1 Submit MSDS with VOC levels of materials as per 01 35 21.

.3 Shop Drawings:

.1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.

.2 Construction details should accurately reflect actual job conditions.

.4 Samples:

.1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.

.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company specializing in fire stopping installations with 5 years documented experience approved by manufacturer.

.2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance w.th Section 01 61 00 - Common Product Requirements
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN- ULC-S115 and not to exceed opening sizes for which they are intended.
.2 Fire stop system rating:to match rating of assembly at location of use.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC and OBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Fire stopping and smoke seals at perimeter of rated walls and floors: Elastomeric Seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.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 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install floor fire stopping before interior partition erections.

.3 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

.1 Inspections: notify Authority Having Jurisdiction and Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

.1 Fire stop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
.2 Edge of floor slabs at curtain wall.
.3 Top of fire-resistance rated masonry and gypsum board partitions.
.4 Intersection of fire-resistance rated masonry and gypsum board partitions.
.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
.6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
.7 Openings and sleeves installed for future use through fire separations.
.8 Around mechanical and electrical assemblies penetrating fire separations to be performed by each applicable trade.
.9 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials, preparation and application for caulking and sealants.

.2 Text to complete other various Sections containing sealant or caulking specifications.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
.3 Section 01 45 00 - Quality Control.
.4 Section 01 61 00 - Common Product Requirements.
.5 Section 04 05 00 - Common Work Results for Masonry
.6 Section 07 26 00 - Vapour Retarders
.7 Section 07 27 00 - Air Barriers
.8 Section 07 52 00 - Modified Bituminous Membrane Roofing
.9 Section 07 62 00 - Sheet Metal Flashing and Trim
.10 Section 08 11 00 - Metal Doors and Frames
.11 Section 08 11 16 - Aluminum Doors and Frames
.12 Section 08 44 13 - Glazed Aluminum Curtain Walls
.13 Section 08 80 50 - Glazing
.14 Section 09 21 16 - Gypsum Board Assemblies
.15 Section 09 22 16 - Non-structural Metal Framing

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM C 919-02, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 General Services Administration (GSA) - Federal Specifications (FS)
.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.6 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.4 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's product to describe.
.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
.1 Instructions to include installation instructions for each product used.

1.5 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joint s complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed.

.5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.5 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.6 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Consultant.

.7 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.8 Fold up metal banding, flatten, and place in designated area for recycling.

1.8 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:
.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding 4abeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work by use of approved portable supply and exhaust fans.

PART 2 – PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1: Silicones One Part.
.1 To CAN/CGSB-19.13, Type MCG-2-25-A-L.
.1 Acceptable material: Spectrum 2 by Tremco

.2 Type 2: Silicone Resistant One Part Mildew resistant:
.1 Acceptable material: Tremsil 200 by Tremco

.3 Type 3: Acrylic Latex One Part.
.1 To CAN/CGSB-19.17.
.2 Acceptable material: Tremflex 834 by Tremco

.4 Type 4: Acoustical Sealant.
.1 To ASTM C 919.
.2 Acceptable material: Acoustical Sealant by Tremco

.5 Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded open closed cell foam backer rod.
.2 Size: oversize 30 to 50 %.

.2 Neoprene or Butyl Rubber.
.1 Round solid rod, Shore A hardness 70.

.3 High Density Foam.
.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
.4 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): Sealant type: 1.

.2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Sealant type: 1.

.3 Expansion and control joints in exterior surfaces of precast panels: Sealant type: 1.

.4 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: 1.

.5 Coping joints and coping-to facade joints: Sealant type: 1

.6 Exterior joints in horizontal wearing surfaces (as itemized): Sealant type: 1.

.7 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: 1.

.8 Control and expansion joints on the interior of exterior poured-in

place concrete walls: Sealant type: 1.

.9 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: 1.

.10 Interior control and expansion joints in floor surfaces: Sealant type: 1.

.11 Perimeters of interior frames, as detailed and itemized: Sealant type: 1.

.12 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type: 1.

.13 Joints at tops of non-load bearing, non-rated masonry walls at the underside of poured concrete: Sealant type: 4

.14 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type:2.

.15 Exposed interior control joints in drywall: Sealant type: 3.

.16 Perimeter of all acoustically rated partitions and around penetrations through acoustically rated partitions: Sealant Type 4

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

PART 3 – EXECUTION

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing

compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 TESTING

.1 Perform an adhesive test of proposed joint sealant for all exterior applications to confirm surface prep, priming and sealant performance to manufacturer's specifications. Submit written test results to Consultant prior to proceeding with project work.

3.4 PRIMING

.1 Where necessary 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.

3.5 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.6 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.7 APPLICATION

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.
.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
.3 Apply primer to joints prior to caulking application.
.3 Apply sealant in continuous beads.
.4 Apply sealant using gun with proper size nozzle.
.5 Use sufficient pressure to fill voids and joints solid.
.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.
.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.
.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
.1 Clean adjacent surfaces immediately and leave Work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

END OF SECTION

ALF	Aluminum Frame
GS	Glazed Screen
GL-1	Single Glazed/Tempered or Laminated Safety Glass
GL-2/3	Insulated Glass Unit (See Section 08 80 50 & Window Elevations) (By Type)
GL-4	Acid-etched single glazed (See Window Elevation)
HMD	Hollow Metal Door
HMF	Hollow Metal Frame
PT	Paint
ST	Stain
WD	Wood Door
WF	Wood Frame
PD	Pocket Door Frame Heavy Duty Commercial Grade (KNC or better)

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 05 50 00 - Metal Fabrications.

.4 Section 06 10 00 - Rough Carpentry.

.5 Section 07 26 00 - Vapor Retarders.

.6 Section 07 92 00 - Joint Sealing.

.7 Section 08 44 13 - Glazed Aluminum Curtain Wall

.8 Section 08 71 00 - Door Hardware - General.

.9 Section 08 80 50 - Glazing

.10 Division 26 - Outlet Boxes, Conduit Boxes and Fittings.

.11 Division 26 - Conduits, Conduit Fastenings and Conduit Fittings.

.12 Division 26 - Wiring Devices.

.13 Division 26 - Wire and Box Connectors - 0-1000 V.

.14 Division 26: Electrical connections for security systems and sensors.

1.2 REFERENCES

.1 Aluminum Association (AA).
- .1 DAF 45-03, Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA).
- .1 AAMA 609-93, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 American Society for Testing and Materials International, (ASTM).
- .1 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB).
- .1 CGSB 1.40-97, Primer, Structural Steel, Oil Alkyd Type.
- .2 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.3 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 Canadian Standards Association (CSA International).
.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 National Fenestration Rating Council, NFRC 100-200,NFRC 200-2001,NFRC 500-2010.

1.3 SYSTEM DESCRIPTION

.1 Design Criteria.
.1 Design frames and doors in exterior walls to:
.1 Accommodate expansion and contraction within service temperature range of -35 to 75 degrees C.
.2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E 330 under wind load of 1.2 kpa submit certificate of tests performed.
.3 Movement within system.
.4 Movement between system and perimeter framing components or substrate.

.2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.

.3 Design door system to provide average thermal resistance of:
.1 Door system (excluding vision glass areas): RSI of 3.8.

.4 Provide continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

1.4 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for caulking materials during application and curing.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:
.1 Interior trim and exterior junctions with adjacent construction.
.2 Junctions between combination units.
.3 Elevations of units.
.4 Core thicknesses of components.
.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
.6 Location of caulking.
.7 Each type of door system including location.
.8 Arrangement of hardware and required clearances.

.3 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements are required for release of payment for work of this Section.

.3 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.
.2 Leave protective covering in place until final cleaning of building.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Construction Manager’s Construction/Demolition Waste Management And Disposal plan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Dispose of corrugated cardboard, polystyrene, plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

.4 Divert used metal cut-offs from landfill by disposal into the on-site metals recycling bin.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aluminum extrusions: Aluminum Association alloy AA 6063-T5 or T6 anodizing quality.

.2 Sheet aluminum: Aluminum Association alloy AA 1100 - H14 or AA 5005 - H32 or H34 anodizing quality.

.3 Steel reinforcement: to CAN/CSA-G40.20/G40.21, grade 300 W.

.4 Fasteners: stainless steel, finished to match adjacent material.

.5 Weatherstrip: replaceable mohair backed wool pile.

.6 Door bumpers: black neoprene.

.7 Door bottom seal: adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, surface mounted with drip cap, closed ends,.

.8 Isolation coating: alkali resistant bituminous paint.

.9 Glazing materials: as per Section 08 80 52.

.10 Sealants: as per Section 07 92 00 colour selected by Consultant .

2.2 ALUMINUM DOORS

.1 Construct doors of porthole extrusions with minimum wall thickness of 2.4 mm minimum and 45 mm wide.

.2 Door stiles nominal 145 mm wide plus or minus 6 mm.

.3 Top rail nominal 145 mm wide plus or minus 6 mm.

.4 Bottom rail nominal 178 mm or 254 mm wide plus or minus 6 mm.

.5 Mid rail nominal 127mm wide plus or minus 6mm where noted on specific doors.

.6 Reinforce mechanically-joined corners of doors to produce sturdy door unit.

.7 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.

.8 Provide thermally broken doors for exterior.

.9 Hardware:as per Hardware Schedule.

.10 Acceptable Products:
- .1 Kawneer 560 Insulclad Exterior/500 Interior
- .2 Alumicor 600A Insuldoor Exterior/600 Interior
- .3 Alumico 5020 Exterior / 5000 Interior
- .4 **Provide a certified U value of .70 (i-P) or U=3.97(SI) Maximum SHGC .40 for all exterior doors as per OBC SB-10**

.11 Corners:
1. As per manufacturers details for heavy duty use cycles

.12 Welding of Joints: Not permitted.

.13 Finish
1. Anodized Aluminum: Smooth finish

2.3 ALUMINUM FRAMES

.1 Exterior framing to be Curtainwall Framing as per Section 08 44 13 or alternate window framing as specified under Section 08 50 00. All frame construction to incorporate thermally broken details to perimeter of all door and frame openings noted on drawings.

.2 Interior framing at vestibules to be aluminum extrusions with minimum wall thickness of 2mm noted as Frame Type II on drawings..
- .1 Frame members 44mmx 115mm nominal size for flush glazing.
- .2 Acceptable products: to match framing system following model.
  - .1 Kawneer Trifab VG 450
  - .2 Alumicor 800 Series
  - .3 Alumico 4500 Series

2.4 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
- .1 Clear anodic finish: designation AA-M12C22A41

.2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1.

2.5 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with zinc coating to CSA G164.

2.6 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm bite for insulating glazed units.

.3 Provide structural steel reinforcement as required.

.4 Fit joints tightly and secure mechanically.

.5 Conceal fastenings.

.6 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Door Hardware - General.

.7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.2 Anchor securely.

.3 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.4 Adjust operable parts for correct function.

.5 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

.1 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.

3.4 CAULKING

.1 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

.2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Consultant.

3.5 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work at stages listed:
.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.

.4 Obtain reports within three days of review and submit.

3.6 CLEANING

.1 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Clean aluminum with damp rag and approved non-abrasive cleaner.

.4 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.5 Clean glass and glazing materials with approved non-abrasive cleaner.

.6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1	Submittal Procedures:	Section 01 33 00
.2	Closeout Procedures:	Section 01 77 00
.3	Finished Carpentry Installation of Wood doors and Hardware	Section 06 20 00
.4	Pressed Steel Frames:	Section 08 11 00
.5	Supply of Finish Hardware:	Section 08 71 00
.6	Glazing:	Section 08 80 50
.7	Painting:	Section 09 91 23

1.2 REFERENCES

.1 Read and be governed by Definitions, Conditions of the Contract and Amendments or supplements thereto and Division

.2 CSA 0115-M1982 Hardwood and Decorative Plywood.

.3 CAN/CSA 0132.2 Series-90 Wood Flush Doors.

.4 Quality Standards for Architectural Woodwork, Architectural Woodwork Manufacturers Association of Canada (AWMAC) 1991.

.5 National Fire Protection Association (NFPA):
- .1 NFPA 80 – 1999 Fire Doors and Windows
- .2 NFPA 252-1999. Door Assemblies

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit one 300 x 300mm corner sample of each type of wood door.

.3 Show door construction, core, glazing detail and faces.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Indicate door types and cutouts for lights and louvres.

1.5 PROTECTION

.1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.

.2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.

.3 Protect doors from scratches, handling marks and other damage.

.

1.6 REGULATORY REQUIREMENTS

.1 Wood Fire Rated Doors: Labelled and listed by an organization accredited by Standards Council of Canada.

1.7 WARRANTY

.1 The warranty period stated in GC 12.3 Warranty and Relevant Supplementary Conditions, is, with respect to this section of work, extended from one year to three. Provide a written guarantee in the form specified in Section 01740.

.2 Warranty shall specifically guarantee the wood doors against warpage, twist, showing core lines, splitting, delaminating and sag.

PART 2 - PRODUCTS

2.1 WOOD FLUSH

.1 Solid Core Flush Doors: To CAN/CSA-0132.2.

.1 Construction Non-Rated Doors: Solid Eastern White Pine or Western Red Cedar or MDF with no added urea-formaldehyde conforming to CAN3-0188.1 Grade R FSC Certified.

.2 Construction Rated Doors: Mineral Core Hardwood/Hardboard Door and frame rated to suit Door Schedule and OBC. 45 minutes minimum. Face veneer to match 2.1.1.4 as noted.

.3 Solid blocking adequate for fastening of hardware specified. Provide 19mm solid maple trim at jambs of door for stain finish to match face.

.4 Face Panel: Quarter Cut, Grade A, Book or Pair Match Clear #1 Ash species.

.5 Adhesive: CSA 0132.2 Type III, containing no added urea-formaldehyde..

.6 45mm (1-3/4") thickness.

.2 Sealers: Interior alkyd primer-sealer, CGSB 1-GP84M, for paint finish, Varnish to CGSB 1-GP36M type 1 for stained or varnished finish. .

.3 Hardwood Plywood: CSA O115, type II, natural edged grain, free of added urea-formaldehyde.

2.2 FABRICATION

.1 Construct doors and use materials conforming to CAN/CSA 0132.3 and AWMAC..

.2 Provide minimum 19mm thick vertical hardwood maple edge strips.

.3 Prepare doors for glazing. Stops to match face veneer. Mitre corners of stops.

.4 Bevel vertical edges of single acting doors 3mm in 50mm on lock side and 1.5mm in 50mm on hinge side.

.5 Provide solid stiles and rails for adequate fastening of hardware specified.

.6 Radius vertical edges of double acting doors to 60mm radius.

.7 Undercut doors where indicated.

.8 Provide shiplap flush detail at transoms and door/frame locations as noted in Door Schedule.

.9 Factory seal top and bottom of doors.

.10 Finish wood veneer smooth and flush with stile edges of door and bevel at approximately 20 degrees.

.11 Provide solid wood finish to match door face at all visible cut outs.

.12 All doors to be factory pre-machined for specified finishing hardware.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Uncrate doors and seal faces of doors and all edges and of cut-outs to CAN/CSA 0132.2, Series Appendix A.

.2 Install doors and hardware in accordance with manufacturer's printed instructions, and CAN/CSA-0132.2 Series, Appendix "A".

.3 Adjust hardware for correct function.

.4 Install stops.

.5 Secure transom panels by means of concealed fasteners.

.6 Ensure clearances on doors in fire separations do not exceed 6mm at bottom and 3mm at sides and top.

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 REQUIREMENTS

.1 Section 01 33 00 - Submittals
.2 Section 01 61 00 – Common Product Requirements
.3 Section 01 74 11 - Cleaning
.4 Section 01 77 00 – Closeout Procedures
.5 Section 04 05 00 – Common Work Results for Masonry
.6 Section 09 21 16 – Gypsum Board Assemblies
.7 Section 09 30 13 – Ceramic Tile
.8 Section 09 65 16 – Resilient Sheet Flooring
.9 Section 09 65 19 – Resilient Tile Flooring
.10 Section 09 68 13 – Tile Carpeting

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures. Submit electronically.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit 1 of each type of hand entry access door, if requested.
.4 Submit one 300 x 300 mm corner sample of each type of body entry door.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals. Submit electronically.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of stainless steel finishes for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect access doors from nicks, scratches, and blemishes.
.3 Apply temporary protective coating to finished surfaces. Remove coating after installation.
.1 Use coatings in accordance with manufacturer's written instructions that are easily removable.
.2 Leave protective coating in place until final cleaning of building.
.4 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 ACCESS DOORS

.1 Sizes: as follows unless indicated:
.1 For body entry: 600 x 600 mm minimum.
.2 For hand entry: 300 x 300 mm minimum.

.2 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.

.3 Materials:
.1 Tiled, acoustic or carpet surfaces: stainless steel with brushed satin.
.2 Other areas: prime coated steel.
.3 Provide recess type where finishes can match wall floor or ceiling finishes.

2.2 EXCLUSIONS

.1 Lay-in tile ceilings: use unobtrusive identification locators.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.
.1 Tiled surfaces: in accordance with Section 09 30 13 - Ceramic Tiling 09 30 15 - Quarry and Paver Tiling.
.2 Install masonry surfaces: in accordance with Section 04 05 00 - Common Work Results for Masonry.
.3 Install gypsum board surfaces: in accordance with Section 09 21 16 - Gypsum Board Assemblies.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

PART 1 – GENERAL

See Section 08 50 00 – Windows for alternate system to be tendered as a separate price to this section.

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 01 61 00 - Common Product Requirements
.3 Section 01 78 00 - Closeout Submittals
.4 Section 05 50 00 - Metal Fabrications
.5 Section 07 21 13 – Board Insulation
.5 Section 07 21 19 – Foamed in Place Insulation
.6 Section 07 27 00 – Air Barriers
.7 Section 07 92 00 - Joint Sealants
.8 Section 08 11 16 - Aluminum Doors and Frames
.9 Section 08 50 00 - Windows
.10 Section 08 80 50 - Glazing
.11 Section 09 21 16 – Gypsum Board Assemblies
.12 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)
.1 AAMA CW-10-04, Care and Handling of Architectural Aluminum From Shop to Site.
.2 AAMA T1R-A1-04, Sound Control for Fenestration Products.
.3 AAMA 501-05, Methods of Test for Exterior Walls.
.4 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.

.3 ASTM International
.1 ASTM A 36/A 36M-08, Specification for Carbon Structural Steel.
.2 ASTM A 123/A 123M-09, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.3 ASTM A 653/A 653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.4 ASTM B 209-07, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
.5 ASTM B 221-08, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
.6 ASTM E 283-04, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.7 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.
.8 ASTM E 331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
.9 ASTM E 413-04, Classification for Rating Sound Insulation.
.10 ASTM E 1105-00(2008), Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.
.2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 CSA International
.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.
.3 CAN/CSA-S157/S157.1-05, Strength Design in Aluminum/Commentary on CAN/CSA-S157, Strength Design in Aluminum.
.4 CSA W59.2-M1991(R2008), Welded Aluminum Construction.

.6 OBC - Ontario Building Code/Part 4/Paragraph 4.1.5.17 Walls Acting As Guards. All glazing systems to comply to lateral loading. Provide Engineer's certificate.

.7 National Fenestration Rating Council, NFRC 100-200,NFRC 200-2001,NFRC 500-2010.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: co-ordinate work of this Section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, and components or materials.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.

.3 Shop Drawings:

.1 **Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada**.

.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

.3 Frame sizes are noted as nominal. Confirm sizes as adequate to suit specific manufacturer cross section and wind wind load charts. Provide required internal reinforcinhg as required to maintain maximum frame depth as noted on drawings and details.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit 1 sample 300 x 400 mm in size illustrating prefinished aluminum surface,(**exterior pressure cap to match colour as found**) finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.

.5 Delegated Design Submittals:

.1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.

.6 Test Reports:

.1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

.2 **Signed and dated certification from the window manufacturer is required for release of payment for work of this Section**

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Conform to applicable code for acoustic attenuation, sound transmission, requirements.

.2 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Supply mock-up including intermediate mullion, corner mullion, sill muntin, column cover, vision glass light, and insulated infill panel glass and assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
.3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with work.
.4 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
.5 Mock-up may remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Handle work of this Section in accordance with AAMA CW-10.
.2 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.
.4 Protect prefinished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
.5 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

1.8 AMBIENT CONDITIONS

.1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.

.2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.9 WARRANTY

.1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified in accordance with CCDC 2, but for 60 months.

PART 2 - PRODUCTS

2.1 SYSTEMS

.1 Description:

.1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with self supporting framing, shop fabricated, factory prefinished, vision glass, spandrel infill, related flashings, anchorage and attachment devices.

.2 Assembled system to permit re-glazing of individual glass (and infill panel) units from exterior without requiring removal of structural mullion sections.

.2 Performance Requirements:

.1 Design and size all components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with OBC to a design pressure for Ottawa, Ontario.

.2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.

.3 Limit mullion deflection to L/240 with full recovery of glazing materials.

.4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.

.5 Ensure system is designed to accommodate the following without damage to components or deterioration of seals:

.1 Movement within system.

.2 Movement between system and perimeter framing components.

.3 Dynamic loading and release of loads.
.4 Deflection of structural support framing.
.5 Shortening of building concrete structural columns.
.6 Creep of concrete structural members.
.7 Mid-span slab edge deflection of 10 mm.

.6 Sound attenuation through wall system (exterior to interior): STC 50, measured to AAMA T1R - A1.
.7 Limit air infiltration through assembly to 0.0003 m^3 /s/m^2 of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501.
.8 Provide U=.38(i-P) or U=2.15 (SI) with SHGC =.40 max. and VT min 1.10 for all curtain wall sections as per SB-10/Ontario Building Code. Refer to 1.4.6.2 for submission requirements.
.9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure.
.10 Water leakage: none, when measured to ASTM E 1105.
.11 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12 hour period without causing detrimental affect to system components.
.12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
.13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
.1 Position thermal insulation on exterior surface of air barrier and vapour retarder.
.14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.
.15 Reinforce curtain wall system to accommodate window washing guide rails.
.1 Supply sufficiently rigid anchors to resist loads caused by equipment platform, without damage to wall system.

2.2 MATERIALS

.1 Extruded aluminum: to ASTM B 221.

.2 Sheet aluminum: to ASTM B 209.

.3 Sheet steel: to CSA-S136M ASTM A653/A 653M; galvanized in accordance with CAN/CSA G164.

.4 Steel sections: to CSA G40.20/G40.21 shaped to suit mullion sections.

.5 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.6 Fasteners: stainless steel, finish to match curtain wall.

.7 Bituminous paint: CAN/CGSB 1.108, Type 1, without thinner.

.8 Vertical glass units: Refer to 08 80 50 Glazing and architectural elevations for glass type and location.

.9 Fire Safety Materials: see Section 07 84 00 - Fire Stopping.

.10 Sealant:
.1 Perimeter sealant: Refer to Section 07 92 10
.2 Sealant used within system (not used for Glazing): Type silicone as recommended by the manufacturer.

2.3 COMPONENTS

.1 Mullion profile: **match as found colour with Duranar finish on exterior pressure caps**
.1 Vertical members: 50.8 x 127 mm nominal dimension to suit heights shown. Pressure plate and cap.
.2 Horizontal members: 50.8 x 127 mm nominal dimension to suit spans shown.
.3 Thermally broken with interior tubular section insulated from exterior pressure plate.
.4 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass and infill panels.
.5 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.
.6 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

.2 Reinforced mullion:50.8 x 127 mm profile of extruded sheet aluminum cladding with internal reinforcement of shaped steel structural section.

.1 Acceptable Products:
.1 Alumico 6200HP
.2 Alumicor 2200
.3 Kawneer 1602

.3 Flashings: 1.5 mm thick galvanized metal, PPG Duranar finish to match existing curtain wall mullion sections where exposed, secured with concealed fastening method. Provide matching end dams at all sills. Fabricate to match coursing.

.4 Operable sash: top hinge open out awning to suit curtainwall application. Alumicor Phantom Vent or equal as offered by alternative approved manufacturers Operable sash to conform to overall performance requirements listed under Part 2.1. Complete with hardware to suit vent sizes indicated on drawings.

.1 One pair stainless steel friction arms
.2 Double arm roto-operator
.3 Two locking-claw handles
.4 Insect screen

.5 Accepable Products:
.1 Alumico 8500ti
.2 Alumicor Phantom-vent *standard of acceptance
.3 Kawneer Glass Vent

.5 Vapour retarder: specified in Section 07 26 00 - Vapour Retarders

.6 Air barrier: specified in Section 07 27 00 - Air Barriers - Descriptive or Proprietary.

2.4 FABRICATION

.1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof

.3 Prepare components to receive anchor devices. Install anchors.

.4 Arrange fasteners and attachments to ensure concealment from view.

.5 Prepare system components to receive exterior doors, and hardware specified in Section 08 71 10 Door and Hardware Schedule.

.6 Reinforce framing members for external imposed loads.

.7 Visible manufacturer's identification labels not permitted.

.8 Finishes:

.1 Finish coatings: conform to AAMA 611

.2 Except as noted in Item 2.4.8.4 below, exterior exposed aluminum surfaces: to AA A41 A42 A43 A44 anodized to 215-R1, 4 mm thickness, prepared with a mechanical M chemical C pre-treatment, anodized to clear colour.

.3 Interior exposed aluminum surfaces: to AA A41 anodized to 215-R1, .4 mm thickness, prepared with a chemical C pretreatment, anodized to clear colour.
.4 All exposed exterior faces of aluminum frames to receive PPG Duranar coating. **Match existing aluminum frames and provide samples to include one shade lighter and darker for approval.**
.5 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
.6 Concealed steel items: galvanized in accordance with ASTM A 123 to 600 gm/m².
.7 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.5 SOURCE QUALITY CONTROL

.1 Perform work in accordance with AAMA CW-DG-1-96, A AMA CWG-1-89.Maintain 1 copy on site.

.2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 5 years documented experience.

.3 Installer qualifications: company specializing in performing the work of this section with minimum 10 years documented experience approved by manufacturer.

.4 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Ontario.

.5 Perform welding Work in accordance with CSA W59.2.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Verify dimensions, tolerances, and method of attachment with other work.
.3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
.4 Inform Consultant of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install curtain wall system in accordance with manufacturer's instructions.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.5 Use thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Co-ordinate installation of fire stop insulation, specified in Section 07 84 00 - Fire Stopping, at each floor slab edge and intersection with vertical construction where indicated.

.8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.10 Install fire-safing in areas as indicated.

.11 Install operating sash in accordance with Section 08 80 50 - Glazing, to glazing method required to achieve performance criteria.

.12 Install glass and infill panels in accordance with Section 08 80 50 - Glazing, to glazing method required to achieve performance criteria exterior wet/dry method of glazing. Place sealant on the up-slope side of the pressure plate cover caps; finish the surface with a slope to encourage drainage over the cap Cover caps to conceal screws and ensure continuous sightline.

.13 Install perimeter sealant, backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealants.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

.1 Inspection by independent testing agency will monitor quality of installation and glazing.

.1 Test system to: ASTM E 1105, and AAMA 501.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer of curtain wall and or glass verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.

.2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Ensure manufacturer's representative of curtain wall and of glass is present before and during critical periods of installation. *Failure to comply will result in retention of funds related to this trades work. Funds will be retained for a period of one (1) year to ensure installation is weather tight through 4 seasons.*

.4 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.5 ADJUSTING

.1 Adjust operating sash for smooth operation.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Remove protective material from prefinished aluminum surfaces.

.3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

.5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Section 08 11 16 Aluminum Doors and Frames

.2 Section 08 14 16 Flush Wood Doors

.3 Section 26 00 00 Electrical

1.2 SCOPE

.1 Supply all materials as listed complete with all fastenings necessary to complete the work to the intent of this section.

1.3 WORK INCLUDED

.1 When preparing the Door Hardware schedule to submit for shop drawing approval, it is the Door Hardware Supplier's responsibility to review specifications and drawings, confirming quantities and detailing, reporting any errors and/or omissions to the Architect. "Extras" will not be considered nor accepted for necessary changes as a result of the Door Hardware Supplier's failure to review the specifications and drawings. Consultant's review of the Door Hardware schedule will not be construed as certifying that the list is complete. Acceptance of the Door Hardware schedule does not relieve the Door Hardware Supplier of responsibility of errors or omissions

.2 "Extras" will be invoiced at no more than 30% off Manufacturer's current list price.
"Credits" will be issued at no less than 70% off Manufacturer's current list price.

.3 Submit six (6) copies of a typewritten Finishing Hardware schedule complete with catalogue cuts for approval by the Architect and the Hardware Consultant prior to the ordering of any materials.

.4 Clearly identify hardware listed by manufacturers name, product catalogue number and finish.

.5 If requested, submit samples of each type of hardware listed in the Finishing Hardware schedule.

.6 Upon receipt of reviewed schedule, issue six (6) copies to the General Contractor for the various subtrades.

.7 Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.8 It shall be clearly understood that within the terms of this Subcontract, the Hardware Supplier is bound not just as a supplier, but as a Subcontractor and is responsible for the supply of Project services relative to project co-ordination, supervision and inspection.

.9 No claims for extra money will be entertained if such claims are from lack of co-ordination between the Hardware Subcontractor and any other Subcontractor. Ensure that Work of other Subcontractors, as it proceeds, will accommodate the installation of hardware.

.10 Attend site meetings as requested by the Contractor.

1.4 TEMPLATES

.1 When requested, issue all necessary templates and instructions to the door and frame supplier.

1.5 KEYING

.1 Prepare a detailed keying schedule in co-operation with and to approval of Architect.

.2 All locks shall be keyed into existing Corbin keying system as follows:
- construction master keyed
- master keyed
- keyed alike or different as required.

.3 Supply (6) construction master keys
Supply (2) change keys per cylinder except where noted.

.4 Supply (3) change keys for each keyed alike group of temporary construction use cylinders.

.5 With the exception of the construction master keys, which are to be given to the Contractor, all permanent keys are to be delivered directly to the City of Ottawa project manager.

.6 The Contractor is responsible for providing cylinders as required for his own use during the period of construction.

1.6 PACKAGING AND STORAGE

.1 All Finishing Hardware shall be delivered to the site in manufacturer's original boxes. Each package to be clearly marked with the item definition and location.

.2 The Door Hardware Supplier shall assist the Contractor in receiving and laying out all hardware on shelving in a locked, clean dry room provided by the Contractor.

1.7 FASTENINGS

.1 All hardware is to be installed using manufactures' supplied fasteners. Failure to comply may void warranties and applicable licensed labels.

.2 Self tapping/tek screws used for installation of butt hinges, locksets, exit devices and door closers **will not be acceptable** on this project.

.3 Supply screws, bolts, expansion shields and other fastening devices required for proper installation and operation of hardware.

.4 Exposed fastening devices to match finish of hardware.

.5 Kick plates shall be supplied with self adhesive tape.

1.8 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association, or an indicated for special conditions.

.2 Only tradesmen competent in the installation of Finishing Hardware shall be used for this purpose. Qualification would require a minimum (5) years experience in commercial application. The installer shall adjust, clean and make good all installation of Finishing Hardware to the satisfactio of the Architect and Hardware Consultant.

.3 The Contractor is responsible for ensuring the door preps for cylinder holes are where required and are aligned properly with mortise locks. The Contractor is to use his own "try- out" cylinders prior to the installation of the permanent cylinders. Any holes found to be misaligned will be rectified by the Contractor.

.4 Section 26 (Electrical) to provide backboxes, conduits c/w pull wires and power supply for all access control systems and related hardware.

.5 The Door Hardware Supplier is responsible for the installation of the door operators and all related hardware. An AAADM certified technician to be approved by the Manufacturer a having the qualifications to ensure the proper operation of all components related to the opener systems.

.6 Kick plates are to be installed 6.35mm maximum up from the bottom edge of door push side. On single doors install in the centre of the door equally spaced to clear between the frame jamb stops.

.7 Contractor to ensure walls are properly blocked to prevent future damage wherever surface mounted hardware i.e. wall stops are to be used.

1.9 INSPECTIONS

.1 The Door Hardware Supplier shall make periodic site inspections during installation of hardware to ensure that all hardware supplied is being applied in accordance with specifications, details and Architect's directions. Inform the Contractor and the Architect in writing of such inspections, Pointing out errors, omissions, etc.; so that same may be corrected.

.2 The Door Hardware Supplier will contact product representatives (locksets, exit device and door closers/auto door openers) who will also make inspections during construction to ensure the proper installation and adjustment of their products. Final inspection to be carried out by the Door Hardware Supplier and Product Representative. Representative to provide written certification that hardware has been installed and adjusted as intended.

.3 The first inspection listed above by the Door Hardware Supplier and product representative shall occur and be submitted within 5 working days of the hardware installation reaching 25% completion. The Consultant will review the submitted inspection report and perform a sampling review of the completed installations to assess if the work to date is in compliance with the Contract requirements. The Contractor shall make all required adjustments to the installed hardware as per the findings of the Consultant and ensure all future installations and reports comply with these findings.

.4 Subsequent inspections and reports shall be completed and submitted by the Contractor at the 50%, 75% and 100% stages of the door hardware installations.

.5 NO PAYMENTS SHALL BE CERTIFIED FOR DOOR HARDWARE INSTALLATIONS UNTIL THE FINAL INSPECTION REPORT HAS BEEN SUBMITTED BY THE CONTRACTOR AT THE END OFTHE PROJECT AND ACCEPTED BY THE CONSULTANT.

1.10 WARRANTY

.1 All hardware supplied under the approved hardware schedule will be guaranteed for a period of one (1) year after final acceptance of the project. Door closers will be guaranteed for thirty (30) years. Door openers to be warrantied for a period of two (2) years.

1.11 FINISHES

Hinges	628	clear anodized
	652	satin chromium plated on steel
Locksets	626	satin chromium plated
Cylinders	626	satin chromium plated
Exit Devices	626	chromium, dull
Door Closers	689	powder coat aluminum
	SRI	special rust inhibitor
Door Openers	CLR ANO	clear anodized aluminum
Kick Plates	630	stainless steel, satin
O/H Stops/Holders	630	stainless steel, satin
Wall & Floor Stops	626	satin chromium
Door Sweep	AL	clear anodized aluminum

1.12 ABBREVIATIONS

ALD	aluminum door
T.B. ALD	thermally broken aluminum door
ALF	aluminum frame
T.B. ALF	thermally broken aluminum frame
SCWD	solid core wood door
LH	left hand
RH	right hand
LHR	left hand reverse
RHR	right hand reverse
HR/FR	hour/fire rated
T.B.	thermally broken (threshold)

2 Products and Acceptable Manufacturers

2.1 BUTTS AND HINGES

.1 To ANSI/BHMA A156.1

.2 Supply 1-1/2 pair per door leaf for doors up to 2235mm in height. Supply one additional hinge for each additional 762mm of height or faction thereof. Doors, 45mm thickness, up to 914mm in width, supply 114mm high hinges; over 914mm to 1220mm, supply 127mm high hinges.

.3 RC - radius corners for aluminum frames. Confirm requirement with frame supplier.
NRP - Non Removable Pin feature on all out-swing doors.

.4 Hinges listed are by Hager.
Stanley equivalents are acceptable.

.5

Hager	Stanley
BB1279	FBB179

2.2 CONTINUOUS HINGES

.1 To ANSI/BHMA A156.26

.2 Continuous hinges shall be full mortise, heavy duty, no inset, minimum thirty-two thrust bearings, staggered screw holes. Length to match door height. 12.7mm of door heel exposure is acceptable and recommended to be sure the moving hinge leaf does not extend below the door.

.3 Roton continuous hinges 780 series 112 HD and 224 HD series listed.
Equivalent continuous hinges SL11 HD and SL 24 HD by Select are acceptable alternates.

2.3 MORTISE LOCKS AND LATCHES

.1 To ANSI/BHMA A156.13

.2 Corbin heavy duty mortise “ML” 2000 series. Lustra lever design & rose (57mm diameter) to match existing. No alternates.

.3 Provide dust boxes behind all ANSI strikes.

.4 Functions as listed.

.5 Provide lockset and latchset strike plates with lip centre dimensions sized to minimally clear trim. Where strike lip extends beyond the projection of the casing or other trim, provide curved lip strikes. Provide dust boxes behind all strikes.

2.4 BORED AND PREASSEMBLED LOCKS AND LATCHES

.1 To ANSI/BHMA A156.2

.2 Schlage heavy duty cylindrical “ND” series. Tubular (TLR) lever design.

2.5 CYLINDERS

.1 To ANSI/BHMA A156.5

.2 Interior door locks are to have Corbin cylinders supplied under this Contract.

2.6 EXIT DEVICES

.1 To ANSI/BHMA A156.3

.2 Von Duprin "98" series flat bar type as specified. No substitution.

2.7 DOOR CLOSERS

.1 To ANSI/BHMA A156.4

.2 Full rack and pinion hydraulic action. Cast iron cylinder body. Heavy duty. Non-sized fully adjustable spring power and back check. Full plastic moulded cover.

.3 Provide adapter plates as required for proper installation of door closers.

.4 REG – regular arm
EDA - extra duty arm
DEL - delayed action

.5 LCN 4040XP and 4041 series. No substitution.

2.8 DOOR OPENERS

.1 To ANSI/BHMA A156.19

.2 Automatic swing door opener c/w electronic digital control board with adjustable opening, full cast aluminum gear body, back check, closing speed and time delay, interface relay for electrified hardware e.g. electric electric strikes, where required, on/off and hold open switch, built-in adjustable stop. Opener to function as a manual door closer in the direction of swing with or without electrical power. Opener has a one-way clutch in the gear train to facilitate easy manual operation of door and to prolong gear and motor life. Recessed circular 1.52mm diameter wall actuators engraved with HDCP logo. Opener to be installed in an aluminum extruded housing with structurally integrated end caps. Full length (flush with outside of jambs). Provide low profile housing where specified. Full length removable cover.

.3 Openers as listed are by Hunter Automatics Inc..

2.9 KICK PLATES

.1 To ANSI/BHMA A156.6

.2 To be drilled and countersunk, .050 (1.27mm) thickness. Stainless steel. Type 304. Height as noted x length to suit.

Standard Metal	Gallery	C.B.H.	Hager
K10A	80A	901/903	190S csk

2.10 O/H STOPS & HOLDERS

.1 To ANSI/BHMA A156.8

.2 Glynn-Johnson heavy duty concealed 100 series and surface 90 series. No substitution.

.3 All listed degrees of hold open should be reviewed and confirmed before preparation and/or installation.

2.11 FLOOR & WALL STOPS

.1 To ANSI/BHMA A156.16

.2 Cast brass or bronze material except where specified zinc die cast.

.3 Rear portion of heavy duty one piece cast floor stops shall have a stud to prevent rotation. Rise to suit door undercut.

.4 Wall stops shall have a metal back plate secured to wall with (2) screws and shields. Housing and rubber insert fits over back plate and is secured with inconspicuous allen set screw on side of housing. No screws or holes shall be visible on face of bumper.

.5 Wall stops listed are by Standard Metal Hardware Manufacturing Ltd.. CBH equivalents are acceptable.

Standard Metal	C.B.H.
S101	102
S120	120

2.12 DOOR SWEEP

.1 To ANSI/BHMA A156.22

.2 K.N. Crowder as specified to match standards of acceptance.
No alternates.

.3 Product # W-24S, aluminum extrusion c/w black nylon bristles.

2.13 SLIDING AND FOLDING HARDWARE

.1 To ANSI/BHMA A156.14

.2 Extruded aluminum track, 6063T5 alloy. Complete with hangers, ball bearing nylon tire wheels, floor guides and bumpers as required. K.N. Crowder product as listed.

2.14 REQUIREMENTS

.1 Use hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 The following is a list of hardware to be used to define required standards on this project. Acceptable alternates as listed. Additional alternates subject to review and written acceptance prior to submission, within the allotted time period, of the Tender closing. Substitutions without prior approval will not be accepted in the shop drawing submission.

.3 Hardware schedule as follows:

GROUND FLOOR

ITEM #1 1 SGLE DOOR 217.1 — CORRIDOR 216A TO MEETING 217A — LH
965 x 2135 x 45 — SCWD/ALF
TYPE WD-1/ALF-217.1

1	EA	CONT. HINGE	780-224 HD	628
1	EA	LOCKSET	ML2057 x LUSTRA x LESS STRIKE	626
1	EA	DOOR CLOSER	4041 REG LPA DEL	689
1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
1	EA	WALL STOP	S120	626

SECURITY SYSTEM SUPPLIED BY SECURITY CONTRACTOR
INCLUDES : CARD READER, ELECTRIC STRIKE (HES 1006) & ALL RELATED HARDWARE.

ITEM #2 1 SGLE DOOR 217.2 — MEETING 217A / OFFICE 217B
1067 x 2135 x 45 — SCWD/WDF
TYPE WD-5/WF-217.2 — POCKET DOOR

1	SET	TRACK	C-411 SERIES – 1 DOOR x L.T.S. c/w ALL RELATED HARDWARE				
		KIT INCLUDES:	(1)	LEN	TRACK	C–411 x L.T.S.	
			(2)	EA	HANGER	C-411	
			(1)	EA	STOP & CATCH	CDC-411	
			(1)	LEN	GUIDE CHANNEL	C-914 x L.T.S. RECESSED INTO BOTTOM OF DOOR	
			NOTE: NOT VISIBLE ON ENDS OF DOOR				
			(1)	EA	DOOR GUIDE	C-913	
1	EA	DOOR GUIDE	KNC SPECIAL POCKET DOOR GUIDE (CONFIRM DOOR THICKNESS) FASTEN TO BOTTOM OF POCKET OPENING				
1	EA	DOOR LOCK	C-90L c/w STRIKE & BOX				626
1	EA	FLUSH PULL	C-90C c/w CYLINDER HOLE				626
1	EA	CYLINDER	1000 CONFIRM LENGTH & CAM REQUIREMENT				626
1	EA	FLUSH PULL	C-90T c/w THUMB TURN				626

ITEM #3	1 SGLE DOOR 217.3		MEETING 217A TO OFFICE 217C		LH
	965 x 2135 x 45		SCWD/ALF		
	TYPE WD-1/ALF-217.3				
	3	EA	HINGE	RCBB1279 127 x 101mm	652
				CONFIRM RADIUS REQUIREMENT FOR FRAME	
	1	EA	LOCKSET	ML2055 x LUSTRA c/w ANSI STRIKE/BOX	626
	1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
	1	EA	WALL STOP	S120	626
ITEM #4	1 SGLE DOOR 217.4		MEETING 217A TO OFFICE 217D		LH
	965 x 2135 x 45		SCWD/ALF		
	TYPE WD-1/ALF-217.4				
	3	EA	HINGE	RCBB1279 127 x 101mm	652
				CONFIRM RADIUS REQUIREMENT FOR FRAME	
	1	EA	LOCKSET	ML2055 x LUSTRA c/w ANSI STRIKE/BOX	626
	1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
	1	EA	WALL STOP	S120	626
ITEM #5	1 SGLE DOOR 218.1		LOBBY 216B TO WC 218		LH
	965 x 2135 x 45		SCWD/ALF		
	TYPE WD-2/ALF-218.1				
	3	EA	HINGE	RCBB1279 127 x 101mm	652
				CONFIRM RADIUS REQUIREMENT FOR FRAME	
	1	EA	PRIVACY SET	ML2020 x LUSTRA c/w ANSI STRIKE/BOX	626
	1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
	1	EA	WALL STOP	S120	626

ITEM #6 1 SGLE DOOR 219.1 — LOBBY 216B FROM UNIVERSAL WC 219 — LHR
965 x 2135 x 45 — SCWD/ALF
TYPE WD-2/ALF-219.1

3	EA	HINGE	RCBB1279 127 x 101mm CONFIRM RADIUS REQUIREMENT FOR FRAME	652
1	EA	PRIVACY SET	ND40S x TLR x LESS STRIKE	626
1	EA	ELECT. STRIKE	HES 1006 FAIL SECURE x 24V CONFIRM c/w FACE PLATE AS REQUIRED POWER SUPPLY THRU OPENER SYSTEM	630
1	EA	DOOR OPENER	HUNTER HA-8-LP c/w E/S RELAY (PUSH SIDE MTG.) c/w FLAT ARM & BRACKET APPLICATION c/w FULL LENGTH HOUSING	CLR
2	EA	WALL ACTUATOR	CM-60/2 c/w ESCUTHEONS TO MATCH EXISTING	630
1	EA	WASHROOM RELAY PKG. CFS-WRP-M INCLUDES: MOTION SENSOR T-REX DOOR POSITION SWITCH 1076N (CONCEALED) RELAYS 2/iCOREi 200		
1	EA	EMERGENCY CALL CX-WEC10 KIT c/w BILINGUAL SIGNAGE		
1	EA	EMERGENCY STRIKE RELEASE RELAY #624		
1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630

CORRIDOR SIDE WALL ACTUATOR TO RELEASE ELECTRIC STRIKE AND ACTIVATE DOOR OPENER.
WC SIDE MOTION SENSOR TO DEACTIVATE CORRIDOR SIDE WALL ACTUATOR.
DOOR POSITION SWITCH RESETS CORRIDOR SIDE WALL ACTUATOR.
WC SIDE WALL ACTUATOR ACTIVE AT ALL TIMES.
LOCATION OF ACTUATORS TO BE CONFIRMED

EMERGENCY CALL CONSISTS OF AUDIBLE AND VISUAL SIGNAL DEVICES INSIDE AND OUTSIDE OF THE WASHROOM, CONTROL DEVICE INSIDE THE WASHROOM AND EMERGENCY SIGNAGE AS PER O.B.C.

EMERGENCY STRIKE RELEASE RELAY TO RELEASE ELECTRIC STRIKE UPON SIGNAL FROM EMERGENCY CALL SYSTEM ALLOWING RESPONDERS ACCESS TO WC WITHOUT HAVING TO UNLOCK OUTSIDE LEVER.

ITEM #7 1 SGLE DOOR 220.1 — CORRIDOR 216A FROM STORAGE 220 — RHR
965 x 2135 x 45 — SCWD/ALF
TYPE WD-3/ALF-220.1

3	EA	HINGE	RCBB1279 127 x 101mm NRP CONFIRM RADIUS REQUIREMENT FOR FRAME	652
1	EA	LOCKSET	ML2057 x LUSTRA c/w ANSI STRIKE/BOX	626
1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
1	EA	O/H STOP/HOLDER	GJ 904F x 95 DEGREE	630

ITEM #8 1 SGLE DOOR 220.2 — ACTIVITY ROOM 221 FROM STORAGE 220 — RHR
965 x 2135 x 45 — SCWD/ALF
TYPE WD-3/ALF-220.2

3	EA	HINGE	RCBB1279 127 x 101mm NRP CONFIRM RADIUS REQUIREMENT FOR FRAME	652
1	EA	LOCKSET	ML2057 x LUSTRA INSIDE ONLY c/w MOUNTING PLATE / NO PULL SIDE LEVER TRIM c/w ANSI STRIKE/BOX	626
1	EA	FLUSH PULL	H404 x WS	626
1	EA	KICK PLATE	K10A 203.2 x 927mm x TAPE	630
1	EA	O/H STOP/HOLDER	GJ 904F x 95 DEGREE c/w BLADE STOP SHIM AS REQUIRED	630

ITEM #9 1 SGLE DOOR 221.1 — LOBBY 216B FROM ACTIVITY ROOM 221 — RHR
1067 x 2135 x 45 — SCWD/ALF
TYPE WD-4/ALF-221.1

1	EA	CONT. HINGE	780-224 HD	628
1	EA	EXIT DEVICE	98*NL x *996L-R/V (03) x 4FT x L/STRIKE *WORKING DUMMY LEVER TRIM. CUT BACK LIFT FINGER #969545 AS REQUIRED FROM LEVER TRIM. DO NOT REMOVE NL DRIVE SCREW	626
1	EA	RIM CYLINDER	3000	626
1	EA	DOOR CLOSER	4041 EDA DEL x 62G SHOE (IF BLADE STOP)	689
1	EA	ADAPTER PLATE	4040-18 CONFIRM REQUIREMENT	689
1	EA	KICK PLATE	K10A 203.2 x 1028mm x TAPE	630
1	EA	WALL STOP	S120	626

DOOR & FRAME SUPPLIER TO PROVIDE BLOCKING UNDER WEATHERSTRIPPED ALUMINUM SECTION ACROSS HEAD AS REQUIRED TO ACCOMMODATE THE PARALLEL ARM DOOR CLOSER INSTALLATION.

SECURITY SYSTEM SUPPLIED BY SECURITY CONTRACTOR
INCLUDES : CARD READER, ELECTRIC STRIKE (HES 1006) & ALL RELATED HARDWARE.

ITEM #10 1 SGLE DOOR 221.2 — EXTERIOR FROM ACTIVITY ROOM 221 — RHR
965 x 2135 x CONFIRM — ALD/T.B. ALF
TYPE ALD/ALF — WIDE STILE INSULCLAD

1	EA	CONT. HINGE	780-112 HD		628
1	EA	EXIT DEVICE	LD98EO x 4FT x 1410/1439 STRIKE		626
			CONFIRM FRAME STOP & STRIKE REQUIREMENT		
1	EA	DOOR CLOSER	4040XP EDA x 62G SHOE (IF BLADE STOP)		SRI 689
1	EA	ADAPTER PLATE	4040-18 CONFIRM REQUIREMENT	SRI	689
1	EA	O/H STOP	GJ 104S x 95 DEGREE		630
		T.B. THRESHOLD	BY DOOR AND FRAME SUPPLIER		
		DOOR SWEEP	BY DOOR AND FRAME SUPPLIER		
		W/STRIPPING	BY DOOR AND FRAME SUPPLIER		
1	EA	DOOR SWEEP	W-24S x 965mm (EXTERIOR SIDE)		AL

DOOR & FRAME SUPPLIER TO PROVIDE BLOCKING UNDER INSIDE FACE OF DOOR CLADDING FOR EXIT DEVICE AND UNDER WEATHERSTRIPPED ALUMINUM SECTION ACROSS HEAD AS REQUIRED TO ACCOMMODATE THE PARALLEL ARM DOOR CLOSER INSTALLATION.

SECURITY SYSTEM SUPPLIED BY SECURITY CONTRACTOR
INCLUDES : DOOR CONTACT & ALL RELATED HARDWARE.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 01 45 00 - Quality Control
.3 Section 01 74 21 - Construction Demolition Waste Management and Disposal
.4 Section 01 78 00 - Closeout Submittals
.5 Section 07 92 00 - Joint Sealants
.6 Section 08 00 00 - Door Schedule
.7 Section 08 11 00 - Metal Doors and Frames
.8 Section 08 11 16 - Aluminum Doors and Frames
.9 Section 08 14 16 - Flush Wood Doors
.10 Section 08 44 13 - Glazed Aluminum Curtain Walls
.11 Section 08 50 00 - Windows

1.2 REFERENCES

.1 ASTM International
.1 ASTM C 542-05, Standard Specification for Lock-Strip Gaskets.
.2 ASTM D 790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
.3 ASTM D 1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
.4 ASTM D 1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
.5 ASTM D 2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
.6 ASTM E 84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
.7 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
.8 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
.3 CAN/CGSB-12.8-97, Insulating Glass Units.
.4 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
.5 CAN/CGSB-12.9-M91, Spandrel Glass.
.6 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
.7 CAN/CGSB-12.11-M90, Wired Safety Glass.

.8 CAN/CGSB-12.13-M91, Patterned Glass.

.3 Glass Association of North American (GANA)
.1 GANA Glazing Manual - 2008.
.2 GANA Laminated Glazing Reference Manual - 2009.

.4 2012 Ontario Building Code
.1 Subsection 4.1.5.14 – Loads on Guards
.2 SB-13 Glass in Guards.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
.1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Consultant prior to start of Work to examine existing site conditions.

.3 Hold project meetings bi-weekly.

.4 Ensure key personnel site supervisor project manager subcontractor representatives attend.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario Canada.
.2 OBC Ontario Building Code Part 4/Paragraph 4.1.5.17 walls acting as guards. All glazing to comply to lateral loadings.

.4 Samples:
.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.
.3 Submit duplicate 300 mm size samples of framing and sealant material.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements for all insulating and spandrel glass sealed unit constructions.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
.2 Submit shop inspection and testing for glass.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up to include glass glazing, and perimeter air barrier.
.3 Mock-up will be used:
.1 To judge quality of work, substrate preparation, operation of equipment and material application.
.4 Locate where directed .
.5 Allow 24 hours for inspection of mock-up before proceeding with work.
.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect glazing and frames from nicks, scratches, and blemishes.
.3 Protect prefinished aluminum surfaces with wrapping or strippable coating.
.4 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

1.8 AMBIENT CONDITIONS

.1 Ambient Requirements:
.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:
.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
.2 Size glass to suit terms of reference as required by the Ontario Building Code.
.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Flat Glass:
.1 Float glass: to CAN/CGSB-12.3, glazing quality thickness as required for pane size.
.2 Safety glass: to CAN/CGSB-12.1, transparent, thickness as required to comply with engineering requirements for panel size.
.1 Type 1-laminated or 2-tempered.
.2 Class B-float.
.3 Category 11.
.4 Edge treatment ground and polished.

.3 Silvered mirror glass: 6 mm thick.
.1 Type 1B-float glass for high humidity use 3A-tempered or 3B-laminated.

.4 Tempered glass: 6mm thick
Noted as **Type GL-1** on Drawings
.1 glass laminated tempered clear float glass **all single glazed interior doors and sidelights.**

.5 Insulating Glass: (Indicated as IGL on Door Schedule Legend 08 00 00)
1 Double insulating glass units: to CAN/CGSB-12.8, double unit, 25mm overall thickness. Thermal Edge low conductivity spacer, colour black, with bent corners, filled with desiccant in two sides, appropriate dimension to obtain a unit thickness of 25.4 mm. **All exterior window area and exterior door locations**

.2 Noted as **Type GL-2** on Drawings: Insulating glass unit as per CAN/CGSB-12.8, double unit, 25mm overall thickness.
.1 Glass to CAN.CGSB-12.3, outer glass Solarban 70XL(2) clear, (2) soft coat Low-E, tempered, inner glass clear tempered.
.2 Glass thickness: 6mm each lite (Minimum)
.3 Inter-cavity space thickness: 12.5mm with **low conductivity thermal edge spacer**, colour: black
.4 Glass coating: surface number 2, soft coat low “E”
.5 Inert gas fill: argon
.6 Performance:
.1 Visible transmittance: 64%
.2 Winter U value(night): 0.28
.3 Shading coefficient: 0.32
.4 Solar heat gain coefficient: 0.27

.3 **Type GL-3**: Double insulating glass unit with w / Solarban 70XL tempered exterior light and translucent glass tempered inner light as per CAN/CGSB-12.3, (6mm min) 25.4 mm overall thickness. **All upper lights of exterior glazing where noted on elevations**
.1 Glass to CAN.CGSB-12.3, satin acid-etched, Prelco or to architect selection

.4 **Type GL-4**: Spandrel Glass: 6mm Thick Class A Low Iron glass colour to be selected from OPACI-Coat or NGI Designer Glass. **Upper and lower lights on exterior as noted complete with insulated sealed backpan.**

.5 Safety Glass: to CAN/CGSB-12.1, 6mm thick, tempered, for use in interior sidelights.

2.2 ACCESSORIES

.1 Setting blocks: neoprene EPDM or silicone, 80-90 Shore A durometer hardness to ASTM D 2240, length of 25 mm for each square meter of glazing minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height or to suit glazing method, glass light weight and area.

.2 Spacer shims: neoprene or silicone, 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:
.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.
.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.

.4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.5 Lock-strip gaskets: to ASTM C 542.

.6 Mirror attachment accessories:
.1 Stainless steel clips concealed.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
.1 Verify that openings for glazing are correctly sized and within tolerance.
.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
.3 Visually inspect substrate.
.4 Inform of unacceptable conditions immediately upon discovery.
.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.4 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.5 INSTALLATION: MIRRORS

.1 Set mirrors with clips. Anchor rigidly to wall construction.

.2 Set in frame.

.3 Place plumb and level.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

1.0 ROOM FINISH SCHEDULE INDEX

Room Finish Schedule Refer to Schedule on drawing

2.0 GENERAL NOTES

.1 Ceiling heights given Above Finished Floor (AFF) unless noted otherwise.
.2 All steel brackets and covers to be painted.
.3 Heating units supplied primed for paint to be finished to match wall finish on which they occur.
.4 Closets to have same finish as room in which they occur.
.5 All exposed piping, ductwork, conduit and equipment inside and outside of mechanical and electrical service rooms to be painted.
.6 All gas piping (exposed and concealed) to be painted.
.7 All surfaces visible through ceiling openings to be painted out. Refer to room schedule for same as wall colour or painted noted accent colour. To be confirmed.
.8 All wood millwork such as handrails, wood ceiling panels are to be pre-finished by Section 06 40 00. All site applied finish carpentry to be stained unless otherwise noted. Refer to Section 09 91 23 for finishing formulas.
.9 Paint all exposed steel supports, framing and connectors of millwork to match adjacent finish unless otherwise noted.
.10 All mounting boards and backing furring/studs for electrical equipment to be painted with two coats of fire retardant paint.
.11 Paint fire extinguisher cabinets to match adjacent wall colour unless stainless steel.
.12 All steel stairs, railings, trim brackets, access ladders, manhole covers and sump pit covers to be painted
.13 All discrepancies between documents and drawings are to be reported to the Architect.
.14 Grout lines width are 3mm wide. Align grout lines with wall and floor grout lines.
.15 Provide MG1 corner guards or Architect approved equals on all outside corners in public corridor spaces. Approx quantities
.16 Paint in Wet Areas to have anti-mildew additive. Rooms such as washrooms, showers and lockers

3.0 MATERIAL CODES

WALLS

CONC	Reinforced Poured Concrete – refer Section 03 30 00
CBLOCK	Concrete Block – refer Section 04 22 00
GB GWB	Gypsum Board – refer Section 09 21 16
CB	Cement Board backing – refer Section 09 21 16
PT_	Paint finish – refer Section 09 91 23
CT_	Ceramic Tile – refer Section 09 30 13
PC	Precast Concrete – refer Section 03 45 00
TBB	Tile Backer Board

CEILINGS

GB GWB	Gypsum Wall Board – refer Section 09 21 16
PT_	Paint Finish – refer Section 09 91 23
ACT_/	Acoustical Ceiling Tile– refer Section 09 51 13 & 09 53 00
/G_	Suspended Grid for Ceiling Tile - refer Section 09 51 13 & 09 53 00
CT_	Ceramic Tile – See Section 09 30 13
ASD	Acoustic Steel Deck

MILLWORK

PL_	Plastic Laminate – refer Specification 06 47 00
WS_	Wood Stained – refer Specification 06 40 00
SS	Stainless Steel – refer Specification 06 40 00
WD_	Wood Species – refer Section 06 40 00
HD_	Hardware Drawer/Door Pulls for Millwork
MT_	Metal Trim
TSM_	Through Solid Surface Material
ST_	Stone

FLOORING

CT_	Ceramic Tile – refer specification 09 30 13
CAR_	Carpet Tile – refer Specification 09 68 13
RT_	Resilient Tile – refer Specification 09 65 50
MT_	Metal Trim
WD	Wood Activity Floor(Robbins BioCushion Standard of Acceptance)

BASE

RB_	Resilient Base and Transitions – refer Specification 09 65 50
BT_	Base Tile - Ceramic Tile – refer specification 09 30 13
GB	Gym Base (Robbins compatible and as per spec Section 09 64 30)
CB	Carpet Base

4.0 INTERIOR FINISHES LEGEND

A RUBBER TILE = RT-(NO.) SECTION 09 65 16

NOTE: FLOOR BASE TYPE REFER TO DRAWING AND/OR ROOM FINISH SCHEDULE

CODE	MFTR / CO	PRODUCT	SIZE	BASE MATCH	GENERAL ROOM / AREA
RT-1	Roppe Rep: Centura Harry Davies 613.229.4308	Roppe Line: Tuflex Spartus Colour: 936 Dusk	Rubber Tile 685.8mm x 685.8mm x 9.0mm TH	RB-2	Storage Room 220

B CARPET BASE = CB SECTION 09 68 13

NOTE: FLOOR BASE APPLY TO MILLWORK BASE UNLESS OTHERWISE NOTED

CODE	MFTR / CO	PRODUCT	PROFILE/SIZE	GENERAL ROOM / AREA
CB-1	Rep: Centura Harry Davis 613-229-4308	Venture Tribeca 4”	4”	Office, Meeting Room,

C CARPET = CAR-(NO.) SECTION 09 68 13

CODE	MFTR / CO	PRODUCT	BASE	GENERAL ROOM / AREA
CAR-1	Rep: Centura Harry Davis 613-229-4308	Venture Tribeca 50cm X 50 cm(20”x20”) Rain 10050, Style 400059 Stacked or brick(1/4 turn)	CB	Office, Meeting Room

D CERAMIC/PORCELAIN TILE = CT-(NO.) SECTION 09 30 13

Note: Grout product is specific match to the Tile supplier and is not be substituted

CODE	MFTR / CO	PRODUCT	SIZE	GROUT	GENERAL ROOM / AREA

CT-1	Vitra Rep: Centura Harry Davies 613.229.4308	Dotti Series Dark Grey 835604	12”x12”	Power Grout TEC #929 Charcoal Gray	Reception Desk Family Change Lifeguard Station
CT-2	Rep: Centura Harry Davies 613.229.4308	D.Positive Series LOBBLO White Mat 0	500mm x 200mm	Power Grout TEC #910 Bright White	Office backsplash Multipurpose backsplash Family Change
CT-3	Rep: Centura Harry Davies 613.229.4308	D.Positive Series LOGGR3 Grey 3	500mm x 200mm	Power Grout TEC #910 Bright White	B/F Washroom
CT-4	Rep: Centura Harry Davies 613.229.4308	D.Positive Series LOJAA5 Yellow Ani 5	500mm x 200mm	Power Grout TEC #910 Bright White	Showers
CT-5	Rep: Centura Harry Davies 613.229.4308	D.Positive Series BLB1 Blue Blue 1	500mm x 200mm	Power Grout TEC #910 Bright White	Lifeguard Station
CT-6	Rep: Centura Harry Davies 613.229.4308	Miki Unglazed Series MBU22105 Plain SP White	2”x2”	Power Grout TEC #929 Charcoal Gray	Showers
CT-7	Rep: Centura Harry Davies 613.229.4308	Miki Unglazed Series MBU22103 Charcoal	2”x2”	Power Grout TEC #929 Charcoal Gray	Showers
BT-1	Rep: Centura Harry Davies 613.229.4308	Arkitkt Vision Series K785122 White	4”x12”	Power Grout TEC #931 Standard White	Men’s Locker Room base, Lifeguard Locker base

E **INTERIOR PAINT = PT-(NO.)** SECTION 09 91 23

CODE	MFTR / CO	COLOUR	GENERAL ROOM / AREA
PT-1	Benjamin Moore	CC-40 Cloud White	GWB Ceiling, Fitness Room, Reception, Storage
PT-2	Benjamin Moore	HC-168 Chelsea Gray	Fitness Room, Office, Doors and Frames, Accent
PT-3	Benjamin Moore	2066-30 Big Country Blue	Reception Ceiling
PT-4	Benjamin Moore	HC-145 Van Courtland Blue	Office Accent
PT-5	Benjamin Moore	2122-40 Smoke	Accent

PT-6	Benjamin Moore	OC-51 Intense White	Field color - walls
PT-7	Benjamin Moore	2072-30 Purple Lotus	
PT-8	Benjamin Moore	2065-10 Admiral Blue	
PT-9	Benjamin Moore	2021-20 Lemon	
PT-A	Accent Paints	Accent paint from a selection of up to six colours	Confirm colour prior to implementing

F **PLASTIC LAMINATE = PL-(NO.)** SECTION 06 47 00

CODE	MFTR / CO	PRODUCT	MILLWORK	GENERAL ROOM / AREA
PL1	Deleted			

G **WOOD STAIN = ST-(NO.)** SECTION 06 40 00
WOOD SPECIES = /WD-(NO.) SECTION 06 40 00

CODE	SPECIES	FINISH	GENERAL LOCATION
WD-1	Birch Select	Clear stain to match existing. Provide samples for Architect's review prior to implementation.	Fitness Room Window Sills
WD-2	Maple Select	Stain finish Provide samples for Architect's review prior to implementation.	Doors, millwork

H **SUSPENDED CEILING SYSTEM = G#/T#**
T-BAR GRID = /G-(NO.) SECTION 09 53 00
LAY-IN TILE = ACT-(NO.)/ SECTION 09 51 13

CODE	MFTR / CO	PRODUCT	SIZE	GENERAL ROOM / AREA
/G1	Opt 1: CGC Donn DXT	Two directional exposed tee bar grid. Colour: White	Suitable for 2x2 or 4x2 system	Office
ACT-1/	CGC Mars ClimaPlus Edge: SQ Square	Ceiling Panel ASTM E 1264 Type IV, form 1 & 2, pattern EG Colour: White	60cmx60cm	Office

I **STONE = STN-(NO.)** SECTION 06 40 00
THROUGH SOLID SURFACE MATERIAL = TSM-(NO.) SECTION 09 72 00

CODE	MFTR / CO	PRODUCT	SIZE	GENERAL ROOM / AREA
STN-1	Ceasarstone Joan Lyon 514.389.2999	Classico 5000 London Grey		Concierge Desk
STN-2	Ceasarstone Joan Lyon 514.389.2999	Classico 4230 Shitake		Office, Multipurpose

J **CABINETRY HARDWARE = HD-(NO.)** SECTION 08 07 05

CODE	MFTR / CO	PRODUCT	GENERAL LOCATION
HD01	Hafele Cabinet pull	Aluminum Handles Silver Coloured Anodized 116.05.931 128mm	Typical unless noted
HD02	Deleted		
HD03	Hafele Coat Hook	Anodized aluminium, silver 842.20.959 Or approved equal.	Family Change B/F W/C
HD04	Deleted		
HD05	Hafele Metal Shelf Supports	Steel, nickel plated 282.43.727	Millwork
HD06	Hafele Cable Grommets	Push and Pinch Grommet Grey, 80cm 631.21.510	Reception, Lifeguard Station
HD07	Hafele Cable Grommets	Flexi-Top Grommets Silver, 80cm 631.43.902	Reception

END SECTION

Room No	Room Name	Floor		Base		Walls				Door			Ceiling					Remarks
		Field	Accent	Mat.'l	Ht.	Material / Colour				Number	Door Colour	Frame Colour	Mat.'l	Fin.	Wind. Sill	Counter	Cabinets	
						North	East	South	West									
LEVEL 2																		
211B	Conciege Desk	CT1	EX	EX	EX	-	PT4/CT2	-	-	-	-	-	GWB	PT1 As req'd	-	STN2	WD2, RB2 Base	Paint and make good ceiling as req'd.
216A	Corridor / Lobby	CT1	-	TB	100	PT4	PT4	PT6	PT6	-	-	-	ACT1/G1 GWB	PT1	WD1	-	-	
217A	Meeting	CAR1	-	CB	100	PT2	PT?	PT2	PT2	217.1	WD2	ALU	ACT1/G1	-	-	-	-	
217B	Office	CAR1	-	CB	100	PT2	PT2	PT2	PT?	217.2	WD2	WD2	ACT1/G1	-	-	-	-	
217C	Office	CAR1	-	CB	100	PT2	PT2	PT2	PT?	217.3	WD2	ALU	ACT1/G1	-	-	-	-	
217D	Office	CAR1	-	CB	100	PT2	PT?	PT2	PT2	217.4	WD2	ALU	ACT1/G1	-	WD1	-	-	
218	Washroom	CT1	-	-	-	CT2	CT3	CT2	CT2	118.1	WD2	ALU	GWB	PT1	-	-	-	
219	Universal Washroom	CT1	-	-	-	CT2	CT2	CT2	CT3	119.1	WD2	ALU	GWB	PT1	-	STN1	-	
220	Storage	VC1	-	RB1	63.5	CBLOCK/ PT1	CBLOCK/ PT1	CBLOCK/P T1	CBLOCK/P T1	220.1	WD2	ALU	ASD	PTX	-	STN1	-	-
										220.2	WD2	ALU						

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 01 33 00 - Submittals
.2 01 74 21 - Construction Demolition Waste Management Disposal
.3 05 41 00 - Structural Metal Stud Framing
.4 06 10 00 - Rough Carpentry
.5 07 21 16 - Blanket Insulation
.6 08 11 16 – Aluminum Doors & Frames
.7 08 31 00 – Access Doors - Mechanical
.8 09 22 16 – Non-structural Metal Framing
.9 09 91 23 – Interior Painting

1.2 REFERENCES

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
.1 ASTM C 475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.2 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
.3 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
.4 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.5 ASTM C 1280-99, Standard Specification for Application of Gypsum Sheathing.
.6 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
.7 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
.8 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.

.3 Association of the Wall and Ceilings Industries International (AWCI)
.1 AWCI Levels of Gypsum Board Finish-97.
.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

SUBMITTALS

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store gypsum board assemblies materials level indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
.3 Protect from weather, elements and damage from construction operations.
.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
.5 Protect prefinished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
.6 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

1.5 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Standard board: All ceilings and bulkheads: to ASTM C 1396/C 1396M regular, 12.7 & 15.9 mm thick and Type X, 1200 mm wide x maximum practical length, ends square cut, edges beveled.
- .1 Acceptable products:
  - .1 CGC Sheetrock TGD
  - .2 Certainteed Proroc

.2 High Impact Resistant board: to CAN/ULC S102-M88. Use in all public areas, and on hallway-side of new and existing corridors to 2400 A.F.F., 15.9mm thick, 1200mm wide x maximum practical length, ends square cut, edges beveled.
.1 Acceptable Products:
- .1 CGC Inc. Mold-Tough VH1 Firecode Core
- .2 Certainteed ProRoc Extra Abuse Type X

.3 Ceramic tile backer board:
- .1 12.7 mm thick
- .2 For all stud areas to receive ceramic wall tile
- .3 Acceptable materials:
  - .1 CGC Fibrerock Aqua-tough tile backer board
  - .2 CGC Cement Board: washroom and kitchen areas.
  - .3 Certainteed PermaBase brand Cement Board

.4 Glass mat gypsum substrate sheathing: to ASTM C 1177/C 1177M, 12.7 and 15.9 mm thick, 1200 mm wide x maximum practical length.
- .1 Acceptable materials:
  - .1 CGC Securock Glass-Mat Sheathing, regular and Type X as required.
  - .2 Certainteed Embedded Glass Reinforced Gypsum Sheathing, regular and Type X as required.
  - .3 Georgia-Pacific DensGlass Glass-Mat, Sheathing, regular and Type X as required.

.5 Shaft Wall Panels: to ASTM C442, 610mm wide x 25mm thick. Lengths to suit application, fire and moisture resistant,Beveled edges for installation in tested C-H assemblies.
- .1 Acceptable materials:
  - .1 CGC Sheetrock Gypsum Liner
  - .2 Certainteed M2Tech Shaftliner Type X

.6 Metal furring runners, hangers, tie wires, inserts, anchors: to CSA 82.30, galvanized.

.7 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.8 Resilient clips drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.9 Nails: to ASTM C 514.

.10 Steel drill screws: to ASTM C 954.

.11 Stud adhesive: to CAN/CGSB-71.25 ASTM C 557.

.12 Laminating compound: as recommended by manufacturer, asbestos-free.

.13 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal, zinc-coated by hot-dip process zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.

.14 Sealants: in accordance with Section 07 92 00 – Joint Sealants.
.1 Acoustic sealant: in accordance with Section 07 92 00 – Joint Sealants.

.15 Polyethylene: to CAN/CGSB-51.34, Type 2.

.16 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.

.17 Joint compound: to ASTM C 475, asbestos-free.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C 1280.

.3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C 840 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles, and to valves and fire dampers.

.7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.10 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.

.11 Furr openings and around built-in equipment, cabinets, access panels,, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.13 Erect drywall resilient furring transversely across studs or between the layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

.14 Install 150 mm continuous strip of 12.7 mm plywood along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer and screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:
  .1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.
  .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:
  .1 Install gypsum board for base layer and exposed gypsum board for face layer.
  .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
  .3 Apply base layers at right angles to supports unless otherwise indicated.
  .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.3 Exterior Soffits and Ceilings: install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.

.4 Apply ceramic tile backer board where wall tiles coating to be applied and adjacent to slop sinks janitors closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.5 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts,, in partitions where perimeter sealed with acoustic sealant.

.6 Apply 12mm bead of firestop caulking at top of all rated walls and at all penetrations of rated assemblies.

.7 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.8 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.9 Install gypsum board with face side out.

.10 Do not install damaged or damp boards.

.11 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

.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 secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre using contact adhesive for full length.

.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. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Construct control joints of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints where indicated and at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

.8 Install control joints straight and true.

.9 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.10 Install expansion joint straight and true.

.11 Walls noted as fire separations are to be continuous around all vertical and horizontal structural elements. No structure is to be exposed.

.12 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.

.13 Finish face panel joints 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.

.14 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 0: no tapping, finishing or accessories required.

.2 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable. **Concealed areas only.**

.3 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable. **All areas for applied wall finish.**

.4 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges. All exposed wall areas for paint.

.5 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges. All exposed large wall areas greater than 2400 w x 2700 h.

.15 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.16 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.17 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.18 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.19 Skim coat: Mix joint compound slightly thinner than for joint taping.

.20 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.21 Allow skim coat to dry completely.

.22 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Section 07 92 00 - Joint Sealants.

.3 Section 08 11 16 – Interior Aluminum Door and Glazing Frames

.4 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM C 645-00, Specification for Nonstructural Steel Framing Members.
- .2 ASTM C 754-00, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.

.3 Environmental Choice Program (ECP).
- .1 CCD-047a -98, Paints - Surface Coatings.
- .2 CCD-048-98, Surface Coatings - Recycled Water-borne.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.5 Divert unused gypsum materials from landfill to recycling facility approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C 645, stud size as indicated on drawings, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.

.2 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes, 32 mm flange height.

.3 Use 0.91mm thick steel sheet for studs at walls which are to have grab bars and towel bars installed.

.4 Metal channel stiffener: size to suit wall stud, framing,1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.5 Acoustical sealant: to ASTM C919.

.6 Insulating strip: rubberized, moisture resistant 6 mm thick foam strip, full width of track, with self sticking adhesive on one face, lengths as required.

.7 Steel Backing Strip: (alternative to wood blocking specified in Section 06 10 00) 1.083 (18 GA) sheet steel, continuous 200mm wide horizontal strips screw fastened to studs at locations to provide anchorage backing for cabinets, grab bars, towel bars/light fixtures,etc.

PART 3 - EXECUTION

3.1 ERECTION

.1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.2 Install damp proof course under stud shoe tracks of partitions on

slabs on grade.

.3 Place studs vertically at 600 mm on centre and not more than 50 mm 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.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom ceiling track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling

tracks..

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install two continuous beads of acoustical sealant or insulating strip under studs and tracks around perimeter of sound control partitions. Refer to acoustic notes on drawings for acoustic requirements.

3.2 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 09 00 00 Interior Finishes Colour Schedule
.2 Section 09 00 01 Room Finish Schedule
.3 Section 09 21 16 Gypsum Board Assemblies

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).

.2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).

.3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI A108.1).

.4 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C 847-06, Specification for Metal Lath.
.2 ASTM C 979-05, Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.2 CGSB 71-GP-22M-78(AMEND.), Adhesive, Organic, for Installation of Ceramic Wall Tile.
.3 CAN/CGSB-75.1-M88, Tile, Ceramic.
.4 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.6 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.
.2 Tile Maintenance Guide 2000.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
.1 Include manufacturer's information on:
.1 Ceramic tile, marked to show each type, size, and shape required.
.2 Chemical resistant mortar and grout (Epoxy and Furan).
.3 Cementitious backer unit.
.4 Dry-set cement mortar and grout.
.5 Divider strip.
.6 Elastomeric membrane and bond coat.
.7 Reinforcing tape.
.8 Levelling compound.
.9 Latex cement mortar and grout.
.10 Commercial cement grout.
.11 Organic adhesive.
.12 Slip resistant tile.
.13 Waterproofing isolation membrane.
.14 Fasteners.

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Base tile: submit duplicate, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
.2 Floor tile: submit duplicate, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
.3 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.
.4 Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

1.4 QUALITY ASSURANCE

.1 Quality Assurance Submittals:

.1 Manufacturer's Instructions: manufacturer's installation instructions.

1.5 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.

1.8 MAINTENANCE

.1 Extra Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.
.3 Maintenance material same production run as installed material.

PART 2 - PRODUCTS

2.1 FLOOR AND WALL TILE

.1 Ceramic and porcelain tile: to CAN/CGSB-75.1, Size, edges, surface, pattern and colour as noted in Section 09 00 00 Interior Finishes Colour Legend and Section 09 00 01 Room Finish Schedule. Standard of acceptance manufacturers as noted and as represented.

2.2 BASE TILE

.1 Base: coved; type, size, colour and texture to match adjacent flooring material and as noted in Section 09 00 00 Interior Finishes Colour Legend.

2.3 TRIM SHAPES

.1 Conform to applicable requirements of adjoining floor and wall tile.

.2 Use slip resistant trim shapes for horizontal surfaces of showers, overflow ledges, recessed steps, shower curbs, drying area curbs, and stools.

.3 Use ‘Schluter’ type trim shapes & sizes conforming to size of adjoining filed wall tile, including existing spaces, unless specified otherwise. Use trims for transitions between floor types, inside corners, outside corners and edges.

.4 Internal and External Corners: provide ‘Schluter’ type trim

shapes as follows where indicated:
.1 External corners including edges: Use Schluter SCHIENE, clear anodized.
.2 External corners including edges: Use Schluter SCHIENE, clear anodized.
.3 Special shapes for:
.1 Base to floor internal corners to provide integral non-coved vertical and horizontal joint.
.2 Base to floor external corners to provide bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall.
.3 Wall top edge: all wall tile Schluter SCHIENE, anodized aluminum
.4 Wall top edge: all base tile Schluter RENO-U, brushed aluminum.

.5 Provide Schluter trim shapes for changes of floor finish materials, and where indicated and required to complete tile work.

2.4 MORTAR AND ADHESIVE MATERIALS

.1 Cement: to CSA-A5, type 10.

.2 Sand: to ASTM C 144, passing 16 mesh.

.3 Hydrated lime: to ASTM C 207, Type S.

.4 Waterproofing Mortars and adhesives: Showers: floor and wall , shower rooms TEC Lifetime System Warranty
.1 Hydraflex Liquid TA316
.2 Hydroflex Mesh
.3 Mortar Superflex TA392
.4 Grout Power Grout TA550
Follow manufacturer's written instructions.

.5 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

.6 Adhesives
.1 Maximum VOC limit 65 g/L to SCAQMD Rule 1168.

2.5 BOND COAT

.1 Dry set cement mortar: to ANSI A108.1. TEC: TA392 Superflex

.2 Latex Cement mortar: to ANSI A108.1, two-component universal dry-set mortar. TEC: TA392.

.3 Levelling Coat: TEC: TA305.

2.6 GROUT

.1 Colouring Pigments:

.1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C 979.
.2 Colouring pigments to be added to grout by manufacturer.
.3 Job coloured grout are not acceptable.
.4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout. TEC Power Grout TA550

.2 Commercial Cement Grout: to ANSI A118.7.

.3 Latex Cement Grout: to ANSI A118.7, fast curing, high early strength, polymer-modified, stain resistant, mix for floors, mix for walls and floors commercial tile grout. TEC Power Grout TA550.

2.7 ACCESSORIES

.1 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Divider strips:
.1 Zinc: size as noted, complete with anchors, both sides spaced at 150 mm on centre.

.3 Deleted.

.4 Metal lath: to ASTM C 847, galvanized finish, 10mm rib at 2.17kg/my.

.5 Transition Strips: purpose made metal extrusion; anodized aluminum type. Schluter Schiene -AE

.6 Reducer Strips: purpose made metal extrusion; anodized aluminum type; maximum slope of 1:2. Schluter Reno-U-AE

.8 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

.9 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
.1 Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.10 Thresholds: granite thick, bevelled two sides, honed finish to exposed surfaces, size to suit door opening and frame width and as per detail drawings.

2.8 MIXES

.1 Cement:
.1 Scratch coat: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex

additive where required. Adjust water volume depending on water content of sand.
.2 Slurry bond coat: cement and water mixed to creamy paste. Latex additive may be included.
.3 Mortar bed for floors: 1 part cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.
.4 Leveling coat: 1 part cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.
.5 Bond or setting coat: 1 part cement, 1/3 part hydrated lime, 1 part water.
.6 Measure mortar ingredients by volume.

.2 Dry set mortar: mix to manufacturer's instructions. TEC TA392 Superflex.

.3 Mix bond and leveling coats, and grout to manufacturer's instructions.

.4 Adjust water volumes to suit water content of sand.

2.9 PATCHING AND LEVELLING COMPOUND

.1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable. TEC: TA305 Deep Set Patch.

.2 Have not less than the following physical properties:
.1 Compressive strength - 25 MPa.
.2 Tensile strength - 7 MPa.
.3 Flexural strength - 7 MPa.
.4 Density - 1.9.

.3 Capable of being applied in layers up to 50mm thick, being brought to feather edge and being troweled to smooth finish. Standard of acceptance: HB Fuller-TECTA323 EZ Level with TEC TA560 Primer.

.4 Ready for use in 48 hours after application.

2.10 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

PART 3 - EXECUTION

3.1 MANUFACTURER'S

.1 Compliance: comply with manufacturer's written

INSTRUCTIONS

recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 WORKMANSHIP

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2006/2007, "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 3 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Make internal angles square, external angles rounded.

.9 Use round edged tiles at termination of wall tile panels, or Schluter "Schiene" trim except where panel abuts projecting surface or differing plane.

.10 Install divider strips at junction of tile flooring and dissimilar materials.

.11 Allow minimum 24 hours after installation of tiles, before grouting.

.12 Clean installed tile surfaces after installation and grouting cured.

.13 Make control joints at 5 m in each direction and where indicated. Make joint width same as tile joints. Fill control joints with sealant in accordance with Section 07 92 00 - Joint Sealants. Keep building expansion joints free of mortar and grout.

3.3 WALL AND BASE TILE

.1 Install in accordance with TTMAC detail 305W 2009/2010.

3.4 FLOOR TILE

.1 Install in accordance with TTMAC detail 310F - 2009/2010 Cement Mortar Bed or Concrete Slab and 311F 2009/2010 Bonded to Concrete Slab.

3.5 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply in accordance with manufacturer's instructions.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

3.8 SCHEDULE

.1 Refer to Section 09 00 00 Interior Finishes Colour Schedule for all material codes, colour, texture and supplier.

.2 Refer to Section 09 00 01 Room Finish Schedule for locations and extent of all applied finishes.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
.1 Materials and application of acoustical units for installation within a suspended ceiling.

.2 Related Sections:
.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 29 - Health and Safety Requirements.
.3 Section 01 35 43 - Environmental Procedures.
.4 Section 01 45 00 - Quality Control.
.5 Section 01 47 15 - Sustainable Requirements: Construction.
.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.7 Section 01 78 00 - Closeout Submittals.
.8 Section 09 53 00 - Acoustical Suspension: Suspension system.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
.2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products.
.3 ASTM E 1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Canadian Standards Association (CSA International)

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.5 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data: submit WHMIS MSDS in accordance with

Section 01 47 15 - Sustainable Requirements: Construction.

.3 Co-ordinate submittal requirements and provide submittals required by Section 01 47 15 - Sustainable Requirements: Construction.

.4 Submit duplicate full size samples of each type of acoustical units.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by Canadian Certification Organization accredited by Standards Council of Canada.

.2 Mock-up:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up 10 m² minimum of each type acoustical panel tile ceiling including one inside corner and one outside corner.
.3 Construct mock-up where directed.
.4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with ceiling work.
.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

.3 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

.4 Sustainable Requirements:
.1 Construction requirements: in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Store extra materials required for maintenance, where directed by Consultant.

.3 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in

appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.
.5 Ensure emptied containers are sealed and stored safely in accordance with Section 01 35 43 - Environmental Procedures.
.6 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20 -40 % before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.7 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner, upon completion of the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Acoustic units for suspended ceiling system: to ASTM E 1264.
.1 Type IV, Form 1 & 2, Pattern E, G.
.2 Class A.
.3 Cellulose fibre with minimum 76% recycled content.
.4 Pattern E,G , Class A .
.5 Noise Reduction Coefficient (NRC) designation of .70 Type 1 and .80 Type 2.
.6 Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM E 1264
.7 Light Reflectance (LR) range of .89 to ASTM E 1477.
.8 Colour white.
.9 Size 600 x 600 x 22 FLB mm thick.

.10 Shape flat.

.11 Acceptable product:

.1 ACT Type 1: General and Office areas, Mars Climaplus or equal, square edge, CGC or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Consultant.

3.2 INSTALLATION

.1 Install acoustical panels and tiles in ceiling suspension system.

.2 Install seismic bracing as required.

3.3 APPLICATION

.1 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width. Refer to reflected ceiling plan.

.2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.4 INTERFACE WITH OTHER WORK

.1 Co-ordinate with Section 09 53 00.01 - Acoustical Suspension.

.2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Related Sections:
.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 29 - Health and Safety Requirements.
.3 Section 01 35 43 - Environmental Procedures.
.4 Section 01 45 00 - Quality Control.
.5 Section 01 47 15 - Sustainable Requirements: Construction.
.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.7 Section 01 78 00 - Closeout Submittals.
.8 Section 09 51 13 - Acoustical Panel Ceilings.
.9 Section 09 80 00 - Acoustic Treatment

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 635-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
.2 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.3 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C 635 deflection test.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit reflected ceiling plans for special grid patterns as indicated.
.3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, change in level details, access door dimensions, seismic restraint and locations and acoustical unit support at ceiling fixture lateral bracing and accessories.

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit one representative model of each type ceiling suspension system.
.2 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 CLOSEOUT SUBMITTALS .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: Submit operation and maintenance data for acoustical suspension for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Heavy duty system to ASTM C 635.

.2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated prefinished colour

.3 Recycled Content: 95%

.4 Suspension system: non fire rated, made up as follows:
.1 Two directional exposed tee bar grid.
.2 Acceptable Product:
.1 G1 - CGC Centricitee DXT

.5 Exposed tee bar grid components: shop painted satin sheen white colour. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.

.6 Hanger wire: galvanized soft annealed steel wire:
.1 3.6 mm diameter for access tile ceilings.

.7 Hanger inserts: purpose made.

.8 Carrying channels: 38 x 19 mm channel, of 1.2 mm thick

galvanized steel.

.9 Accessories: splices, clips, wire ties, retainers and wall moulding reveal, to complement suspension system components, as recommended by system manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Installation: in accordance with ASTM C 636 except where specified otherwise.

.2 Install suspension system to manufacturer's instructions

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.

.4 Secure hangers to overhead structure using attachment methods acceptable to Consultant .

.5 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.6 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width system according to reflected ceiling plan.

.7 Ensure suspension system is co-ordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers.

.10 Support at light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.11 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.12 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

PART 1 – GENERAL

1.0 GENERAL

.1 Specification Section refers to a proprietary “gymnasium” flooring system installed by a trade recognized as a single specialized trade with no less than 10 years experience installing ”gymnasium” floors. Robbins “Bio-Cushion” is referenced as the standard of acceptance for any alternative systems proposed.

1.1 REFERENCES

.1 Canadian Environmental Protection Act (CEPA) 1999.

.2 Canadian Lumbermen's Association (CLA)
.1 CLA Grading Rules for Canadian Hardwood Strip Flooring . The Long Standing Choice 1997.

.3 Canadian General Standards Board (CGSB)
.1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
.2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.4 Canadian Standards Association (CSA International)
.1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
.2 CAN/CSA G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-O80 Series-97, Wood Preservation.
.4 CSA O151-M1978(R1998), Canadian Softwood Plywood.

.5 MFMA- Maple Flooring Manufacturers Association

.6 FSC- Forest Stewardship Council

1.2 WORK INCLUDED

.1 Provide all labour, materials, products, equipment and services to perform gymnasium floor installation, sanding, lining and finishing as required and/or indicated on the drawings and specifications, also including but not limited to:

- Acceptance & Preparation of Substrate
- Membrane Waterproofing and damp proofing
- Thresholds-Metal
- Game Standard Inserts
- Game Lines
- Cove mouldings and miscellaneous requirements, as required
- Other unspecified materials and labour needed to furnish a complete system.

.2 Schedule for Work:
Installation will be scheduled by the Construction Manager

.3 All work shall be performed so as to avoid conflict with any pre-existing booking schedule of the facilities or work of other trades. Ensure finished work will be protected through the drying and as finished stages.

1.3 DESIGN CRITERIA

.1 To DIN 18032 Part II:
- .1 Shock absorbtion - 57%.
- .2 Deflection – 2.3 mm minimum.
- .3 Ball bounce - 90% minimum.
- .4 Surface friction - .5 - .7 range.
- .5 Rolling load - min. 1500 N.

1.4 QUALITY ASSURANCE

.1 Perform work in accordance with national building code of Canada, and any other codes or legislation in force as it might affect the work. Where there may be conflict between requirements the more stringent shall govern

.2 Installer must have 5 years continuous experience installing resilient wood.

.3 Any designated supervisor for this work shall be a full time employees of the contractor. Contracting out this wok will not be permitted without prior approval of the consultant.

.4 Manufacturer shall be an established firm experienced in field and have been in business or a minimum of ten (10) years.

.5 Manufacturer will be a member in good standing of the Maple Flooring Manufacturers Association (MFMA).

.6 Flooring contractor shall be a firm experienced in flooring field and approved by manufacturer. Submit a list of at least three completed projects of similar magnitude and complexity.

.7 Work shall be performed to the highest standards of workmanship obtainable. All products used and work completed are to be in accordance with drawings and specifications which make up the contract documents. Deviations from contract documents or scope of work will not be accepted without express written direction from the owner or consultant. Substitutions will not be accepted unless submitted and approved during tender process. Contractor will be responsible for correcting any work not complying with contract documents. All materials incorporated into work shall be new. Both the consultant and the owner will visit the site at intervals to determine in general if work is proceeding in accordance with contract documents. Visits will neither be exhaustive not continuous, contractor remains fully responsible for quality assurance and adherence of work to contract documents.

.8 Test performed by the owner in no way release the contractor from the obligation to perform their own quality assurance and should not be construed as acceptance of workmanship less and than contract standards.

.9 Work shall provide the owner with a long lived, fully bonded, attractive finished floor. Materials and work shall be free of defects and deficiencies upon completion. Air-pockets, convex or concave irregularities, delaminated layers, damaged materials, incomplete or inadequate bonding, insufficient or excessive application of materials, floor finish failure, tape residue causing pebbling of finish, or similar irregularities in the opinion of the consultant are unacceptable and shall be considered a deficiency under the contract documents and rejected by the consultant. Cost of correction of the aforementioned shall be entirely at the contractor's expense, nor shall the method of correction be less than to the initial contract standards. Where deficiencies are excessive in the opinion of the Owner the method of correction shall normally be to remove and replace

.10 The Owner shall not be responsible for and does not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs required for the work in accordance with the applicable construction safety legislation, or other regulations or general construction or trade practice. The consultant shall not be responsible for and does not have control or charge over the acts or omissions of the contractor, his sub-contractors or their agents, employees or other persons performing any of the work.

.11 Portions of the Owner's property, building and contents destroyed or damaged whether the result of poor workmanship, use of defective or improperly substituted products, or damage through carelessness or other act or omission of the contractor and whether incorporated in the work or not, shall be made good promptly at the expense of the contractor. The owner reserves the right to have such work performed and the cost thereof deducted from the contract value.

1.5 SUBMITTALS

.2 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.3 Submit Manufacturer's product specification sheets for all materials and proposed assembly.

.4 Submit shop drawings as required complete with game lines and sockets delineated.

.5 Submit MFMA Recommendations for correct preparation, finishing and testing of concrete subfloor surfaces to receive wood flooring.

.6 When requested, the contractor shall provide to the Owner verifiable original receipts, invoices and similar documentation for all specified materials. Invoicing from suppliers shall clearly indicate quantity, type of material (e.g. paint); paint tinting colour codes and similar information to more readily identify purchases.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for floor finish and care for incorporation into manual. Refer 01 78 00 Closeout Submittals.

1.7 MOCK-UPS

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up 10 m² minimum, of resilient wood flooring including one inside corner and base threshold.

.3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with Work.

.4 When accepted, mock-up will demonstrate minimum standard for Work. Mock-up may remain as part of finished work if accepted.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to the site in sealed original packaging / containers bearing the manufacturers original labels.

.2 Materials shall not be stored at the installation location if the moisture content of the concrete slab exceeds 4% or vapor transmission exceeding 4.5 pounds per 1,000 square feet (2.20 kg per 100 square meters). Contractor shall confirm moisture content through testing prior to application.

.3 Do not truck or unload flooring in rain, snow or other excessively humid conditions.

.4 Cover flooring with tarpaulin or vinyl if atmosphere is foggy or damp.

.5 Store in fully enclosed, well-ventilated, clean, dry building with weatherproof windows. Ambient temperature is to be no less than 13 deg Celsius and no more than 27 deg. celsius with a relative humidity of 35 to 65 deg celsius. Do not store materials in concentrations which exceed design live loads. Store all finish flooring on location for a minimum of 3 days prior to installation under proper ventilation.

.6 Leave adequate room for air circulation around stacks of flooring.

.7 Deliver flooring and divide into small lots in installation locations.

.8 Remove packaging and allow 6 days minimum for acclimation.

.9 Check and record moisture content of flooring and subflooring, and report findings to Consultant before beginning installation.

.10 Where material is damaged by the elements, improper handling or other causes, such material will be rejected and shall be replaced at no additional cost to the owner.

.11 Prior to installation Store material in the Ottawa area for a period of 30 days in a warehouse designed to propely store hardwood flooring. Building must be climate controlled and wood must be tested for moisture every 7 days.

.12 Protect all installed work and materials

.13 Take special precautions against fire. Comply with the requirements of authorities having jurisdiction. Provide and maintain adequate temporary fire protection equipment during performance of the work, as required by insurance companies having jurisdiction, governing codes, regulations and bylaws. Do not store volatile materials on site.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Divert unused floor finishes, caulking, and adhesive material from landfill to official hazardous material collections site.

.5 Do not dispose of unused floor finishes, caulking, and adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

.6 Divert unused wood materials from landfill to recycling or reuse

.7 Under no circumstances is the the owners waste handling equipment or bins to be used by the contractor. Failure to comply with this provision will result in deductions from the contract monies in the amount of owner costs incurred.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ventilation.
.1 Provide continuously during and after installation. Run system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of installation.

.3 Temperature. Maintain ambient temperature of not less than 13 ° C nor more than 27 ° C from 72 hours before installation to at least 48hours after completion of work and maintain relative humidity not higher than 40 % during same period. Consult MFMA guidelines for further information. Contractor shall maintain recording temperature and humidity equipment to document actual installation conditions. Maintain minimum temperature 13 ° C within area of installation until final acceptance of building.

.4 Ensure substrate is within moisture limits prescribed by flooring manufacturer.

.5 General Contractor is responsible to ensure slab is clean and free of all dirt and debris prior to floor installation beginning.

.6 After floors are finished, area to be kept locked by general contractor to allow curing time for the finish. If after required curing time general contractor or owner requires use of multipurpose room, he shall protect the floor by covering with non-fibered kraft paper or red rosin paper with taped joints, until acceptance by Consultant of complete gymnasium floor.

1.11 WARRANTY

.1 Project Warranty: Manufacturer shall extend warranty to 2 full years following substantial completion.

.2 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not a limitation of other rights that the Owner may have under the Contract Conditions. Warranty period on material and labour shall be extended from one year to two years.

.4 As a condition of contract the contractor shall supply to the owner a one (1) year 100% maintenance bond (in a form satisfactory to the owner). The bond shall be consistent with the guarantee requirements in the contract documents and shall be issued by the bonding company providing the performance and labour and materials bond under this contract

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Basis of design shall be **Bio-Cushion Classic** floor system as provided by Robbins Sports Surfaces for the Gymnasium Floor as the standard of acceptance. .

.2 Above Slab damp proofing: 0.25mm (10mil) Polyethelene sheet: vapour retarder application type 1 conforming to CAN/CGSB-51.34-M86.

.3 Gymnasium Subfloor:

1. 19mm (3/4")Robbins CPD Bio-Cushion Pads
   13mm (1/2") Plywood. Plywood to be dry
   16mm (5/8") Plywood. Plywood to be dry
   OR
   Provide alternative price to provide:
   Robbins 7/16" Zero/G™ shock pad.
   Bio-Channel LP Subflor panels that have been factory prepared to accept anchor channel.
   14 gauge metal LP Anchor Channels.
   1 layer of 7/16" (11mm) thick, 4' x 8' (1.22m x 2.44m) Exposure 1, APA Rated Sheathing.

   Any substitutions/proposed equivalents must be submitted prior to tender close and approved in writing by consultant

.4 Maple Flooring:

.1 33/32" x 1 1/2" (25mm x 38mm) MFMA-FJ of first grade maple of varying lengths to be tongue and groove on sides and ends. Kiln dried to a maximum moisture content of 7%. Each bundle should be stamped by manufacturer with grading mark.
OR
Provide alternative price to provide:
7/16" x .818" x 9" (11mm x 21mm x 229mm) MFMA-PQ Second & Better Square Edge, Edge Grain Kiln Dried Northern Hard Maple Flooring as manufactured by Robbins.
Grade: Third & Better Grade
Boston Square Pattern throughout Gymnasium only: Panels to be 27x27"" (685mm x 685mm) squares.
Certified Wood: FSC certified lumber.

Any substitutions/proposed equivalents must be submitted prior to tender close and approved in writing by consultant

.5 Fasteners: Purpose designed coated barbed nails for power nailing, 50mm long

.6 Finishing Materials:
- .1 Floor finish to be Bona Kemi Sprot Poly (low VOC Oil modified) finish.
- .2 Sealer to be Bona Kemi Sport seal (low VOC oil modified)
- .3 Fillers: as approved by floor manufacturer
- .4 Gameline paint(s) Bona Kemi sport Courtlines
  or as recommended by the finishing materials manufacturer.
  Must be compatible with the finish.
  Colours as follows:
  - .1 Badminton/Pickle Ball: White – 40mm wide
  - .2 Basketball: Practice Keys: Red – 50mm wide

.7 Perimeter Base : Johnsonite Ventcove heavy duty moulded rubber cove base. 75mm toe x 100 mm high with 10 mm diameter ventilating ports with channels along back side for ventilation of expansion void. Provide matching outside preformed corners.

.8 Fasteners for Base moulding to be Hilti HLD. No substitute allowed.

.9 Thresholds: Install thresholds with counter-sunk screw fastenings as required at all openings to span expansion/contraction space between wood floor and adjacent floor finish.

.10 Floor Sockets: Provide new 214 Speith Anderson floor sockets. and floor socket caps and rings. All sockets to be aligned as per drawings

.11 Materials such as tack rag solvents, varsol and any other material not specifically mentioned herein but required for top quality work shall be compatible with the floor finish when used in conjunction with the specifications as approved by the floor finish supplier

PART 3 - EXECUTION

3.1 INSPECTION

.1 Inspect existing concrete slab for proper tolerance and dryness, and **report any discrepancies to the construction manager in writing**. Slab will be level to within 1/8" (3mm) in a 10' (3m). Moisture content of the concrete slab shall not exceed 4% or vapor transmission exceeds 4.5 pounds per 1,000 square feet (2.20 kg per 100 square meters)

.2 As required, repair concrete floor in areas not meeting specified tolerances with self leveling compound, feather edges in accordance with manufacturers directions. For subfloor finish and patching use Elsro #950, Ardex L-800 Levelcrete self leveling liquid compound.

.3 The commencement of work will imply unconditional acceptance of the surfaces to receive work in this specification.

.4 Concrete Slab Depression: 60mm

.5 Surface Finish: steel toweled and finished smooth.

.6 Concrete Tolerance: 1/8" (3mm) in radius of 10' (3m).

.7 Compressive Strength: Concrete shall be a minimum of 3,000 psi (21 MPa) and a maximum of 4000 psi (28MPa) compressive strength after 28 days.

.8 Concrete shall be free of washed river gravel, pea gravel, flint or hardener additives. No lightweight concrete.

.9 All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the contractor.

,10 Subfloor shall be broom cleaned to completely remove all foreign matter

.11 Installer shall document all working conditions provided in General Specifications prior to commencement of installation.

3.2 INSTALLATION:

.1 Follow all manufacturers installation instructions.

.2 Install damp proofing over entire floor area, lap joints 150 mm and seal with adhesive tape. Turn up 75mm at the walls and seal.

.3 Install Robbins Bio-Cushion pads as per manufacturer's recommendations.

.4 Install the lower subfloor perpendicular to the intended finish flooring direction. All joints shall be staggered 4' and spaced ¼" (6mm) apart. Cut 155mm of the first layer of plywood at the starting wall and at one perpendicular end wall allowing pads and plywood to start 50 mm from these walls. Finish first layer of plywood by installing extra pads at the end of the two far walls as required.

.5 Install solid blocking at doorways in the indicated stacked position

.6 Install the upper subfloor diagonal to the lower subfloor panels staggering joints 4' and spacing ¼" (6mm) apart. Secure these panels using specified adhesive and 1" (25mm) staples placed 6" (150mm) On Center (O.C.) at panel perimeter and 12" (300mm) O.C. throughout interior.

.7 Machine nail maple finish flooring and ensure that proper spacing is provided for humidity conditions in specific regions. Provide 2" (50mm) expansion voids at the perimeter and at all vertical obstructions. Floor to be laid out in a staggered pattern with end joints at least 150mm apart with an even distribution of long and short boards. Install flooring in the direction of the longest dimension of the room. Countersink all nails. Leave 50mm perimeter around the room and at all projections.

.8 Install floor sockets at locations indicated. Secure socket housing in concrete sub-floor by grouting, ensuring socket vertical. Secure existing cap and ring and frame flush in wood floor surface.

3.3 FINISHING

.1 Sanding

.1 Sand per manufacturer's recommendations.

.2 After sanding, buff entire floor using 100 grit screen or equal grit sandpaper, with a heavy-duty buffing machine.

.3 Inspect entire area of floor to insure the floor presents a smooth surface without drum stop marks, gouges, streaks or shiners.

.4 Vacuum and/or tack floor before first coat of seal.

.5 Floor should be clean and completely free of dirt and sanding dust or any material which could adversely affect adhesion of finishes or appearance of final applied coatings Obtain consultant review prior to commencing sealing.

.2 Finishing

.1 Gymnasiums

.1 Apply specified combination of seal, gameline paint, and finish in accordance with manufacturer's instructions.

.2 Apply two coats of sealer at aprox. 6 square meters per litre prior to game line application, details and floor finishes. Allow to dry 6 hours of more between each coat.

.3 Buff and vacuum and/or tack between each coat after it dries.

.4 Apply game lines accurately after buffing and vacuuming the coated surfaces. Layout in accordance with drawings. For game lines, use current rules of association having jurisdiction. Lines shall be straight with sharp edges.

.5 Apply no less than 2 (two) coats of highest quality game line paint to lines allowing no less than 24h between applications of first and second coats. Each coat of paint including the final coat shall be textures and tacked off to ensure total adhesion of the succeeding application of material. Where necessary apply additional coats of paint to achieve totally solid line colours. All finished lines should be of uniform colour and texture and be free of streaks or brush marks. All paint shall be ready mixed using factory ground pigments and shall be free of streaks or sags to yield the highest quality finish.

.6 .Allow no less then 48 hours drying time between screening and tacking off of final paint coat and the application of finish coats or such longer time as may be necessary to ensure stabilization has been achieved. Ensure space is secured from all other persons.

.7 Remove all tape and correct any deficiencies in the game lines. Obtain consultants review of progress prior to commencement of application of finish coats

.8 Apply floor finish as per manufacturers instructions. Apply first coat of floor finish as recommended by the manufacturer, to a dry thickness finish. Finish to be applied at recommended thickness of 1.5 dry mils per coat (3 mils wet). Screen first coat using a no. 100 Disc. Remove all dust or any material that would affect

adhesion. Screen sufficiently to ensure total **(cont'd)** adhesion of next coat but not excessively. Apply three (3) additional coats allowing at least 24 hours dry time between coats. After screening second finish coat and prior to application of final finish coat obtain consultants review of progress prior to commencement of further work. Finish upon completion shall be of uniform thickness, sheen, and appearance and be free of imbedded particulate matter. Allow each finish coat to dry for no less than 24 hours before screening and application of next coat.

.9 Upon completion of each floor after 7 days curing time perform adhesion tests to verify that finish is properly adhered to the gym floor. Verify results of tests to the consultant. The owner reserves the right to perform additional adhesion tests. Allow within the contract price for properly refinishing tested areas at no additional cost to the Owner.

3.4 BASE INSTALLATION

.1 Install vented base with Hilti HLD fasteners to wall surface, spaced at 300 mm o.c. Mitre all joints at angle. Use pre-moulded outside corners and neatly mitre inside corners.

3.5 CLEANING

.1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

.2 Thoroughly clean up all residues and materials left behind by work performed.

3.6 PROTECTION

.1 Protect new floors from damage until final inspection. Prohibit traffic on floor after installation.

.2 Provide adequate cover for all finished work close to surfaces to be worked on.

.3 Provide adequate ventilation to ensure any off gassing is dissipated out of the school.

.4 Post " no smoking " signs and take steps necessary to minimize problems where volatile materials are being used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 09 30 13 - Ceramic Tile
.2 Section 09 65 16 - Resilient Sheet Flooring
.3 Section 09 68 13 - Tile Carpet

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM F 1066-04, Standard Specification for Vinyl Composition Floor Tile.
.2 ASTM F 1344-04, Standard Specification for Rubber Floor Tile.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
.2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.4 South Coast Air Quality Management District (SCAQMD), California State
.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit duplicate tile in size specified, 300 mm long base, feature strips, and transition profiles to other finishes. Stainless steel.

.4 Closeout Submittals:
.1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide 3 sq.m. of each colour, pattern and type flooring material required for this project for maintenance use.

.3 Extra materials from same production run as installed materials.

.4 Identify each container of floor tile and each container of adhesive.

.5 Deliver to Owner, upon completion of the work of this section.

.6 Store where directed by Owner .

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Vinyl composition tile: to ASTM F 1066, Composition 1 - non asbestos Class 1 - solid colour or Class 2 - through pattern tile , plain , 3.17 mm, 300 x 300 mm size, in standard colour indicated .

.1 Standard of acceptance: AMTICO Fortress Series. Colours as noted. Load Limit 300 psf

.2 Resilient base: PVC free rubber, straight/toeless, minimum 2400 mm length and 101mm high x 3mm thick, of colour selected by Consultant.

.1 Standard of acceptance: ROPPE TS/Pinnacle Rubber Type complete with premoulded corner blocks. Both in colours as selected.

.3 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.

.1 Flooring adhesives: compatible with and as recommended by manufacturer.

.1 Adhesive: maximum VOC limit 60 g/L to SCAQMD Rule 1168.

.2 Standard of Acceptance: HB Fuller TEC TA713

.2 Cove base adhesives:
.1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
.2 Standard of Acceptance: HB Fuller TEC TA714
.3 Vented base refer to Section 09 64 53 Resilient Wood Flooring.

.4 Sub-floor filler and leveler: 2 part latex-type filler requiring no water as recommended by flooring manufacturer for use with their product. Feather floor areas as required to ensure minimum transition height between floor finishes as noted on drawings. Standard of Acceptance: HB Fuller TA 320 Perfect Finish

.5 Metal edge strips: Schluter aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.6 Transition strips: Schluter stainless steel or aluminum profiles as noted to provide smooth transition between different finish heights.

.7 Sealer: to CAN/CGSB-25.20, Type 2-water based or type recommended by flooring manufacturer.
.1 Sealant:
.1 Sealant: maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.8 Wax: to CAN/CGSB-25.21 or type recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSPECTION

.1 Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the finished flooring material.

.2 Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, and hardening compounds; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold or mildew.

.3 Report conditions contrary to contract requirements which would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.4 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.5 Moisture Testing: Perform calcium chloride moisture test every 800 square feet of area. Advise Flooring Manufacturer's Technical Representative, Consultant and Project Manager of results.

If Calcium Chloride test results are found to be above Manufacturer's Written Recommendations perform Rapide R.H. Moisture Test by Wagner Electronics. The Contractor shall be paid $200 per Rapide R.H. Moisture Test performed.

.6 Wood subfloors shall not exceed 10% moisture content when measured with a Delmhorst Wood Moisture Tester.

.7 The pH level of the subfloor surface shall not be higher than that recommended in flooring manufacturers written documents. If higher, subfloor must be neutralized.

.8 Underlayment and Patching Compounds: Use only gray colored Portland cement based underlayments; patching compounds are used for filling cracks, holes and leveling. White gypsum materials are not acceptable.

3.3 SUB-FLOOR TREATMENT

.1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.3 Prime Seal concrete to flooring manufacturer's printed instructions.

3.4 TILE APPLICATION

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.

.4 Install flooring to square grid pattern with joints aligned with pattern grain parallel for units and parallel to width of room. Refer to drawings for patterns.

.5 As installation progresses, and after installation, roll flooring in 2 directions including resilient tile with 45 kg minimum roller to ensure full adhesion.

.6 Cut tile and fit neatly around fixed objects.

.7 Install feature strips and floor markings where indicated. Fit joints tightly.

.8 Install flooring in pan type floor access covers. Maintain floor pattern.

.9 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.10 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.11 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 BASE APPLICATION

.1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Remove excess adhesive from floor, base and wall surfaces without damage.

.3 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

3.8 PROTECTION

.1 Protect new floors from time of final set of adhesive until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 01 33 00 – Submittal Procedures
.2 01 45 00 – Quality Control
.3 01 61 00 – Common Product Requirements
.4 01 73 00 – Execution
.5 01 74 11 – Cleaning
.6 01 74 21 – Construction/Demolition Waste Management and Disposal
.7 03 35 00 – Concrete Finishing
.8 09 00 00 – Finish/Colour Schedule
.9 09 30 13 – Ceramic Tiling
.10 09 65 19 – Resilient Tile Flooring

1.2 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
.1 AATCC Test Method 16-2004, Colorfastness to Light.
.2 AATCC Test Method 23-2005, Colorfastness to Burn Gas Fumes.
.3 AATCC Test Method 129-2005, Colourfastness to Ozone in the Atmosphere Under High Humidities.
.4 AATCC Test Method 134-2006, Electrostatic Propensity of Carpets.
.5 AATCC Test Method 171-2005, Carpets: Cleaning of; Hot Water Extraction Method.
.6 AATCC Test Method 175-2008, Stain Resistance: Pile Floor Coverings.
.7 AATCC Test Method 189-2007, Fluorine Content of Carpet Fibers.

.2 ASTM International
.1 ASTM D 297-93(2006), Standard Test Methods for Rubber Products-Chemical Analysis.
.2 ASTM D 1335-05, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
.3 ASTM D 1667-05, Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
.4 ASTM D 3574-08, Standard Test Methods for Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams.
.5 ASTM D 3936-05, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-4.2 No. 22-2004, Textile Test Methods - Colourfastness to Rubbing (Crocking).
.2 CAN/CGSB-4.2 No.27.6M-2004, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
.3 CAN/CGSB-4.2 No. 76-94: , Textile Test Methods - Machine-Made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions.
.4 CAN/CGSB-4.2 No.77.1-94/ISO 4919:2000 , Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
.5 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.

.4 Carpet and Rug Institute (CRI)
.1 CRI Carpet Installation Standard 2009.
.2 CRI Green Label Indoor Air Quality Testing Program.
.3 CRI Green Label Plus Indoor Air Quality Testing Program.

.5 Environmental Choice Program (ECP)
.1 CCD-152-2009, Flooring Products, Commercial Non-modular Textile Flooring.

.6 Health Canada
.1 C.R.C., c.923-10, Hazardous Products Act - Carpet Regulations, Part II of Schedule 1.

.7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.8 National Floor Covering Association (NFCA)
.1 National Floor Covering Specification Manual 2007.

.9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-A2007, Architectural Coatings.
.2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.10 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC-S102.2-07, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile undercushion adhesive carpet protection subfloor patching compound and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.3 Shop Drawings:
.1 Information on shop drawings to indicate:
.1 Nap: direction, open edges, special patterns.
.2 Cutouts: show locations where cutouts are required.
.3 Edgings: show location of edge moldings and edge bindings.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit duplicate samples of each type of carpet tile specified and duplicate tiles for each colour selected, 150 mm length binder bars base divider strips.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test and Evaluation Reports:
.1 Certified test reports showing compliance with specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation and storage instructions.

.8 Manufacturers Reports:
.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance with specifications.
.2 Low-Emitting Materials:
.1 Submit listing of adhesives and coatings used in building, showing compliance with VOC and chemical component limits or restriction requirements.
.2 Submit listing of carpet , carpet backer and

adhesive used in building, showing compliance with CRI Green Label Indoor Air Quality Test Program.

.9 Qualification Statements:
.1 Compliance: to CAN/ULC-S102 and CAN/ULC-S102.2.
.2 Testing: passes testing requirements of:
.1 Green Label Plus Indoor Air Quality Testing Program.
.3 Tuft bind: meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

.3 Warranty Documentation: submit warranty documents .

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra stock materials : deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
.1 Quantity: provide minimum 10% of:
.1 Carpet tile.
.2 Carpet base.
.3 Adhesives.
.2 Delivery, storage and protection: comply with Owner's requirements for delivery and storage of extra materials. as Provide materials in original cartons.

1.6 QUALITY ASSURANCE

.1 Qualifications: .1 Manufacturer: capable of providing field service representation during construction and approving application method.
.1 Supplier: Centura
.2 Flooring Contractor:
.1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
.2 Certified by carpet manufacturer.
.3 Must not sub-contract labour without written approval of Consultant.
.4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.3 Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.

.4 Store and protect carpet tile and accessories in location as directed by Consultant.

.5 Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.

.6 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.7 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.8 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .

1.8 SITE CONDITIONS

.1 Ambient Conditions:

.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer. Prepare moisture testing and provide report.

.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.

.4 Ventilation:
.1 Co-ordinate operation of ventilation system during installation of carpet. Ventilate area of work by use of approved portable supply and exhaust fans.
.2 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.
.5 Install carpet after space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

1.9 WARRANTY

.1 Manufacturer's warranty: submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents.

.2 Warranty period: 1 year, commencing on date of substantial performance of work.
.1 Warranty covers labour and repair or replacement of defective components for 1 year after date of substantial performance.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Manufacturers:
.1 Ensure manufacturer has minimum 5 years experience in manufacturing components similar to or exceeding requirements of project.

.2 Description:
.1 Adhesives: VOC limit 150 g/L maximum to SCAQMD Rule 1168 GS-36.
.2 Primer and Sealer: in accordance with manufacturer's recommendations for surface conditions:
.1 VOC limit: 100 g/L maximum to SCAQMD Rule 1113
.3 Carpet and Accessories:
.1 Green Label certified.
.2 30% minimum Post-industrial and Post-consumer recycled content.

2.2 PERFORMANCE

.1 Flammability: certified for flammability to Health Canada regulations under "Hazardous Products - Carpet Regulations", Part II of Schedule 1.

.2 Flame Spread: maximum flame spread rating 300, maximum smoke developed classification 500, when tested to CAN/ULC-S102.2.

.3 Smoke Development: 450 or less per ASTM E 662.

.4 Dry Breaking Strength: to ASTM D 2661, minimum acceptable tear strength in both length and width:
.1 11.3 kg for carpets installed by glue down installation.

.5 Wear: maximum 10% of pile face fiber by weight for 10 years.

.6 Edge Ravel: none for 10 years.

.7 Static Resistance: permanent static control to AATCC 134, and 3000 V maximum at 20% RH and 22 degrees C.

.8 Static Generation: less than 3.0 kV per AATCC 134 for 10 years.

.9 Tuft Bind: Tuft Lock: to CAN/CGSB-4.129, minimum acceptable 1.6 kilograms for cut pile product 3.6 for loop pile product.

.10 De-lamination of Secondary Backing: Lamination Strength of Secondary Backing: to ASTM D 3936, minimum acceptable peel strength of 1.6 kg/25 mm.

.11 Stain resistance: to AATCC 175, 8.

.12 Colourfastness to light: to CAN/CGSB-4.2 No.18.3 AATCC 16.

.13 Colourfastness to atmosphere: to AATCC 129 and AATCC 23.

.14 Colourfastness to crocking: to CAN/CGSB-4.2 No. 22.

.15 Indoor Air Quality Certification: certified to CRI Green Label IAQ requirements.

.16 Millennium/Mill-00630 24 x 24 Monolithic Stacked or Brick by Centura, Harry Davies, 613 229 4308

2.3 ACCESSORIES

.1 Base:.
.1 See Finish Colour Legend Section 09 00 00

.2 Adhesive:
.1 Pressure Sensitive Type: recommended by carpet tile manufacturer for direct glue down installation of specialty backed carpet tiles. TEC TA 749 Centura
.2 On site application VOC limit: 150 g/L maximum to SCAQMD Rule 1168.
.3 Adhesive in compliance with CCD-152.

.3 Transition Mouldings:
.1 Carpet edge / reducer strip: Schluter type, Schluter – Reno T-K AE.

.4 Carpet protection: non-staining heavy duty kraft paper.

.5 Concrete floor sealer or primer: as recommended by carpet tile manufacturer.
.1 VOC limit: 100 g/L maximum to SCAQMD Rule 1113.

.6 Subfloor patching compound: Portland cement base filler, mix with water to form cementitious paste. Ardex Feather Finish - Centura

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section, co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
.1 Inform Consultant of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied. .

3.3 PREPARATION

.1 Subfloor Preparation:
.1 Inspect concrete and determine special care required to make it a suitable for carpet.
.2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible latex polymer fortified patching compound.
.3 Comply with manufacturer's written recommendations for maximum patch thickness.
.4 Prime large patch areas with compatible primer.
.5 Ensure concrete substrates are cured, clean and dry.
.6 Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
.7 Where powdery or porous concrete surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation.

.2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
.1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.

.3 Tile Carpeting Preparation:
.1 Pre-condition carpeting: following manufacturer's written instructions.

3.4 INSTALLATION

.1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard and co-ordinate with Section 01 73 00 - Execution.

.2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.

.3 Install carpet tile after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.

.4 Install carpet tile as per manufacturer's recommendation. This can include quarter-turn 90 degree format, monolithic, random, quarter turn ashlar, horizontal, herringbone or vertical ashlar. To be determined by Architect prior to installation.

.5 Snugly join carpet tiles in completed installation.
.1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer specifications.
.2 Do not trap yarn between carpet tiles.

.6 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.

.7 Use material from same dye lot.
.1 Ensure colour, pattern and texture match within visual areas.
.2 Maintain constant pile direction.

.8 Fit around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.9 Install carpet tiles to access covers.

.10 Install carpeting in pan type floor access covers.

.11 Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.12 Install carpet tiles smooth and free from bubbles, puckers, and other defects.

.13 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

.14 Base Installation: Install at perimeter of rooms as noted on Finish Schedule Section 09 00 00.

3.5 SITE QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Co-ordinate manufacturer's services with Section 01 45 00 - Quality Control. Have manufacturer review work involved in handling, installation / application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.
.2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
.3 Schedule site visits:
.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.
.4 Obtain reports within 3 days of review and submit immediately to Consultant.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Vacuum carpets clean immediately after completion of installation.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.

.3 Install carpet protection to satisfaction of Consultant.

.4 Repair damage to adjacent materials caused by tile carpeting installation.

3.8 ATTACHMENTS

.1 Schedules:
.1 Room Finish Schedule and Material Legend Section 09 00 00.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures
.2 Section 05 50 00 - Miscellaneous Metals
.3 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 Environmental Protection Agency (EPA)
.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - February 2004.
.2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.

.4 National Fire Code of Canada.

.5 Society for Protective Coatings (SSPC)
.1 Systems and Specifications, SSPC Painting Manual 2005.

.6 South Coast Air Quality Management District (SCAQMO) Rule 1113 - Paints and Coatings

.7 Green Seal Program
.1 GS-11 - paints (1993)
.2 GC-03-Anti Corrosive Paints (1997)

1.3 QUALITY ASSURANCE

.1 Qualifications:
.1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification

Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.

.7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.

.8 Standard of Acceptance:

.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.1 Provide paint products meeting MPI "Environmentally Friendly" E2 & E3 ratings based on VOC (EPA Method 24) content levels.

.2 Green Performance in accordance with MPI Standard GPS-1.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS - Material Safety Data Sheets. Indicate VOCs during application and curing.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 MPI Environmentally Friendly classification system rating.

.5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Provide samples in accordance with Section 01 33 00 -

Submittal Procedures.

.1 Submit duplicate 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 50 mm concrete block for finishes over concrete or concrete masonry surfaces.

.3 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

.3 Submit full range of available colours where colour availability is restricted.

1.6 QUALITY CONTROL

.1 Provide mock-up in accordance with Section 01 45 00 - Quality Control.

.2 When requested by Consultant or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.7 MAINTENANCE

.1 Extra Materials:

.1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit one four litre can of each type and colour of primer & finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:.

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels: to indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.
.4 Provide and maintain dry, temperature controlled, secure storage.
.5 Observe manufacturer's recommendations for storage and handling.
.6 Store materials and supplies away from heat generating devices.
.7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.
.10 Remove paint materials from storage only in quantities required for same day use.
.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
.12 Fire Safety Requirements:
.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
.4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
.5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
.1 Retain cleaning water for water-based materials

to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.7 Set aside and protect surplus and uncontaminated finish materials:. Deliver to or arrange collection for verifiable re-use or re-manufacturing.

.8 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

1.9 AMBIENT CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or

snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds:

.1 12 % for concrete and masonry (clay and concrete brick/block).

.2 15 % for wood.

.3 12 % for plaster and gypsum board.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

2.2 COLOURS

.1 Consultant will provide Colour Schedule after Contract award Submit proposed Colour Schedule to Consultant for approval.

.2 Colour schedule will be based upon selection of three base colours and one accent colour. No more than six colours will be selected for entire project and no more than two colours will be selected in each area.

.3 Selection of colours will be from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection will be based on limited range.

.5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Consultant's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte	0 to 5	max. 10

finish		
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

2.5 EXTERIOR PAINTING SYSTEMS

.1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
.1 EXT 2.1A - Latex zone/traffic marking finish.
.2 EXT 2.1B - Alkyd zone/traffic marking finish.

.2 Structural Steel and Metal Fabrications:
.1 EXT 5.1G - Pigmented polyurethane finish (over epoxy zinc rich primer and high build epoxy).

.3 Galvanized Metal: not chromate passivated
.1 EXT 5.3D - Pigmented polyurethane finish for use in high contact/high traffic areas.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and surface debris by wiping with dry, clean cloths.
.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
.5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
.6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been accepted by paint manufacturer's representative.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.3 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Consultant. Do not proceed with work until

conditions fall within acceptable range as recommended by manufacturer.

3.4 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Consultant.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Consultant.

3.5 APPLICATION

.1 Method of application to be as approved by Consultant. Apply paint by brush and roller . Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Use dipping, sheepskins or daubers when no other method is

practical in places of difficult access and when specifically authorized by Consultant.

.4 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

3.7 FIELD QUALITY CONTROL

.1 Inspection:
.1 Advise Consultant when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
.2 Co-operate with and provide access to areas of work.

.2 Manufacturer's Field Services:
.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.
.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
.1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.
.2 Sustainable requirements for construction and verification:

.2 Related Sections:
.1 Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
.2 Section 01 33 00 - Submittal Procedures.
.3 Section 01 35 29 - Health and Safety Requirements.
.4 Section 01 45 00 - Quality Control.
.5 Section 01 61 00 - Common Product Requirements.
.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.7 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)
.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)
.1 MPI Architectural Painting Specifications Manual, 2004.

.5 National Fire Code of Canada - 1995

.6 Society for Protective Coatings (SSPC)
.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

.7 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34 .

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.

.2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.

.3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

.2 Mock-Ups:

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.1 Provide mock-up. Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.

.2 Mock-up will be used:

.1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.

.3 Locate where directed

.4 Allow 24 hours for inspection of mock-up before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

.3 Pre-Installation Meeting:

.1 Convene pre-installation meeting two weeks prior to beginning work of this Section and on-site installations

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.4 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.

.3 Samples:
.1 Submit full range colour sample chips to indicate where colour availability is restricted.
.2 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
.1 3 mm plate steel for finishes over metal surfaces.
.2 13 mm maple plywood for finishes over wood surfaces.
.3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
.4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
.4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
.1 Lead, cadmium and chromium: presence of and amounts.
.2 Mercury: presence of and amounts.
.3 Organochlorines and PCBs: presence of and amounts.
.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.6 Manufacturer's Instructions:
.1 Submit manufacturer's installation and application instructions.
.7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.

1.5 MAINTENANCE

.1 Extra Materials:

.1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.

.2 Quantity: provide one four litre can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

.3 Delivery, storage and protection: comply with Consultant requirements for delivery and storage of extra materials.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.9 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).

.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan (WMP).

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal, regulations.

.7 Ensure emptied containers are sealed and stored safely.

.8 Unused paint coating materials must be disposed of at official hazardous material collections site as approved by Consultant.

.9 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.10 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.11 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.12 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure

proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.13 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.14 Set aside and protect surplus and uncontaminated finish materials:. Deliver to or arrange collection by, or organizations for verifiable re-use or re-manufacturing.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Provide continuous ventilation for seven days after completion of application of paint.

.3 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.4 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling

psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 Allow new concrete and masonry to cure minimum of 28 days.

.2 15 % for wood.

.3 12 % for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Only qualified products with E2 E3 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.7 Provide paint products meeting MPI "Environmentally Friendly", E2& E3 ratings based on VOC (EPA Method 24) content levels.

2.2 COLOURS

.1 Refer to 09 00 01 Room Finish Schedule for paint colour legend.

.2 Colours may be changed on outside and inside corners and along any surface. Allow for a maximum of three colours per room.

.3 Selection of colours from manufacturer's full range of colours.

.4 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

.5 The following is to be considered as the colour schedule: Refer to Section 09 00 00Interior Finishes Colour Legend.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN

.1 Paint gloss is defined as sheen rating of applied paint, in

RATINGS

accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete vertical surfaces: including horizontal soffits:
.1 INT 3.1E - Latex G4 Premium Grade
.2 INT 3.1G - Waterborne epoxy finish for smooth concrete, Premium Grade:

.2 Concrete horizontal surfaces: floors and stairs:
.1 INT 3.2B - Alkyd floor enamel low gloss finish for painted concrete floors. Premium grade.
.2 INT 3.2G - Concrete floor sealer for floors indicated to receive finish sealer.

.3 INT 3.2L - Waterborne epoxy floor finish for floors indicated to receive "EPX" finish premium grade.

.3 Concrete masonry units: smooth and split face block and brick:
.1 INT 4.2D - High performance architectural latex G4 Premium grade finish.
.2 INT 4.2K - Waterborne light industrial G5 premium grade

.4 Structural steel and metal fabrications: columns, beams, joists:
.1 INT 5.1E Alkyd - G5 premium finish.

.5 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
.1 INT 5.3B - Waterborne light industrial G5 premium coating.

.6 Dressed lumber: including doors, door and window frames, casings, mouldings:
.1 INT 6.3A - High performance architectural latex G5 premium grade finish for painted wood.
.2 INT 6.3S - Clear fire retardant finish (ULC rated), for fire treated wood.
.3 INT 6.3Z - Clear (2 component) polyurethane finish. Premium grade.

.7 Wood paneling and casework: partitions, panels, shelving, millwork:
.1 INT 6.4J - Polyurethane varnish G4 premium finish.
.2 INT 6.4Y - Clear lacquer G4 premium grade finish.
.3 SHEEN – Furniture finish (semi-gloss)

.8 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
.1 INT 9.2B - High performance architectural latex G2 - all ceilings/bulkheads, G4 in "public" areas, walls premium grade finish.

.9 Canvas and cotton coverings.
.1 INT 10.1A - Latex G4 premium grade finish.

.10 Bituminous coated surfaces: cast iron pipe, concrete, etc.:
.1 INT 10.2A - Latex G4 premium grade finish.

2.6 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
- .1 Stucco, plaster and gypsum board: 12 %.
- .2 Concrete: 12 %.
- .3 Clay and Concrete Block/Brick: 12 %.
- .4 Wood: 15 %.

3.4 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as

necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by wiping with dry, clean cloths.

.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly.

.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.

.6 Use trigger operated spray nozzles for water hoses.

.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Paint Manufacturer's Representative

3.5 APPLICATION

.1 Method of application to be as approved by Consultant. Apply paint by brush,roller and airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
.1 Apply paint in uniform layer using brush and/or roller type suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
.4 Brush out immediately all runs and sags.
.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of

interior cupboards and cabinets and projecting ledges.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

.11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.10 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface

when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD QUALITY CONTROL

.1 Standard of Acceptance:
.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
.2 Ceilings: no defects visible from floor at 45 degrees degrees to surface when viewed using final lighting source.
.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.2 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Cooperate with inspection firm and provide access to areas of work.

.4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittals
.2 Section 01 45 00 - Quality Control
.3 Section 01 61 00 - Common Product Requirements
.4 Section 01 74 11 - Cleaning
.5 Section 01 78 00 - Closeout Submittals
.6 Division 22 Plumbing

1.2 REFERENCES

.1 ASTM International
.1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
.2 ASTM B 456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
.3 ASTM A 653/A 653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
.2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
.3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 CSA International
.1 CAN/CSA-B651-04, Accessible Design for the Built Environment.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars .

.4 Samples:
.1 Submit samples if requested.
.2 Samples will be returned for inclusion into work.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:
.1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
.2 Deliver special tools to Owner.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Sheet steel: to ASTM A 653/A 653M with ZF75 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A 167, Type 304, with satin finish.

.3 Sustainability Characteristics:
.1 Laminate Adhesives.
.1 Urea Formaldehyde Free.

.4 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: double roll type, surface mounted, steel frame, roll under spring tension for controlled delivery. One in W/C 218 and one in Universal WC 219

.1 Bradley Model 5A00 Recessed Mounted Multi-Roll Toilet Tissue Dispenser.

.2 Recess mounted waste receptacle: interior of 0.8mm stainless steel, exterior of 0.76mm stainless steel. Removable .92mm stainless steel waste receptacle, lockable to cabinet. Provide 12 gal. vinyl liner #P11-044. One in WC 218 and one in Universal W/C 219.

.1 Bradley Model 3A05 Recessed Waste Container.

.3 Soap dispenser: liquid push-in valve spout, self contained, 1.2 L stainless steel, tamper proof filler lock, surface mounted.

.1 Bradley Model 6326-68 Lavatory Mounted soap dispenser or equal. One in W/C 218 and one in Universal W/C 219. Lavatory mounted.

.4 Grab bars: 32 mm diameter x 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Grab bar material and anchorage to withstand 1.3kN applied in all directions. All stainless steel finish. Lengths and angles as per drawings. Refer to interior elevations for detail information.

.5 Baby Change Station: horizontal, wall-mounted polypropylene cabinet and bed with 18 ga. exterior stainless steel finish .

.1 Koala Kare KB110-SSRE Horizontal Recessed Mounted SS Finish Baby Changing Station. One in Universal W/C 219.

.6 Mirrors:

1. Full height Mirror: tempered glass, welded frame. Min. 24” w x 40” high (610 x 1020). ¼” (6mm) tempered mirror glass. One in WC 218 and one in Universal WC219. Refer to drawings for mounting heights. Acceptable product: Bradley 781-2440-2 or equal.

.7 Sanitary Product Disposal: surface mounted, stainless steel, self-closing panel c/w tumbler lock. One in WC 218 and one in Universal WC.219.

1. Bradley 4A00 Recessed Sanitary Product disposal Unit

.8 Dyson Airblade V /HU02 Low Voltage: 120volt, 1000 watt digital brushless motor, surface mounted, sprayed nickel, Provide stainless steel backplate Dyson 964691-01 Hand Dryer Back Panel. One in WC 218 and one in Universal WC.219.

1. Dyson Airblade V /HU02 Low Voltage 307174-01
2. Dyson Hand Dryer Back 964691-01

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

.1 Chrome and nickel plating: to ASTM B 456, satin finish.

.2 Manufacturer's or brand names on face of units not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories

previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
.4 Toilet and shower compartments: use male to female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

.5 Install mirrors in accordance with manufacturers instructions.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.6 SCHEDULE

.1 Locate accessories where indicated on interior elevations and plans and as follows. Exact locations determined by Consultant.

.2 Toilet tissue dispenser: one in each WC & UWC mounting height 600-700 mm above finished floor.

.3 Combination towel dispenser/waste receptacles: one in each WC & UWC. Maximum height of dispenser and operable part from floor 1200 mm.

.4 Soap dispenser: one rim mounted on each lavatory.

.5 Grab bar:

.1 Universal WC 219: One L-shaped with 760mm long horizontal and vertical components mounted with the horizontal component at 800mm AFF and vertical component 150mm from the front of the toilet bowl, and one 600mm long mounted horizontally on the wall behind the water closet from 840mm to 920mm AFF. Refer A8.02 for detail and location

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures
.2 Section 01 35 30 – Safety Requirements
.3 Section 01 45 00 – Quality Control
.4 Section 01 56 00 – Temporary Barriers and Enclosures
.5 Section 01 61 00 – Common Product Requirements
.6 Section 01 71 00 – Examination and Preparation
.7 Section 01 73 00 – Execution
.8 Section 01 74 11 – Cleaning

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D 422-632002, Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).
.5 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ^{3}) (2,700 kN-m/m ^{3}).
.6 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
.2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 Geotechnical Investigation Dovercourt Recreational Centre

Expansion Phase II 1525834-1000 dated July 2015 and Addendum No.1-Additional Geotechnical Input Proposal No. 1525834-01 dated May 12, 2017 and prepared by Golder Associates shall take precedent over any paragraph of this section.

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be required common excavation and unclassified excavation.

.1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Rock Excavation is any rock larger than 1.5 m3 and will be the definition if encountered on site

.2 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.4 Notify Geotechnical Engineer of any suspect materials and comply with site recommendations where requested.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Inform Engineer at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Divert excess aggregate materials from landfill to local quarry for reuse as directed by Consultant.

1.7 EXISTING CONDITIONS

.1 Examine soil report included herein.

.2 Buried services:
.1 Before commencing work verify and establish location of buried services on and adjacent to site.
.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
.5 Prior to beginning excavation Work, notify applicable Engineer authorities having jurisdiction establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
.6 Confirm locations of buried utilities by careful test excavations.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered

and as indicated.

.8 Where utility lines or structures exist in area of excavation, obtain direction of Engineer before removing or re-routing. Costs for such Work to be paid by Owner.

.9 Record location of maintained, re-routed and abandoned underground lines.

.10 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:

.1 Conduct, with Engineer, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed.

.3 Where required for excavation, cut roots or branches as directed by Consultant .

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Type 1 fill: OPSS Granular B Type 1 or clean sand conforming to OPSS 1010 as non-frost susceptible backfill. Maximum 300 mm lifts. Compacted to 95% of materials standard Proctor maximum dry density.

.2 Type 2 fill: OPSS Granular B Type II conforming to OPSS 1010. Maximum 300 mm lifts. Compacted to 95% of materials standard Proctor maximum dry density.

.3 Type 3 fill: OPSS Granular A conforming to OPSS 1010

.4 Unshrinkable fill: Refer to specification Section 03 30 00 Cast in Place Concrete

.5 Pavement Areas: refer to Geotechnical Report for granular fill profiles, asphalt thicknesses and compaction densities. Review cross sections of existing disturbed paved areas with Geotechnical engineer and reinstate as directed.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according

CONTROL

to requirements of authorities having jurisdiction sediment and erosion control drawings, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/ PROTECTION

.1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.4 Protect buried services that are required to remain undisturbed.

.5 Bottom of excavations / surface of native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of subgrade preparation. Dewatering may be required.

3.4 STOCKPILING

.1 Stockpile fill materials in areas designated.
.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Ontario
.1 Where conditions are unstable, Engineer to verify and advise methods.

.2 Obtain permits from authority having jurisdiction.

.3 Construct temporary Works to depths, heights and locations as required.

3.6 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide details of proposed dewatering or heave prevention methods.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering in advance of excavating.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 A Permit-to-Take-Water would be required prior to lowering the groundwater level to permit excavations below the water table as per geotechnical report.

3.7 EXCAVATION

.1 Remove concrete, masonry, paving, walks demolished foundations and rubble and unselected fill material and any other obstructions encountered during excavation.

.2 Excavation must not interfere with bearing capacity of adjacent foundations.

.3 Excavations into the bedrock should be avoided due to its high hydraulic conductivity.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 For trench excavation, unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.6 Keep excavated and stockpiled materials and large boulders safe distance away from edge of trench.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material off site.

.9 Earth bottoms of excavations to be inspected by Geotechnical consultant to confirm undisturbed soil, level, free from loose, soft or organic matter. Bottom of excavations/surface native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of sub-grade preparation. De-watering may be required.

.10 Bottom of excavations / surface of native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of subgrade preparation. Dewatering may be required.

.11 Notify Engineer when bottom of excavation is reached.

.12 Obtain Engineer approval of completed excavation and bearing capacity.

.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Engineer.

.14 Correct unauthorized over-excavation as follows:
.1 Fill under bearing surfaces and footings with concrete specified for footings or as directed by the Geotechnical consultant.
.2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.15 Hand trim, make firm and remove loose material and debris from excavations.
.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.8 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
.1 Exterior side of perimeter walls: use Type 1 fill to subgrade level. Compact to 98 % of corrected maximum dry density.
.2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 98 % of corrected maximum

dry density.

.3 Under concrete slabs: provide 150 mm compacted thickness base course of Type 3 fill to underside of slab. Compact to 98% SPMDD.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated and as specified with 150 mm bed of Type 3 fill to spring line of pipe. Cover from spring line to at least 300mm above pipe obvert. Place in 300 mm lifts and compact to 95% of Standard Proctor Maximum Dry Density.

.2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Engineer has inspected and approved installations.

.2 Engineer has inspected and approved of construction below finish grade.

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer to 95% of Standard Proctor Maximum Dry Density.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed .3 m.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Engineer or:

.2 If approved by Engineer, erect bracing or shoring

to counteract unbalance, and leave in place until removal is approved by Engineer.

3.11 RESTORATION

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant.

.2 Install topsoil to grade and thickness noted on landscape drawings and specifications..

.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by Consultant.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION