PARKIN
ARCHITECTS LIMITED

Federal Building
Arviat, Nunavut

Project No. 1408-00
Date: April 07, 2015
Issued: For Bid

VOLUME 1

Bid Set No. _____

PART 1 - THE CONSULTANTS

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END OF DOCUMENT

The following professional seals and signatures are provided as required by the National Building Code, including amendments thereto, for above Project and apply only to those documents written by Architectural, Structural, Mechanical, Electrical, Landscaping and Civil *Consultants.*

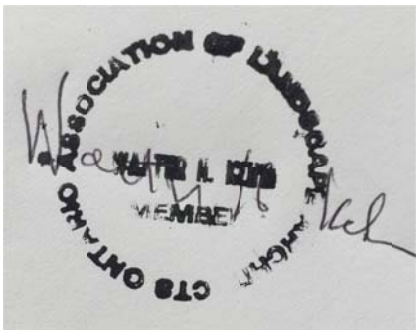
Architectural
Specifications (A)

Structural
Specifications (S)

Mechanical
Specifications (M)

Electrical
Specifications (E)

Civil
Specifications (C)



Landscape
Specifications (L)

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* - SPECIFICATIONS PREPARED BY CONSULTANTS OTHER THAN PARKIN ARCHITECTS LIMITED HAVE BEEN PREFIXED WITH AN ASTERISK. THESE SPECIFICATIONS ARE NOT INCLUDED UNDER, NOR GOVERNED BY, PARKIN ARCHITECTS LIMITED’S SEAL

END OF DOCUMENT

PART 1 -GENERAL

1.1 DRAWINGS

.1 Architectural, *Structural, *Mechanical, *Electrical, *Civil and *Landscape Drawings forming part of the Contract Documents are those listed on Drawing No. 1408-A-000 dated “April 07, 2015" with the following statement in the revision column:

.1 “Issued for Tender, 04-07-2015”.

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PART 1 -GENERAL

1.1 DATES

.1 The Schedules are dated Issued for Bid, April 07, 2015.

PART 2 - SCHEDULES (BOUND WITH SPECIFICATIONS)

2.1 ROOM FINISH SCHEDULE

.1 Room Finish Schedule Abbreviations (1 page).

.2 Room Finish Schedule (2 pages).

2.2 DOOR SCHEDULE

.1 Door Schedule Abbreviations (1 page).

.2 Door Schedule (3 pages).

.3 This Document contains following sketches related to Door Schedule:
- .1 Sheet Number: 1408-A1000 Door Types
- .2 Sheet Number: 1408-A2000 Frame Types
- .3 Sheet Number: 1408-A2001 Screen Types
- .4 Sheet Number: 1408-A2002 Door Types
- .5 Sheet Number: 1408-A3000, A3001, A3002, A3003, A3004, A3005, A3006 and 3007 Frame Details

2.3 ACCESSORIES SCHEDULE

.1 Accessories Schedule Abbreviations (1 page).

.2 Accessories Schedule (1 page).

2.4 HARDWARE SCHEDULE**

.1 No. Pages: 14

2.5 FURNITURE AND EQUIPMENT SCHEDULES

.1 Refer to Drawing 1408-A-131.

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** - Schedules prepared by Consultants other than Parkin Architects Limited have been prefixed by an asterisk and are not included under, nor governed by, Parkin Architects Limited's seal.

END OF DOCUMENT

Room Finish Schedule Abbreviations

Federal Building
Project No.1408-00

Issued for tender April 7, 2015

Flooring	Description
SR-1	Epoxy Seamless Flooring
MRW	Mechanical Room Waterproofing
SHV-1	Sheet Vinyl
SHV-S2	Sheet Vinyl - Safety
SHV-S4	Sheet Vinyl - Safety for wet areas
CT-1	Porcelain Tile - Special (See Specs) 600x300mm size
CT-2	Porcelain Tile- Special (See Specs) 50x50mm Hexagon or Square Mosaic
H. CONC	Hardened Concrete with Sealer

Walls	Description
MRGB	Gypsum Board - Moisture Resistant
IRGB	Impact Resistant Gypsum Board
GB	Gypsum Board
GS	3/8" Galvanized Steel Plate
G1S	Good One Side Plywood
VWP	PVC-free Wall Protection Covering

Ceiling	Description
ACT-1	2'X4' Acoustic Ceiling Tile
ACT-2	2'x4' Acoustic Ceiling Tile Security Rated
ACT-4	2'x4' Vinyl Ceiling Tile
R-1	Suspended Acoustic Panels
BULK	Bulkhead
EXP	Exposed Structure
WSC	Wood Clear Stained Cedar - 4" T & G, V - Groove
GB	Gypsum Board
PMCT	2' x 2' Perforated Metal Ceiling Tile
G1S	Good One Side Plywood

Base	Description
RB-1	4" Coved Resilient Base
CT-1	4" Ceramic Tile Base

Finishes	Desription
PLAM-1	Plastic Laminate Material
PT-1	Paint
PT-E1	Epoxy Coating
ECR-1	Reinforced Epoxy Coating
CS	Clear Stained
FCC	Flame Control Coating

Notes

1. Millwork and Casework base to match room wall base, including integral base, see schedule
2. Allow for 3 accent paint colours per room.
3. All stairwells unless noted to have safety flooring, resilient base and Rubber Tread System.
4. Finishes in closets to match room finishes, unless noted otherwise
5. All fire hose cabinets (inside & out), electrical panels, grills or exposed conduit to be painted to match surface to which it is mounted
6. All door headers to MATCH wall surface paint colour
7. Painted bulkheads to be painted on all sides in colour indicated on finish and colour schedule
8. Coved base to match floor colour
9. Refer to plans for corner guard locations

Room Colour and Finish Schedule

Federal Building
Project No.1408-00

Issued for Tender April 07, 2015

Facility	Floor	Room Number	Floor Material	Base Material	Walls Material	Walls Finish	Ceiling Material	Ceiling Finish	Remarks
NAME OF THE DEPARTMENT OR AREA									
	L1	100	CT-1	CT-1	GB GL	PT-1 -	GB	PT-1	
	L1	101	SHV-1	RB-1	GB	PT-1	PMCT WSC	CS	Clear Finish for T & G wood V-Joint- Refer to specs. Install suspended acoustic panels (R-1) as indicated on the reflected ceiling plan.
	L1	102	SHV-1	RB-1	MRGB CT-3	PT-1 -	ACT-4		
	L1	103	SHV-1	RB-1	GB	PT-1	GB	PT-1	
	L1	104	SHV-1	RB-1	GB	PT-1	PMCT WSC	CS	Bulkhead to be Perforated Metal Ceiling Tile - Refer to specs. Clear Finish for T & G wood V-Joint- Refer to specs.
	L1	105	SHV-1	RB-1	GB	PT-1	WSC	CS	Bulkhead to be Perforated Metal Ceiling Tile - Refer to specs. Clear Finish for T & G wood V-Joint- Refer to specs. Install suspended acoustic panels (R-1) as indicated on the reflected ceiling plan.
	L1	106	SHV-1	RB-1	GB	PT-1	GB	PT-1	
	L1	107	SHV-1	RB-1	GB	PT-1	ACT-1 WSC BULK GB	CS PT-1	Clear Finish for T & G wood V-Joint- Refer to specs. Install suspended acoustic panels (R-1) as indicated on the reflected ceiling plan.
	L1	108	CT-1	CT-1	GB	PT-1	GB	PT-1	
	L1	109	SHV-S2	RB-1	GB VWP	PT-1	GB	PT-1	PVC-Free Wall Protection- Refer to specs.
	L1	110	SHV-1	RB-1	GB	PT-1	ACT-1		
	L1	111	SHV-1	RB-1	GB	PT-1	ACT-1 BULK GB	PT-1 PT-1	
	L1	112	SHV-S2	RB-1	GB	PT-1	ACT-1		
	L1	113	SR-1	SR-1	IRGB GS	PT-1 -	IRGB	PT-1	GS - applied on all walls
	L1	114	SHV-S2	RB-1	GB	PT-1	ACT-1		
	L1	115	SHV-S2	RB-1	GB	PT-1	ACT-1		
	L1	116	SR-1	SR-1	GB	PT-1	ACT-1		
	L1	117	SHV-S2	RB-1	GB	PT-1	ACT-1		
	L1	118	SHV-S2 SHV-S4	RB-1 RB-1	GB MRGB CT-3	PT-1 PT-E1 -	GB MRGB	PT-1 PT-E1	PT-E1 , in shower area.
	L1	119	SHV-1	RB-1	GB	PT-1	ACT-1		
	L1	120	MRW	MRW	GB	PT-1	EXP		
	L1	121	H. CONC.	RB-1	IRGB	PT-1	EXP		
	L1	122	H. CONC.	RB-1	IRGB	PT-1	EXP		
	L1	123	SR-1	SR-1	IRGB	PT-1	ACT-2		
	L1	124	SR-1	SR-1	IRGB	PT-1	BULK ACT-2	PT-1	
	L1	125	SR-1	SR-1	GB	PT-E1	ACT-1		
	L1	126	SR-1	SR-1	MRGB	PT-E1	ACT-1 MRGB	PT-1	
	L1	127	SR-1	SR-1	IRGB	ECR-1	IRGB	PT-E1	Ensure the IRGB is moisture resistant also.
	L1	128	SR-1	SR-1	IRGB G1S	PT-1	IRGB	PT-1 PT-1	. Good One Side Plywood on East wall only - refer to plan
	L1	129	SR-1	SR-1	IRGB	PT-1	ACT-2		
	L1	130	SR-1	SR-1	IRGB	PT-1	ACT-2		
	L1	131	SR-1	SR-1	GB VWP	PT-1	GB	PT-1	PVC-Free Wall Protection- Refer to specs.
	L1	132	SR-1	SR-1	IRGB	PT-1	IRGB	PT-1	
	L1	133	SR-1	SR-1	G1S	FCC	G1S	FCC	Use Fire Retardant Intumescent Paints for interior use, refer to specifications
	L1	134	SR-1	SR-1	G1S	FCC	G1S	FCC	Use Fire Retardant Intumescent Paints for interior use, refer to specifications

Room Colour and Finish Schedule

Federal Building
Project No.1408-00

Issued for Tender April 07, 2015

Facility	Floor	Room Number	Floor	Base	Walls		Ceiling		Remarks
			Material	Material	Material	Finish	Material	Finish	
	L1	135	SR-1	SR-1	G1S	FCC	G1S	FCC	Use Fire Retardant Intumescent Paints for interior use, refer to specifications
	L1	136	SR-1	SR-1	G1S	FCC	G1S	FCC	Use Fire Retardant Intumescent Paints for interior use, refer to specifications
	L1	137	SR-1	-	G1S	PT-1	G1S	PT-1	
	L1	138	SR-1	-	G1S	PT-1	G1S	PT-1	
	L2	201	MRW	MRW	GB	PT-1	EXP		

Door / Screen Schedule Abbreviations

Federal Building

PROJECT NO. 1408-00

Issued for Tender April 07, 2015

Door Material Descriptions			**Door Finish Descriptions**	
HM	Hollow Metal		PLAM	Plastic Laminate
IHM	Insulated Hollow Metal		PT	Paint
WD	Flush Wood Core Door			
FG	Fibreglass Insulated Door			
Door/Screen Frame Material Descriptions			**Door/Screen Frame Finish Descriptions**	
PS	Pressed Steel		PT	Paint
IPS	Insulated Pressed Steel			
FG	Fibreglass Insulated Frame			
Glazing Descriptions			**Fire Rating Descriptions**	
GL	Glass		45 min.	45 minute Fire Separation
LGL	Laminated Glass		90 min.	90 minute Fire Separation
SGL-AR1	Security Laminated Glass - Attack resistent			
TGL	Tempered Glass			
WGL	Wired Glass			
DG-2	Insulated Glazing Unit			

DOOR & SCREEN SCHEDULE

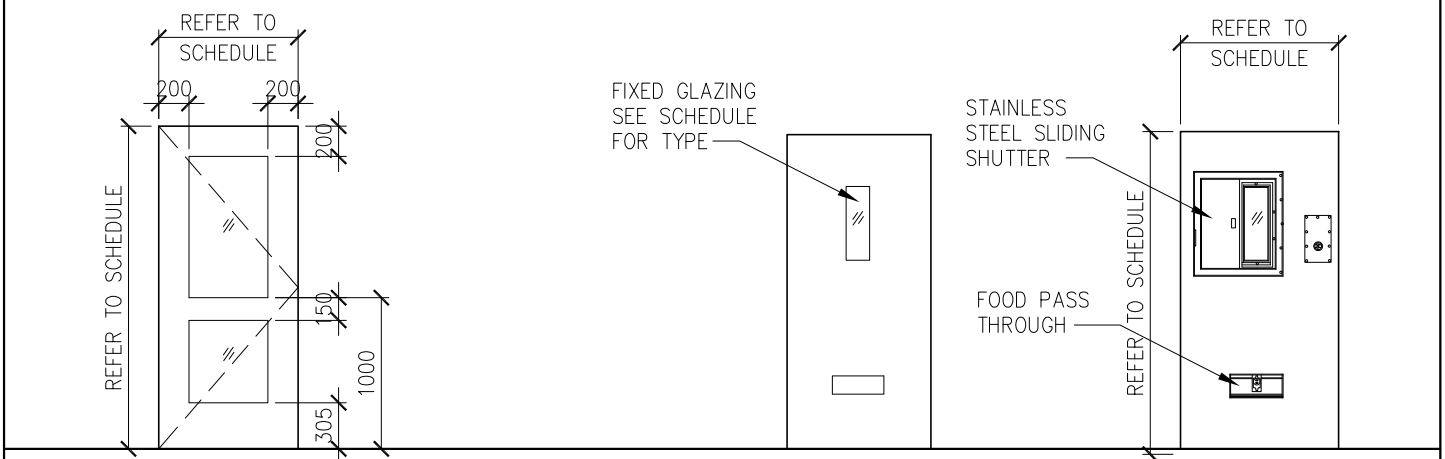
Federal Building
PROJECT NO. 1408-00

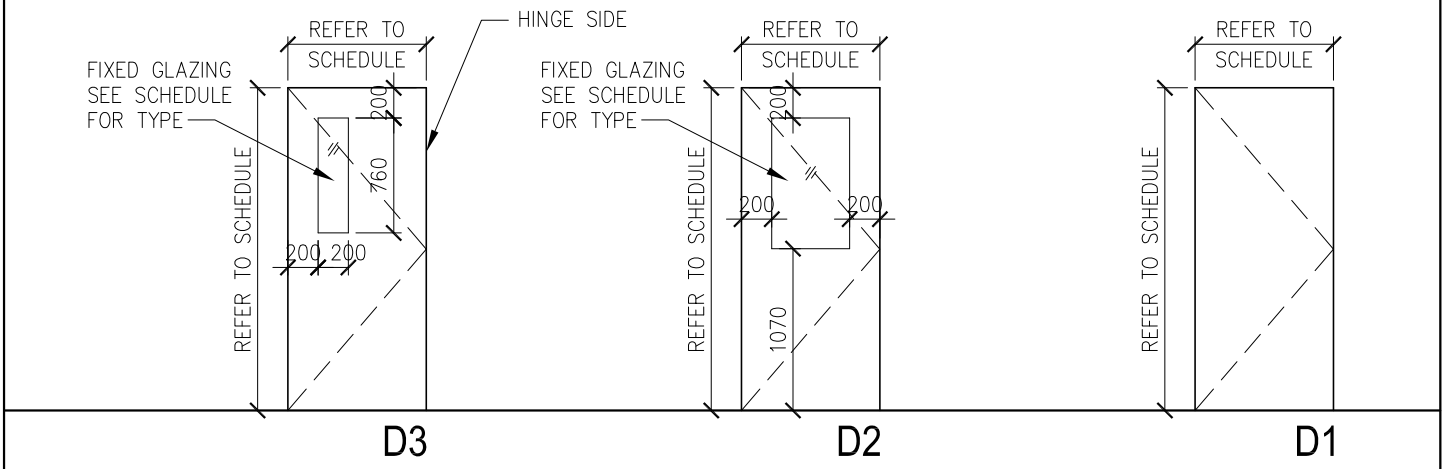
Issued for Tender Arpil 07, 2015

Floor	Door No.	Room No.	DOOR							FRAME				Fire Rating	Hardware	Door Remarks/Detail Numbers
			Width	Hght	Thk.	Type	Mat.	Finish	Gl.	Type	Mat.	Finish	Gl.			
Level 1																
L1	100A	Rm 100	915	2134	45	D1	FG	PT		F2	FG	PT				Exterior door, Fiberglass frame and door, Strike bucket with deadbolt and handicap access. Door Frames: Thresholds are not to exceed 13 mm in height and should be bevelled at edges to accommodate the entry of a person in a wheelchair. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	100B	Rm 100	915	2134	45	D6	HM	PT	SGL-AR1	F3	PS	PT	GL			See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	101	Rm 101	915	2134	45	D3	HM	PT	Gl.	F1	PS	PT				Reception - Public (Operations). See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	102	Rm 102	915	2134	45	D1	WD	PLAM		F1	PS	PT				Door: 45 mm solid-core wood conforming to CSA-0132.2-M1990. Locks: See App. III-3-2. Schedule "B". Public (off reception area) - Access controlled by detachment staff. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	103A	Rm 103	915	2134	45	D3	HM	PT	Gl.	F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip, closer, (do not drill /install peep hole door viewers in acoustic doors). See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	103B	Rm 103	915	2134	45	D3	HM	PT	Gl.	F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip, closer, (do not drill /install peep hole door viewers in acoustic doors). See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	106	Rm 106	915	2134	45	D2	HM	PT	TGL	F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip. Door Frame CONSIDERATION: weather stripping on door and may include threshold and door sweep where required to enhance speech privacy as directed by STC door supplier. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	107A	Rm 107	915	2134	45	D1	HM	PT		F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip, closer, . Multipurpose to operations area: apply weatherstrip and door sweep to enhance speech privacy as directed by STC door supplier. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	107B	Rm 107	915	2134	45	D3	HM	PT	Gl.	F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip, closer, (do not drill /install peep hole door viewers in acoustic doors). From Reception to the multipurpose room: See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	107C	Rm 107	Width of room	Full		Accordian	Vinyl	Vinyl coated fabric		Custom structural for track						See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	108A	Rm 108	915	2134	45	D3	HM	PT		F1	HM	PT				Door Frames: All other vestibule door frames: 1.6 mm steel having a strike bucket which will accept a 25mm throw deadbolt. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	108B	Rm 108	915	2134	45	D1	IHM	PT	Gl.	F2	IPS	PT				Exterior door, insulated thermally broken frame, Strike bucket with deadbolt. Door Frames: 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Thresholds are not to exceed 13 mm in height and should be bevelled at edges to accommodate the entre of a person in a wheelchair. Locks: See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	109	Rm 109	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	110	Rm 110	915	2134	45	D1	HM	PT		F1	PS	PT				See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	112	Rm 112	915	2134	45	D1	HM	PT		F1	PS	PT				See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	113	Rm 113	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Door Hinge c/w non-removable pins. 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Wedge in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware. Ballistic resistent door.
L1	114	Rm 114	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Door Hinge c/w non-removable pins. 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Wedge or grout in the area of the strike bucket to prevent spreading. Apply 1 1/2 pair with nonremovable pins on reverse hand door.See Hardware Schedule part of spec. section 08 71 00 for door hardware.

Floor	Door No.	Room No.	DOOR							FRAME				Fire Rating	Hardware	Door Remarks/Detail Numbers
			Width	Hght	Thk.	Type	Mat.	Finish	Gl.	Type	Mat.	Finish	Gl.			
L1	115	. Rm 115	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Door Frame: 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Grout or wedge in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	116	Rm 116	915	2134	45	D1 Ballistic	HM	PT		F1	PS	PT		45 MIN		Ballistic construction for door type in Secure Exhibit Room, Door Hinge c/w non-removable pins. Door Hinge c/w non removable pins. 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Wedge in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	117	Rm 117	915	2134	45	D1	WD	PLAM		F1	PS	PT				Door: 45 mm solid-core wood, conforming to CSA-0132.2-M1990. Door Frame: Steel. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	118	Rm 118	915	2134	45	D1	WD	PLAM		F1	PS	PT				Door: 45 mm solid-core wood conforming to CSA-0132.2-M1990. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	119	Rm 119	915	2134	45	D1	WD	PLAM		F1	PS	PT				Door: 45 mm solid-core wood, conforming to CSA-0132.2-M1990. Door Frame: Steel. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	120	Rm 120	2-915	2134	45	D1	IHM	PT		F4	IPS	PT				Exterior door, Thermally broken frame, Mechanical/Electrical room door, Strike bucket with deadbolt. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	120.1	Rm 120	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Mechanical Room Door. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	121A	Rm 121	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Glazing: None. Pedestrian Door Frame: 1.6 mm steel having a strike bucket will accept a 25 mm throw deadbolt. Grout in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	121B	Rm 121	3956	2440	45	Overhead Garage	Insulated metal	PT			Steel	PT				Exterior door, Thermally broken frame. Overhead garage door.
L1	121C	Rm 121	915	2134	45	D1	HM	PT		F1	PS	PT		0H		Exterior door, Thermally broken frame. Glazing: None. Pedestrian Door Frame: 1.6 mm steel having a strike bucket will accept a 25 mm throw deadbolt. Grout in the area of the strike bucket to prevent spreading. . See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	122A	Rm 122	915	2134	45	D1	HM	PT		F1	PS	PT		90 MIN		Provide a viewer. Glazing: None. 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Grout or wedge in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	122B	Rm 122	915	2134	45	D1	IHM	PT		F2	IPS	PT				Exterior door, Thermally broken frame. Glazing: None. 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. Grout or wedge in the area of the strike bucket to prevent spreading. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	122C	Rm 122	3956	2440	45	Overhead Garage	Insulated metal	PT			Steel	PT				Exterior door, Thermally broken frame. Overhead garage door.
L1	123	Rm 123	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		Door Frame: 1.6 mm steel having a strike bucket which will accept a 25 mm throw deadbolt. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	124	Rm 124	915	2134	45	D1	HM	PT		F1	PS	PT		90 MIN		See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	125	Rm 125	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	126	Rm 126	915	2134	45	D1	HM	PT		F1	PS	PT				See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	127	Rm 127	915	2134	45	D5	HM	PT		F1	PS	PT				Door Frame: Undercut door for exhaust air make-up. Door must swing outwards. Dummy Trim Knob (no trim on the inside). Includes vertical door viewer with shutter. (OD: 25 1/2" x 26 3/4" X Door thickness Viewable ID: 7 1/4" x 20 1/2" x Door thickness) See Hardware Schedule part of spec. section 08 71 00 for door hardware.

Floor	Door No.	Room No.	DOOR							FRAME				Fire Rating	Hardware	Door Remarks/Detail Numbers
			Width	Hght	Thk.	Type	Mat.	Finish	Gl.	Type	Mat.	Finish	Gl.			
L1	128	Rm 128	915	2134	45	D5	HM	PT		F1	PS	PT				Includes vertical door viewer with shutter. (OD: 25 1/2" x 26 3/4" X Door thickness Viewable ID: 7 1/4" x 20 1/2" x Door thickness) See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	130	Rm 130	915	2134	45	D1	IHM	PT		F2	IPS	PT				Exterior door, Thermally broken frame. 1.6 mm steel frame with strike bucket to accept 25 mm throw deadbolt. Grout or wedge frame in the area of the strike bucket to prevent spreading. Locks: See Hardware Schedule part of spec. section 08 71 00 for door hardware. Exterior doors; viewing from patrol corridor. 2. Door to operation zone; install two viewers for viewing from both directions.
L1	131	Rm 131	915	2134	45	D1	HM	PT		F1	PS	PT		45 MIN		See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	132	Rm 132	915	2134	45	D2	HM	PT	SGL-AR1	F1	PS	PT				Acoustic door to achieve STC 46 raiting , Door sweep, Weatherstrip, closer, (do not drill /install peep hole door viewers in acoustic doors). Resilient threshold. Locks: See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	133	Rm 133	915	2111	50	D4 Sliding	HM heavy Duty	PT	Polyca-rbonite	See A3004 & A3005	PS	PT				Deadbolt key outside, no inside operation. Cell Door Locks: Use the same make and keyway on all cell door locks. Our cell doors are sliding doors. See door type D4. Approved Sliding Door Lock Models: 1. Chubb 1030D-1; 2. Folger Adam 32D; 3. Southern Steel - 1030-D1; 4. RR Brink - 7030D.
L1	134	Rm 134	915	2111	50	D4 Sliding	HM heavy Duty	PT	Polyca-rbonite	See A3004 & A3005	PS	PT				Deadbolt key outside, no inside operation. Cell Door Locks: Use the same make and keyway on all cell door locks. Our cell doors are sliding doors. See door type D4. Approved Sliding Door Lock Models: 1. Chubb 1030D-1; 2. Folger Adam 32D; 3. Southern Steel - 1030-D1; 4. RR Brink - 7030D.
L1	135	Rm 135	915	2111	50	D4 Sliding	HM heavy Duty	PT	Polyca-rbonite	See A3004 & A3005	PS	PT				Deadbolt key outside, no inside operation. Cell Door Locks: Use the same make and keyway on all cell door locks. Our cell doors are sliding doors. See door type D4. Approved Sliding Door Lock Models: 1. Chubb 1030D-1; 2. Folger Adam 32D; 3. Southern Steel - 1030-D1; 4. RR Brink - 7030D.
	136	Rm 136	915	2111	50	D4 Sliding	HM heavy Duty	PT	Polyca-rbonite	See A3004 & A3005	PS	PT				Deadbolt key outside, no inside operation. Cell Door Locks: Use the same make and keyway on all cell door locks. Our cell doors are sliding doors. See door type D4. Approved Sliding Door Lock Models: 1. Chubb 1030D-1; 2. Folger Adam 32D; 3. Southern Steel - 1030-D1; 4. RR Brink - 7030D.
L1	137	Rm 137	915	915	45	D1	HM	PT		F1	PS	PT				Cleanout/access door. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	138	Rm 138	915	915	45	D1	HM	PT		F1	PS	PT				Cleanout/access door. See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	ADR-01	Rm 112	915	915		Floor Hatch	Metal	SHV		Floor Hatch				45 MIN		Access door to below floor crawl space, refer to specification section 08 31 10.
S--1	S-001	Crawl Space	915	810	45	D1	HM	PT		F1	PS	PT		0 HR		Access through 0 hour rated wall in crawl space.See Hardware Schedule part of spec. section 08 71 00 for door hardware.
L1	SC-100	Rm 100	1015	1015		SCREEN			SGL-AR1	S1	PS	PT	SGL-AR1			Interior Elevation refer to A2001 / S1
L1	SC-101	RM101	1800	VARIES		SCREEN			SGL-AR1	S7	PS	PT				Interior Elevation refer to A20022 / S7
L1	SC-132	RM132	760	1220		SCREEN			SGL-AR1	S2	PS	PT				Interior Elevation refer to A2001 / S2 , refer to frame detail A3007
L2	SC-101A	OVER Rm 101	726	1737		SCREEN			Gl.	S6	PS	PT				Interior Elevation refer to A2001 / S6
L2	SC-101B	OVER Rm 101	1713	1737		SCREEN			Gl.	S5	PS	PT				Interior Elevation refer to A2001 / S5
L2	SC-101C	OVER Rm 101	2553	1737		SCREEN			Gl.	S4	PS	PT				Interior Elevation refer to A2001 / S4





Sheet Title: DOOR TYPES
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
A1000

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Apr 08, 2015 - 4:18pm

NOTE:
REFER TO SCHEDULE FOR
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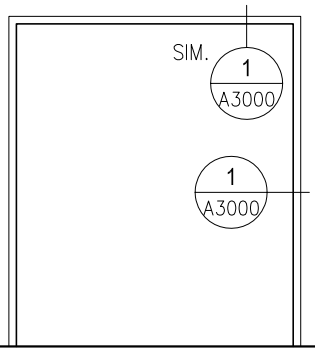
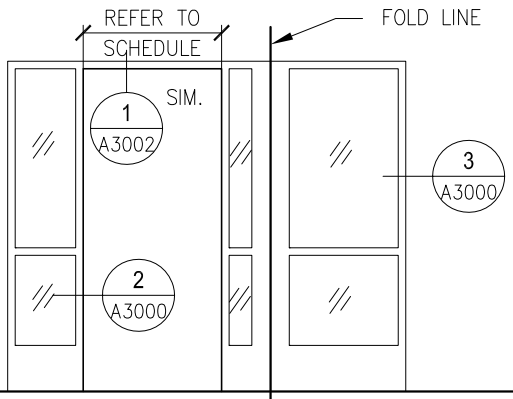


F4

NOTE: USE THERMALLY BROKEN FRAME
(DETAILS REFER TO A3002 & A3003)
WHERE NOTED IN SCHEDULE. TYP.



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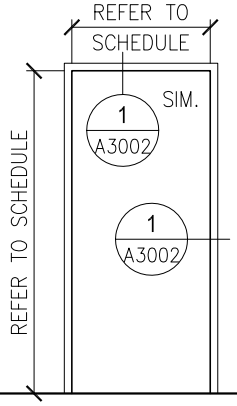

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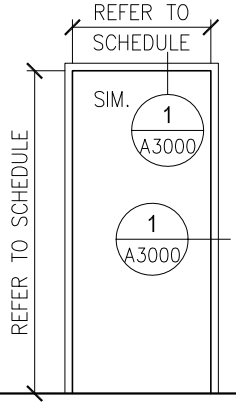

F1

Sheet Title: FRAME TYPES
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
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Apr 08, 2015 - 4:19pm

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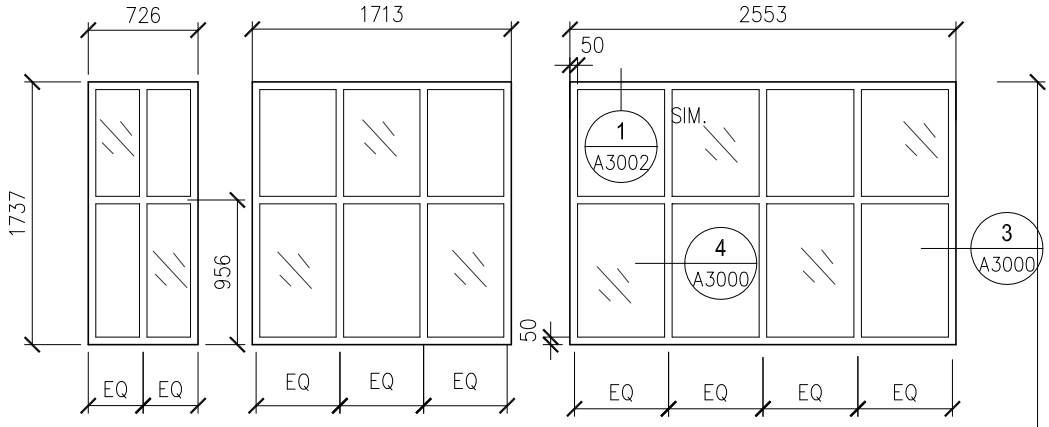


SC-101A

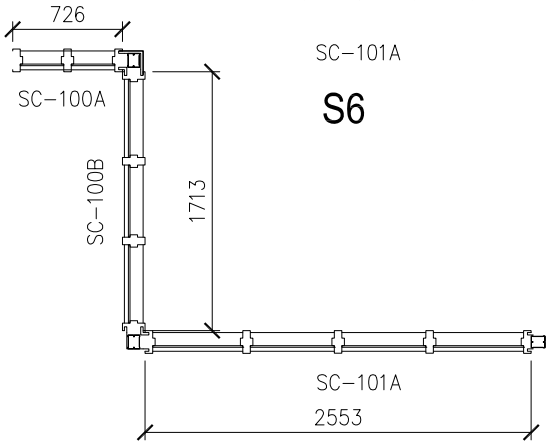
S6

SC-101B

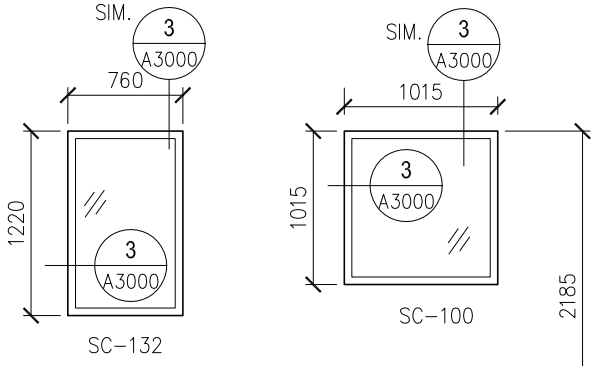
S5

SC-101C

S4



INTERIOR STEEL FRAME
CLERSTORY SCREENS



INTERIOR STEEL
FRAME SCREENS

S2

S1

Sheet Title: SCREEN TYPE
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
A2001

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Apr 08, 2015 - 4:19pm

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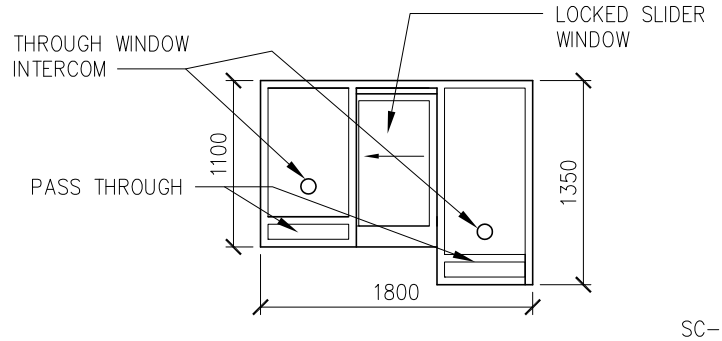
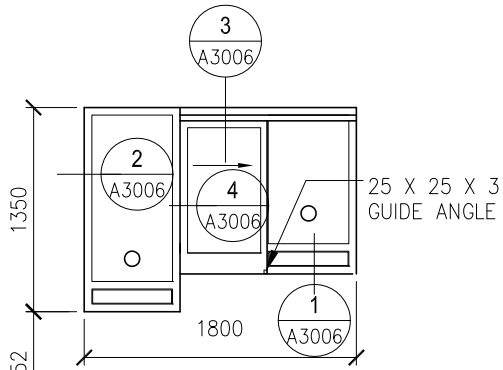


INTERIOR ALUMINIUM FRAMED
TRANSACTION SCREEN RM. 101 SIDE

S7

SC-101



INTERIOR ALUMINIUM FRAMED
TRANSACTION SCREEN Rm. 104 SIDE

S7

Sheet Title: DOOR TYPES
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
A2002

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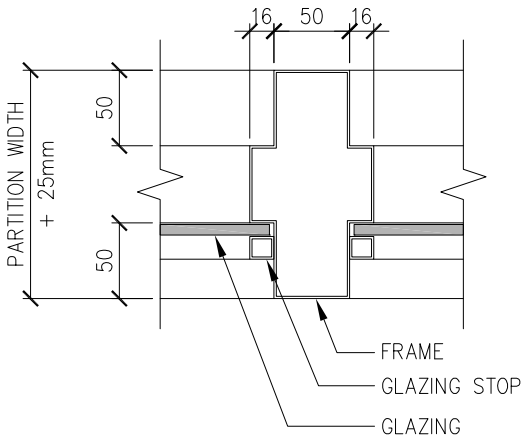
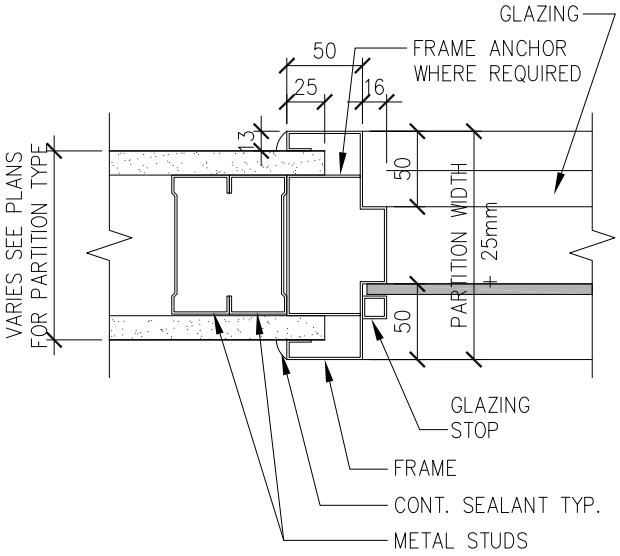
Apr 08, 2015 - 4:20pm

STANDARD FRAMES



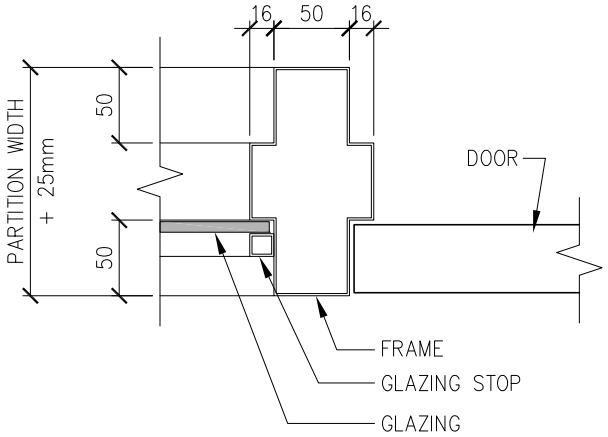


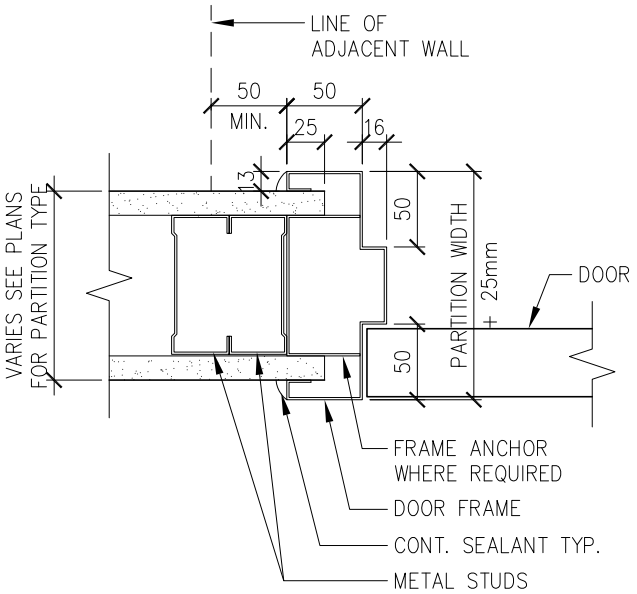
TYP. INTERMEDIATE VERT. MULLION (HORIZ. SIM.)
1:5

4 / A3000

TYP. GLAZING FRAME JAMB (HEAD SIM.)
1:5

3 / A3000





TYP. INTERIOR DOOR @ GLAZING MULLION
1:5

2 / A3000

TYP. DOOR JAMB (HEAD SIM.)
1:5

1 / A3000

b

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Apr 08, 2015 - 4:12pm

Sheet Title: STANDARD FRAME DETAIL
08 20 00
ISSUED FOR TENDER

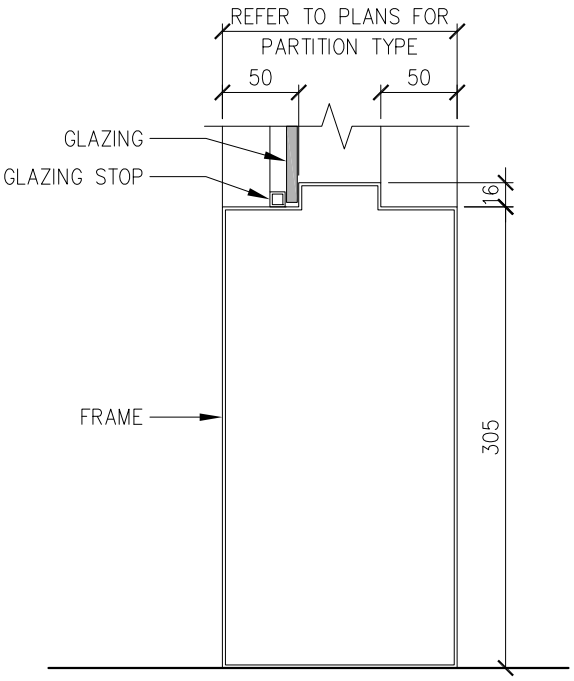
Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

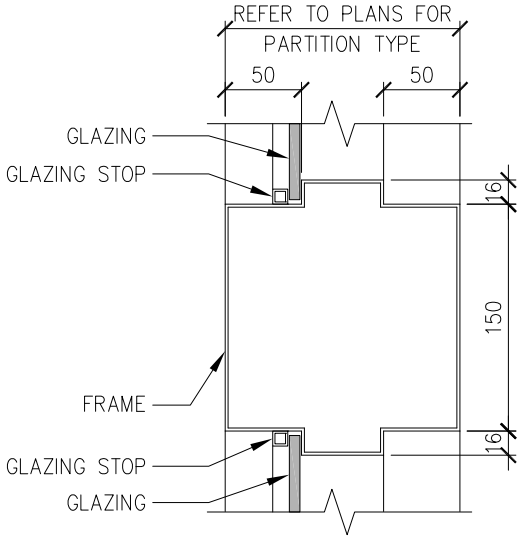
Sheet Number:
A3000

STANDARD FRAMES



GLAZING BASE INTERIOR TYP.
1:5

2
A3001



GLAZING MULLION INTERIOR TYP.
1:5

1
A3001

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Apr 08, 2015 - 4:13pm

Sheet Title: STANDARD FRAME DETAILS
08 20 00
ISSUED FOR TENDER

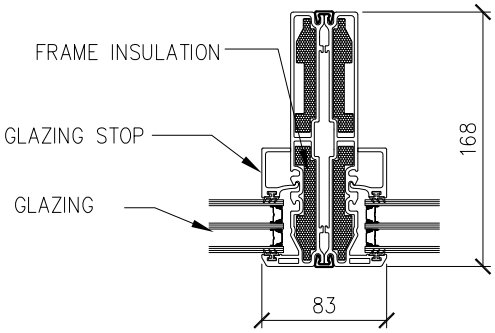
Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

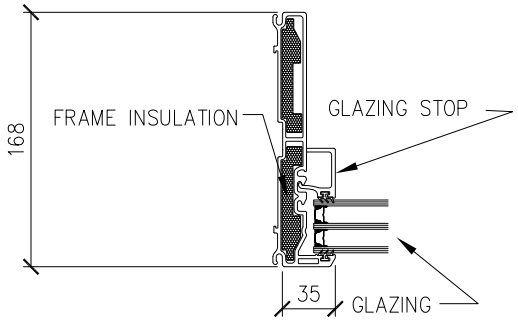
Sheet Number:
A3001

FIBERGLASS FRAMES
DUXTON 658 SERIES



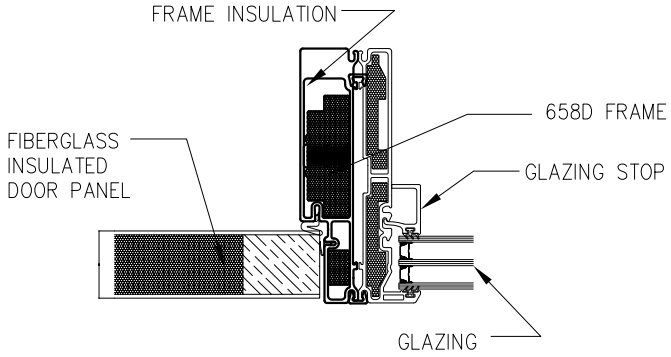
TYP. EXTERIOR INTERMEDIATE VERT. MULLION (HORIZ. SIM.)
1:5

4 / A3002



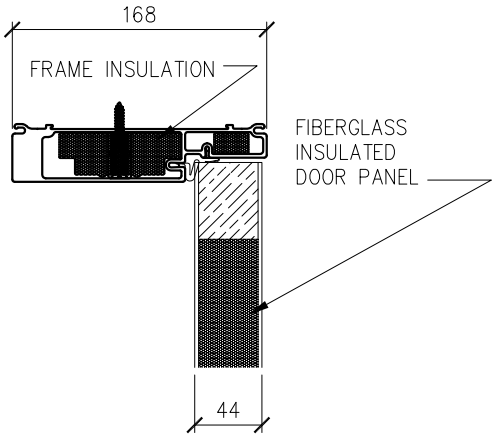
TYP. EXTERIOR GLAZING JAMB (HEAD SIM.)
1:5

3 / A3002



TYP. EXTERIOR DOOR @ GLAZING MULLION
1:5

2 / A3002



TYP. EXTERIOR DOOR JAMB (HEAD SIM.)
1:5

1 / A3002

Sheet Title: EXTERIOR FIBERGLASS FRAME DETAILS
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number: A3002

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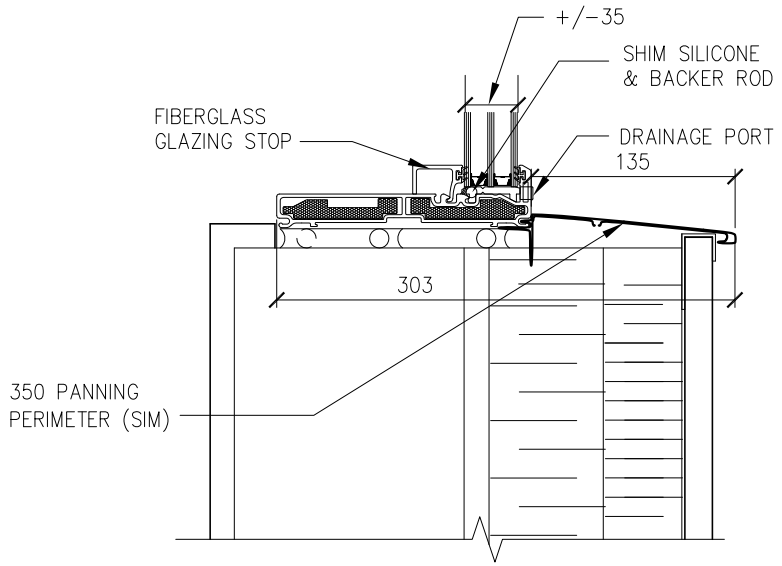
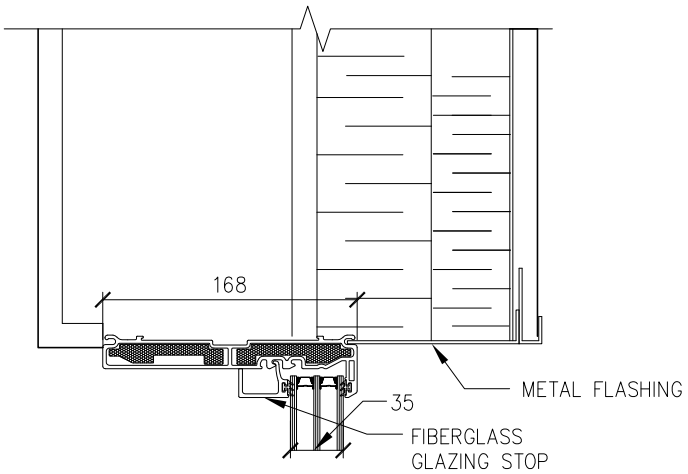
Apr 08, 2015 - 4:13pm

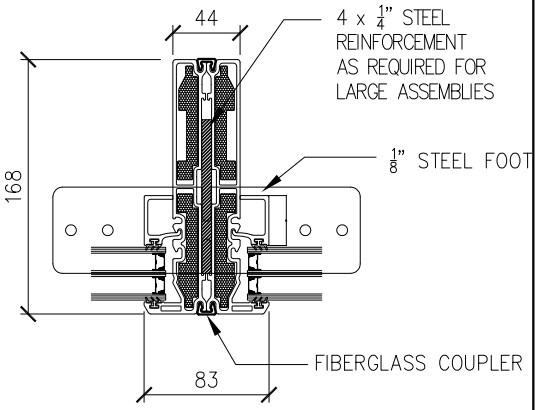
FIBERGLASS FRAMES
DUXTON 658 SERIES



TYP. EXTERIOR GLAZING SILL
1:5

3
A3003





EXTERIOR FIXED HEAD AND SILL
1:5

2
A3003

EXTERIOR REINFORCED FRAME MULLION
1:5

1
A3003

Sheet Title: EXTERIOR FIBERGLASS FRAME DETIALS
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
A3003

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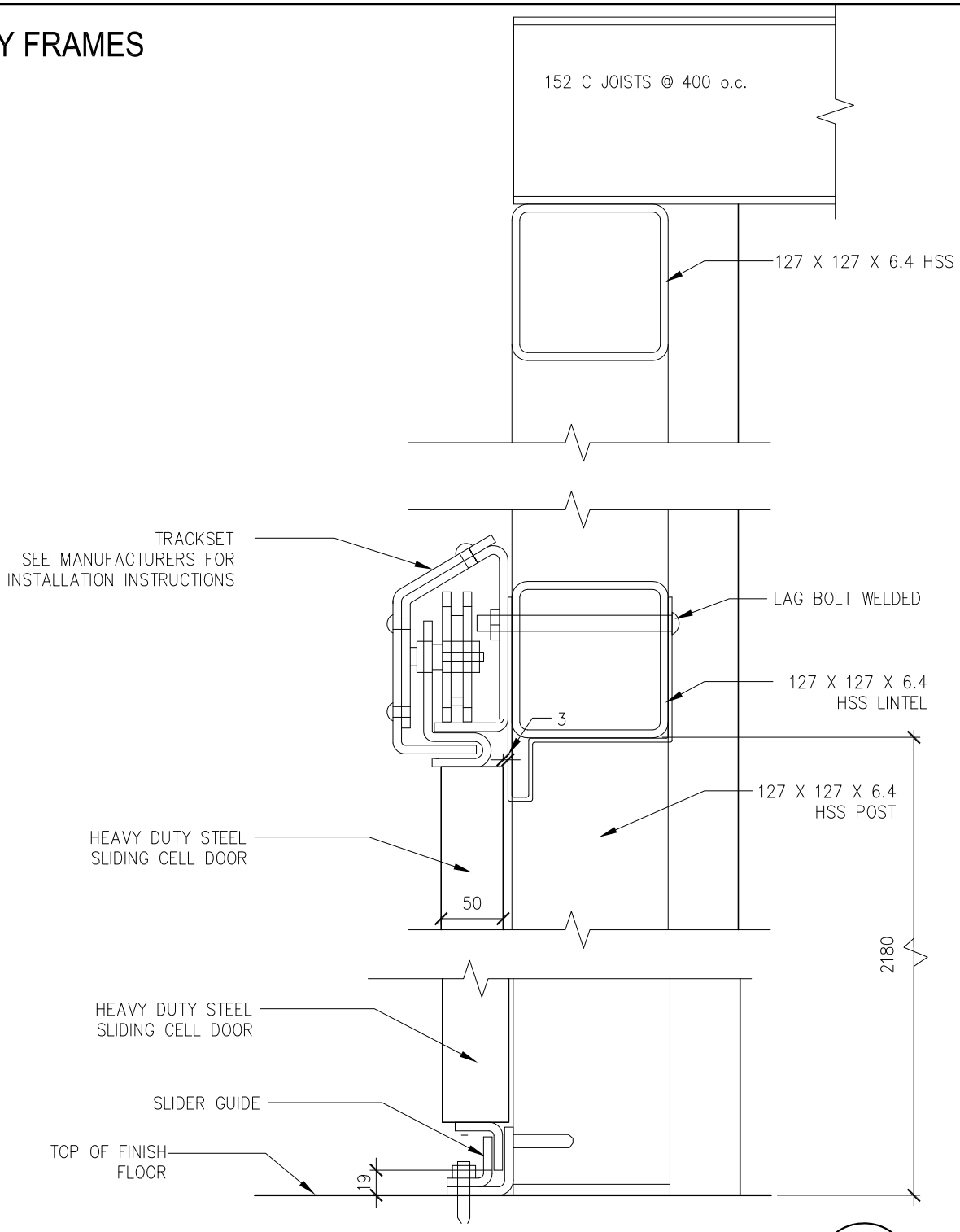
Apr 08, 2015 - 4:13pm

SPECIALTY FRAMES



HEAD – SLIDER TRACK
1:5

1
A3004

Sheet Title: FRAME DETAILS 08 20 00 ISSUED FOR TENDER	PARKIN ARCHITECTS LIMITED
Project: Federal Building Arviat, NUNAVUT PROJECT No: 1408-00	Date: 2015-04-07 / Scale: 1:50 Drawn By: WH / Revision: Sheet Number: A3004

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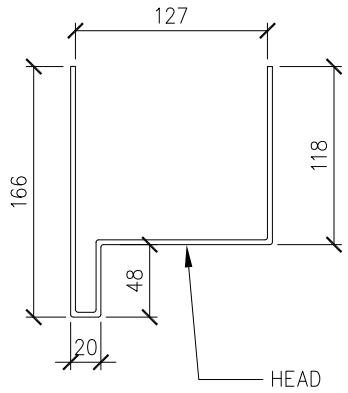
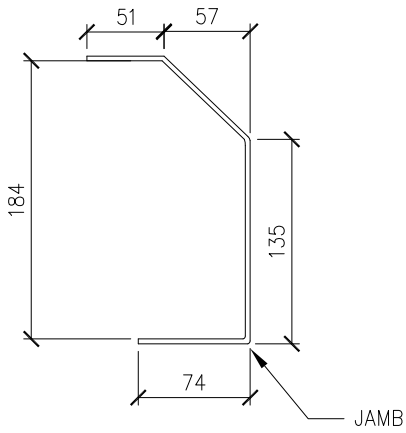
Apr 08, 2015 - 4:15pm

SPECIALTY FRAMES

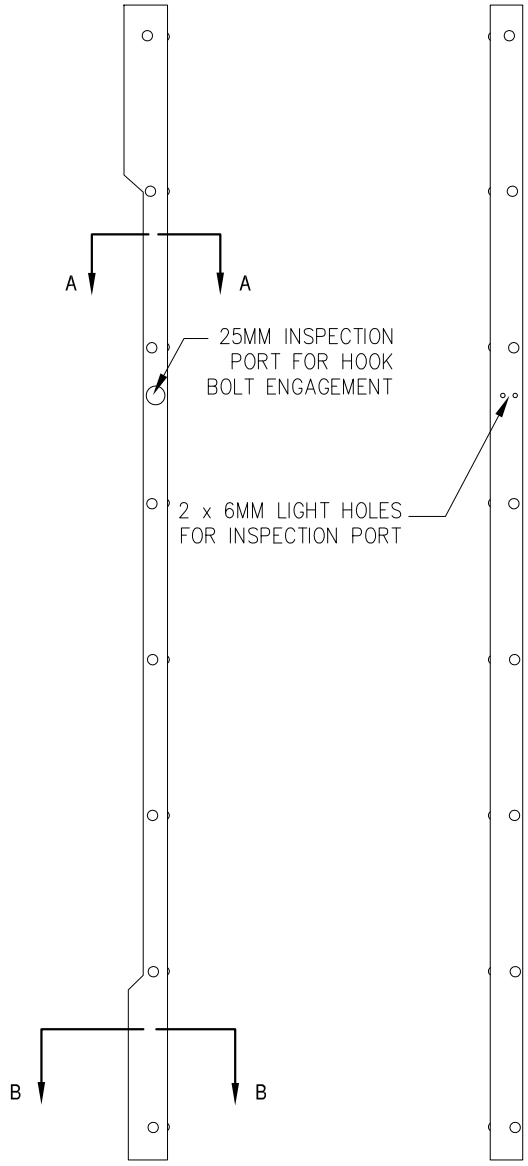




JAMB & HEAD PROFILES FOR BENDING

1:5

2 / A3005



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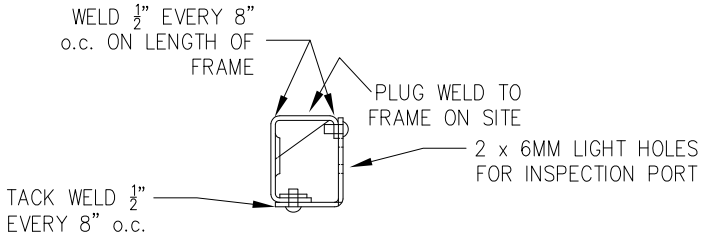
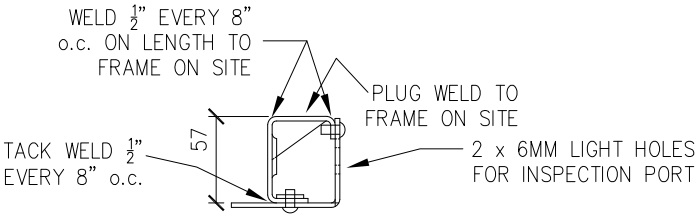


SECTION A - A



SECTION B - B

JAMB LATCH SIDE

1:5

1 / A3005

Sheet Title: FRAME DETAILS 08 20 00 ISSUED FOR TENDER	PARKIN ARCHITECTS LIMITED
Project: Federal Building Arviat, NUNAVUT PROJECT No: 1408-00	Date: 2015-04-07 / Scale: 1:50
	Drawn By: WH / Revision:
	Sheet Number: A3005

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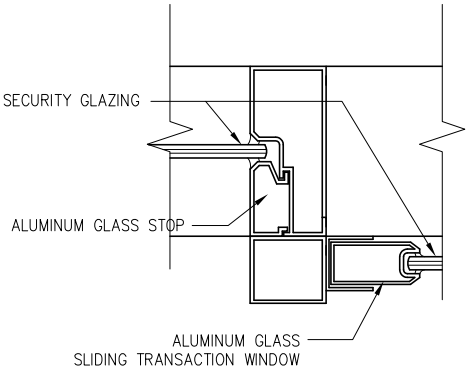
Apr 08, 2015 - 4:16pm



ALUMINUM GLAZING MULLION
1:5

4
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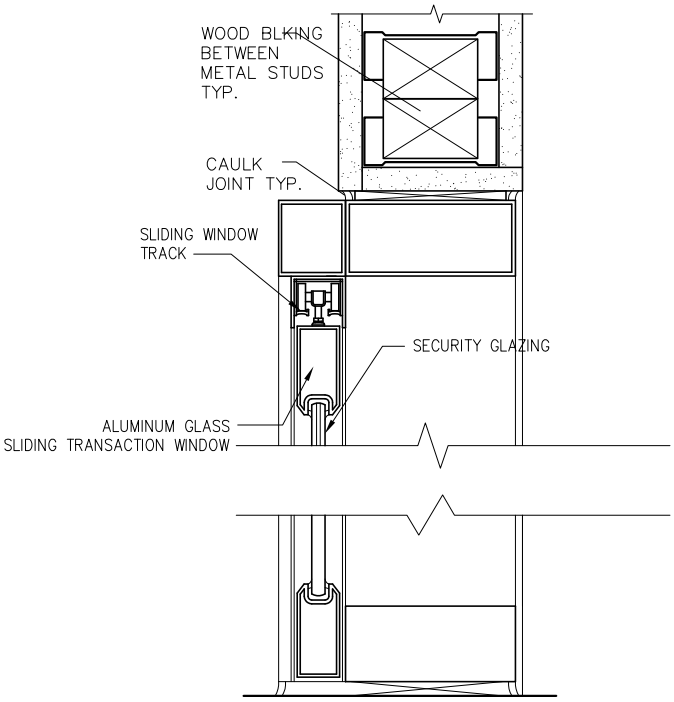
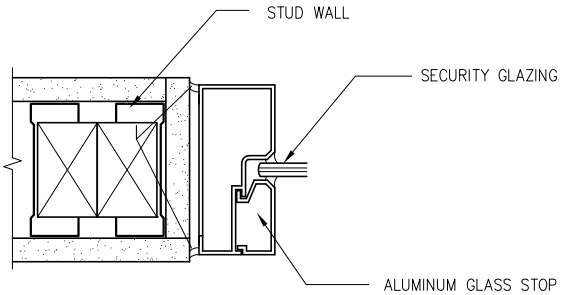


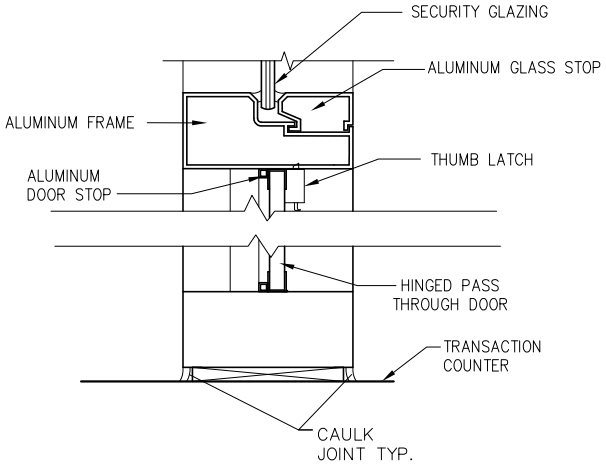
ALUMINUM GLAZING FRAME SILL & HEAD AT SLIDER
1:5

3
A3006



TYP. ALUMINUM GLAZING FRAME JAMB & HEAD (SIM)
1:5

2
A3006



TYP. ALUMINUM GLAZING FRAME SILL
1:5

1
A3006

Sheet Title: ALUMINIUM INTERIOR FRAME DETAILS
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN
ARCHITECTS LIMITED

Date:	Scale:
2015-04-07	1:50
Drawn By: WH	Revision:

Sheet Number:
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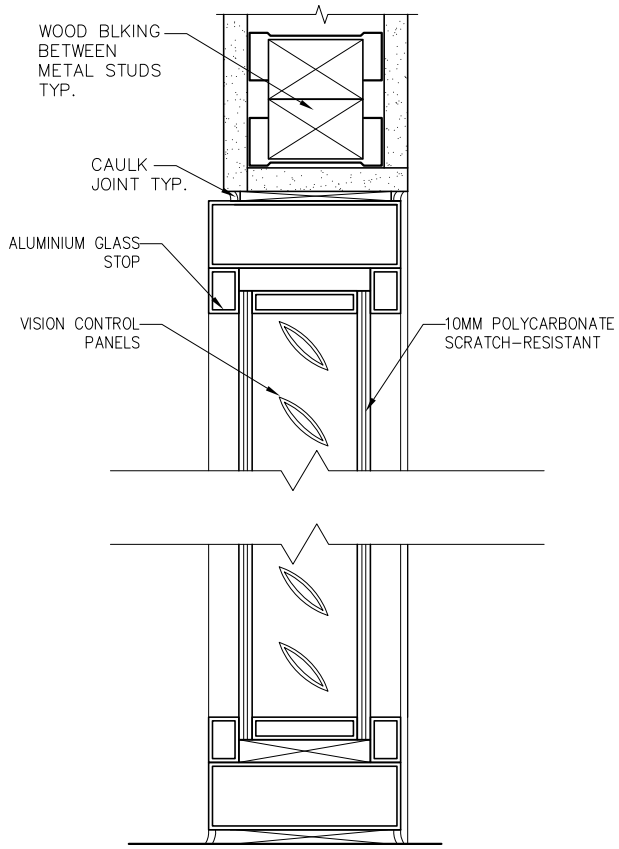
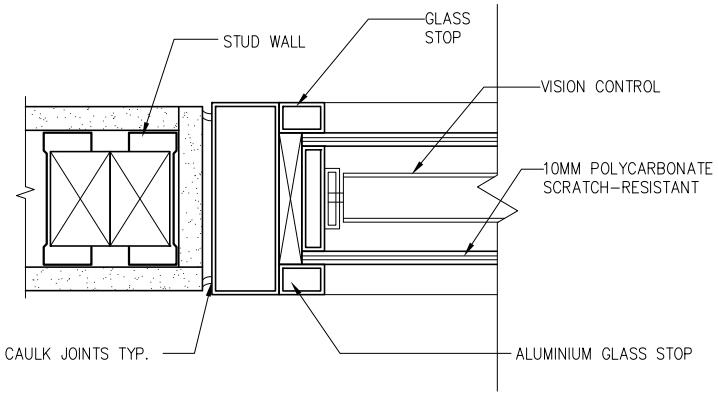
Apr 08, 2015 - 4:16pm



ALUMINUM GLAZING FRAME FOR SCREEN# 132
SILL & HEAD WITH SCREEN
1:5

1 / A3007



ALUMINUM GLAZING FOR SCREEN # 132
FRAME JAMB & HEAD (SIM)
1:5

2 / A3007

Sheet Title: ALUMINIUM INTERIOR FRAME DETAILS
08 20 00
ISSUED FOR TENDER

Project:
Federal Building
Arviat, NUNAVUT
PROJECT No: 1408-00

PARKIN ARCHITECTS LIMITED

Date:	Scale:
2015-05-12	1:50
Drawn By: YA	Revision:

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Accessories Schedule Abbreviations

Federal Building
PROJECT NO. 1408-00

Issued for Tender April 07, 2015

Abbreviation	Description
BR-1	Boot Rack 34"
CH-1	Clothing Hook - Mounted at 1500mm A.F.F.
CHM	Clothing Hook - Mounted at 1500mm A.F.F.-multiple
CHS	Safety Clothing Hook
CHMS	safety/suicide resistant clothing hook- multiple
CLK	Clock
EHD	Electric Hand Dryer
GRB-1	610mm (24")
GRB-2	765mm X 765mm (30" x 30") - L Shaped Vertical
GRB-4	Flip Up Grab Bar
HCHS	Safety Handicapped Clothing Hook - Mounted at 1200mm A.F.F.
HCHMS	safety/suicide resistant handicapped hook- multiple
JU	Janitors Unit 34"
MIR-1	Mirror Type 1 - 460mm X 910mm (18" x 36") - including suicide resistant type
PTD-1	Paper Towel Dispenser
PTDD-1	Combination Paper Towel Dispenser/Disposal Unit
SD-1	Soap Dispenser -Regular (Wall Mounted)
SHT.ST	Shower Seat - including bariatric type
SND	Sanitary Napkin/Tampon Disposal Unit
SSS-1	Stainless Steel Shelf - (18"[455mm] x 8"[205mm])
TB-1	Aluminum Frame Tackboard (1000mm x 1220mm)
TTD-1	Toilet Tissue Dispenser (Surface Mounted) - including suicide resistant type
TWB	Towel Bar 24" c/c

Flr	Room #	BR-1	CH-1	CHM	CHS	CHMS	CLK	EHD	GRB-1	GRB-2	GBR-4	HCHS	HCHMS	JU	MIR-1	PTD-1	PTDD-1	SD-1	SHT.ST	SND	SSS-1	TB-1	TTD-1	TWB	Remarks
L1	100	1																							
L1	101			1			1																		
L1	102				1			1	1	1	1	1			1		1	1		1			1		
L1	103		1				1																		
L1	104																								
L1	105						1															1			
L1	106						1															1			
L1	107					1	1						1			1		1				1			
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L1	115																								
L1	116																								
L1	117				4																				
L1	118														1		1	1	1	1			1	1	Shower Rod and Curtain for shower
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L1	120																								
L1	121																								
L1	122																								
L1	123																								
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L1	125						1									1		1							
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L1	137																								
L1	138																								
L2																									

2015-04-23 20:08:01 by Les Eaton
Revision 8

Hardware list for

Federal Building
Arviat, NU

Issued for Tender
2015-04-07

Architect: Parkin Architects Limited

Supplier: LMT Group inc.
RBQ Licence: 1347-9464-81

Hardware consultant: Les Eaton AHC

Work Order N° LE3063

100A — LHR

Insulated fiberglass frame
Insulated fiberglass door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Corridor lockset LV9456BD 06B 630	SCH
	1	Electric strike 1006CDB x SMART Pac 3 630	SEC
	1	Automatic operator HA8 x 1/4HP x SA-1 x FLH 689	CFS
	1	Actuators 4R-3 630	CFS
	1	Threshold CT45 x DW 628	KNC
	1	Weatherstripping W20S 2 x DH x 1 x DW 628	KNC
	1	Door sweep W24S x DW 628	KNC
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

Complete supply and installation of the automatic operator and electric strike by this section
All conduit, 120VAC wiring and connection by others
All testing, commissioning and connection of the auto operator, actuators and electric strike by this section

100B — LHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Corridor lockset LV9456BD 06B 630	SCH
	1	Electric strike 1006CDB x SMART Pac 3 630	SEC
	1	Automatic operator HA8 x 1/4HP x SA-1 x FLH 689	CFS
	2	Actuators 4R-3 630	CFS
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

Complete supply and installation of the automatic operator and electric strike by this section
All conduit, 120VAC wiring and connection by others
All testing, commissioning and connection of the auto operator, actuators and electric strike by this section

101 — RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Hotel lockset LV9486BD 06B 630	SCH
	1	Door closer 4040XP SCUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH

102 — RHR

Pressed steel frame
Wood door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 NRP 652	IVS
	1	Hotel lockset LV9486BD 06B 630	SCH
	1	Electric strike 1006CDB x SMART Pac 3 630	SEC
	1	Remote actuator locate in room 104	
	1	Door closer 4040XP SCUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH

103A — RH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Storeroom lockset LV9080BD 06B 630	SCH
	1	Floor stop GSH209 626	GSH
	1	Soundseal complete by STC door supplier	LMT

103B — RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Storeroom lockset LV9480BD 06B 630	SCH
	1	Floor stop GSH209 626	GSH
	1	Soundseal complete by STC door supplier	LMT

Note: Cylinder on the interview room side

106 LH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Office lockset LV9050BD 06B 630	SCH
	1	Floor stop GSH209 626	GSH
	1	Soundseal complete by STC door supplier	LMT

107A RH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Corridor lockset LV9456BD 06B 630	SCH
	1	Door closer 4040XP HO 689	LCN
	1	Floor stop GSH209 626	GSH
	1	Soundseal complete by STC door supplier	LMT

107B RH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Hotel lockset LV9486BD 06B 630	SCH
	1	Door closer 4040XP HO 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH
	1	Soundseal complete by STC door supplier	LMT

107C

Folding door
Dimensions: Refer to plans

	1	All hardware complete by door supplier	

108A — RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

1	Continuous hinge 780-112HD x DH 628	IVS
1	Passage set LV9010 06B 630	SCH
1	Door closer 4040XP reg mtg 689	LCN
1	Kickplate GSH80A 200mm x DW x STS 630	GSH
1	Floor stop GSH209 626	GSH

108B — LHR

Insulated pressed steel frame
Insulated hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Hotel lockset LV9486BD 06B 630	SCH
	1	Door closer 4040XP SCUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Threshold CT45 x DW 628	KNC
	1	Weatherstripping W20S 2 x DH x 1 x DW 628	KNC
	1	Door sweep W24S x DW 628	KNC
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

109 — LH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Storeroom lockset L9080BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Wall stop GSH250 630	GSH

110 LH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Storeroom lockset L9080BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

112 RH

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Corridor lockset LV9456BD 06B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

113 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Hotel lockset L9486BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

114 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Hotel lockset L9486BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

115 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Hotel lockset L9486BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

116 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

Balistic construction

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Hotel lockset L9486BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Floor stop GSH209 626	GSH

117 RH

Pressed steel frame
Wood door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Privacy set LV9044 x L283-124 06B 630	SCH
	1	Floor stop GSH209 626	GSH

118 LH

Pressed steel frame
Wood door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 630	IVS
	1	Privacy lockset LV9040 06B 630	SCH
	1	Door closer 4040XP EDA 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Wall stop GSH250 630	GSH

119 RH

Pressed steel frame
Wood door
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Passage set LV9010 06B 630	SCH
	1	Floor stop GSH209 626	GSH

120 RHRA

Insulated pressed steel frame
Insulated hollow metal door
Dimensions: 2-915 x 2134 x 45

	2	Continuous hinge 780-112HD x DH 628	IVS
	1	Deadlock L9464BD 630	SCH
	2	Door closer 4040XP SHCUSH 689	LCN
	2	Surface bolts 70TB 630	GSH
	1	Threshold CT45 x DW 628	KNC
	1	Weatherstripping W20S 2 x DH x 1 x DW 628	KNC
	2	Door sweep W24S x DW 628	KNC

120.1 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	3	Hinges 3CB1HW 114 x 102 652	IVS
	1	Storeroom lockset L9080BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Wall stop GSH250 630	GSH

121A — RHR

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Hotel lockset LV9486BD 06B 630	SCH
	1	Door closer 4040XP SCUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x STS 630	GSH
	1	Threshold CT45 x DW 628	KNC
	1	Weatherstripping W20S 2 x DH x 1 x DW 628	KNC
	1	Door sweep W24S x DW 628	KNC
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

121B

Overhead door

	1	All hardware complete by door supplier	

121C — LHR

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Storeroom/utility lockset L9466BD 42B 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Wall stop GSH250 630	GSH
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

122A — RHR

Pressed steel frame Fire-rating 90 min
Hollow metal door Fire rating 90 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom/utility lockset L9466BD 42B x Torx+ 630	SCH
	1	Door closer 4210 CUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Threshold CT45 x DW x Torx+ 628	KNC
	1	Weatherseal W20S 2 x DH x 1 x DW x Torx+ 628	KNC
	1	Door sweep W24S x DW x Torx+ 628	KNC
	2	Door viewer Widescope EX (27D827C) x Torx+ 626	

Note: Install the door wiewers for view in both directions

122B — LHR

Insulated pressed steel frame
Insulated hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom/utility lockset L9466BD 42B x Torx+ 630	SCH
	1	Door closer 4210 CUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Threshold CT45 x DW x Torx+ 628	KNC
	1	Weatherseal W20S 2 x DH x 1 x DW x Torx+ 628	KNC
	1	Door sweep W24S x DW x Torx+ 628	KNC
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

122C

Overhead door

	1	All hardware complete by door supplier	

123 — LH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom lockset LV9080BD 42B x Torx+ 630	SCH
	1	Door closer 4510T pull side mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Floor stop FS18S Blk	IVS

124 LHR

Pressed steel frame Fire-rating 90 min
Hollow metal door Fire rating 90 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom/utility lockset L9466BD 42B x Torx+ 630	SCH
	1	Door closer 4040XP reg mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Floor stop GSH209 626	GSH
	1	Door sweep W24S x DW 628	KNC
	1	Threshold CT45 x DW x Torx+ 628	KNC
	1	Weatherseal W20S 2 x DH x 1 x DW x Torx+ 628	KNC
	2	Door viewer Widescope EX (27D827C) x Torx+ 626	

Note: Install the door wiewers for view in both directions

125 RH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Passage set LV9010 42B x Torx+ 630	SCH
	1	Door closer 4510T pull side mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Floor stop FS18S Blk	IVS

126 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD x DH 628	IVS
	1	Privacy lockset LV9044 x L283-124 42B x Torx+ 630	SCH
	1	Overhead stop GJ100S x Torx+ 630	GJN

127 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Deadlock L9464BD x Torx+ 630	SCH
	1	Dummy knob L9175 x Torx+ 630	SCH
	1	Overhead stop GJ100S x Torx+ 630	GJN
	1	Vertical door viewport complete with shutter	LMT

128 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom lockset LV9080BD 42B x Torx+ 630	SCH
	1	Door closer 4510T pull side mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Floor stop FS18S Blk	IVS
	1	Threshold CT45 x DW x Torx+ 628	KNC
	1	Weatherseal W20S 2 x DH x 1 x DW x Torx+ 628	KNC
	1	Door sweep W24S x DW x Torx+ 628	KNC
	1	Vertical door viewport complete with shutter	LMT

130 RHR

Insulated pressed steel frame
Insulated hollow metal door
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom/utility lockset L9466BD 42B x Torx+ 630	SCH
	1	Door closer 4210 CUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Threshold CT45 x DW x Torx+ 628	KNC
	1	Weatherseal W20S 2 x DH x 1 x DW x Torx+ 628	KNC
	1	Door sweep W24S x DW x Torx+ 628	KNC
	1	Door viewer Widescope EX (27D827C) x Torx+ 626	

131 LH

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 2134 x 45

	1	Continuous hinge 780-112HD SEC x DH 628	IVS
	1	Storeroom lockset LV9080BD 42B x Torx+ 630	SCH
	1	Door closer 4510T pull side mtg 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Floor stop FS18S Blk	IVS

132 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 2134 x 45

STC 46

	3	Cam lift hinges by STC door supplier 630	LMT
	1	Storeroom/utility lockset L9466BD 42B x Torx+ 630	SCH
	1	Door closer 4210 CUSH 689	LCN
	1	Kickplate GSH80A 200mm x DW x Torx+ 630	GSH
	1	Soundseal complete by STC door supplier	LMT

133

Sliding door
Dimensions: 915 x 2111 x 50

	1	Sliding detention door complete with hardware and track	LMT

134

Sliding door
Dimensions: 915 x 2111 x 50

	1	Sliding detention door complete with hardware and track	LMT

135

Sliding door
Dimensions: 915 x 2111 x 50

	1	Sliding detention door complete with hardware and track	LMT

136

Sliding door
Dimensions: 915 x 2111 x 50

1	Sliding detention door complete with hardware and track	LMT

137 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 915 x 45

1	Continuous hinge 780-112HD SEC x DH 628	IVS
1	Deadlock L9464BD x Torx+ 630	SCH

138 RHR

Pressed steel frame
Hollow metal door
Dimensions: 915 x 915 x 45

1	Continuous hinge 780-112HD SEC x DH 628	IVS
1	Deadlock L9464BD x Torx+ 630	SCH

S-001

Pressed steel frame Fire-rating 45 min
Hollow metal door Fire rating 45 min
Dimensions: 915 x 810 x 45

2	Spring hinge 2060 4.5 x 4 626	STA
1	Passage set LV9010 42B x Torx+ 630	SCH

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the General Conditions and Supplementary Conditions of the *Contract*;
- .2 Division 1 requirements and documents referred to therein.

1.2 INFORMATION AVAILABLE TO BIDDERS

.1 Following information available to Bidder is bound in specifications appended to this Document.

.2 Following Report is for information only. Neither Consultant nor Owner assumes any liability for items extracted from Report.

.3 Geotechnical and Environmental Investigation Report(s):
- .1 A copy of a geotechnical and environmental investigation report and related letters, prepared by Owner's consultant for the Place of the Work are bound herein. Refer to following:
  - .1 GEOTECHNICAL EVALUATION FOR FEDERAL BUILDING ARVIAT, NU, dated January 2015, prepared by Tetra Tech EBA Inc.
- .2 Geotechnical investigation documents are not guaranteed to be representative of actual subsurface conditions.
- .3 Submit a Base Bid Price which includes and accommodates work implied in, or reasonably inferable from, investigation documents. Owner's investigation consultant will be interpreter of documents. Consultant will be arbiter of a change to Contract Price and/or Contract Time.
- .4 When calculating soil volumes for bidding purposes, assume flat plane geometric layers formed by straight lines drawn between subgrade elevations, for each material identified in soils report.
- .5 This report **shall** form part of the Contract Documents.

END OF DOCUMENT

TETRA TECH EBA

GEOTECHNICAL EVALUATION FOR FEDERAL BUILDING ARVIAT, NU



PRESENTED TO

PARKIN ARCHITECTS LIMITED

JANUARY 2015
ISSUED FOR USE
FILE: Y14103295-01

CONSULTING ENGINEERS & SCIENTISTS · www.eba.ca

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APPENDICES

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Parkin Architects Limited and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Parkin Architects Limited, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement, unless some other form of agreement has been executed. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

1.0 INTRODUCTION

1.1 General

Tetra Tech EBA Inc. (Tetra Tech EBA) was requested by Parkin Architects Limited. (Parkin Architects) to conduct a geotechnical evaluation for a proposed new Federal Building in Arviat, NU.

This report presents the results from a site investigation carried out by Tetra Tech EBA and provides recommendations related to the design and construction of the building foundation.

Authorization to proceed was given by a contract signed by Robert Boraks, Principle with Parkin Architects, dated June 13, 2014.

1.2 Project Details

Tetra Tech EBA understands that the services of Parkin Architects have been engaged to design a new Federal Building in Arviat, NU. The site for the proposed development is located at latitude 61° 06' 33" N and longitude 94° 03' 48" W. The project site under investigation is currently occupied by a derelict house, approximately 160 m^2. The location of the site within the community is shown in Figure 1.

1.3 Scope of Work

Tetra Tech EBA was approached about this project, just as the drilling contractor was finishing another project in the community. Due to the quick nature of the request for Tetra Tech EBA's services, no formal proposal was written for the work undertaken in Arviat. Mr. Ed Hoeve, P.Eng., of Tetra Tech EBA, sent a proposed scope of work via email on June 10, 2014, to Mr. Ken Drysdale of Accutech Engineering Inc., outlining Tetra Tech EBA's methodology and associated costs for performing the required work.

The following tasks were considered to be the scope of work:

- Conduct a review of relevant available information to characterize anticipated subsurface conditions for the subject site in order to plan an appropriate site investigation;
- Conduct a site investigation by monitoring the drilling of four (4) probeholes, and collect and log the disturbed soil sample characteristics. It was anticipated that these probeholes would be advanced to about 12 - 15 m, or as site conditions warrant;
- Install several single-bead thermistor cables at varying depths to permit ground temperatures to be measured;
- Conduct a limited environmental assessment by collecting soil samples for third party environmental and contamination identification testing purposes;
- Return all collected samples to Tetra Tech EBA's Yellowknife laboratory for further examination and testing purposes, including soil classification, salinity and to determine engineering properties;
- Consider the feasibility of different foundation types and develop recommendations for the design and construction of foundation types that are considered to be practical; and
- Prepare an evaluation report that presents the findings from the site investigation and the resulting recommendations.

This report is the deliverable for the foregoing scope of work.

2.0 SITE INVESTIGATION

Due to a drill break-down, the site investigation did not occur in June as initially anticipated. The site investigation was conducted on September 11, 2014. Tetra Tech EBA's representative, Mr. Conor Costigan, M.Eng., observed the drilling of four probeholes at the project site. A building is currently present on the project site, therefore, the probeholes were spaced around the structure to provide reasonable coverage of the site.

Canadrill Drilling Ltd. of Iqaluit, Nunavut, mobilized a track-mounted air-rotary drill to advance the 140 mm diameter probeholes. Probeholes were advanced to depths ranging between 4.0 to 15.0 m below grade. A hand-held GPS device was used to record the approximate location of each probehole. Approximate probehole locations are shown in Figure 1.

Two of Tetra Tech EBA's probeholes terminated at shallower depths than desired due to continued sloughing of the soil and insufficient steel casing on site.

Six single bead thermistor cables were installed at varying depths ranging between 1.7 and 14.8 m in two of the probeholes drilled at the project site to monitor the ground temperature. Table 1 contains more information on the single bead thermistors.

The drilling technique used returned disturbed soil cuttings to the surface. These cuttings were characterized in the field and samples were collected at 1 m intervals or as changes in soil conditions warranted. Soil samples were shipped to Tetra Tech EBA's laboratories in Yellowknife and Edmonton for soil classification and determination of specific engineering properties. Tests performed in the Yellowknife laboratory included the determination of moisture contents, grain size distribution (sieve and hydrometer). Additionally, samples were shipped to Edmonton for porewater salinity testing.

Two soil samples were collected for environmental testing purposes. The environmental samples were selected based on the suspected presence of strong odours of hydrocarbon contamination, as well as noticeable staining within the soil.

3.0 SITE DESCRIPTION

3.1 Location

The Hamlet of Arviat is located on the western shore of Hudson Bay at latitude 61° 07' N and longitude 94°03' W, on the north side of a point traditionally known as Tikirajualaaq, meaning a little long point. It lies 210 km south of Rankin Inlet, Nunavut and 265 km north of Churchill, Manitoba. It has a population of approximately 2,318 (2011 census). The community is located approximately 1,100 km by air east of Yellowknife.

3.2 Geology

The Arviat area is underlain by granitic gneiss and schist of Proterozoic age (about 0.5 to 2.5 billion years old). The thickness of surficial material in the community is not known; however, it was reported that bedrock outcrops are present about 2.5 km south of the community (Thurber 1985). No bedrock was encountered during the drilling of the four probeholes at the project site.

The Arviat area generally consists of deposits of sandy glacial till. The Hamlet is situated on the northern shore of a narrow peninsula on the western coast of Hudson Bay. The near shore sediments are generally well-sorted sand, gravel, cobbles, or boulders due to glacial rebound. The aerial photographs and topographic maps show that the developed area in Arviat is generally low-lying, flat, and it slopes gently towards the sea. Undisturbed surfaces are generally characterized by sparse vegetation and orthogonal frost cracks. There were no signs of

surface or subsurface frost cracking or ice wedges encountered within the probeholes drilled on the project site, or observed within the developed land in and around the Hamlet. This could be primarily due to the fact that the majority of the structures within the community have been constructed on imported fill material.

3.3 Climate

Environment Canada maintains a weather station in Arviat with records available from 1973 to present, with a gap between 1976 and 1984. However, the records before 1976 and between 1984 and 1990 are incomplete, so for the purpose of identifying annual trends, only records from 1990 and later have been used. Over the period of record, the mean annual air temperature has averaged approximately -8.9°C. Linear interpolation was used to interpret temperature trends since 1990, indicating a warming trend of nearly 0.08 C°per year.

This warming trend has been more pronounced during the winter months; summer temperatures have seen less change. Over the last 20 years, the average freezing index has been approximately 4190 C°-days, and the average thawing index has been about 980 C°-days.

Data from the Rankin Inlet weather station were also used to estimate the mean annual air temperature and the approximate thawing and freezing indices for Arviat. The mean annual air temperature in Rankin Inlet is estimated to be about -10°C for the period from 1981 to 2012. The approximate thawing and freezing indices are estimated to be about 4660 degree-days and 870 degree-days, respectively.

3.4 Surface Conditions

The site for the proposed development is located on Plan 78715 CLSR, Lot No. VBU12. The site is approximately 42 m wide by 55 m long and is currently occupied by a derelict single storey dwelling. The dimensions of the derelict structure are approximately 14 x 12 m with a height of 3.8 m from the ground up to the bottom of the roofs soffit. The ground around the east, west and northern sides of the house is mainly gravel and sand fill which has been well established with grass and other vegetation. The ground to the south western side of the site is mainly gravel fill with little or no plant growth.

The site is bounded on the western side by a single storey private dwelling and bounded on the eastern side by a recently constructed duplex housing unit, currently being used by the local RCMP officers. This building has been constructed using a triodetic multipoint foundation type which is sitting on a compacted granular base pad. The project site is bounded on the south side by Road R10 and on the north side by Road R13. The project site is approximately 10 m above sea level and a distance of 250 m from the shore of Hudson Bay.

A review of air photographs and previous studies indicates the Arviat region was poorly drained prior to development of the community. It is believed that all of the buildings in the area of the subject site are constructed on fill.

The housing structure currently occupying the project site as shown in photo, was constructed on a sloped fill embankment, approximately 1.0 m thick. The embankment slopes gently at a 1° to 2° slope down towards the southern limits of the project site. The fill embankment is graded in a stepped manner before the slope falls sharply away on the northern edge of the project site, with a 20° to 25° slope being observed from the top of the fill slope down to the bottom edge of Road R13.

An area of marshy, and lightly water-logged ground was observed at the southern side of the project site, as shown in Figure 1. The dimensions of the marshy area are approximately 20 x 40 m. The wet, marshy area on site is currently serviced by a 25 m long, 600 mm diameter steel culvert, which is aligned from south to north along the eastern side of the project site. The culvert outlet is slightly damaged on the northern end while there was considerable damage observed to the culvert inlet at the southern end of the site.

3.5 Subsurface Conditions

Probehole logs of the subsurface material encountered during the site investigation are presented in Appendix B. Subsurface conditions at the proposed site are characterized based on the four probeholes drilled during the current site investigation as well as information collected from previous investigations undertaken within the community (EBA 1995 & 1998). The soils were similar in all the probeholes and the subsurface conditions generally consisted of sand and gravel fill underlain with multiple layers of sand and silt with traces to some amounts of gravel. No bedrock was encountered during the drilling of the four probeholes at the project site.

The thicknesses and depths of the soil layers varied among the four boreholes drilled within the project site, but generally followed the description below:

FILL

A 1.0 m layer of sand and gravel fill was found to cover large sections of the project site. The fill material was encountered in Probeholes 2, 3 and 4 drilled on the project site. The material consisted of fine to medium grained sand and gravel, with some silt and trace cobbles. Moisture content in this layer had an average of 5%.

SILT

A 1.0 m layer of silt was encountered in Probehole 1 which was drilled within a marshy and wet area of the project site. The silt material contained varying amounts of sand, with trace amounts of gravel and clay also present. The silt layer was found to be non-plastic and had no visible ice crystals present. Moisture content was highest in this layer had an average of 13%.

SAND and SILT

A layer of sand and silt or silty sand with varying amounts of gravel and occasional cobbles was encountered at depths ranging between 5.0 m in Probehole 3 and 7.0 m in Probehole 1. The sand is fine to medium-grained, grey with a moisture content averaging 8%.

SAND

Multiple layers of sand with varying amounts of silt and gravel and occasional cobbles or boulders was found at depths ranging between 1.0 and 15.0 m. The sand is fine to coarse-grained, grey to brown with a moisture content averaging 8.5%. This layer extended to the termination depth of all probeholes. This silty sand soil is considered to be the primary soil constituent at the proposed site.

3.6 Permafrost

Arviat is located within the zone of continuous permafrost. The thickness of the active layer at the project site ranges between 2.8 to 3.5 m. Permafrost was encountered in three of the four probeholes drilled on the project site at depths ranging between 2.8 m in Probehole 1 and 3.5 m in Probehole 4. No permafrost was encountered in Probehole 2 as there was a large volume of groundwater present, causing the probehole to be terminated before encountering frozen ground conditions. The frozen soil was well bonded with less than 5% visible ice being observed. The depth to permafrost is deeper than would be expected for this area. This is likely attributed to the placement of the gravel fill that effectively increased the thickness of the active layer.

3.6.1 Ground Temperature

Six thermistor cables were installed in Probeholes 3 and 4 on September 11, 2014. Temperature readings were collected for seven consecutive days and showed a ground temperature ranging between -2.8 °C at 1.7 m and -5.0 °C at 14.8 m. Data collected from the thermistor cables is presented in Table 1 below.

Table 1: Thermistor Cable Data

Depth of Installation (m)		Probehole # 3				Probehole # 4	
		1.7	6.7	10.3	13.7	7.5	14.8
Cable Number:		523	519	481	490	505	1
Date	Time	Temperature Readings (°C)					
9/12/2014	7:30	-2.5	-4.3	-4.1	-4.0	-4.0	-4.3
9/12/2014	20:00	-2.9	-4.9	-4.5	-4.6	-4.6	-4.9
9/13/2014	10:00	-3.6	-5.5	-4.0	-4.5	-4.5	-5.2
9/14/2014	10:00	-2.8	-4.6	-4.3	-4.4	-4.4	-4.7
9/15/2014	10:00	-2.7	-5.1	-4.3	-4.4	-4.4	-4.5
9/16/2014	10:00	-2.7	-4.9	-4.3	-4.5	-4.5	-5.0
9/17/2014	10:00	-3.1	-5.1	-4.2	-4.5	-4.5	-4.9
9/18/2014	10:00	-2.8	-5.0	-4.3	-4.7	-4.7	-5.0

3.6.2 Porewater Salinity

Samples collected from the field were shipped to Tetra Tech EBA's laboratory in Edmonton for porewater salinity testing. One sample from each of the four probeholes was taken, from varying depths, and sent for analysis.

The test results show that the overall level of soluble salt content at the site is high with the lowest salinity reading being 4 parts-per-thousand (ppt) in Probehole 2 at 3.0 m, while the highest salinity reading was 46 ppt in Probehole 4 at 15.0 m. It is evident that the level of porewater salinity is increasing with depth at the project site. The complete test results are presented in Appendix C while a summary of the test results is presented in Table 2.

Table 2: Salinity Test Data

Borehole #	Depth Below Grade (m)	Salinity (ppt)
1	7.0 - 8.0	36
2	2.5 - 3.0	4
3	4.0 - 5.0	21
4	14.0 - 15.0	46

3.7 Groundwater

Groundwater was encountered between 1.5 and 2.5 m below grade in Probeholes 1 and 2, which are located to the south and center of the project site respectively. Groundwater was not encountered in either Probehole 3 or 4 as these probeholes were positioned at a higher elevation and were located on the west and east side of the site respectively. Due to the nature of the current site grading, there may be groundwater trapped in the southeastern corner of the project site.

Groundwater should be expected in much of the southern and western parts of the site in the late spring, summer and autumn. Water may also collect locally on surface in other local low areas and in other parts of the site during heavy rainfall. Surface runoff and seasonal groundwater is expected to generally flow from south to north.

4.0 LIMITED ENVIRONMENTAL INVESTIGATION

4.1 Objective

The limited environmental assessment was conducted in conjunction with the present geotechnical investigation. The objective of this investigation was to confirm the presence of residual hydrocarbon contamination related to past or present use of the subject site and the immediate surrounding areas.

4.2 Methodology

Soil samples were collected from below the heating oil fuel tank (0.3 m) and from one of the four borehole locations drilled on site (Probehole 3, 0.5 m), due to the presence of an odour of hydrocarbon contamination. The tank is located near the middle of the eastern side of the building and Probehole 3 is located near the northeast corner of the building, downhill from the tank. Soil samples were placed in laboratory supplied glass jars with Teflon™-lined lids, stored in ice-packed coolers, and transported to Maxxam Analytics under chain-of-custody. Soil samples were analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) and petroleum hydrocarbon (PHC) Fractions F1 to F4, and lead.

4.3 Regulatory Guidelines

The analytical results for soil were compared to the Government of Nunavut, Department of Environment's *Environmental Guideline for Contaminated Site Remediation* (March 2009 Update), residential land use and coarse-grained soil texture. This provides soil quality guidelines for the protection of human health and ecological receptors. The closest body of water to the subject site is Hudson Bay, located 110 m north and down-gradient from the subject site.

The most stringent pathways for soil were Eco Soil Contact pathway. Table 3 below summarizes the guidelines selected and the most stringent applicable pathway.

Table 3: Tier 1 Guidelines (Residential Land Use, Course Grained Soil Texture)

Parameter	Applicable Pathway (Most Stringent)	Guideline Value (mg/kg)	Below Fuel Tank (mg/kg)	Probehole 3 (mg/kg)
Lead	No Pathway Listed	140	5.9	
Benzene	No Pathway Listed	0.03	<0.0050	0.015
Toluene	No Pathway Listed	0.37	<0.020	0.14
Ethylbenzene	No Pathway Listed	0.082	<0.010	0.062
Xylenes	No Pathway Listed	11	<0.040	0.32
F1	Eco Soil Contact	210	<12	34
F2	Eco Soil Contact	150	730	3500
F3	Eco Soil Contact	300	460	1600
F4	Eco Soil Contact	2800	<50	<50

4.4 Soil Analytical Results

The concentrations of PHC fractions F2 and F3 were above applicable guidelines in both of the samples taken. The samples were below guidelines for BTEX, PHC fractions F1 and F4, and lead.

The detailed environmental laboratory results from the soil samples taken on site are presented in Appendix D.

4.5 Environmental Recommendations

Based on the analytical results from the current investigation, PHC Fractions F2 and F3 concentrations in the soil samples collected from below the tank and from Probehole 3 is above the applicable (GN) Tier 1 guidelines.

Tetra Tech EBA recommends the following options:

Option A

- Develop a risk management plan for the contaminated soil located near the east side of the housing unit currently occupying the project site; and remediate the soil at a future date when the housing unit would be demolished; and
- Drill additional probeholes near Probehole 3 to identify horizontal and vertical extent of contamination plume.

Option B

- Excavate and treat the contaminated soil on a lined treatment area near the south boundary of the subject site; and
- Collect confirmatory soil samples to ensure that all contamination has been removed.

A hazardous building materials assessment should be performed prior to demolition or remodelling of the housing unit, to determine whether asbestos, lead-based paint, or other hazardous building materials are present.

5.0 GEOTECHNICAL RECOMMENDATIONS AND CONSIDERATIONS

5.1 General

Based on the findings from the site investigation, it is Tetra Tech EBA's opinion that the site is suitable for the proposed development.

Buried shallow foundations could be considered for use as the building foundation type. Deep foundations such as adfreeze piles may be used although the porewater salinity content will result in lower adfreeze bond values.

Variations of shallow foundations include grade-supported foundations. Screw jacks or a space frame foundations could also be considered as viable alternatives. Of the foundations mentioned above, Tetra Tech EBA recommends the use of a space frame foundation because it should be more resilient to seasonal frost action and should require less future maintenance.

A deep foundation, such as adfreeze steel pipe piles should also be feasible. However, the high porewater salinities would give low pile capacities if we use conventional adfreeze pile design approaches. If the underlying soil is not ice-rich, then there may be a possibility of optimizing pile design by including a small component of end-bearing and by using modified creep parameters. It is recommended that an air space be maintained beneath the structure to prevent degradation of the permafrost.

5.2 Climate Change Considerations

The impacts of potential climate change should be considered in the design of the Federal Building.The Canadian Standards Association (CSA 2010) provides guidance for screening the vulnerability of a development to climate change.

The sensitivity of the site to climate change is governed by the ice content of the subsurface soils and the anticipated ground temperature at the end of the service life of the building. The current mean annual ground temperature was measured at about -4.8°C at depth.

The CSA gives guidance on the potential implications of climate change on ground temperature. Under a high green-house gas scenario, mean annual air temperature warming of about 1.3°C can be expected over a 30-year design life. This suggests that the ground temperature may rise to about -3.5°C towards the end of the service life of the building. At this temperature, the permafrost will be maintained.

The sensitivity of the site to potential climate change is considered to be "low" based on the soil type and the ground temperature.

If permafrost thaw and settlement did occur, the building might exhibit differential movement, which could crack building finishes and affect the operation of doors and window. Because an elevated building is envisioned, it is expected that the movements could be mitigated by foundation adjustment. None-the-less, the consequences of permafrost thaw would be considered "major".

Considering the site sensitivity and the associated consequences together, the resulting risk level is classified as "C" (low risk), as defined by CSA (2010). This level of risk suggests that a "qualitative analyses" and expert judgement should be applied to develop a design for this development. This requires a comparison of the project with other built structures in the region, to judge performance. The person assessing the options and making the judgement should be able to demonstrate directly related experience, both with the selected foundation design and with permafrost conditions in the community. This level of analysis and judgement has been applied to this project.

If other aspects of the development are sensitive to ground settlement, these may need to be considered in the context of potential permafrost thaw.

5.3 Buried Footings

Spread footings could be considered at this site. The intent is to set the footing either on or within permafrost that has been stabilized with buried insulation. Provided sufficient wind resistance is available, the footings could be supported at grade. However, the available bearing pressure increases with depth of burial, so it is may be advantageous to bury the footings. Figure 2 illustrates the concept of a buried spread footing.

Footings may be constructed of pressure treated wood, concrete or steel. Wood footings are advantageous in that they are capable of being pre-assembled and placed immediately after excavation, minimizing the time an excavation must remain open. This reduces the potential for problems with seepage and disturbance to the underlying permafrost. Consideration could be given to precasting concrete footings, even on site, in order to facilitate construction.

Footings should be placed on compact, inorganic sand or gravel. The geotechnical resistance is dependent on the size and burial depth of footings. The factored geotechnical resistance may be calculated with:

$$q_{fact} = 150d + 90b$$

Where: q_{fact} denotes factored geotechnical resistance (kPa);

d denotes the footing burial depth, from final grade to base of footing (m); and

b denotes the minimum width of the footing (m).

A minimum spread footing width of 0.9 m is recommended.

From the foregoing equation, it can be seen that the available bearing pressure increases rapidly with burial depth. However, as burial depth increases, the potential for seepage and permafrost disturbance increases. Therefore, the increased bearing pressure should be weighed against the risk of increased construction difficulty when establishing a footing burial depth.

Figure 2 presents a recommended insulation configuration. For a footing burial depth of 1 m, a minimum thickness of 75 mm of Styrofoam HI-40, or equivalent, is recommended. The insulation should extend a minimum of 1.2 m beyond the edges of the footing. For footing burial depths of less than 0.5 m, the insulation thickness should be increased to 100 mm.

It is recommended that footings be installed in late summer, when the active layer is almost fully developed. This will reduce the potential for having to excavate frozen ground.

If the base of a footing excavation becomes disturbed or soft, it may be necessary to over-excavate, backfill with clean gravel backfill and compact.

Insulation should be placed and the excavation backfilled as soon as practical after the footing is placed. This will reduce degradation of the underlying permafrost.

There may be some frost heave through the first winter season of foundation freeze-back. The magnitude of heave cannot be predicted. Provided foundation construction occurs efficiently, this heave should be relatively uniform throughout the building. However, this possibility should be considered when scheduling completion of brittle finishes, such as drywall.

It is recommended that footing bearing surface be evaluated by a qualified geotechnical engineer or technologist.

5.4 Space Frame Multipoint Foundation

An adjustable foundation such as one supported on a space frame foundation system such as a Triodetic© multipoint foundation system on a granular pad could be considered for the building foundation and is a commonly used system in the community.

A space frame foundation is constructed of a three dimensional network of tubes and grade-supported bearing points that provide a rigid plane on which to support the building. Being supported at grade, the frame will move with the ground and be susceptible to seasonal movements. However, the frame has to be designed sufficiently rigid to minimize differential movements, hence stress on the building.

On granular soils, a space frame multipoint foundation can be supported by 250 mm square bearing plates. The conventional bearing capacity equation gives an allowable bearing pressure of about 8 kPa. Clearly, the conventional bearing capacity equation cannot be applied to develop a realistic design with this technology. Tetra Tech EBA understands that the design premise is that there will be settlement and load redistribution of building loads. Tetra Tech EBA recommends that timber pads be used at foundation bearing points to more effectively distribute load.

As the foundation is grade-supported, it is recommended that the structural engineer check the adequacy of the foundation against wind loads. Tetra Tech EBA recommends that foundation bearing points be supported on timber pads. A photo of a working example within the community is provided in the photos section.

Tetra Tech EBA recommends that the space frame foundation be constructed on a compacted granular pad. A minimum pad thickness of 1 m is recommended to account for potential future settlements. The granular fill for the pad should be compacted to at least 98% of Standard Proctor maximum dry density. No frost protection is required if the 1 m air space is maintained.

5.5 Screw Jack Foundation

An adjustable foundation such as one supported on screw jacks would follow the same concept as the previously mentioned space frame multipoint foundation system. The same requirements for the construction of the granular pad stand. The difference is that maintenance of the foundation system is critical since as the ground settles, the screw jacks must be adjusted to reduce the damage to the structure. This would be an ongoing maintenance item to address.

5.6 Adfreeze Steel Pipe Piles

The design premise for adfreeze piles is creep settlement. This is analogous to serviceability limit state. Ultimate limit state geotechnical resistance would be much higher, but is of limited relevance due to the time-dependent nature of adfreeze pile capacity.

Specifically, adfreeze steel pipe pile capacities are determined by assuming an allowable settlement over the design life of the structure. The settlement is determined by assuming the pile reaches a state of secondary creep, which is a constant rate of settlement in log time. The relationship used applies to ice-rich soil. At this site, non-ice-rich soil is expected to be present at depth, based on the site investigation. This suggests that the conventional approach may be overly conservative. In fact, it is anticipated that adfreeze piles in non-ice-rich soil may settle in primary creep, which attenuates with time. However, there are no established relationships for design in primary creep.

In an effort to more reasonably approximate the creep behaviour, the standard creep parameters were reviewed and determined considering the findings reported in Cavanagh, et. al. (2012). Also, because the soil is competent, it is reasonable to account for some end-bearing to be mobilized with pile settlement.

The allowable adfreeze bonds are dependent on the pile configuration, the nature of the load being supported, and subsurface conditions. These have been calculated assuming the parameters in Table 4.

Table 4: Design Parameter for Determining Adfreeze Capacity

Parameter	Value
Soil porewater salinity	30 ppt
Estimated mean ground temperature	-3.5 °C
Pile Diameter	141 mm
Design life	30 years
Allowable long-term settlement/heave	30 mm
Allowable short-term settlement/heave	2 mm in 4 months
Active layer thickness	2.5 m
Soil resistance factor (unslotted piles)	0.9

The design parameters in Table 4 are based on the site conditions interpreted from the review of available information, and an estimate of ground temperature resulting from global warming (CSA 2010). The active layer thickness has been estimated at 2.5 m. The ground temperature is considered to be unchanged as climate change warming and an allowance for cooling as a result of the shading effect of the building should balance.

In the analysis, Tetra Tech EBA has considered total settlements of 30 mm (serviceability) to determine on bond strengths. The rate of settlement will vary throughout the life of the building as a function of changing ground temperatures. In general, settlement can be expected to be slow at the outset and increase over time as the ground warms. Differential settlement may be approximately half of this value.

Factored adfreeze pile to backfill bond strengths are provided in Table 5.

Table 5: Factored Geotechnical Resistance for Adfreeze Piles

	Adfreeze – Unslotted Piles (Minimum embedment 14 m)		
Depth Below Final Grade (m)	**Long-Term Bond Strength (kPa)**	**Combined Short-Term and Long-Term Bond Strength (kPa)**	**End-Bearing (kPa)**
0 to 2.5	0	0	0
2.5 to 10.0	10	18	0
Below 10.0	10	18	3,000

In Table 5, adfreeze bond can be considered to resist both compression and tension loads. End-bearing is available to resist compression loads only. End-bearing may be applied to the gross end-area of the pipe.

Long-term loads in Table 5 refer to dead load and sustained live load, such as occupancy load. Short-term loads refer to environmental loads, such as snow load and wind load.

Higher adfreeze bonds can be mobilized when slots are cut into the piles. However, the cost to cut slots in Nunavut can be more than the cost of installing additional pile length by assuming the lower capacities associated with unslotted piles. Therefore, recommendations for unslotted piles are provided in the foregoing table.

A minimum air space of 1 m below the building is recommended to maintain permafrost and reduce snow drifting. This is typically accomplished by constructing an elevated, structural floor and maintaining an air space below the building. Though an air space smaller than 1 m can maintain the ground frozen, the impeded ventilation is more prone to snow drifting around the building, which in turn insulates the ground inhibiting freeze back of the ground.

The ultimate frost-jacking force is estimated to be about 166 kN on each pile. For unslotted piles, a minimum embedment of 14 m below final grade is recommended to resist frost-jacking. The minimum embedment length has been developed without considering any resistance provided by sustained loading on the piles. If sustained dead load is considered, the minimum pile embedment could be reduced. Tetra Tech EBA can review the minimum embedment depths once design loads are available.

If the designer has difficulty achieving desired pile capacities using the parameters in Table 5, consideration could be given to backfilling the portion of the pile holes below the active layer with grout. This would drive the failure surface from the backfill/pile interface, out to the edge of the drilled pile hole. For a 141 mm diameter pile, the pile hole would typically be about 195 mm in diameter. If grout is used, the adfreeze bond parameters given in Table 5 could be increased by 30% and applied at the grout/soil interface. If grouted piles are used, the minimum pile embedment can be reduced to 9 m below final grade. The grout would not need to be particularly strong for the stresses involved, so it is anticipated that a Ciment Fondu based mix could be developed using local sand. Tetra Tech EBA can provide further advice on a grout mix if this alternative is of interest, but a sample of the sand proposed for the grout mix should be provided for assessment.

Adfreeze piles in groups should be spaced at least four pile diameters on-centre apart.

The piles can be taken as laterally restrained from the bottom of the pile to the top of the permafrost. The soil in the active layer can be relied upon to provide some lateral support to the piles. As a minimum, active earth pressure can be relied upon. An earth pressure coefficient at-rest of 0.5 can be used to compute lateral support within the active layer, assuming a soil unit weight of 19 kN/m^3.

Adfreeze steel pipe piles should be installed in accordance with the following general recommendations:

- Piles are best installed while the ground is still frozen, but with moderate air temperatures (April, May, or June). This permits good access and clean holes to be drilled.
- Any soil, loose material, oil, grease, or any other material adhering to the pile should be removed before installation. Factory sealants should be removed from the pile.
- Pile holes should be drilled to a diameter at least 50 mm larger than the outside diameter of the piles.
- Sand slurry should be placed into the pile hole between the soil and the steel pipe pile. It should be mixed to a consistency of a wet paste such that it will flow down the hole. It should not have more water than necessary. The sand should not contain particles over 5 mm in diameter and should have no more than 10% fines passing the No. 200 sieve size (silt and clay sizes). In addition, the sand used in the slurry should have a salinity of less than 5 ppt. The pile should be vibrated with the drill, or by other means to ensure the formation of a continuous column of sand slurry around the outside of the pile. The inside of the pile should also be filled with sand slurry up to approximately 1 m below the pile cut-off elevation.

- Water used for slurry production should be fresh potable water. The placement temperature should not exceed 10°C to reduce disturbance and freeze-back time.
- No loading should occur before the backfill is completely frozen.

It is recommended that a qualified geotechnical engineer or technologist monitor the pile installations. In general, pile monitoring will include observations and/or measurements for each pile installation including pile plumbness, length, and installation depth, volumes of sand slurry, ground temperatures, and soil descriptions.

5.7 Site Grading and Drainage

It is recommended that final site grading should direct water away from the building. Natural drainage would be towards the north. Proper ditches do not exist along the roadways. Improper drainage and ponding of water near or under the structures could initiate foundation failure. Future and existing developments should be taken into consideration when directing drainage so as not to divert flow into those developments.

Tetra Tech EBA recommends that final grade within 3 m of the building or other structures are sloped down, away from the building or structures at 4%. It is also recommended that gravel or landscaped areas beyond 3 m from the buildings have a minimum grade of 2%. For asphalt or concrete paved areas, a minimum final grade of 1% is recommended.

The construction of spread footings does warrant building up the site with fill. To reduce the potential for difficulties during construction, Tetra Tech EBA recommends a minimum fill thickness of 1 m on the site, regardless of footing burial depth. If the footing burial depth is more than 1 m, the fill thickness should be increased such that the foundation is constructed in a fill section.

Other than provision for adequate surface grading and trafficability during and after construction, an adfreeze steel pile foundation has no particular requirement for fill on-site.

5.8 Seismic Classification

Table 4.1.8.4.A of the National Building Code of Canada (NBCC, 2010) suggests a seismic classification based on the shear strength of the upper 30 m of soil. Permafrost conditions are expected at a depth below 2.5 m. Considering the permafrost conditions, the seismic response of the permafrost will govern the site classification. The National Building Code of Canada does not explicitly consider permafrost, but it is indirectly addressed through the ranges of shear wave velocity. Based on available shear wave velocity data for frozen ground, the seismic classification for the site is conservatively interpreted to be Class B based on Table 4.1.8.4.A in NBCC (2010).

6.0 DESIGN AND CONSTRUCTION GUIDELINES

Recommended general design and construction guidelines are provided in Appendix E, under the following headings:

- Backfill Materials and Construction (4 pages)
- Construction Excavations (1 page)

The guidelines are generic and are intended to present standards of good practice. They have been developed largely from Tetra Tech EBA's southern practice. We have attempted to address specific local requirements in the main text of this report. The guidelines are supplemental to the main text of this report. In the event of any

discrepancy between the main text of this report and Appendix B, the main text should govern. The design and construction guidelines are not intended to represent detailed specifications for the works, although they may prove useful in the preparation of such specifications.

7.0 REVIEW OF DESIGN AND CONSTRUCTION

Tetra Tech EBA should be given the opportunity to review details of the design and specifications related to the geotechnical aspects of this project prior to construction. All recommendations presented in this report are based on the assumption that an adequate level of monitoring will be provided during construction and that all construction will be carried out by suitable qualified contractors, experienced in earthworks and foundation construction in the North.

- For surface or shallow foundations, an adequate level of monitoring is considered to be an inspection of the bearing surface and design review during construction.
- For deep foundations, an adequate level of monitoring is considered to be full-time monitoring of pile installations and monitoring the ground temperature and freeze back rates.

All such quality assurance monitoring should be carried out by qualified persons, on behalf of the owner, independent of the contractor. If the contractor also carries out testing for quality control, all parties should be made aware of this. One of the purposes of providing an adequate level of monitoring is to check that the recommendations provided in this report are pertinent to soil conditions encountered at the site, or to other areas should the foundations be relocated. Tetra Tech EBA will provide these services upon request.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.

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REGISTERED PROFESSIONAL ENGINEER
T. E. HOEVE
N.W.T.

PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date January 9, 2015
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

Reviewed by:
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/KLA

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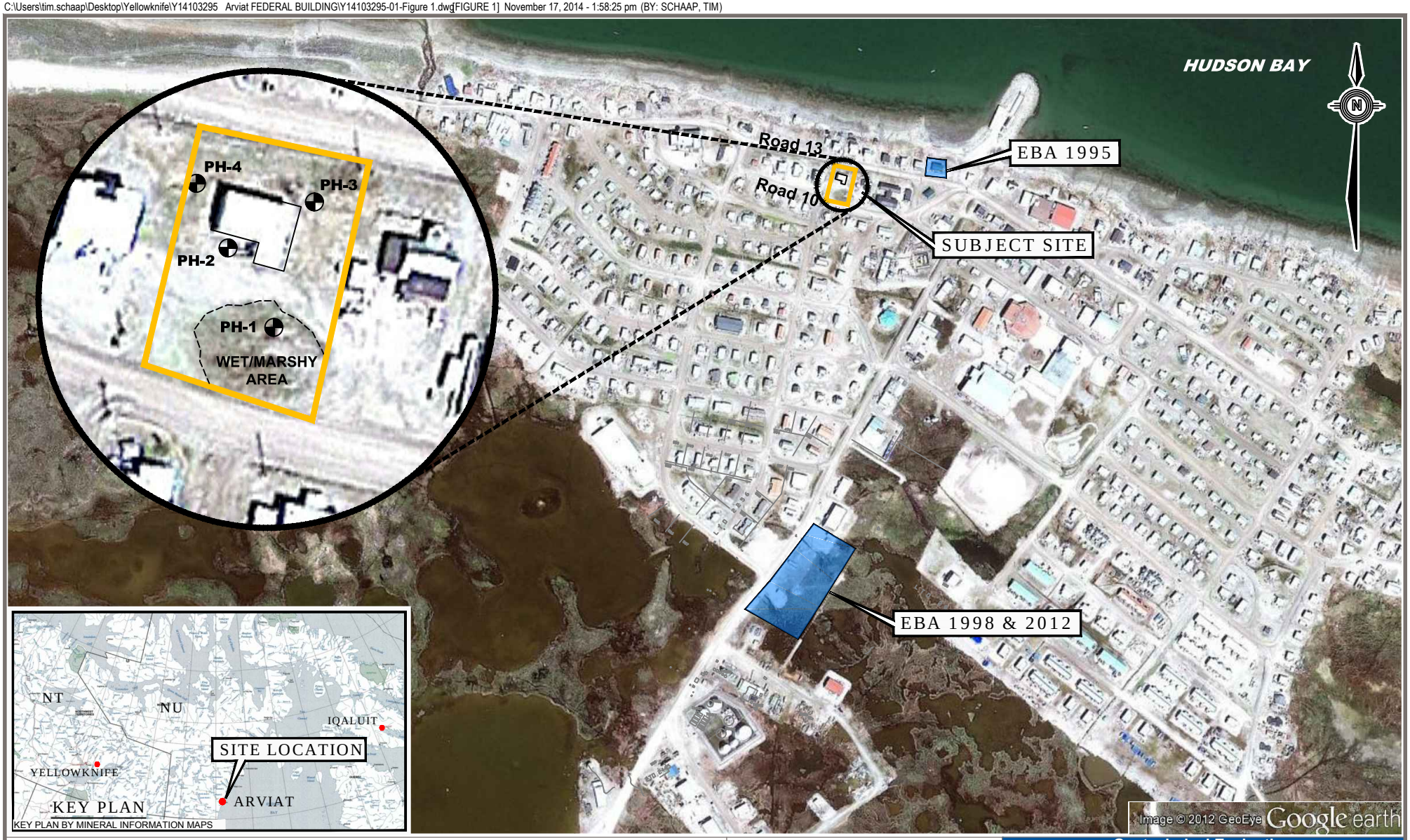
FIGURES

C:\Users\tim.schaap\Desktop\Yellowknife\Y14103295 Arviat FEDERAL BUILDING\Y14103295-01-Figure 1.dwg[FIGURE 1] November 17, 2014 - 1:58:25 pm (BY: SCHAAP, TIM)



LEGEND

- PROBEHOLE LOCATION

0 250

Scale: 1: 7 500 (metres)

CLIENT

PARKIN ARCHITECTS LIMITED

TETRA TECH EBA

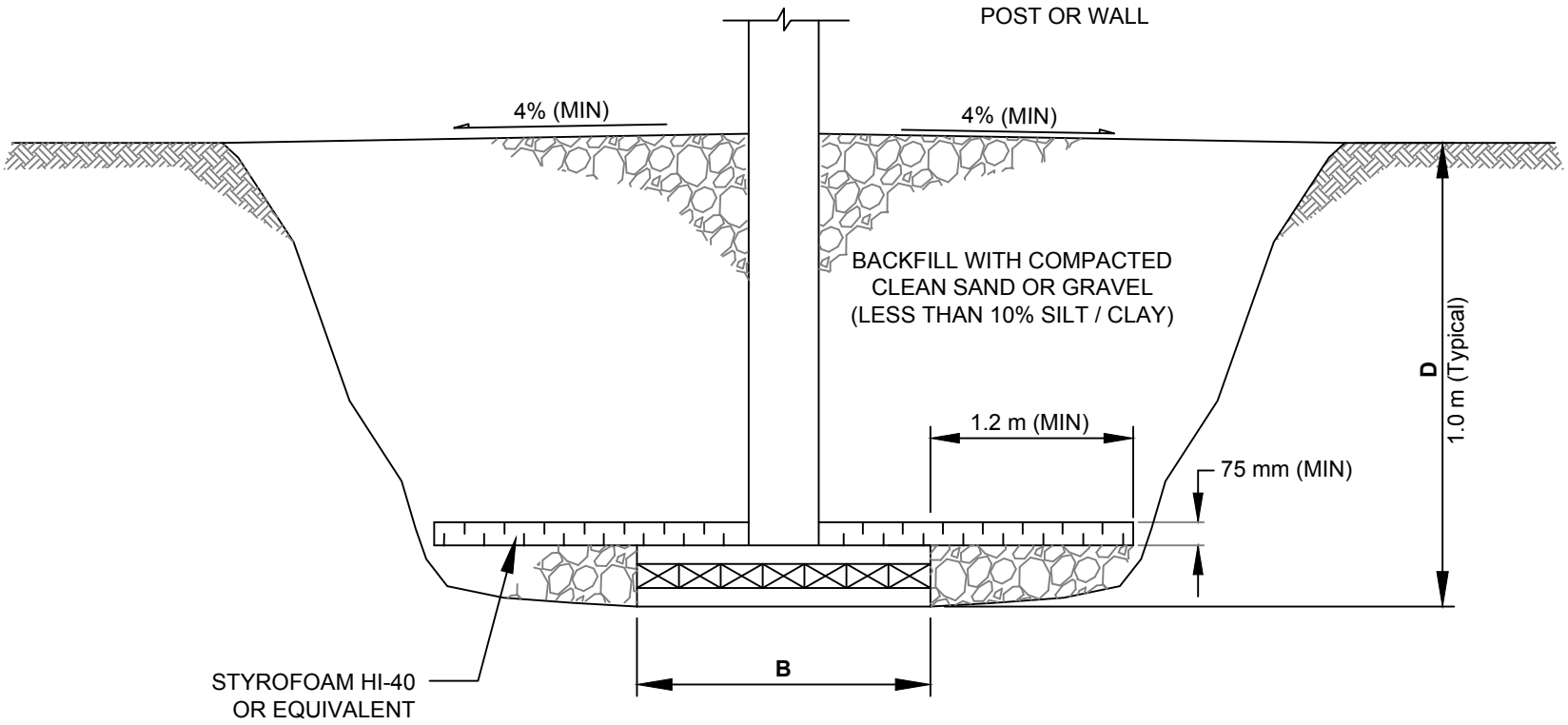
Geotechnical Evaluation
FEDERAL BUILDING
Arviat, NU

SITE LOCATION PLAN

PROJECT NO.	DWN	CKD	REV
Y14103295-01	TB/MM	CC	0

OFFICE	DATE
EDM	November 2014

Figure 1



NOTES

- MINIMUM RECOMMENDED FOOTING WIDTH **B** IS 0.90 m FOR SPREAD FOOTINGS
- BEARING PRESSURE: Q_{FACT} = 150 **D** + 90 **B** (AS PER TEXT OF REPORT)
- IF **D** IS LESS THAN 0.5 m, INSULATION THICKNESS SHOULD BE 100 mm
- DRAWING IS NOT TO SCALE

CLIENT

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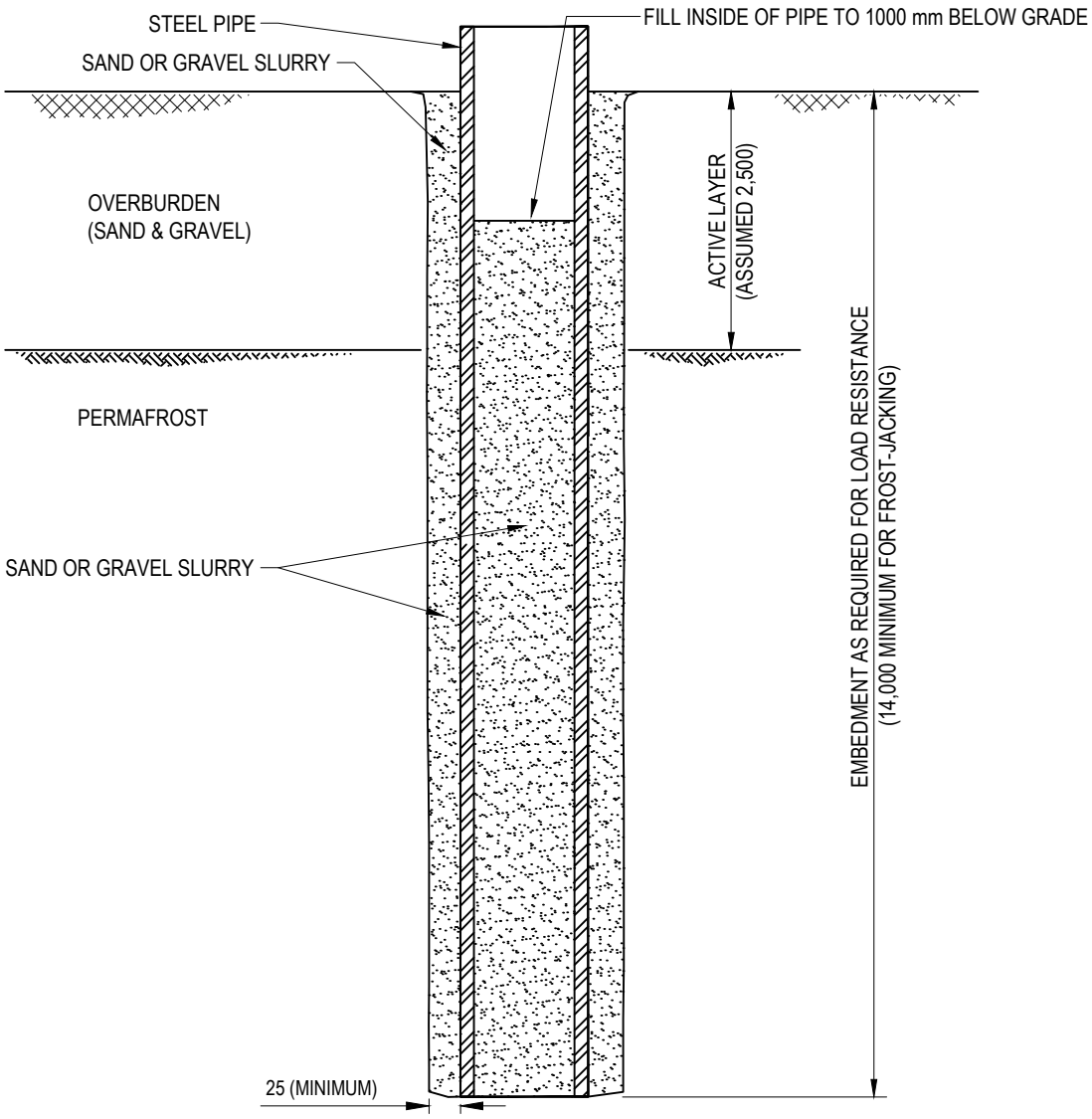
Geotechnical Evaluation
FEDERAL BUILDING
Arviat, NU

TYPICAL BURIED SPREAD FOOTING

PROJECT NO.	DWN	CKD	REV
Y14103295-01	THS	JAM	0

OFFICE	DATE
YEL	November 2014

Figure 2



NOTES

- NOT TO SCALE
- ALL DIMENSIONS IN MILLIMETERS

CLIENT

PARKIN ARCHITECTS LIMITED

TETRA TECH EBA

Geotechnical Evaluation
FEDERAL BUILDING
Arviat, NU

TYPICAL ADFREEZE STEEL PIPE PILE DESIGN

PROJECT NO.	DWN	CKD	REV
Y14103295-01	THS	TEH	0

OFFICE	DATE
YEL	January 2015

Figure 3

PHOTOGRAPHS

Photo 1: Looking northwest through the project site where the yellowish vegetation identifies the marshy ground on the project site. Road R10 can be seen on the LHS running along the edge of the marshy area.

Photo 2: Looking north through the project site at the derelict house currently occupying the site.

Photo 3: Looking west through the site along Road R13. The sloped fill embankment can be seen running down to the edge of Road R13.

Photo 4: Looking south through the project site. The height of the fill embankment is almost equal to the height of the house on site.

Photo 5: Looking south through the project site at the culvert outlet and fuel tank.

Photo 6: Looking north through the project site at the gravel entrance on the left and the marshy and area of the project site on the right.

Photo 7: Facing northeast through the project as the driller begins drilling Probehole 1 within the marshy area of the site.

Photo 8: The disturbed soil cuttings blown from Probehole 2 can be seen around the cased probehole.

Photo 9: Water can be seen being blown from Probehole 2 during drilling. Water was observed at a depth of 2.0 m within the probehole.

Photo 10: The disturbed soil cuttings blown from Probehole 3 can be seen around the cased probehole.

Photo 11: Looking east through the project site as the driller beings to drill Probehole 4 at the western side of the unoccupied house.

Photo 12: This 5-plex housing unit in Arviat is being constructed using a triodetic multipoint foundation system.

Photo 13: Close up of the multipoint connector system utilized by the triodetic foundation type.

APPENDIX A
GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of Tetra Tech EBA’s Client. Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Tetra Tech EBA’s Client unless otherwise authorized in writing by Tetra Tech EBA. Any unauthorized use of the report is at the sole risk of the user.

2.0 ALTERNATE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Tetra Tech EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of Tetra Tech EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Tetra Tech EBA. Tetra Tech EBA’s instruments of professional service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems. Tetra Tech EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, Tetra Tech EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. Tetra Tech EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. Tetra Tech EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

Tetra Tech EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of the report, Tetra Tech EBA may rely on information provided by persons other than the Client. While Tetra Tech EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B
PROBEHOLE LOGS

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

DESCRIPTIVE TERM	RELATIVE DENSITY	N (blows per 0.3m)
Very Loose	0 TO 20%	0 to 4
Loose	20 TO 40%	4 to 10
Compact	40 TO 75%	10 to 30
Dense	75 TO 90%	30 to 50
Very Dense	90 TO 100%	greater than 50

The number of blows, N, on a 51mm O.D. split spoon sampler of a 63.5kg weight falling 0.76m, required to drive the sampler a distance of 0.3m from 0.15m to 0.45m.

FINE GRAINED SOILS (major portion passing 0.075mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH (KPA)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.
Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated - composed of thin layers of varying colour and texture.
Interbedded - composed of alternate layers of different soil types.
Calcareous - containing appreciable quantities of calcium carbonate.;
Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.
Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

Geotechnical Evaluation for FEDERAL BUILDING	Parkin Architects Limited	PROJECT NO. - BOREHOLE NO.
Arviat, NU	Air Rotary - Canadrill Ltd.	Y14103295-01 - PH-01
Plan 78715 CLSR, Lot No. VBU12.	6775509.74N; 442682.49E; Zone 15	ELEVATION: 10 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Elevation (m)
0	SILT (FILL) - sandy, gravelly, trace silt, dark brown and black, moist, strong odour		1		Unfrozen	10.0
1	SAND and SILT - trace gravel, trace clay, brown and grey, well graded, sub rounded to sub angular gravel, moist, non plastic		2			9.0
2	[Sand 45%, Silt 35%, Gravel 13%, Clay 7%]		3			8.0
3	- some gravel, grey, rounded gravel, well graded, damp		4		Frozen	7.0
4	- trace clay, trace gravel, sub angular to sub rounded gravel, non plastic, grey, damp [Sand 49%, Silt 39%, Clay, 7%, Gravel 5%]		5			6.0
5			6			5.0
6	[Sand 46%, Silt 44%, Gravel 10%]		7			4.0
7	- silty, trace gravel, well graded, damp, grey Porewater Salinity: 36 ppt		8			3.0
8	End of Probehole at 8.0 m - Terminated due to probehole continuously sloughing in.					2.0
9						1.0
10						0.0
11						-1.0
12						-2.0
13						-3.0
14						-4.0
15						-5.0
16						-6.0

TETRA TECH EBA

LOGGED BY: CC
REVIEWED BY: THS
DRAWING NO:

COMPLETION DEPTH: 8 m
COMPLETE: 9/11/2014

Geotechnical Evaluation for FEDERAL BUILDING	Parkin Architects Limited	PROJECT NO. - BOREHOLE NO.
Arviat, NU	Air Rotary - Canadrill Ltd.	Y14103295-01 - PH-02
Plan 78715 CLSR, Lot No. VBU12.	6775519.92N; 442666E; Zone 15	ELEVATION: 10 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Elevation (m)
0	SAND and GRAVEL (FILL) - trace silt, trace cobble, well graded, light brown and grey, damp		9		Unfrozen	10.0
1	- sandy, trace silt, trace cobble, sub angular to sub rounded gravel, well graded, brown, damp		10			9.0
2	SAND - some gravel, trace silt, sub angular to sub rounded gravel, grey, damp Porewater Salinity: 4 ppt		11		Frozen	8.0
3	- gravelly, some silt, trace cobbles, sub rounded to sub angular gravel, grey, damp [Sand 40%, Gravel 33%, Silt 27%]		12			7.0
4	End of Probehole at 4.0 m - Terminated due to probehole continuously sloughing in.					6.0
5						5.0
6						4.0
7						3.0
8						2.0
9						1.0
10						0.0
11						-1.0
12						-2.0
13						-3.0
14						-4.0
15						-5.0
16						-6.0

TETRA TECH EBA

LOGGED BY: CC
REVIEWED BY: THS
DRAWING NO:

COMPLETION DEPTH: 7 m
COMPLETE: 9/11/2014

Geotechnical Evaluation for FEDERAL BUILDING	Parkin Architects Limited	PROJECT NO. - BOREHOLE NO.
Arviat, NU	Air Rotary - Canadrill Ltd.	Y14103295-01 - PH-03
Plan 78715 CLSR, Lot No. VBU12.	6775529.43N; 442683.94E; Zone 15	ELEVATION: 10 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Elevation (m)
0	SAND and GRAVEL (FILL) - trace silt, trace cobbles, well graded, light brown and grey, damp strong hydrocarbon odour				Unfrozen	10.0
1	- sandy, trace silt, trace cobbles, well graded, grey, damp - strong hydrocarbon odour		13			9.0
2	SAND - gravelly, trace silt, brown and grey, damp medium hydrocarbon odour		14			8.0
3	- silty, trace gravel, well graded, grey, damp - slight odour of hydrocarbon contamination		15		Frozen	7.0
4	- sub angular to sub rounded gravel, some silt - no odour of hydrocarbon contamination Porewater Salinity: 21 ppt		16			6.0
5	SAND and SILT, trace gravel, well graded, non plastic, grey, damp		17			5.0
6	- silty, trace gravel, sub angular to sub rounded gravel, poorly graded, grey, damp		18			4.0
7						3.0
8			19			2.0
9	- some silt, some gravel, well graded, grey, damp		20			1.0
10						0.0
11			21			-1.0
12	- silty, trace gravel, well graded, light brown, damp					-2.0
13	[Sand 69%, Silt 24%, Gravel 7 %]					-3.0
14			22			-4.0
15	End of Probehole at 15.0 m - Terminated due to availability of drill rods.					-5.0
16						-6.0

TETRA TECH EBA

LOGGED BY: CC	COMPLETION DEPTH: 15 m
REVIEWED BY: THS	COMPLETE: 9/11/2014
DRAWING NO:	Page 1 of 1

Geotechnical Evaluation for FEDERAL BUILDING	Parkin Architects Limited	PROJECT NO. - BOREHOLE NO.
Arviat, NU	Air Rotary - Canadrill Ltd.	Y14103295-01 - PH-04
Plan 78715 CLSR, Lot No. VBU12.	6775537.28N; 442660.19E; Zone 15	ELEVATION: 10 m

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Elevation (m)
0	SAND and GRAVEL (FILL) - trace silt, trace cobble, well graded, light brown and grey, damp,				Unfrozen	10.0
1	- sandy, trace silt, trace cobble, sub angular to sub rounded gravel, well graded, brown, damp		23 24			9.0
2	SAND - silty, trace gravel, well graded, light brown, damp, angular to sub angular		25			8.0
3			26		Frozen	7.0
4	SAND and SILT - trace gravel, trace cobble, well graded, grey, damp		27			6.0
5			28			5.0
6	- sandy, trace gravel, well graded, grey, damp		29			4.0
7	- trace cobbles		30			3.0
8			31			2.0
9						1.0
10			32			0.0
11	[Sand 55%, Silt 40%, Gravel 5%]					-1.0
12	- silty, trace gravel, grey, damp [Sand 73%, Silt 21%, Gravel 6%]					-2.0
13			33			-3.0
14	Porewater Salinity: 46 ppt		34			-4.0
15	End of Probehole at 15.0 m - Terminated due to availability of drill rods.					-5.0
16						-6.0

TETRA TECH EBA

LOGGED BY: CC
REVIEWED BY: THS
DRAWING NO:

COMPLETION DEPTH: 15 m
COMPLETE: 9/11/2014

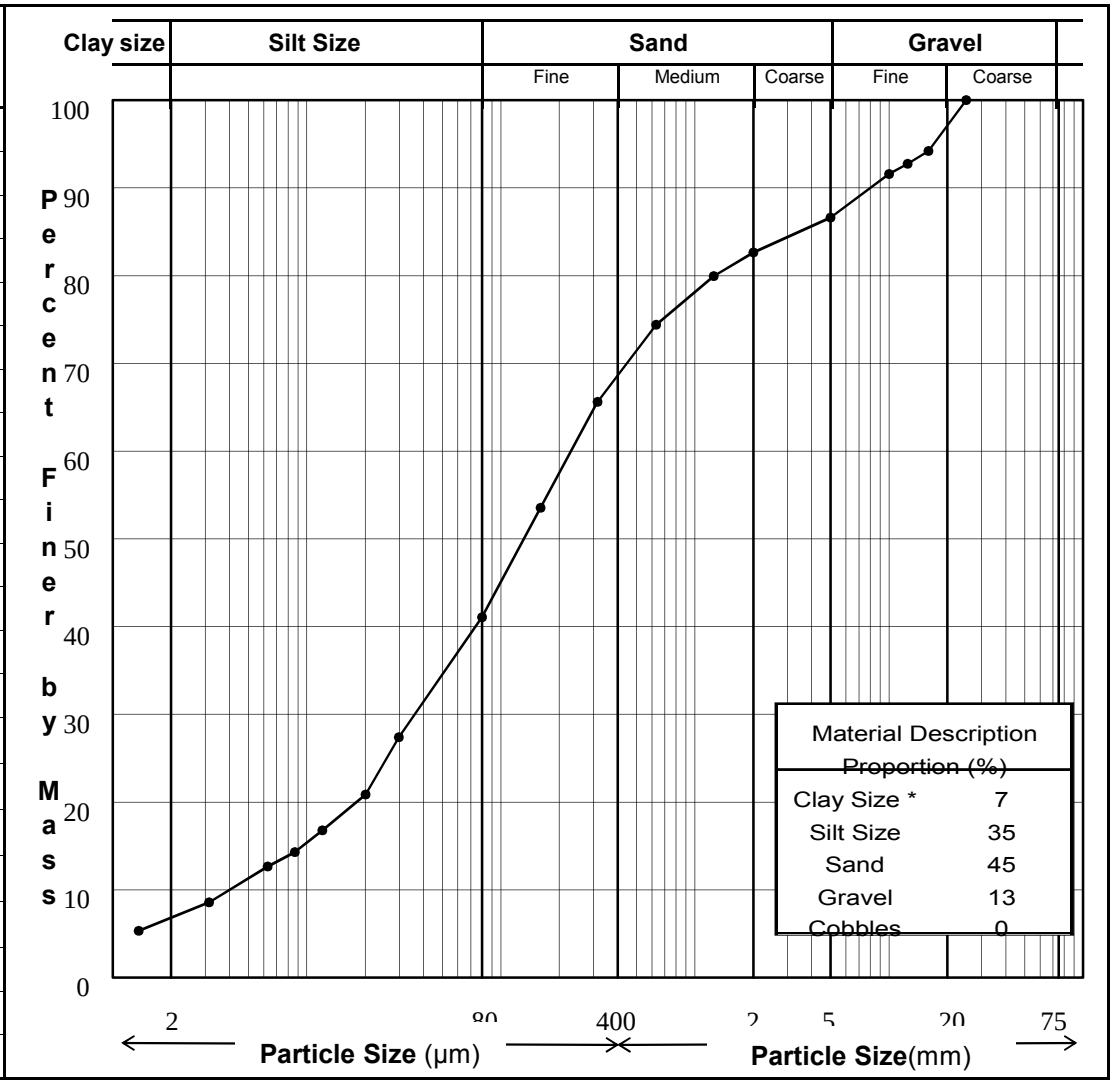
APPENDIX C
LABORATORY TEST RESULTS

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Geotechnical Evaluation for FEDERAL BUILDING	Sample No.:	6073
Client:	Parkin Architects Ltd.	Borehole/ TP:	PH-01, Sample 2
Project No.:	Y14103295-01	Depth:	1 - 2 m
Location:	Arviat, NU	Date Tested	Sept 30- Oct 1, 2014
Description **:	SAND and SILT, some gravel, trace clay	Tested By:	NR

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	100
16 mm	94
13 mm	93
10 mm	92
5 mm	87
2 mm	83
1.3 mm	80
630 µm	74
315 µm	66
160 µm	54
80 µm	41
30 µm	27
20 µm	21
12 µm	17
9 µm	14
6 µm	13
3 µm	9
1 µm	5



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Eng.

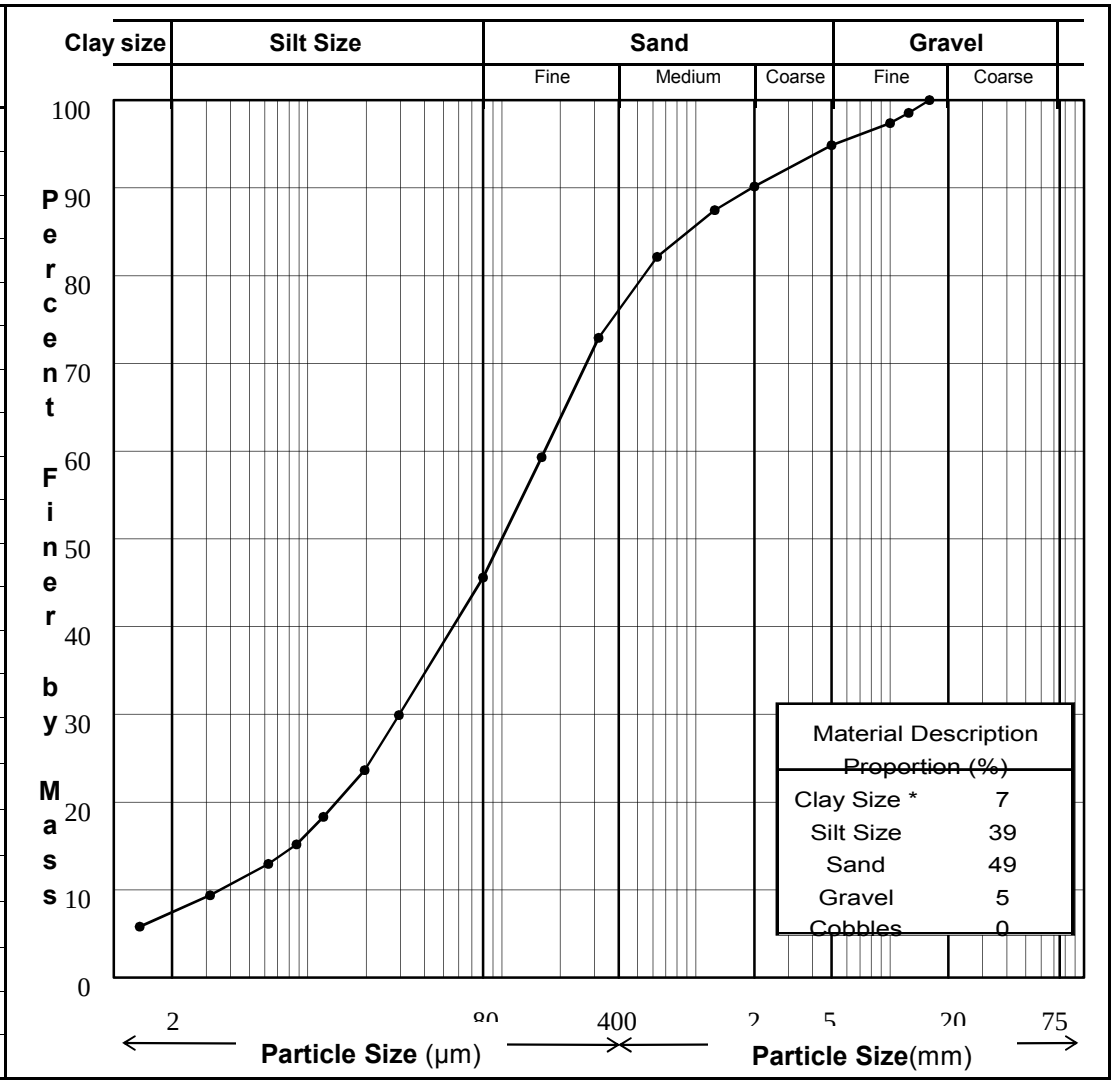
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Geotechnical Evaluation for FEDERAL BUILDING	Sample No.:	6073
Client:	Parkin Architects Ltd.	Borehole/ TP:	PH-01, Sample 5
Project No.:	Y14103295-01	Depth:	4 - 5 m
Location:	Arviat, NU	Date Tested	Sept 30- Oct 1, 2014
Description **:	SAND and SILT, trace gravel, trace clay	Tested By:	NR

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
16 mm	100
13 mm	99
10 mm	97
5 mm	95
2 mm	90
1.3 mm	87
630 µm	82
315 µm	73
160 µm	59
80 µm	46
29 µm	30
20 µm	24
12 µm	18
9 µm	15
6 µm	13
3 µm	9
1 µm	6



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Reviewed By: _____ P.Eng.

PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Geotechnical Evaluation for FEDERAL BUILDING
Arviat, NU

Project Number: Y14103295-01

Date Tested: October 23, 2014

Borehole Number: PH-01

Depth: 5.0 - 6.0 m

Soil Description: SAND and SILT - trace gravel

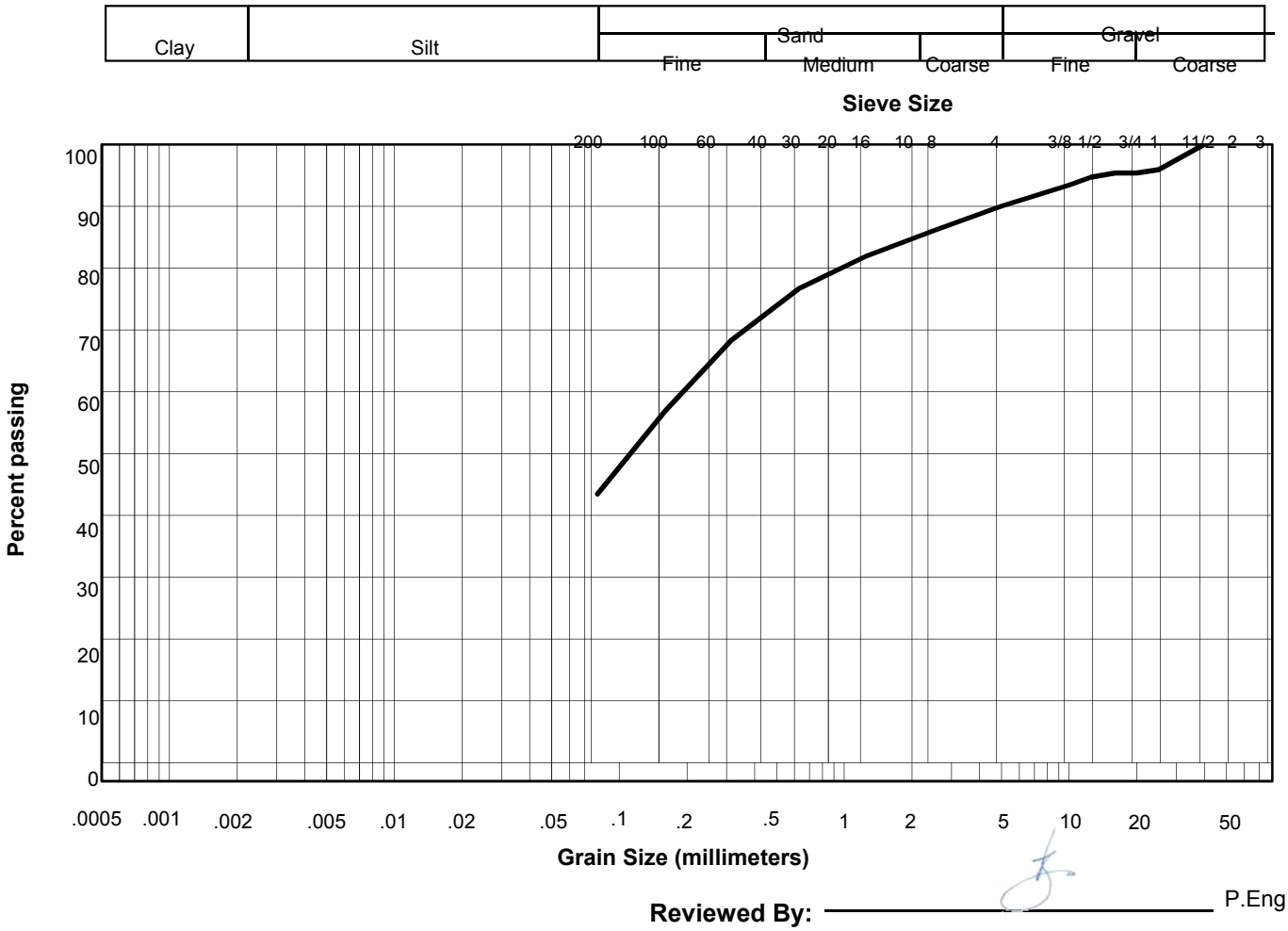
Cu:

Cc:

Natural Moisture Content: 9.6%

Remarks: Client: Parkin Architects Limited
Attention: Robert Boraks - Email: boraks@parkin.ca

Sieve Size (mm)	Percent Passing
40	100
25	96
20	95
16	95
12.5	95
10	93
5	90
2.5	86
1.25	82
0.63	77
0.315	68
0.160	57
0.080	43.4



Reviewed By: _____ P.Eng.

TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Geotechnical Evaluation for FEDERAL BUILDING
Arviat, NU

Project Number: Y14103295-01

Date Tested: October 23, 2014

Borehole Number: PH-02

Depth: 2.0 - 3.0 m

Soil Description: SAND and GRAVEL - some silt

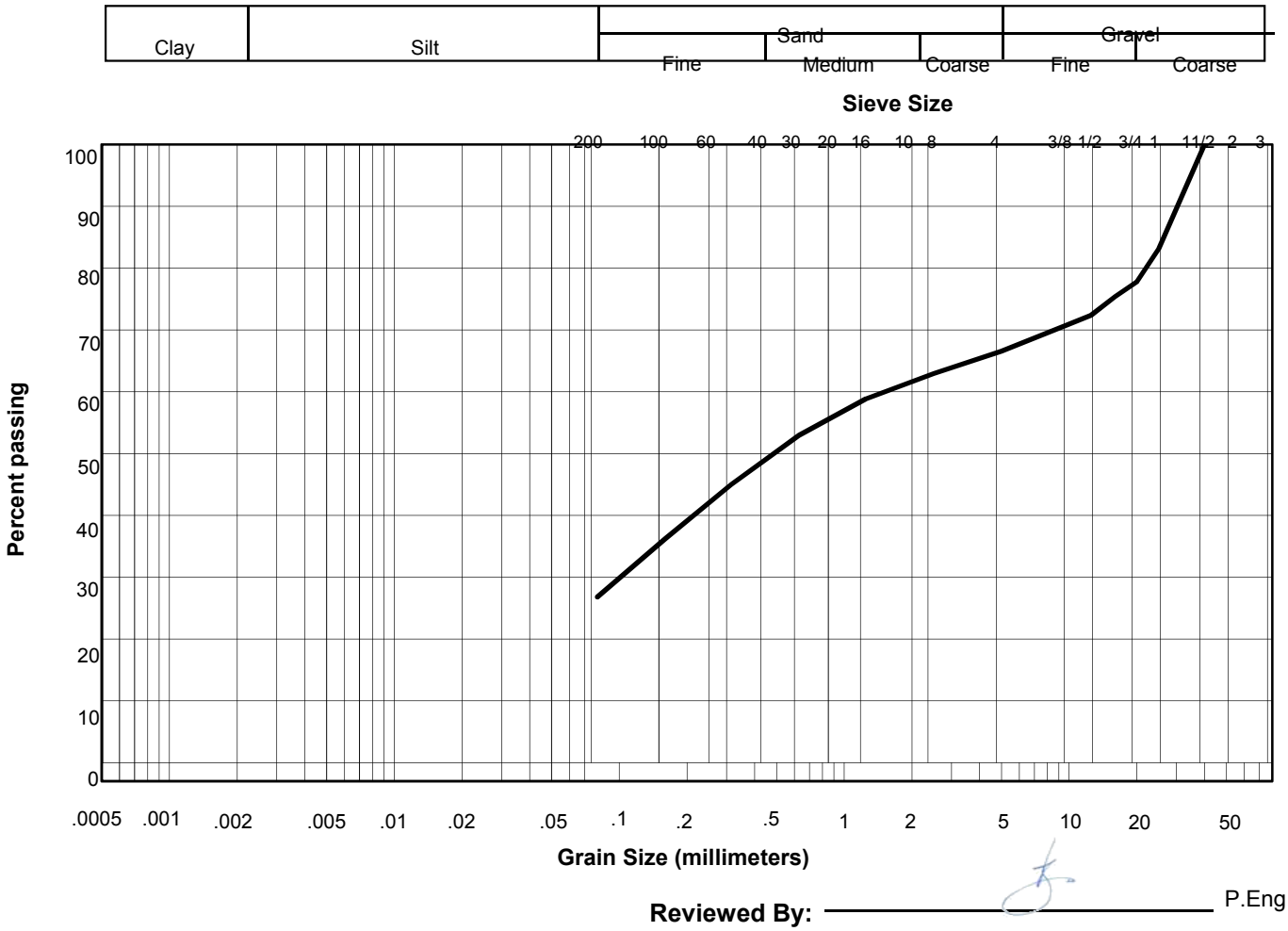
Cu:

Cc:

Natural Moisture Content: 6.3%

Remarks: Client: Parkin Architects Limited
Attention: Robert Boraks - Email: boraks@parkin.ca

Sieve Size (mm)	Percent Passing
40	100
25	83
20	78
16	75
12.5	72
10	71
5	67
2.5	63
1.25	59
0.63	53
0.315	45
0.160	36
0.080	26.8



Reviewed By: _____ P.Eng.

TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Geotechnical Evaluation for FEDERAL BUILDING
Arviat, NU

Project Number: Y14103295-01

Date Tested: October 23, 2014

Borehole Number: PH-03

Depth: 12.0 - 15.0 m

Soil Description: SAND - silty, trace gravel

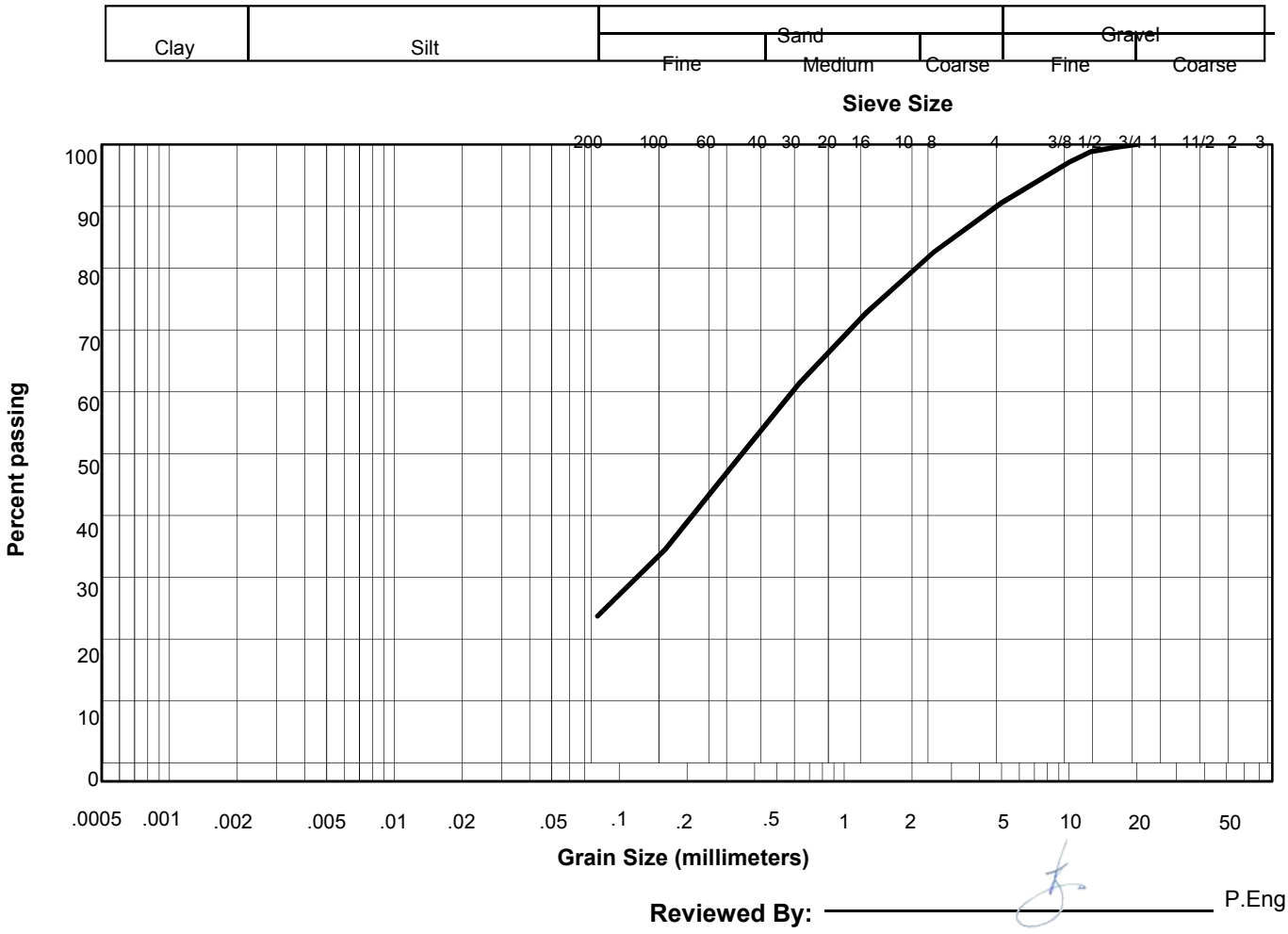
Cu:

Cc:

Natural Moisture Content: 6.2%

Remarks: Client: Parkin Architects Limited
Attention: Robert Boraks - Email: boraks@parkin.ca

Sieve Size (mm)	Percent Passing
40	#N/A
25	#N/A
20	100
16	100
12.5	99
10	97
5	91
2.5	83
1.25	73
0.63	61
0.315	48
0.160	34
0.080	23.7



Reviewed By: _____ P.Eng.

TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Geotechnical Evaluation for FEDERAL BUILDING
Arviat, NU

Project Number: Y14103295-01

Date Tested: October 23, 2014

Borehole Number: PH-04

Depth: 9.0 - 11.0 m

Soil Description: SAND and SILT - trace gravel

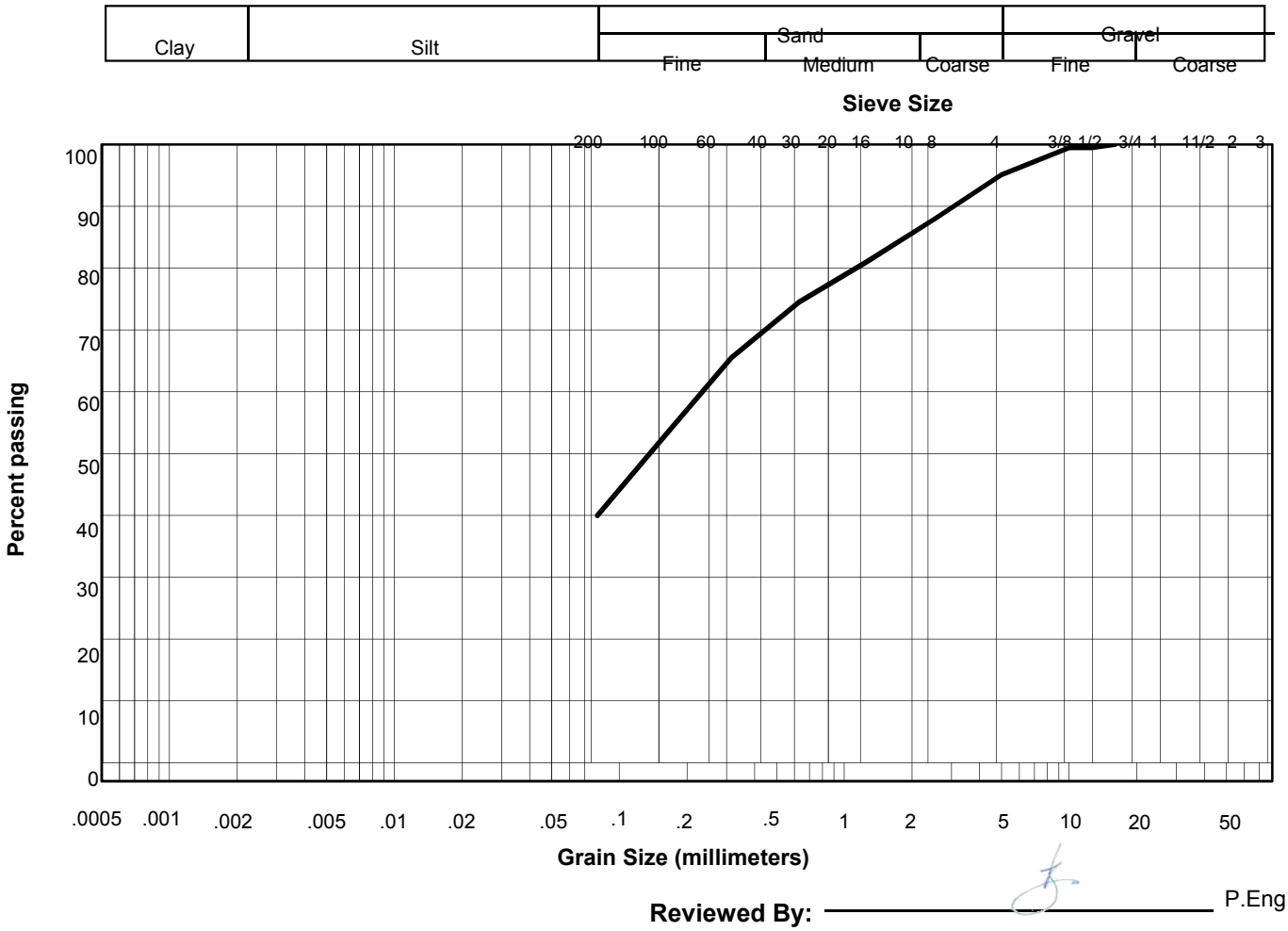
Cu:

Cc:

Natural Moisture Content: 9.2%

Remarks: Client: Parkin Architects Limited
Attention: Robert Boraks - Email: boraks@parkin.ca

Sieve Size (mm)	Percent Passing
40	#N/A
25	#N/A
20	#N/A
16	100
12.5	99
10	99
5	95
2.5	88
1.25	81
0.63	75
0.315	65
0.160	53
0.080	40.0



Reviewed By: _____ P.Eng.

TETRA TECH

APPENDIX D
ENVIRONMENTAL TEST RESULTS

Your P.O. #: Y1403295-01
Your Project #: ARVIAT-Federal Building
Your C.O.C. #: A134839

Attention:Conor Castigan

TETRA TECH EBA INC.
#201, 4916 - 49 Street
P.O. Box 2244
YELLOWKNIFE, NT
CANADA X1A-2P7

Report Date: 2014/09/24
Report #: R1648426
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B482313
Received: 2014/09/16, 10:40

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS (MeOH extract)	1	2014/09/17	2014/09/21	AB SOP-00039	CCME CWS/EPA 8260C m
BTEX/F1 by HS GC/MS (MeOH extract)	1	2014/09/17	2014/09/23	AB SOP-00039	CCME CWS/EPA 8260C m
CCME Hydrocarbons (F2-F4 in soil)	1	2014/09/17	2014/09/18	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil)	1	2014/09/17	2014/09/22	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS
Moisture	2	N/A	2014/09/18	AB SOP-00002	CCME PHC-CWS
Lead	1	2014/09/19	2014/09/20	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Particle Size by Sieve (75 micron)	1	N/A	2014/09/18	EENVSOP-00077	Carter 2nd ed 55.4 m

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Sherlyne Sim, B.Eng, Project Manager
Email: SSim@maxxam.ca
Phone# (780)577-7113

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		KP6668		KP6669		
Sampling Date		2014/09/11 19:00		2014/09/11 20:00		
COC Number		A134839		A134839		
	Units	FUEL TANK-MIDDLE OF HOUSE	QC Batch	CORNER OF HOUSE	RDL	QC Batch
Physical Properties						
Moisture	%	7.0	7642619	33	0.30	7642618
Sieve - Pan	%	1.5	7642829	N/A	0.20	N/A
Sieve - #200 (>0.075mm)	%	98	7642829	N/A	0.20	N/A
Grain Size	%	COARSE	7642829	N/A	0.20	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		KP6668		KP6669		
Sampling Date		2014/09/11 19:00		2014/09/11 20:00		
COC Number		A134839		A134839		
	Units	**FUEL TANK-MIDDLE OF HOUSE**	**QC Batch**	**CORNER OF HOUSE**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/kg	730	7642781	3500	10	7642779
F3 (C16-C34 Hydrocarbons)	mg/kg	460	7642781	1600	50	7642779
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	7642781	<50	50	7642779
Reached Baseline at C50	mg/kg	Yes	7642781	Yes	N/A	7642779
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	93	7642781	91	N/A	7642779

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		KP6668		
Sampling Date		2014/09/11 19:00		
COC Number		A134839		
	Units	**FUEL TANK-MIDDLE OF HOUSE**	**RDL**	**QC Batch**
Elements				
Total Lead (Pb)	mg/kg	5.9	1.0	7646356
RDL = Reportable Detection Limit				

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Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		KP6668		KP6669		
Sampling Date		2014/09/11 19:00		2014/09/11 20:00		
COC Number		A134839		A134839		
	Units	FUEL TANK-MIDDLE OF HOUSE	QC Batch	CORNER OF HOUSE	RDL	QC Batch
Volatiles						
Benzene	mg/kg	<0.0050	7642846	0.015	0.0050	7642813
Toluene	mg/kg	<0.020	7642846	0.14	0.020	7642813
Ethylbenzene	mg/kg	<0.010	7642846	0.062	0.010	7642813
Xylenes (Total)	mg/kg	<0.040	7642846	0.32	0.040	7642813
m & p-Xylene	mg/kg	<0.040	7642846	0.19	0.040	7642813
o-Xylene	mg/kg	<0.020	7642846	0.13	0.020	7642813
F1 (C6-C10) - BTEX	mg/kg	<12	7642846	34	12	7642813
(C6-C10)	mg/kg	<12	7642846	34	12	7642813
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	103	7642846	114	N/A	7642813
4-Bromofluorobenzene (sur.)	%	95	7642846	100	N/A	7642813
D10-ETHYLBENZENE (sur.)	%	103	7642846	106	N/A	7642813
D4-1,2-Dichloroethane (sur.)	%	102	7642846	101	N/A	7642813

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	11.7°C

Results relate only to the items tested.

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Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7642618	ZZ	Method Blank	Moisture	2014/09/18	<0.30		%	
7642618	ZZ	RPD	Moisture	2014/09/18	9.8		%	20
7642619	ZZ	Method Blank	Moisture	2014/09/18	<0.30		%	
7642619	ZZ	RPD	Moisture	2014/09/18	3.2		%	20
7642779	KO	Matrix Spike	O-TERPHENYL (sur.)	2014/09/18		85	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/18		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/09/18		90	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/09/18		87	%	50 - 130
7642779	KO	Spiked Blank	O-TERPHENYL (sur.)	2014/09/18		93	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/18		106	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2014/09/18		110	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2014/09/18		104	%	70 - 130
7642779	KO	Method Blank	O-TERPHENYL (sur.)	2014/09/18		90	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/18	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/09/18	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/09/18	<50		mg/kg	
7642779	KO	RPD	F2 (C10-C16 Hydrocarbons)	2014/09/18	35		%	50
			F3 (C16-C34 Hydrocarbons)	2014/09/18	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2014/09/18	NC		%	50
7642781	PK4	Matrix Spike	O-TERPHENYL (sur.)	2014/09/22		85	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/22		99	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/09/22		103	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/09/22		95	%	50 - 130
7642781	PK4	Spiked Blank	O-TERPHENYL (sur.)	2014/09/22		84	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/22		106	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2014/09/22		110	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2014/09/22		101	%	70 - 130
7642781	PK4	Method Blank	O-TERPHENYL (sur.)	2014/09/22		78	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/09/22	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/09/22	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/09/22	<50		mg/kg	
7642781	PK4	RPD	F2 (C10-C16 Hydrocarbons)	2014/09/22	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2014/09/22	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2014/09/22	NC		%	50
7642813	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/09/21		106	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/21		100	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/21		110	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/21		98	%	60 - 140
			Benzene	2014/09/21		92	%	60 - 140
			Toluene	2014/09/21		89	%	60 - 140
			Ethylbenzene	2014/09/21		92	%	60 - 140
			m & p-Xylene	2014/09/21		94	%	60 - 140
			o-Xylene	2014/09/21		94	%	60 - 140
			(C6-C10)	2014/09/21		115	%	60 - 140
7642813	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/09/21		95	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/21		101	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/21		105	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/21		98	%	60 - 140
			Benzene	2014/09/21		89	%	60 - 140
			Toluene	2014/09/21		86	%	60 - 140
			Ethylbenzene	2014/09/21		88	%	60 - 140
			m & p-Xylene	2014/09/21		87	%	60 - 140

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Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			o-Xylene	2014/09/21		91	%	60 - 140
			(C6-C10)	2014/09/21		116	%	60 - 140
7642813	SES	Method Blank	1,4-Difluorobenzene (sur.)	2014/09/21		95	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/21		98	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/21		107	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/21		99	%	60 - 140
			Benzene	2014/09/21	<0.0050		mg/kg	
			Toluene	2014/09/21	<0.020		mg/kg	
			Ethylbenzene	2014/09/21	<0.010		mg/kg	
			Xylenes (Total)	2014/09/21	<0.040		mg/kg	
			m & p-Xylene	2014/09/21	<0.040		mg/kg	
			o-Xylene	2014/09/21	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2014/09/21	<12		mg/kg	
			(C6-C10)	2014/09/21	<12		mg/kg	
7642813	SES	RPD	Benzene	2014/09/21	NC		%	50
			Toluene	2014/09/21	NC		%	50
			Ethylbenzene	2014/09/21	NC		%	50
			Xylenes (Total)	2014/09/21	NC		%	50
			m & p-Xylene	2014/09/21	NC		%	50
			o-Xylene	2014/09/21	NC		%	50
			F1 (C6-C10) - BTEX	2014/09/21	NC		%	50
			(C6-C10)	2014/09/21	NC		%	50
7642829	EI2	QC Standard	Sieve - Pan	2014/09/18		100	%	91 - 109
			Sieve - #200 (>0.075mm)	2014/09/18		101	%	84 - 116
7642829	EI2	RPD	Sieve - Pan	2014/09/18	0.16		%	35
			Sieve - #200 (>0.075mm)	2014/09/18	0.64		%	35
7642846	SES	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/09/23		108	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/23		95	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/23		105	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/23		103	%	60 - 140
			Benzene	2014/09/23		95	%	60 - 140
			Toluene	2014/09/23		92	%	60 - 140
			Ethylbenzene	2014/09/23		93	%	60 - 140
			m & p-Xylene	2014/09/23		96	%	60 - 140
			o-Xylene	2014/09/23		98	%	60 - 140
			(C6-C10)	2014/09/23		92	%	60 - 140
7642846	SES	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/09/23		99	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/23		94	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/23		106	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/23		105	%	60 - 140
			Benzene	2014/09/23		98	%	60 - 140
			Toluene	2014/09/23		94	%	60 - 140
			Ethylbenzene	2014/09/23		95	%	60 - 140
			m & p-Xylene	2014/09/23		98	%	60 - 140
			o-Xylene	2014/09/23		99	%	60 - 140
			(C6-C10)	2014/09/23		105	%	60 - 140
7642846	SES	Method Blank	1,4-Difluorobenzene (sur.)	2014/09/23		99	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/09/23		93	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/09/23		97	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/09/23		101	%	60 - 140
			Benzene	2014/09/23	<0.0050		mg/kg	
			Toluene	2014/09/23	<0.020		mg/kg	

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B482313
Report Date: 2014/09/24

TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Ethylbenzene	2014/09/23	<0.010		mg/kg	
			Xylenes (Total)	2014/09/23	<0.040		mg/kg	
			m & p-Xylene	2014/09/23	<0.040		mg/kg	
			o-Xylene	2014/09/23	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2014/09/23	<12		mg/kg	
			(C6-C10)	2014/09/23	<12		mg/kg	
7642846	SES	RPD	Benzene	2014/09/23	NC		%	50
			Toluene	2014/09/23	NC		%	50
			Ethylbenzene	2014/09/23	NC		%	50
			Xylenes (Total)	2014/09/23	NC		%	50
			m & p-Xylene	2014/09/23	NC		%	50
			o-Xylene	2014/09/23	NC		%	50
			F1 (C6-C10) - BTEX	2014/09/23	NC		%	50
			(C6-C10)	2014/09/23	NC		%	50
7646356	JEP	Matrix Spike	Total Lead (Pb)	2014/09/20		96	%	75 - 125
7646356	JEP	QC Standard	Total Lead (Pb)	2014/09/20		102	%	54 - 146
7646356	JEP	Spiked Blank	Total Lead (Pb)	2014/09/20		95	%	75 - 125
7646356	JEP	Method Blank	Total Lead (Pb)	2014/09/20	<1.0		mg/kg	
7646356	JEP	RPD	Total Lead (Pb)	2014/09/20	6.1		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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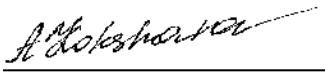
Maxxam Job #: B482313
Report Date: 2014/09/24

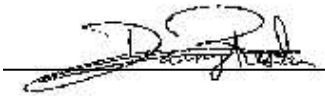
TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Your P.O. #: Y1403295-01
Sampler Initials: CC

VALIDATION SIGNATURE PAGE

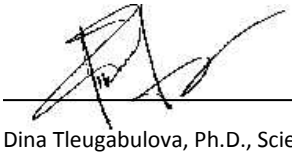
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anna Koksharova, M.Sc., Senior Analyst



Daniel Reslan, Chem. Tech., Volatiles Supervisor



Dina Tleugabulova, Ph.D., Scientific Specialist, Inorganics Department

Yashu Mohan, B.Sc. B.Tech., Senior Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
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www.maxxamanalytics.com

AWB 70307974.

Chain of Custody A134839

09/868 AWD

Page: _____ of _____

	Invoice To:	C/O Report Address ☐
Company:	Tetra Tech EBA	
Contact:	Conor Costigan	
Address:		
	Prov:	PC:
Contact #s:	Ph: 867 766 3728 x264	Cell: 867 445 3485

Report To:	Same as Invoice ☑
Prov:	PC:
Ph:	Cell:

Report Distribution (E-Mail): Conor.Costigan@tetratech.com

REGULATORY GUIDELINES:
- ☐ AT1
- ☐ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: Y1403295-01
Project # / Name: Arviat - RCMP
Site Location:
Quote #:
Sampled By: Conor Costigan

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: _____ ☑ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐VOCs	WATER: ☐BTEX F1-F2 ☐BTEX F1-F4	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	Other Analysis: Lead	Other Analysis: Grain Size Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	Fuel Tank - Middle of House	0.3m		14/09/11-19:00	✓													✓	✓		1
2	Corner of House	0.5m		14/09/11 -20:00	✓													✓	✓		1
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

RECEIVED IN YELLOWKNIFE
By: Jenna Wood
2014 -09- 16 10:40

Temp: 12/11/1:2

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Conor Costigan	14/09/16	10:40 Am
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B482313
Jenna Walter	20140917	1005	

Lab Comments:

Custody Seal	Temperature	Ice
present	3, 4, 4	present

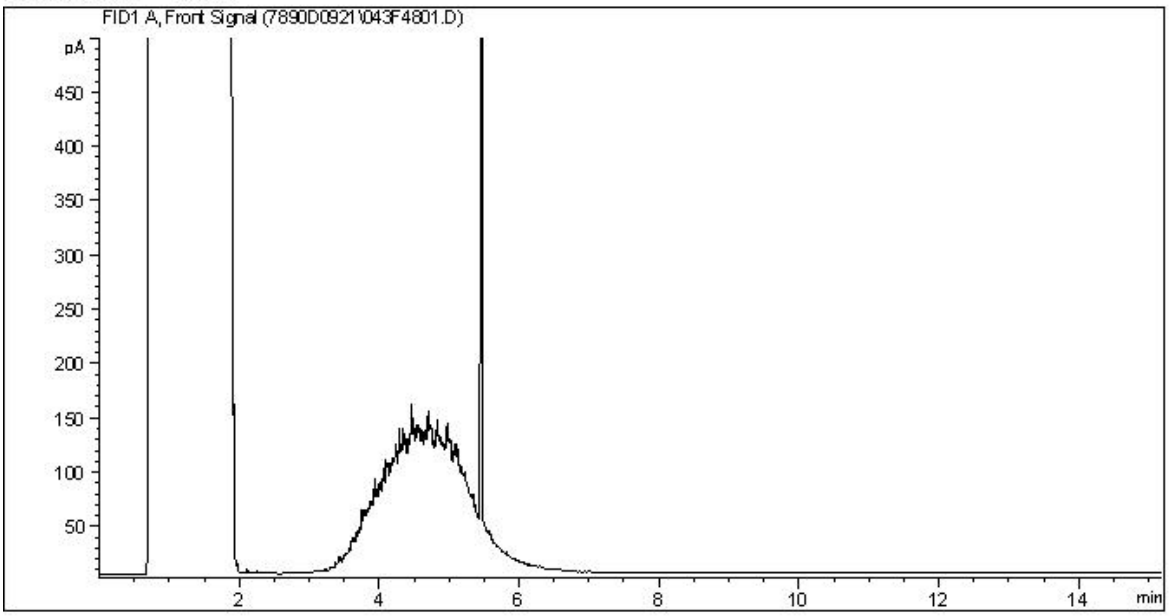
JW/MPC

Maxxam Job #: B482313
Report Date: 2014/09/24
Maxxam Sample: KP6668

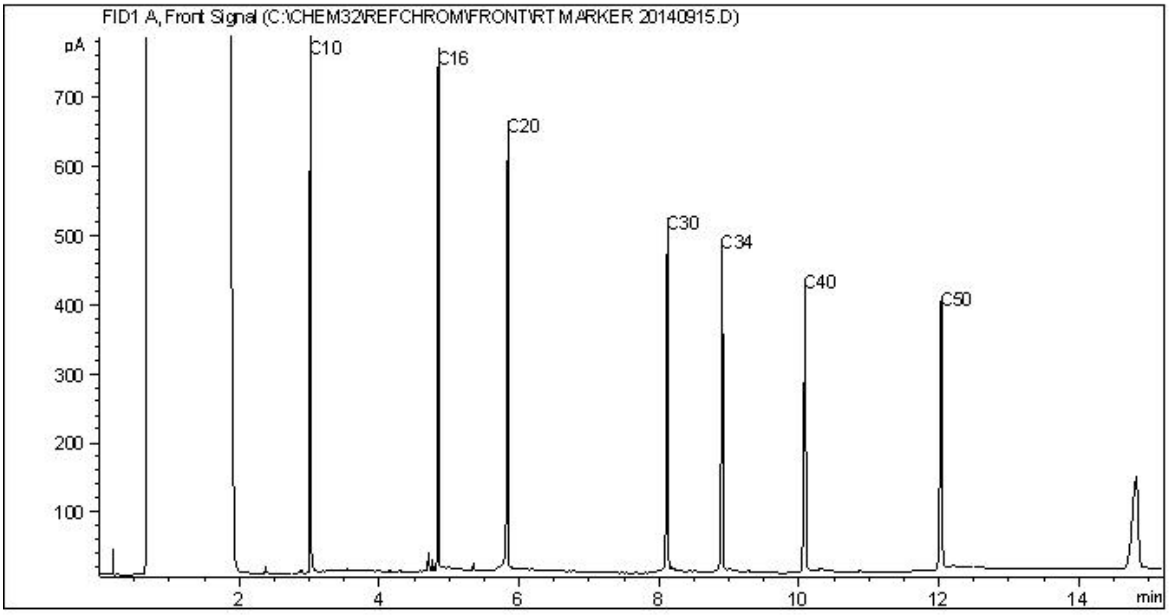
TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Client ID: FUEL TANK-MIDDLE OF HOUSE

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

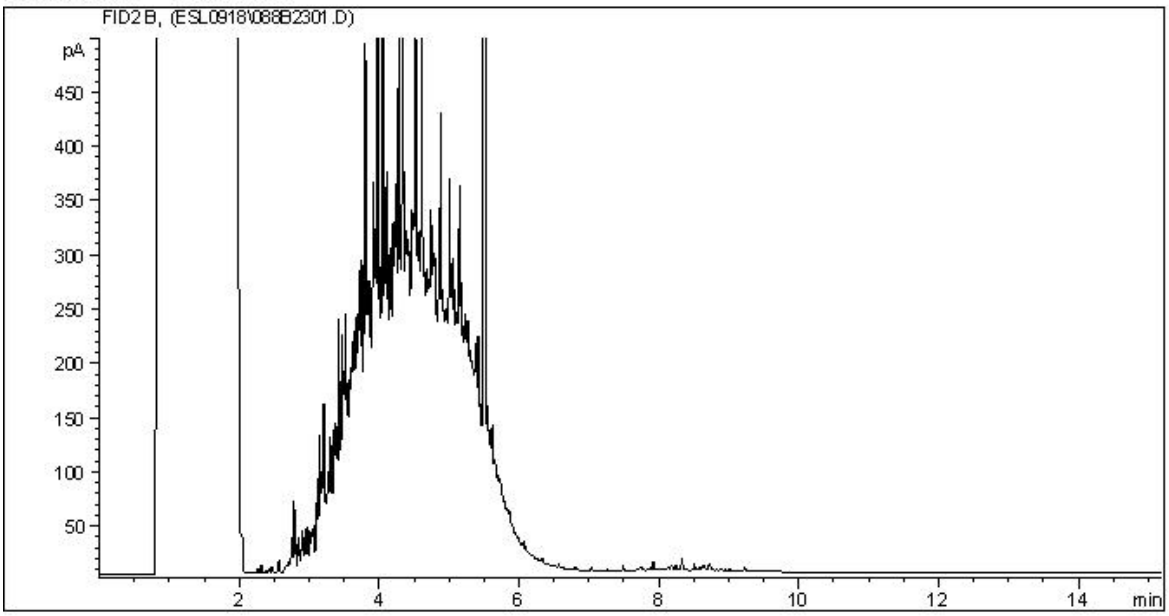
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B482313
Report Date: 2014/09/24
Maxxam Sample: KP6669

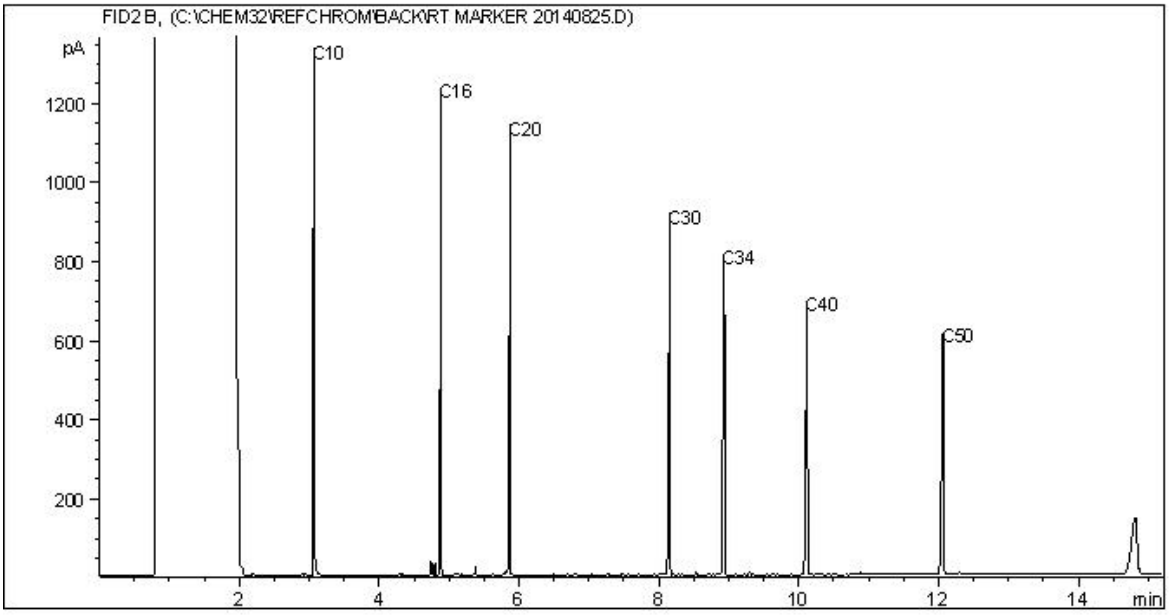
TETRA TECH EBA INC.
Client Project #: ARVIAT-Federal Building
Client ID: CORNER OF HOUSE

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: ESL-00197



Carbon Range Distribution - Reference Chromatogram



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Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX E
DESIGN AND CONSTRUCTION GUIDELINES

BACKFILL MATERIALS AND COMPACTION (ALBERTA)

1.0 DEFINITIONS

"Landscape fill" is typically used in areas such as berms and grassed areas where settlement of the fill and noticeable surface subsidence can be tolerated. "Landscape fill" may comprise soils without regard to engineering quality.

"General engineered fill" is typically used in areas where a moderate potential for subgrade movement is tolerable, such as asphalt (i.e., flexible) pavement areas. "General engineered fill" should comprise clean, inorganic granular or clay soils.

"Select engineered fill" is typically used below slabs-on-grade or where high volumetric stability is desired, such as within the footprint of a building. "Select engineered fill" should comprise clean, well-graded granular soils or inorganic low to medium plastic clay soils.

"Structural engineered fill" is used for supporting structural loads in conjunction with shallow foundations. "Structural engineered fill" should comprise clean, well-graded inorganic granular soils.

"Lean-mix concrete" is typically used to protect a subgrade from weather effects including excessive drying or wetting. "Lean-mix concrete" can also be used to provide a stable working platform over weak subgrades. "Lean-mix concrete" should be low strength concrete having a minimum 28-day compressive strength of 3.5 MPa.

Standard Proctor Density (SPD) as used herein means Standard Proctor Maximum Dry Density (ASTM Test Method D698). Optimum moisture content is defined in ASTM Test Method D698.

2.0 GENERAL BACKFILL AND COMPACTION RECOMMENDATIONS

Backfill adjacent to and above footings, abutment walls, basement walls, grade beams and pile caps or below highway, street or parking lot pavement sections should comprise "general engineered fill" materials as defined above.

Exterior backfill adjacent to footings, foundation walls, grade beams and pile caps and within 600 mm of final grade should comprise inorganic, cohesive "general engineered fill". Such backfill should provide a relatively impervious surface layer to reduce seepage into the subsoil.

Backfill should not be placed against a foundation structure until the structure has sufficient strength to withstand the earth pressures resulting from placement and compaction. During compaction, careful observation of the foundation wall for deflection should be carried out continuously. Where deflections are apparent, the compactive effort should be reduced accordingly.

In order to reduce potential compaction induced stresses, only hand held compaction equipment should be used in the compaction of fill within 1 m of retaining walls or basement walls.

All lumps of materials should be broken down during placement. Backfill materials should not be placed in a frozen state, or placed on a frozen subgrade.

Where the maximum-sized particles in any backfill material exceed 50 percent of the minimum dimension of the cross-section to be backfilled (e.g., lift thickness), such particles should be removed and placed at other more suitable locations on-site or screened off prior to delivery to site.

Bonding should be provided between backfill lifts, if the previous lift has become desiccated. For fine-grained materials the previous lift should be scarified to the base of the desiccated layer, moisture-conditioned and recompacted and bonded thoroughly to the succeeding lift. For granular materials, the surface of the previous lift should be scarified to about a 75 mm depth followed by proper moisture-conditioning and recompaction.

3.0 COMPACTION AND MOISTURE CONDITIONING

“Landscape fill” material should be placed in compacted lifts not exceeding 300 mm and compacted to a density of not less than 90 percent of SPD.

“General engineered fill” and “select engineered fill” materials should be placed in layers of 150 mm compacted thickness and should be compacted to not less than 98 percent of SPD. Note that higher compaction levels may be specified within 300 mm of the design elevation. Cohesive materials placed as “general engineered fill” or “select engineered fill” should be compacted at 0 to 2 percent above the optimum moisture content. Granular materials placed as “general engineered fill” or “select engineered fill” should be compacted at slightly below the optimum moisture content.

“Structural engineered fill” material should be placed in compacted lifts not exceeding 150 mm in thickness and compacted to not less than 100 percent of SPD at slightly below the optimum moisture content.

4.0 “GENERAL ENGINEERED FILL” SPECIFICATIONS

Low to high plastic clay is considered acceptable for use as “general engineered fill,” assuming this material is inorganic and free of deleterious materials.

Materials meeting the specifications for “select engineered fill” or “structural engineered fill” as described below would also be acceptable for use as “general engineered fill.”

5.0 “SELECT ENGINEERED FILL” SPECIFICATIONS

Low to medium plastic clay with the following range of plasticity properties is generally considered suitable for use as “select engineered fill”:

Liquid Limit	= 20 to 40%
Plastic Limit	= 10 to 20%
Plasticity Index	= 10 to 30%

"Pit-run gravel" and "fill sand" that meet the following specifications are generally considered acceptable for use as "select engineered fill."

Granular "Select Engineered Fill" – Percent Passing by Weight

Sieve Size	Pit-run Gravel (AT D6-C80)	Fill Sand
80 mm	100	--
50 mm	55 – 100	--
25 mm	38 – 100	100
16 mm	32 – 85	--
5.0 mm	20 – 65	75 – 100
630 μm	--	45 – 80
315 μm	6 – 30	--
80 μm	2 – 10	2 – 10

The "pit-run gravel" should be free of any form of coating and any gravel or sand containing clay, loam or other deleterious materials should be rejected. No oversize material should be tolerated.

The materials above are also suitable for use as "general engineered fill."

6.0 "STRUCTURAL ENGINEERED FILL" SPECIFICATIONS

Crushed gravel used as "structural engineered fill" should be hard, clean, well graded, crushed aggregate, free of organics, coal, clay lumps, coatings of clay, silt and other deleterious materials. The aggregates should conform to the following gradation requirement when tested in accordance with ASTM C136:

"Structural Engineered Fill" – Percent Passing by Weight

Sieve Size	20 mm Crush (AT D2-C20)	40 mm Crush (AT D2-C40)
40 mm		100
25 mm		70 – 94
20 mm	100	--
16 mm	84 – 94	55 – 85
10 mm	63 – 86	44 – 74
5.0 mm	40 – 67	32 – 62
1.25 mm	20 – 43	17 – 43
630 μm	14 – 34	12 – 34
315 μm	9 – 26	8 – 26
160 μm	5 – 18	5 – 18
80 μm	2 – 10	2 – 10

In addition to the above grading limits, the following criteria should be met:

"Structural Engineered Fill" – Additional Material Properties

Material Type	Percentage of Material Retained on 5 mm Sieve having Two or More Fractured Faces	Plasticity Index (<400 μm)	L.A. Abrasion Loss (percent Mass)
20 mm Crush	60 min	6 max	50 max
40 mm Crush	50 min	6 max	50 max

Materials that meet the above grading limits and material property criteria are also suitable for use as "select engineered fill."

7.0 DRAINAGE MATERIALS

"Coarse gravel" for drainage or weeping tile bedding should conform to the following grading:

"Coarse Gravel" Drainage Material – Percent Passing by Weight

Sieve Size	25 mm Gravel (AT D8-C25)	20 mm Gravel
40 mm	--	--
28 mm	--	100
25 mm	100	--
20 mm	--	85 – 100
16 mm	90 – 100	--
14 mm	--	60 – 90
10 mm	45 – 75	--
5 mm	0 – 15	0 – 10
2.5 mm	--	0 – 5
1.25 mm	0 – 5	--

"Coarse sand" for drainage should conform to the following grading limits:

"Coarse Sand" Drainage Material – Percent Passing by Weight

Sieve Size	Coarse Sand*
10 mm	100
5 mm	95 – 100
2.5 mm	80 – 100
1.25 mm	50 – 90
630 μm	25 – 65
315 μm	10 – 35
160 μm	2 – 10
80 μm	0 – 3

* From CSA A23.1-09, Table 10, "Grading Limits for Fine Aggregate", Class FA1

Note that the "coarse sand" above is also suitable for use as pipe bedding material.

8.0 BEDDING MATERIALS

The “fill sand” gradation presented above in Section 5.0 is suitable for use as pipe bedding and as backfill within the pipe embedment zone. If drainage is also a consideration, “coarse sand” presented in Section 7.0 above should be used.

CONSTRUCTION EXCAVATIONS

Construction should be in accordance with good practice and comply with the requirements of the responsible regulatory agencies.

All excavations greater than 1.5 m deep should be sloped or shored for worker protection.

Shallow excavations up to about 3 m depth may use temporary sideslopes of 1H:1V. A flatter slope of 2H:1V should be used if groundwater is encountered. Localized sloughing can be expected from these slopes.

Deep excavations or trenches may require temporary support if space limitations or economic considerations preclude the use of sloped excavations.

For excavations greater than 3 m depth, temporary support should be designed by a qualified geotechnical engineer. The design and proposed installation and construction procedures should be submitted to Tetra Tech EBA for review.

The construction of a temporary support system should be monitored. Detailed records should be taken of installation methods, materials, in situ conditions and the movement of the system. If anchors are used, they should be load tested. Tetra Tech EBA can provide further information on monitoring and testing procedures if required.

Attention should be paid to structures or buried service lines close to the excavation. For structures, a general guideline is that if a line projected down, at 45 degrees from the horizontal from the base of foundations of adjacent structures intersects the extent of the proposed excavation, these structures may require underpinning or special shoring techniques to avoid damaging earth movements. The need for any underpinning or special shoring techniques and the scope of monitoring required can be determined when details of the service ducts and vaults, foundation configuration of existing buildings and final design excavation levels are known.

No surface surcharges should be placed closer to the edge of the excavation than a distance equal to the depth of the excavation, unless the excavation support system has been designed to accommodate such surcharge.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
.3 CSA O121-M1978(R2003), Douglas Fir Plywood.
.4 CSA O151-04, Canadian Softwood Plywood.
.5 CSA O153-M1980(R2003), Poplar Plywood.
.6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
.7 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
.8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

.2 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings for formwork and falsework.
.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Territory of Nunavut, Canada.

.3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.

.4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.5 Indicate sequence of erection and removal of formwork/falsework as directed by Consultant.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Separate and separate waste materials in accordance with applicable local laws and regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Do verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification.

.2 Formwork materials:
.1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.
.2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
.3 Rigid insulation board: to CAN/ULC-S701 .

.3 Form ties:
.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
.2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:
.1 Plywood: Canadian Softwood Plywood to CSA O151.

.5 Form release agent: non-toxic, biodegradable, low VOC,.

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal, 15 to 24 mm^2 /s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.7 Falsework materials: to CSA-S269.1.

.8 Sealant: to Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.6 Align form joints and make watertight.
.1 Keep form joints to minimum.

.7 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.9 Construct forms for architectural concrete, and place ties as indicated and as directed.
.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.11 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.
.1 24 hours for walls and sides of beams.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000mm apart.

.5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:
.1 Measure reinforcing steel in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Consultant.
.2 No measurement will be made under this Section.
.1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.3 REFERENCES

.1 American Concrete Institute (ACI)
.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International
.1 ASTM A 82/A 82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
.2 ASTM A 143/A 143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
.3 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
.4 ASTM A 775/A 775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.3 CSA International
.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
.3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
.4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)
.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Territory of Nunavut, Canada.
.1 Indicate placing of reinforcement and:
.1 Bar bending details.
.2 Lists.
.3 Quantities of reinforcement.
.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative DCC Representative Consultant, with identifying code marks to permit correct placement without reference to structural drawings.
.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
.2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

1.5 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
.1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
.2 Upon request submit in writing to Consultant proposed source of reinforcement material to be supplied.

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, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground, in a 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 Substitute different size bars only if permitted in writing by Consultant

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A 82/A 82M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A 82/A 82M.

.6 Welded steel wire fabric: to ASTM A 185/A 185M.

.7 Welded deformed steel wire fabric: to ASTM A 82/A 82M.

.8 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.9 Mechanical splices: subject to approval of Consultant.

.10 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Consultant's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request inform Consultant of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Consultant's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section01 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:
.1 Measurement Procedures: in accordance with Section 01 29 00 - Payment Procedures.
.2 Measure cast-in-place concrete in cubic metres calculated from neat dimensions as indicated in writing by Consultant.
.1 Concrete placed beyond dimensions indicated will not be measured.
.3 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.
.4 No deductions will be made for volume of concrete less than 0.1 m^2 in cross sectional area displaced by individual drainage openings.
.5 Cast-in-place concrete will not be measured but will paid for as fixed price item.
.6 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.
.7 Measure supply and installation of waterstops in lineal metres installed.

1.3 REFERENCES

.1 Abbreviations and Acronyms:
.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
.1 Type GU, GUb and GUL - General use cement.
.2 Type MS and MSb - Moderate sulphate-resistant cement.
.3 Type HS and HSb - High sulphate-resistant cement.

.2 Reference Standards:
.1 ASTM International
.1 ASTM C 260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
.2 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
.3 ASTM C 494/C 494M-10a, Standard Specification for Chemical Admixtures for Concrete.
.4 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
.5 ASTM D 412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.6 ASTM D 624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
.7 ASTM D 1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
.8 ASTM D 1752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
.2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA International
.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
.3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), convene pre-installation meeting three weeks prior to beginning concrete works.
.1 Ensure key personnel, site supervisor, Consultant, and speciality contractor - finishing, forming, concrete producer and testing laboratories attend.
.1 Verify project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 At least 4 weeks prior to beginning Work, provide Consultant with samples of materials proposed for use as follows:
.1 One kg of each fine and coarse aggregate.

.3 Provide testing results and reports for review by Consultant, and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.5 Concrete hauling time: provide for review by Consultant deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Consultant, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Consultant on following items:
.1 Cold weather concrete.
.2 Curing.
.3 Finishes.
.4 Formwork removal.
.5 Joints.

.4 Quality Control Plan: provide written report to Consultant verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Concrete hauling time: deliver to site of Work and discharged within 90 minutes maximum after batching.
.1 Do not modify maximum time limit without receipt of prior written agreement from Consultant and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Consultant.
.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Consultant and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU, HS.

.2 Blended hydraulic cement: Type GUb, HSb to CSA A3001.

.3 Supplementary cementing materials: with minimum 15% Type F, CI, CH fly ash replacement, by mass of total cementitious materials to CSA A3001.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:
.1 Air entraining admixture: to ASTM C 260.
.2 Chemical admixture: to ASTM C 494 and ASTM C 1017. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Mechanical waterstops: ribbed, extruded PVC Arctic Grade.

.8 Premoulded joint fillers:
.1 Bituminous impregnated fiber board: to ASTM D 1751.
.2 Sponge rubber: to ASTM D 1752, Type I, flexible grade.

.9 Dampproof membrane:
.1 Polyethylene membrane:
.1 Plain: .15mm thick polyethylene film bonded to asphalt treated creped kraft.
.2 Reinforced: two .15mm thick polyethylene films bonded each side of asphalt treated creped kraft paper, reinforced with 13 x 13 mm fibreglass scrim.
.3 Membrane adhesive: as recommended by membrane manufacturer.

2.4 MIXES

.1 Refer to structural drawings for mix proportions and strengths of concrete required.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Consultant's written approval before placing concrete.
.1 Provide 72 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather .

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.10 Do not place load upon new concrete until authorized by Consultant.

3.2 INSTALLATION/ APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Sleeves and inserts:
.1 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.2 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Consultant.
.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Consultant before placing of concrete.
.4 Confirm locations and sizes of sleeves and openings shown on drawings.

.3 Anchor bolts:
.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
.2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Consultant.
.1 Drilled holes: to manufacturers' recommendations.
.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
.4 Set bolts and fill holes with epoxy grout.
.5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.5 Finishing and curing:
.1 Finish concrete to CSA A23.1/A23.2.
.2 Use procedures acceptable to Consultant or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
.3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
.4 Provide float finish unless otherwise indicated.
.5 Rub exposed sharp edges of concrete with carborundum to produce 3mm minimum radius edges unless otherwise indicated.

.6 Waterstops:
.1 Install waterstops to provide continuous water seal.
.2 Do not distort or pierce waterstop in way as to hamper performance.
.3 Do not displace reinforcement when installing waterstops.
.4 Use equipment to manufacturer's requirements to field splice waterstops.
.5 Tie waterstops rigidly in place.
.6 Use only straight heat sealed butt joints in field.
.7 Use factory welded corners and intersections unless otherwise approved by Consultant.

.7 Joint fillers:

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
.2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
.3 Locate and form isolation joints as indicated.
.4 Install joint filler.
.5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.8 Dampproof membrane:
.1 Install dampproof membrane under concrete slabs-on-grade inside building.
.2 Lap dampproof membrane minimum 150 mm at joints and seal.
.3 Seal punctures in dampproof membrane before placing concrete.
.4 Use patching material at least 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1 Straightedge Method.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
.1 Concrete pours.
.2 Slump.
.3 Air content.
.4 Compressive strength at 7 and 28 days.
.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Consultant for review to CSA A23.1/A23.2.
.1 Ensure testing laboratory is certified to CSA A283.

.3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Consultant.

.4 Owner will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

.5 Consultant will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.7 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.5 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.2 CSA International
.1 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction//Methods of Test for Concrete.

.3 South Coast Air Quality Management District (SCAQMD), California State
.1 SCAQMD Rule 1168-A2005(June 2006), Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.
.1 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content in g/L.
.2 Include application instructions for concrete floor treatments.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Temporary lighting:
.1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.

.2 Electrical power:
.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:
.1 Make work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:
.1 Maintain ambient temperature of not less than 10 degrees C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:
.1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.

.6 Safety:
.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.7 Ventilation:
.1 Ventilate area of work as directed by Consultant by use of approved portable supply and exhaust fans.
.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
.3 Provide continuous ventilation during and after coating application.

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:
.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

2.2 HARDENERS/SEALERS

.1 Hardener/Sealer: Sikafloor 35: clear finish. Apply in accordance with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that substrate surfaces are ready to receive work and elevations are as indicated on drawings.

3.2 PREPARATION OF EXISTING SLAB-ON-GRADE

.1 Saw cut control joints to CAN/CSA-A23.1, 24 hours maximum after placing of concrete, as indicated on drawings.

3.3 APPLICATION

.1 Apply concrete finishing floor hardener in accordance with manufacturer's written instructions.

.2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.

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.

3.5 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 ASTM International Inc.
.1 ASTM A 36/A 36M-08, Standard Specification for Carbon Structural Steel.
.2 ASTM A 193/A 193M-08, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications.
.3 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.4 ASTM A 325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
.5 ASTM A 325M-08, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile StrengthMetric.
.6 ASTM A 490M-04ae, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints Metric.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
.1 Handbook of the Canadian Institute of Steel Construction.
.2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)
.1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.
.4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.
.5 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
.6 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
.7 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
.8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute
.1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
.2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International
.1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
.1 Provide drawings stamped and signed by professional engineer registered or licensed in the Territory of Nunavut, Canada.

.3 Erection drawings:
.1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
.1 Description of methods.
.2 Sequence of erection.
.3 Type of equipment used in erection.
.4 Temporary bracings.

.4 Fabrication drawings:
.1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Territory of Nunavut, Canada.

.5 Fabricator Reports:
.1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements ofCAN/CSA-S16 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:
.1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
.2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in the Territory of Nunavut, Canada for non standard connections.

2.2 MATERIALS

.1 Structural steel: to CSA-G40.20/G40.21. Grade 350W for HSS and W sections, Grade 300W for all other sections.

.2 Anchor bolts: to ASTM A 36/A 36M.

.3 Bolts, nuts and washers: to ASTM A 325 or ASTM A 325M.

.4 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.5 Shop paint primer: to CISC/CPMA 2-75 solvent reducible alkyd, red oxide grey.

.6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m^2.

2.3 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

.2 Continuously seal members by continuous welds where indicated. Grind smooth.

2.4 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16.

.2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.

.3 Apply one coat of primer in shop to steel surfaces, except:
- .1 Surfaces to be encased in concrete.
- .2 Surfaces to receive field installed stud shear connections.
- .3 Surfaces and edges to be field welded.
- .4 Faying surfaces of slip-critical connections.
- .5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

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 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Consultant for direction before commencing fabrication.

3.4 MARKING

.1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.5 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.

.2 Field cutting or altering structural members: to approval of Consultant.

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Consultant.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Consultant.

.3 Submit test reports to Consultant within 3 weeks of completion of inspection.

.4 Owner will pay costs of tests as required.

3.7 FIELD PAINTING

.1 Paint in accordance with Section 09 91 23 - Interior Painting.
.1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

3.8 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
.1 CISC/CPMA 2-75-1975, Quick-Drying, Primer for Use on Structural Steel.

.3 CSA International
.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA S16-09, Design of Steel Structures.
.3 CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.
.4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
.5 CSA W55.3-08, Certificate of Companies for Resistance Welding of Steel and Aluminum.
.6 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

.4 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.

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 steel joist framing 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 the Territory of Nunavut, Canada.
.2 Indicate on erection drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.

.3 Indicate particulars, on shop drawings, relative to joist geometry, framed openings, splicing details, bearing and anchorage. Include member size, properties, specified and factored member loads, and stresses under various loadings, deflection and camber.

.4 Delegated Design Submittals:
.1 Submit floor vibration analysis as directed by Consultant.
.2 Submit 3 copies of calculations and joist design drawings for typical joists to Consultant for review at least 4 weeks prior to fabrication and/or delivery.

1.4 QUALITY ASSURANCE

.1 Submit 3 copies of mill test reports at least 4 weeks prior to fabrication of steel joists and accessories. Reports to show:
.1 Chemical and physical properties.
.2 Other details of steel to be incorporated into work.
.3 Certification by qualified metallurgists confirming that tests conform to requirements of CSA G40.20/G40.21

.2 Submit affidavit prepared by fabricator of structural steel joists stating that materials and products used in fabrication conform to this specification.

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, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground, in a dry location, and in accordance with manufacturer's recommendations in a clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design steel joists to carry loads indicated in joist schedule shown on drawings to CSA S16.

.2 Design joists and anchorages for uplift forces as indicated.

.3 Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.

.4 Limit roof joist deflection due to specified live load to 1/360 maximum of span, and deflection due to specified total load to 1/240 maximum of span.

.5 Limit floor joist deflection due to specified live load to 1/360 of maximum span, and deflection due to specified total load to 1/240 maximum of span.

2.2 MATERIALS

.1 Open web steel joists: to CSA S16.

.2 Structural steel: to CSA G40.20/G40.21.

.3 Welding materials: to CSA W59.

.4 Shop paint primer: to CISC/CPMA-2.

.5 Shear studs: to CSA W59, Appendix H.

2.3 FABRICATION

.1 Fabricate steel joists and accessories as indicated in accordance with CSA S16, and in accordance with reviewed shop drawings.

.2 Weld in accordance with CSA W59.

.3 Provide top chord extensions where indicated.

.4 Provide diagonal and horizontal bridgings and anchorages as indicated.

2.4 SHOP PAINTING

.1 Clean, prepare and shop prime surfaces of steel joists to CSA S16.

.2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces to SSPC SP1 brush blast.

.3 Apply one coat of CISC/CPMA 2 primer to steel surfaces to achieve dry film thickness of .065 mm to .080 mm maximum except:
.1 Surfaces to be encased in concrete.

.2 Surfaces to receive field installed stud shear connectors and steel decks.
.3 Surfaces and edges to be field welded.
.4 Faying surfaces of friction-type connections.
.5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.6 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel joist framing installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

.1 Do structural steel work: to CSA S16.

.2 Do welding: in accordance with CSA W59.

.3 Ensure installers are certified to CSA W47.1 for fusion welding and/or CSA W55.3 for resistance welding.

.4 Submit certification that welded joints are qualified by Canadian Welding Bureau.

3.3 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Consultant.

.2 Testing laboratory will inspect representative joists for integrity, accuracy of fabrication and soundness of welds. Testing laboratory will also monitor test loading of joists used by manufacturer to verify design and check representative field connections. Consultant will determine extent of and identify all inspections.

.3 Submit test report to Consultant within 21 days after completion of inspection.

.4 Owner will pay costs of tests as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

3.4 ERECTION

.1 Erect steel joists and bridging as indicated to CSA S16, and in accordance with reviewed erection drawings.

.2 Complete installation of bridging and anchorages before placing construction loads on joists.

.3 Field cutting or altering joists or bridging that are not shown on shop drawings: to approval of Consultant.

.4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

3.5 FIELD PAINTING

.1 Paint: in accordance with Section 09 91 23 - Interior Painting.

.2 Touch up all damaged surfaces and surfaces without shop coat with CISC/CPMA-2 in accordance with manufacturers' recommendations.

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.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by steel joist framing installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 ASTM International
.1 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.
.2 ASTM A 792/A 792M-09a, Standard 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 CSA International
.1 CSA C22.2 No.79-1978(R2008), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
.2 CSA S16-09, Design of Steel Structures.
.3 CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.
.4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
.5 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
.6 CSA W59-03(R2008), Welded Steel Construction, (Metal Arc Welding).

.4 Canadian Sheet Steel Building Institute (CSSBI)
.1 CSSBI 10M-08, Standard for Steel Roof Deck.
.2 CSSBI 12M-08, Standard for Composite Steel Deck.

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 steel decking 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 the Territory of Nunavut, Canada.

.2 Submit design calculations if requested by Consultant.
.3 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.
.4 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

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 materials off ground, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect decking from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design steel deck to CSA S136, CSSBI 10M and CSSBI 12M.

.2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, composite deck action, and uplift as indicated.

.3 Deflection under specified live load not to exceed 1/240 of span, except that when gypsum board ceilings are hung directly from deck, live load deflection not to exceed 1/360 of span.

.4 Where vibration effects are to be controlled as indicated, dynamic characteristics of decking system to be designed to be in accordance with CSA S16.

2.2 MATERIALS

.1 Zinc-iron Alloy (ZF) coated steel sheet: to ASTM A 653/A 653M structural quality Grade 230 255, with ZF75 coating, for interior surfaces not exposed to weather, painted unpainted finish, 0.76 mm minimum base steel thickness.

.2 Decks to be painted: zinc-iron alloy coated decks suitable for finish painting.

.3 Acoustic insulation: fibrous glass 17.5 kg/m^3 density minimum profiled to suit deck flutes.

.4 Closures: as indicated in accordance with manufacturer's recommendations.

.5 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm minimum. Metallic coating same as deck material.

.6 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

.7 Caulking: to Section 07 92 00 - Joint Sealants.

2.3 TYPES OF DECKING

.1 Steel roof deck: 0.76 mm minimum base steel thickness, 38 mm maximum deep profile, non-cellular, interlocking side laps.

.2 Acoustic steel roof deck: 0.76 mm minimum base steel thickness, 38 mm maximum deep profile, non-cellular, perforated on vertical face of flutes, interlocking side laps.

.3 Composite steel roof deck: 0.76 mm minimum base steel thickness, 38 mm deep profile, non-cellular, embossed fluted profile, interlocking side laps.

.4 Acceptable materials:
.1 Canam.
.2 Vicwest.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel decking installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied, and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

.1 Structural steel work: in accordance with CSA S136, CSSBI 10M, and CSSBI 12M.

.2 Welding: in accordance with CSA W59, except where specified otherwise.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.3 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA S136, CSSBI 10M, and CSSBI 12M, and in accordance with reviewed erection drawings.

.2 Butt ends: to 1.5 to 3 mm gap. Install steel cover plates or over gaps wider than 3 mm.

.3 Lap ends: to 50 mm minimum.

.4 Steel deck units shall be adequately fastened to structural supports. The maximum spacing of fasteners along bearing supports shall be two (2) flutes. Puddle welds shall have a 20 mm nominal top diamter. Spacing of welds should be in accordance with what is shown on drawings.

.5 Steel roof deck over glulam members to be fastened to structure using Dekfast #14 screws. Use two (2) screws to fasten deck along bearing support in every flute, 150 mm o/c. Both screws should be centered on glulam with spacing of 100 mm and minimum edge distance of 57 mm. Fasteners embedment should be 50 mm into bearing support.

.6 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.

.7 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mil scale and other foreign matter.

.8 Temporary shoring, if required, to be designed to support construction loads, wet concrete and other construction equipment. Do not remove temporary shoring until concrete attains 75% of its specified 28 day compression strength.

.9 Place and support reinforcing steel as indicated.

3.4 CLOSURES

.1 Install closures in accordance with approved details.

3.5 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.

.2 Frame deck openings with any one dimension between 150 to 300 mm as recommended by manufacturer, except as otherwise indicated.

.3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.6 CONNECTIONS

.1 Install connections in accordance with CSSBI recommendations as indicated.

3.7 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.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by steel decking installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 ASTM International
  .1 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  .2 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.
  .3 ASTM A 792/A 792M-09a, Standard 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 CSA International
  .1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
  .2 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
  .3 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
  .4 CAN/CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.

.4 Canadian Sheet Steel Building Institute (CSSBI)
  .1 CSSBI 50M-06, Lightweight Steel Framing Manual.
  .2 CSSBI Fact Sheet #3 June 1994, Care and Maintenance of Prefinished Sheet Steel Building Products.
  .3 CSSBI Technical Bulletin Vol. 7, No. 2 February 2004, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
  .4 CSSBI S5-04, Guide Specification for Wind Bearing Steel Studs.

.5 Master Painters Institute (MPI)
  .1 Architectural Painting Specification Manual - current edition.

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 structural metal studs 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 the Territory of Nunavut, Canada.
.2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
.3 Indicate locations, dimensions, openings and requirements of related work.
.4 Indicate welds by welding symbols as defined in CSA W59.

.4 Samples:
.1 Submit samples of framing components for review.
.2 Submit duplicate 300 x 300 mm samples of each type.

.5 Certificates: prior to beginning Work, submit: 2 certified copies of mill reports covering material properties.

.6 Manufacturer Reports:
.1 Submit manufacturer's written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

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 materials off ground, in a dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect structural metal studs from nicks, scratches, and blemishes.
.3 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
.4 Handle and protect galvanized materials from damage to zinc coating.
.5 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel: to CAN/CSA S136, fabricated from ASTM A 653/A 653M, Grade 340 steel.

.2 Zinc coated steel sheet: quality to ASTM A 653/A 653M, with Z275 designation coating.

.3 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.4 Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected with minimum zinc coating thickness of 0.008 mm.

.5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.

.6 Bolts, nuts, washers: hot dipped galvanized to ASTM A 123/A 123M, 600 g/m^2 zinc coating.

.7 Touch up primer: zinc rich, to CAN/CGSB-1.181.

2.2 STEEL STUD DESIGNATIONS

.1 Colour code: to CSSBI Technical Bulletin Vol.7, No. 2.

2.3 METAL FRAMING

.1 Steel studs: to CAN/CSA S136, fabricated from metallic coated steel, depth as indicated.
  .1 Minimum steel thickness of 1.37 mm.

.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.
  .1 Bottom track: single piece.
  .2 Top track: single piece.

.3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness.

.4 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.37 mm minimum thickness.

.5 Tension straps and accessories: as recommended by manufacturer.

2.4 SOURCE QUALITY CONTROL

.1 Ensure mill reports covering material properties are reviewed by Consultant

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied, and after receipt of written approval to proceed from Consultant.

3.2 GENERAL

.1 Weld in accordance with CSA W59.

.2 Certification of companies: to CSA W47.1 for fusion welding and CSA W55.3 for resistance welding.

.3 Do structural metal stud framing work to CSSBI S5.

3.3 ERECTION

.1 Erect components to requirements of reviewed shop drawings.

.2 Anchor tracks securely to structure at 600 mm on centre maximum, unless lesser spacing prescribed on shop drawings.

.3 Erect studs plumb, aligned and securely attached with 2 screws minimum, or welded in accordance with manufacturer's recommendations.

.4 Seat studs into bottom tracks and single piece top track.

.5 Install 50 mm minimum telescoping track at top of walls where required to accommodate vertical deflection.
.1 Nest top track into deflection channel minimum of 30 mm and maximum of 40 mm.
.2 Do not fasten tracks together.
.3 Stagger joints.

.6 Install studs at not more than 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.7 Brace steel studs with horizontal internal bridging at 1200 mm maximum.
.1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.

.8 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

.9 Touch up welds with coat of zinc rich primer.

3.4 ERECTION TOLERANCES

.1 Plumb: not to exceed 1/500th of member length.

.2 Camber: not to exceed 1/1000th of member length.

.3 Spacing: not more than +/- 3 mm from design spacing.

.4 Gap between end of stud and track web: not more than 4 mm.

3.5 CUTOUTS

.1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

.2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Obtain written report from manufacturer's verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL 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 follows.

.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.

3.7 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.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by structural metal stud installation.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* metal fabrications including but not limited to following:
  .1 galvanized commercial mesh
  .2 exterior handrails and guardrails.
  .3 exterior steel stairs and landings.
  .4 steel ladders.
  .5 operable partition supports.
  .6 overhead door jambs and headers.
  .7 floor trench and sump pit cover plates.
  .8 Bollards, bumper posts and rails.
  .9 metal locker bases.
  .10 supports for architectural woodwork including benches and countertops.
  .11 miscellaneous sections and framing.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;

.2 Pre-construction Site Meeting:
.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets Provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials designated later by Consultant.

.3 Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Division 01. In addition to minimum requirements indicate following:

.1 large scale details of members, materials and connections.
.2 jointing details.
.3 methods of setting, sealing, securing, anchorage.
.4 field connections.
.5 Submit Shop Drawings for following work bearing the stamp of a Professional Engineer registered in the Territory of Nunavut:
.1 handrails, pipe handrails and balustrades.
.2 steel stairs.
.3 supports for suspended items.

.4 Samples: Submit samples in accordance with Division 01. Submit following samples in sizes indicated:
.1 extruded and formed metals: minimum 300 mm (12") long.
.2 metal sheet: minimum 300 mm (12") square and of specified thickness.

1.6 QUALITY ASSURANCE

.1 Installer's Qualifications: Provide work of this Section executed by competent installers with minimum 5 years' experience in manufacture, application of metal fabrication work and assemblies specified; with approval and training of manufacturers. Demonstrate experience of Projects of similar scope and size, and evidence of a continuing quality assurance program for both materials and installation crews.

.2 Welding:
.1 Provide welding in accordance with CSA W59-M performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau as specified herein.
.2 Ensure fabricator is fully certified by Canadian Welding Bureau for fusion welding of steel structures to CSA W47.1 and for fusion welding of aluminum to CSA W47.2.

.3 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance, non-exhaustively including the following:
.1 stairs including landings and supports.
.2 balustrades, handrails, railings.
.3 suspended supports.
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of Shop Drawings,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 Provide site administration and inspection of this part of the Work.
.8 Submit certificate validating seismic assessment and field review of this part of the Work

.4 Certification:

.1 Welders employed on this *Project* may be asked by *Consultant* at any time for their welding certificate.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
- .1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond designed limits.
- .2 Handle and store metal materials at job to prevent damage to other materials and to adjacent construction.

.2 Storage and Handling Requirements: Handle components with care, and Provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of metal members.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:
- .1 The Work of this section that functions to resist forces imposed by dead and live loads shall conform to latest requirements of National Building Code of Canada and those of jurisdictional authorities.

.2 Performance/Design Criteria:
- .1 Architectural Drawings and details are diagrammatic and are only intended to show design concept, aesthetics, interfacing requirements, configuration, components and arrangements. They are not intended to identify or solve completely problems of thermal and structural movements, assembly framing, engineering design, fixings and anchorages
- .2 Design work of this Section to withstand within acceptable deflection limitations, specified tolerances in vertical and horizontal planes, its own weight, forces applied by movements of building structure and attached adjacent components, and maximum design loads due to pressure and suction of wind, snow, ice, rain and hail.
- .3 Design load bearing structures to National Building Code of Canada requirements and Provide miscellaneous steel supports and anchors to suit design. Conform to CAN/CSA-S16.1 and CAN/CSA-S136.
- .4 Design free standing handrails and guardrails to the requirements of the National Building Code of Canada. Ensure handrails and guard rails connections are made of welded constructions unless indicated otherwise. Make adequate provision for differential thermal and structural movement of component parts of system and fastenings, to prevent opening of joints, undue stress on fastenings or other detrimental effects.
- .5 Design and detail angle lintels, steel pipe railings, handrails, guardrails and balustrades in accordance with NBCC and CAN/CSA B651.

2.2 MATERIALS

.1 Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.

.2 Hollow Structural Sections: New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.

.3 Steel Pipe: ASTM A53/A53M, Type E or S, Grade A or B, Standard weight, Schedule 40.

.4 Stainless Steel
- .1 Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A167 or ASTM A666, Type 304 and Type 316 alloy with exposed surfaces having No. 4 polished finish. Sizes as required to meet design requirements.
- .2 Exterior Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A666, Type 316.
- .3 *Provide* highest architectural quality in various forms, straight and true. Ensure there are no scratches, scars, creases, buckles, ripples or chatter marks. *Provide* finish surfaces suitable for polishing where required. Ensure finished surfaces exposed to view are free of pitting, seam marks, roller marks, oil-canning, stains, discolourations or other imperfections.
- .4 Refer to *Drawings* for extent of stainless steel work.

.5 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.

.6 High Strength Bolts: *Supply* bolts, nuts and washers conforming with ASTM A325M. *Supply* each type and size of bolt and nut of same manufacture and of same lot.
- .1 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thick-ness of members joined and for type of connection.
- .2 Nuts: Heavy hexagon semi-finished nuts.
- .3 Washers: For general use bolt, nut and stud application to *Provide* increased bearing surfaces, spacing and to prevent galling. Flat and smooth hardened washers, quenched and tempered to suit applications and conforms to ASTM F844. *Provide* AISI Type 304 stainless steel washers at exterior locations.
- .4 Hardened Steel Washers: To suit applications and conforms to ASTM F436M.
- .5 Stainless Steel Bolts: To suit applications and conforms to ASTM F738M.
- .6 Stainless Steel Nuts: To suit applications and conforms to ASTM F836M.
- .7 Lock Washers: Helical spring type steel “lock” washers to suit applications and conforms to Federal specification FF-W-84. *Provide* AISI Type 304 stainless steel lock washers at exterior locations.
- .8 Exterior Vandal Resistant Fasteners: AISI Type 304 stainless steel, dual pin type vandal resistant fasteners to suit applications and acceptable to *Consultant*.
- .9 Security Fasteners: Button head Torx® Plus R screw tamper resistant # 10, 25 mm (1") long 2 per glass stop minimum stainless steel machine

screws.

.7 Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming with ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. *Supply* common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm (1/4") beyond nut, without the use of washers. *Supply* anchor bolts of lengths noted, but projecting not less than 13 mm (1/2") beyond nut unless otherwise noted.

.8 Structural connectors; ASTM A10110/A1011M and ASTM A325M-09 heavy structural bolt, hexagonal nut and 1 hardened washer. Steel Pipe Handrails: Conforming to ASTM A53/A53M, Type "S", Schedule 40, Grade A steel pipe of sizes shown.

.9 Steel Pipe Bumpers: Conforming to ASTM A53/A53M, Schedule 80 steel pipe of sizes shown.

.10 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m2 to CAN/CSA-G164-M.

.11 Galvanized Sheet Steel: *Supply* 0.91 mm (20 ga) core thickness commercial quality to ASTM A653/A653M, CS Type A, with Z275 zinc coating designation to ASTM A653/A653M.

.12 Aluminum Extrusions: ASTM B221M size accurately formed as shown on *Drawings*, extruded aluminum alloy AA-6063- T5 or T6 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.

.13 Aluminum Sheet: ASTM B209M, Minimum thickness 3 mm (1/8") of type and characteristics to match finished extrusions; sheet which is not exposed shall be Utility Aluminum mill finished; for intricate forming with decorative finishes use AA 1100 and for siding and exposed panels use AA-3003 with specified finish.

.14 Grout
- .1 Cementitious, non shrinking, non expanding grout: ‘Sika Grout 212' by Sika Canada Inc., or ‘Non Shrink Structural Grout - Dry Pack Grout’ by Euclid Chemical Company or ‘Sealtight CG 86 Construction Grout’ by W.R. Meadows.
- .2 Epoxy, non-shrinking, non expanding grout: ‘Sika Anchor Fix’

2.3 DECORATIVE COMPONENTS

.1 Non-Security Galvanized Commercial Mesh (at building perimeter and at handrails at stairs and ramps):
- .1 13 mm (1/2") x 50 mm (2") x 0.162" diameter, galvanized, smooth weave style carbon steel wire mesh conforming to ASTM A1011, panel length width to suit design requirements. Design based on “3120 Plus Deco” by McNichols Products, www.mcnichols.com or approved equivalent by Gerard Daniel Worldwide, Canadian Division, www.geralddaniel.com or W.S.Tyler-Wire Cloth Products www.wstyler.com .
- .2 Anchors, fasteners and hardware as recommended by manufacturers.

.3 Exterior Paint Finish: Refer to Section 09 91 00.

2.4 FABRICATION

.1 Fabricate each item of work of this Section in accordance with following general requirements:
- .1 members square and straight.
- .2 members plumb and true.
- .3 joints accurately and tightly fitted.
- .4 intersecting members in true, flush planes.
- .5 fasteners concealed.
- .6 steel connections.

.2 Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.

.3 *Provide* hangers, rods, bars, bolts, anchors, brackets, rivets, bearing plates and bracing, fitting, drilling, stopping, soldering, as required for a complete assembly.

.4 Insulate dissimilar metals to prevent galvanic corrosion.

.5 Weld connections unless otherwise indicated.

.6 Shop Welding:
- .1 Execute welding to avoid damage or distortion to work. Should there be, in the opinion of *Consultant* or Inspection Company, doubt as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards be removed and replaced with new work satisfactory to *Consultant*. Carry out welding in accordance with following standards:
  - .1 Fabricator shall be fully certified by Canadian Welding Bureau for fusion welding of steel structures to CSA W47.1 and for fusion welding of aluminum to CSA W47.2.
  - .2 CSA W48-M - for Electrodes (If rods are used, only coated rods are allowed).
  - .3 CSA W59-M - for design of connections and workmanship.
  - .4 CAN/CSA W117.2 - for safety.

.7 Thoroughly clean welded joints and steel exposed for a sufficient space to properly perform welding operation. Neatly finish welds. Ensure welds exposed to view and finish painted are continuous and ground smooth.

.8 *Provide* exposed metal fastenings and accessories of same material, texture, colour and finish as base metal to which they are applied or fastened.

2.5 FINISHES

.1 Cleaning and Shop Painting:
- .1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2 Shop prime steel with 1 coat of primer paint to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale,

grease. Do not paint when temperature is lower than 7 deg C (45 deg F). Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Shop prime non galvanized perimeter steel members and structural steel members to receive sprayed fire resistive materials with 1 coat of high performance corrosion protection primer to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C (45 deg F). Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.4 Shop prime galvanized steel in accordance with CAN/CGSB-85.10.

.5 Clean but do not paint surfaces being welded in the field and surfaces in contact after assembly.

.2 Hot Dip Galvanizing:

.1 After fabrication, hot dip galvanize specific miscellaneous steel items noted on Drawings or specified herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Galvanize following members:

.1 members exposed to elements in final location;

.2 members embedded on exterior side of exterior walls;

.3 members embedded in concrete;

.4 members specified in this Section or noted on Drawings.

.2 Hot-dip galvanize members, in accordance with and the requirements of following ASTM A153/A153M, standards, with minimum coating weights or thicknesses as specified:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating per sq ft of actual surface,

.1 For members having thickness of 4.8 mm (3/16") and less: 2 ounces

.2 For heavier members: 2.3 ounces.

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in ounces per sq ft of surface in accordance with Table 1 of ASTM A153/A153M, for various classes of materials used on Project.

.3 Steel Sheet: ASTM A653/A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z275 (G90) minimized spangle and chemically treated.

.3 Zinc-rich primer: Ready, mixed, zinc-rich primer conforming to CAN/CGSB-1.181 for new galvanized metal. Acceptable Products: “Zinc Clad III HS” by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.4 Galvanized Primer Paint, Field Touch-Up Paint and Repair to Damaged Galvanized Surfaces: Zinc rich ready mix organic CGSB 1-GP-181M and in compliance with CGSB 85-GP-16M. Acceptable Products: Glidden ICI "Devoe Catha Coat 13034" or “Zinc Clad III HS” by Sherwin Williams Company of Canada Ltd., or approved equivalent. Conform to manufacturer’s recommendations.

Colour: Identical to affected surface.

.5 Exposed Aluminum Surfaces: Clear anodized coating (Architectural Class II). Pre-treat aluminum with caustic tech treatment prior to applying integral, clear, anodic oxide coating. Apply clear, anodic oxide coating in accordance with AAMA 611, 0.4 mils minimum coating thickness and to Aluminum Finish Designation AA-M12C22A31, Architectural Class II. Protect clear anodized coating with removable protective film.

.6 Dielectric Separator: Acid and alkali resistant isolation coating to Provide dielectric separation between cementitious surfaces and metals. Provide best grade, quick drying, non-staining alkali resistant asphalt utility enamel by approved manufacturer to Provide dielectric separation and which will dry to be tack-free and able to withstand high temperatures. Acceptable Products: “Carboline Bitumastic 50” by Carboline Canada, or “Copper Creek Top Service 760 Black” by Sherwin Williams Company, “410-02” by Bakor Inc. or approved equivalent.

PART 3 -EXECUTION

3.1 INSTALLATION

.1 Verify dimensions at the *Place of The Work* to ensure work of this Section fits to that of other parts of *The Work*.

.2 Erect *The Work* of this Section plumb, square, true and level.

.3 Securely anchor work of this Section and rivet, weld or bolt to structural framing of the building. Where secured to concrete, *Provide* bolts for setting in concrete.

.4 *Provide* necessary fitting, setting and cutting required in connection with the fitting of work of this Section to other parts of *The Work*.

.5 Field Painting: Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up with matching paint, shop primer damaged during transit and installation.

.6 Erect stair work to line, plumb, square, true and level, with runs of stairs registering level with floor levels.

3.2 CLEANING

.1 On completion of installation, carefully clean metal work.

3.3 SCHEDULES

.1 EXTERIOR HANDRAILS AND GUARDRAILS
  .1 Pipe Handrail:
    .1 Material and finish: *Provide* minimum 3 mm wall thickness, Type 302 stainless steel handrail pipe.
    .2 Material and finish: *Provide* minimum 3 mm wall thickness hot

dip galvanized prime painted steel with urethane finish.
.3 Outside diameter: 38 mm
.4 *Provide* closed pipe ends and grind welds smooth.
.2 *Provide* minimum Type 302 stainless steel hot dip galvanized brackets and escutcheons and finish to match handrails.
.3 Stainless steel finish: XL Blend S
.4 Fabricate as detailed.

.2 EXPANDED METAL STAIRS AND BALUSTRADE (EXTERIOR)
.1 Stringers: minimum 250 x 12.5 MC prime painted steel channel sections.
.1 Stringer end cover plate: minimum 6 mm (1/4") continuous prime painted steel, welded.
.2 *Provide* clip angles and anchor bolts to attach treads.
.3 Finish: galvanized finish
.2 Tread and riser carrier bars (horizontal): minimum 30 mm x 30 mm x 6 mm prime painted steel angles, welded to the steel stringers.
.1 Finish: prime finish
.3 Treads and landings: minimum 12 ga sheet steel, welded
.1 Treads: diamond treads and landings of Expanded Metal Corporation Unitread, sized to suit.
.2 Finish: galvanized.
.3 Pan depth: 38 mm.
.4 Projection: 25 mm.
.5 Reinforce tread and landing nosings with 2 - 10 ga gusset plates.
.6 Bolt treads and landings to horizontal carrier angles.
.4 Risers: open.
.5 Balustrade:
.1 Balustrade posts: minimum 50 mm x 50 mm HSS.
.2 Balustrade pickets: minimum 12 mm diameter.
.3 Balustrade and wall bracket finish: galvanized.
.4 Balustrade and wall handrail covering: vinyl, by Rehau Inc. Profile and colour shall be later selected by *Consultant*.

.3 STEEL LADDERS
.1 *Provide* galvanized steel ladders for following locations:
.1 One ladder in each elevator pit from 1500 mm above last floor served to bottom of pit.
.2 On vertical exterior walls for roof access where indicated.
.2 Obtain exact locations of ladders from the *Consultant* where not otherwise indicated.
.3 *Provide* 6 mm galvanized steel checker plate platform and 38 mm x 38 mm x 6 mm angle framing for ladders.
.4 *Provide* a hot dip galvanized steel safety cage from 2200 mm from the finished roof to 900 mm above the parapet.

.4 LADDER SAFETY CAGES (if applicable)
.1 General: Fabricate ladder safety cages to comply with ANSI A14.3 and local OHSA requirements. Assemble by welding.
.2 Finish: Galvanize exterior ladders; prime paint interior ladders.

.5 OPERABLE PARTITION SUPPORTS
.1 *Provide* structural steel plates and support rods in accordance with

the operable door manufacturer's detail requirements.
.2 Brace support system against lateral movement.
.3 Finish: alkyd prime painted.

.6 OVERHEAD DOOR JAMBS AND HEADERS
.1 *Provide* HSS, channel framing and 6 mm plate steel closures to profile as indicated.
.2 Finish: Galvanized steel.

.7 OVERHEAD DOOR TRACK AND OPERATOR ANCHORAGE
.1 *Provide* inside jamb extensions, centre spring mount and motor supports in accordance with the manufacturer's instructions.

.8 FLOOR TRENCH AND SUMP PIT COVER PLATES
.1 As detailed.
.2 Finish: Galvanized
.3 *Provide* perimeter gasket for air tight seal at pits connected with sanitary drainage piping.

.9 BOLLARDS
.1 Bollards: 6 mm thick x 300 mm round diameter HSS.
.1 Finish: galvanized.
.2 Concrete fill and bases provided as part of work of Section 03 30 00.
.3 Bollards installed as part of this Section.

.10 METAL LOCKER BASES
.1 *Provide* as detailed.
.2 Finish: Galvanized steel.

.11 ARCHITECTURAL WOODWORK
.1 *Provide* miscellaneous steel items required as part of *The Work* of Section 06 40 00, e.g.: valance supports, vanity support brackets.
.1 Finish: prime finish.

.12 MISCELLANEOUS SECTIONS AND FRAMING
.1 *Provide* miscellaneous steel sections which are not shown or identified on Structural *Drawings*, or specified under another Section of *Specifications*.
.2 Provide steel framing and supports indicated and as necessary to complete the Work and which are not a part of the structural framework, including but not limited to:
.1 operable partitions,
.2 countertop and vanities,
.3 benches
.4 projection screens,
.5 ceiling hung televisions and cameras,
.6 tube framing for partial height walls,
.7 mechanical and electrical equipment.
.2 Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and

similar items.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* steel stairs and railings including but not limited to following:
  .1 steel stairs and railings.
  .2 miscellaneous steel framing.
  .3 interior handrails, guardrails with security mesh and miscellaneous railings.
  .4 exterior handrails and guard rail, exterior stair and ramps, complete with safety grating treads, hands and ramps, treads and structural channel stringer
  .5 miscellaneous steel framing.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's

consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,

.2 materials to be used,

.3 storage and handling of materials,

.4 installation of materials,

.5 sequence and quality control,

.6 Project staffing,

.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and as other materials designated later by *Consultant*.

.3 *Shop Drawings*:

.1 Submit *Shop Drawings* of the work of this Section in accordance with Division 01.

.2 In addition to minimum requirements indicate following:

.1 large scale details of members, materials and connections, attachments, reinforcing, anchorage and location of exposed fastenings.

.2 jointing details.

.3 methods of setting, sealing, securing, anchorage.
.4 field connections.

.3 Submit *Shop Drawings* for the following work bearing the stamp of a Professional Engineer registered in the Territory of Nunavut:
.1 Steel stairs.
.2 Handrails, pipe handrails and balustrades.

.4 Samples:
.1 Submit samples in accordance with Division 01.
.2 Submit following samples in sizes indicated:
.1 Steel Sheet: minimum 300 mm (12") square and of specified thickness.

1.6 QUALITY ASSURANCE

.1 Welding: *Provide* welding in accordance with CSA W59-M performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau.

.2 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond the designed limits.

.2 Handle and store metal materials at job site in such a manner to prevent damage to other materials, to existing buildings or property.

.3 Handle components with care, and *Provide* protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of steel members.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:
Conform to National Building Code of Canada, CAN/CSA B651 and other

requirements of authorities having jurisdiction.

.2 Design and Performance Requirements:
- .1 Design stairs in accordance with National Building Code Of Canada, NAAMM AMP 5 10, CSA S16, CAN/CSA-B651 and other requirements of authorities having jurisdiction.
- .2 Work of this Section shall be designed by a professional engineer licensed to design structures and registered in the Territory of Nunavut.
- .3 Maximum deflection for individual members shall not exceed L/360 of the span.
- .4 Design stairs to carry a minimum uniform live load of 488 kg/m² of projected plan area.
- .5 Design stairs to carry a minimum concentrated load of 1465 kg/m² applied at the centre of any tread span.
- .6 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA S136 with CSA S136 to resist forces, moments, shears and allow for movements indicated.
- .7 Design anchorage inserts for installation as part of other Sections of the Work.
- .8 Welding of any structural component related to work of this Section shall be executed by fabricator having certification of CSA W47.1.

2.2 MATERIALS

.1 Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 350W.

.2 Hollow Structural Sections: New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.

.3 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.

.4 High Strength Bolts: *Supply* bolts, nuts and washers conforming with ASTM A325M. *Supply* each type and size of bolt and nut of same manufacture and of same lot.
- .1 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thick-ness of members joined and for type of connection.
- .2 Nuts: Heavy hexagon semi-finished nuts.
- .3 Washers: Flat and smooth hardened washers, quenched and tempered.

.5 Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming with ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. *Supply* common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm (1/4") beyond nut, without the use of washers. *Supply* anchor bolts of lengths noted, but projecting not less than 13 mm (1/2") beyond nut unless otherwise noted.

.6 Primer Paint: *Supply* "MR053" by Selectone or DuPont "209 Series" as distributed by SWT.

.7 Galvanized Primer Paint, Field Touch-Up Paint and Repair to Damaged

Galvanized Surfaces: Zinc rich conforming to CAN/CGSB-1.181 for new galvanized metal in compliance with CGSB 85-GP-16M. Conform to manufacturer's recommendations. Colour: Identical to affected surface.

.8 Steel Pipe Handrails: Conforming to ASTM A53M, Type "S", Schedule 40, Grade A steel pipe of sizes shown.

.9 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m^2 to ASTM A153.

.10 Galvanized Sheet Steel: *Supply* 0.91 mm (20 ga) core thickness commercial quality to ASTM A653M, Grade A, with Z275 zinc coating designation to ASTM A653M

2.3 COMPONENTS

.1 EXTERIOR HANDRAILS AND GUARDRAILS
- .1 Pipe Handrail:
  - .1 Material and finish: *Provide* minimum 3 mm wall thickness hot dip galvanized prime painted steel with epoxy finish.
  - .2 Outside diameter for Handrail: Minimum 38 mm unless otherwise indicated on Drawings.
  - .3 Outside diameter for Guardrail: Minimum 50 mm unless otherwise indicated on Drawings.
  - .4 *Provide* closed pipe ends and grind welds smooth.
  - .5 Fabricate as detailed.

.2 STEEL GRATING STAIRS AND BALUSTRADE
- .1 Stringers: minimum 250 x 12.5 MC prime painted steel channel sections.
- .2 Stringer end cover plate: minimum 6 mm continuous prime painted steel, welded.
  - .1 Finish: galvanized.
- .3 Tread and riser carrier bars (horizontal and vertical): minimum 30 mm x 30 mm x 6 mm prime painted steel angles, welded to the steel stringers.
  - .1 Finish: galvanized.
- .4 Treads and landings:
  - .1 Metal bar grating: to ANSI/NAAMM MBG 531, steel with checkered plate nosings.
  - .2 Finish: galvanized.
- .5 Reinforce tread and landing nosings with 2 - 10 ga gusset plates.
- .6 Risers: open, minimum 12 ga sheet steel, welded
  - .1 Finish: galvanized.
- .7 Provide galvanized wire mesh guardrail fill. Refer to Section 05 50 00 for specification.

2.4 FABRICATION

.1 Fabricate each item of the work of this Section in accordance with following general requirements:
- .1 members square and straight.

.2 members plumb and true.
.3 joints accurately and tightly fitted.
.4 intersecting members in true, flush planes.
.5 fasteners concealed.
.6 steel connections.

.2 Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.

.3 *Provide* hot rolled structural steel channel stringers, other framing members, steel shapes; channels, angles and plates. *Provide* treads, risers, soffits, metal pans and landings as detailed. Treads, landings, metal pans and risers shall be 3 mm (1/8") thick minimum, unless otherwise indicated. *Provide* stair handrails and pickets spaced as shown. *Provide* wall railings to match balustrade railings complete with brackets.

.4 *Provide* hangers, rods, bars, bolts, anchors, brackets, rivets, bearing plates and bracing, fitting, drilling, stopping, soldering, as required for a complete assembly.

.5 Insulate dissimilar metals to prevent galvanic corrosion.

.6 Weld connections unless otherwise indicated.
.1 *Provide* exposed welds continuous.
.2 File and grind exposed welds smooth and flush.

.7 *Provide* exposed metal fastenings and accessories of the same material, texture, colour and finish as the base metal to which they are applied or fastened.

.8 PLATE/GRATING STAIRS
.1 Form treads from minimum 6 mm thick steel plate to profile indicated, and secure to stringers with L supports.
.2 Form landings from minimum 6 mm thick steel plate, reinforced by C-section.
.3 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.

2.5 FINISHING

.1 *Provide* work of this Section free from:
.1 wrinkles, waves, cracks or other defects which would reduce the strength or mar the appearance of finished work.
.2 distortion, weld splatter, weld burn and defects detrimental to appearance.

.2 File and grind marks and other imperfections to a smooth surface.

.3 Touch-up surfaces damaged due to cutting, welding, threading and installation.

.4 Do not *Provide* trademarks or labels on exposed finished surfaces.

.5 Interior Finish: Prime paint finish unless indicated otherwise.

.6 Exterior Finish: Hot-dip galvanized, unless indicated otherwise.

.7 Surface Preparation:
- .1 Bare Ferrous Metal:
  - .1 Remove rust, grease, oil, and scale.
  - .2 *Provide* SSPC SP6 Commercial sandblast.
  - .3 *Provide* SSPC SP10 Near White sandblast.
  - .4 Solvent wipe.
- .2 Previously Primed Metal:
  - .1 Remove rust, oil, grease and loose paint.
  - .2 Repair shop prime coat and feather edges.
- .3 Previously Galvanized Metal:
  - .1 Remove oils and passivation coatings.
  - .2 *Provide* SSPC SP7 Brush sandblast.
  - .3 Apply chemical pretreatment if necessary for good bond.
  - .4 Touch-up finish: inorganic zinc rich primer conforming to CAN/CGSB-1.171.

.8 Hot-Dip Galvanizing:
- .1 After fabrication, hot dip galvanized specific steel items noted on *Drawings* and/or called for herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing.
- .2 Galvanize members exposed to elements when in final location; members embedded on exterior side of exterior walls; members imbedded in cementitious materials; members specified in this Section or noted on *Drawings*.
- .3 Hot-dip galvanize members, in accordance with requirements of following ASTM standards, with minimum coating weights or thicknesses as specified:
  - .1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123M; average weight of zinc coating per sq/ft of actual surface, for 4.8 mm (3/16") and less thickness members 2 ounces, for 6 mm (1/4") and heavier members 2.3 ounces.
  - .2 Miscellaneous Steel Items: ASTM A153M; minimum weight of zinc coating, in ounces per sq ft of surface shall be in accordance with Table 1 of ASTM A153M, for the various classes of materials used on the *Project*.
  - .3 Steel Sheet: ASTM A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z 275 (G90,) minimized spangle and chemically treated.

.9 Shop Epoxy Finish:
- .1 Surface Preparation: As specified above.
- .2 Apply epoxy finish in shop.
- .3 Surface preparation to SSPS SP10
- .4 Epoxy primer: CAN/CGSB-1.165-M inorganic
- .5 Epoxy finish coat: CAN/CGSB-1.146 (3 mils/coat)
- .6 Touch-up on site with sanded perimeter and epoxy finish coat.

.7 Colour to be selected by *Consultant*.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

.1 Verify dimensions at the *Place of the Work* to ensure work of this Section fits to that of other parts of the *Work*.

.2 Install in accordance with NAAMM, Metal Stair Manual.

.3 Where fastenings, anchors, or angles/plates for welding have to be built in by other trades, *Supply* all necessary templates, instructions and supervise to ensure satisfactory installation. *Provide* weld plates and anchorages for building in by other Sections as indicated and required.

.4 Erect treads, metal pans, grating treads, stringers, hanger assemblies, landings, closures, balustrades and handrails of this Section plumb, square, true and level.

.5 Weld connections between handrails and balusters and in lengths of handrails continuously. Weld balustrades to steel stairs. Secure wall handrails to walls. Do welding work in accordance with CSA W59 unless specified otherwise.

.6 Ends of tube railings shall have closure plates continuously welded to railing.

.7 Securely anchor work of this Section and weld or bolt to structural framing of the building. Where secured to concrete, *Provide* bolts for setting in concrete.

.8 Metal surfaces in contact with cementitious surfaces or dissimilar metals shall receive one coat of bituminous paint.

.9 Grind off surplus welding material smooth and flush. Internal and external corners shall have sharp lines. Remove grind marks.

.10 *Provide* necessary fitting, setting and cutting required in connection with the fitting of work of this Section to other parts of the *Work*.

.11 Erect stair work to line, plumb, square, true and level, with runs of stairs registering level with floor levels.

3.3 CLEANING

.1 On completion of installation, carefully clean metal *Work*. Touch up damaged portions of primed finish coat where necessary.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* rough carpentry including but not limited to following:
  .1 miscellaneous interior carpentry.
  .2 equipment mounting panels.
  .3 roofing carpentry.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 SUBMITTALS

.1 *Product* Data:
  .1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00.
  .2 Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  .3 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials later designated by *Consultant*.

1.5 QUALITY ASSURANCE

.1 Installer Qualifications: Provide work of this Section executed by competent installers with minimum 5 years’ experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

.2 Grading:

.1 *Provide* lumber bearing stamps of an agency accredited by the Canadian Lumber Standards Accreditation Board for identification.
.2 Plywood Grading Agency: Certified by APA The Engineered Wood Association; http://www.apawood.org
.3 *Provide* roof sheathing bearing manufacturer's grading stamp for identification.
.4 Provide "preservative treated" and "fire treated" wood and plywood bearing the stamp of the Canadian Wood Preservers Bureau and ULC stamp.

.3 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers

1.6 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements: Store lumber in a dry place and protect from dampness and injury. Stack to prevent warping.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:
.1 Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

.2 Performance Requirements:
.1 Visual Characteristics: Measure knots, checks, shakes and slope of grain in visually graded lumber in accordance with ASTM D245 with exceptions as noted under NLGA 120d.
.2 For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes
.3 Use CLS grade marked lumber conforming to the Standard Grading Rules for Canadian Lumber published by the National Lumber Grades Authority.

2.2 MATERIALS

.1 Softwood Lumber:
.1 Softwood Lumber conforming to CAN/CSA O141.
.2 *Consultant* reserves right to select species and appearance grades to suit design requirements.
.3 Furring, blocking, nailing strips, rough bucks, cants, curbs, fascia backing and slippers: Of grades conforming to National Lumber Grades Authority "Standard Grading Rules for Canadian Lumber":

.2 Appearance Lumber: Appearance shall be graded in accordance with NLGA Para 125.

.3 Studs:
.1 NLGA Para 121c, Stud.

.4 Light Framing:
.1 NLGA Para 122b, Construction Light Framing.
.2 NLGA Para 122c, Standard Light Framing.

.5 Structural Light Framing:
.1 NLGA Para 124a Select Structural.
.2 NLGA Para 124b, No 1, Structural.
.3 NLGA Para 124c, No 2, Structural.

.6 Hardwood Lumber: Of grades conforming to grading rules of U.S. National Hardwood Lumber Association, solid Yellow Birch, select or better.

.7 Concealed Framing Lumber: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction S-P-F, kiln dried, free from sap, shakes, splits, knots and other defects.

.8 Grounds, Nailing Strips and Blocking: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction S-P-F, kiln dried, free from sap, shakes, splits, knots and other defects.

.9 Plywood:
.1 Exterior Plywood: 19 mm (3/4") thick, waterproof, grade stamped exterior grade Douglas Fir plywood, select grade, un-sanded conforming to CSA O121-M.
.2 Refer to Section 09 91 00 for Exterior Plywood Paint.
.3 Softwood Plywood: Conforming to CSA O151; minimum 19 mm (3/4") thick.

.10 Glue: waterproof.

.11 Adhesives in accordance with CSA O 112 and CAN/CGSB-71.26 requirements with VOC limit acceptable to authorities having jurisdiction.

.12 Field Applied Wood Preservative: For field cut ends, *Supply* "Wolman End Cut" by Koppers Company Inc. or same CCA preservative as used for shop impregnation.

.13 Rough Hardware and Fastening Accessories:
.1 *Supply* rough hardware to frame and fix rough carpentry including bolts, anchors, nails, expansion shields and other fastenings required.
.2 Hardware for exterior work to be hot dip galvanized. Use galvanized fasteners for exterior *Work* and interior highly humid areas; galvanizing shall be in accordance with ASTM A123.
.3 In other locations *Provide* cadmium plated hardware. *Provide* spiral thread nails except as indicated otherwise.
.4 Rough hardware including without limitations bolts, anchors, nails, expansion shields and other fastenings required in contact with wood preservative application or treatment to be hot dipped galvanize in accordance with requirements of ASTM A153M;
.1 Minimum weight of zinc coating: G185, in ounces per sq ft of

surface (zinc coating of 600 g/m² and or better and shall be in accordance with Table 1 of ASTM A153M, for the various classes of materials used on the *Project*.)

.5 Wire Nails, Spikes and Staples: Conforming to CSA B111.

.6 Bolts minimum 12 mm (½") complete with nuts and washers.

.7 Proprietary fasteners such as toggle bolts, expansion shields, screws and lead or organic fibre plugs: recommended for purpose by manufacturers.

.8 Do not use electroplated galvanized fasteners in contact with wood preservative.

.9 If stainless steel fasteners are used, use only Type 316 fasteners.

.14 Treated Wood and Plywood:

.1 Treat wood to resist termites or decay, such treatment shall be in accordance with CSA O80.1-08, “Specification of Treated Wood” Table 2, “Use Categories for Specific Products, Uses and Exposures

.2 Pressure treat structural wood elements such as retaining wall or cribbing with a preservative to resist decay, where the vertical clearance between structural wood elements and the finished ground level is less than 150mm (6”)

.3 "Treated" Wood and Plywood (Decay and Termite Resistant):

.1 Acceptable Manufacturer: Koppers Company Inc., Wolmanized, Distributed by Hickson Building Products Limited.

.2 Acceptable Treatment: Timber Specialties K-33.

.3 *Provide* vacuum/pressure impregnated lumber treated in accordance with CSA O80-M.

.4 Retention/Penetration Standards: Conform to CSA O80 Series.

.5 *Provide* treated wood kiln dried to maximum 12% moisture content.

.6 Cut end liquid wood preservative as recommended by manufacturer of treated wood.

.15 "Fire Treated" Wood And Plywood:

.1 Acceptable Manufacturer: Koppers Company Inc., Dricon, Distributed by Hickson Building Products Limited.

.2 Acceptable Treatment: Timber Specialties Flame Proof LHC.

.3 Flame Spread: Max 25 in 30 mins in accordance with CAN/ULC-S102.

.4 *Provide* fire treated wood kiln dried to max 19% moisture content.

.5 Do not resurface or rip fire treated wood if it affects the ULC Label.

.6 Interior Fire Retardant Treated Lumber and Plywood: Pressure treated lumber and plywood with fire retardant chemicals to meet Underwriters' Laboratories FR-S rating with surface-burning characteristics rating of 25 or less for flamespread, fuel contributed and smoke developed. Ensure each piece of fire retardant treated lumber and plywood bears UL label or imprint attesting to this rating.

.16 Fire Resistant Barrier: Non toxic, water based latex fire resistant coating with proprietary fibers, 68% solids, each container or package bearing UL label. “Firefree Ff88" by International Fire Resistant Systems, Inc.; www.phoenixthermal.com

.17 Oriented strand board (OSB) and waferboard: CSA O 437, generic structural

panel products composed of wafers, flakes, or strands sliced from whole aspen poplar, southern yellow pine or other mixed hardwood logs. After slicing they are dried, blended with wax and waterproof exterior type binders (phenolic resin and/or polyurethane binder), formed into a loose mat or pad containing three to five layers and pressed under high heat and pressure into a rigid, dense structural panel.

.1 Acceptable Manufacturer:

.1 Weyerhaeuser; www.weyerhaeuser.com

.2 Georgia-Pacific Wood Products LLC; www.gp.com/build

.3 Norbord; www.norbord.com

.2 Size and thickness as indicated on Drawings.

PART 3 -EXECUTION

3.1 VERIFICATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Treat surfaces with wood preservative or fire retardant applications before installation.

.2 Apply preservative by dipping or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak for plywood.

.3 *Provide* pressure treatment to materials exterior and materials within an envelope wall or exterior floor assembly.

.4 Coordinate with other Sections providing blocking, nailing strips and trims as required for installation of work.

3.3 INSTALLATION

.1 Properly frame together parts of the work with members accurately cut to size, closely fitted, well spiked, and erected in a substantial manner, plumb, level, square and true to dimension.

.2 Locate joints over bearing or supporting surfaces.

.3 *Provide* running members full length wherever possible.

.4 Design for expansion and contraction of the materials.

.5 After cutting, drilling and fitting of "treated" wood and plywood but before installation, apply 1 full coat of wood preservative to exposed surfaces, including ends of blocking, furring, nailers and rough carpentry. Retreat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative or fire retardant before application.

.6 *Provide* fasteners and rough hardware for a rigid and secure installation. In addition to mechanical fastener, place continuous adhesive bead where appropriate in accordance with manufacturer’s instructions. i

.7 Mix intumescent paint coating *Product* to manufacturer’s recommendations. Do not thin or strain. Apply primer and paint coating providing fire resistant barrier in accordance with manufacturer’s recommendations to achieve requirements of authorities having jurisdiction. Apply at rate 3.2 sq.m /L (125 sq.ft/gal) to obtain dry film thickness of 10 mil (0.25 mm)

.8 Miscellaneous Interior Carpentry:
- .1 *Provide* plywood, blocking, furring, nailers, rough carpentry, grounds and nailing strips as indicated or required for proper installation.
- .2 *Provide* furring, blocking as required to support miscellaneous work indicated on *Drawings* or as required to meet design requirements. This non-exhaustively includes following: support for fascia, composite wood panels, wall mounted equipment, crash rails, bumpers, wood blocking required with roofing and exterior walls and other similar locations.

.9 Exterior Plywood:
- .1 Provide treated exterior plywood, 19 mm (3/4") thick, waterproof, grade stamped exterior grade Douglas Fir plywood, G1S grade, un-sanded conforming to CSA O121-M. Plywood shall be treated as specified herein above and prepared to receive exterior paint specified under Div.09.

.10 Oriented strand board (OSB) and waferboard:
- .1 Provide waferboard/strandboard as a backer in locations indicated on Drawings.

.11 Equipment Mounting Panels:
- .1 *Install* wood panels required for mechanical, electrical and communication trades for mounting of controls, panel boards, pull

boxes, splitters, switches, wall mounted switch gear, junction boxes, electrical cabinets, data control equipment, disconnect switches, fire alarm control equipment, lighting control equipment, sound/communication equipment and other similar devices.

.2 *Provide* 19 mm (3/4") thick exposed plywood backboard panels in one piece screw-fastened to fire treated wood strapping. Refer to Electrical *Drawings* for sizes and locations and securely mount panels to wall surfaces.

.3 Ensure panel size and mounting height suits mechanical and electrical requirements and are acceptable to *Consultant*. *Provide* "fire treated" plywood and apply 1 coat of fire retardant wood preservative to surfaces and edges of plywood panels.

.12 Roof Carpentry:

.1 *Install* continuous wood nailers around roof perimeters, curbs and roof openings at edges of insulation. Use cadmium plated self tapping screws for securing wood to metal deck, lead shields and cadmium plated lag screws for securing wood to substrate as shown. *Install* cut cant strips and continuous nailers on copings and curbs as detailed.

.13 Pressure Treated Wood:

.1 *Provide* pressure treated wood members at locations indicated on *Drawings.* In particular, *Provide* pressure treated wood in locations where wood will be in direct contact with earth or concrete and at junction of miscellaneous concrete with elements below grade.

.2 *Provide* Jack Pine or Red Pine, pressure treated in accordance with CAN/CSA- O80-M for wood in contact with earth or concrete. Acceptable Preservative: Chromated Copper Arsenate (CCA) with net retention of 6.73 kg/m3 (0.42 lbs/cu ft). *Provide* wood precut, where practical, prior to preservative treatment.

.3 Ensure pressure treated lumber cut on site has cut ends treated with copper napthnate based end cut preservative for protection against fungal decay.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 CSA International
.1 CSA O322-02(R2007), Procedure for Certification of Pressure-Treated Wood Materials for Use in Preserved Wood Foundations.
.2 CAN/CSA-S406-14, Specification of Permanent Wood Foundations for Housing and Small Buildings.

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 wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Identify pieces of treated lumber and plywood used in preserved wood foundations by CSA O322 certification stamp.

.2 Sustainable Standards Certification:
.1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

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, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, in a dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management:
.1 Ensure preservative treated wood is disposed of by means other than for recycling or reuse.
.2 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.
.3 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Lumber and panel materials: to CAN/CSA-S406.
.1 CAN/CSA-Z809 or FSC or SFI certified.
.2 SCAQMD Rule 1113 - Architectural Coatings.

.2 Preservatives: maximum VOC 350 g/L.

.3 Fasteners and connectors , moisture barrier, sealant and field applied preservative: to CAN/CSA-S406.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 CONSTRUCTION

.1 Construct preserved wood foundation in accordance with CAN/CSA-S406.

.2 Place cut ends up where studs cut to length.

3.3 INSTALLATION

.1 Install preserved wood foundation in accordance with CAN/CSA-S406.

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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Entire Specification Book.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A 36/A 36M-08, Standard Specification for Carbon Structural Steel.
- .2 ASTM A 47/A 47M-99(2009), Standard Specification for Ferritic Malleable Iron Castings.
- .3 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 ASTM A 307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .5 ASTM A 653/A 653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 CSA International
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 CAN/CSA O80 Series-08, Wood Preservation.
- .4 CSA O86 Consolidation-09, Engineering Design in Wood.
- .5 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .6 CAN/CSA-O122-06(R2011), Structural Glued-Laminated Timber.
- .7 CSA O177-06(R2011), Qualification Code for Manufacturer's of Structural Glued-Laminated Timber.
- .8 CSA S16-09, Design of Steel Structures.
- .9 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

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

.4 Society of Automotive Engineers International (SAE)
- .1 SAE Handbook 2009.

.5 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
- .2 MPI #79 Primer, Alkyd, Anti-Corrosive for Metal.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
.1 Convene pre-installation meeting 2 weeks prior to beginning on-site installation with Contractor's Representative and Consultant, in accordance with Section 01 31 19 -C 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 Hold project meetings every month.

.3 Ensure project manager attends.

.4 Consultant will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.5 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work.

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 glued-laminated construction 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 the Territory of Nunavut, Canada.
.2 Submit erection drawings in accordance with CSA S16 and CSA O86.
.3 Shop drawings for members: indicate stress grade, service grade and appearance grades, shop applied finishes, camber, cuts, ledgers, holes and connection details.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit 2 samples of connector plates.

.5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.1 Submit manufacturer's plant certification to CSA O177, Appendix B at completion of fabrication.

.6 Test and Evaluation Reports: submit certified test reports for beams from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.8 Manufacturers Reports:
.1 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 Manufacture structural glued-laminated members in plant certified by CSA as meeting requirements of CSA O177, class X.
.2 Submit certificate in accordance with CSA O177, Appendix B at completion of fabrication.
.3 Fabricator for welded steel connections to be certified to CSA W47.1.
.4 Place authorization labels on glued-laminated members indicating manufactured in CSA certified plant.
.5 Certification of material protective sealer.

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:
.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.2 Apply protective sealer to glued-laminated units before shipping unless specified otherwise.
.3 Wrap quality commercial grade members prior to leaving plant with a moisture resistant wrapping.
.4 Use padded, non-marring slings for handling glued-laminated members.
.5 Protect corners with wood blocking.
.6 Make adequate provision for delivery and handling stresses.

.3 Storage and Handling Requirements:

.1 Store materials off ground, in a dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Slit underside of membrane covering during storage at site without defacing member.
.3 Store glued-laminated units and protect from weather, block off ground and separate with stripping, so air may circulate around faces of members.
.4 Cover glued-laminated units with opaque moisture resistant membrane if stored outside.
.5 Store and protect glue-laminated products from nicks, scratches, and blemishes.
.6 Replace defective or damaged materials with new.

.4 Packaging Waste Management:
.1 Ensure preservative treated wood is disposed of by means other than for recycling or reuse.
.2 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.
.3 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Laminating stock: Douglas Fir-Larch, Hem Fir and Douglas Fir-Larch to CAN/CSA-O122.
.1 CAN/CSA-Z809 or FSC or SFI certified.

.2 Adhesive: to CSA O112.10, to grade of service required in accordance with CAN/CSA-O122.
.1 Urea-formaldehyde free.

.3 Sealer for glued-laminated members: penetrating type, clear, non-yellowing liquid.
.1 Coatings: VOC limit 550 g/L maximum.

.4 Fastenings:
.1 Split ring connections: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.
.2 Shear plate connections:
.1 Pressed steel type: hot rolled carbon steel, SAE 1010, in accordance with SAE handbook.
.2 Malleable iron type: to ASTM A 47/A 47M, grade 350.
.3 Lag screws: per fabricator's specifications.
.4 Bolts: to ASTM A 307.
.5 Side plates: to CSA G40.20/G40.21.
.6 Drift pins: to ASTM A 307.

.7 Glued-laminated rivets: hot dip galvanized to CSA G40.20/G40.21.
.8 Nails and spikes: to CSA B111.
.9 Truss plates: light gauge galvanized sheet steel to ASTM A 653, grade A, yield point 255 MPa.

.5 Shop coat primer for steel connections: to MPI #18.

.6 Galvanizing: to ASTM A 123/A 123M, hot dipped, minimum zinc coating of 610 g/m^2.

2.2 FABRICATION

.1 Fabricate members to following classifications:
.1 Stress grade: to CSA O86, 20f-E bending grade.
.2 Service grade: exterior.
.3 Appearance grade: commercial.

.2 Mark laminated members for identification during erection. Marks not to be visible in final assembly.

.3 Do not apply sealer to areas which are to receive stained finish or preservative treatment.

.4 Design connections to CSA O86, and CSA S16 unless specifically detailed, to resist shears, moments and forces indicated.
.1 Fabricate in accordance with CSA S16.

.5 Galvanize connections after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glue-laminated material installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 ERECTION

.1 Protect protective sealer from damage before erection.

.1 Touch up damaged areas on site with specified sealer.

.2 Erect glued-laminated members in accordance with reviewed erection drawings.

.3 Brace and anchor members until permanently secured by structure.

.4 Make adequate provisions for erection stresses.

.5 Splice and join only at locations as indicated on reviewed erection drawings.

.6 Do not field cut or alter members without Consultant's approval. If approved, preservative treat cut ends.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, protecting and cleaning of product.
.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 is present before and during critical periods of installation.
.4 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 the Work, after cleaning is carried out.

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.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by glue laminated construction installation.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 *Work* Included: *Provide* architectural woodwork including but not limited to following:
  .1 architectural cabinet casework.
  .2 architectural cabinet casework drawers and doors.
  .3 edgebanding for architectural cabinet casework and doors.
  .4 plastic laminate countertops.
  .5 custom stainless steel countertops and casework.
  .6 architectural cabinet casework hardware.
  .7 interior architectural wood frames.
  .8 preservative treatment.
  .9 specialty millwork.
  .10 wood slat ceiling

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 Architectural Cabinetry:
    .1 In the context of architectural cabinetry, the following definitions apply in accordance with AWS, Section 10.
      .1 Exposed Surfaces: Defined as all interior surfaces exposed to view in open casework or behind transparent doors. These include:
        .1 Shelves (including edgebanding),
        .2 Divisions and partitions,
        .3 Interior face of ends (sides), backs, and bottoms (including pull-outs). Also included are the interior surfaces of cabinet top members 914 mm (36”) or more above the finished floor
      .2 Semi-Exposed Surfaces: Defined as those interior surfaces only exposed to view when doors or drawers are opened. These include:
        .1 Shelves, including edgebanding
        .2 Divisions,
        .3 Interior face of ends (sides), backs, and bottoms (including pull-outs). Also included are the interior surfaces of cabinet top members 914 mm (36”)

or more above the finished floor
.4 Drawer sides, sub-fronts, backs, and bottoms.
.5 The underside of cabinet bottoms between 610 mm (24″) and 1067 mm (42″) above the finished floor.
.6 Security and dust panels or drawer stretchers.

.3 Concealed Surfaces: Defined as those exterior or interior surfaces that are covered or not normally exposed to view. These include:
.1 Toe space unless otherwise specified
.2 Sleepers, stretchers, and solid sub-top
.3 The underside of cabinet bottoms less than 610 mm (24″) above the finished floor
.4 The flat tops of cabinets 2032 mm (80″) or more above the finished floor, except if visible from an upper floor or building level.
.5 The three non-visible edges of adjustable shelves.
.6 The underside of countertops, knee spaces, and drawer aprons.
.7 The faces of cabinet ends of adjoining units that butt together.

.2 Abbreviations and Acronyms:
.1 NHLA: National Hardwood Lumber Association.
.2 NEMA: National Electrical Manufacturers Association

.3 Reference Standards:
.1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
.2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
.1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
.1 environmental procedure requirements,
.2 health, safety and emergency response procedure and policy requirements,
.3 and security requirements;
.2 Pre-construction Site Meeting:
.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure

complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Coordination with Mechanical, Electrical and Communication Services: As a requirement of this Specification section, allow access to shop by associated trades for purpose of performing pre-wiring and partial mounting of electrical and audio/visual equipment and concealed wiring required by the design. Exposed wiring is not acceptable.

.4 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product* Data:
.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.
.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials as designated later by *Consultant*.

.2 Shop Drawings:
.1 Submit Shop Drawings indicating cabinetry, custom millwork and their material characteristics, details of construction, connections and relationship with adjacent construction.
.2 Clearly indicate material being supplied and show connections,

attachments, reinforcing, anchorage and location of exposed fastenings in accordance with AWS Section 1.

.3 Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication to ensure proper fitting of work.

.3 Samples: Submit samples in accordance with Division 01 samples in following sizes:

.1 minimum 300 mm (12") square and of specified thickness, veneer mounted on 19 mm (3/4") core and finished as specified. Submit veneer samples for *Consultant*'s approval prior to fabrication.

.2 each type of hardware.

.3 each plastic laminate in manufacturer's standard chip size.

.4 minimum 300 mm (12") square x 13 mm (1/2”) thick countertop materials.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturers: *Provide Work* of this Section executed by competent installers with minimum 5 years’ experience in the application of *Products*, systems and assemblies specified and be a member of AWI/AWMAC in good standing for 2 years.

.2 Metal Fabricator: *Provide* metal work of this Section performed by firm capable of producing required *Shop Drawings* of quality levels necessary to meet requirements specified herein. Ensure retained fabricator possesses modern architectural metal fabricating equipment capable of doing cutting, fitting, bending and installing of steel and stainless steel finishes.

.3 Welders: Perform welding by fabricator having minimum certification of Division 3 1, 2 of CSA W47.1. Ensure welders are familiar with welding procedures for structural welding for steel and structural welding for aluminum.

.2 Single Source Responsibility: A single manufacturer shall *Provide* and *Install The Work* of described in this Section.

.3 *Mock-up*s: *Provide Mock-ups* in locations designated by *Consultant* and as required to demonstrate quality of workmanship. Maintain *Mock-ups* during construction in an undisturbed condition as a standard for judging the completed work. *Provide Mock-ups* for following items:

.1 Basic Cabinetry,

.2 Millwork pieces as indicated by Consultant.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver and Acceptance Requirements:

.1 Do not deliver finished *Product*s during rainy or damp weather.

.2 Do not deliver *Work* of this Section until building and storage areas are sufficiently dry to ensure *Product*s will not be damaged by excessive changes in moisture content.

.3 Deliver, store and handle *Product*s of this Section in accordance with AWS Section 2.

.4 Do not deliver and *Install* damaged *Product*s. Replace in accordance

with requirements of this Section.

.5 Storage and Handling Requirements: Cover finished plastic laminate surfaces and varnished surfaces with heavy kraft paper and put in cartons for protection. Protect installed plastic laminate surfaces by acceptable means. Do not remove protective covers until immediately prior to final cleaning.

1.8 PROJECT CONDITIONS

.1 Ambient Conditions: Ensure Project conditions conform to requirements of AWS Section 2 and moisture contents of wood for interior locations at time of installation are at established Optimum Moisture Content and Optimum Indoor Relative Humidity outlined in AWS Section 2.

1.9 WARRANTY

.1 Warrant work of this Section for period of 3 years against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to: delamination of plastic laminate, opening of seams, warpage and extensive colour fading.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:

.1 Provide work of this Section in accordance with Architectural Woodwork Standards (AWS), except as specified otherwise herein. Any reference to grades and terminology in this Section to be as defined in “AWS” and by reference are made a part of this Section. Requirements of this Section govern and modify AWS.

.2 Flame-spread index of not greater than 25 when tested according to CAN/ULC-S102 and in accordance with National Building Code of Canada requirements.

.3 Fire-Test-Response Characteristics: Where fire-retardant materials are indicated, Provide materials with specified fire-test-response characteristics as determined by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency on surfaces of materials that will be concealed from view after installation

.2 Design and Performance Requirements:

.1 Architectural *Drawings* and details are diagrammatic and are only intended to show design concept, aesthetics, interfacing requirements, configuration, components and arrangements. They are not intended to identify or solve completely problems of thermal and structural movements, assembly framing, engineering design, fixings and anchorages.

.2 Ensure millwork casework (e.g. countertops, wall cabinets, cabinet drawers and similar items) are capable of supporting structural loads without deflection in accordance with Casework Integrity Tests in Appendix A of AWS.

.3 Without limitations, in particular ensure:

.1 Base Cabinets are capable of supporting 907 kg (2000 lb) as per AWS Casework Integrity Tests AWS Appendix A.

.2 Kitchen areas:0.718 Kilopascals (15 psf)

.3 Closet shelves: 1.197 Kilopascals (25 psf)

.4 Bookshelves:1.915 KPA(40 psf) load as per AWS Casework Integrity Tests AWS Appendix A

.4 Minimum nominal thickness and material for cabinet components and shelf deflection, type of materials, thicknesses, span width and total load distribution: In accordance with Architectural Woodwork Standards Section 10.

.5 Fire Retardant Treated Materials:

.1 Conform to AWS Section 3, for Fire Retardant Wood, AWS Section 8, for Flame Spread Classification, Built up Construction to Improve Fire Rating, Fire Retardant Treatments FRT and AWS Section 5, for Preservative Treatments.

.2 Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by pressure process or other means acceptable to authorities having jurisdiction to produce Products with following fire-test-response characteristics:

.1 *Provide* fire retardant pressure treatment complying with CSA O80-C20 for lumber and O80-C27 for plywood. Kiln dry materials after treatment to required moisture content specified in this Section. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

.2 Flame-spread index of not greater than 25 when tested according to CAN/ULC-S102 and in accordance with National Building Code of Canada Requirements.

.3 For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.

.4 Interior, Low-Hygroscopic-Type, Fire-Retardant Treatment: Formulation that results in treated material with apparent moisture content of not more than 28% when tested according to ASTM D3201 at 92% relative humidity.

.5 Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber and plywood from warping and developing discolorations from drying sticks, marring, and other defects affecting appearance of treated woodwork.

.6 Pressure treat lumber for fire retardance prior to final milling. Pressure treat plywood for fire retardance to receive a natural finish before face veneer is applied and apply face veneers not thicker than 1.0 mm (6.2 mills) in

the rough to treated cores.

.7 *Provide* ULC or WHI label for treated lumber and plywood as received from the pressure treating plant. Do not expose pressure treated material to dampness between time of material treatment and time of finish application. Carefully sand surfaces which show surface salt deposits to remove such deposits before application of finish. Arrange wood members in pressure treating equipment to avoid sticker marks on best face of members.

.8 *Provide* quality of finished *Work* of equal standard to that of untreated material. *Provide* identification on materials delivered to *Project* site showing that these *Specification*s have been complied with, on each large item, and on bundles of small items.

.9 Minimize reworking of fire retardant treated wood. Re-treat surfaces which have been exposed by cutting, trimming or boring to requirements of authorities with fire retardant chemical before installation.

2.2 MATERIALS

.1 Softwood Lumber: White Pine, Yellow Pine or other Pine species meeting CAN/CSA O141 and National Lumber Grade Authority (NLGA) requirements.

.2 Hardwood Lumber: Premium Grade Solid Oak or American Appalachian Red Oak or Solid Mahogany or Philippine Mahogany or Solid Birch Meeting NHLA requirements.

.3 Framing Lumber (Concealed Framing): Softwood or hardwood lumber as specified herein of uniform grain and colour, free from sap, shakes, knots, splits and other defects with grade marked by NLGA and meeting CAN/CSA O141 requirements as applicable. No cross grain permitted. *Provide* concealed wood of most appropriate grade required to satisfy fabrication, utility and structural requirements.

.4 Architectural Lumber (Exposed framing, solid members and trim): Clear, straight, kiln dried, hardwood lumber as specified herein, of species indicated on Drawings. Provide lumber kiln-dried to moisture content recommended by AWS, free from blemishes that would be apparent after finish is applied. Where species are not indicated on Drawings, Provide:

.1 Transparent Finish: Maple, quarter sawn, Premium grade, matched for compatibility of grain and colour.

.2 Opaque Finish: Natural Birch, quarter sawn, Premium grade.

.5 Panel Products: Conform to AWMAC AWS Section 4.

.1 Medium Density Fibreboard Core (MDF): All wood core substrates to be MDF unless used in areas subject to moisture. *Provide* MDF *Products* manufactured from 100% recycled materials, without the use of added formaldehyde resins and with following characteristics:

.1 Minimum density: 770 kg/m^3 (48 lb. /cu ft.)

.2 Surface characteristics: In accordance with ANSI/NPA A208.2

.3 Grade: Minimum 155.

.4 Finish and Texture: To match Consultant's sample
.5 Where indicated, provide industrial grade MDF certified to meet Class 1 surface burning characteristics of ASTM E84, CAN/ULC-S102 and UL 723 with maximum Flame Spread rating of 25 and maximum Smoke Developed of 200.
.6 Acceptable Products:
.1 Medium Density Fibreboard Core (MDF): Decorative panels, “Medite II®“ by Sierra Pine Ltd; www.sierrapine.com or approved equivalent Products manufactured by Flakeboard Company Limited.; www.flakeboard.com, Uniboard Canada Inc.; www.uniboard.com; or Tafisa Canada and Company, Ltd.; www.tafisa.ca.
.2 Fire-Rated Medium Density Fibreboard Core (FR-MDF): Decorative panels, “Medite FR®“ by Sierra Pine Ltd; www.sierrapine.com or approved equivalent Products manufactured by Flakeboard Company Limited.; www.flakeboard.com, Uniboard Canada Inc.; www.uniboard.com; or Tafisa Canada and Company, Ltd.; www.tafisa.ca.

.2 Veneer Core (Plywood): *Provide* exterior grade, veneer core (plywood) at countertop cores and splashes where sinks are scheduled to be installed and at other locations as required to meet design requirements. Provide fire-retardant treatment as required to meet Code stipulations. Conform to AWS Section 4.
.1 Softwood plywood (rough framing and rough carpentry only):
.1 Premium Grade, Douglas Fir plywood - CSA O121, or Western Softwood Plywood - CSA O151 or Poplar plywood - CSA O153-M. *Provide* Grade G2S where exposed on two sides and Grade G/Solid where exposed on one side. Consider fitment doors exposed on both sides.
.2 Hardwood Plywood (wood cores): Conforming to ANSI/HPVA HP-1.
.1 Water-resistant plywood “PureBond™“ by Columbia Forest Products; www.columbiaforestproducts.com or “HyBrid Panel – SkyPly” by Rosenburg Forest Products; www.rfpco.com
.3 *Provide* veneer core (plywood) for following applications:
.1 millwork cores subject to moisture,
.2 cabinet bases in contact with floor,
.3 countertop cores in other locations designated on *Drawings* and Schedules.

.6 Facings:
.1 Facing Adhesive: As recommended by manufacturer and containing no added urea-formaldehyde. Provide water-resistant adhesive for areas subject to moisture
.2 Wood face veneer:
.1 Face Grade: Minimum 0.8 mm (0.03”) thick, Grade A in accordance with requirements of AWMAC AWS Section 4 to match approved samples and containing no open joints, face depression, glue stain, patches, plastic repair or other manufacturing irregularities or defects

.2 Slicing: Quarter slicing unless otherwise indicated.
.3 Species: Maple

.3 High Pressure, Paper Base, Decorative Laminates (HPDL):
.1 Fire-Test Response Characteristics: Ensure decorative laminates meet flame spread requirements for Class A (Class I) rating in accordance with ASTM E84 and CAN/ULC S102.2. Flame spread index: < 25; Smoke developed Index: 0.
.2 *Provide* following types and thicknesses conforming to ANSI/NEMA LD3 and ANSI/NEMA LD3.1 and AWS Section 4:
.1 Horizontal General Purpose: HGS - 1.2 mm (0.048").
.2 Vertical General Purpose: VGS - 0.7 mm (0.028").
.3 Postforming Horizontal: HGP - 1.0 mm (0.039").
.4 Postforming Vertical: VGP - 0.7 mm (0.028").
.5 Fire Rated HGF - 1.2 mm (0.048")
.6 Cabinet Liner: CLS - 0.5 mm (0.020").
.7 Backer Sheet: BKM - 1.0 mm (0.039").
.8 Flame Retardant: HGF - 1.2 mm (0.048").
.3 Plastic Laminate Types (PLAM):
.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
.1 Formica Inc.; www.formica.com/
.2 Nevamar Company, LLC; www.nevamar.com
.3 Panolam Industries; www.panolam.com
.4 Arborite; www.arborite.com/en
.5 International-Pionite;www.panolam.com
.6 Wilsonart Canada; www.wilsonart.com
.2 Colours and Finishes: To be selected by *Consultant* at a later date from manufacturer's full colour range including solid and woodgrain patterns with ability to offer cross-grain patterns and printed patterns in suede or matte finishes. Maximum Number of Colours: 10.

.7 Wood Slat Ceiling (WSC):
.1 Provide Western Red Cedar siding, 3-3/8" wide, 5/8" or 11/16" thick, tongue and groove, V joint on side. Install in dimensions and patterns indicated on drawings. Submit Shop Drawings to Consultant prior to installation.
.2 Finishes: Wood slat ceiling system to be clear stained to match and provide uniform appearance.

.8 Architectural Woodwork Hardware and Accessories: Provide hardware meeting or exceeding applicable ANSI/BHMA A156 Series (Grade 1) standards. Coordinate requirements of Architectural woodwork hardware with Section 08 71 00.
.1 Slides:
.1 Light Duty Drawer Slides – 610 mm (24") wide or less, Capacity: 34.02 kg (75 lbs):
.1 Side Mounted Telescoping Ball Bearing drawer slide, 3/4 extension (length as required to suit drawer size); *Provide* 1 of following:
.1 Model No. Accuride – 2132 by Hafele

.2 Model No. KA 3432 – by Hettich
.3 Approved equivalent by Knape & Vogt

.2 Medium Duty Drawer Slides – more than 610 mm (24″) wide, Capacity 45.36 kg (100 lbs)
.1 Side Mounted Telescoping Ball Bearing drawer slide with full extension (length as required to suit drawer size); *Provide* 1 of following:
.1 Model No. Accuride – 3832 by Hafele
.2 Model No. 1375 by Knape & Vogt
.3 Model No. KA 5632 by Hettich

.3 Heavy Duty Drawer Slides – more than 610 mm (24″) wide, Capacity: 68.04 kg (150 lbs)
.1 Side Mounted Telescoping Ball Bearing drawer slide with full extension and 25 mm (1″) overtravel (length as required to suit drawer size); *Provide* 1 of following:
.1 Model No. Accuride – 3640 by Hafele
.2 Model No. 8505 by Knape & Vogt
.3 Model No. KA 555 by Hettich

.2 Cabinet Door Hinges and Stays: Ensure cabinet hinge pin is not removable (tack weld or cap). *Provide* hinges complete with one-piece non-removable pin with tapered tips.
.1 Wood Door Hinges:
.1 Frameless Concealed Hinges (European Type) – 165° - 170° opening: Self closing concealed hinges with integrated soft close. Manufacturer's recommended number of hinges to suit door size and thickness. *Provide* 1 of following:
.1 "Salice Concealed Wide Angle Hinges - No. 329.07 Series" by Hafele.
.2 "Blum Concealed - Clip-Top Hinge" by Richelieu Hardware
.3 “Intermat 9943” or “Intermat 9956” by Hettich

.3 Door and Drawer Locks: Provide locks for 50% of doors and drawers. Lock locations to be to be selected by Consultant at a later date prior to occupancy. *Provide* locks per *Owner*’s keying requirements unless otherwise indicated.
.1 Wood Framed Doors and Drawers:
.1 Cylinder Locks: *Provide* adjustable locking system with lock throw, orientation and size to suit cabinet size. *Provide* 1 of following:
.1 "Cylinder Module System; Model No. 232 Series" by Hafele complete with cam locks or deadbolt locks and cores as required to suit applications indicated.

.4 Handles (Doors and Drawers):
.1 Flush Handles:
.1 Black Rectangular Flush Handles:
.1 "Model No. 129.57 Series" by Hafele;
.2 "HEWI Flush Pull Model No. 158.88.099" by Hafele
.3 Model No. UT-105/S" by Sugatsune America, Inc.

.5 Workstation Accessories:
.1 Keyboard Mechanism and Platform: Provide 635 mm x 270 mm (25″ x 10.625″) keyboard complete with clip-on mousepad platform

Model No. “6G55090G” by Humanscale, www.humanscale.com.
.1 Height Adjustment Range: 178 mm (7”)
.2 Tilt Adjustment Range: 0 deg to -15 deg
.3 Finish: “Black” mechanism with “Platinum” keyboard and palm support.

.2 Single Monitor Arm: Provide clamp mounted monitor arm with integrated cable management system for single monitor mount “Model No. M2CW1S” by Humanscale; www.humanscale.com.
.1 Maximum Capacity: 9 kg (20 lbs).
.2 Finish: “Silver/Grey”
.3 Height Adjustment Range: 254 mm (10”)

.3 Undercounter CPU Holder: Provide 360 deg swivel undercounter track mounted CPU holder “CPU600W” by Humanscale; www.humanscale.com.
.1 Maximum Capacity: 14 kg (30 lbs.)
.2 Finish: “Brushed Aluminum”

.4 Cable Management Grommets: Provide 54 mm (2-1/8”) diameter grommets in numbers indicated at locations shown on reviewed Shop Drawings. Finish: Black unless otherwise indicated.
.1 "Flip Top Series", by Mockett; www.mockett.com
.2 "Round Plastic Cable Grommets; Model No. 429.9 Series" by Hafele.

.6 Recessed Shelf Pilasters, Standards and Clips: *Provide* required accessories to mount wood shelves. *Provide* 1 of following:
.1 “KV255" pilaster and “KV256" adjustable clip by Knape & Vogt
.2 “120-10 Series” pilasters and “1903-2G” clip supports by Richelieu Hardware Ltd

.7 Door and Drawer Stops, Bumpers and Catches:
.1 Drawer and Hinged Door Bumpers: *Provide* 2 clear resilient, press-fit bumpers per door or drawer.
.2 Built-in Drawer Stops: Resilient type recommended by manufacturer.
.3 Magnetic Door Catch: Holding Power: 3 kg - 4kg (6.6 lbs – 8.8 lbs) Finish: Heavy duty cast aluminum. *Provide* 1 of following:
.1 Model No. 246.26 Series by Hafele
.2 Model No. 918 by Knape & Vogt

.8 Closet Coat Rods: “KV660" by Knape and Vogt Manufacturing Company, 27 mm (1-1/16") od stainless steel rod complete with “KV734" and “KV735" polished chrome flanges. Size rods to suit closet widths.

.9 Clothing Hooks: Refer to Section 10 95 00.

.9 Solid Surfacing: Refer to Section 06 61 16.

.10 Fastenings:
.1 Include necessary fastenings, anchors and accessories required for fabrication and erection of work of this Section.
.2 Fastenings include non-exhaustively: anchor bolts, machine bolts, toggle bolts, male/female bolts, lag screws, expansion shields, sleeves, brackets, washers and nuts.
.3 *Provide* exposed fasteners, where approved and shown on reviewed *Shop Drawings*, of same texture, colour and finish as base material on which they occur unless otherwise shown or noted. Use only stainless steel

fasteners with stainless steel components.

.4 *Supply* bolts complete with washers and nuts required for complete installation. *Provide* lock washers where vibration may loosen bolted fastenings.

.5 Ensure thread dimensions are such that nuts and bolts fit without rethreading or chasing threads.

.6 Bevelled hexagon head bolts: ASTM A307.

2.3 COMPONENTS

.1 Casework and Frames Construction: Conforming to AWS Section 10 unless otherwise indicated.

.1 *Provide* premium grade quality construction and finishing unless otherwise indicated.

.2 Casework Construction Type: Type A – Frameless construction with edgebanded front edges

.3 Interface Style: Style 1 – Flush Overlay unless otherwise indicated.

.4 Exposed Surfaces Core: Medium Density Fiberboard Core (MDF) unless otherwise indicated.

.5 Semi-Exposed and Concealed Surfaces Core: Medium Density Fiberboard Core (MDF) unless otherwise indicated.

.6 Edge Banding: ABS edgebanding, per AWS Section 10, Rule 4.4.26. Provide edgebanding for exposed (visible) and semi-exposed edges of type specified herein.

.1 case bodies: minimum 0.5 mm (0.0197”) thick,

.2 doors, drawer fronts, and false fronts: minimum 3 mm (1/8”)thick.

.3 Pattern: wood grain to match door faces unless otherwise indicated. Solid colors are not acceptable.

.7 Facing: Plastic Laminate as specified below:

.1 Exposed surfaces Finish: HGS for horizontal surfaces and VGS for vertical surfaces in accordance with AWS Section 4, Rule 4.2c.

.1 Finish: To be selected from manufacturer’s full range at a later date.

.2 Semi-Exposed Surfaces Finish: Plastic laminate; HGS for horizontal surfaces and VGS for vertical surfaces in accordance with AWS Section 4, Rule 4.2c.

.1 Finish: Solid colour to match exposed surface finish

.3 Concealed Surfaces Finish: Backing sheet; Provide BKV at vertical locations and BKH at horizontal locations; unless otherwise indicated.

.2 Countertops and Backsplashes: Conforming to AWS Section 11 unless otherwise indicated.

.1 Cores: *Provide* exterior grade veneer core plywood as specified herein unless otherwise indicated.

.2 Solid Polymer Surface Countertops: Refer to Section 06 61 16

.3 Plastic Laminate Countertops:

.1 Front Edge type: Type 6 – Postformed with waterfall coved splash and waterfall edge detail per AWS Section 11.

.2 Finish edgebanding other than backsplash or sidesplash with

same material used for countertops.

.3 Laminate Material:

.1 Standard Laminate: *Provide* HGP post-forming for horizontal locations and VGP for vertical locations.

.3 Stainless Steel Countertops and Casework (Food Prep and Breath Test Rooms): Refer to Section 12 35 71.

.4 Custom Stainless Steel Workstation (Guard Area): Provide Stainless Steel countertop, base cabinets and legs as indicated on Drawings:

.1 Reinforce and sound-deaden with a 3/4″ thick, waterproof, marine plywood core, bonded with waterproof contact adhesive. Seal underside of core with waterproof sealing coat. Build up outer edges of tops with solid wood strips to a thickness of 32 mm (1-1/4″).

.2 Provide a raised rim or marine edge 25 mm (1″) wide along front edges and exposed or open ends. From inner edge of the 25 mm (1″) wide surface, Provide a downward slope of 30o with a vertical drop of 6 mm (1/4″). Extend stainless steel under counter top a minimum of 13 mm (1/2") and form a drip edge.

.3 Form splash back integrally where noted on Drawings with the tops radiused from horizontal. Bond splash backs to particleboard core as with the tops to finished thickness of 19 mm (3/4″).

.4 Fabricate tops in lengths as previously specified and, where necessary to join in field, Provide field-welded joints properly ground and finished to a perfect, smooth surface indistinguishable from surrounding surfaces.

.5 Welding shall be by the Argon Arc process. Fillers, solders or spot-welding will not be permitted. Make welds continuous, crevice free, ground and polished to the original #4 satin finish. At right angle return tops, joints shall be mitred at 45o, and polishing and graining shall follow the 45 joint line.

.5 Stainless Steel Cabinet

.1 Stainless steel shall be Type 302 or Type 304 as required, non-magnetic, austenitic, chromium nickel, 18-8 alloy. Material shall be fully finished quality sheet with # 4 finish, using 180 grit to assure an even, smooth attractive finish on all interior and exterior surfaces.

.2 Gauges: Cabinet, outside door panels, steel shelves shall be 1.27 mm (18 ga); Inside door panel, outside drawer head, drawer body 0.95 mm (20 ga); table frames, aprons, tubing legs 1.59 mm (16 ga). Stainless steel tubing shall be commercially welded and ground.

.3 Provide flush faced construction. Exposed joints on fascia shall be flush welded, ground smooth and polished. Base cabinets doors and drawers shall be interchangeable without use of special tools.

.4 Provide single door cupboard, combination cupboard including door and drawer, drawer units, file drawer, double door cupboard and combination cupboard including multiple doors and drawers to suit design requirements.

.5 Sectionalized units shall have double wall drawer and door fronts incorporated into construction of cabinet. Bodies of units shall be of specified gauge, dieformed with channel shaped corner posts.

.6 Exposed sections of corner posts, rails and stiles shall be not less than 25 mm (1") wide. Where required to meet design requirements Provide exposed stiles between doors and drawers at points where necessary for addition of strengths and flexibility. Provide also rails between top row of drawers and top rails. Doors and drawers shall close against bumbpers and shall so installed that doors and drawers shall fit flush with face of cabinets.

.7 Removable channel door strikes shall be attached to sides of upright posts. Doors shall close against these rabbets. Removable backs shall engage in an off set and shall be held in position mechanically and shall be entirely removable without use of special tools. Back shall be flanged to ensure maximum rigidity.

.8 Bottom of cabinets shall be 1.27 mm (18 ga) and shall be coved at sides. Construction shall make bottom and top space one continuous piece and shall also be closed underneath toe space.

.9 Bottoms shall be securely welded in place at all points to ensure rigidity. Loose bottoms shall not be permitted. All such units shall incorporate 100 mm (4") high and 75 mm (3") deep toe space and shall be formed continuous with bottom of cabinet. Each cabinet section shall be fitted with 4 corner gusset plates welded in place and, shall be provided with adjustment bolts. Each gusset shall be die-formed to insure maximum rigidity. Glides or bolts previously indicated shall insure easy handling when moving during installation, as well as for adjustment. In bottom of cabinet and above each bolt, there shall be a 25 mm (1") hole. Hole shall be fitted with a chromium-plated button closure cover. This shall enable installation of cabinet entirely from within unit, by use of a screwdriver.

.10 Where 100 mm (4") masonry bases are furnished, toe-space section of cabinet is then deleted and body of cabinet is set directly onto masonry base.

.11 Where square tube leg supports are furnished, base of each leg shall be provided with an adjustment device similar to base cabinets and then provided with a protective rubber or stainless steel shoe. Upper portion of leg shall fit into a formed gusset and then be securely bolted in place.

.6 Basic Cabinet Construction:

.1 Materials and Thicknesses: Use following minimum steel thicknesses for furniture manufacturing:

.2 1.519 mm (16 ga) for tubular rails and legs for tables.

.3 1.519 mm (16 ga) drawer slides and side suspension channels.

.4 1.214 mm (18 ga) for cabinet sides, vertical and horizontal front members, service cover panels, table and kneehole frames, front rails, gusset plates and gable legs.

.5 0.912 mm (20 ga) for drawer fronts, false panels, door fronts, cabinet floors and back panels, shelves, bottoms and sides of drawers, back of drawer bodies, drawer dividers, and closing panels, furring and filler panels, bin bodies, follow block spacers and pull-out shelves.

.6 0.759 mm (22 ga) for backs of drawer fronts and back of doors.

.7 Basic Cabinet Frame:

.1 Spot-weld cabinet frames into a rigid modular case construction.

.2 Provide "HAT" shaped channels installed at rear vertical corners and at centre and third points respectively on 457 mm, 610 mm, 914 mm, 1219 mm and 1473 mm (18″, 24″, 36″, 48″ and 58″) frames, pre-punched to receive drawer suspension tracks and shelf clips.
.3 Provide 1-piece die-formed cabinet construction with return flanges turned up. Spot weld flanges to cabinet sides.
.4 Use electro spot-welding for cabinet construction to form a strong well-fitted, 1-piece unit.
.5 Exposed horizontal structural cabinet members between doors and drawers are unacceptable.

.8 Base Cabinet Components:
.1 Provide removable back panels for cupboard section of base cabinets. Provide back panels and security panels on cabinets requiring locks.
.2 Shelving Edges: Turned down on all 4 sides 25 mm (1″) and returned under on front and back 16 mm (5/8″).
.3 Fabricate doors of 2 telescoping metal panels, coated internally with an acceptable laminated sound-deadening material extending continuously full-width and top to bottom. Reinforce hinged side of door adequately with cold formed steel components to insure firm fastening and to prevent sagging. Secure recessed hinges in place, and Provide positive door closer by nylon roller friction catches, mounted at a central location on the vertical height of pull side of doors. Provide each hinged door with black PVC flush fitting pull and 2 rubber bumpers.
.4 Ensure doors, drawers, tracks and back panels are interchangeable in the field without requiring special tools.

2.4 FINISHES

.1 Factory Finishing: Defer only final touch up, cleaning, and polishing until after installation. As far as practical, ensure casework is factory finished unless otherwise indicated or unavoidable:
.1 Apply finishes in accordance with AWS Section 5.
.2 Transparent Wood Finishing:
.1 Exposed parts: AWS System – 5, Varnish, Conversion or System – 7, Vinyl, Catalyzed.
.2 Semi-Exposed parts: AWS System – 5, Varnish, Conversion or System – 7, Vinyl, Catalyzed.
.3 Staining: Match *Consultant*'s sample
.4 Sheen: Flat in accordance with ASTM D523.

.2 Field Touch-Up: Field touch-up is responsibility of installing trade. Architectural woodwork manufacturer is responsible for factory finishing. Field touch-up includes filling and touch-up of exposed job-made nail and screw holes, refinishing of raw surface resulting from job fitting, repair of job-inflicted scratches and mars and final cleaning up of finished surfaces.

2.5 FABRICATION

.1 Fabricate joints accurately fitted, coped where possible, and well glued

up. Fabricate joints mitred to perfect fit and alignments carefully matched.

.2 Fabricate finished woodwork in 1 piece where possible. Fabricate running members in the longest lengths obtainable.

.3 Fabricate to conceal fastenings.

.4 *Provide* plastic laminate *Work* in shop in accordance with ANSI/NEMA. LD3. *Provide* backer sheets to panels to ensure balance.

.5 *Provide* metal laminate *Work* in shop in accordance with ANSI/NEMA. LD3, Annex A. *Provide* backer sheets to panels to ensure balance.

.6 Fabricate exposed gables to match the required exposed finishes.

.7 Exposed wood construction:
- .1 Fabricate joints carefully matched for grain and colour.
- .2 Fabricate millwork with slow fed machines free from sticker and/or sander markings, with sections and moulding *Work* cut accurately to profiles.
- .3 Sandpaper woodwork, smooth removing burrs, feathers, sleeves, raised grain and sharp arises and leave exposed surfaces perfectly clean and smooth ready for finishing.
- .4 *Provide* edges noted to be solid, as minimum 6 mm (1/4") thick wood to match exposed veneer to visible and semi-exposed edges, glued to core prior to application of face veneers. *Provide* plastic laminate or elastomeric edges to plastic laminate work visible or semi-visible edges.

.8 Countertops:
- .1 Fabricate and assemble countertops and backsplashes in shop to profiles and lengths required.
- .2 Fabricate cutouts for services penetrations as required.
- .3 Verify governing dimensions before fabricating items which abut wall surfaces.
- .4 *Provide* cutouts required and round internal corners, chamfer edges and seal exposed core.
- .5 *Provide* sidesplashes at abutting ends of counters and at adjoining walls, where indicated.
- .6 *Provide* a 6 mm (1/4") drip groove approximately 13 mm (1/2") in from the underside edge.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.

.2 Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Wood Surface Preparation for Finish:
.1 Verify and determine wood species, grain direction and structure, properties of finish, application method and exposure to elements. Check moisture content to avoid movement of wood caused by expansion and contraction due to changes in moisture content. Verify grain cut as it may interfere with adhesion of finish.
.1 Apply wood finishing *Product* in following order and as needed for specific appearance and application specified herein. Sanding sealer to control penetration of subsequent coats to create more uniform finish. Stain to colour wood and highlight grain for final finish. Filler to fill pores of wood and control penetration of subsequent coats. Apply filler across grain forcing it into pores followed with rubbing and sanding when dried. For staining requirements mix stain with filler before applying for uniform finish. Finish coats to provide protection to wood.

.2 Wood Surface Preparation for Finish:
.1 Verify and determine wood species, grain direction and structure, properties of finish, application method and exposure to elements. Check moisture content to avoid movement of wood caused by expansion and contraction due to changes in moisture content. Verify grain cut as it may interfere with adhesion of finish.
.1 Apply wood finishing *Product* in following order and as needed for specific appearance and application specified herein. Sanding sealer to control penetration of subsequent coats to create more uniform finish. Stain to colour wood and highlight grain for final finish. Filler to fill pores of wood and control penetration of subsequent coats. Apply filler across grain forcing it into pores followed with rubbing and sanding when dried. For staining requirements mix stain with filler before applying for uniform finish. Finish coats to provide protection to wood.
.2 Woodwork for Clear Finish or Stain:
.1 Sand smooth all woodwork to be finished using 150 grit paper followed by a second sanding using 220 grit paper and clean surfaces free of dust using brush, compressed air or tack rags before applying first coat. Abrade surfaces with stiff brush to remove loose fibers and splinters. Fill nail holes, splits and scratches with non-shrinking filler tinted to match local grain condition after first coat is dry. Sand lightly between coats with No. 220 sandpaper and remove dust.
.3 Wood Surface Preparation for Opaque Coating:
.1 Seal knots and sapwood in surfaces to receive paint with alcohol-based primer-sealer. Seal door edges. Sand smooth rough surfaces of woodwork to be finished using 150 grit paper followed by a second sanding using 220 grit paper. Sand in direction of grain. Clean surfaces free of dust before applying first coat using brush, compressed air or tack rags. Fill nail holes, splits and scratches with non-shrinking filler after

first coat is dry. Remove salt deposits that may appear on wood surfaces treated with fire retarder.

.2 Prepare plywood surface by removing dirt and debris. Fill screw and nail holes or minor imperfections with recommended filler and sand properly to receive finish coating. Plywood requiring stained or painted finish shall be primed with top quality alkyd primer. Use only penetrating quality stain over plywood.

.3 Woodwork for Clear Finish or Stain: Sand smooth all woodwork to be finished using 150 grit paper followed by a second sanding using 220 grit paper and clean surfaces free of dust using brush, compressed air or tack rags before applying first coat. Abrade surfaces with stiff brush to remove loose fibers and splinters. Fill nail holes, splits and scratches with non-shrinking filler tinted to match local grain condition after first coat is dry. Sand lightly between coats with No. 220 sandpaper and remove dust.

.4 Remove salt deposits that may appear on wood surfaces treated with fire retarder.

.5 Ensure resilient flooring under millwork cabinets are provided prior to proceeding work of this Section unless indicated otherwise.

3.3 INSTALLATION

.1 *Install Work* of this Section in accordance with corresponding product section of the AWMAC AWS.

.2 Grade: Install woodwork to comply with requirements for grade specified herein for fabrication of type of woodwork involved.

.3 Assemble woodwork and complete fabrication at site to comply with requirements for fabrication specified herein and to extent that it was not completed in shop.

.4 *Install* woodwork level, plumb, true, and straight. Shim as required with concealed shims. *Install* level and plumb (including tops) to a tolerance of 3 mm in 2400 mm (1/8" in 8'-0").

.5 Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

.6 Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

.7 Cabinets: *Install* without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

.1 *Install* cabinets with no more than 3 mm in 2400 mm (1/8" in 8'-0") sag, bow, or other variation from a straight line

.2 Maintain veneer sequence matching of cabinets with transparent finish.

.3 Fasten wall cabinets through back, near top and bottom, at ends and not more than 400 mm (16") o.c. with No. 10 wafer-head screws sized for 25 mm (1") penetration into wood framing, blocking, or hanging strips.

.8 Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. *Install* countertops with no more than 3 mm in 2400 mm (1/8" in 8'-0") sag, bow, or other variation from a straight line.

.1 Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

.2 Secure backsplashes to tops with concealed metal brackets at 400 mm (16") o.c. and to walls with adhesive.

.9 Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

.10 *Provide Work* of this Section true and straight and securely fastened in place.

.11 Mitre exposed corners and butt joints.

.12 *Provide* plastic laminate countertops plumb and true, neatly scribed to adjoining surfaces.

.13 Thoroughly fix and anchor *Work* of this Section into position.

.14 Mechanical and Electrical Fittings:

.1 *Provide* openings required to accommodate mechanical and electrical fittings as part of the *Work* of this Section and *Provide* a core sealant to protect counter cores which are exposed to accommodate:

.1 Locate and *Install* lenses where indicated. Carefully align lenses, shown in continuous lines so that appear as straight lines. Mount lenses perfectly level or plumb. Lenses shall fit tightly without showing space or light leak between frame and lenses. Remove improperly installed lenses and re*Install* at no cost to *Owner*.

.2 mechanical services and fittings.

.3 washroom accessories.

.2 Mechanical and electrical fittings and services will be provided as part of the *Work* of 21, 22 23, 26, 27 and 28.

.15 Installation of Architectural Woodwork Hardware:

.1 *Install* architectural woodwork hardware in accordance with AWMAC AWS and manufacturer's requirements and templates. Adjust architectural woodwork hardware to provide smooth operation and ensure clearances are maintained. Repair damage to adjacent surfaces resulting from failure to conform to this requirement.

.2 *Provide* lubricants required and use in manner to ensure smooth

function of hardware consistent with manufacturer's recommendations.

.3 Verify fastening components are tightened securely. Align screws, bolts and similar fastenings such that relationship of screw head indentations, similar surfaces and slots are perpendicular to matching vertical or horizontal position when on same surface. Do not burr or otherwise mar edges of surfaces of hardware components. Repair defects caused by *Work* of this Section in an acceptable manner.

.16 Finishing:

.1 Prime unexposed surfaces including backs of fitments against walls and underside of fitments.

.2 Before priming, treat knots and sap streaks, with a coat of shellac and then prime with a wood primer.

.3 Shop finish natural finished wood surfaces.

3.4 CLEANING

.1 Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork.

.2 Adjust joinery for uniform appearance.

.3 Clean, lubricate, and adjust hardware.

.4 Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* solid polymer fabrications including but not limited to following:
  .1 shower bench
  .2 Shower threshold
  .3 Millwork countertop with non-integral sinks and coved backsplashes.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 Solid Polymer Surface (SPS): Nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

.2 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.
  .1 Pre-Installation Meetings:
    .1 Regulatory Requirement Review Meeting: *Provide* pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
      .1 environmental procedure requirements,
      .2 health, safety and emergency response procedure and policy requirements,
      .3 and security requirements;
    .2 Pre-construction Site Meeting:
      .1 Prior to start of work, arrange for *Project* site meeting of parties associated with work of this Section, including non-exhaustively *Subcontractor* performing work of trade involved, testing company's representative and

Contractor's *Consultants* of applicable discipline. *Consultant* may attend.

.2 Review *Contract Documents* to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
- .1 work included,
- .2 materials to be used,
- .3 storage and handling of materials,
- .4 installation of materials,
- .5 sequence and quality control,
- .6 *Project* staffing,
- .7 restrictions on areas of work and other matters affecting construction.

1.5 SUBMITTALS

.1 *Product Data*:
- .1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01. Ensure data sheets *Provide* required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. *Provide* adequate warning of maintenance practices or cleaning agents detrimental to specified materials.
- .2 Indicate *Product* description including solid polymer sheets and other applicable items illustrating full range of standard colours, fabrication information and compliance with specified performance requirements. Submit *Product Data* indicating resistance to list of chemicals.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials later designated by *Consultant*.

.3 *Shop Drawings*: Submit *Shop Drawings* in accordance with Division 01, indicating material characteristics, details of construction, connections and relationship with adjacent construction.
- .1 Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking including concealed blocking, and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid polymer fabrications.
- .2 Coordination *Drawings*: Submit coordination *Drawings* indicating plumbing and miscellaneous steel work indicating locations of wall (rated or non-rated), blocking requirements, recessed wall items and similar items.
- .3 Field Measurements: Take field measurements prior to preparation of *Shop Drawings* and fabrication to ensure proper fitting of work. Do not fabricate work unless *Shop Drawings* have been reviewed.

.4 Samples: Submit minimum 150 mm x 150 mm (6" x 6") samples in accordance with Division 01.Cut sample and seam together for representation of inconspicuous seam. Indicate full range of color and pattern variation.

.5 Test and Evaluation Reports:
.1 Submit flammability test reports confirming material compliance with requirements of ASTM E84, and CAN/ULC S102-M.
.2 Submit food preparation zone test certifications confirming compliance with NSF/ANSI 51 for following food zones: all food types.

.6 Operation and Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. *Provide* commercial care and maintenance kit and video. Review maintenance procedures and warranty details with *Owner* upon completion. Include information in *Project* closeout documents.

1.6 QUALITY ASSURANCE

.1 Qualifications: *Provide* Work of this Section executed by competent installers with minimum 5 years' experience in application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers. Ensure fabricators and installers are approved by solid polymer manufacturer.

.2 Mock-ups:
.1 Prior to final approval of *Shop Drawings*, erect 1 full size Mock-up of each component at *Project* site demonstrating quality of materials and execution for *Consultant* review. Rework or remake rejected Mock-ups until approval is granted. Remove rejected units from *Project* site.
.2 Approved Mock-up will be used as standard for acceptance of subsequent work and may remain as part of finished work if undisturbed at time of Substantial Performance.

.3 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver no components to *Project* site until areas are ready for installation. Store components indoors prior to installation.

.2 Storage and Handling Requirements: Handle materials to prevent damage to finished surfaces. *Provide* protective coverings to prevent physical damage or staining following installation for duration of Project.

1.8 WARRANTY

.1 Warrant work of this Section for period of 10 years against defects and deficiencies in accordance with General Conditions of the *Contract.*

Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 Solid Polymer Fabrications:
- .1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
  - .1 DuPont; www.dupont.com
  - .2 Hanex; www.hanwhasurfaces.com
  - .3 Wilsonart Canada; www.wilsonart.com
  - .4 LG Hausys; www.lghausys.com
- .2 Substitution Limitations: This specification is based on DuPont's *Products*. Comparable *Products* from manufacturers listed herein will be accepted provided they meet requirements of this specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Ensure materials used comply with requirements of ASTM E84, and CAN/ULC S102-M as follows:
  - .1 Flame Spread: <25
  - .2 Smoke Developed: <25
- .2 Ensure materials used comply with use in food preparation zones and conform to requirements of NSF/ANSI 51 for following food zones: all food types.

.2 Solid Polymer Surfaces Performance Requirements:
- .1 *Provide* cast, nonporous, filled polymer fabrications, not coated, laminated or of composite construction with through body colours meeting referenced standards and having minimum physical and performance properties as specified herein.
- .2 Ensure surfaces do not prevent use of electronic devices that function with optical or tactile sensors.
- .3 Ensure superficial damage to a depth of 0.25 mm (0.010") is repairable by sanding and polishing.
- .4 Mechanical and Structural Properties:
  - .1 Tensile Strength: 6000 psi min. per ASTM D638
  - .2 Tensile Modulus: 1.5 x 10^{-6} psi min. per ASTM D638
  - .3 Flexural Strength: 10000 psi min. per ASTM D790
  - .4 Flexural Modulus: 1.2 x 10^{-6} psi min. per ASTM D790
  - .5 Elongation: 0.4% min. per ASTM D638
  - .6 Hardness: >85-Rockwell "M" scale min. per ASTM D785; 56-Barcol Impresser min per ASTM D2583
  - .7 Thermal Expansion: 3.02 x 10^{-5} in/in/deg C. max. per ASTM D696
    1.80 x 10^{-5} in/in/deg F. max.

.8 Color Stability: No change,100 hours min. per ANSI/NEMA LD3
.9 Gloss (60 Gardner): 5–75 (matte—highly polished) per ANSI Z124
.10 Light Resistance: (Xenon Arc) No effect, NEMA LD 3-2000 Method 3.3
.11 Wear and Cleanability: Passes per ANSI Z124.3 & ANSI Z124.6
.12 Abrasion Resistance: No loss of pattern max. per ANSI/NEMA LD3. Weight loss (1000cycles) =0.9g per ANSI Z124.3
.13 Boiling water Surface Resistance: No Change per NEMA LD3, Method 3.5
.14 High Temperature Resistance: No Change per NEMA LD3, Method 3.6
.15 Impact Resistance: Izod Impact (Notched Specimen): 0.28 ft.-lbs/in. Of notch per ASTM D256, Method A
.16 Gardner: 9.0 ft-lbs min per ASTM D5420
.17 Ball Impact Resistance Sheets:
.1 1/4" sheet: 36" min, 1/2 lb ball, no failure per NEMA LD3, Method 3.8
.2 1/2" sheet: 144" min, 1/2 lb ball, no failure per NEMA LD3, Method 3.8
.18 Stain Resistance: Passes per ANSI Z124.3
.19 Weatherability: E^*_{94}<5 in 1,000 hrs 1000 hours per ASTM D1499
.20 Fungi and Bacteria Resistance: Does not support microbial growth per
STM G21 & GREENGUARD, Microbial Resistance Program
.21 Specific Gravity: 1.7 min
.22 Water Absorption Weight (% max.) Long Term (per ASTM D570): 0.4% (3/4"), 0.6% (1/2"), 0.8% (1/4")
.23 Gloss Level: Matte or Semi-gloss.
.24 Static Coefficient of Friction: Where uses as flooring materials, ensure solid polymer surfaces are stable, firm and slip resistant. Ensure slip resistant surfaces provide sufficient frictional counterforce to forces exerted in walking in order to permit safe ambulation. Provide Products with the following minimum values as determined by ASTM C1028 unless otherwise indicated:
.1 Level Surfaces: Minimum 0.6.
.2 Ramp Surfaces: Minimum 0.8.

2.3 MATERIALS

.1 Solid Polymer Fabrications (SPS-1): Homogeneous sheets composed of minimum 30% acrylic resin (Polymethyl Methacrylate) and +/- 70% blend of natural minerals meeting ANSI Z124.3 &.6, Type 4 and Fed. Spec. WW-P-541E/GEN. Solid polymer fabrications containing blends with polyester-based materials are not acceptable. Ensure material has minimum physical and performance properties as specified herein. *Provide* solid polymer fabrications complete with following materials as recommended by *Product* manufacturer:
.1 Joint Adhesive: Manufacturer's standard 2-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.
.2 Panel Adhesive for Tub and Shower Systems: Manufacturer's recommended standard neoprene-based panel adhesive meeting ANSI A136.1. UL® listed, Greenguard Certified.

.3 Adhesive for Bonding to Other *Products*: One component silicone as recommended by *Product* manufacturer conforming to ASTM C920.

.4 Sealant: Manufacturer's standard mildew-resistant, FDA/UL® and NSF/ANSI 51 compliant, recognized silicone sealant in color matching components or clear formulations.

.5 Conductive Tape: Manufacturer’s standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

.6 Insulating Felt Tape: Manufacturer’s standard for use with conductive tape in insulating solid polymer material from adjacent heat source.

.2 Veneer Core (Plywood) at Countertops: Douglas Fir, CSA O121-M, Exterior Grade. *Provide* for countertop cores to be installed and at other locations indicated on *Drawings* to meet design requirements.

2.4 COMPONENTS

.1 Miscellaneous Custom Specialty Solid Polymer Fabrications: Custom fabricated solid polymer horizontal and vertical surfaces with inconspicuous seams and edge details as specified herein and as indicated on *Drawings*. Colour: To be selected by *Consultant* at a later date from manufacturer’s full colour range of Price Group C. Finish: Matte

.2 Countertops and Work Surfaces:

.1 Countertops: 13 mm (1/2") thick solid polymer solid surfacing material fabricated to desired profiles and sizes having edge details, back splash and end splashes as indicated on *Drawings*, if applicable. *Provide* items conforming to ANSI Z124.6, Type 4.

.2 Colour: To be selected by *Consultant* at a later date from manufacturer’s full colour range of Corian’s price line B or approved equivalent.

.3 Finish: Matte.

.4 Core and Supports: As specified herein.

2.5 FABRICATION

.1 Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved *Shop Drawings* and solid polymer manufacturer requirements. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints. Reinforce with strip of solid polymer material 50 mm (2") wide. *Provide* factory cutouts for plumbing fittings and bath accessories as indicated on *Drawings*.

.2 Thermoform corners and edges to shapes and sizes indicated on *Drawings*, prior to seaming and joining. Front faces shall have micro bevel edges. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.

.3 Ensure no blistering, whitening and cracking of components during forming.

.4 Form backsplashes from solid surfacing material with radius cove where counter and backsplashes meet as indicated on *Drawings*.

.5 Form joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 100 mm (4") wide reinforcing strip of solid polymer material under each joint.

.6 *Provide* holes and cutouts for plumbing and bath accessories as indicated on *Drawings*.

.7 Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate Work.

.8 Finish: *Provide* surfaces with uniform finish:
.1 Matte: gloss rating of 5 - 20.
.2 Semi-gloss: gloss rating of 25 - 50.
.3 Polished: gloss rating of 55 - 80.

.9 Allowable Tolerances:
.1 Variation in Component Size: ± 3 mm (1/8").
.2 Location of Openings: ± 3 mm (1/8") from indicated location.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

.2 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing Work.

.3 Examine cabinets upon which countertops are to be installed. Verify cabinets are level to within 3 mm in 3 m (1/8" in 10' - 0").

.4 Notify *Consultant* in writing of any conditions which would be detrimental to installation. Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

.1 *Install* components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed *Shop Drawings* and *Product* installation details.

.2 Form field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished Work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints with solid polymer strips extending a minimum of 25 mm (1") on either side of seam with strip being same thickness as top. Cut and finish component edges with clean, sharp returns.

.3 Route radii and contours to template. Anchor securely to base component or

other supports. Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match Work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

.4 *Install* countertops with no more than 3 mm (1/8") sag, bow or other variation from a straight line.

.5 Seal joints between wall and components with joint sealant as specified herein and in Section 07 92 00, as applicable.

.6 *Provide* backsplashes and end-splashes as indicated on *Drawings*. Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on reviewed *Shop Drawings*. Where indicated, *Provide* CNC-cut rebates for coved backsplashes and side-splashes at walls and adjacent millwork. Do not attach backsplashes and side splashes to countertops with sealants unless specifically noted herein.

.7 Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on reviewed *Shop Drawings*. Adhere to countertops using manufacturer's standard color-matched joint adhesive.

.8 Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean and free of defects at Substantial Performance of *The Work*.

.9 Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean and free of defects at Substantial Performance of *The Work*.

.10 Coordinate connections of plumbing fixtures with Division 22 and ensure fittings and accessories are provided by Division 22.

3.3 ADJUSTING AND CLEANING

.1 Replace damaged Work which cannot be repaired to *Consultant*'s satisfaction. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's instructions.

.2 Clean surfaces in accordance with manufacturer's care and maintenance instructions.

3.4 SCHEDULE

.1 Solid Polymer Shower Bench: Surfaces of material adhesively joined with inconspicuous seams. *Provide* following thicknesses and finish:
- .1 Vertical Thickness: Minimum 12 mm (1/2") thick
- .2 Edge Details: Waterfall
- .3 Finish: Matte

.2 Solid Polymer Shower Threshold: Surfaces of material adhesively joined with inconspicuous seams. *Provide* following thicknesses and finish:
- .1 Vertical and Horizontal Thickness: as indicated on Drawings.

.2 Edge Details: Beveled as shown on drawings
.3 Slope: As indicated on Drawings.
.4 Finish: Matte.

.3 Countertops at general areas: Surfaces of material adhesively joined with inconspicuous seams. *Provide* following thicknesses and finish:
.1 Vertical Thickness: Minimum 12 mm (1/2″) thick
.2 Horizontal Thickness: Minimum 12 mm (1/2″) thick
.3 Edge Details: Waterfall
.4 Finish: Matte
.5 Backsplash: Radius coved with inconspicuous seams
.6 Sidesplash: Radius coved with inconspicuous seams

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* general installations including but not limited to following:
  .1 installation of hollow metal doors and frames.
  .2 spot grouting of door frames in gypsum board partitions.
  .3 installation of flush wood doors.
  .4 installation of finish hardware.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.
.8 electrical roughing in and other preparatory work performed by other trades.
.9 sequence of operation of each type of electrified door hardware.
.10 construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
.11 required testing, inspecting and certifying procedures.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

1.6 QUALITY ASSURANCE

.1 Installers: *Provide* work of this Section executed by competent installers with minimum 5 years’ experience in the application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Product*s of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 ChemRex Inc.; www.chemrex.com
- .2 CPD Construction *Product*s; www.cpd.ca
- .3 Euclid Admixture Canada Inc.; www.euclidchemical.com
- .4 Sika Canada Inc.; www.sikacanada.com
- .5 W.R. Meadows of Canada; www.wrmeadows.com

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Ensure fire rated doors and frames are listed and labeled for ratings specified and noted by organization accredited by the Standard Council of Canada in conformance with CAN4-S104 and CAN4-S105, NFPA 80 and NFPA 252.
- .2 Ensure doors and frames are labeled at manufacturing plant by means of metal tags or embossing. Site applied and stamped fire-labelling is not acceptable
- .3 Ensure Product quality meets standards set by Canadian Steel Door Manufacturers Association (CSDMA).

.2 Performance Requirements:
- .1 *Install* fire rated doors in accordance with NFPA 80.

2.3 MATERIALS

.1 Doors, Frames and Hardware: Refer to following Sections for *Product*s to be installed as part of the work of this Section:
- .1 Section 06 40 00, Architectural Woodwork.
- .2 Section 08 11 13, Steel Doors and Frames.
- .3 Section 08 14 16, Flush wood Doors.
- .4 Section 08 71 00, Finish Hardware.

.2 Spot Grout: Proportion when used at metal door frames; 1 part hardwall plaster to not more than 2-1/2 parts Perlite by weight, with enough water added for `hand pack' consistency and/or use Gyproc 90 by Georgia-Pacific Canada, Inc. or Durabond 90 by CGC Inc.

.3 Batt Insulation: Preformed gall fibre or rockwool batt or roll insulation, conforming to CAN/ULC-S702, “QuietZone Acoustical Batts” by Owens Corning Canada Inc., “Roxul AFB - Acoustical Fire Batts” by Roxul Inc., “Fibrex Sound Attenuation Batt (SAFB) Insulation” by Fibrex Insulations Inc. or “Thermafibre Sound Attenuation Blankets” by CGC Inc., of type, minimum thickness, width to suit metal framing spacing and other miscellaneous spacings as indicated on *Drawings*.

.4 Threshold Sealant: As recommended by installer in accordance with Section 07 92 00.

PART 3 -EXECUTION

3.1 FIRE LABELED DOORS AND FRAMES

.1 *Install* fire labeled doors and frames in accordance with manufacturer's printed instructions and NFPA 80.

.2 Verify labeled doors and frames are placed in their designated openings. Review, inspect and certify where required by authorities having jurisdiction.

3.2 HOLLOW METAL DOORS

.1 *Install* hollow metal doors in accordance with manufacturer's instructions.

.2 *Install* in accordance with following edge clearances unless otherwise indicated:
- .1 Between doors and frames at head and jambs: 3 mm (1/8") maximum.
- .2 Between meeting edges of pairs of doors: 3 mm (1/8") maximum.
- .3 At door bottom:
  - .1 For non rated doors: 19 mm (3/4") maximum to unfinished floor, 16 mm (5/8") maximum to finished floor unless indicated to be undercut;
  - .2 For fire rated doors: 6 mm (1/4") and not more than 3 mm (1/8") at the sides and top.

3.3 HOLLOW METAL FRAMES

.1 *Install* hollow metal frames in accordance with manufacturer's instructions.

.2 Set frames plumb, square, level and at correct elevation, maintaining uniform door width and height.

.3 Secure anchorages and connections to adjacent construction.

.4 Brace frames rigidly in position while being built in. *Provide* vertical supports and horizontal spreaders to prevent deflection and warping.

.5 Allow for deflection to prevent structural loads from being transmitted to frame.

.6 *Provide* batt insulation to completely fill pressed steel frames of exterior doors and adjacent cavities.

.7 Spot Grouting:
- .1 Coordinate spot grouting with Section 09 21 16.
- .2 *Provide* spot grout to increase rigidity of frame and improve resistance to frame rotation caused by weight of door.
- .3 Comply with manufacturer’s recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.
- .4 Mix grout in accordance with ASTM C305 requirements.
- .5 Spot grout at strike and hinge side jambs at steel door frames set in gypsum board partitions, walls and other similar locations in accordance with manufacturer’s recommendations. Spot grout at strike jamb anchor clips shall be after stud is installed but before gypsum boards are erected. Grouting compound shall be applied before face

layer is inserted to securely adhere boards to frame. Immediately insert gypsum panels into jamb and attach to framing. Do not terminate gypsum board against trim.

.6 Do not use pumped slurry method to perform spot grouting.

3.4 FLUSH WOOD CORE DOORS

.1 *Install* flush wood doors in accordance with manufacturer's instructions.

.2 *Install* in accordance with following edge clearances unless otherwise indicated:

- .1 Between doors and frames at head and jambs: 3 mm (1/8") maximum.
- .2 Between meeting edges of pairs of doors: 3 mm (1/8") maximum.
- .3 At door bottom:
  - .1 For non rated doors: 19 mm (3/4") maximum to unfinished floor, 16 mm (5/8") maximum to finished floor unless indicated to be undercut;
  - .2 For fire rated doors: 6 mm (1/4") and not more than 3 mm (1/8") at the sides and top.
- .4 Cut, drill and prepare doors to template to receive hardware.
- .5 Drill pilot holes before installing hinges. Check and verify with screw manufacturers’ recommendations for size of pilot holes required.

3.5 FINISH HARDWARE

.1 *Install* hardware to doors and frames in accordance with manufacturer's packaged installation, template, and adjusting instructions.

.2 Adjust hardware to *Provide* smooth operation of doors and ensure clearances are maintained. *Provide* lubricants to allow smooth function of hardware consistent with manufacturer's recommendations.

.3 Mount hardware at heights in accordance with the "Recommended Locations for Builder's Hardware" by the Door and Hardware Institute (DHI) except as otherwise indicated on the Documents or required by the authorities having jurisdiction.

.4 *Install* door louvres and frame bumpers.

.5 Tighten fastening components snugly. Do not burr or otherwise mar the edges of surfaces of hardware components. Repair defects resulting from work of this Section in accordance with *Consultant*'s review.

.6 Set exterior door thresholds in a continuous bed of sealant to prevent water and air intrusion beneath the sill.

.7 Unless otherwise indicated, mounting heights for door hardware is as follows:

- .1 Locksets - 1023 mm (40-5/16") from floor to centre line of knob.
- .2 Deadlocks - 1524 mm (60") from floor to centre line of cylinder.
- .3 Panic Bolts - 1023 mm (40-5/16") from floor to centre line of bar.
- .4 Pulls - 1041 mm (41") from floor to centre line of pull.
- .5 Push Plates - 1143 mm (45") from floor to centre line of plate.

.6 Guard Bars - 1066 mm (42") from floor to centre line of bar.

.8 *Provide* locked room for storage of finish hardware at the job site and a person responsible for control and distribution of finish hardware.

3.6 SITE QUALITY CONTROL

.1 Site Tests and Inspections: *Owner* reserves the right to inspect at random edge finishing of field-cut flush wood core doors.

.2 Non-Conforming Work: Replace damaged work and/or non-conforming work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of *Consultant* at no cost to *Owner*.

3.7 ADJUSTING AND CLEANING

.1 Check and readjust operating hardware items immediately before final inspection. Remove and replace defective work, including doors and frames that are warped, bowed, or otherwise unacceptable.

.2 Clean grout and other bonding material off detention doors and frames immediately after installation. Carefully wipe clean doors of dust created due to work of this Project.

.3 Touch-ups: Immediately after erection clean and repair surfaces in accordance with manufacturer's written instructions

.4 Verify and adjust each door to ensure proper operation.

.5 Carefully wipe clean doors of dust created due to work of this *Project*.

.6 Replace defective doors as directed by *Consultant*.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* dampproofing including but not limited to following:
  .1 dampproofing.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by Consultant.

1.5 QUALITY ASSURANCE

.1 Installer’s Qualifications: *Provide* the work of this Section, executed by competent installers with minimum of 5 years’ experience in the application of *Products*, systems and assemblies specified, and with the approval and training of the *Product* manufacturers.

1.6 SITE CONDITIONS

.1 Environmental Requirements:
  .1 Do not proceed with work when wind chill effect would tend to set bitumen before proper curing takes place.

.2 Do not apply dampproofing in wet weather.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 Henry Company of Canada; www.henry.com
- .2 Tremco; www.tremco.com
- .3 W.R.Meadows; www.wrmeadows.com

2.2 DESCRIPTION

.1 Performance Requirements:
- .1 Multiple layer application shall control absorption and migration of moisture.
- .2 Apply membrane even to control hydrostatic pressure and act as dampproofing to concrete or masonry substrates.
- .3 Cured coating shall be stable, ductile and shall be impervious to sustained contact with water

2.3 MATERIALS

.1 Asphalt for Temperature at or above 5 deg C (41 deg F): Mineral colloid asphalt emulsion, CAN/CGSB-37.2-M, 700-01 by Henry Company Canada..

.2 Asphalt for Temperature Below 5 deg C (41 deg F): Asphalt cutback unfilled, CGSB 37-GP-6Ma, 710-07 by Henry Company Canada

.3 Reinforcing Membrane: Open weave glass fabric yarn saturated with synthetic resins, bright yellow, 990-06 Yellow Jacket by Henry Company Canada.

.4 Primer: As recommended by dampproofing manufacturer.

.5 Elastomeric Sheet Waterproofing: Refer to Section 07 13 53.

PART 3 -EXECUTION

3.1 APPLICATION

.1 Apply primer at a rate recommended by manufacturer.

.2 Apply dampproofing to all parged surfaces of foundation walls extending from 50 mm (2") below grade level to toe of footing.

.3 At temperature of 5 deg C (41 deg F) and above, apply mineral colloid asphalt emulsion to CAN/CGSB-37.3-M, at rate of 0.5 L/m2 (0.01 gal/sf) for each of 2 coats.

.4 At temperatures below 5 deg C (41 deg F), apply primer at the rate of 0.44

m2 (0.008 gal/sf) followed by 2 coats of asphalt cut back unfilled at the rate of 0.54 m2 (0.01 gal/sf) each.

3.2 APPLICATION - HIGH-BUILD SYSTEM

.1 Apply fabric reinforcing into coat of dampproofing not less than 1 L/m2. Brush reinforcing into place to eliminate wrinkles, air pockets or blisters and obtain full contact.

.2 Overlap reinforcing at least 50mm at all joints. At all corners and angles reinforce with two extra coats of dampproofing and two plies of reinforcing fabric at least 100mm each side of the junction.

.3 Apply seal coat of dampproofing over the whole area at not less than 1 L/m2.

3.3 ACCESSORIES

.1 Allow dampproofing to thoroughly dry and apply protection board or drainage board layer prior to commencing backfill.
.1 Adhere protection board and drainage board with adhesive in a spot adhered pattern 150mm o.c.

.2 Obtain Consultant's approval before permitting backfilling.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the ***Contract;***
  .2 Division 1 requirements and documents referred to therein

1.2 SUMMARY

.1 ***Work*** Included: ***Provide*** underslab vapour retarder including but not limited to following:
  .1 plastic underslab vapour retarder,
  .2 pipe boots.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 hospital health, safety and emergency response procedure and policy requirements,
    .3 infection prevention and control requirements;
    .4 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
      .1 work included,

.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for ***Project*** in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

1.6 QUALITY ASSURANCE

.1 Installer's Qualifications: ***Provide*** work of this Section executed by competent installers with minimum 5 years' experience in the application of ***Products***, systems and assemblies specified and with approval and training of the ***Product*** manufacturers.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to the site in manufacturer's original, unopened

containers, with labels and seals intact.

.1 Store materials in a clean dry area in accordance with manufacturer's instructions.

.2 Stack membrane on smooth ground or wood platform to eliminate warping.

.3 Protect materials during handling and application to prevent damage and/or contamination.

1.8 SITE CONDITIONS

.1 Ambient Conditions:

.1 ***Product*** is not intended for uses subject to abuse or permanent exposure to the elements.

.2 Do not apply on frozen ground

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

.1 Carlisle Coatings & Waterproofing ; www.carisle-ccw.com

.2 Grace Construction Products; www.graceconstruction.com .

.3 Stego Industries, LLC; www.stegoindustries.com

.4 W.R. Meadows of Canada; www.wrmeadows.com

2.2 DESCRIPTION

2.3 MATERIALS

.1 Plastic Underslab Vapour Retarder: Sheet membrane, underslab vapour retarder, minimum 0.38 mm (15 mils) thick; complete with manufacturer's approved tape ***Product*** for joints.

.1 Ensure vapor retarder meets or exceeds all requirements of ASTM E1745, Class A and has following characteristics:

.1 Water vapour permeance (ASTM E96 or ASTM F1249): ≤0.01 perms.

.2 Puncture resistance (ASTM D1709): ≥2,200 grams.

.3 Tensile strength (ASTM E154): ≥68 lbs force/inch.

.2 Acceptable ***Products***:

.1 "Preprufe 300r Waterproofing Menbranes" by Grace Construction Products; www.graceconstruction.com

.2 "Perminator" by W. R. Meadows of Canada ; www.wrmeadows.com

.3 "Blackline 400" by Carlisle Coatings and Waterproofing; www.carisle-ccw.com

.4 "Stego® Wrap" Vapor Barrier" by Stego Industries, LLC; www.stegoindustries.com

.3 Seam Tape: High density, polyethylene tape with pressure sensitive adhesive for joints. Minimum width 100 mm (4"). Acceptable ***Products***:

.1 "Preprufe Tape" by Grace Construction Products,

.2 "Perminator Tape" by W.R. Meadows,

.3 "Monobond Tape" by Carlisle.

.4 "Stego Tape" by Stego Industries, LLC.

.2 Pipe Boots: Construct pipe boots from vapour barrier material and pressure sensitive tape, in accordance with manufacturer's instructions.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify ***Consultant*** in writing of any conditions which would be detrimental to the installation. Examine substrates designated to receive underslab vapour barrier membrane. Notify the ***Consultant*** if substrates are not acceptable to the installation of this work. Do not begin surface preparation or application until unacceptable substrates and/or conditions have been corrected.

.2 Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Surface Preparation: Prepare substrates in accordance with manufacturer's recommendations.

3.3 APPLICATION

.1 Installation shall be in accordance with manufacturer's recommendations, reviewed ***Shop Drawings*** and the requirements of ASTM E1643.

.2 Unroll membrane with the long dimension parallel with the direction of the concrete pour.

.3 Lap membrane over footings and seal to foundation walls.

.4 Overlap joints in membrane minimum 150 mm (6") and seal with tape.

.5 Seal all penetrations (including pipes) with pipe boots.

.6 No penetration of the membrane shall be permitted, except for reinforcing steel and permanent utilities.

.7 Repair damaged areas by cutting patches of membrane, overlapping damaged area minimum 150 mm (6") and taping all four sides.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: Provided elastomeric sheet waterproofing including but not limited to following:
  .1 elastomeric sheet waterproofing at locations indicated on drawings.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials later designated by Consultant.

.3 Samples: Submit sample of sheet membrane waterproofing material in accordance with Division 01.

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store materials in weathertight enclosure raised clear of the ground so they are protected from sunlight, weather exposure, moisture and deterioration.

.2 Comply with manufacturer's printed recommendations for handling of materials.

1.7 WARRANTY

.1 Warrant work of this Section against defects or deficiencies for period of 5 years. Promptly correct, at no expense to Owner and to satisfaction of Consultant, any defects or deficiencies which become apparent within warranty period.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and specifications:
- .1 Bakor Inc.; www.bakor.com
- .2 Carlisle Coatings and Waterproofing; www.carlisle-ccw.com
- .3 Cosella-Dorken Products Inc.; www.cosella-dorken.com
- .4 Grace Canada, Inc.; www.grace.com
- .5 Soprema Inc.; www.soprema.ca

2.2 DESCRIPTION

.1 Design and Performance Requirements:
- .1 Design: Vertical, self-adhering, bituminous sheet membrane waterproofing shall have minimum properties as follows:
  - .1 Tensile Strength, Membrane: Minimum 250 psi (1.7 MPa) in accordance with ASTM D412, Die C, modified.
  - .2 Ultimate Elongation: Minimum 300 percent in accordance with ASTM D412, Die C, modified.
  - .3 Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C) in accordance with ASTM D1970.
  - .4 Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3 mm) movement in accordance with ASTM C836.
  - .5 Puncture Resistance: Minimum 40 lbf (180 N) in accordance with ASTM E154.
  - .6 Water Absorption: Maximum 0.2 percent weight-gain after 48-hour immersion at 70 deg F (21 deg C) in accordance with ASTM D570.
  - .7 Water Vapour Permeance: Maximum 0.05 perms (2.9 ng/Pa x s x sq. m) in accordance with ASTM E96/E 96M, Water Method.
  - .8 Hydrostatic-Head Resistance: Minimum 200 feet (60 metres) in accordance with ASTM D5385.

.2 Extent of Waterproofing:
- .1 On exterior vertical face and full width of top of footings to all walls bordering basement floors.
- .2 Over entire area of base levelling slabs, turned up minimum of 50 mm

(2") above slab at all vertical surfaces; at horizontal surfaces at tunnel, at horizontal locations shown on Drawings, around pipes and drains extending through slabs; atop all interior footings against which base levelling slab abuts; at all changes in levels of such slabs and lapped over horizontal waterproofing to ensure watertight membrane.

.3 In angle between toe footing and outside face of all basement walls to which surface waterproofing is applied.

.4 In locations indicated on Drawings.

2.3 MATERIALS

.1 Vertical Application: Elastomeric Sheet Waterproofing (Type 1), Minimum 1.5 mm (60 mils), Composite preformed waterproofing membrane system consisting of a high density, cross laminated polyethylene sheet to which a factory controlled layer of adhesive consistency rubberized asphalt has been applied. Only specially formulated Products for low temperature application are permitted during cold weather.

.1 "Bituthene 3000" and "Bituthene Low Temperature Membrane System" by Grace Canada, Inc.

.2 "Colphene 3000" and “Elastocol Stick Primer” by Soprema Inc.

.3 “Blueskin WP200” and primer by Bakor Inc.

.4 “CCW-Mira Dri 861 and CCW Cav-Grip or 702 Primer by Carlisle Coatings and Waterproofing;

.2 Horizontal Application: Elastomeric Sheet Waterproofing (Type 2), At horizontal locations as above, but using following Products:

.1 Bituthene 5000 System: Bituthene P-3000 Primer or Bituthene Green Concrete Primer or Bituthene Low VOC Content Primer with Bituthene Deck Prep by Grace Canada, Inc.

.2 Colphene 1500 with Elastocol Stick Primer by Soprema Inc.

.3 Blueskin AG with Air Bloc 21 Adhesive by Bakor Inc.

.4 “Delta-thene 60 and Delta- Primer” by Cosella-Dorken Products Inc.

.3 Self-Adhering, Bituminous Sheet Membrane Waterproofing Tape: Selfadhering, rubberized-asphalt strips of same material and thickness as selfadhering, bituminous sheet membrane waterproofing

.4 Vertical and Horizontal Drainage Fabric: high impact, dimpled polystyrene drainage core and a non-woven, needle-punched filter fabric adhered to outward face of core;

.1 "Hydroduct Drainage Composite" by Grace Canada, Inc.,

.2 "Hitek Cordrain" by Burcan Industries Ltd.,

.3 “Sopradrain 10G” by Soprema Inc.,

.4 Delta-drain 6000” by Cosella-Dorken Products Inc

.5 Primer: As recommended by membrane manufacturer.

.6 Membrane Flashing: 1.2 mm (3/64") neoprene sheet membrane highly impermeable, black in colour by Lexcan Construction Products.

.7 Termination Bars: Continuous 3 mm (1/8”) thick x 1 inch (25 mm) wide AISI

Type 304 stainless steel bar, drilled at 8 inches (200 mm) on centres, for fastener fixing. AISI Type 304 stainless steel shall comply with ASTM A167, ASTM A276 and ASTM A666 as applicable.

.8 Protective Course:

.1 Vertical Surfaces and Horizontal Surfaces with No Vehicular Traffic: At Contractor's option:

.1 3 mm (1/8") thick, asphalt/mineral composite board,

.1 "Sealtight Vibraflex Type 70" by W.R. Meadows,

.2 "Globeglas Protection Board" by Bakor Inc.

.3 "Hydroflex 30" by Hydrotech

.2 min 2.4 mm (3/32") thick extruded polypropylene polyethylene copolymer

.1 "Hydro-Shield Protection Board" by Hydrotech,

.2 "PQ 2450" by Permaquick Asphalt Tech Corp.

.3 "990-31" by Bakor Inc.

.2 Ensure material selected is suitable for protection of waterproofing, regardless of type of granular material being installed against the boards.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Ensure horizontal concrete surfaces have a magnesium float finish or better, vertical surfaces have fins removed and honeycombing filled.

.2 Before commencing work, examine all areas and report in writing any conditions which would adversely affect waterproofing application.

.3 Ensure surfaces are clean, free of excessive dampness, frost, dust, laitance of loose concrete and films of oil, grease, curing compounds or other substances which could affect adhesion of membrane.

.4 Where tying into existing surfaces, review methods of achieving watertightness with Consultant, membrane manufacturer's technical representative prior to commencing work.

3.2 APPLICATION

.1 Priming:
- .1 Apply primer to concrete and masonry and other surfaces, as required. Allow to dry 1 hour or until tack free. Prime only areas to be covered by membrane within 24 hours. Re-prime surfaces not covered within 24 hours.
- .2 Apply primers at a rate of 1/2 gal/100 sq ft.
- .3 Form fillets at inside corners of walls/slabs with liquid membrane.

.2 At tie-in point, clean existing surfaces back 300 mm (12") from actual joint in structure and re-prime as necessary.

.3 Flashing and Corner Reinforcing:
- .1 Install flashing in 900 mm (36") widths. Bring flashing a minimum of 150 mm (6") onto deck and a minimum of 200 mm (8") up walls from finished elevation or as shown.
- .2 Stagger flashing and membrane seams.
- .3 Install flashing to protrusions, expansion joints, control joints, drains, junction with existing and the like. Bring flashing a minimum of 150 mm (6") onto membrane.
- .4 Apply mastic with inorganic mesh to flashing seams.

.4 Membrane Installation:
- .1 Install composite membrane in accordance with manufacturer's printed instructions over flashings and corner reinforcement.
- .2 Lay membrane without buckles, fishmouths and avoid stretching membrane. Where membrane cannot extend at least 100 mm (4") onto horizontal surface, terminate in a horizontal reglet and seal.
- .3 Lap membrane 64 mm (2-1/2") on side laps and 150 mm (6") on end laps. Stagger end laps.

.4 Ensure membrane always finishes in a reglet when applying over concrete substrate. Inform Section 03 30 00 of final locations of reglets in time to avoid necessity of saw cutting walls and concrete surfaces.
.5 Roll membrane with 75 mm (3") wide hand roller.

.5 Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.

.6 Protection Board/Drainage Fabric:
.1 Before laying protection board/drainage fabric, verify integrity of and repair any damage to waterproofing membrane.
.2 Install protection board in a single layer to all faces of composite membrane waterproofing only, using applicable types specified herein. Spot apply compatible adhesive to secure membrane material.
.3 Follow manufacturer's detailed installation instructions for sequence, overlapping, termination conditions and the like.

.7 Expansion Joint Treatment:
.1 At expansion joints up to 25 mm (1") in width, prior to application of waterproof membrane, install strip of flexible (heavy duty) membrane flashing sheet along joint in such width as to allow it to be looped into joint 25 mm to 38 mm (1" to 1-1/2") from surface and extend min 75 mm (3") on either side of joint. Ensure membrane flashing sheet is not stretched while being installed. Secure in place with fixing bars down both sides of joint mechanically fastened at max 150 mm (6") oc.
.2 When installing waterproofing membrane sheets, extend continuously over expansion joint, roll to bond intimately and slice down centre of waterproofing sheet only, taking care not to contact neoprene sheet in expansion joint with knife blade.

3.3 FIELD QUALITY CONTROL

.1 Inspection and Testing:
.1 Prior to covering of waterproofing, notify Consultant in writing that installation of waterproofing has been inspected and approved by waterproofing applicator and manufacturer's representative.
.2 Inspection includes following:
.1 examination of surfaces to receive waterproofing.
.2 check on methods of application.
.3 examination of waterproofing before application of protective coat including water test under 75 mm (3") minimum water depth.
.4 examination of filled reglets.
.5 examination of protective coat before covering up.
.6 examination of expansion joints.

.2 Supervision:

.1 Arrange for manufacturer's technical representative to visit the site prior to commencement of installation of composite membrane waterproofing systems, to meet and discuss with Contractor, Consultant and waterproofing inspector, installation procedures to be adopted, conditions under which work will be done and to inspect substrate on which membrane is to be installed, in order that alternative recommendations may be made should adverse conditions exist.

.2 Manufacturer's technical representative shall visit site periodically and provide written reports to ensure work is being executed in conformance with specifications and manufacturer's recommendations.

3.4 PROTECTION

.1 Comply with manufacturer's printed recommendations respecting protection. Provide protective measures required to prevent injury to waterproofing until Work has been accepted.

.2 Repair all damage resulting from performance of the Work of this Section, in a manner acceptable to Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* service rooms waterproofing including but not limited to following:
  .1 interior service room elastomeric waterproofing for slabs;

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with other related Sections.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for *Project* site meeting of parties associated with work of this Section, including non-exhaustively *Subcontractor* performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. *Consultant* may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
      .1 work included,
      .2 materials to be used,
      .3 storage and handling of materials,

.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 In particular ensure Division 3 requirements for concrete are compatible with requirements of this Section. Ensure following meet acceptable criteria to ensure proper performance floor covering work:
.1 floor flatness and floor levelness requirements for rubber flooring installation and their acceptability by flooring manufacturer;
.2 surface texture of finished floor required for rubber sheet flooring installation;
.3 acceptable approaches to remediation of high moisture and high pH floors;
.4 adhesive application and floor covering installation.

.4 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with *Contractor* and *Consultant*, procedures to be adopted and conditions under which work is to be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Cooperate fully with other *Subcontractors* on *The Work* and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 *Supply* items to be built-in in ample time to be incorporated into work of other *Subcontractors*, together with measurements and other information required for location thereof.
.4 Ensure work which may create dust does not proceed during work related to painting and final finishing

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Provide cured film data based on following:
.1 Tensile Elongation and Strength based on ASTM D412.
.2 Hardness (Shore A) based on ASTM D2240.
.3 Tensile Adhesion to Concrete based on ASTM D4541.
.4 Abrasion Resistance based on ASTM D4060.

.3 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials as designated later by Consultant.

1.6 QUALITY ASSURANCE

.1 Installer’s Qualifications: *Provide* work of this Section executed by competent installers with minimum of 5 years’ experience in application of *Product*s, systems and assemblies specified and with approval and training of *Product* manufacturers.

.1 *Provide* membrane manufacturer's supervision during preparation and application.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.3 Mock-up: Provide Mock-up at least 10 m^2 (100 sq ft) in location designated by Consultant incorporating surface preparation, pre-installation testing and service room traffic and waterproofing coat and base. Ensure Mock-up illustrates level of quality of finished Work and acceptable levels of slip resistance for various site conditions. Correct deficiencies as directed by Consultant. Once accepted, site Mock-up may form part of finished work and sets basis of comparison for remainder of work of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Protection: Protect surfaces which are not to be treated from soiling by spillage, overspray or other causes in connection with work of this Section.

1.8 WARRANTY

.1 Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the *Contract*. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*.

.2 Cracks arising from normal shrinkage and/or expansion of concrete shall not be considered as structural failure. Hairline cracks which result from these causes shall be considered normal and consequently warranty shall not be voided as a result of these minor defects.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specification*s:
  .1 Sherwin Williams: www.sherwin-williams.com
  .2 Sika Canada Inc.; www.skia.ca
  .3 Stonhard; www.stonhard.com

.2 Substitution Limitations: Comparable *Products* from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
  .1 Fire-Test-Response Characteristics: Provide Products with following flame spread rating and smoke developed rating when tested in accordance with following standards:
    .1 Conform to NBCC requirements for internal finishes; Surface burning characteristics to CAN/ULC-S102.2-M. Tunnel test: Flame Spread 49; Smoke Developed 304.
  .2 Static Coefficient of Friction: Ensure floor surfaces are stable, firm and slip resistant. Ensure slip resistant surfaces provide sufficient frictional counterforce to forces exerted in walking in order to permit safe ambulation. Provide Products with the following minimum values as determined by ASTM D2047 unless otherwise indicated:
    .1 Level Surfaces: Minimum 0.6.
    .2 Ramp Surfaces: Minimum 0.8.

.2 Performance Requirements:
- .1 Ensure elastomeric waterproofing membrane with wear surface withstands pedestrian traffic and prevents the passage of water under pressure. Membrane to be capable of spanning cracks up to 1.5 mm (1/8") without failure and in accordance with ASTM C957.
- .2 Where elastomeric waterproofing membrane exposed to diesel fuel, provide additional chemical resistant protective coatings which resist damage due to diesel fuel.
- .3 Antibacterial and Antifungal Treatment: Provide flooring complete with antibacterial and antifungal treatment to inhibit growth of bacteria, mould, mildew and fungi for lifetime of floor. Treatment to prevent deterioration and discoloration caused by bacteria and fungi. Ensure antibacterial and antifungal treatment does not migrate and affect application properties of flooring system. Provide flooring system meeting following performance characteristics:
  - .1 ASTM G21 or ASTM D3273: Pass
- .4 Tensile strength: ASTM D638, base coat minimum 9.1 MPa (1,320 psi), top coat minimum 9.8 MPa (1,421 psi).
- .5 Tear resistance: to ASTM D624, base coat minimum 38 KN/m (218.24 lb./in), top coat minimum 16.8 N/mm (95.93 lb./in).
- .6 Hardness (indentation): ASTM D2240, Shore A durometer; base coat: 80, top coat: 80 or Shore D durometer, base coat: 50, top coat: 40
- .7 Water absorption: ASTM C413, 0.1% maximum.
- .8 Bond strength: ASTM D4541, 2.4 MPa (350 psi)
- .9 Abrasion resistance: ASTM D4060, CS-17 wheel, 15 g maximum weight loss.
- .10 Chemical resistance: no chemical attack or discolouration when tested in accordance with ASTM D1308 at 72 deg F for 7 days, against following reagents and concentrations:
  - .1 Ammonium hydroxide; 28%.
  - .2 Clorox.
  - .3 Isopropyl Alcohol: 98%.
  - .4 Mineral spirits.
  - .5 Sodium Hydroxide: 30%.
  - .6 Urine-synthetic: 6.6%.
- .11 Water Vapour Performance (ASTM E96)
  - .1 Transmission: 0.028 g/h/m^2 (0.04 grain/hr/ft^2)
  - .2 Permeability: 0.0013 ng/Pa·s·m (0.09 perm inch)
  - .3 Permeance: 0.0026 ng/Pa·s·m^2 (4.65 x 10^{-5} perms)

2.3 MATERIALS

.1 Interior Mechanical Room Waterproofing (MRW):
- .1 Elastomeric waterproof membrane and 2-component flexible, flame retardant epoxy topping capable of pedestrian traffic. Provide 1 of following:
  - .1 "Sika Floor Resoclad MRW Type II – Interior Use Only" by Sika Canada Inc., (38 mils).
  - .2 Epo-Flex Mer II by Sherwin Williams. (32 mils)
  - .3 "Stoneproof ME7 plus Stone Kote GS4" by Stonhard. (25-30 mils)

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions:
- .1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- .2 Carry out pre-installation moisture testing in accordance with manufacturer's recommendations
- .3 Before applying waterproofing membrane, examine preceding work of other trades for defects detrimental to application or performance of waterproofing membrane. Report defects to Consultant in writing for correction before work progresses. Commencement of work shall imply acceptance of all conditions.

.2 Pre-installation Testing:
- .1 Calcium Chloride Test:
  - .1 Perform calcium chloride test in accordance with requirements of ASTM F1869 immediately prior to installation of waterproofing for moisture on concrete floors around perimeter of areas, at columns, and where moisture may be anticipated.
  - .2 Conduct 1 test for every 93 m² (1000 sq ft) of flooring. Moisture emission from concrete floor shall not exceed 1.5 kg/93 m² (3.5 lbs/1000 sq ft) in 24 hours. Do not proceed with installation until moisture problems have been corrected. Provide results to Consultant in writing prior to commencement of installation.

3.2 PREPARATION

.1 Ensure surfaces are dry at commencement of work and cured minimum of 28 Days. Remove all dust and dirt with industrial type vacuum cleaner. Ensure dryness of surface is acceptable to manufacturer.

.2 Free surfaces to receive work of this Section from dust and loose particles, grease, paint, frost, form oil and other material detrimental to bond of membrane traffic topping. Employ steam cleaning where necessary to remove form oil.

.3 Ambient and surface temperatures shall be at least 10 deg C (50 deg F) for a minimum period of 48 hours before, during and after membrane application.

.4 Treat shrinkage cracks and dynamic expansion joints prior to application of membrane.

.5 Acid etch, sandblast, or abrade and clean using a steel shot blast machine having vacuum pick-up. Use appropriate cleaning method depending on condition of concrete.

.6 Ensure substrate surfaces are free from cavities or shutter marks detrimental to traffic topping membrane. Ensure substrates slope properly to drains.

.7 Mix components in accordance with manufacturer’s recommendations.

3.3 APPLICATION

.1 Apply to primed surface with notched squeegee at a rate recommended by manufacturer and backroll with a 12 mm (½ in) nap roller to achieve recommended thickness.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Service:
- .1 Ensure manufacturer's representative inspects finished surface preparation, application and finished coating. Provide further preparation or application to achieve appropriate result as recommended by manufacturer’s representative.

.2 Inspection and Testing:
- .1 Appoint and pay independent traffic topping and waterproofing inspection company to perform inspection and testing.
- .2 If required by inspection company, Provide cuts for testing. Repair cuts at no additional cost. Submit testing and inspection report to Consultant for review.
- .3 Inspect work of other Sections where such is associated with waterproofing membrane system including placement, finishing and curing of concrete substrate.

3.5 CLEANING

.1 Clean and Make Good to *Consultant*'s satisfaction, surfaces soiled or otherwise damaged in connection with work of this Section. Pay cost of replacing finishes or materials that cannot be satisfactorily cleaned.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract;*
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* building insulation including but not limited to following:
  .1 board, batt, and loose insulation throughout building, except as specified under other Sections.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
      .1 work included,

.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product* Data:
.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project*. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials as designated later by Consultant.

1.6 QUALITY ASSURANCE

.1 Manufacturers' Qualifications: Ensure manufacturers selected for *Work* of this Section have a minimum 10 year experience in fabrication and installation of *Work* of this section or work similar to that which is described herein.

.2 Installer's Qualifications:
.1 *Provide* work of this Section executed by competent installers with minimum of 5 years' experience in application of *Products*, systems and assemblies specified.
.2 Employ only skilled mechanics having experience in the work specified and having an understanding of the design principles of the thermal and air/vapour barriers which they are providing.

.3 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.4 *Mock-up*s: *Provide Mock-ups* in locations designated by *Consultant* and as required to demonstrate quality of workmanship. Maintain *Mock-ups* during construction in an undisturbed condition as a standard for judging the completed work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
  .1 Deliver materials to site in original wrappings with labels intact and store in areas directed by Consultant.

.2 Storage and Handling Requirements:
  .1 Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to sun.
  .2 Store materials inside buildings for 24 hours prior to installation.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:
  .1 Where combustible insulation or vapour barrier materials are specified herein, comply with applicable Code requirements including supply and installation of approved non-combustible backing and independently-supported, non-combustible insulation covering except where these provisions are expressly specified as work of other Sections.

.2 Design and Performance Requirements:
  .1 Thermal Design Requirements: Thermal properties required are as follows unless otherwise specified.
    .1 Floors: Minimum RSI 7.0(R39)
    .2 Walls: Minimum RSI 4.9(R28)
    .3 Roofs: Minimum RSI 7.0(R39)
    .4 Exterior glass vision panels: Refer to Division 8 of the Specifications.
    .5 Refer to *Drawings* for thicknesses of insulation required.
  .2 This Section establishes insulation and accessory *Products* and minimum performance criteria which apply to all board, batt, and loose insulation types used throughout this *Project*. Read and become familiar with insulation requirements of all Sections.
  .3 Material types (trade names), compatibility, sealing and adhesive qualities for each combination of insulation, adhesive, and substrate encountered in work shall be reviewed for compatibility and suitability prior to commencement of installation. Include manufacturer's laboratory reports on adhesive quality and

compatibility of each of these conditions.

.4 ***Provide*** air sealing to supplement and provide continuity of primary air/vapour barrier assembly including sealing and/or filling of perimeter of door and window openings, crevices, gaps, cracks in walls, roof/wall connections, mechanical and electrical penetrations in walls, floors, roofs, curtain wall mullions, beams, columns enclosures and other similar locations with polyurethane foam consisting single mix of chemical in pressurized container formulated to cure when exposed to moisture present in air to provide and maintain air/vapour barrier integrity and impermeable barrier to air infiltration or loss.

.5 Select appropriate ***Products*** from list of materials on basis of their maintaining thermal value of envelope, total compatibility when incorporated into finished system while ensuring substrate conditions as well as their ability to adhere components permanently, where applicable in rigid manner and maintain flexibility where required in finished work.

.6 Insulation materials and their facing shall not support fungal growth when tested in accordance with ASTM C1338.

2.2 MATERIALS

.1 Extruded Polystyrene Insulation:

.1 Extruded Polystyrene – Category 1 (INSUL-XPS1): CAN/ULC-S701, Type: 4.

.1 Minimum Compressive strength: 210 kPA (30 psi)

.2 Maximum Water sorption: < 0.7%

.3 Thickness: As required to provide specific thermal resistance values.

.4 Minimum RSI (R) Value: 0.87 per 25 mm (5.0 per 1”) in accordance with ASTM C518

.5 Surface Burning Characteristics: N/A (Combustible)

.6 Edges: shiplapped (horizontal locations); butt joints (other locations)

.7 Acceptable Products:

.1 "STYROFOAM™ SM" or " STYROFOAM™ PERIMATE" (drainage layer applications) by Dow Chemical of Canada ULC.

.2 “Foamular® C-300” or “Cel-Drain®” (drainage layer applications) by Owens Corning Canada LP

.2 Extruded Polystyrene – Category 2 (INSUL-XPS2): CAN/ULC-S701, Type: 4.

.1 Minimum Compressive strength: As required to carry stipulated live loads and dead loads but not less than 276 kPA (40 psi)

.2 Maximum Water sorption: < 0.7%

.3 Thickness: As required to provide specific thermal resistance values.

.4 Minimum RSI (R) Value: 0.87 per 25 mm (5.0 per 1”) in accordance with ASTM C518

.5 Surface Burning Characteristics: N/A (Combustible)

.6 Edges: shiplapped (horizontal locations)

.7 Acceptable Products:

.1 "HIGHLOAD 40" by Dow Corning of Canada Inc. as required to carry stipulated live loads and dead loads.
.2 "Foamular® C-400" by Owens Corning Canada LP as required to carry stipulated live loads and dead loads.

.2 Expanded Polystyrene - Category 1 (INSUL-XPD1): CAN/ULC-S701, Type: 4.
.1 Minimum Compressive strength: As required to carry stipulated live loads and dead loads but not less than 276 kPA (40 psi)
.2 Maximum Water sorption: < 1.4%
.3 Thickness: As required to provide specific thermal resistance values.
.4 Minimum RSI (R) Value: 0.74 per 25 mm (4.2 per 1") in accordance with ASTM C518
.5 Surface Burning Characteristics: N/A (Combustible)
.6 Edges: shiplapped (horizontal locations)
.7 Acceptable Products: "ThermalStar X-grade 40" by Atlas or approved equivalent as required to carry stipulated live loads and dead loads.

.3 Concrete Topped Insulated Panels (INSUL-CONC1):
.1 Insulation: Extruded Polystyrene, CAN/ULC-S701, Type: 4
.1 Minimum Compressive strength: 210 kPA (30 psi)
.2 Maximum Water sorption: < 0.7%
.3 Thickness: 56 mm (2-1/4")
.4 Minimum RSI (R) Value: 0.87 per 25 mm (5.0 per 1") in accordance with ASTM C518
.5 Surface Burning Characteristics: N/A (Combustible)
.6 Edges: tongue and groove
.2 Facing: Minimum 8 mm (5/16") thick glass-fiber-mesh-reinforced concrete panels
.1 Minimum Compressive Strength: 17.93 mPA (2600 psi)
.2 Minimum Flexural Strength: 10.34 mPA (1500 psi)
.3 Acceptable Products:
.1 "WallGuard" by T-Clear Corporation or "Tech Crete Concrete Faced Insulated (CFI) Wall Panels" by Tech-Crete Processors Ltd.; www.tclear.com or approved equivalent

.4 Mineral Wool Insulation:
.1 Mineral Wool – Category 1(INSUL-WOOL1): CAN/ULC-S702, type 1.
.1 Minimum Compressive strength: 17 kPA (2.4 psi)
.2 Maximum Water sorption: < 0.04%
.3 Minimum Density: 128 kg/m³ (7.99 lbs/cu ft).
.4 Thickness: As required to provide specific thermal resistance values.
.5 Minimum RSI (R) Value: 0.74 per 25 mm (4.3 per 1") in accordance with ASTM C518
.6 Surface Burning Characteristics: Flame Spread ≤ 0, Smoke Developed ≤ 5 per CAN/ULC S102 and ASTM E84
.7 Acceptable Products: "DrainBoard" by Roxul Inc. or approved equivalent.
.2 Mineral Wool – Category 2 (INSUL-WOOL2): CAN/ULC-S702, Type 1
.1 Minimum Compressive strength: Less than 10% deformation after applying 1.2 kPA load (25 psf)
.2 Minimum Density: 70 kg/m^3 (4.37 lbs/cu ft).

.3 Maximum Water Absorption: < 0.02%
.4 Thickness: As required to provide specific thermal resistance values.
.5 Minimum RSI (R) Value: 0.74 per 25 mm (4.3 per 1") in accordance with ASTM C518
.6 Surface Burning Characteristics: Flame Spread ≤ 0, Smoke Developed ≤ 5 per CAN/ULC S102 and ASTM E84
.7 Edges: butt joints.
.8 Acceptable Products:
.1 "CAVITYROCK MD-Single Density" or "CAVITYROCK DD-Dual Density" by Roxul Inc. or approved equivalent.

.3 Mineral Wool – Category 5 (INSUL-WOOL5): CAN/ULC-S702, Type 1; and ASTM C553 (TYPE VII)
.1 Minimum Density: 32 kg/m^3 (2 lbs/cu ft).
.2 Maximum Water Absorption: < 0.028%
.3 Thickness: As required to provide specific thermal resistance values.
.4 Surface Burning Characteristics: Flame Spread ≤ 0, Smoke Developed ≤ 5 per CAN/ULC S102 and ASTM E84and CAN/ULC S102. Non-combustible to CAN/ULC S114
.5 Minimum RSI (R) Value: 0.74 per 25 mm (4.3 per 1") in accordance with ASTM C518
.6 Edges: butt joints.
.7 Acceptable Products: "ROXUL PLUS™ METAL BUILDING" or approved equivalent.

.4 Mineral Wool – Category 6 (INSUL-WOOL6): CAN/ULC-S702, Type 1; ASTM C553 (Type VII) and non-combustible in accordance with requirements of CAN/ULC-S114.
.1 Minimum Density: 45 kg/m^3 (2.81 lbs/cu ft).
.2 Maximum Water Absorption: < 0.04%
.3 Thickness: As required to provide specific STC values.
.4 Air erosion Rating (plenum applications only): Capable of handling velocities up to 5.08 m/s (1000 fpm) per UL 181
.5 Surface Burning Characteristics: Flame Spread ≤ 0, Smoke Developed ≤ 0 per CAN/ULC S102 and ASTM E84
.6 Edges: butt joints.
.7 Acceptable Products:
.1 "ROXUL AFB" by Roxul Inc.
.2 "Thermafibre Sound Attenuation Blankets" by CGC Inc

.5 Mineral Wool – Category 7 (INSUL-WOOL7): CAN/ULC-S702, Type 1; and ASTM C553 (TYPE VII)
.1 Minimum Compressive strength: Less than 10% deformation after applying 6.9 kPA load (144 psf)
.2 Minimum Density: 72 kg/m^3 (4.5 lbs/cu ft).
.3 Maximum Water Absorption: < 0.04%
.4 Thickness: As required to provide fire protection.
.5 Surface Burning Characteristics: Flame Spread ≤ 0, Smoke Developed ≤ 0 per CAN/ULC S102 and ASTM E84and CAN/ULC S102. Non-combustible to CAN/ULC S114
.6 Edges: butt joints.
.7 Acceptable Products: "ROXUL SAFE" by Roxul Inc. or approved

equivalent.

.5 Mineral Glass Fibre Insulation:

.1 Mineral Glass Fibre – Category 1 (INSUL-GLASS1): CAN/ULC-S702, Type 1.
.1 Minimum Compressive strength: Less than 10% deformation after applying 1.2 kPA load (25 psf)
.2 Minimum Density: 48 kg/m^3 (3 lbs/cu ft).
.3 Maximum Water Absorption: < 2%
.4 Thickness: As required to provide specific thermal resistance values.
.5 Minimum RSI (R) Value: 0.73 per 25 mm (4.2 per 1") in accordance with ASTM C518
.6 Surface Burning Characteristics: Flame Spread ≤ 25, Smoke Developed ≤ 50 per CAN/ULC S102 and ASTM E84
.7 Edges: butt joints.
.8 Acceptable Products:
.1 "Type 703 FiberGlas® Insulation" by Owens Corning Canada LP
.2 "OFI-48 Rigid Fibreglass" Board by Ottawa Fibre Inc.
.3 Approved equivalent.

.2 Mineral Glass Fibre – Category 3 (INSUL-GLASS3): CAN/ULC-S702, Type 1; ASTM C553 (TYPE VII) and non-combustible in accordance with requirements of ULC CAN/ULC-S114.
.1 Minimum Compressive strength: Less than 10% deformation after applying 1.2 kPA load (25 psf)
.2 Minimum Density: 13 kg/m^3 (0.81 lbs/cu ft).
.3 Maximum Water Absorption: < 2%
.4 Thickness: As required to provide specific thermal resistance values.
.5 Surface Burning Characteristics: Flame Spread ≤ 25, Smoke Developed ≤ 50 per CAN/ULC S102
.6 Air erosion Rating (plenum applications only): Capable of handling velocities up to 5.08 m/s (1000 fpm) per UL 181
.7 Edges: butt joints.
.8 Acceptable Products:
.1 "EcoTouch™ QuietZone® PINK™ FiberGlas® Acoustical Batts" by Owens Corning Canada LP
.2 "NoiseReducer Sound Attenuation Batts" by CertainTeed.

.6 Foamed-in-place insulation (INSUL-FOAM):
.1 Spray Applied Polyurethane Foam Insulation – Category 1 (INSUL-SPR1): CAN/ULC-S705.1,
.1 Minimum density: 28 kg/m^3,
.2 Surface Burning Characteristics: Flame Spread ≤ 500, Smoke Developed ≤ 500 per CAN/ULC S102
.3 Minimum Compressive Strength (ASTM D1621):, 170 kPa (25 psi);
.4 Air Infiltration at 75 Pa, (ASTM E283): maximum 0.00014 ℓ/s/m^2;
.5 Thermal Resistance: RSI 1 (R5.74 per inch)
.6 Water Vapour permeance on 25 mm (1") substrate, (ASTM E96):
.1 when applied on exterior gypsum sheathing: maximum 68 ng/Pa*s*m^2;
.7 Acceptable *Products*:
.1 "Heatlok Soya" by Demilec Inc.

.2 "Walltite® ECO" by BASF Canada Inc.

.7 Miscellaneous Materials and Accessories:

.1 One component Foamed-in-Place Air Barriers Insulating Foam Sealants: General Purpose Type (for application at gaps and cracks): semi-rigid single-component polyurethane sealant, to CAN/ULC-S710 and CAN/ULC-S711; and having the following properties:

.1 Minimum Thermal Resistance (ASTM C518): RSI 0.73 per 25 mm (R4.2 per inch)

.2 Core Density (ASTM D1622): minimum 24.03 kg/m^3 (1.5 pcf).

.3 Fire Resistance (ASTM E84): Flame spread < 15, Smoke Developed < 20.

.4 Primer: As recommended by sealant manufacturer.

.5 Acceptable ***Products***:

.1 "Zerodraft Air Sealant Foam and Insulating Sealant" by Zerodraft (Division of Canam Building Envelope Specialists Inc.), www.zerodraft.com

.2 "Handi-Foam®" by Fomo Products, Inc.; www.fomo.com

.3 "GREAT STUFF PRO™ Series" Foam Sealant by Dow Chemical.

.2 Air/Vapour Barrier: As specified in Section 07 25 00.

.3 Adhesives: As recommended by manufacturer of insulating materials and compatible with all materials within assemblies.

.4 Mechanical Fasteners:

.1 Insulation Clips: Impale type, perforated clips 50 mm x 50 mm (2" x 2") cold rolled steel, spindle of length to suit insulation plus 25 mm (1") with speed washers.

.2 Adhesive: Purpose-made adhesive suitable for bonding insulation to substrates as indicated.

.3 Strip Impalement Clips: 25 mm (1") wide strip, fabricated from galvanized sheet in rolls with punch out insulation securement arrows.

.4 Nails: Galvanized steel, length 25 mm (1") longer than insulation thickness, CSA B111 Table 12.

.5 Panel Fasteners: Epoxy coated, square drive, thin head self tapping screws for metal, wood in stainless or carbon steel, length to suit design requirements, colour coordinated with panels.

.6 Staples: Galvanized wire, 12 mm (1/2") minimum.

.5 Adhesive: As recommended by manufacturer of insulating materials.

.1 Type A: Synthetic rubber base, solvent type, trowel consistency for use with glass fibre rigid insulation, "230-38" by Bakor Inc.

.2 Type B: CGSB 71-GP-24M, Type 1, for bead application and Type 2 for trowel application.

.3 Type C: For use with polystyrene or glass fibre rigid insulation. Vapour barrier type, medium trowel consistency, or "260-08" by Bakor Inc.

.4 Cement Mortar Mix at concrete-topped panels: 1 part Portland cement, 6 part masonry sand, 1 part hydrated lime, potable water to produce a workable mix.

.8 Insulation Covering: In all locations where insulation is exposed within

ceiling or wall space where ceiling panels are removable, or where ceiling space acts as air plenum; Provide high density polyethylene continuous protection around insulation to prevent fibre loss. Submit documentation verifying following values regarding protection around insulation; flame spread rating shall not exceed 25, and smoke developed shall not exceed 50. Acceptable Product: "Alathon DL 5005" by Dupont Canada.

PART 3 -EXECUTION

3.1 PREPARATION

.1 Ensure surfaces to receive adhesive or insulation are dry, firm, straight, and free from loose material, projections, ice, frost, slick, grease, oil or other matter detrimental to bond of adhesive or uniform bedding of insulation.

.2 Maintain surface and ambient temperatures during application and curing of adhesive at temperature recommended by manufacturer of type of adhesive used.

3.2 INSTALLATION

.1 ***Install*** insulation when conditions meet requirements specified under "Preparation".

.2 ***Install*** insulation to maintain continuity of thermal protection to building elements and spaces as indicated on ***Drawings***.

.3 Fit insulation tight to electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other projections or openings.

.4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation panels free from ripped backs or chipped or broken edges. Ensure integrity and continuity of insulation at juncture with different types of materials and seal in acceptable manner. Stagger joints in row.

.5 ***Install*** materials in accordance with manufacturer's instructions.

.6 Do not cover insulation and air/vapour barrier installed under this Section or other Sections until it has been reviewed by ***Consultant***.

.7 Rigid Insulation:

.1 With glass or mineral fibre insulation apply Type A adhesive to insulation board at rate of 1 ℓ/m^2 (50 sq ft/gal) (unless otherwise recommended by manufacturer) by notched trowel with 5 mm (3/16") notches at 10 mm (3/8") oc or apply at rate of 0.35 ℓ/m^2 (130± 10 sq ft/gal) by spot method with daubs in thickness recommended by manufacturer to maintain tightness of assemblies at 200 mm (8") oc each way or by bead method with diameter beads 350 mm (14") oc.

.2 With glass fibre or mineral wool, polystyrene, apply Type B adhesive to insulation board at a rate of 0.35 ℓ/m^2 (130± 10 sq ft/gal), by spot

method with daubs in thickness recommended by manufacturer to maintain tightness of assemblies at 200 mm (8") oc each way or by bead method with diameter beads 350 mm (14") oc.

.3 With polystyrene and glass fibre insulation apply Type C adhesive to substrate material at rate of 3 ℓ/m^2 (16 sq ft/gal) 3 mm (1/8") thick, to achieve a continuous vapour retardant film. Butter edges of board for continuous seal.

.4 Apply mortar mixed adhesive to insulation board by push box method to applied thickness of 3 mm (1/8"), 5 mm (3/16"), 6 mm (1/4").

.5 Fix insulation clip type fasteners on substrate, 600 mm x 1200 mm (2 per 24" x 48") board minimum. Impale insulation board on insulation clips, butting all joints firmly together and secure with washers, cut off spindles 3 mm (1/8") beyond washer.

.6 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm (6") wide 0.15 mm (6 mil) polyethylene strip over joint using compatible adhesive prior to application of insulation.

.7 ***Provide*** flexible insulation of equivalent thickness and thermal insulation to fit areas where application of rigid insulation is not possible to provide continuous coverage.

.8 Perimeter Insulation:

.1 Exterior Application: ***Install*** insulation boards on exterior face of perimeter foundation walls extending as shown on ***Drawings***. Apply with adhesive Type B or cement mortar mix. Protect entire face of insulation exposed to back-fill with 6 mm (1/4") thick pressure treated plywood or fibre-reinforced cement flat panels.

.9 Under Concrete Floor Slab Insulation:

.1 Lay insulation boards on level compacted fill extending a minimum of 600 mm (24") in from perimeter foundation wall.

.10 Insulation Behind Convectors: Refer to mechanical specifications

.8 Batt or Roll Insulation:

.1 ***Install*** batt or roll insulations where indicated on ***Drawings***.

.2 Fit batt between framing and press firmly into place. Butt tightly at joints, free of gaps.

.3 Insulate behind pipes, ducts, electric conduits and outlets or junction boxes. Cut insulation to fit around and behind obstructions and non-standard spaces.

.4 Place insulation over soffit grid system sealing around metal hangers and at wall on all sides. Carry insulation up wall and fit around steel.

.9 Loose Insulation:
- .1 Pour or pack or pneumatically place loose wall insulation above ceiling between joists or in walls between studs or between wythes exterior cavity walls or where indicated on ***Drawings*** to thicknesses indicated.
- .2 Ensure areas exposed to outside air are insulated.
- .3 ***Provide*** vapour barrier before application of ceiling finish.

.10 Air Seal Insulating Foam Sealants:
- .1 ***Install*** air seal insulating foam sealants materials to NATIONAL BUILDING CODE OF CANADA requirements in accordance with manufacturer's instructions and acceptable to authorities having jurisdiction and ***Consultant*** to provide required air seal.
- .2 Apply sealants within recommended application temperature ranges. Consult manufacturer when sealants cannot be applied within specified ranges.
- .3 In low humidity, mist area with water to aid cure of one-component sealant.
- .4 Do not expose foam to ultra-violet radiation.
- .5 Avoid overfilling restricted spaces.
- .6 Use one-component foam for cracks or openings 6 mm (1/4") to 50 mm (2") wide. Use two- component foam sealant for gaps over 50 mm (2") wide, and for voids in hidden cavities.
- .7 To provide continuity with air/vapour barrier for this ***Project***, without limitations seal following areas:
  - .1 Various roof areas including sloped roof/wall junctions, penetrations of all kinds and roof/wall junctions.
  - .2 Junction of roof air/vapour barrier and wall air/vapour barrier.
  - .3 Ensure continuity of air and vapour seal between wall and window frame in accordance with requirements of CSA A440.4 Windows standard. Window heads, jambs and sills in cavity walls. Window frames at walls and columns where applicable. Window frames, and parapets, in wall construction.
  - .4 In cavity wall construction at roof/wall junctions, window perimeters, exhaust vents and soffits. At intervals in cavity wall to achieve compartmentalization. At window perimeters and at metal panel interface locations.
  - .5 Sliding door head, jambs and threshold.
  - .6 All basement, corridor penetrations made vertically through floors or horizontally through walls. ***Provide*** safe insulation.
  - .7 Inspect roof perimeter for air leakage paths such as fluted deck itself, truss and structural beam penetrations above and below top of wall, open mortar joints, and conduit and pipe penetrations.
  - .8 Use smoke tester kits to identify and locate leakage.
  - .9 Use both one-component and two-component foam sealants in combination to create a continuous foamed-in-place seal between wall and roof air/vapour barrier.
  - .10 Where deck flutes run perpendicular to wall, foam open flutes completely out to fascia.***Provide*** safe insulation.

.11 Where closed flutes occur, punch flutes and inject foam through holes. Locate holes as close to wall as possible so that plane of injected and cured foam within closed flute is level with plane of exposed foam in open flutes.

.12 Where steel deck is parallel to wall, fill void with either one-component or two-component material, depending on gap size. ***Provide*** safe insulation.

.11 Apply foamed-in-place air barrier sealants in strict accordance with manufacturer's installation guidelines. Conform to CAN/ULC-S710.2. Avoid overfilling restricted spaces. Ensure gaps around windows are conforming to requirements of CSA A440.

.12 Air/Vapour Barriers: Refer to Section 07 25 00.

.13 Foam Insulation:

.1 Install one-component foam in accordance with CAN/ULC S710.2-05 application standard.

.2 Install two-component foam in accordance with CAN/ULC S711.2-05 application standard.

3.3 SCHEDULES

.1 Insulation And Vapour Barrier Systems: The various combinations of insulation and vapour barrier materials and installation systems have been given "INSULATION TYPE" numbers as follows:

Application	Insulation Type and Abbreviation
Perimeter foundation walls below grade	Extruded Polystyrene – Category 1 (INSUL-XPS1) or Mineral Wool – Category 1(INSUL-WOOL1)
Perimeter foundation walls above grade.	Concrete Topped Insulated Panels (INSUL-CONC1)
Insulation under concrete slab	Extruded Polystyrene – Category 2 (INSUL-XPS2)or Expanded Polystyrene – Category 1 (INSUL-XPD1)
Insulation for Panelized Cladding Systems and sheet Metal air/vapour barriers (Metal cladding, Wood cladding, Composite cladding etc.)	Mineral Wool – Category 2 (INSUL-WOOL2) or Mineral Glass Fibre – Category 1 (INSUL-GLASS1).
Insulation for preformed metal siding and soffits	Mineral Glass Fibre – Category 1 (INSUL-GLASS1) or Mineral Wool – Category 5 (INSUL-WOOL5)

Application	Insulation Type and Abbreviation
Interior acoustic batt insulation and sound attenuation blankets (Walls, Ceilings and Soffits)	Mineral Wool – Category 6 (INSUL-WOOL6) or Mineral Glass Fibre – Category 3 (INSUL-GLASS3)
Insulation for mechanical units and ductwork	Refer to mechanical *Specifications*.
Safing insulation (perimeter gaps between concrete floor slabs and exterior wall systems; between fire walls and floor slabs)	Mineral Wool – Category 7 (INSUL-WOOL7)
Loose and Packing insulation (various locations)	Mineral Glass Fibre – Category 1 (INSUL-GLASS1) or Mineral Wool – Category 5 (INSUL-WOOL5)
Foam-in-place Insulation at soffits, canopies, within window frames and other locations indicated on Drawings	Foam-in-place insulation(INSUL-FOAM)
Roofing Insulation	As indicated in individual roofing Specification Sections

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the General Conditions and Supplementary Conditions of the ***Contract;***
- .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: ***Provide*** spray-in-place urethane foam insulation including but not limited to following:
- .1 spray-in-place urethane foam insulation.
- .2 Supply and installation of transition membrane between this work and adjacent construction.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
- .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
- .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
- .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
  - .1 environmental procedure requirements,
  - .2 health, safety and emergency response procedure and policy requirements,
  - .3 and security requirements;
- .2 Pre-construction Site Meeting:
  - .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
  - .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
    - .1 work included,

.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for ***Project*** in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 Quality Assurance/Control Submittals:
.1 Design Data and Laboratory Test Reports:
.1 Submit a laboratory report of the adhesion compatibility with flashing, membranes, coatings and substrates.
.2 Submit results of independent laboratory test reports, data sheets, physical proprieties meeting or exceeding requirements of this ***Specification***.
.3 Submit independent laboratory results on vapour permeance properties (ASTM E96) for 3 samples in each wall composition.
.2 Certifications:
.1 Submit proof confirming installing Sub-contractor is licensed and certified by insulation manufacturer to perform installation of system specified in accordance with requirements of CAN/ULC S705.2 – Installation Standard.
.2 Submit by manufacturer, a certification of conformity to NBC

of the polyurethane foam system.

.3 Submit a CCMC Evaluation Report ***Products*** may be used as insulation and air barrier system.

.4 Upon request, submit a copy of ***Contractor's*** quality control reports as requested in CAN/ULC-S705.2.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 ***Provide Products*** by company specializing in manufacturing the products specified in this section with minimum 10 years documented experience. Submit proof of experience upon request by ***Consultant***.

.2 Installers:

.1 ***Provide*** work of this Section executed by competent installers experienced in application of ***Products*** (minimum 3 years), systems and assemblies specified and with approval and training of ***Product*** manufacturers.

.2 ***Subcontractor*** shall be licensed and certified by insulation manufacturer and conform to requirements of CAN/ULC S705.2 for provision of insulation for this ***Project***. Applicators shall have their photo-identification certification cards in their possession and available on site upon request.

.2 Documents on site:

.1 Keep on site 1 copy of manufacturer's installation manual for application of sprayed polyurethane foam insulation.

.2 Keep on site 1 copy of transition membrane manufacturer's installation manual.

.3 ***Mock-up***s:

.1 ***Provide Mock-ups*** in locations designated by ***Consultant*** and as required to demonstrate quality of workmanship. Maintain ***Mock-ups*** during construction in an undisturbed condition as a standard for judging the completed work. ***Provide Mock-up*** panels with identical substrate materials scheduled for use in finished building.

.2 ***Provide*** 1 m^2 (10 sq ft) ***Mock-up*** of spray urethane foam insulation, to which each combination of materials used under this Section shall be installed, interlapped, reinforced and secured to demonstrate compatibility, adhesion and cohesion qualities, fastening systems and general workmanship to be used throughout finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Materials shall be delivered in manufacturer's original sealed containers or holding tanks, clearly labelled with manufacturer's name, ***Product*** identification, safety information, net weight of contents and expiration date.

.2 Store material in a safe manner and where temperatures are within limits specified by material manufacturer (refer to manufacturer's MSDS).

.3 Remove empty containers from site on a daily basis in accordance with CAN/ULC-S705.2 and in accordance with requirements of authorities having

jurisdiction. Dispose of empty containers in conformance with requirements of local Municipality regarding disposal of waste materials.

1.8 PROJECT CONDITIONS

.1 Execute work of this Section when temperature of air and substrate are within limits of data sheet supplied by manufacturer.

.2 Apply spray-foam only when relative humidity is lower than 80%.

.3 Prepare oily surfaces with primer, follow manufacturer's recommendations.

.4 Prime metal surfaces including Z-bars when application temperature is below 5 deg C (41 deg F). Follow manufacturer's recommendations

.5 Ventilate and section off area to receive insulation to maintain a safe working environment.

.6 Protect workers as required by CAN/ULC-S705.2 and manufacturer's MSDS.

.7 Protect adjacent surfaces, windows, equipment and site areas from overspray.

1.9 WARRANTY

.1 Warrant work of this Section for period of 3 years against defects and/or deficiencies in accordance with General Conditions of the ***Contract***. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of ***Consultant*** and at no expense to ***Owner***. Defects include but are not limited to: buckling, opening of seams and bond failure.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:
  .1 BASF Canada Inc.; www.basf.com
  .2 Icyene; www.icynene.com

.2 Substitution Limitations: This Specification is based on BASF's ***Products***. Comparable ***Products*** from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
  .1 Conform to Code and requirements of authorities having jurisdiction.

.2 Performance Requirements:
  .1 ***Provide*** spray polyurethane foam insulation conforming to CAN/ULC-S705.1 and having CCMC Evaluation Report substantiating use as an air barrier system.

.1 Air permeance of Air/vapour membrane system: ≤ 0.02 L/s/m² (0.06 cfm/sq ft) under a pressure differential of 75 Pa (1.56 psf).

.2 Air/vapour membrane system shall control air leakage, moisture and thermal transfer while maintaining its structural integrity in accordance with requirements of NBC.

.3 Air/vapour membrane shall be continuous and compatible with interfacing materials in plane of air-tightness and sealed at interfaces to provide proper air barrier system in construction.

.4 ***Provide*** greater attention for air/vapour barrier continuity at physical connections of material components between window frames and wall assembly while taking into consideration construction tolerance, reduction of unnecessary interfaces in system and providing proper structural support to air/vapour barrier connections, such that wind loads, deflection, and air pressure differentials do not cause connections to fail.

.2 ***Provide*** equipment required for complete installation in accordance with requirements and recommendations of CAN/ULC S705.2 and equipment manufacturer's recommendations for specific type of application.

2.3 MATERIALS

.1 Sprayed Urethane Foam Insulation: CAN/ULC-S705.1, closed cell, medium density spray applied polyurethane foam and capable of being used as an air barrier system in accordance with CCMC's Technical Guide, Air Barrier Systems for Exterior Walls of Low-Rise Buildings. ***Provide*** products utilizing a Zero ODS (Ozone Depleting Substance) blowing agent:

.1 Acceptable Products: “Walltite Eco V2” by BASF Canada Inc or approved equivalent.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

.3 Auxiliary Air/Vapour Barrier ***Products***: Conforming to requirements of Section 07 25 00.

.1 Transition Membrane: 1.0 mm thick, Self-adhering, SBS modified bitumen, sheet membrane complete with a cross-laminated polyethylene film.

.1 Air Leakage: < 0.005 L/s.m²@ 75 Pa to ASTM E283.

.2 Vapour Permeance: 2.8 ng/Pa.m² (.05 Perms) to ASTM E96.

.3 Low Temperature Flexibility: -30°C to CGSB 37-GP-56M.

.4 Elongation: 200% to ASTM D412 modified.

.5 Acceptable Products: "Blueskin SA" by Henry/Bakor or "ExoAir 110" by Tremco or approved equivalent by IKO.

.2 Through-wall flashing: 1.0 mm thick, Self-adhering, SBS modified bitumen, sheet membrane complete with a cross-laminated polyethylene film.

.1 Performance Requirements: Meeting or exceeding the properties of the transition membrane.

.2 Acceptable ***Products***: "Blueskin TWF" by Henry/Bakor or approved equivalent by IKO.

.3 Liquid air seal, insulation adhesive, through-wall flashing and

dampproof coursing material: Synthetic rubber base compound, compatible with air barrier membrane, substrate and insulation materials.

.1 Acceptable *Products*: "Air- Bloc 21" or "230-21" by Henry/Bakor or approved equivalent by IKO.

.4 Primer for self-adhering membranes: in accordance with manufacturer's recommendations for surface conditions.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work.

.2 Examine surface to receive work of this Section to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of work.

.3 Verify conditions in accordance with CAN/ULC-S705.2:

.1 Ensure surfaces to be covered with spray foam, are free of moisture, frost, oil, rust and any other foreign material able to have a negative affect on adhesion of material.

.2 Ensure substrates are completely cured; concrete, mortar, fillers, membranes, primers, coatings or other surfaces, taking into account climatic conditions.

.3 Where application thickness greater than 50 mm (2") and if temperature is lower than 0 deg C (32 deg F), use mechanical fasteners for self-adhesive membranes (galvanized steel angle: 13 mm x 25 mm x 0.455 mm (1/2" x 1" x 0.0179”) in thickness. Fixed at 600 mm (24") intervals.

.4 Respect moisture content of the different materials.

.4 Do not *Install* air/vapour barrier until other work which penetrates membrane has been completed.

.5 Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

.6 Ensure membrane manufacturer's representative is on site at beginning of installation to provide training and supervision of *Contractor's* personnel in installation of air/vapour barrier. Manufacturer’s representative shall provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

.7 Site Tolerances: Maximum variation from indicated thicknesses: +/- 6 mm (+/- 1/4").

3.2 AIR SEAL CONTINUITY

.1 Air/vapour barrier shall provide an impermeable seal to resist infiltration and exfiltration of air and moisture.

3.3 PREPARATION

.1 Apply primer in accordance with manufacturer's written instructions.

.2 Prime all metal and non-porous surfaces when required by polyurethane foam manufacturer’s written instructions.

.3 Provide transition membranes and through wall flashings prior to polyurethane foam application.

.4 Ensure that work by other trades that may penetrate through the air barrier system is in place and complete.

3.4 APPLICATION

.1 Perform spray application of polyurethane foam in accordance with CAN/ULC-S705.2.

.2 Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer. Refer to technical data sheets.

.3 Apply insulation by spray method, to a uniform monolithic density without voids, in lifts having minimum 13 mm (1/2”) thickness not exceeding 50 mm (2”) in a single pass.

.4 Apply to minimum cured thicknesses as indicated on ***Drawings***. Apply ***Product*** uniformly in manner to maintain maximum cavity width of 25 mm (1") in all areas.

.5 Do not apply closer than 75 mm (3”) to chimneys, recessed spot light or other source of heat or as specified by the provincial codes. Not to be used inside electrical outlets or junction boxes.

.6 Do not expose foam to open flames, cutting and welding torches, electric heaters, high intensity lamps, cigars or cigarettes.

.7 Warning signs must be posted and be clearly visible in all sprayed areas. Rigid polyurethane cellular plastic must not be exposed to flames or other sources of intense heat in accordance with CAN/ULC-S705.2.

.8 Finished surface of foam to be free of voids and imbedded foreign objects.

.9 Remove masking materials and overspray from adjacent areas immediately after foam surface has hardened.

.10 Repair damaged areas in accordance with spray polyurethane foam insulation manufacturer's application guidelines.

3.5 CLEANING

.1 Immediately clean adjacent surfaces which have been soiled and leave work in neat, clean condition. Remove excess materials, compound smears or other soiling resulting from application of spray in place foam insulation. Use recommended cleaners and solvents.

3.6 PROTECTION

.1 ***Provide*** approved, non-staining means of protection for completed foam insulation work where required to protect work from mechanical, thermal, chemical and other damage by construction operations and traffic.

.2 Maintain protection securely in place until completion of work. Remove protection when so directed by ***Consultant***.

.3 Repair damaged or deteriorated installations immediately so installations with repaired areas are indistinguishable from original work.

.4 Discolouration will be considered part of normal aging process for foam, especially when exposed to UV.

3.7 FIELD QUALITY CONTROL

.1 Conduct daily visual inspection, adhesion testing and density measurements as required by CAN/ULC S705.2 and the manufacturer's application guidelines. Upon request submit copy of all completed forms to ***Consultant*** prior to making application for payment.

.2 Permit access to site by manufacturer or 3rd Party Inspection Company representative for technical assistance, verification of operator certification or confirmation of quality of polyurethane foam application.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* miscellaneous air/vapour retarders to maintain integrity of air/vapour barrier systems including but not limited to following:
  .1 air/vapour retarders required to maintain air/vapour integrity of building envelope not shown or identified on *Drawings* or specified under another Section.
  .2 coordination of work for this Section with other trades working on building envelope. *Provide* periodic review during construction of wall to ensure proper implementation of system in construction.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.
  .1 Be responsible to ensure that adjacent and related work is performed in accordance with system manufacturer’s recommendations and authorities having jurisdictions.
  .2 Ensure continuity of the air/vapour retarder membrane system throughout the scope of this section.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:

.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

1.5 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include:
.1 Product characteristics.
.2 Performance criteria.
.3 Limitations.
.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, and other materials designated later by *Consultant*.
.3 Submit complete set of standard details for the air/vapour retarder membrane systems showing a continuous plane of air tightness throughout the building envelope.
.4 Submit material check list complete with application rates & minimum thickness of primary membranes.

.2 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.

1.6 QUALITY ASSURANCE

.1 Qualifications: *Provide* work of this Section executed by competent installers with minimum of 5 years' experience in application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers. Ensure compatibility between various types of air/vapour retarders when used adjacent to each others.

.2 *Mock-up* Panels: identical substrate materials scheduled for use in finished building, *Provide* on site in location as directed, *Mock-up* panels to which each combination of materials to be used under this Section shall be installed, interlapped, reinforced and secured to demonstrate compatibility, adhesion and cohesion qualities, fastening systems of flats and general workmanship to be used throughout finished work.

.3 Single Source Responsibility: Ensure primary materials, including sheet membrane, air/vapour retarder sealants, primers, mastics and adhesives provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store materials in weathertight enclosure raised clear of ground so they are protected from sunlight, weather exposure, moisture and deterioration.

.2 Comply with manufacturer's printed recommendations for handling of materials.

1.8 WARRANTY

.1 Warrant work of this Section for period of 3 years against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to; material remaining air and water tight.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:

.1 Bakor Inc.; www.bakor.com

.2 Grace Construction *Products*; www.graceconstruction.com

.3 IKO Industries Ltd.; www.iko.com
.4 Soprema; www.soprema.ca
.5 W.R.Meadows; www.wrmeadows.com

2.2 DESCRIPTION

.1 Design and Performance Requirements:
.1 Air/vapour membrane system shall control air leakage, and control moisture while maintaining its structural integrity in accordance with National Building Code of Canada.
.2 Air/vapour membrane shall be continuous and compatible with interfacing materials in plane of air-tightness and sealed at interfaces to *Provide* proper air barrier system in construction.
.3 *Provide* greater attention for air/vapour retarder continuity at physical connections of material components between window frames and wall assembly while taking into consideration construction tolerance, reduction of unnecessary interfaces in system and providing proper structural support to air/vapour retarder connections, such that wind loads, deflection and air pressure differentials do not cause connections to fail.
.4 Air barrier shall be in accordance with ASTM E1186 for air leakage site detection in building envelope and air retarder systems.
.5 Air/vapour membrane shall have an air permeance of less than 0.02 L/s/m² (0.06 cfm/sq ft) under a pressure differential of 75 Pa (1.56 psf).
.6 Air/vapour membrane shall be able to withstand 2 kPa (42 psf) air pressure from either direction, with no increase in ELA (Equivalent Leakage Air).
.7 When membrane forms a dual role it shall meet all requirements of air tightness control and vapour diffusion control in accordance with ASTM E283 and ASTM E96.
.8 Material Compatibility: Of various materials specified herein, select combination of base materials, transition, bridging and reinforcing membranes, adhesives and accessories so that when cured, they are compatible and give bonding characteristics equivalent to shear strength of selected air/vapour retarder materials used.

2.3 MATERIALS

.1 Air/vapour retarder Membrane: *Supply* 1 or more of following systems:
.1 Air/vapour retarder System Torched Applied:
.1 Primary Membrane (TFT):
.1 SBS modified bitumen, reinforced thermofusible membrane having the following physical properties:
.1 Thickness: 2.5 mm (100 mils) min.,
.2 Air leakage: 0.000 L/s•m² @ 75 Pa,
.3 Vapour permeance: 0.2 ng/Pa.m².s, (0.003 perms),
.4 Low temperature flexibility: -15°C to CGSB 37-GP-56M,
.5 Elongation: 40% md, 40% xd.
.2 Acceptable Products:
.1 "IKO AquaBarrier TG" manufactured by IKO.

.2 "Blueskin-TG" manufactured by Henry – Bakor.
.3 “Sopraseal 60" by Soprema

.2 Air/vapour retarder transition membrane (SA):
.1 SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film having following physical properties:
.1 Thickness: 1.0 mm (40 mils) min.
.2 Air leakage: <0.01 L/s.m² @ 75 Pa to ASTM E283,
.3 Vapour permeance: 1.6 ng/Pa.m².s (0.03 perms) to ASTM E96,
.4 Low temperature flexibility: -30 degrees C to CGSB 37-GP-56M,
.5 Elongation: 200% to ASTM D412-modifed.
.2 Acceptable Products:
.1 "IKO AquaBarrier AVB" by IKO.
.2 "Blueskin SA" manufactured by Henry – Bakor.
.3 "Sopraseal Stick 1100 T" by Soprema Inc.

.3 Through-wall flashing membrane and dampproof course (Self-Adhering):
.1 SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, having the following physical properties:
.1 Colour: Yellow,
.2 High Temperature Stability: 110 degrees C min. to ASTM D5147 (resistance to flow),
.3 Thickness: 1.0 mm (40 mils),
.4 Air leakage: <0.005 L/s.m² @ 75 Pa to ASTM E283-91,
.5 Water vapour permeance: 1.6 ng/Pa.m².s (0.03 perms) to ASTM E96,
.6 Low temperature flexibility: -30 °C to CGSB 37-GP-56M.
.2 Acceptable Products:
.1 "IKO AquaBarrier TWF" by IKO.
.2 "Blueskin TWF" manufactured by Henry – Bakor.

.2 Primers:
.1 As recommended by manufacturer for substrates requiring priming. Provide solvent based fast dry primer or unfilled asphalt primer conforming to CAN/CGSB 37-GP-9Ma or synthetic rubber based adhesive type, quick setting primer for self-adhering membranes effective at temperatures for temperatures as low as -12°C. Ensure primer meets VOC limits of authorities having jurisdiction as recommended by membrane manufacturer.

.3 Mastic: Conforming to CAN/CGSB 37-GP-5M.

.4 Termination Sealants: As recommended by manufacturer to reduce heat loss and restrict air convection between the air/vapour retarder membrane and insulating materials. Provide type compatible with air/vapour retarder membrane, substrate and insulation.

.5 Insulation Adhesive: As recommended by manufacturer.

.6 Sheet Metal Air/vapour retarder and Lap Sealant:
.1 Miscellaneous Metal Air Seal: Minimum 0.76 mm 22 ga) of Grade A, ASTM A653M, Z275 zinc coated steel.
.2 Fasteners and Weld:
.1 Sheet metal screws shall have a minimum of coating thickness of 0.008 mm (0.33 mil) of zinc. Other coatings providing equal or better corrosion protection may be used.
.3 Lap Sealant: Non-Compression Tape, preformed, 100% solids, cross linked butyl rubber, polyisobutylene, hardness 65 Durometer, unaffected by UV, "Tremco 440 Tape" by Tremco Canada. Tape shall be sufficiently wide and thick as to completely cover bite area.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine surface to receive membranes to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of work.

.2 Do not *Install* air/vapour retarder until other work which penetrates membrane has been completed.

.3 Ensure membrane manufacturer's representative is on site at beginning of installation to *Provide* training and supervision of *Contractor's* personnel in installation of air/vapour retarder. Manufacturer’s representative shall *Provide* frequent inspection visits thereafter to assure quality and competence of membrane installation.

3.2 AIR SEAL MEMBRANE CONTINUITY

.1 *Provide* Air/vapour retarder impermeable membrane seal to resist infiltration and exfiltration of air and moisture. Ensure air/vapour membrane function as required to meet design criteria specified herein before.

.2 Apply air/vapour retarder envelope to this *Project* with utmost care to ensure positive support and continuity.

.3 *Provide* flexible sheet membrane at all junctions with dissimilar materials and corners as indicated and required. Apply in addition to fluid adhesive, 1.5 mm x 19 mm (1/16" x 3/4") flats of either extruded aluminum or galvanized sheet steel where attaching air seal membrane to metal frames and similar components.

3.3 INSTALLATION

.1 Protect surrounding surfaces against damage from this work.

.2 Type TFT:
.1 After application of primer, apply thermo- fused membrane in

accordance with manufacturer's written instructions.

.2 Ensure complete coverage of and adhesion of membrane to substrate, including all wall protrusions. Co-operate with other trades to ensure continuity of membrane.

.3 Support vertically placed membrane runs near top of each sheet with mechanical fasteners, applied to substrate at 1500 mm (5') oc. Carefully and completely lap a minimum of 25 mm (1") and flame-seal junction of each membrane sheet.

.4 Reinforce corners with 300 mm (12") wide sheets of Type TFT membrane prior to installing main wall sheets.

.5 Inspect air/vapour retarder for continuity. Repair punctures, rips and tears with pieces of membrane completely heat-fused to damaged membrane.

.6 Where punctures and tears are extensive, replace entire damaged section.

.7 *Install* all joint reinforcements and transition membranes in accordance with requirements specified herein, bridging all cracks greater than 3 mm (1/8") wide, all bends up to 120 and transitions to framing members and similar items penetrating air/vapour retarder membrane.

.8 At all overlapping joints, smooth out with hot trowel.

.9 Vapour barrier installation for this *Project* shall be executed with utmost care to ensure positive support of barrier. This membrane shall act as both air and vapour barrier, and as such requires accurate cutting and placement over supports.

.10 Ensure continuity of this envelope where *Drawings* indicate locations which require 2-phase installation, such as at steel beams and like.

.11 Lap joints minimum 100 mm (4"), adhere continuously to steel framing with double-sided tape and tape all joints with vapour-proof tape.

.3 Type SAT:

.1 Begin installation after mechanical insulation clips have been applied to substrate, have cured and are examined for bond.

.2 Priming:

.1 Apply fluid primer as required to surfaces and allow to dry 1 hour or until tack-free. Prime only areas to be covered by membrane within manufacturers' recommended time period. Reprime surfaces not covered within that time.

.2 Apply primers at a rate of 6 - 8 m^2/L (300 - 400 sq ft/gal) for Type SAT membrane.

.3 Form fillets at inside corners of walls/slabs with liquid membrane.

.3 Flashing, Corner Reinforcing and Transition Membrane:

.1 *Install* membrane flashing in 900 mm (36") widths. Where applicable, bring flashing a minimum of 150 mm (6") onto horizontal surfaces and a minimum of 200 mm (8") up walls from horizontal elevation shown.

.2 Type SAT membrane will be acceptable materials for transition conditions at frames and like.

.3 Stagger all flashing and membrane seams.

.4 *Install* flashing to all protrusions, expansion joints, control

joints and like. Bring flashing a minimum of 150 mm (6") onto membrane.

.5 Apply mastic with inorganic mesh to all flashing seams.

.4 Installation:

.1 *Install* membrane in accordance with manufacturer's printed instructions over flashings and corner reinforcement.

.2 Lay membrane without buckles, fishmouths and avoid stretching membrane. Where membrane cannot extend at least 100 mm (4") onto horizontal surface, terminate in a horizontal reglet and seal.

.3 Lap all membranes 65 mm (2-1/2") on side laps and 150 mm (6") on all end laps. Stagger end laps.

.4 Roll membrane with 75 mm (3") wide hand roller.

.5 Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.

.4 Sheet Metal Air/vapour retarder:

.1 Ensure surfaces receiving sealant or tape are dry firm, straight and free of loose materials, projections, ice, frost, slick grease or oil or other detrimental materials.

.2 Overlap metal panels 50 mm (2") and secure with self taping screws at 150 mm (6") oc along edges of panels and 300 mm (12") to 150 mm (6") oc at intermediate fixings.

.3 At overlapping sheet metal edges, apply continuous strip of tape and gun apply continuous bead of sealant along sheet metal edges to maintain air/vapour retarder integrity. Use flexible washers with fasteners and apply sealant at all penetrating fasteners.

.4 Apply flexible membrane at joints between sheet metal air vapour barrier and adjacent building components, at control joints and at cracks to maintain air/vapour retarder integrity while accommodating expansion and contraction of system.

.5 Flexible Membrane, Reinforcement and Accessories:

.1 Unless otherwise noted, it is responsibility of this Section to *Provide* and maintain continuity of air seal to adjacent dissimilar materials. Fit flexible seals at locations required to *Provide* air/vapour/water resistant and weathertight junctions. Ensure continuity of seal at end joints between lengths of material by overlapping and cementing. Seal junctions of system components to themselves and other Work with sealant to maintain effective vapour, air and water barrier and fix in place with metal flat to air seal line at adjacent material.

.2 Air seal membrane termination shall consist of a compatible flexible membrane reinforcement sheet embedded in a permanent, compatible sealant or fluid type air/vapour retarder material, lapping a minimum of 200 mm (8") on to base materials, and having free edge installed to penetrating framing by combination of adhesive or fluid coating, and finally secured mechanically using continuous metal flats and screws or other mechanical fasteners spaced at 150 mm (6") oc. Flats shall be installed prior to setting up and curing of fluid materials.

.3 Where deflection of structure will cause dynamic joint movement

between metal framing work and dissimilar materials, *Provide* flexible seals of sufficient width to allow formation of bellows to take up any torsional and shear stresses.

.4 Where Types SAT membrane are used as base air/vapour retarder, same material may also be used as flexible transition material.

.5 This work shall be considered as 2-phase work, with final attachment of reinforced bridging sheet to be made at time of installation of door frames and windows by other *Subcontractors*.

.6 Where air/vapour retarder crosses junction between concrete block and concrete columns or beams, *Provide* flexible membrane of 150 mm (6") minimum width to bridge possible openings at such locations.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract;*
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included:
  .1 self-adhered weather-resistive barriers and accessories.

.1 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
      .1 work included,
      .2 materials to be used,
      .3 storage and handling of materials,

.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

1.5 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include:
.1 Product characteristics.
.2 Performance criteria.
.3 Limitations.
.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, and other materials designated later by *Consultant*.
.3 Submit complete set of standard details for the weather resistive barrier membrane systems showing a continuous plane of air tightness throughout the building envelope.
.4 Submit material check list complete with application rates & minimum thickness of primary membranes.

.2 Samples:
.1 Submit duplicate 300 mm x 300 mm (12" x 12") sample of membrane.
.2 Submit duplicate 300 mm (12") long samples of seam tape and each type of flashing materials.

.3 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.

1.6 QUALITY ASSURANCE

.1 Qualifications: ***Provide*** work of this Section executed by competent installers with minimum of 5 years' experience in application of ***Products***, systems and assemblies specified and with approval and training of the ***Product*** manufacturers. Ensure compatibility between various types of weather-resistive barriers when used adjacent to each other.

.2 Be responsible to ensure that adjacent and related work is performed in accordance with system manufacturer's recommendations and authorities having jurisdictions.

.3 ***Mock-up*** Panels: identical substrate materials scheduled for use in finished building, ***Provide*** on site in location as directed, ***Mock-up*** panels to which each combination of materials to be used under this Section shall be installed, interlapped, reinforced and secured to demonstrate compatibility, adhesion and cohesion qualities, fastening systems of flats and general workmanship to be used throughout finished work.

.4 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store materials in weathertight enclosure raised clear of ground so they are protected from sunlight, weather exposure, moisture and deterioration.

.2 Comply with manufacturer's printed recommendations for handling of materials.

1.8 WARRANTY

.1 Warrant work of this Section for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the ***Contract.*** Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of ***Consultant*** and at no expense to ***Owner.*** Defects include but are not limited to: failure of material remaining air and water tight.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:
- .1 Cosella-Dörken Products Inc.; www.cosella-dorken.com
- .2 Dupont; www.dupont.com
- .3 Fiberweb; www.fiberweb.com

.2 Substitution Limitations: This Specification is based on Dupont'sProducts. Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Design and Performance Requirements:
- .1 Material Compatibility: Of various materials specified herein, select combination of base materials, transition, bridging and reinforcing membranes, adhesives and accessories so that when cured, they are compatible and give bonding characteristics equivalent to shear strength of selected weather resistive barrier materials used.
- .2 Air leakage: <0.02L/s/m2 @ 75Pa <0.004 CFM/ft2 @ 1.57 lbs/ft2 when tested in accordance with ASTM E2178.
- .3 Water Vapor Transmission: Minimum 28 perms, when tested in accordance with ASTM E96, Method B.
- .4 Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.
- .5 Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
- .6 Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
- .7 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: ≤ 10, Smoke Developed: ≤ 100.

2.3 MATERIALS

.1 Weather Resistive Barriers for Walls: ASTM E1677, Type I air barrier; with water-vapor permeance of minimum 15 perms (1436 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A); UV stabilized; and acceptable to authorities having jurisdiction. Acceptable Products:
.1 "DELTA®-VENT S" by Cosella-Dörken Products Inc.
.2 "TYPAR MetroWrap" by Fiberweb
.3 "Tyvek® CommercialWrap®" by DuPont™ and related assembly components.

2.4 ACCESSORIES

.1 Flashings: Adhesive butyl rubber or rubberized-asphalt compound, bonded to plastic film or spunbonded polyolefin, with an overall thickness of 0.030 inch (0.8 mm)for window openings and penetrations.

.2 Building Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

.3 Seam tape: Acrylic-based adhesive tape in accordance with weather-resistive barrier manufacturer’s written recommendations.

.4 Fasteners:
.1 Wrap Cap Screws, as recommended by manufacturer; 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4” or 2” metal gasketed washer.

.5 Sealants: Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions as recommended by the weather barrier manufacturer. Ensure sealants are compatible with adjacent materials. Refer to Section 07 92 00.

.6 Adhesives: As recommended by weather barrier manufacturer.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine surface to receive membranes to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of work.

.2 Ensure membrane manufacturer's representative is on site at beginning of installation to ***Provide*** training and supervision of ***Contractor's*** personnel in installation of weather-resistive barrier. Manufacturer’s representative shall ***Provide*** frequent inspection visits thereafter to assure quality and competence of membrane installation.

3.2 AIR SEAL MEMBRANE CONTINUITY

.1 ***Provide*** weather-resistive barrier impermeable membrane seal to resist infiltration and exfiltration of air and water. Ensure membrane functions as required to meet design criteria specified herein before.

.2 ***Provide*** flexible sheet membrane at all junctions with dissimilar materials and corners as indicated and required. Apply in addition to fluid adhesive, 1.5 mm x 19 mm (1/16" x 3/4") flats of either extruded aluminum or galvanized sheet steel where attaching air seal membrane to metal frames and similar components.

3.3 INSTALLATION

.1 Do installation in accordance with ABAA written recommendations for installation of water-resistive barriers.

.2 Apply building wrap immediately after sheathing is installed. Attach weather-resistive barrier to steel studs through exterior sheathing with mechanical fasteners in accordance with manufacturer's written recommendations.
- .1 Secure using fasteners and metal gasketed washers spaced 457 mm (18") maximum vertically on center along stud line and 610 mm (24") maximum on center, horizontally.
- .2 Ensure fasteners penetrate securely through metal studs 19 mm (3/4") minimum.
- .3 Install fasteners 152 mm (6") from sill and frame of window and door openings.
- .4 Ensure fasteners are installed 230 mm (9") minimum from window or door head.

.3 Seal seams, edges, fasteners, and penetrations with building wrap tape.

.4 Extend into jambs of openings and seal corners with building wrap tape.

.5 Flexible Flashing
- .1 Prime substrates as recommended by flashing manufacturer.
- .2 Lap seams and junctures with other materials at least 75 mm (3"), except that at flashing flanges of other construction, laps need not exceed flange width.
- .3 Lap flashing over water-resistive barrier at bottom and sides of openings.
- .4 Lap weather-resistive barrier over flashing at heads of openings.
- .5 After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Services:
- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
- .2 Report any inconsistencies from manufacturer's recommendations

immediately to Consultant.

3.5 CLEANING AND PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by weather-resistive barrier installation.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract;*
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* preformed aluminum composite panel system including but not limited to following:
  .1 air/vapour barrier.
  .2 structural steel framing members required for support of aluminum composite panels.
  .3 insulation.
  .4 preformed aluminum composite panels (ACM), soffits, closures, associated flashings, associated exposed and concealed sealants.
  .5 related trims and extrusions.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 Water penetration and infiltration shall mean appearance of uncontrolled water in wall system.

.2 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of

parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for ***Project*** in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials later designated by Consultant.

.3 Certification:
- .1 Submit in accordance with Division 01.
- .2 Submit preformed aluminum composite system manufacturer's written certification that ***Products***, systems and assemblies have been installed in accordance with manufacturer's requirements.
- .3 Submit design calculations signed and sealed by professional structural engineer registered in the Territory of Nunavut, attesting to ability of aluminum composite panel system assembly to withstand specified design loads including inward and outward loads and loads under fastenings to structure.
- .4 Submit test reports showing compliance with specified performance characteristics and physical properties.

.4 ***Shop Drawings***:
- .1 Submit ***Shop Drawings*** showing layout, profiles, ***Product*** components, including anchorage, accessories, finishes for work of this Section in accordance with Division 01.
- .2 In addition to minimum requirements indicate following:
  - .1 Size, spacing and location of structural supports.
  - .2 Cladding system details.
  - .3 Airseal closures to adjacent parts of ***the Work***.
  - .4 Panel sizes, finishes and identifying marks.
  - .5 Provision for thermal movement.
  - .6 Jointing details and details necessary to accommodate thermal movement.
  - .7 Cut and drilled holes.
  - .8 Anchorage and securement systems including clearances.
  - .9 Interfaces with work of other Sections.
  - .10 Material identification, thicknesses and gauges. Identification of panels as to building location to facilitate panel removal and replacement due to construction damage.
  - .11 Flashing installation method.
  - .12 Locations and details of horizontal fire stopping.
  - .13 Sequence of erection and any special handling or bracing required.
  - .14 Indicate panel sizes and finishes in elevation, sections, materials and thicknesses arrangements of joints and bonding, metal framing and anchorage and flashing.

.5 Samples: Submit samples in accordance with Division 01. Submit following samples:
- .1 Manufacturer's colour charts or chips illustrating full range of colours, finishes and textures.
- .2 300 mm x 300 mm (12" x 12") aluminum composite panel in thickness specified, including clips, anchors, supports, fasteners, closures and other panel accessories necessary for assembly.
- .3 Include panel assembly sample not less than 300 mm x 300 mm (12" x 12") showing 4 way joint system.
- .4 300 mm (12") each of extruded and formed trim.

.6 Maintenance Data:
- .1 ***Provide*** maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual specified in Section.
- .2 Submit instructions for touch-up, repair and removal of panels.

1.6 QUALITY ASSURANCE

.1 Qualifications: ***Provide*** work of this Section executed by competent installers with minimum of 10 years' experience in application of ***Products***, systems and assemblies specified and with approval and training of ***Product*** manufacturers.

.2 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
- .1 design the components of the work of this Section requiring structural performance,
- .2 be responsible for full assemblies and connections
- .3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
- .4 be responsible for production and review of ***Shop Drawings***,
- .5 inspect the work of this Section during fabrication and erection,
- .6 stamp and sign each shop drawing,
- .7 ***Provide*** site administration and inspection of this part of the ***Work***.

.3 Supervision: Arrange for ***Product*** manufacturer's technical representative to:
- .1 meet and discuss installation procedures and unique conditions at the ***Place of the Work.***
- .2 inspect substrate surfaces and recommend solutions to accommodate adverse conditions.
- .3 periodically visit and inspect the installation and report unsatisfactory conditions to ***Contractor***.
- .4 attend final inspection and to submit written certification that ***Products***, systems and assemblies have been installed in accordance with manufacturer's requirements.

.4 Site Mock-up:
- .1 Conform to requirements of Division 01.
- .2 Prior to installation of work of this Section construct 1 site mock-up

of preformed aluminum composite panel system including all components of wall system for ***Consultant's*** review.

.3 Modify site mock-up detailing if necessary in accordance with ***Consultant's*** review.

.4 Site mock-up will serve as reference for detailing and quality of construction for remaining work of this Section

1.7 DELIVERY, STORAGE AND HANDLING

.1 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package composite wall panels for protection against transportation damage. ***Provide*** markings to identify components consistently with ***Drawings***.

.3 Protect finish and edges using a plastic film adhered to panel in accordance with panel manufacturer's recommendations.

.4 Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.

.5 Store components and materials in accordance with panel manufacturer's recommendations. Store components off ground to prevent twisting, bending and defacement. Slope to shed moisture.

1.8 WARRANTY

.1 Warrant work of this Section including finish for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the ***Contract***. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of ***Consultant*** and at no expense to ***Owner***.

1.9 MAINTENANCE

.1 Extra Materials: Submit 1 litre sealed can touch-up paint, properly identified for each panel colour provided.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:

.1 "Alcotex Aluminum Composite Panels" by Alcotex.; www.alcotex.com

.2 "Accumet 2000 FR" by Flynn Canada Ltd.; www.flynn.ca

.3 "SL-2000" by Sobotec Ltd.; www.sobotec.com

.4 "Architectural Panel System #3" by Vicwest; www.vicwest.com

.5 Approved equivalent by Alpolic Materials – Mitsubishi Plastics Composite America; www.alpolic-northamerica.com

.1 Substitution Limitations: This Specification is based on "Alcotex Aluminum Composite Panels". Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Comply with requirements of applicable Code, laws, bylaws, fire regulations, health and safety regulations of authorities having jurisdiction;
- .2 Comply with requirements attributed to engineering to suit design, fabrication and installation of the Work. Ensure standards used for work of this Section are considered a minimum
- .3 Fire Resistance: Where required by building type, classification, occupancy, height or building size, aluminum composite panel system shall be tested by an independent testing organization accredited by Standard Council of Canada in accordance with CAN/ULC-S134 and be approved for use in non-combustible construction in accordance with NBC.

.2 Design and Performance Requirements:
- .1 Design, fabricate and erect preformed aluminum composite panel system to meet following performance requirements:
  - .1 Design aluminum composite panel system based on "Rain Screen Principle" by the National Research Council. Incorporate means of draining moisture to exterior. Design drainage system to provide clear, internal paths of drainage of any trapped moisture within construction to exterior. Ensure weep water discharges in a manner that avoids staining of architectural finishes, collecting in puddles or formation of icicles.
  - .2 Design metal framing system to support thermal insulation and aluminum composite panel system. Design metal framing system to incorporate gridlock to eliminate rocking of Z-bars on gypsum board or other support sub wall systems.
  - .3 Design aluminum composite panel system including its support and attachments to resist wind loads, positive and negative, expected in this geographical region (NBC climatic data, 30 year probability), 1 kPa with a maximum allowable deflection of L/180, per ASTM E72 without causing rattling, vibration or excessive deflection of panels, over stressing of fasteners, clips and other detrimental effects on wall system.
  - .4 Tolerances: Panel Bow: Maximum 0.8% of panel dimension in width and length of any 1828 mm (72") panel dimension. Panel fabrication tolerances for length or width to be maximum of ± 1 mm (3/64") and variation from theoretical diagonal dimensions of finished panel cannot exceed 3 mm (1/8"). Joints to not vary more than 5% of their dimensioned width at any location along full joint length and to not be wavy, out of line, or of different width from panel to panel. Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm (1/4") in (20') non-accumulative
  - .5 Design aluminum composite panel system to accommodate structural and thermal movement of supporting structural framing and movement caused by thermal expansion and contraction of system component parts without causing bowing, backing, delamination, oil canning, failure of joint seals,

excessive stress on fasteners or any other detrimental effects.

.6 Design aluminum composite panel system with deflection of perimeter framing member not to exceed L/175 normal to plane of wall and deflection of individual panels not to exceed L/60. At connection points of framing members to anchors, anchor deflection in any direction shall not exceed 1.6 mm (1/16"). Allow for free horizontal and vertical thermal movement, due to expansion and contraction of components over temperature range recommended by manufacturer for specific location. Buckling, opening of joints, undue stress on fasteners, failures of sealants or other detrimental effects due to thermal movement shall not be acceptable. Design aluminum composite panel system not to exhibit any permanent deformation when subjected to design loads. Make allowance in aluminum composite panel system for movement within system caused by deflection in building structure.

.7 Design aluminum composite panel system to provide continuous air/vapour barrier and sealed at joints, laps, terminations and penetrations to prevent air infiltration and exfiltration and to effectively retard moisture vapour migration through system.

.8 Design system to allow for movement of air between exterior and interior side of aluminum composite cladding.

.9 Design system that have been tested and certified to conform to following criteria:

.1 Air leakage shall not exceed 0.003 (L/s) m^2 (0.06 cfm/sf) when tested at 0.075 kPa (1.57 psf) in accordance with ASTM E283.

.2 No water penetration or infiltration after 15 minutes, under static pressure at differential of 10% of inward acting design load 0.299 kPa (6.24 psf) minimum, when tested in accordance with ASTM E331

.3 System shall be tested in accordance with ASTM E330 at design pressure specified herein above and shall be certified to be without permanent deformation or failures of structural members. Minimum design pressure of 3.12 kPa (65 psf).

.4 Panel flatness tolerance applies to even rises and falls across panel. Local bumps and depressions will not be accepted. Fabricate panels not exceeding the following tolerances:

.1 1.5 mm (0.06") in a convex direction, measured perpendicularly to normal plane.

.2 1.5 mm (0.06") in a concave direction, measured perpendicularly to normal plane.

.5 Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm (1/4") in 6 m (20' - 0").

.6 Maximum deviation from panel flatness shall be 3 mm (1/8") in 1500 mm (59") panel in any direction for assembled units (non-accumulative).

2.3 MATERIALS

.1 Torched Applied Air/Vapour Barrier Membrane:
  .1 Primer: Unfilled asphalt conforming to CAN/CGSB 37-GP-9Ma. or 53% solid 2 waterbased primer meeting VOC limits of authorities having jurisdiction or as recommended by membrane manufacturer.
  .2 Mastic: Conforming to CAN/CGSB-37.5-M89.
  .3 Membrane: Torch applied, thermofusible reinforced modified asphalt membrane with average minimum thickness of 2.5 mm (3/32"), reinforced with non-woven polyester or glass fibre fabric, both sides of membrane covered with plastic film, cut to suit design and lap requirements; "Sopraseal 60" by Soprema, "Blueskin TG" by Bakor Inc. or "IKO AquaBarrier TG" by IKO Industries Ltd.

.2 Insulation:
  .1 ***Supply*** semi-rigid Mineral Wool – Category 2 (INSUL-WOOL2) or
  .2 Mineral Glass Fibre – Category 1 (INSUL-GLASS1)board as specified in Section 07 21 00,
  .3 conforming to CAN/ULC-S702 having minimum density of 48 kg/m3 (3 lbs/cu ft).and minimum thermal value of RSI = 4.9 (R28); thickness as shown on ***Drawings***.

.3 Fasteners for Rigid Insulation: Type N "Stik-Klip" fasteners and Type S neoprene adhesive, with self-locking washers manufactured by Eckel Industries of Canada Ltd., Morrisburg, "Insul-Anchors" by Continental Stud Welding Inc., or impale type, perforated 2" x 2" cold rolled steel, 22 gsg adhesive pack, spindle of 0.098 x 0.106" dia. annealed steel, length to suit insulation 1" dia. washers of self-locking nylon manufactured by Fleck Bros.

.4 Insulation Adhesive: CGSB 71-GP-24M, Type II, rubber asphalt adhesive, compatible with insulation, Bakor 230-21 by Bakor Inc.

.5 Weather-resistive barrier: Refer to Section 07 25 00.

.6 Preformed Aluminum Composite Panels (ACM):
  .1 Face and Liner Material: Minimum 0.51 mm (0.02") 3105-H14 aluminum alloy.
  .2 Coil coated with specified high performance finish.
  .3 Liner coated with chrome or polyester.
  .4 Thermally bonded in a continuous process to core material.
  .5 Core: Extruded thermoplastic "FR" core.
  .6 Panel Thickness: 4 mm (5/32").
  .7 Bond Integrity: For resistance to delamination and peeling:
    .1 Bond Strength: 10.3 MPa (15000 psi) when tested in accordance with ASTM C297.
    .2 Peel Strength: 150 N-m/m (33.6 in-lb/in) minimum when tested in accordance with ASTM D1781.
    .3 No degradation in bond performance after 8 hours of submission in boiling water and after 21 ***Days*** of immersion in water at 21 deg. C (70 deg. F)
  .8 Fire Performance
    .1 Flame spread: ASTM E84, 0
    .2 Smoke Developed: ASTM E84, 0
    .3 Surface Flammability: Modified ASTM E108, pass.

.9 Production Tolerances:
- .1 Length and Width: ± 1 mm/m (0.04"/3')
- .2 Thickness: ± 0.2 mm (0.008")
- .3 Bow: Maximum 0.5% per length or width.
- .4 Squareness: Maximum 5.1 mm (0.2")
- .5 Edges of sheets shall be square and trimmed with no displacement of aluminum sheets or protrusion of core materials.
- .6 Panel Dimensions: Make allowance for field adjustments, in manner recommended by manufacturer, where final dimensions cannot be established by field measurement prior to panel manufacturing.
- .7 Panel lines, breaks and angles to be sharp and true: panel surfaces to be free from warp or buckle.

.7 Strippable Coating: Applied prior to roll forming and embossing.

.8 Panel, Wall and Soffit Accessories:
- .1 ***Provide*** proprietary aluminum extrusions compatible with panel edges, manufacturer's standard profiles, vertical and horizontal joint closures, perimeter trim, clips and attachments as required for a complete installation.
- .2 Fasteners and Anchorage Devices: Stainless steel of proper size for fastening, concealed, non-corrosive, corrosion resistant in accordance with manufacturer's recommendations to meet design load requirements specified and to maintain a weather-resistant installation.
- .3 Typical joinery shall be attached with concealed fasteners. When exposed fasteners are required in isolated conditions, the fastener shall be obscured in the panel joinery, exposed fasteners shall be stainless steel.
- .4 Extrusions and extrusion clips for attaching panels to substructure: purpose made aluminum. ***Install*** a separator between extrusions and sub-girts.
- .5 Joint filler strip: same material as panels.

.9 Sub-Girts, Z-bars: Sheet steel conforming to ASTM A653M, Grade A Zinc coating to Z275 designation, formed from minimum 1.219 mm (18 ga) base thickness. Transfer grid may be hat bars, Z-bars, adjustable Z-bars or combination of clip and Z-bar. Material visible after assembly of wall panel shall be finished to match aluminum panels.
- .1 Thermal Spacers: ***Provide*** low-conductivity, thermally broken structural clips to maintain effectiveness of assemblies' R-values. Acceptable ***Products***:
  - .1 Cascadia Clip; www.cascadiawindows.com
  - .2 TClip Thermally Broken Façade Substructure; www.engineeredassemblies.com

.10 Stiffeners, as required: Minimum 25 mm (1") x 25 mm (1") aluminum, bonded to the full length of face sheet using double sided high bond isolating tape to prevent weather staining and frost lines to face of the panel. Bonding tape to be protected with continuous bead of caulking on both sides of stiffeners, type as recommended by manufacturer.

.11 Fasteners:

.1 High Strength Bolts: To ASTM A325M. Supply each type and size of bolt and nut of same manufacture and of same lot.

.2 Bolts: To ASTM F568M, Property Class 4.6. Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.

.3 Nuts: To ASTM A563M. Heavy hexagon semi-finished nuts.

.4 Washers: For general use bolt, nut and stud application to provide increased bearing surfaces, spacing and to prevent galling. Flat and smooth hardened washers, quenched and tempered to suit applications and comply with ASTM F436M, F844 and ASME B18.22M. Provide AISI Type 304 stainless steel alloy washers at exterior locations.

.5 Lock Washers: Helical spring type steel "lock" washers to suit applications and comply with to ASME B18.21.2. Provide AISI Type 304 stainless steel lock washers at exterior locations.

.6 Stainless Steel Bolts: To ASTM F738M, AISI Type 304 stainless steel alloy.

.7 Stainless Steel Nuts: To ASTM F836M, AISI Type 304 stainless steel alloy.

.8 Concealed Fasteners for Aluminium Composite Panels and Trim: To ASTM F738M. Corrosion resistant, AISI Type 304 stainless steel self-drilling and tapping No. 12 TEK type screws.

.9 Separator Sheet: To ASTM D1330, 0.079 inch (2 mm) thick neoprene sheet.

.12 Isolation Coating: Acid and alkali resistant material conforming to CAN/CGSB-1.108-M, Type 2.

.13 Flashings: Panel design to include for corners, jambs and abutments. Flashings shall not be permitted at these locations.

.1 Sill flashings to be of matching gauge and finish as panels complete with reinforce back up splice plates at joints and directional changes.

2.4 FABRICATION

.1 Coordinate and verify job site dimensions affecting this work. Submit in writing dimensions or conditions which vary from those on reviewed ***shop drawings*** or detrimental to installation. Obtain corrective measures from ***Consultant*** prior to fabrication. Ensure suitability of adjacent building components in relationship to work of this Section.

.2 Fabricate components of aluminum composite panel system in factory and ready for field installation. Radiused formed components shall be bent to true circular curve. Fabricate metal panels for designated facade complete with trims to profiles and finish required to meet design requirements. Form panel lines, breaks and angles sharp, true with adjacent surfaces and free from warp and buckle. Fabricate sharply cut edges with no displacement of aluminum sheet or protrusion of core.

.3 Fabricate with straight lines, square corners and/or smooth bends, free from twists or warps, kinks, dents and other similar imperfections which may

affect appearance and/or serviceability. Exposed edges and ends of metal shall be dressed smooth, free from sharp ends. Connections and joints exposed to element shall be constructed to exclude water.

.4 Carry out complete fabrication including welding, grinding, punching and like to finish work. Make welds clean, sound and solid, free from defects. Grind smooth, free from marks.

.5 Attach all clips and necessary attachments.

.6 Finished cladding shall be free from visible defects and accurately manufactured to dimensions of reviewed ***Shop Drawings***.

.7 Make connections rigid and fail-safe wherever practicable, and make completely concealed.

.8 Coordinate openings required by other trades and ***Provide*** openings in panels prior to finishing whenever possible. Reinforce perimeter of openings to meet design requirements and as recommended by manufacturer.

.9 Fabricate all flashing pieces associated with and in contact with wall panel system from 1.57 mm (0.062") minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Use same sheet stock as exposed face sheets, pre-finished to match.

.10 Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and ***Provide*** weathertight installation including non-corrosive fasteners.

.11 ***Provide*** for condensation and inner wall drainage at sill members and other shapes which would otherwise tend to trap water.

.12 Prior to commencement of fabrication, obtain ***Consultant's*** final approval of colours. Fabricate to manufacturer's standard assembly line production methods, incorporating unique conditions of this ***Project***.

2.5 FINISHES

.1 Factory coil-coating meeting or exceeding following property and performance requirements:
- .1 Primer and fluoropolymer thermal setting enamel meeting or exceeding AAMA 2605 with minimum 70% fluoropolymer resin, polyvinyldiene fluoride (PVDF), 3 coat system. 'Duranar XL' by PPG Industries or approved equivalent by Valspar or Hylar;
- .2 Colours: To be selected at a later date by Consultant from manufacturer's full range.
- .3 Touch-up paint: ***Provide*** matching touch-up paint supplied by coating manufacturer for minor touch-up of small scratches, abrasions, and fasteners. Paint to be applied with an artist brush, and never spray applied.

.2 Painting: Concealed surfaces of aluminum and galvanized steel which would otherwise come in direct contact with structural steel or concrete shall

be given a heavy coating of bituminous paint.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

.2 Examine and verify structural components to ensure walls and openings are within specified tolerance and structure is plumb within 1: 1000 of overall height.

.3 Do not *Install* air/vapour barrier until other work which penetrates membrane has been completed.

.4 Ensure membrane manufacturer's representative is on site at beginning of installation to provide training and supervision of *Contractor's* personnel in installation of air/vapour barrier. Manufacturer's representative shall provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

3.2 INSTALLATION

.1 Air/Vapour Barrier: Conform to requirements of Section 07 24 00.
- .1 Entire membrane shall be completely thermo-fused (after application of primer), in accordance with manufacturer's written instructions.
- .2 Ensure complete coverage of and adhesion to substrate, including all wall protrusions. Co-operate with other trades to ensure continuity of membrane.
- .3 Vertically placed membrane runs shall be supported near top of each sheet with mechanical fasteners, applied to concrete substrate at 1500 mm (5') oc. Carefully and completely lap a minimum of 25 mm (1") and flame-seal junction of each membrane sheet.
- .4 Reinforce corners with 300 mm (12") wide sheets of Type TFT membrane prior to installing main wall sheets.
- .5 Inspect air/vapour barrier for continuity. Repair punctures, rips and tears with pieces of membrane completely heat-fused to damaged membrane.
- .6 Where punctures and tears are extensive, replace entire damaged section.
- .7 *Install* all joint reinforcements and transition membranes in accordance with requirements specified herein, bridging all cracks greater than 3 mm (1/8") wide, all bends up to 120˚ and transitions to framing members and similar items penetrating air/vapour barrier membrane.
- .8 At all overlapping joints, smooth out with hot trowel.
- .9 Installation:
  - .1 *Install* membrane in accordance with manufacturer's printed

instructions over flashings and corner reinforcement.

.2 Lay membrane without buckles, fishmouths and avoid stretching membrane. Where membrane cannot extend at least 100 mm (4") onto horizontal surface, terminate in a horizontal reglet and seal.

.3 Lap all membranes 65 mm (2-1/2") on side laps and 150 mm (6") on all end laps. Stagger end laps.

.4 Roll membrane with 75 mm (3") wide hand roller.

.10 Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.

.2 Sub-girt Installation:

.1 Erect sub-girts fastened through air/vapour barrier to steel studs in accordance with system manufacturer's installation details and instructions.

.2 Sub girts system shall be attached to structure as required to transmit design loads.

.3 Sub girt framing shall be straight to match plane of aluminum composite panel system as required to meet installed panel tolerances with straight, sharply formed edges.

.4 After their correct position has been determined and allowances for expansion, building movement, uniform joint width and alignment of all parts have been reviewed, components shall be permanently fastened.

.3 Insulation:

.1 Ensure surfaces to receive insulation are dry and free of matter detrimental to uniform bedding of insulation.

.2 Apply adhesive to insulation board at rate of 1 L/m^2 (50 sf/gal) by notched trowel with 5 mm (3/16") notches at 10 mm (3/8") oc or apply at rate of 0.35 L/m^2 (130± 10 sf/gal) by spot method with daubs 25 mm - 40 mm (1" to 1-1/2") dia x 25 mm (1") high at 200 mm (8") oc each way or by bead method with 8 mm (5/16") diameter beads 350 mm (14") oc.

.3 Fix insulation clip type fasteners on substrate, 600 mm x 1200 mm (2 per 24" x 48") board minimum. Impale insulation board on insulation clips, butting all joints firmly together and secure with washers, cut off spindles 3 mm (1/8") beyond washer.

.4 ***Install*** insulation to maintain continuity of thermal protection to building elements and spaces.

.4 Weather Barrier: Conform to requirements of Section 07 25 00.

.1 Install weather barrier over exterior face of exterior wall in accordance with manufacturer recommendations.

.2 Install weather barrier prior to installation of windows and doors. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

.3 Seams: minimum 6 inches.

.4 Weather Barrier Attachment:

.1 Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

.5 Flashing: Apply flashing to weather barrier membrane prior to installing cladding anchors Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.Seal any tears or cuts as recommended by weather barrier manufacturer. Flush cut weather barrier at edge of sheathing around full perimeter of opening. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.

.5 Wall Panel System:

.1 Erect panels and joint filler strip in accordance with system manufacturer's details and instructions and so as to meet specified design and performance requirements.

.2 Erect panels plumb, true, level and in alignment to established lines and elevations.

.3 Erected panels shall not deviate from overall plane or alignment by more than 1:1000. Joints shall not be less than their dimensioned width at any location along their full length and shall not wavy, out of line or of different width from panel to panel.

.4 Finished work shall be securely anchored, free of distortion and surface imperfections, uniform in colour and gloss.

.5 Use concealed fastenings only, except where exposed fastenings are specifically permitted by ***Consultant*** in writing. Seal all joints in accordance with requirements of Section 07 92 00.

.6 Where indicated on ***Drawings*** or as required to complete work of this Section, ***Supply*** and ***Install*** closures, caps, fascias, covers and trims with colour matching panel finish, where exposed.

.7 ***Install*** flashing to divert moisture to exterior.

3.3 FIELD QUALITY CONTROL

.1 Site Tests, Inspection:

.1 Ensure manufacturer’s representative carries out intermediate inspections of air barriers and insulations in the system prior to enclosure and concealment of cladding and soffit cladding system.

.2 Ensure walls and openings are within ±3 mm (± 1/8") and structure is plumb within 1:1000 of overall height.

.3 Have manufacturer’s representative and ***Contractor*** carry out final inspection and approval of completed work.

3.4 CLEAN-UP

.1 Remove protective film from panels.

.2 Clean exposed panel surfaces in accordance with manufacturer's instructions.

.3 Repair and touch-up with colour matching high grade enamel minor surface damage, only where permitted by ***Consultant*** and only where appearance after touch-up is acceptable to ***Consultant***.

.4 Replace damaged panels and components which in opinion of ***Consultant*** cannot be satisfactorily repaired.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein

1.2 SUMMARY

.1 Work Included: *Provide* pre-finished preformed aluminum siding system including but not limited to following
  .1 secondary structural steel framing members required for support of aluminum siding system, fascia and soffit system not shown on Structural *Drawings*.
  .2 aluminum siding system includes:
    .1 air space,
    .2 insulation,
    .3 and air/vapour barrier over sheathing,
    .4 including associated trims, extrusions, flashings, closures, sealants.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's

consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
- .1 work included,
- .2 materials to be used,
- .3 storage and handling of materials,
- .4 installation of materials,
- .5 sequence and quality control,
- .6 Project staffing,
- .7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
- .1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
- .2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
- .3 Co-operate with other Sections for application of all miscellaneous specialties.
- .4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
- .5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01.
- .2 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 *Shop Drawings*:
- .1 Submit shop and erection *Drawings* for work of this Section in accordance with Division 01.
- .2 Ensure shop and erection *Drawings* are stamped and signed by a structural engineer licensed to practice in the Territory of Nunavut.
- .3 Submit *Shop Drawings* which clearly indicate type of materials and *Products* being supplied, connections, attachments, supplementary

framing and structural supports, flashings, sealants, gutters and relationship with adjacent components and construction, surface finish, type and thickness of insulation, thicknesses of sheet steel roofing, fastening devices, anchorage components and methods, trim details, size, spacing of cleats and location of structural support, connections, air seal closures, sealants and gaskets, paths of pressure equalization and cavity drainage, types and locations of fastenings. Indicate provisions for structural and thermal movement between metal cladding and adjacent materials.

.4 Include details of installation, manufacturer's installation instructions where available and complete data on supplementary structural back-up system being furnished under this Section, along with interface details.

.4 Samples:

.1 Submit samples of sheet steel roofing system *Consultant* complete with components, fastening system and finishes for review. Do not order material until colour samples have been approved.

.2 For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

.3 Verification Samples: For each finish product specified, two samples, minimum size 2 inches (51 mm) by 3-1/2 inches (89 mm), representing actual product, color, and gloss.

.5 Engineering Data: Submit engineering data substantiating that previously specified structural requirements of roofing assembly meet minimum requirements of CSA S136.

.6 Certification: Submit written certification that *Products*, systems and assemblies have been installed in accordance with manufacturer's requirements.

1.6 QUALITY ASSURANCE

.1 Manufacturer’s Qualifications: Manufacturer of roof system, and installer shall demonstrate at least 5 years’ experience in projects similar in scope

.2 Applicator Qualifications: Execute work of this Section using trade specialists having minimum 5 years’ experience in application of *Products*, systems, assemblies specified and trade specialists approved by manufacturer. Submit evidence upon *Consultant’s* request.

.3 Qualifications of Fabricator: Execute work using firm thoroughly conversant with laws, by-laws and regulations which govern and is capable of quality of work consistent with best modern shop and field practice known to recognized manufacturers specializing in this work.

.4 Qualifications of Welders: Perform welding of structural components related to work of this Section using fabricator having minimum certification of Division 3 of CSA W47.1. Conform to Technical Bulletins and Metric Standards of CSSBI.

.5 Single Source Responsibility: Ensure primary materials provided in this

Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.6 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
- .1 design the components of the work of this Section requiring structural performance,
- .2 be responsible for full assemblies and connections
- .3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
- .4 be responsible for production and review of *Shop Drawings*,
- .5 inspect the work of this Section during fabrication and erection,
- .6 stamp and sign each shop drawing,
- .7 *Provide* site administration and inspection of this part of the *Work*.

.7 Supervision of work of this Section: Arrange for *Product* manufacturer's technical representative to:
- .1 meet and discuss installation procedures and unique conditions at *Place of the Work*.
- .2 inspect substrate surfaces and recommend solutions to accommodate adverse conditions.
- .3 periodically visit and inspect installation and report unsatisfactory conditions to *Contractor*.
- .4 attend final inspection and to submit written certification that *Products*, systems and assemblies have been installed in accordance with manufacturer's requirements and recommendations.

.8 Site Mock-up:
- .1 Conform to requirements of Division 01.
- .2 Prior to installation of work of this Section construct 1 site mock-up of preformed aluminum modular plate system including all components of wall system for Consultant's review.
- .3 Modify site mock-up detailing if necessary in accordance with Consultant's review.
- .4 Site mock-up will serve as reference for detailing and quality of construction for remaining work of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site only when work of this Section can be started.

.2 Should storage on site become necessary follow manufacturer's recommendations. Without limitations store materials flat at site under protection to prevent staining from the ground or from collection of water on material, or both; and secure against wind damage. Protect sheet metal materials from bending and scratching. *Provide* air circulation around finished metal surfaces. Store insulation and adhesives in dry areas, heated as required to prevent damage to adhesives.

.3 *Provide* necessary crating and bundling for the shipment of components to

the site including protection against weather likely to impair the adequacy or appearance of the material in the finished assembly. Do not load any package beyond the design limit and properly protect all components against damage.

.4 Remove and replace damaged and bent units at no additional cost to *Owner*.

.5 Hoist components in an acceptable manner to the working level without damaging units and exposed surfaces. Protect exposed surfaces.

1.8 WARRANTY

.1 Warrant work of this Section for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

.2 Manufacturer’s limited warranty against cracking, peeling and gloss/color retention within the guidelines stated by the American Aluminum Manufactures Association (AAMA).
- .1 Standard Colors:
  - .1 D2000 - AAMA 2604 15 Year manufacturer's Warranty
  - .2 D3000 - AAMA 2605 20 Year manufacturer's Warranty
- .2 Woodgrains
  - .1 AAMA 2604 15 Year manufacture's Warranty

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 Agway Metals Inc.; www.agwaymetals.com
- .2 Mayne Coatings Corp.; www.maynecoatings.com
- .3 VICWEST; www.vicwest.com

.2 Substitution Limitations:
- .1 Aluminum Siding System design is based on Mayne Coatings Corp.; www.maynecoatings.com “Extruded Aluminum Siding and Soffits: Longboard Wood Grain Aluminum Siding and Soffits with Alluminate bonded Film Finish complete with extruded aluminum with integrated venting system.
- .2 Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.
- .3 Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
- .4 Certificates: Submit certificate(s) certifying substitute manufacturer attesting to adherence to specification requirements for roofing system performance criteria, and has been engaged in the design, manufacturer and fabrication of roofing system for a period of not less than 5 years complete full company name.

.5 Test Reports: Submit test reports verifying compliance with each test requirement for roofing system required by Project.

.6 Product Sample and Finish: Submit product sample, representative of roofing panels for the Project, with specified finish.

2.2 DESCRIPTION

.1 Regulatory Requirements:

.1 Conform to NBC requirements for wind and snow loads and environmental data for a 1 in 30 year probability factor.

.2 Design and Performance Requirements:

.1 Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with applicable code.

.2 Design system based on "Rain Screen Principle" by the National Research Council. Incorporate means of draining moisture to exterior

.3 Movement: Accommodate movement within system without damage to components or movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.

.4 Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.

.5 Description represents in general without limitations, extent of work of aluminum siding system supplied under this Section, with final determination of exact limits of such work indicated on *Drawings*.

.6 Design structural elements in accordance with CAN/CSA S136.1 to withstand live, dead, lateral wind, handling, transportation and erection loads.

.7 Design aluminum siding system to provide a vented and drained system which will prevent infiltration of water into system. *Provide* means of drainage and air space between insulation and exterior skin in accordance with the 'Rain Screen Principle".

.8 Design to accommodate movement between aluminum siding system and building structure caused by structural movement, without permanent distortion, racking of joints, breaking of seals, water penetration of other damage. Design to allow for sufficient tolerances to accommodate building tolerances and deflections.

.9 Design system to provide continuous barrier against water and vapour transmission and air movement effectively sealed at laps, penetrations and terminations.

.10 Design work of this Section to meet or exceed the NBC requirements for wind and snow loads, based on a 1 in 30 year occurrence.

.11 Design structural supports and anchorage system to maintain profiles and aluminum siding as indicated on *Drawings*.

.12 Allow for thermal movements from ambient and surface temperature changes by preventing buckling, overstressing of components, failure of connections, and other detrimental effects.

.13 Temperature Change (Range): 20 deg C, ambient; 40 deg C, material surfaces

.14 Design gutter system where applicable.

.15 Thermal: Minimum R value to meet or exceed design requirements.

2.3 MATERIALS

.1 Extruded Aluminum Siding and Soffits:
- .1 Longboard Wood Grain Aluminum Siding and Soffits with Alluminate bonded film finish is extruded aluminum with integrated venting system.
- .2 Size:
  - .1 Width:
    - .1 4 inch V Groove Siding and Soffit.
  - .2 Length:
    - .1 12 feet.
    - .2 24 feet.

.2 Accessories: Prefinished aluminum: Provide with matching accessories and starter strips as required.
- .1 J Track.
- .2 J Track Non-Tempered.
- .3 Craftsman Single J Trim.
- .4 Craftsman Double J Trim.
- .5 Wide Starter Strip.
- .6 U Cap (pc 1 of 2) used with mill finish 102001 Base.
- .7 Flat Cap (pc 1 of 2) used with mill finish 102001 Base.
- .8 Inside Corner.
- .9 Outside Corner.
- .10 Closer Trim (pc 1 of 2) used with mill finish 102312 Closer Base.
- .11 Craftsman Closer Trim (pc 1 of 2) used with mill finish 102312 Closer Base.
- .12 Base (pc 2 of 2) used with Profile 102002 and 102315.
- .13 Closer Base (pc 2 of 2) used with Profile 102313 and 102314.
- .14 Rain Screen.

.3 Thermally Broken Backframing system: Provide clip sizes and girt lengths required.
- .1 Thermally Broken Clip for external insulation:
  - .1 2 inch Clip System.
  - .2 3 inch Clip System.
  - .3 4 inch Clip System.
  - .4 5 inch Clip System.
  - .5 6 inch Clip System.
- .2 Girts: Extruded aluminum:.
  - .1 12 foot Standard Length.

2.4 FINISHES

.1 Pretreatment:
- .1 E-CLPS Chrome Free five stage aluminum pretreatment system.
- .2 Complies with AAMA 2603 AAMA 2604 and AAMA 2605 Superior Performance Standard and meets EPA, OSHA, State and Local environmental requirements and contains no chromates, cyanides or other heavy metals. Waste treatment is usually a simple pH neutralization and disposal to the sanitary sewer.

.2 Powder Coating System:

.1 Akzo Nobel Interpon D2000 Series electrostatically applied Architectural Powder Coatings are approved to AAMA 2604 Performance Standard.
.2 Gloss Level: Standard Gloss is 30 percent, plus or minus 5 percent.
.3 Solid Colors: Selected later by Consultant from manufacturer's full color range.

.3 Miscellaneous Secondary Angles, Sub-Girts, flat, Hat Bars and Z Bars, Structural Supports: Manufactured from galvanized sheet steel in accordance with requirements of ASTM A653M, Grade A, minimum 1.214 mm (18 ga) overall thickness, zinc coating Z275 (G90), at centres as determined by siding thickness.

.4 Miscellaneous Secondary Steel Shapes Including Plate and Hollow Sections: CSA G40.21, Grade 350W, or ASTM A1396M hot dipped galvanized complete with shop applied primer of either CPMA/CISC 1-73 or CGSB 1-GP-140M. Deck reinforcement and hat bar minimum 1.897 mm (14 ga).

.5 Gypsum Glass Mat Reinforced Board Sheathing: *Supply* gypsum glass mat reinforced silicone treated [silicone free] board conforming to ASTM C1177M, non combustible according to ASTM E136/CAN4-S114-M thermal barrier as tested to UL 1256/ CAN/ULC-S126-M, flame spread 0, smoke developed 0 to ASTM E84/ CAN/ULC-S102-M and ASTM D3273 with a rating of 10, no mould growth after 4 weeks exposure, 13 mm (1/2") or for fire rating requirement 16 mm (5/8") thick gypsum board 1200 mm (4') wide, maximum practical length, tapered edge as required, "DensGuard DensDeck Prime Roof Guard" by Georgia-Pacific Canada, Inc.

.6 Rigid Insulation: CAN/ULC-S702, rigid mineral or glass fibre board having minimum 4.0 lb/sq ft and minimum of thermal value R15; "730 (formerly AF 530)" by Owens-Corning Canada Inc., "RXL 40" by Roxul Inc. or "CWB 45" by Fibrex Inc., thickness as shown on *Drawings*. Insulation shall be rigid and dense enough to transfer live load to solid substrate below.

.7 Fasteners for Rigid Insulation: Factory Mutual approved, "Buildex S-12 Rock-On Climaseal - Coated Screws" by Buildex Fastening Systems, or "Lexgrip Fastening Screws" by Lexcor, corrosion resistant, self-tapping screws complete with 50 mm (2") diameter metal lap plate, minimum 30 mm (1-1/4") long to provide 13 mm (1/2") penetration into substrate.

.8 Insulation Adhesive: CGSB 71-GP-24M, Type II, rubber asphalt adhesive, compatible with insulation, Bakor 230-21 by Bakor Inc.

.9 Fasteners for Roofing System: As recommended by cladding manufacturer, adequate for safe and secure fastening. Fasteners in concealed clips shall be stainless steel Type 304 screws.

.10 Girts, clips and brackets to be structural steel or formed sheet steel of required thickness and size to meet design requirements, hot-dip galvanized. ASTM A653M, Z275 designation zinc coated painted steel components, minimum 1.214 mm (18 ga). Conform to manufacturer's recommendations to suit design requirements.

.11 Thermal Break: 3 mm (1/8") core x 25 mm (1") wide cork composition.

.12 Air/Vapour Barriers: SBS modified bituminous sheet membrane reinforced with glass scrim, self-adhering, 1.14 mm (45 mil) thick minimum; “Blueskin SA” by Bakor Inc., having following characteristics:
.1 Thickness: 1.14 mm
.2 Application temperature: 5 deg C
.3 Service temperature: -40 deg C to 70 deg C
.4 Low temperature flexibility: -30 deg C (CAN/CGSB-37.5)
.5 Breaking strength:
.1 md>150 N/5cm
.2 xd≥150 N/5cm
.6 Air permeance: < 0.01 L/m² at 75 Pa pressure difference

.13 Fasteners Minimum No. 12-gage [0.109-inch-shank-diameter (2.77mm)] corrosion-resistant steel or stainless steel nails having a minimum 3/8-inch diameter (9.5 mm) head, or minimum No. 14 gage [0.083-inch-shank-diameter (2.11 mm)] corrosion-resistant steel or stainless steel screws or nails installed with a 1-inch-diameter (25.4 mm) caps, plate or washer.

.14 Primer for Sealant: Recommended by installer and accepted by *Consultant*.

.15 Joint backing to be continuous, extruded, polyolefin foam, consisting of non-absorbing outer skin and highly resilient interior, non-gassing, cellular network of open and closed cells, sized 25% greater than joint width.

.16 Sealant: CAN/CGSB-19.13-M, 1 component, silicone base, chemical curing, "795" by Dow Corning Company Limited, "Spectrum 2" by Tremco Ltd. Colour to be selected by *Consultant*.

.17 Shop Primer for Steel Components: CISC/CPMA 1-73.

.18 Galvanizing: ASTM A 153.

.19 Bituminous Paint: Best grade, quick drying, non-staining alkali resistant asphalt utility enamel by approved manufacturer to provide dielectric separation and which will dry to be tack-free and able to withstand high temperatures.

2.5 FABRICATION

.1 Coordinate and verify site dimensions affecting this work. Submit in writing dimensions or conditions which vary from those on reviewed *Shop Drawings* or detrimental to installation. Obtain corrective measures from *Consultant* prior to fabrication. Ensure suitability of adjacent building components in relationship to work of this Section.

.2 Submit in writing defects in work prepared under other Sections. Commencement of work shall imply acceptance of substrates and conditions.

.3 Joints and intersecting members shall be accurately fitted to true planes, adequately and securely fastened and made completely watertight and weathertight. Component fastening devices shall be of adequate strength and concealed, except as otherwise specified.

.4 Fabricate aluminum siding system and trim sections to profiles and patterns indicated. Manufacture panels from sufficiently thick material in combination with backing and/or reinforcing of manufacturer's option, to produce metal cladding required to suit design requirements indicated on *Drawings*.

.5 Carry out complete fabrication free from defects. Attach all clips and necessary attachments. Finished system shall be free from visible defects and accurately manufactured to dimensions of reviewed *Shop Drawings*.

.6 Make connections rigid and fail-safe wherever practicable, and make completely concealed.

.7 Fabricate all flashing pieces associated with and in contact with work of this Section. Fabricate system with rain screen design with air space and rigid mineral wool insulation.

.8 Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and *Provide* weathertight installation including non-corrosive fasteners.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine alignment of structural steel as per CAN/CSA-S16.1 and related supports prior to installation and proceed only after defects are corrected by responsible trades.

.2 Examine structural members, decking and adjoining work on which this work depend. Verify governing dimensions, elevations, curve, minimum clearances between system and structural frame. Confirm conditions are satisfactory before proceeding. Commencement of work shall be deemed to be acceptance of conditions and substrates.

.3 Before installing sheathing, inspect steel deck and report any deficiencies.

3.2 ERECTION

.1 *Install* sheathing in accordance with manufacturer’s recommendations.

.2 *Install* waterproof air/vapour barrier directly over sheathing starting at eave and lap 150 mm shingle style to high point.

.3 Lap sidelaps 100 mm (4") and 150 mm (6") endlaps.

.4 Seal laps with adhesive.

.5 Extend waterproof air/vapour barrier to interface with air/vapour barrier of walls to maintain continuity of building air/vapour barrier system. Ensure surface is free of wrinkles, fishmouths and tears.

.6 Apply adhesive in accordance with manufacturer's written instructions.

.7 Mechanically fasten 'Z' bars and 'U' channels through waterproof air/vapour membrane spaced in accordance with reviewed *Shop Drawings*, to suit loading requirements and manufacturer's data sheets. Fasten subgrits to steel deck with fasteners spaced to suit design loads and uplift.

.8 Install insulation between subgirts using approved adhesive over waterproof air/vapour barrier. Ensure ends and sides are installed right to subgirts and adjoining insulation. *Install* insulation parallel to sheathing in accordance with manufacturer's recommendations.

.9 *Install* aluminum siding system in accordance with *Shop Drawings* and manufacturer's instructions.

.10 Fasten siding to structural supports; aligned, level, and plumb. Locate joints over supports. Install expansion control joints where indicated. Use concealed fasteners unless otherwise approved by Architect. Install soffits, and accessories in accordance with best practice, with all joint members plumb and true.

.11 *Install* necessary formed metal closures and trim and closures as applicable at openings and penetrations, fastening as required.

.12 Coordinate and cooperate with Section 07 25 00 in application of miscellaneous air/vapour barrier on concrete and/or masonry substrata. Seal all areas with approved joint sealers as required to ensure watertight installation in accordance with requirements of Section 07 92 00.

.13 Cooperate with other trades to ensure proper installation and anchorage of this work

.14 Touch-up any minor abrasions with touch-up paint and clean roof surface.

.15 Barrier Protection: Do not install over cementitious materials, dissimilar metals or pressure treated material without adequate barrier protection.
- .1 Install building paper horizontally on walls to receive metal siding.
- .2 Weather lap edges 6 inches (150 mm) and ends minimum 6 inches (150 mm).
- .3 Stagger vertical joints of each layer.
- .4 Securely staple, nail in place

3.3 CLEANING AND PROTECTION

.1 Upon completion of the work of this Section, remove all *Products*, materials, debris and equipment from the site.

.2 Leave site in a neat and tidy condition, acceptable to *Consultant*.
- .1 Do all touch-up required to satisfaction of *Consultant*.

.3 Protect installed products until completion of project.

.4 Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract;*
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* pre-insulated composite cladding including but not limited to following:
  .1 Structural steel framing members required for support of preformed pre-insulated composite cladding system not shown on Structural *Drawings*.
  .2 Preformed pre-insulated composite soffit cladding system complete with prefinished steel faced factory formed polyisocyanurate core and accessories necessary for panel installation
  .3 Sealants as required between metal panel components and between panels and adjoining construction.
  .4 All metal flashing and trims required for insulated composite cladding system.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 Water penetration and infiltration shall mean appearance of uncontrolled water in wall system.

.2 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,

.3 and security requirements;

.2 Pre-construction Site Meeting:

.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,

.2 materials to be used,

.3 storage and handling of materials,

.4 installation of materials,

.5 sequence and quality control,

.6 Project staffing,

.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for ***Project*** in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 ***Shop Drawings***:

.1 Submit ***Shop Drawings*** of work of this Section in accordance with Division 01.

.2 In addition to minimum requirements indicate following:

.1 Size, spacing and location of structural supports.

.2 Cladding system details.

.3 Airseal closures to adjacent parts of work
.4 Panel sizes, finishes and identifying marks.
.5 Provision for thermal movement
.6 Jointing details and sealing.
.7 Cut and drilled holes.
.8 Anchorage and securement systems including clearances.
.9 Interfaces with work of other Sections.
.10 Material identification, thicknesses, gauges.
.11 Flashing installation method.
.12 Air and weather seal detailing at expansion joints.
.13 Path of pressure equalization and cavity drainage.
.14 Locations and details of horizontal fire stopping.
.15 Sequence of erection and any special handling or bracing required.
.16 Indicate panel sizes and finishes in elevation, sections, materials and thicknesses arrangements of joints and bonding, metal framing and anchorage and flashing.

.3 Samples:
.1 Submit samples in accordance with Division 01.
.2 Submit following samples:
.1 300 mm x 300 mm (12" x 12") insulated metal panel.
.2 300 mm (12") each of extruded and formed trim
.3 Design Data, Test Reports: Submit manufacturer's certified and approved performance requirements conforming to Code requirements and authorities having jurisdiction.
.4 Manufacturers' Instructions: Submit manufacturer's written installation instructions.
.5 Manufacturers' Field Reports: Submit pre-insulated composite cladding manufacturer's written field reports confirming that ***Products***, systems and assemblies have been installed in accordance with manufacturer's requirements.

1.6 QUALITY ASSURANCE

.1 Qualifications: ***Provide*** work of this Section executed by competent installers with minimum 5 years' experience in the application of ***Products***, systems and assemblies specified and with approval and training of the ***Product*** manufacturers.

.2 Welding of structural components related to work of this Section shall be performed by fabricator having minimum certification of Division 1 of CSA W47.1 and CSA W59.

.3 ***Mock-ups***: Conform to requirements of Division 01, mock-ups.
.1 Prior to installation of work of this Section construct 1 site mock-up of preformed metal panel system for ***Consultant's*** review.
.2 Construct site mock-up in 1 full bay to be selected by ***Consultant*** and allow for demonstration of following detailing:
.1 Anchorage system
.3 Modify site mock-up detailing if necessary in accordance with ***Consultant's*** review.

.4 Site mock-up will serve as reference for detailing and quality of construction for remaining work of this Section.

.4 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of ***Shop Drawings***,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 ***Provide*** site administration and inspection of this part of the ***Work***.
.8 Submit certificate validating seismic assessment and field review of this part of the ***Work***

1.7 DELIVERY, STORAGE AND HANDLING

.1 Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact. Package composite wall panels for protection against transportation damage. ***Provide*** markings to identify components consistently with ***Drawings***.

.3 Protect finish and edges using a plastic film adhered to panel in accordance with panel manufacturer's recommendations.

.4 Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.

.5 Store components and materials in accordance with panel manufacturer's recommendations. Store components off ground to prevent twisting, bending and defacement. Slope to shed moisture.

1.8 SCHEDULING

.1 Coordinate and cooperate with other trades working adjacent to this work.

1.9 WARRANTY

.1 Warrant work of this Section against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.
.1 Material and Installation: for period of 5 years. Defects include but are not limited to: buckling, delamination and structural failure.
.2 Panel Finish: for period of 30 years. Defects include but are not limited to: discoloration, finish peeling and extensive colour

fading.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:
- .1 Kingsspan Insulated Panels Ltd; www.kingspanpanels.com
- .2 Metl-Span; http://metlspan.com/
- .3 Vicwest; www.vicwest.com
- .4 Zero-Lock Enterprises Ltd.; www.zeroloc.com

.2 Substitution Limitation: Design is based on "Kingspan Insulated Panels KS-Shadowline Series Panels" by Kingspan Insulated Panels Ltd. Thickness as specified herein and Colure as selected later from manufacturer's standard range.

2.2 DESCRIPTION

.1 Regulatory Requirements
- .1 Work of this Section to meet or exceed the Code requirements for wind and snow loads, based on a 1 in 50 year occurrence.
- .2 Comply with requirements of National Building Code, applicable laws, bylaws, fire regulations, health and safety regulations of authorities having jurisdiction;
- .3 Comply with requirements attributed to engineering to suit design, fabrication and installation of the Work. Ensure standards used for work of this Section are considered a minimum.

.2 Design and Performance Requirements:
- .1 Structural Requirements:
  - .1 Design structural supports and anchorage system to maintain profiles, panel layouts, live loads and dead load requirements.
  - .2 Design to accommodate thermal movement of materials.
  - .3 Design to allow for sufficient tolerances to accommodate building tolerances and deflections.
  - .4 Design load/deflection criteria and fastening pattern shall be verified by tests in accordance with ASTM E72 requirements.
    - .1 Panel Deflection: L/180 max.
    - .2 Structural Framing Wind Load Deflection: L/240 max and not greater than 19 mm (3/4")
    - .3 Structural Framing Vertical Deflection: L/720 max and not greater than 13 mm (½")
    - .4 Loads: In accordance with requirements of the Code including wind, snow and build up snow loads
    - .5 Fatigue Test: Ensure there is no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads (positive and negative loads), when applied for 2,000,000 alternate cycles of L/180 deflection.

.5 Anchors: 1.5 times design minimum

.2 Design corner pieces, trim, flashing and caps symmetrical with cladding panel lines and overall design.

.3 Thermal and Moisture Performance:

.1 Thermal Resistance: Minimum R value to meet or exceed design requirements; but not less than RSI 1.32 per 25 mm (R7.5 per inch) when tested in accordance with requirements of ASTM C1363 and ASTM C518. Ensure total panel provides minimum of RSI 6.6 (R37.5)

.2 Maximum Air Leakage Rate (ASTM E283): 0.001 cfm/ft^2 at air pressure differential of 0.96 kPA (20.0 psf)

.4 Water Penetration: Static Water Penetration: no uncontrolled water penetration through the panel joints at a static pressure of 0.96 kPA (20.0 psf) when tested per ASTM E331.

.5 Design work of this Section to meet requirements of the Code for compliance for fire tests without use of sprinklers and in a sprinklered building occupancy to suit design requirements

.1 Fire Resistance Rating:

.1 ASTM E119: pass

.2 CAN/ULC-S101: pass

.3 CAN/ULC-S114: pass

.2 Panel Fire Tests:

.1 Fire Endurance Test - 10 minutes: Panels remained in place without joint stitch fastening per CAN/ULC-S101.

.2 Fire Endurance Test - 15 minutes: Panels remained in place with joint stitch fastening per CAN/ULC-S101.

.3 Flame Spread and Smoke Developed Tests on exposed Insulating Core:

.1 Flame Spread: Less than 25.

.2 Smoke Developed: Less than 250.

.3 Tests performed in accordance with CAN/ULC-S102 and ASTM E84

.6 Wall Panels and Framing:

.1 Fabricate wall panels in thicknesses required to ***provide*** minimum 1 hour fire resistance rating a non-bearing wall in accordance with requirements of UL263, ASTM E119 and CAN/ULC S101. ***Provide*** greater thickness if required to meet requirements of authorities having jurisdiction.

.2 Wall Framing: Wall-framing support members and adjacent construction may require fire protection in accordance with Code. Provide fire protection of these frames as appropriate in accordance with authorities having jurisdiction.

.7 Acoustic Requirements Test: Minimum STC 25 when tested in accordance ASTM E90.

.8 Humidity Test: Panels shall exhibit no delamination or metal interface corrosion when subjected to +140°F (+60°C) temperature and 100% relative humidity for a total of 1200 hours (50 days).

2.3 MATERIALS

.1 Panel Description:
  .1 Minimum 125 mm (5”) thick composed of exterior and interior steel faces with polyisocyanurate insulating core meeting following requirements:
    .1 Insulating Core:
      .1 Non-rated applications: foamed in place multi-component 95% closed cell polyisocyanurate insulation conforming to ASTM C1289, having following physical properties:
        .1 Minimum density: 35 to 45 kg/m3 (2.2 to 2.8 pcf) per ASTM D1622
        .2 Compressive strength: 0.16 MPa (23 psi) per ASTM D1621
        .3 Minimum RSI (R) Value: 1.32 per 25 mm (7.5 per 1”) in accordance with ASTM C518
        .4 Surface Burning Characteristics: Flame Spread ≤ 25, Smoke Developed ≤ 250 per CAN/ULC S102
    .2 Exterior and Interior Panel Faces:
      .1 Steel coil material: ASTM A755, Grade 33, G90 galvanized steel in accordance with ASTM A653 and ASTM A924 or AZ50 Galvalume/ Zincalume (55% aluminum, 45% zinc) in accordance with ASTM A792.
      .2 Steel Thickness: Minimum 0.759 mm (22 ga) with orange peel texture.
  .2 Fasteners:
    .1 Self drilling fasteners shall be cadmium plated steel with neoprene washer, as recommended by manufacturer.
    .2 Material: Hex-head type with steel and neoprene washer and 12 gauge stainless steel clip supplied by manufacturer.
    .3 Size: As recommended by manufacturer.
  .3 Perimeter Trims: Required trim and metal flashing to be steel with same coating, color, and gauge as exterior face of insulated metal wall panel.
    .1 Extruded perimeter trim: Shall be extruded aluminum 6063-T5 alloy with spray applied PVF coating in same color as exterior face of insulated metal wall panel.
  .4 Sealants: Factory applied butyl, non-skinning/curing type as recommended by manufacturer.
  .5 Panel Edges: Tongue and groove.
  .6 Metal Soffits:
    .1 Provide metal soffits constructed from metal panels as indicated.
    .2 Provide a complete suspension system as required to support and anchor the metal soffits.
  .7 Butyl Tape: As recommended by manufacturer.
  .8 Flexible Membrane and Fastening Bars:
    .1 Provide minimum 1.0 mm (0.004”) thick, reinforced, continuous self-adhesive compatible SBS Modified bitumen flexible membrane airseal closures recommended by manufacturer.
    .2 Fastening Bars: Provide minimum 6 mm x 25 mm (1/4" x 1") hot dip galvanized steel, continuous fastening bars.

2.4 FABRICATION

.1 Fabricate components of system in factory and ready for field installation. Radius-formed components shall be bent to true circular curve. Fabricate metal panels for designated facade complete with trims to profiles and finish required to meet design requirements. Form panel lines, breaks and angles sharp, true with adjacent surfaces and free from warp and buckle. Fabricate sharply cut edges with no displacement of sheet or protrusion of core.

.2 Fabricate with straight lines, square corners and/or smooth bends, free from twists or warps, kinks, dents and other similar imperfections which may affect appearance and/or serviceability. Exposed edges and ends of metal shall be dressed smooth, free from sharp ends. Connections and joints exposed to element shall be constructed to exclude water.

.3 Carry out complete fabrication including welding, grinding, punching and like to finish work. Make welds clean, sound and solid, free from defects. Grind smooth, free from marks.

.4 Finished cladding shall be free from visible defects and accurately manufactured.

.5 Make connections rigid and fail-safe wherever practicable, and make completely concealed.

.6 Coordinate openings required by other trades and Provide openings in panels prior to finishing whenever possible. Reinforce perimeter of openings to meet design requirements and as recommended by manufacturer.

.7 Fabricate all flashing pieces associated with and in contact with wall panel system. Use same sheet stock as exposed face sheets, pre-finished to match.

.8 Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and Provide weathertight installation including non-corrosive fasteners.

.9 Provide for condensation and inner wall drainage at sill members and other shapes which would otherwise tend to trap water.

2.5 FINISHES

.1 Exterior and Interior Finish System:
- .1 Fluropolymer (PVDF) Two Coat system: 0.8 mil primer with 0.8 mil Kynar 500 (70%) or Hylar 5000 colour top coat
- .2 Minimum Coating thickness: 1.6 mil.
- .3 Colour: to be selected by Consultant at later date from the manufacturer’s standard range.
- .4 Strippable Coating: applied prior to roll forming and embossing as recommended by manufacturer.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions:
- .1 Verify actual site dimensions and location of adjacent materials prior to commencing work.
- .2 Examine all structural steel before beginning installation to ensure that all supporting members are straight, level, plumb, properly braced and satisfactory for panel installation.
- .3 Do not begin installation until unsatisfactory conditions are corrected.
- .4 Start of installation shall signify structure and adjacent conditions as being proper and acceptable.
- .5 Wall framing alignment:
  - .1 Ensure proper alignment of wall framing members to assure proper fit up of overall construction.
  - .2 Wall panels installed over misaligned intermediate wall framing members will cause deflection (bending) of panels. Deflected panels will have bending stress which may cause panel face rippling or buckling when combined with conditions of thermal stress and wind stress.
  - .3 Prior to starting panel installation, check wall framing for straightness and alignment, and also check to verify that wall panels can be installed without interference.
  - .4 Conform to specified wall framing alignment tolerance. Intermediate framing members may require more critical alignment tolerances then specified tolerances.
  - .5 Notify ***Consultant*** in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

.1 ***Provide*** framing, supports and cast-in anchorage plates, as necessary, to support prefinished preformed composite wall panel.

.2 ***Provide*** the work of this Section in accordance with panel manufacturer's instructions

.3 ***Provide*** the work of this Section set in alignment, plumb, straight to true planes.

.4 Remove strippable coatings.

.5 ***Provide*** a 10 mm (3/8") wide x 25 mm (1") deep perimeter joint at the interface of adjacent, dissimilar materials / construction for caulking as part of the work of the Sealants Section.

.6 Butyl Weather Barrier Sealant:
- .1 Apply non-skinning butyl sealant as shown on shop drawings and manufacturer’s installation instructions as necessary to establish the vapor barrier for the panels.
- .2 Use non-skinning butyl tube sealant only for tight metal-to-metal contact.

.3 Do not use non-skinning butyl tube sealant to bridge gaps.

.7 Sealant For Exposed Joints:
.1 Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.
.2 sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.
.3 Direct contact between butyl and silicone sealants is not permitted.

.8 Flexible Membrane and Fastening Bars:
.1 ***Provide*** flexible membrane airseal closures to complete the airseal system from the work of this Section to adjacent parts of ***the Work***.
.2 ***Provide*** flexible membrane laps with adhesive overlap seal minimum 150 mm (6") in width.
.3 ***Provide*** fastening bars to securely clamp the flexible membrane and to seal it against the airseal sheet and panel lap sealants of the insulated metal panels.

.9 Panel Trim and Panel Flashings:
.1 Place trim and trim fasteners only as indicated per details on reviewed shop drawings.
.2 Include panel trim in continuous airseal system of insulated metal panel system.
.3 Field drill weep holes where appropriate in horizontal trim where indicated on shop drawings.
.4 Place continuous strip of butyl tape or butyl sealant on closure trims for the length of the panel to be covered as indicated on shop drawings.

.10 Place panel fasteners through pre-punched holes in attachment clips, concealed within the joint of the panel. Secure units to the structural supports. Space clips as recommended by manufacturer or otherwise indicated on the approved shop drawings.

3.3 CLEANING AND CARE

.1 After completing panel installation, strip protective film as designated, Panel surfaces shall be free of deleterious material including dirt;

.2 Wipe finishes surfaces of filling caused by drilling or cutting to prevent any discolouration or rust stains resulting from installation process.

3.4 FIELD QUALITY CONTROL

.1 Testing Requirements:
.1 Testing Agency: Appoint an independent testing and inspection agency acceptable to the Consultant to perform field tests and inspections and to prepare reports of findings.
.2 Field Water Test: After completing portion of metal wall panel assembly including accessories and trim, test a 2-bay area selected by the Consultant for water penetration in accordance with AAMA 501.2.

.2 Manufacturer's Field Services:

.1 Ensure manufacturer's representative carries out regular inspections of system during installation.

.2 Ensure walls and openings are within ±3 mm (± 1/8") and structure is plumb within 1:1000 of overall height.

.3 Have manufacturer's representative and *Contractor* carry out final inspection and approval of completed work.

3.5 CLEANING

.1 Clean exposed panel surfaces in accordance with manufacturer's instructions.

.2 Repair and touch-up with colour matching high grade enamel minor surface damage, only where permitted by *Consultant* and only where appearance after touch-up is acceptable to *Consultant*.

.3 Replace damaged panels and components which in opinion of *Consultant* cannot be satisfactorily repaired.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* flashing and sheet metal including but not limited to following:
  .1 break forming and installation of prepainted metal coping flashings.
  .2 miscellaneous metal flashings on roof.
  .3 sheet metal flashings at roof expansion joints.
  .4 flashings at roof openings.
  .5 caulking.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:

.1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:

.1 environmental procedure requirements,
.2 health, safety and emergency response procedure and policy requirements,
.3 and security requirements;

.2 Pre-construction Site Meeting:

.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, and other materials designated later by Consultant.

.3 *Shop Drawings*: Submit fully detailed *Shop Drawings* showing proposed method of shaping, forming, jointing, fastening and application of sheet metal work, in accordance with the *Contract Documents*. Submit lists of materials to be used to *Consultant*.

.4 Samples: Submit a representative sample section of prepainted metal flashing illustrating "S" lock jointing, minimum 600 mm (24") long, method

to accommodate thermal movement, cleats and fasteners. Submit sample well in advance of material fabrication.

1.6 QUALITY ASSURANCE

.1 Ensure work of this Section is installed by a company specializing in sheet metal flashing work with 5 years documented experience and a member in good standing of CRCA.

.2 Conform to requirements contained in CRCA manual.

.3 Prior to commencing work for this Section, arrange for *Contractor*, installer and manufacturer's representative to meet on site and review conditions under which work is to be performed, installation procedures and inspect surfaces to receive this work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Protect work of this Section from damage. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned at no cost to *Owner*.

1.8 WARRANTY

.1 Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the *Contract*. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are limited to; actual leakage, loosening and splitting of seams of flashings.

PART 2 -PRODUCTS

2.1 MATERIALS

.1 Sheet Steel Concealed from View: Commercial quality galvanized sheet to ASTM A653M, 0.50 mm (26 ga) thick minimum, Z275 zinc coated by hot-dip process.

.2 Prefinished, Sheet Steel Exposed to View: Coil modified silicone polyester coated sheet steel, prefinished to requirements of CSSB S8-2007 Baycoat "Perspectra Series™" by U.S Steel Canada or ArcelorMittal Dofasco Inc. or Valspar Silicone Modified Polyester (SMP) System, WeatherX by VicWest Steel or Valspar Silicone Modified Polyester (SMP) System, WeatherX, Minimum 0.45 mm (26 ga - 0.018") core thickness, commercial quality sheet, Grade A to ASTM A653/653M, Structural Steel Quality Grade 33 (230) with Z275 (G90) zinc coating designation. by U.S Steel Canada or ArcelorMittal Dofasco Inc. in colour(s) selected by *Consultant* from manufacturer's standard range.

.3 Flexible flashing membrane: 1.19 mm (47 mils) thick, self-adhering heat resistant membrane complete with primer. Modified bituminous sheet "Bituthene 3000" by Grace Construction Products.

.4 Slip Sheet: Rosin sized building paper; 1.2 mm thick EPDM strips or

modified bituminous sheet “Bituthene 3000" by Grace Construction Products.

.5 Isolation Coating: Bituminous paint, alkali-resistant bituminous paint or epoxy resin solution to provide dielectric separation which will dry to be tack-free and withstand high temperatures. Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers. Carboline Bitumastic 50 by Carboline Canada, or Copper Creek Top Service 760 Black by Sherwin Williams Company, 410-02 by Bakor Inc. or other *Product* and manufacturer acceptable to *Consultant*.

.6 Bedding Compound: Rubber-asphalt type.

.7 Plastic Cement: Conforming to CAN/CGSB-37.5-M recommended by installer and acceptable to *Consultant*.

.8 Sealant: *Supply* 1 part polysulphide, PRC "Rubber Caulk 5000-S", Parr "Unilastic" or other sealants conforming to CAN/CGSB-19.13-M.

.9 Starter Strips: Of same material as flashing used, 1.2 mm (18 ga), minimum 50 mm (2") wide, interlocked with metal flashing.

.10 Flashing Cleats, Starter Strips, Skirts, Clips and Backup Plates: Same as specified sheet metal, unless indicated otherwise, make cleats at best 50 mm (2") wide and interlocked with metal flashing.

.11 Flashing Fasteners: Nails, screws, bolts and other fastening devices and fasteners to CSA B111, Table 12, finished to match metal being fastened where exposed to view. Size and type to suit applicable conditions. Use stainless steel where connecting directly to concrete.

.12 Roofing Fasteners: Stainless steel self drilling fastening system by SFS Intec; www.sfsintec.biz

2.2 FABRICATION

.1 Fabricate copings, parapet vertical flashings, flashings, curb counter flashing starter clips, strips and miscellaneous flashings in accordance with CRCA recommendations and to detail indicated.

.2 Form sections true to shape, accurate in size, square, and free from distortion or defects. Equally space joints in any one run of flashing to suit building module or window spacing and in all cases locate in consultation with *Consultant* before installation commences. Make dedicated flashings meeting the *Project* requirements for roof mounted equipments to details shown.

.3 Fabricate cleats and starter strips of same material as sheet, minimum 50 mm (2") wide, interlockable with sheet.

.4 Form pieces in longest practical lengths. Make joints to permit thermal movement. Make flashing surfaces free from building, warp, wave, dents, oil canning or other defects.

.5 Hem exposed edges on underside 13 mm (1/2"); mitre and seam corners.

.6 Fabricate corners from 1 piece with minimum 450 mm (18") long legs; seam for rigidity, seal with sealant. Make corners square and surfaces straight and in true planes.

.7 Fabricate vertical faces with bottom edge formed outward 6 mm (1/4") and hemmed to form drip.

2.3 FINISHES

.1 Shop prepare and prime exposed ferrous metal surfaces.

.2 Concealed metal surfaces to receive 1 coat of bituminous paint, 0.4 mm (1/64") thickness.

.3 Provide metal finishes as designated on *Drawings*.

PART 3 -EXECUTION

3.1 INSPECTION

.1 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

.2 Verify membrane termination and base flashings are in place, sealed and secure.

.3 Notify *Consultant* of any unsatisfactory conditions. Do not proceed with this work until conditions have been corrected.

.4 Commencement of work shall imply acceptance of conditions and substrates.

3.2 PREPARATION

.1 Field measure site conditions prior to fabricating work.

.2 *Install* starter, edge strips and cleats before starting installation.

.3 Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations accepted by *Consultant*.

.4 Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.3 INSTALLATION

.1 Conform to drawing details included in CRCA manuals.

.2 *Install* copings, curb coverings, starter strips, (back-up plates), pipe collars and other flashings to details shown on *Drawings*.

.3 Exposed fastenings will not be permitted in the Work.

.4 *Install* starter strips where indicated or required to present a true, non-waving, leading edge. Anchor to back-up to provide rigid, secure

installation.

.5 End joints where adjacent lengths of metal flashing meet shall be made using an "S-lock" joint as detailed on *Drawings*. Execute by inserting the end of 1 coping length in a 25 mm (1") deep "S" lock formed in the end of the adjacent length. Extend concealed portion of the "S" lock 25 mm (1") outwards and nail to substrate. Face nailing of joints will not be permitted.

.6 Sealing: Seal where required to form weathertight seal between flashing and adjoining surfaces and between flashing and other work of this Section. Caulking work consists of bedding between members where possible and with neatly formed caulking bead where exposed.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein

1.2 SUMMARY

.1 Work Included: *Provide* pre-finished standing seam roof system including but not limited to following
  .1 secondary structural steel framing members required for support of pre-finished sheet metal standing seam roofing and panel system not shown on Structural *Drawings*.
  .2 pre-finished sheet metal standing seam roofing and panel system includes pre-finished sheet steel standing seam roof, air space, insulation, and air/vapour barrier over sheathing,
  .3 sheathing over metal deck complete with accessories necessary for standing seam steel roof and panel system installation.
  .4 Accessories including associated flashings, closures, sealants.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's

consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
- .1 work included,
- .2 materials to be used,
- .3 storage and handling of materials,
- .4 installation of materials,
- .5 sequence and quality control,
- .6 Project staffing,
- .7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
- .1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
- .2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
- .3 Co-operate with other Sections for application of all miscellaneous specialties.
- .4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
- .5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 *Shop Drawings*:
- .1 Submit shop and erection *Drawings* for work of this Section in accordance with Section 01 30 00.
- .2 Ensure shop and erection *Drawings* are stamped and signed by a structural engineer licensed to practice in the Territory of Nunavut.
- .3 Submit *Shop Drawings* which clearly indicate type of materials and *Products* being supplied, connections, attachments, supplementary framing and structural supports, flashings, sealants, gutters and relationship with adjacent components and construction, surface

finish, type and thickness of insulation, thicknesses of sheet steel roofing, fastening devices, anchorage components and methods, trim details, size, spacing of cleats and location of structural support, connections, air seal closures, sealants and gaskets, paths of pressure equalization and cavity drainage, types and locations of fastenings. Indicate provisions for structural and thermal movement between metal cladding and adjacent materials.

.4 Include details of installation, manufacturer's installation instructions where available and complete data on supplementary structural back-up system being furnished under this Section, along with interface details.

.4 Samples: Submit samples of sheet steel roofing system *Consultant* complete with components, fastening system and finishes for review. Do not order material until colour samples have been approved.

.5 Engineering Data: Submit engineering data substantiating that previously specified structural requirements of roofing assembly meet minimum requirements of CSA S136.

.6 Certification: Submit written certification that *Products*, systems and assemblies have been installed in accordance with manufacturer's requirements.

1.6 QUALITY ASSURANCE

.1 Manufacturer’s Qualifications: Manufacturer of roof system, and installer shall demonstrate at least 5 years’ experience in projects similar in scope

.2 Applicator Qualifications: Execute work of this Section using trade specialists having minimum 5 years’ experience in application of *Products*, systems, assemblies specified and trade specialists approved by manufacturer. Submit evidence upon *Consultant’s* request.

.3 Qualifications of Fabricator: Execute work using firm thoroughly conversant with laws, by-laws and regulations which govern and is capable of quality of work consistent with best modern shop and field practice known to recognized manufacturers specializing in this work.

.4 Qualifications of Welders: Perform welding of structural components related to work of this Section using fabricator having minimum certification of Division 3 of CSA W47.1. Conform to Technical Bulletins and Metric Standards of CSSBI.

.5 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.6 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:

.1 design the components of the work of this Section requiring structural performance,

.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.

.7 Supervision of work of this Section: Arrange for *Product* manufacturer's technical representative to:
.1 meet and discuss installation procedures and unique conditions at *Place of the Work*.
.2 inspect substrate surfaces and recommend solutions to accommodate adverse conditions.
.3 periodically visit and inspect installation and report unsatisfactory conditions to *Contractor*.
.4 attend final inspection and to submit written certification that *Products*, systems and assemblies have been installed in accordance with manufacturer's requirements and recommendations.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site only when work of this Section can be started.

.2 Should storage on site become necessary follow manufacturer's recommendations. Without limitations store materials flat at site under protection to prevent staining from the ground or from collection of water on material, or both; and secure against wind damage. Protect sheet metal materials from bending and scratching. *Provide* air circulation around finished metal surfaces. Store insulation and adhesives in dry areas, heated as required to prevent damage to adhesives.

.3 *Provide* necessary crating and bundling for the shipment of components to the site including protection against weather likely to impair the adequacy or appearance of the material in the finished assembly. Do not load any package beyond the design limit and properly protect all components against damage.

.4 Remove and replace damaged and bent units at no additional cost to *Owner*.

.5 Hoist components in an acceptable manner to the working level without damaging units and exposed surfaces. Protect exposed surfaces.

1.8 WARRANTY

.1 Warrant work of this Section against defects and/or deficiencies in accordance with General Conditions of the *Contract* as amended:
.1 *Provide* to *Owner* a written standard CRCA warranty on CRCA's “Standard Form of Warranty” covering defects of workmanship for a period of 2 years commencing from date of Substantial Performance of *The Work*. Such defects include but are not limited to; deformation of members, mechanical failure, failure of system to remain completely weather tight, leaking, faulty materials, discolouration of finishes or

faulty or poor quality of work and other deformations.

.2 *Provide* to *Owner* a written total system, non-pro-rated, "No-Dollar-Limit" warranty that includes labour, materials, workmanship and stipulates that manufacturer shall replace, at no cost to *Owner*, any portion of roofing membrane system which experiences leaks, blow-offs, wind damage or other failures resulting from manufacturing and workmanship defects or deficiencies in accordance with the General Conditions of the *Contract* for a period of 25 years commencing from date of Substantial Performance of *The Work*.

.3 Submit evidence of manufacturer's warranty reserve for *Consultant*'s approval.

.4 *Provide* manufacturer's complete design review approval which will include Code, membrane thickness and system warranty requirements prior to installation to ensure warranty coverage.

.5 Wind Speed Coverage for system: 72 km/hr

.6 Coverage Limit of Liability: No-set dollar limitation.

.7 Promptly correct any defects or deficiencies which become apparent within warranty period to satisfaction of *Owner*.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:

.1 Agway Metals Inc.; www.agwaymetals.com

.2 Roll Form Group; www.rollformgroup.com

.3 VICWEST; www.vicwest.com

.2 Substitution Limitations:

.1 Standing Seam Sheet Metal Roofing Design is based on VicWest Steel, metal roof profile Tradition 100-4, spaced at 400 mm (16") oc

.2 Soffit and Fascia: Refer to Section 07 46 16.

.3 Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

.4 Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.

.5 Certificates: Submit certificate(s) certifying substitute manufacturer attesting to adherence to specification requirements for roofing system performance criteria, and has been engaged in the design, manufacturer and fabrication of roofing system for a period of not less than 5 years complete full company name.

.6 Test Reports: Submit test reports verifying compliance with each test requirement for roofing system required by Project.

.7 Product Sample and Finish: Submit product sample, representative of roofing panels for the Project, with specified finish.

2.2 DESCRIPTION

.1 Regulatory Requirements:

.1 Conform to NBC requirements for wind and snow loads and environmental data for a 1 in 30 year probability factor.

.2 Design and Performance Requirements:

.1 Work indicated on *Drawings* shall consist of:

.1 Standing seam curved metal roof.

.2 Air space.

.3 Breathable spun bonded polypropylene waterproof fabric.

.4 Insulation.

.5 Air/vapour barrier.

.6 Sheathing over structural metal roof deck.

.3 Description represents in general without limitations, extent of work of pre-finished preformed metal wall roofing systems supplied under this Section, with final determination of exact limits of such work indicated on *Drawings*.

.4 Design metal roofing elements in accordance with CAN/CSA S136.1 to withstand live, dead, snow load, lateral wind, seismic, handling, transportation and erection loads.

.5 Design roof system to provide a vented and drained system which will prevent infiltration of water and snow into roofing system. *Provide* means of drainage and air space between insulation and exterior skin in accordance with the 'Rain Screen Principle".

.6 Design system to accommodate movement between roofing system and building structure caused by structural movement, without permanent distortion, racking of joints, breaking of seals, water penetration of other damage. Design to allow for sufficient tolerances to accommodate building tolerances and deflections.

.7 Design system to provide continuous barrier against water and vapour transmission and air movement effectively sealed at laps, penetrations and terminations.

.8 Design work of this Section to meet or exceed the NBC requirements for wind and snow loads, based on a 1 in 30 year occurrence.

.9 Design structural supports and anchorage system to maintain profiles and panel layout as indicated on *Drawings*.

.10 Deflection of the roof system shall not exceed 1/240th of the span for the specified live loading.

.11 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

.12 Temperature Change (Range): 20 deg C, ambient; 40 deg C, material surfaces

.13 Design gutter system as shown. Design panels terminating at eaves gutters

shall not be face fastened. Panels shall be folded and hooked into concealed flashings.

.14 Thermal: Minimum R value to meet or exceed design requirements.

2.3 MATERIALS

.1 Pre-finished Sheet Steel Roofing Outer Sheet, Prefinished Sheet Steel Flashings:
- .1 Coil silicone modified polyester coated sheet steel, prefinished to requirements of CSSB S8-2007.
- .2 Silicone Modified Polyester (SMP) System, WeatherX by VicWest.
- .3 Colour shall selected by *Consultant* from standard range

.2 Pre-finished Sheet Steel Panels and Flashing Sheet:
- .1 Coil fluropolymer coated sheet steel, prefinished to requirements of CSSB S8-2007 Silicone Modified Polyester (SMP) System, WeatherX by VicWest.
- .2 Colour shall selected by *Consultant* from standard range
- .3 Minimum 0.607 mm (24 ga- 0.024") core thickness, commercial quality sheet, Grade A to ASTM A653/653M, Structural Steel Quality Grade 33 (230) with Z275 (G90) zinc coating designation.
- .4 Standing Seam System by VicWest Steel, metal roof profile Tradition 100, spaced at 400 mm (16") oc or approved profile and system by Agway Metals Inc., or by Roll Form Group.
- .5 Metal Panels: VicWest Steel profile AD 300-R continuous.

.3 Miscellaneous Secondary Angles, Sub-Girts, flat, Hat Bars and Z Bars, Structural Supports: Manufactured from galvanized sheet steel in accordance with requirements of ASTM A653M, Grade A, minimum 1.214 mm (18 ga) overall thickness, zinc coating Z275 (G90), at centres as determined by cladding thickness.

.4 Miscellaneous Secondary Steel Shapes Including Plate and Hollow Sections: CSA G40.21, Grade 350W, or ASTM A1396M hot dipped galvanized complete with shop applied primer of either CPMA/CISC 1-73 or CGSB 1-GP-140M. Deck reinforcement and hat bar minimum 1.897 mm (14 ga).

.5 Gypsum Glass Mat Reinforced Board Sheathing: *Supply* gypsum glass mat reinforced silicone treated silicone free board conforming to ASTM C1177M, non combustible according to ASTM E136/CAN4-S114-M thermal barrier as tested to UL 1256/ CAN/ULC-S126-M, flame spread 0, smoke developed 0 to ASTM E84/ CAN/ULC-S102-M and ASTM D3273 with a rating of 10, no mould growth after 4 weeks exposure, 13 mm (1/2") or for fire rating requirement 16 mm (5/8") thick gypsum board 1200 mm (4') wide, maximum practical length, tapered edge as required, “DensGuard DensDeck Prime Roof Guard” by Georgia-Pacific Canada, Inc.

.6 Rigid Insulation: CAN/ULC-S702, rigid mineral or glass fibre board having minimum 4.0 lb/sq ft and minimum of thermal value R15; “730 (formerly AF 530)” by Owens-Corning Canada Inc., “RXL 40" by Roxul Inc. or “CWB 45" by Fibrex Inc., thickness as shown on *Drawings*. Insulation shall be rigid and dense enough to transfer live load to solid substrate below.

.7 Fasteners for Rigid Insulation: Factory Mutual approved, “Buildex S-12 Rock-On Climaseal - Coated Screws” by Buildex Fastening Systems, or “Lexgrip Fastening Screws” by Lexcor, corrosion resistant, self-tapping screws complete with 50 mm (2") diameter metal lap plate, minimum 30 mm (1-1/4") long to provide 13 mm (1/2") penetration into substrate.

.8 Insulation Adhesive: CGSB 71-GP-24M, Type II, rubber asphalt adhesive, compatible with insulation, Bakor 230-21 by Bakor Inc.

.9 Fasteners for Roofing System: As recommended by cladding manufacturer, adequate for safe and secure fastening. Fasteners in concealed clips shall be stainless steel Type 304 screws.

.10 Girts, clips and brackets to be structural steel or formed sheet steel of required thickness and size to meet design requirements, hot-dip galvanized. ASTM A653M, Z275 designation zinc coated painted steel components, minimum 1.214 mm (18 ga). Conform to manufacturer’s recommendations to suit design requirements.

.11 Thermal Break: 3 mm (1/8") core x 25 mm (1") wide cork composition.

.12 Air/Vapour Barriers: SBS modified bituminous sheet membrane reinforced with glass scrim, self-adhering, 1.14 mm (45 mil) thick minimum; “Blueskin SA” by Bakor Inc., having following characteristics:
- .1 Thickness: 1.14 mm
- .2 Application temperature: 5 deg C
- .3 Service temperature: -40 deg C to 70 deg C
- .4 Low temperature flexibility: -30 deg C (CAN/CGSB-37.5)
- .5 Breaking strength:
  - .1 md>150 N/5cm
  - .2 xd≥150 N/5cm
- .6 Air permeance: < 0.01 L/m² at 75 Pa pressure difference

.13 Moisture, Ice and Water Shield Under Insulation:
- .1 Self adhesive, self sealing composite sheet membrane composed of high-density, cross laminated polyethylene and rubberized asphalt.
  - .1 'Ice and Water Shield' by W.R. Grace and Company of Canada Ltd.,
  - .2 ‘Colphene 1000 GSA’ by Soprema Waterproofing Inc., or
  - .3 ‘Eaveguard’ by Bakor Inc. or

.14 Breathable Waterproof Fabric: Waterproof, wind resistant, UV stabilized, rot proof, tear resistant, waterproof, condensation control, triple layer spun bonded polypropylene breather membrane over insulation on pitched roofs, nominal weight 175 g/m², 0.6 mm thick, roll length 50 m (164'), width 3 m (10'), green colour, Daltex Roof Shield by Proctor Group Limited or SRP Roofshield by SRP Canada Ins.; www.srpcanada.ca

.15 Auxiliary Materials:
- .1 Detail Tape: SRP-Eternabond 4" Detail Tape, 30 mil, single sided. To seal SRP-AirOutshield to itself and to other surfaces and substrates and mod bit membranes.
- .2 Seam Tape: SRP-Eternabond 1" D.S (double sided) Seam Tape distributed by SRP Canada Inc. 30 mil. To seal vertical and horizontal seams between layers of SRP-AirOutshield.

.3 Seam Tape: SRP-Seam Seal Tape, Green 2" single sided seam tape distributed by SRP Canada Inc. To seal vertical and horizontal seams between layers of SRP-AirOutshield.

.16 Factory Formed Corners: SRP Pre-Fab Curb Corners, 18"x18", distributed by SRP Canada Inc., used to flash corners of large openings including windows and doors.

.17 Self Adhered Membrane: Regular temperatures: SRP Underlayment as distributed by SRP Canada Inc.; High Temperature: SRP High Temp Underlayment as distributed by SRP Canada Inc.

.18 Fasteners Minimum No. 12-gage 0.109-inch-shank-diameter (2.77mm) corrosion-resistant steel or stainless steel nails having a minimum 3/8-inch diameter (9.5 mm) head, or minimum No. 14 gage 0.083-inch-shank-diameter (2.11 mm) corrosion-resistant steel or stainless steel screws or nails installed with a 1-inch-diameter (25.4 mm) caps, plate or washer.

.19 Ventilation Mat: SRP Ventilation Mat, 6mm thick non-woven nylon with maximum 20% contact area.

.20 Glass Fibre Mesh Reinforced Flexible PVC Transition Membrane Sheet: “FR40" by Lexsuco Ltd., minimum 1.0 mm (40 mils) thick, with butyl tape and adhesive as recommended by flexible membrane manufacturer.

.21 Primer for Sealant: Recommended by installer and accepted by *Consultant*.

.22 Joint backing to be continuous, extruded, polyolefin foam, consisting of non-absorbing outer skin and highly resilient interior, non-gassing, cellular network of open and closed cells, sized 25% greater than joint width, having following characteristics:
.1 Density (ASTM D1622): 2.0 lb/cu ft
.2 Tensile strength (ASTM D1623): 25 psi
.3 Water absorption (ASTM C509): 0.5% by volume
.4 Deflection at 50% compression: 3 psi
.5 Recover at 50%: 95%
.6 Out-gassing: None
.7 Temperature range: -45 deg F to 225 deg F

.23 Sealant: CAN/CGSB-19.13-M, 1 component, silicone base, chemical curing, "795" by Dow Corning Company Limited, "Spectrum 2" by Tremco Ltd. Colour to be selected by *Consultant*.

.24 Shop Primer for Steel Components: CISC/CPMA 1-73.

.25 Galvanizing: CAN/CSA-G164.

.26 Field Touch-Up Paint: Silicone modified polyester air dry touch up paint compatible with pre-finished coating system.

.27 Bituminous Paint: Best grade, quick drying, non-staining alkali resistant asphalt utility enamel by approved manufacturer to provide dielectric separation and which will dry to be tack-free and able to withstand high

temperatures.

.28 Ice Melt System: Self regulating heating cable system by Tyco Thermal Controls; www.tycothermal.co

.29 Gutter:
.1 Galvanized sheet steel 0.76 mm, 22 ga (023") complete with all required clips, stiffeners to roof at 600 mm (24") and brackets, pre-finished in silicone modified polyester coating to match roof.
.2 Gutter Liner: Flexible polymeric membrane alloy, integrally welded to a polyester reinforcing scrim, 1 mm (40 mil) thick, “FR-40" by Lexcor,

.30 Membrane Primer: Recommended by membrane manufacturer, for particular substrate and accepted by *Consultant*.

.31 Membrane Adhesive: Recommended by membrane manufacturer, for particular substrate and accepted by *Consultant*.

.32 Seam Sealant: One component silicone, recommended by membrane manufacturer and accepted by *Consultant*.

2.4 FABRICATION

.1 Coordinate and verify site dimensions affecting this work. Submit in writing dimensions or conditions which vary from those on reviewed *Shop Drawings* or detrimental to installation. Obtain corrective measures from *Consultant* prior to fabrication. Ensure suitability of adjacent building components in relationship to work of this Section.

.2 Submit in writing defects in work prepared under other Sections. Commencement of work shall imply acceptance of substrates and conditions.

.3 Joints and intersecting members shall be accurately fitted to true planes, adequately and securely fastened and made completely watertight and weathertight. Component fastening devices shall be of adequate strength and concealed, except as otherwise specified.

.4 Fabricate sheet steel roofing and panel system and trim sections to profiles and patterns indicated. Manufacture panels from sufficiently thick material in combination with backing and/or reinforcing of manufacturer's option, to produce metal cladding required to suit design requirements indicated on *Drawings*.

.5 Carry out complete fabrication including welding, grinding, punching and like to finish work. Make welds clean, sound and solid, free from defects. Grind smooth, free from marks.

.6 Attach all clips and necessary attachments.

.7 Finished cladding shall be free from visible defects and accurately manufactured to dimensions of reviewed *Shop Drawings*.

.8 Make connections rigid and fail-safe wherever practicable, and make completely concealed.

.9 Fabricate all flashing pieces associated with and in contact with work of this Section. Fabricate system with rain screen design with air space and rigid mineral wool insulation.

.10 Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and *Provide* weathertight installation including non-corrosive fasteners.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine alignment of structural steel as per CAN/CSA-S16.1 and related supports prior to installation and proceed only after defects are corrected by responsible trades.

.2 Examine structural members, decking and adjoining work on which this work depend. Verify governing dimensions, elevations, curve, minimum clearances between system and structural frame. Confirm conditions are satisfactory before proceeding. Commencement of work shall be deemed to be acceptance of conditions and substrates.

.3 Before installing sheathing, inspect steel deck and report any deficiencies.

3.2 ERECTION

.1 *Install* sheathing at right angles to deck flutes, in accordance with recommendations contained in CRCA Manual with approved fasteners. Fasten at 300 mm (12") centers, 32 fasteners for each 1200 mm x 2400 mm (4'x 8') sheet.

.2 *Install* waterproof air/vapour barrier directly over sheathing starting at eave and lap 150 mm shingle style to high point. Lap sidelaps 100 mm (4") and 150 mm (6") endlaps. Seal laps with adhesive. Extend waterproof air/vapour barrier to interface with air/vapour barrier of walls to maintain continuity of building air/vapour barrier system. Ensure surface is free of wrinkles, fishmouths and tears.

.3 Apply adhesive in accordance with manufacturer's written instructions.

.4 Mechanically fasten ‘Z’ bars and ‘U’ channels through waterproof air/vapour membrane spaced in accordance with reviewed *Shop Drawings*, to suit loading requirements and manufacturer’s data sheets. Fasten subgrits to steel deck with fasteners spaced to suit design loads and uplift.

.5 Install insulation between subgirts using approved adhesive over waterproof air/vapour barrier. Ensure ends and sides are installed right to subgirts and adjoining insulation. *Install* insulation parallel to sheathing in accordance with manufacturer’s recommendations.

.6 Breathable Membrane Application:
.1 *Install* breathable fabric over insulation in shingle style in

accordance with manufacturer's recommended instructions, with horizontal laps of 150 mm (6"). Lap membrane minimum 50 mm (2") and vertical laps of 100 mm (4") minimum . Extend past eave for any drainage.

.2 Fasten at top and bottom of roll within 50 mm (2") of edge.

.3 Shingle next layers of ensuring minimum horizontal and minimum vertical laps specified herein.

.4 Ensure membrane is slipped under bottom edge of penetration "skirt" and shingled over taped top edge.

.5 Seal top and sides with 25 mm (1") double sided seam tape

.6 Ensure whole "skirt" assembly is flashed appropriately with metal.

.7 Do not place vertical laps above windows.

.8 For delayed installation of siding/masonry determine the amount of fasteners for wind exposure. Use cap nails or screws with washers.

.9 Pipes and Conduits Penetrations:

.1 Cut a piece of membrane to act as a skirt around counter flashed penetrations. Distance from penetration to edge of barrier "skirt" minimum 12".

.2 Make four cuts to form a star shape and place over penetration snugly. Extend "ears" of material along vertical penetration and seal with 4" Detail Tape.

.3 Tape top edge of "skirt" to wall using Seal Tape. Do not tape bottom edge at this time.

.4 Large openings: Starting at the bottom of the opening, install curb corners. Using strips of membrane, connect curb corners creating a continuous flashing. Using 4" detail tape, seal all flashings strips and pre-Fab corners together. See standard details for sequencing.

.7 *Install* sheet steel standing seam roofing in accordance with *Shop Drawings* and manufacturer's instructions. Install steel standing seam roof panel over roof shield. Install roof thermo clips through roof roof shield to subgirts with recommended fasteners. At eave, install starter strip over eave flashing to eave subgrit roof sheet. Roof sheet shall be notched and folded under to hook to starter strip. Do not use roof sheet fasteners at eave. Hook roof sheet to starter strip and attach roof thermo clips . Fasten through roof panel only at top end of sheet to steel subgirt.

.8 Seam sidelaps of roof panel at conclusion of each working day. Install 'U' clips over side laps as roof panels are installed. At conclusion of each working day, ensure last roof panel is secure to prevent blow off.

.9 *Install* flexible flashing at all junctions between this work and work of other Sections and at changes in plane within this work.

.10 *Install* necessary formed metal closures and trim and closures as applicable at openings and penetrations, fastening as required. Make cut-outs neatly by saw cutting. Ensure water tight installation. *Install* end closures, drip flashing, and any other accessory required to complete metal clad envelope.

.1 Rigidly connect pre-finished flashing pieces with specified colour-matching fasteners at 300 mm (12") oc along length. Use preformed corner pieces and erect with ample allowances for thermal movement.

.2 Install preformed lined metal gutter and rain water leader to suit design requirements.

.11 Coordinate and cooperate with Section 07 25 00 in application of miscellaneous air/vapour barrier on concrete and/or masonry substrata. Seal all areas with approved joint sealers as required to ensure watertight installation in accordance with requirements of Section 07 92 00.

.12 Cooperate with other trades to ensure proper installation and anchorage of this work

.13 Touch-up any minor abrasions with touch-up paint and clean roof surface.

3.3 CLEANING

.1 Upon completion of the work of this Section, remove all *Products*, materials, debris and equipment from the site.

.2 Leave site in a neat and tidy condition, acceptable to *Consultant*.
.1 Do all touch-up required to satisfaction of *Consultant*.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract;*
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* sprayed fire resistive materials including but not limited to following:
  .1 spray applied fire-resistive materials and installation in accordance with Code requirements and requirements of all authorities having jurisdiction.
  .2 Unless otherwise indicated Provide interior sprayed fireproofing to:
    .1 all steel structure supporting floors,
    .2 floor recesses in suspended structure
  .3 Application of mineral fiberboard, asbestos free, fireproofing of interior exposed structural steel wide flange columns and beams, to provide rated fireproofing.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade

involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product Data*:

.1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for *Project.*in accordance with Division 01.

.1 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Submit *Product* information. Brand names and descriptive catalogue data of proposed *Products*.

.3 Include complete test report in cases where references are not published by testing laboratories, and where authority having jurisdiction has approved significant changes from tested assembly on basis of an engineering study; study calculations shall accompany report.

.4 Where sprayed fire-resistive materials are scheduled to be applied directly over primed surfaces, or where contact is made with primed surfaces, submit letter from manufacturer of

fireproofing signifying compatibility between all contact materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by ***Consultant***.

.2 Certificates:

.1 Submit applicator's certification that spray fire resistive materials has been applied in accordance with ULC or WH Designs to suit design requirements.

.2 Submit test results in accordance with CAN/ULC-S101-M for fire endurance and CAN/ULC-S102-M or ASTM E84 for surface burning characteristics.

.3 Submit certified test reports for mineral board application indicating the following:

.1 Fire test reports of fireproofing application to substrate materials similar to project conditions.

1.6 QUALITY ASSURANCE

.1 Qualifications: ***Provide*** work of this Section executed by competent installers with minimum of 5 years' experience in application of ***Products***, systems and assemblies specified and with approval and training of the ***Product*** manufacturers.

.2 Before proceeding with work of this Section verify proposed thicknesses and densities from applicable authorities.

.3 Minimum acceptable physical performance standards are those stated herein. Materials having higher performance standards are not precluded from submission or acceptance.

.4 ***Mock-ups:***

.1 Provide ***Mock-ups*** in locations designated by ***Consultant*** and as required to demonstrate quality of workmanship. Maintain ***Mock-ups*** during construction in an undisturbed condition as a standard for judging completed work.

.2 Provide mockup of applied mineral fiberboard fireproofing under provisions of this Section. Provide testing and analysis of mockup to manufacturer's published data. Apply sample section in size designated by ***Consultant*** to substrate on site.

.3 Comply with project requirements as to thickness, density, fire rating, and finish texture.

.5 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver sprayed fire-resistive materials in original unopened containers

bearing manufacturer's name, brand of ***Product***, certification labels for fire hazard and fire resistance classifications (ULC or cUL or WH labels).

.2 Store materials in dry, protected area, off ground in original undamaged, sealed containers. Discard any bags or containers that have been exposed to water before use.

.3 Refer to ***Product*** MSDS for precautionary measures during storage and handling.

1.8 PROJECT CONDITIONS

.1 Environmental Requirements:
- .1 Maintain air and substrate temperature of 5 deg C (40 deg F) for 24 hours prior to installation, during and for a minimum of 24 hours after application of materials. ***Provide*** heated enclosures to maintain temperatures.
- .2 ***Provide*** adequate air circulation and exhaust to outdoors to achieve total air exchange rate of 4 times per hour until material is substantially dry.

1.9 PROTECTION

.1 Precautions for Safe Handling and Use:
- .1 Ensure installation of mineral wool and/or rock wool ***Products*** is performed in accordance with "Code of Practice for the Safe Use of Man Made Vitreous Mineral Fibre".
- .2 Sweep up and place in disposal containers if material is accidentally released or spilled. Avoid inhalation of dust.
- .3 Use approved landfill site for waste disposal.
- .4 During handling and storing avoid inhalation of dust and skin and eye contact.
- .5 In case of accidental contact, use normal personal hygienic methods to remove contaminants.

.2 Control Measures:
- .1 Respiratory Protection from Dust: Use NIOSH 21-Cxx approved dust mask for cementitious fireproofing application and NIOSH approved respirators with high efficiency (HEPA) cartridge filters for mineral fibre fireproofing application.
- .2 Ventilation: ***Provide*** sufficient air ***Supply*** to maintain dust levels below TLV.
- .3 Eye Protection: Wear dust goggles.
- .4 Protective Equipment: Wear loose fitting long sleeve shirt and pants when handling fireproofing materials.

.3 Protect during installation any adjacent finished surfaces from contamination and damage due to work under this Section.

.4 Protect completed work, vulnerable corners, edges and surfaces liable to be damaged due to construction activities. ***Provide*** wood cover strips and sheet material as required to prevent damage.

.5 Method and materials to effect protection are subject to review by ***Consultant***.

1.10 SCHEDULING

.1 All fire protection work on a floor shall be completed before proceeding to next floor.

.2 Cooperate, coordinate and schedule fire protection work with other trades to avoid delays in job progress.

1.11 WARRANTY

.1 Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the ***Contract.*** Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of ***Consultant*** and at no expense to ***Owner***. Defects include but are not limited to; flaking, delamination, fibre loss, crazing and cracking, spalling, separation, blistering or evidence of other defects of finish.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:
  .1 A/D Fire Protection Systems Inc.; www.adfire.com
  .2 Cafco Industries Inc.; www.cafco.com
  .3 Grace Construction ***Products***; www.graceconstruction.com
  .4 Albi Manufacturing, Division of StanChem Inc.; www.albi.com

.2 Substitution Limitations: This Specification is based on Cafco's ***Products***. Comparable ***Products*** from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
  .1 Materials and applied systems shall have full acceptance by authorities having jurisdiction. Minimum acceptable standards to which sprayed fire-resistive materials shall conform are: NBCC Subsection 3.1.7 "Fire Resistance Rating" and CAN/ULC S102.2-10, ASTM E84, ASTM E119, UL 263 and UL 1479.
    .1 Steel members are to be considered unrestrained unless specifically noted otherwise.
  .2 Minimum acceptable physical performance standards are those stated herein. Materials having higher performance standards are not precluded from submission or acceptance.
  .3 Conform to ULC or cUL providing restrained or unrestrained fire rating as scheduled to suit design requirements.
  .4 ***Provide*** fireproofing for all steel including without limitations

structural support for service penetrations and similar components as required by Code except where alternate means of protection is indicated or specified.

.5 Non-combustibility: When tested in accordance with ASTM E136 or CAN4-S114, the material shall be noncombustible.

.6 Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN/ULC S102, the material shall exhibit the following surface burning characteristics:

.1 Flame Spread.....0

.2 Smoke Developed.....0

.7 Engineered Judgement: For assemblies not tested and rated in accordance with CAN/ULC-S101 and CAN/ULC-S1012, submit proposals based on related designs using accepted fireproofing design criteria acceptable to authorities having jurisdictions.

.8 Materials and applied systems shall have full acceptance by authorities having jurisdiction. Minimum acceptable standards to which sprayed fire-resistive materials shall conform are NBCC, Subsection 3.1.7 "Fire Resistance Rating" and ASTM E84 and ASTM E119 and UL 1479.

.9 Sprayed cementitious fireproofing shall be formulated with a mould inhibitor. Sprayed cementitious fireproofing material shall be tested in accordance with ASTM G21 and shall resistance to mould growth for a period of 21 days for general use and for 60 days for sprayed cementitious fireproofing materials used in plenums

.10 Where installed, mineral fiberboard fireproofing to provide a minimum two hour fire rating.

2.3 MATERIALS

.1 Ensure materials and applied systems have full acceptance by authorities having jurisdiction. Ensure conformance to standards specified herein, conform to NBCC, Division B, Part 3, Subsection 3.1.7 "Fire Resistance Rating" and CAN/ULC-S101, ANSI/UL 263, ASTM E84 and ASTM E119. Fire-Resistive Materials: Gypsum based cementitious materials with synthetic or organic aggregates or inorganic mineral wool fibres; containing factory added mold inhibitors to prevent growth of organisms and fungi; listed in specified UL or ULC or WH design, providing fire rating specified and meeting physical performance characteristics as specified.

.2 ***Provide*** materials certified as fire resistant by UL or ULC or WH in accordance with CAN/ULC-S101-M, ANSI/UL or ASTM E119 and are asbestos free.

.3 Ensure materials do not induce deterioration of members to which they are applied.

.4 Ensure bonding agents, binders, accessories, cleaning solvents, aggregates and sealers are in accordance with base material manufacturer’s recommendation.

.5 Ensure mixing water is potable, clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious or stain-producing substances harmful to fireproofing materials.

.6 Fiberglass Mesh: Symmetrical, interlaced glass fibre made from twisted multi-end strands with alkaline resistant coating of 32.21 - 36.28 g/m^2 (0.95 - 1.07 oz/sq yd), for compatibility with system materials. Mesh shall be shift-proof, with trimmed roll edges. to minimize building on overlapped seams. Nominal Greige weight of mesh shall be 130 g/m^2 (3.85 oz/sq yd). Reinforcing mesh adhesive shall be water resistive type glue of approved characteristics and manufacturer, suitable for use intended; contact type to CAN/CGSB-71.20-M. No urea formaldehyde.

.7 Expanded Metal Lath: In sheet sizes of 685 mm x 2438 mm (27" x 96") from galvanized, copper alloy steel sheets. Use 9 mm (3/8") rib lath at 3.0 lb/sq yd.

.8 Sealer: Type recommended by fireproofing manufacturer, qualified for use in ULC or WH Design specified or indicated.

.9 Fasteners: Provide screws and other fasteners types in accordance with board manufacturer's recommendations.

2.4 FIREPROOFING TYPES

.1 Normal Density: Following types are acceptable used singly or in combination.

.1 Gypsum Based Cementitious (Type 1A):

Characteristics	**Tests References**	**Required Results**
Density	ASTM E605	≥ 15 pcf (240.3 kg/m^3)
Bond Strength	ASTM E736	≥ 150 psf (7.18 kPa)
Corrosion	ASTM E937	Pass
Compressive Strength	ASTM E761	≥ 12.6 psi (86.87 kPa)
Air Erosion	ASTM E859	0.0 G/SF
Deflection	ASTM E759	Pass

.1 Acceptable Products:

.1 "Monokote Type MK-6" manufactured by Construction Products Division, W.R. Grace & Co. of Canada Ltd.,

.2 "CAFCO® 300 Series" by Cafco Industries Inc.,

.3 A/D Type 5 by A/D Fire Protection Systems

.4 Approved equivalent meeting performance criteria specified herein and approved by ***Consultant***.

.2 Sprayed mineral fibre (Type 1B):

Characteristics	**Tests References**	**Required Results**
Density	ASTM E605	≥ 10 pcf (160.2

		kg/m^3)
Bond Strength	ASTM E736	≥ 399 psf (19.1 kPa)
Corrosion	ASTM E937	Pass
Compressive Strength	ASTM E761	≥ 11.8 psi (81.36 KPa)
Air Erosion	ASTM E859	≤ 0.0 G/SF
Deflection (L/120)	ASTM E759	Pass (No cracks or delamination)
Bond Impact	ASTM E760	No cracks

.1 Acceptable ***Products***:
.1 "AD Type FP" by AD Fire Protection
.2 "DC/F" by Cafco Industries Inc.

.3 Application: Fireproofing for structural components concealed above ceiling, or within wall, chase, or furred space. Where necessary, ensure fireproofing is sealed with manufacturer's approved sealer.

.2 Medium Density - Portland Cement Based Cementitious (Type 2):

Characteristics	**Tests References**	**Required Results**
Density	ASTM E605	≥ 22 pcf (352.4 kg/m^3)
Bond Strength	ASTM E736	≥ 434 psf (0.07 MPa)
Corrosion	ASTM E937	Pass
Compressive Strength	ASTM E761	≥ 79 psi (544.68 KPa)
Air Erosion	ASTM E859	0.0 G/SF
Deflection	ASTM E759	Pass

.1 Acceptable ***Products***:
.1 "Monokote Type Z-106" manufactured by Construction Products Division, W.R. Grace & Co. of Canada Ltd.,
.2 "CAFCO 400" by Cafco Industries,
.3 A/D Type 7GP by A/D Fire Protection Systems,
.4 Approved equivalent meeting performance criteria specified herein and approved by ***Consultant***.

.2 Application: Fireproofing for exposed applications in mechanical rooms, elevator shafts, etc. except where otherwise specified or indicated.

.3 High Density - Portland Cement Based Cementitious (Type 3):

Characteristics	**Tests References**	**Required Results**
Density	ASTM E605	≥ 40 pcf (352.4 kg/m^3)

Bond Strength	ASTM E736	≥ 1,000 psf (47.9 kPa)
Corrosion	ASTM E937	Pass
Compressive Strength	ASTM E761	≥ 79 psi (640.74 KPa)
Air Erosion	ASTM E859	≤ 0.025 G/SF
Deflection	ASTM E759	Pass

.1 Acceptable ***Products***:
- .1 "Monokote Type Z-146" by Grace Construction ***Products***,
- .2 "Fendolite M-II" by Cafco Industries Inc.,
- .3 "A/D Type 7HD" by A/D Fire Protection Systems
- .4 Approved equivalent meeting performance criteria specified herein and approved by ***Consultant***.

.2 Applications: exterior applications and areas where high levels of impact and abrasion resistance are necessary.

2.5 MIXES

.1 Mix sprayed fire resistive materials as recommended by manufacturer.

.2 Do not use partially set, frozen, caked or lumpy materials. Mix each batch separately in mechanical mixer and clean mixer free of particles before mixing new batch.

.3 Heavy Duty Protective Decorative Finish: Chlorinated Rubber Coating; PPG Heavy Duty Coatings as approved by A/D Fire Protection Systems or CAFCO SprayFilm coating by CAFCO Industries Inc. acceptable to Fire Protection System manufacturer. Colours selected by Consultant. Top coat shall be compatible with applied fireproofing and base material. Ensure materials and Products do not induce deterioration of members to which they are applied

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine surfaces to receive sprayed fire-resistive materials and report to ***Consultant*** any defects. Commencement of work implies acceptance of surfaces and conditions.

.2 Ensure ducts, pipe, conduit and other items which would interfere with application of sprayed fire-resistive materials, have not been installed until sprayed fire-resistive material work is completed.

.3 Do not apply fireproofing until all clips, hangers, inserts, sleeves and similar items have been installed in areas to receive sprayed fire-resistive materials. Ensure that items required to penetrate fireproofing are place before application of sprayed fire-resistive materials.

.4 Ensure no corrosion protection primer on non-galvanized steel members and

galvanized primer for galvanized perimeter steel and structural steel members to receive sprayed fire resistive materials is applied. Ensure primed surfaces if any, to receive sprayed fire-resistive materials are compatible with fireproofing materials and bond requirements.

.5 Do not commence application of fireproofing prior to completion of concrete work on steel decking.

.6 Do not commence application of fireproofing prior to completion of roofing application and roof traffic has ceased.

.7 Mineral Fiberboard Fireproofing:
.1 Verify that surfaces are ready to receive *Work;* Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place; commencement of application means applicator accepts existing substrate.

3.2 PREPARATION

.1 Protection:
.1 *Provide* temporary enclosures and masking to prevent spray from contaminating adjacent areas and surfaces.
.2 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of sprayed fire-resistive materials. *Provide* masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.
.3 Mineral Fiberboard Fireproofing:
.1 Protect floor areas from this Work by completely covering with tarps or 4 mil polyethylene sheets; protect adjacent surfaces and equipment from damage by dusting, close off and seal ductwork in areas where fireproofing is being applied

.2 Surface Preparation: Clean surfaces free of dust, dirt, oil, grease, loose paint, mill scale, paints/primers (other than those listed and tested) and other foreign matter which would interfere with bond of fireproofing. Ensure surfaces to be sprayed are dry and reviewed by *Consultant* before spraying.

.3 Manufacturer shall be contacted for procedures on handling primed/painted steel. Be responsible for any cleaning of surfaces to receive sprayed fire protection as recommended by manufacturer.

.4 Ensure clips, hangers, supports, sleeves and other attachments to substrate are to be placed by others prior to application of spray-applied fire resistive materials.

.5 Ensure installation of ducts, piping, conduit or other suspended equipment shall not take place until application of sprayed fire protection is complete in an area.

.6 Safety Precautions:
.1 Respiratory Protection from Dust: Use NIOSH approved N95 dust mask for cementitious fireproofing application and NIOSH approved N95 respirators for mineral fibre fireproofing application.

.2 Ventilation: ***Provide*** sufficient air ***Supply*** to maintain dust levels below TLV.
Eye Protection: Wear dust goggles.
Protective Equipment: Wear loose fitting long sleeve shirt and pants when handling fireproofing materials.

3.3 APPLICATION

.1 Equipment, mixing and application shall be in accordance with manufacturer's written application instructions.

.2 Prior to application of spray-applied fire resistive material inspect and ensure surfaces to receive sprayed fire protection is acceptable

.3 Do not apply fire protection to steel floor decks prior to completion of concrete work on that deck if any.

.4 Do not apply spray-applied fire resistive material to underside of roof deck until roof is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and construction roof traffic has ceased.

.5 Apply bonding materials (adhesives, catch coats, metal lath, mesh, stud pins and similar applications) in accordance with appropriate UL/ULC fire resistance design and manufacturer's written recommendations.

.6 Apply fireproofing according to manufacturer's printed instruction, required ULC or WH Design numbers and using spray equipment approved by manufacturer of fireproofing.

.7 Apply fireproofing to required total thickness and density.

.8 Apply sprayed fire-resistive materials in accordance with manufacturer's recommendation and to UL or ULC or WH Designs requirements to suit design requirements for restrained and unrestrained conditions and as indicated on ***Drawings*** to achieve required ratings.

.9 Water tamp fibrous fireproofing after application to ***Provide*** dense, medium smooth surfaces.

.10 Board tamp fibrous fireproofing when use in high velocity plenum and in vertical contact areas (i.e. columns in Mechanical Room) to ***Provide*** additional surface protection.

.11 Apply sealer or curing compound to surface of fibrous sprayed fire-resistive materials as required by manufacturer.

.12 Topcoat material, if any, shall be type recommended and approved by manufacturer of each spray-applied fire resistive material required for applications indicated.

.13 Do all cutting, patching and repairing of damage caused by work of this Section or of unsatisfactory fireproofing as directed. Repair areas cut out or damaged as result of testing.

.14 Except as provided above, repair damaged spray fireproofing at expense of those causing damage. Do all repairs before fireproofing concealed, or if exposed, before final inspection.

.15 After application clean off any overspray and broom clean floor.

.16 Mineral Fiberboard Fireproofing: Apply fireproofing in sufficient thickness to achieve rating, and in accordance with manufacturer's written application instructions. Use full number of fasteners in accordance with manufacturer's recommendations.

3.4 INSPECTION AND TESTING

.1 Carry out tests required by authorities having jurisdiction.
- .1 In addition spray-applied fire resistive material shall be tested for thickness and density in accordance with one of following procedures:
  - .1 ASTM E605 - Standard Test Method for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
  - .2 AWCI - Inspection Procedure for Field-Applied Sprayed Fire-Resistive Materials, Technical Manual 12-A; an annotated guide.
  - .3 UBC Standard No. 7-6 - Thickness and Density Determination for Spray-Applied Fire Protection.

.2 *Consultant* may appoint independent inspection and testing company as specified in Division 01.
- .1 Inspector may perform following tests:
  - .1 Thickness: 2 tests in each area on beams and columns and on steel deck. Each test consisting of 4 measurements and average of 4 tests reported.
  - .2 Density: 2 tests in each area on beams and columns and 2 tests on steel deck. For purpose of test remove 150 mm (6") square portion of spray material from backing, dry to constant weight, measure and weigh. Calculate density in kg/m^3 (lb/cu ft).

3.5 REPAIRS

.1 Where installed materials is found not to meet performance criteria, remove material and replace with new material to meet specified criteria.

.2 All patching of and repair to sprayed fire protection, due to damage by other trades, shall be performed under this section.

3.6 CLEANING

.1 Waste Management:
- .1 Sweep up and place in disposal containers if material is accidentally released or spilled. Avoid inhalation of dust.
- .2 Use approved landfill site for waste disposal.

3.7 PROTECTION AFTER COMPLETION

.1 Protect completed work, vulnerable corners, edges and surfaces liable to be damaged due to construction activities. *Provide* wood cover strips and sheet material as required to prevent damage.

.2 Method and materials to effect protection are subject to review by *Consultant*.

3.8 FIREPROOFING SCHEDULE

Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.

LOCATION	**ASSEMBLY**	**REQUIRED RATING**
Columns	cUL/ULI Design No X827, X829, X790 or approved equivalent system.	Refer to Drawings.
Floor decks and floor supports	cUL/ULI Design No D759, cUL/ULI Design No D902 or approved equivalent system.	Refer to Drawings.
Roof decks and roof supports	cUL/ULI Design No P719, P729, P819 or approved equivalent system.	Refer to Drawings.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the Contract;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* intumescent fire protection including but not limited to following:
  .1 intumescent alkyd fire protection system consisting primer for adhesion, intumescent base coat and decorative top coat.
  .2 inspection of preparation and coating thickness by independent testing company

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Cooperate in coordination and scheduling of fire protection work to avoid delays in Work Schedule.

.3 Do not commence installation of piping, ducts, conduit or other suspended equipment until application of fire protection is complete in that area.

.4 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 hospital health, safety and emergency response procedure and policy requirements,
    .3 infection prevention and control requirements;
    .4 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including

non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.5 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01.

.2 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 Samples: If requested, submit samples in accordance with Division 01 of intumescent alkyd fire protection showing successive stages of application and showing colours to be used on metal substrate.

.4 Design Data, Test Reports:

.1 Submit test reports and certificates as requested showing conformance with ULC, cUL or WH approved designs, acceptable to authorities having jurisdiction. Verify hourly rating, influence of coating's expansion and ability to retain insulating char layer on structural steel with manufacturer's test data.

.2 In cases where such test reports are not available and/or where changes to such test reports are required, arrange, pay for, and submit test reports on basis of engineering studies and tests from an accredited testing company acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

.1 Ensure manufacturer is a company specializing in manufacturing *Products* of this Section.

.2 Qualifications: *Provide* work of this Section executed by competent installers with minimum of 5 years' experience in application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers.

.3 Applicator shall be approved and licensed for this type of work by manufacturer of materials. Use equipment approved by fire protection material manufacturer.

.4 Before commencing work of this Section, have material manufacturer's representative examine surface conditions and verify substrate surfaces are ready to receive work. Arrange for periodic visits by manufacturer's representative while work is in progress to verify proper materials, methods and procedures are being followed.

.5 Verify cured intumescent alkyd thickness at random locations chosen by and in presence of Consultant

.6 Field Installation: *Provide* field sample installation of intumescent alkyd fire protection in location on *Work* where directed. Installation, when accepted, may form part of final work and shall be minimum standard for *Project.*

.7 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to *Project* in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packages shall bear ULC, cUL or WH labels and seals for fire resistance ratings.

.2 Deliver and store *Products* in dry, protected area off ground in original, undamaged sealed containers bearing manufacturer's labels, application instructions and certification labels for fire hazard and fire resistance classifications. Ship and store materials at temperatures recommended by

material manufacturer.

.3 Remove damaged packages found unsuitable for use and any materials which have come into contact with contaminants prior to use.

1.8 PROJECT CONDITIONS

.1 Comply with manufacturer's recommended requirements for ambient and substrate temperature, relative humidity, and substrate moisture content during application and curing of materials.

.2 Protect work area from inclement weather and moisture during application and curing of materials.

.3 Ensure heat is uniformly distributed and adequate ventilation is provided during application and curing of fire protection system.

1.9 WARRANTY

.1 Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to; cracks, chalking, spalling, separation and blistering.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and specifications:
  .1 A/D Fire Protection Systems Inc.; www.adfire.com
  .2 Carboline, Division of StonCor Group; www.carboline.com
  .3 Cafco Industries Inc.; www.cafco.com
  .4 Flame Control Coatings; www.flamecontrol.ca
  .5 3M Canada Company; www.mmm.com

.2 Substitution Limitations:
  .1 Fire retardant intumescent paint for interior is based on product by Flame Control Coatings. Comparable *Products* from manufacturers listed herein will be considered provided they meet the requirements of this Specification.
  .2 Certificates: Submit certificate(s) certifying substitute manufacturer attesting to adherence to specification requirements; Submit test reports verifying compliance with each test requirement required by Project.

2.2 DESCRIPTION

.1 Regulatory Requirements:
  .1 Conform to OBC requirements and in accordance with requirements of authorities having jurisdiction.

.2 Design Requirements:

.1 Exposed to fire, intumescent base coat shall expand forming a thick layer of foam and protect structural performance of exposed steel by thermally insulating it and shielding it from heat. Intumescent alkyd fire protection system shall expand up to 15 to 30 times when tested under UL 263 fire test and form ash like or char layer during expansion process.

.2 Be responsible for and ensure intumescent alkyd fire protection materials, its application, its thickness, on their own and in combination with structural components and building assemblies *Provide* specified fire resistance classification to approval of authorities having jurisdiction.

.3 Conform to fire rating requirements indicated on *Drawings*.

2.3 MATERIALS

.1 Intumescent Fire Protection:

.1 Flame Control No. 10-10 FIat Alkvd Paint, (FCC), Coating manufactured in accordance with U.S. Federal Specification TT-P-26C, suitable for interior application, quick drying to velvety flat finish. Colour white or black as selected later by Consultant.

.1 Coatings based on System by Flame Control Coatings
.2 or approved equivalent by A/D Fire Protection Systems Inc.;
.3 or by Carboline Division of the StonCor Group;
.4 or by CAFCO Industries Inc.;
.5 or by 3M Canada Company;
.6 or other approved manufacturer.
.7 Fire protection system shall be listed by ULC and bearing label on each container.

.2 Cleaning Solvents: In accordance with fire protection material manufacturer's recommendations.

.3 Primer: Corrosion inhibiting type primer for ferrous metal surfaces, hi-build type primer for irregular ferrous metal surfaces, and acceptable primer for galvanized surfaces as recommended by intumescent alkyd fire protection material manufacturer for use with their *Product* to suit site conditions.

.4 Decorative Finish Coat: *Provide* protective decorative finish coat. Colours selected by *Consultant*. Top coat shall be compatible with applied intumescent fireproofing and base material. Colours selected by *Consultant*.

.5 Ensure materials and *Products* do not induce deterioration of members to which they are applied.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine work prepared by others which is to receive work of this Section and report in writing conditions which are not acceptable.

.2 Ensure ducts, pipe, conduit and other items which would interfere with application of intumescent alkyd fire protection have not been installed until intumescent alkyd fire protection work is completed.

.3 Do not apply intumescent alkyd fire protection until all clips, hangers, supports, inserts, sleeves and similar devices have been installed in areas to receive fire protection.

.4 Do not apply intumescent alkyd fire protection to underside of roof decks (if any) until roofing application is complete.

.5 Start application only when surface, weather and local environmental conditions are satisfactory.

.6 Commencement of work shall indicate acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Site Condition Materials: Before application, permit materials to reach same temperature as surface temperature of steel by storing unopened containers in room or area where it will be applied.

.2 Take care in handling and application process to prevent spattering, spilling, overrun and overspraying onto other work. Mask or otherwise protect surrounding surfaces and areas.

.3 Remove identification markings on steel components and grind weld flashes smooth prior to commencement of application.

.4 Clean surfaces of dirt, dust, grease, oil, loose paint, rust, mill scale and other foreign matter which would interfere with bond of applied fire protection by commercial blasting in accordance with SSPC-SP6. Ensure work to be protected is dry and has bee

.5 n approved before application of material.

.6 Confirm compatibility of surfaces to receive fire protection materials. Determine suitability of substrates for bond strength of fire protection material. Surface preparation of steel shall meet or exceed minimum requirements recommended on manufacturer’s data sheets.

.7 Prime galvanized and ferrous metal substrate surfaces in accordance with manufacturer's instructions. Ensure surfaces are completely covered. Allow to dry. Ensure that all site erection damage to shop primed surfaces shall be repaired properly and inspected prior to commencing with application of intumescent fireproofing.

.8 Coordinate scheduling and sequencing of work with work specified in other Sections. Steel surfaces with inadequate working access shall receive intumescent alkyd fire protection material to inaccessible surfaces prior to erection of finished steel members either at point of fabrication or on site

3.3 APPLICATION

.1 Before commencing work of this Section, have material manufacturer's representative examine surface conditions and verify substrate surfaces are ready to receive work. Arrange for periodic visits by manufacturer's representative while work is in progress to verify proper materials, methods and procedures are being followed.

.2 Verify cured intumescent alkyd thickness at random locations chosen by and in presence of *Consultant*.

.3 Mix and apply intumescent alkyd fire protection in accordance with manufacturer's instructions and using equipment approved by manufacturer.

.4 Apply intumescent alkyd fire protection and protective decorative finish by spray or brush or as recommended by manufacture to achieve fire protection requirements.

.5 Apply intumescent alkyd fire protection in number of coats required to achieve smooth uniform texture and total thickness necessary to *Provide* required fire ratings. Allow to dry 24 hours between coats. Do not exceed wet film thickness per coat recommended by material manufacturer.

.6 At all ducts, pipes and similar items passing through fire protected structural members, extend fire protection material [150 mm (6")] on either side along penetrating item.

.7 Measure final thickness with a dry film gauge. Do not apply finish coat until it has been determined that required dry film thickness of intumescent alkyd fire protection has been provided.

.8 Conform to SSPC-PA 2 for method of thickness determination.

.9 Allow minimum of 3 to 15 *Days* between application of final coat of fire protection material and application of decorative protective finish coat, as recommended by material manufacturer.

.10 Apply protective decorative finish in accordance with manufacturer's instructions.

.11 Do all cutting, patching and repairing of damages caused by work of this Section or of unsatisfactory intumescent alkyd fire protection, as directed. Repair areas cut out or damaged as result of testing.

.12 Repair damaged work caused by other trades at expense of those causing damages.

3.4 FIELD QUALITY CONTROL

.1 Perform tests required by authorities having jurisdiction as part of work of this Section.

.2 Engage and pay for services of an independent inspection and testing company to carry out inspection and testing of materials and application for quality control.

.3 Conform to requirements of AWCI technical manual 12-B for testing and

inspection of field applied thin film intumescent fire resistive materials.

.4 Maintain complete record of environmental conditions such as continuous monitoring of air temperature, surface temperature, dew point temperature and percent relative humidity during and after application of intumescent coating. Deduct dew point temperature from surface temperature to determine probability of condensation. Accurately and non-destructively measure total dry film thickness of intumescent fire resistive coating to determine if adequate coverage has been applied to protect structure for fire rating time required by authorities having jurisdiction during crisis situations. Make available to *Consultant* inspection report.

.5 *Owner* may engage services of an independent inspection and testing company to carry out inspection and testing of materials and application for *Owner's* quality control. Cost of such inspection and testing, if required, will be paid by *Owner*.

3.5 CLEANING

.1 Clean adjoining walls, floors, equipment, ducts, pipes and other surfaces coated as a result of work of this Section. Remove excess material, over spray, droppings and debris. Do cleaning in an acceptable manner to prevent damage to finish work.

3.6 INTUMESCENT FIREPROOFING SCHEDULE

.1 Available Approved Designs based on Nullifire S605/S606/S607” by the Carboline Division of the StonCor Group :

.1 Approved Beam Designs:

.1 ULC No.S 605 are D784; D935; N609. (2 Hours)

.2 ULC No. S606 are D785; D936; N610. (2 Hours)

.3 ULC No. S607 are D786; D937; N611. (1 Hour)

.2 Approved Column Designs:

.1 ULC No. S605 are X629; X630; X631.(2 Hours)

.2 ULC No. S606 are X632; X633; X634.(2 Hours)

.3 ULC No. S607 are X635; X636; X637.(1 Hour)

OR

3.7 INTUMESCENT FIREPROOFING SCHEDULE

.1

LOCATION	**ASSEMBLY**	**REQUIRED RATING**
W Shaped Columns	cUL/ULI Design No X649 or Y615 (depending on column size)	2 hours
HSS Shaped Columns	cUL/ULI Design No Y616	2 hours
W Shaped Beams (Minimum M/D = 30)	cUL/ULI Design No N614	2 hours
W Shaped Beams (Minimum M/D = 41)	cUL/ULI Design No N634	2 hours

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the General Conditions and Supplementary Conditions of the *Contract*;
- .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: Provide firestopping and smoke seals in accordance with Code requirements including but not limited to following:
- .1 firestop systems for hollow or filled penetrations through fire resistance rated assemblies in floors, roof assemblies, walls, partitions and smoke barriers.
- .2 necessary approved tested accessories such as sealant, insulation, damming materials, form board, primers, collars required to complete firestopping work, excluding those inside sealed mechanical and electrical assemblies.
- .3 Do not use gypsum products in fire stop assemblies.
- .4 As a minimum, Provide firestopping and smoke seals at following locations:
  - .1 at openings and around penetrations,
  - .2 at un-penetrated openings,
  - .3 at projecting and recessed items,
  - .4 at openings and joints within fire separations and assemblies having fire resistance rating.
  - .5 at openings between structurally separate sections of wall or floors
  - .6 at penetrations in fire-resistance rated assemblies where items penetrate one side of fire barrier.
  - .7 at slot gaps between edge of floor slabs and curtain walls,
  - .8 at gaps between top of walls and ceilings or roof assemblies.
  - .9 at expansion joints in walls and floors.
  - .10 at openings around structural members that penetrate floors or walls.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
- .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
- .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
- .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
  - .1 environmental procedure requirements,
  - .2 health, safety and emergency response procedure and policy requirements,
  - .3 and security requirements;
- .2 Pre-construction Site Meeting:
  - .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
  - .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
    - .1 work included,
    - .2 materials to be used,
    - .3 storage and handling of materials,
    - .4 installation of materials,
    - .5 sequence and quality control,
    - .6 Project staffing,
    - .7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
- .1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
- .2 Schedule installation of cast in place firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
- .3 Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- .4 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
- .5 Co-operate with other Sections for application of all miscellaneous specialties.
- .6 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
- .7 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product Data*: Submit manufacturer's literature, data sheets for each type of firestopping system with its material composition and its corresponding location, provided under this Section for Project in accordance with submittal requirements of Division 01. Ensure data sheets Provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials as designated later by Consultant.

.3 Firestopping Manual: Submit to Consultant, within 4 weeks of Contract award, firestopping manual complete with applicable Product Data sheets prepared by Product manufacturer to schedule Products used for each assembly and installation required in The Work.

.4 *Shop Drawings*:
- .1 Submit Shop Drawings in accordance with submittal requirements of Division 01.
- .2 Ensure Shop Drawings indicate material characteristics, details of construction, connections and relationship with adjacent construction. Submit complete and detailed Shop Drawings indicating ULC and/or cUL assembly number certification and material safety data sheets. In addition to minimum requirements, indicate following:
  - .1 Required temperature, hose stream and flame ratings,
  - .2 Material thicknesses,
  - .3 Installation methods,
  - .4 Primers,
  - .5 Damming materials as applicable.
- .3 Coordinate and ensure *shop Drawings* for fire stopping and smoke seals inside sealed mechanical and electrical assemblies are reviewed by Divisions 21, 22, 23 and 26 respectively.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing Products of this Section with minimum three (3) years documented experience quality management system registered in accordance with requirement s of ISO 9001.

.2 Installer Qualifications: Provide work of this Section executed by competent installers experienced trained, licensed and approved, by material or system manufacturer for application of materials and systems being used; having minimum 5 years experience in application of Products, systems and assemblies specified.

.3 *Mock-ups*: *Provide Mock-ups* in locations designated by *Consultant* and as required to demonstrate quality of workmanship. Maintain *Mock-ups* during construction in an undisturbed condition as a standard for judging the

completed work. Provide mock-up of typical firestopping system as shown on reviewed Shop Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to Site in manufacturer's sealed and labeled containers intact and legible at time of use.

.2 Handle and store materials in accordance with manufacturer's instructions with proper precautions to ensure fitness of material when installed.

.3 Do not use damaged or adulterated materials and materials exceeding their expiry dates.

1.8 PROJECTCONDITIONS

.1 Ambient Conditions: Comply with manufacturer's recommended requirements for temperature, relative humidity, ventilation and substrate conditions during application and curing of materials.

1.9 WARRANTY

.1 Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to cracking, breakdown of bond, failure to stay in place of bleeding and any other defect which affect firestopping.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
  .1 3M Fire Protection; www.3m.com/firestop
  .2 A/D Fire Protection Systems Inc.; www.adfire.com
  .3 Hilti (Canada) Limited; www.ca.hilti.com
  .4 Self-Seal Firestopping *Products*; www.nucoinc.com
  .5 Specified Technologies Inc; www.stifirestop .com
  .6 Tremco (Canada) Limited. www.tremcosealants.com

2.2 DESCRIPTION

.1 Regulatory Requirements:
  .1 Regulatory Requirements: Conform to National Building Code of Canada, ULC, cUL UL, WH, FM listings, CAN/ULC-S115, ASTM 2307 ASTM E814 and ASTM E1966 fire test standards to achieve required fire protection rating in accordance with requirements of authorities having jurisdiction.

.2 Design and Performance Requirements:

.1 Design firestopping to meet or exceed requirements of local Code authorities; submit *Drawings* signed and sealed by professional engineer registered in the Place of *Work* complete with material data sheets and instructions for firestopping.

.2 *Provide* tested firestop material or material systems used to retain integrity of fire-rated construction by maintaining effective barrier against spread of flame, smoke, water and hot gases through penetrations in fire rated wall and floor assemblies. Ensure firestop assembly maintains original fire-resistance rating of assembly penetrated.

.3 Provide firestopping system(s) capable of maintaining fire resistance rating, indicated on Drawings in accordance with required UL, ITS, ULC, cUL or FM design details. Ensure firestopping systems conform to requirements of ULC S115 and Provide fire rating as shown. Ensure materials Provide fire resistance rating equivalent to rating of adjacent floor, wall or other fire separation assembly.

.4 Ensure Firestop Materials coming directly in contact with plastic pipe or plastic coated wire have undergone Firestop Material compatibility testing by Systems manufacturer or pipe and wire manufacturer. All Firestops coming into contact with CPVC Piping (direct or indirect) shall be FBC system compatible This includes spray applied Firestop materials as overspray onto CPVC Pipe .

.5 Ensure fire stop systems are compatible with one another, with substrate forming openings, with any item penetrating fire stop systems during application and service based on testing and field experience.

.6 Ensure firestop system exposed to ambient conditions do not deteriorate after curing during and after completion of construction.

.7 Firestop system ratings: Ensure fire resistance ratings of installed *Firestop Systems* are not less than fire resistance rating of surrounding Fire Separation or Firewall.

.1 Comply with applicable National Building Code Of Canada requirements for locations and hourly ratings of F, FT, FH, FTH, L and W (as applicable) designations. As a minimum use following protection guidelines:

.1 F-Rating at Fire-Resistance-Rated Walls: Not less than that of construction penetrated.

.2 F-Rating at Horizontal Assemblies: At least 1 hour, but not less than that of construction penetrated.

.3 T-Rating at Firewall and Horizontal Firewall Assemblies: At least 1 hour, but not less than the fire resistance rating of construction penetrated.

.4 Exposed Penetration Firestopping: Provide Products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined by ASTM E84 OR ULC S102 and in accordance with National Building Code of Canada requirements.

.5 L ratings at all assemblies shall be less than 15 CFM

.2 For combustible pipes, tubing, ducts, chimneys, optical fibre cables, electrical wires andcables, totally enclosed non-combustible raceways, electrical outlet boxes and similar

building services that penetrate through a fire separation provide a firestop system with 'F' Rating as determined by ULC or cUL as indicated below:

Separation Fire Resistance Rating	Firestopping Required ULC or cUL 'F' Rating
30 minutes	1 Hour
45 minutes	1 Hour
1 hour	1 Hour
1.5 hours	2 Hours
2 hours	2 Hours
3 hours	3 Hours
4 hours	4 Hours

.3 For combustible pipe penetrations through a fire separation provide a firestop system with a 'F' Rating as determined by ULC or cUL (when tested with a pressure differential of 50 Pa between exposed and unexposed sides) which is equal to the fire resistance rating of the construction being penetrated.

.4 L-Rating: Where applicable, provide penetrations with L-ratings Less than 15 CFM.

.5 W-Rating: Where applicable, provide penetrations with W-ratings having Class 1 Ratings.

.3 Ensure firestopping systems do not affect structural integrity of load bearing walls and assemblies. Coordinate with Consultant prior to penetrating any load bearing assembly.

.4 Ensure firestopping systems do not affect acoustical performance of acoustical assemblies.

.5 For unusual firestop application for which no tested system is available, Provide manufacturer's "Engineering Judgement" derived from similar ULC or cUL system designs or other tests of acceptable firestopping system required to maintain specified fire rating. Submit proposals to local authorities having jurisdiction for review and approval prior to installation. Ensure "Engineering Judgment" *Drawings* follow requirements set forth by International Firestop Council.

.6 Conform to temperature, flame and smoke ratings of standards listed herein and other requirements of authorities having jurisdiction.

.7 Confirm locations of exposed/non-exposed firestopping/smoke seal surfaces prior to application. Provide movement capability at movement joints in accordance with design requirements for movement joint.

.8 Consult with Product manufacturer's technical representative about following items:

.1 Fire separation required.

.2 Curing characteristics of materials specified.

.3 Joint characteristics as built.

.4 *Provide* interior elastomeric joint sealants establishing and

maintaining water tight, water resistant and air tight continuous joint seals without staining or deteriorating joint substrates.

.5 Ensure elastomeric sealants provided comply with ASTM C920 and other standards specified herein for type, grade, class and uses.

.6 *Provide Products* with capability, when tested for adhesion and cohesion under maximum cyclic movement in accordance with ASTM C719, to withstand required percentage change in joint width existing at time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.

.7 *Provide* elastomeric sealants that are non-staining and have undergone testing in accordance with ASTM C1248 for joint substrates indicated for *Project*

2.3 MATERIALS

.1 Firestop Systems and Components:

.1 Firestop systems: Certified by ULC, Intertek and ULI . Provide mineral wool, silicone, silicone SL sealants, mortar, collars, intumescent caulk, pillows, seal, seal NS, inserts, putty, wrap strip, collar strip or putty pads not exceeding opening sizes for which they are intended. Ensure materials and Products provided do not cause stress, chemical or physical reaction, or other damage to penetrating items or adjacent materials.

.2 Firestop system components: Certified by ULC, Intertek and ULI. Ensure compatibility of firestop system components with abutting dissimilar membranes, architectural coatings, finishes at floors, walls and ceilings. Check with manufacturer requirements of materials being installed.

.3 Cementitious matrices: Capable of providing minimum 2758 kPa (400 psi) compressive strength when cured, to retard cable tray warping within firestop seal.

.4 Damming and backup materials, supports and anchoring devices: in accordance with manufacturer’s recommendations, tested firestop system/design and as acceptable to authorities having jurisdiction.

.5 Cast-in-Place Materials: *Provide* Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors as required to meet firestopping requirements.

.6 Primers: As required by firestopping manufacturer and compatible with selected system and contiguous materials.

.7 Water: Potable

.8 Pipe and duct insulation and wrappings: compatible with firestopping systems.

.9 Intumescent pads: Permanently pliable type.ntumescent composite sheet: Composite sheet, strip or precut shapes.

.10 Sealants and putty for vertical and overhead joints: Non-sagging.

.11 Sealants and fluid seals at floors: Self-levelling.

.12 Firestop Joint Spray: A sprayable fire rated mastic for construction joint; maximum flexibility in accordance with ASTM E 1966 and UL 2079; containing no halogens, solvents or asbestos; water based, paintable.

.13 Re-penetrable Sealants: *Provide* Non curing, re-penetrable

intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles.

.14 Accessories: Provide miscellaneous components needed to Install fill materials and to maintain ratings required. Use only components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions:

.1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

.2 Examine substrates, openings, voids, adjoining construction and conditions under which firestop is to be installed. Confirm compatibility of surfaces. Verify penetrating items are securely fixed and properly located with proper space allowance between penetrations and surfaces of openings.

3.2 PREPARATION

.1 Ensure surfaces to receive firestopping are free of dirt, dust, grease, oil, rust, loose materials, release agents, frost, moisture or any other matter which would impair bond of firestopping material to substrate of penetrating items.

.2 Prime substrates in accordance with manufacturer’s written instructions.

.3 Do not apply firestopping and smoke seals to surfaces previously painted or treated with sealers, curing compounds, water repellents or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure that anchoring devices, back-up materials, clips, sleeves, supports and other related materials used in actual fire tests are provided.

.5 Mask where necessary to prevent firestopping materials from contacting adjoining surfaces that will remain exposed upon completion of work. Remove tape as soon as it is possible to do so without damaging firestop material or substrate.

3.3 INSTALLATION

.1 Comply with UL, ULC, cUL, ITS or FM Listings and manufacturer’s instructions for type of material and condition of opening in each case. Consult with manufacturer to determine proper procedure for conditions not fully covered by printed instructions. Record in writing any oral instructions received, with copy to manufacturer.

.2 Remove excess firestopping material promptly as work progresses and upon completion. Provide leak-proof dams as required to seal openings and contain firestop until cured. Install damming in accordance with test design and manufacturer’s instructions.

.3 Provide an easily read label to firestop seals stating following: “THIS IS A FIRESTOP INSTALLED BY [ ] AND INSPECTED BY [ ] AND DATE INSTALLED COMPLETE WITH LISTED SYSTEM, TYPE AND THICKNESS. DO NOT REMOVE OR ALTER UNLESS IT IS IMMEDIATELY REPAIRED. TO REPAIR OR RETROFIT, USE ONLY COMPATIBLE FIRESTOP PRODUCTION IN ORDER TO MAINTAIN SYSTEM CLASSIFICATION”

3.4 FIRESTOPPING SCHEDULE

.1 Firestopping and smoke seals at openings where reinstallation occurs: UL or FM listed, Elastomeric or re-useable cementitious matrix or putty seal; do not use permanent cementitious seal at such locations.

.2 Firestopping and smoke seals at openings around penetrations for electrical bus ducts, pipes, ductwork and other electrical and mechanical items requiring sound and vibration control or allowance for expansion, contraction and other movement: UL or FM listed, Elastomeric seal; do not use a cementitious or rigid seal at such locations.

.3 Firestopping and smoke seals at joints and spaces designed and required to allow movement such as building movement joints, deflection spaces, control joints, expansion joints, and similar locations: UL or FM listed, flexible, elastomeric seal suitable to withstand the required movement and capable of returning to original configuration without damage to seal and without adhesive or cohesive failure; do not use a cementitious or rigid seal at such locations.

3.5 FIELD QUALITY CONTROL

.1 Manufacturer’s Services:
  .1 Ensure manufacturer's direct representative (not distributor or agent) is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures.

.2 Notify Consultant when completed installations are ready for inspection prior to concealing or enclosing an area containing firestopping materials.

.3 Owner may appoint independent inspection and testing company to carry out additional inspection and testing as directed by Consultant. Cooperate, coordinate, and arrange for inspections by independent inspection and testing company at required time. 3rd Party testing should be carried out in accordance with ASTM E2174 and ASTM D2393.

.4 Following field inspections, Provide repair as required to ensure compliance with Contract Documents.

3.6 CLEANING AND PROTECTION

.1 Upon completion of this work, remove all materials, equipment and debris from site. Leave *Work* area and adjacent surfaces in a condition acceptable to *Consultant*.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* joints sealants including but not limited to following:
  .1 Exterior:
    .1 Control and expansion joints in cast-in-place concrete.
    .2 Joints between metal panels.
    .3 Perimeter joints between materials listed above and frames of doors and windows.
    .4 Control and expansion joints in cast-in-place concrete slabs.
    .5 Joints between different materials listed above.
    .6 Self leveling sealants.
    .7 Other joints as indicated.
  .2 Interior:
    .1 Control and expansion joints on exposed interior surfaces of exterior walls.
    .2 Perimeter joints of exterior openings where indicated.
    .3 Tile control and expansion joints.
    .4 Vertical control joints on exposed surfaces of concrete walls and partitions.
    .5 Joints on underside of precast beams and planks.
    .6 Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    .7 Joints between plumbing fixtures and adjoining walls, floors and counters.
    .8 Mildew resistant sealants.
    .9 Self leveling sealants.
    .10 Other joints as indicated.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
.1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
.1 environmental procedure requirements,
.2 health, safety and emergency response procedure and policy requirements,
.3 and security requirements;
.2 Pre-construction Site Meeting:
.1 Prior to start of work, arrange for *Project* site meeting of parties associated with work of this Section, including non-exhaustively *Subcontractor* performing work of trade involved, testing company's representative and *Contractor*'s *Consultants* of applicable discipline. *Consultant* may attend.
.2 Review *Contract Documents* to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 *Project* staffing,
.7 restrictions on areas of work and other matters affecting construction.
.3 In addition to minimum requirements above, also discuss following:
.1 verify with sealant manufacturer that specified sealants are compatible with and will satisfactorily adhere to substrates.
.2 weather conditions under which work will be done.
.3 anticipated frequency and extent of joint movement.
.4 joint design.
.5 suitability of durometer hardness and other properties of material to be used.
.6 recommendations of manufacturer for mixing of multi-component sealants.
.7 number of beads to be used in sealing operation and priming operation if required.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with *Contractor* and *Consultant*, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other *Subcontractors* on *The Work* and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 *Supply* items to be built-in in ample time to be incorporated into work of other *Subcontractors*, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product Data*:
.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with submittal requirements of Division 01. Ensure data sheets *Provide* required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. *Provide* adequate warning of maintenance practices or cleaning agents detrimental to specified materials.
.2 Submit *Product* information from sealant manufacturer prior to commencement of work of this Section verifying:
.1 selected sealant materials are from those specified.
.2 composition and physical characteristics.
.3 surface preparation requirements.
.4 priming and application procedures.
.5 suitability of sealants for purposes intended and joint design.
.6 test report on adhesion, compatibility and staining effect on samples of materials used on Project.
.7 sealants compatibility with other materials and *Products* with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumens, concrete, metals and metal finishes, ceramic tile, plastic laminates and paints.
.8 suitability of sealants for temperature and humidity conditions at time of application.
.3 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials later designated by *Consultant*.

.2 Compatibility Testing Report: Prior to *Supply* or installation, test exterior sealant materials for compatibility with joint substrates. Test for staining and adhesion of materials including substrates treated with sealers, curing compounds and water repellants etc. Submit written report of test results to *Consultant* in accordance with Division 01.

.3 Colours: Submit sealant colours for acceptance in accordance with following general colour hierarchy. Between 2 dissimilar materials, colour the sealant to match the material with the higher relative position on the colour hierarchy scale (highest is at ".1"):
.1 Concrete.
.2 Metal extrusions.
.3 Metal (formed).

.4 Samples: Submit samples in accordance with Division 01. *Provide* cured, colour samples of manufacturer's standard range of colours in each type of sealant and caulking compound for colour selection by *Consultant*. Submit samples of primer, bond breaker tape and joint backing material, if requested.

1.6 QUALITY ASSURANCE

.1 Installer Qualifications: *Provide* work of this Section executed by competent installers who have a membership in good standing in the Sealant and Waterproofing Association and with minimum of 5 years' experience in application of *Products*, systems and assemblies specified and with approval and training of *Product* manufacturers. Include lists of completed *Projects* with *Project* Name of *Consultants* and contact persons.

.2 Testing Agency Qualifications: Retain an independent testing agency qualified in accordance with ASTM C1021 to conduct testing indicated, as documented according to sealant manufacturer's recommendations. Ensure materials are verified for suitability in accordance with ASTM C719 and ASTM C661.

.3 Preconstruction Testing:
- .1 Test elastmeric joint sealants for compliance with requirements of ASTM C920 and where applicable, to other standard test methods.
- .2 Test elastomeric joint sealants for compliance with requirements of ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel and indentation hardness.
- .3 Test other joint sealants for compliance with requirements indicated by referencing standard *Specifications* and test methods.
- .4 Prior to commencement of sealing, arrange for sealant manufacturer's technical representative to visit the *Place of The Work* and inspect surfaces and joints to be sealed.
- .5 Test for compatibility of sealant and accessory *Products* with joint substrates. Test results and written recommendations for primers and substrate preparation required for proper adhesion. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including use of specialty formulated primers.

.4 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.5 Mock-ups:
- .1 Conform to requirements of Division 01. At site, in area(s) designated by *Consultant*, erect sample panels 1 m (39"") long for each type(s) of sealant joint design, showing location, size, shape and depth of joint complete with backup materials, primer, caulking and sealant, bond, colour and quality of installation work.
- .2 If requested conduct field test for joints designated. Construct additional Mock-ups if required to obtain approval. Do no sealant work

until Mock-ups have been approved. Approved Mock-ups become standard of comparison for sealant and caulking work on site and may become part of finished installation if undisturbed at time of Substantial Performance of *The Work*

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver caulking and sealant materials to site in original, unopened containers with manufacturers' labels and seals intact. Labels to identify manufacturer's name, brand name of Product, grade and type, application directions and shelf life or expiry date of Product.

.2 Handle and store materials in accordance with manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.

.3 Do not use caulking and sealant materials that have been stored for period of time exceeding maximum recommended shelf life of materials.

1.8 PROJECT CONDITIONS

.1 Environmental Requirements: Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5 deg C (40 deg F). Maintain minimum temperature of application during application and for 8 hours after application. Consult manufacturer for specific instructions before proceeding; obtain *Consultant*'s approval.

.2 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated, and until contaminants capable of interfering with adhesion are removed from joint substrates.

1.9 WARRANTY

.1 Warrant work of this Section for period of 5 years against defects and deficiencies in accordance with General Conditions of the *Contract.* Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to: cracking, crumbling, melting, shrinkage, sag, adhesion or cohesion failure, reversion, air and moisture leakage, marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials.

1.10 MANUFACTURER'S GUARANTEE

.1 *Provide* sealant manufacturer's non-stain guarantee naming *Owner* as beneficiary and covering defects and deficiencies and weather tightness of complete membrane and flashings for 20 years from date *The Work* is certified as substantially performed.

.2 *Provide* guarantee covering materials and including furnishing, repair and replacement of materials at manufacturer's expense, and to extent required

for work of this Section which does not comply with performance and other requirements specified herein.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 BASF Inc.; www.basf.com
- .2 CPD Construction *Products*;
- .3 Dow Corning; www.dowcorning.com
- .4 Euclid Chemical Canada Ltd.; www.euclidchemical.com
- .5 Momentive Performance Materials; www.gesilicones.com
- .6 Hilti (Canada) Limited; www.ca.hilti.com
- .7 Pecora Corporation; www.pecora.com
- .8 Sika Canada Inc.; www.sikacanada.com
- .9 Tremco Canada; www.tremcosealants.com
- .10 W. R. Meadows; www.wrmeadows.com

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Ensure sealants comply with Code requirements and requirements of authorities having jurisdiction with regards VOC emission

.2 Performance Requirements:
- .1 *Provide* exterior and interior elastomeric joint sealants establishing and maintaining water tight, water resistant and air tight continuous joint seals without staining or deteriorating joint substrates.
- .2 Ensure elastomeric sealants provided comply with ASTM C920 and other standards specified herein for type, grade, class and uses.
- .3 *Provide Products* with capability, when tested for adhesion and cohesion under maximum cyclic movement in accordance with ASTM C719, to withstand required percentage change in joint width existing at time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.
- .4 *Provide* elastomeric sealants that are non-staining and have undergone testing in accordance with ASTM C1248 for joint substrates indicated for *Project.*
- .5 *Provide* tamper resistant sealants having Shore A hardness of 50 and 80+ respectively.

2.3 MATERIALS

.1 Type A Sealant: Provide 1 of following:
- .1 Provide following Type A sealants in following locations unless otherwise indicated:
  - .1 Perimeters of exterior openings, where frames meet exterior facade of building such as precast, coping joints and coping

to facade Joints and similar surfaces:
.1 Non Sag Medium Modulus Sealants:
.1 “795 Silicone Building Sealant” by Dow Corning.
.2 “Spectrem 2" by Tremco Canada.
.3 "GE SilPruf SCS2000" by Momentive Performance Materials.
.4 “Sikasil WS-295” by Sika Canada Inc.
.2 Neutral Cure Medium Modulus Sealants:
.1 “791 Silicone Weatherproofing Sealant” by Dow Corning.
.2 “Spectrem 3" by Tremco Canada.
.3 “UltraPruf II SCS2900" by Momentive Performance Materials.
.4 “Sikasil N-Plus” by Sika Canada Inc.
.3 High Elongation Low Modulus Sealants:
.1 “123 Silicone Seal” by Dow Corning.
.2 “Spectrem Simple Seal” by Tremco Canada.
.3 “UltraSpan US1100" by Momentive Performance Materials.
.4 “Sika Silbridge 300” by Sika Canada Inc.
.2 Composite Metal Panels and Joints:
.1 “795 Silicone Building Sealant” by Dow Corning.
.2 "Silicone Weatherproofing Sealant SWS 35%" by Momentive Performance Materials or “Contractor’s Weatherproofing Sealant CWS” or “Contractor’s Concrete Sealant CCS” by Dow corning or”Tremsil 400 (25%)" by Tremco Canada.
.3 “Spectrem 2" by Tremco Canada.
.4 “GE SilPruf SCS2000" by Momentive Performance Materials.
.5 “Sikasil WS-290“by Sika Canada Inc.
.3 Interior Perimeters of Exterior Openings:
.1 “791 Silicone Weatherproofing Sealant” by Dow Corning.
.2 “Spectrem 3" by Tremco Canada.
.3 "GE SilPruf NB SCS9000" by Momentive Performance Materials.
.4 “Sikasil N-Plus” by Sika Canada Inc.

.2 Type B Sealant: *Provide* 1 of following:
.1 Interior Mildew Resistant Sealant: Non-sag type, 1 component, mildew resistant silicone containing non-toxic fungicidal agents sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT. *Supply* in standard colours as selected. *Supply* 1 of following:
.1 “Dow Corning 786" by Dow Corning Canada Inc.
.2 “Trade Mate Tub, Tile & Ceramic Silicone Sealant" by Dow Corning.
.3 “Tremsil 200", white or clear by Tremco Canada. White and Clear.
.4 “Sanitary SCS1700" by Momentive Performance Materials.
.5 “Sikasil-GP” by Sika Canada Inc.

.3 Type C Sealant: *Provide* 1 of following:
.1 Latex Sealants: Non-sag type, 1 component, acrylic latex sealant conforming to ASTM C834, Type OP, Grade -18 C. *Supply* in standard colours as selected. *Supply* 1 of following:

.1 "GE RCS20" by Momentive Performance Materials.
.2 "Sonolac" by Sonneborn.
.3 "Tremflex 834" by Tremco Canada.

.2 Interior Sealant for vertical movement and non-movement joints: Non-sag type, multi-component polyurethane sealant conforming to ASTM C920, Type M, Grade NS, Class 50, Use T, I, M, A and O. *Supply* in standard colours as selected. *Supply* 1 of following:
.1 "Sonoplastic NP2" by BASF Inc.
.2 "Eucolastic II (25%)" by Euclid Chemical Canada Ltd.
.3 "Sikaflex -2c NS" by Sika Canada Inc.
.4 "Dymeric 240" by Tremco Canada.

.3 Interior Sealant for vertical movement and non-movement joints: Non-sag type, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A and O. *Supply* in standard colours as selected. *Supply* 1 of following:
.1 "Sonoplastic NP1" by BASF Inc.
.2 "Sikaflex -1a" by Sika Canada Inc.
.3 "Dymonic" and/or "Vulkem 116" by Tremco Canada.

.4 Type D Sealant: *Provide* 1 of following:
.1 Traffic Bearing Self Levelling Exterior Sealant: Pour grade, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade P, Class 25, Use T, M, A, I and O. *Supply* in standard colours as selected. *Supply* 1 of following:
.1 "SL 1" by BASF Inc.
.2 "Sikaflex Self Levelling Sealant" by Sika Canada Inc.
.3 "Vulkem 45SSL" by Tremco Canada.

.2 Traffic Bearing Self Levelling Interior Sealant: Non-sag type, 1 component low-modulus, pre-pigmented, neutral cure elastomeric silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A and O. *Supply* in standard colours as selected. *Supply* 1 of following:
.1 "Dow Corning *Contractors* Concrete Sealant (CCS)" by Dow Corning.
.2 "Dow Corning NS Parking Structure Sealant (Non-Sag)" by Dow Corning.
.3 "GE Tosseal* 811" by Momentive Performance Materials.
.4 "Spectrum 800 Low Modulus Silicone Highway and Parking Structure Sealant" by Tremco Canada.
.5 "Sikasil-728 SL" by Sika Canada Inc.

.5 Type E Sealant: *Provide* 1 of following:
.1 Load Bearing Self-levelling Sealant: epoxy modified joint sealant, cold-applied, 2 components, pour grade, grey colour. *Supply* 1 of following:
.1 "Loadflex" by Sika Canada Inc.
.2 "Rezi-Weld ™" by W.R. Meadows of Canada.

.6 Type F Sealant :
.1 Tamper Resistant Security Sealant: For use at joints in unsupervised locations; movement capability 25%. *Supply* 1 of following:
.1 1 component, non-sag polyurethane tamper resistant security

joint sealant:
.1 “Pecora Dynaflex™ SC” by Pecora.
.2 “Sonolastic® ULTRA” by BASF.
.3 "Sikabond Construction Adhesive" or "Sikaflex 221 12.5%" by Sika Canada Inc.

.2 Pickproof Sealant: For use at corner joints; nonmoving fixtures joints (sinks, lights, mirrors); and window and door frame joints to wall, metal, masonry and concrete block in supervised interior private and isolated areas including but not limited to: holding cells, seclusion rooms, washrooms.
.1 2 component, non-sag epoxy tamperproof security joint sealant
.1 “Pecora Dynaflex EP 1200” by Pecora.
.2 “Epolith G” by BASF.
.3 “Anchor Fix 3” by Sika Canada Inc.

.7 Type H Sealant: Provide following:
.1 Acoustical Sealing Materials: for sound isolation and for interior use between joints.
.1 Acoustic Sealant: ASTM C834 and ASTM C920, Class 25, Non-hardening. Provide 1 of following:
.1 “QuietZone Acoustic Sealant” by Owens-Corning Canada Inc.
.2 “Tremco Acoustical Sealant” by Tremco Ltd.,
.3 “QuietSeal” by Serious Materials or QuietSeal 350 by Serious Materials.
.4 "CP506 – Smoke and Acoustic Sealant" by Hilti
.5 or approved equivalent.
.6
.2 Putty Pad for sealing electrical boxes and other penetrations:
.1 Fire-rated, mouldable putty, “QuietPutty 380” by CertainTeed.
.3 Gaskets: Closed cell neoprene, 3 mm (1/8") thick x 64 mm (2-1/2") wide.
.4 Asphalt Felt: CSA A123.3; No. 15 Type.

2.4 COMPONENTS

.1 Joint Backing: Preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam, compatible with joint substrates and are approved by sealant manufacturer based on field experience and laboratory test. Sizes and shapes to suit various conditions, diameter 25% greater than joint width. Backing shall be compatible with sealant, primer and substrate.

.2 Bond Breaker Tape: As recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. *Provide* self-adhesive tape where applicable.

.3 Joint Primer: Non-staining, suitable for substrate surfaces, compatible with joint forming materials and as recommended by sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

.4 Masking Tape: *Provide* non-staining, non-absorbent tapes and sheets which effectively mask sealant without leaving an adhesive residue compatible with joint sealants and surfaces adjacent to joints.

.5 Cleaning Material: Non-corrosive, non-staining, isopropyl alcohol (IPA) or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine joints for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Ensure joints are suitable to accept and receive sealants.

.2 Verify that joint surfaces are clean, sound, free of defects and that dimensions are within sealant manufacturer’s size requirements.

.3 Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work implies acceptance of surfaces and conditions.

.4 Before any sealing work is commenced, test materials for indications of staining or poor.

.5 Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Ensure joint interfaces are clean.

.2 Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

.3 Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers and other foreign material.

.4 Clean porous surfaces such as concrete by wire brushing, grinding or blast cleaning, mechanical abrading or combination of these methods as required to obtain clean and sound surfaces.

.5 Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.

.6 Wipe non-porous surfaces such as metal and glass to be sealed, except pre-coated metals, with cellulose sponges or clean rags soaked with ethyl alcohol, or approved equivalent cleaning method recommended by manufacturer and wipe dry with clean cloth. Where joints are to be sealed with silicone based sealants clean joint with cleaning method recommended by manufacturer. Do not allow solvent to air-dry without wiping. Clean pre-coated metals with solutions or compounds which will not injure finish and which are compatible with joint primer and sealant. Check ferrous metal surfaces are painted before applying sealant.

.7 Examine joint sizes and where depth of joint exceed required depth of sealant correct to achieve proper manufacturer's recommended width/depth ratio.

.8 *Install* joint backing material to achieve correct, uniform joint profile and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

.9 Do not leave gap between ends of sealant backing; do not stretch, twist, puncture, or tear sealant backings; remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

.10 Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape to prevent 3-sided adhesion.

.11 Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. *Install* bond breaker tape at back of joint where joint backing is not required or cannot be installed.

.12 On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.

.13 Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.

.14 Do not exceed shelf life and pot life of materials and installation times, as stated by manufacturer.

.15 Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.

.16 Use materials as received from manufacturer, without additions, deletions and adulterations of materials.

.17 Mix multiple component sealants and bulks sealants using mechanical mixer capable of mixing without mixing air into material, in accordance with manufacturer's directions and recommendations. Continue mixing until material is homogeneously blended, uniform in colour and free from streaks of unmixed material. *Install* compound prior to start of hardening or curing cycle.

.18 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are prime painted in shop before sealing check to make sure prime paint is compatible with primer and sealant. If they are

incompatible, inform *Consultant* and change primer and sealant to compatible types approved by *Consultant*.

.19 Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.

.20 Prime exterior horizontal joints. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker or sealant as recommended by sealant manufacturer.

3.3 APPLICATION

.1 Apply in accordance with manufacturer's directions and recommendations unless more stringent requirements apply.

.2 Apply sealant by proven techniques using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer.

.3 Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill all voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead is not acceptable.

.4 Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.

.5 Compound may be tooled, provided such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.

.6 Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.

.7 Ensure joint surfaces are straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and be uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life *Products*.

.8 Do not use solvent curing sealants indoors.

.9 Use 1 of sealants specified for each type in following locations. Ensure sealant chosen (from several specified under each type under "MATERIALS") for each location is recommended by manufacturer for use for conditions encountered:

.1 Type A: Joints between metal frames and adjacent concrete construction in exterior walls, exterior and interior sides; control and expansion joints in exterior and interior surfaces of poured-in-place concrete walls, and all other locations where sealant is required or noted on *Drawings* except in locations designated for Type B, C, D, E, F, G, H and I and except where sealant is specified

in other Sections.

.2 Type B: Joints between urinals and walls, around washrooms accessories, at corners of walls, between splash backs and walls, in shower, damp or wet areas, at ceramic tiles where mildew resistant sealant is required.

.3 Type C: Joints between interior metal or wood frames and adjacent construction in interior partitions.

.4 Type D (traffic bearing): Joints with movement in horizontal surfaces between concrete slabs.

.5 Type E (load bearing): Static joints in horizontal surfaces where self-levelling sealants are required.

.6 Type F: Floor/Wall Joints; corner joints; non-moving fixtures joints (sinks, lights, mirrors); and window and door frame joints to wall and metals in following locations:

.1 unsupervised interior public areas.

.2 exterior public locations up to 3 m (10’-0”) above grade.

.7 Type H: Conform to ASTM C919 for use of sealants in sound attenuation partitions.

.1 Apply acoustical sealant to every air gap, such as gaps around perimeter of wall, between wall panels and around any penetrations made for plumbing or electrical wiring. Seal off any piping, electrical output boxes, and duct work with acoustical treatments. Treat junction boxes with acoustic putty, treat piping and duct work either with fiberglass duct liner or damping material or both. Treat frame with gasket material (weather-strip) and *Install* security flap on bottom of door to seal it off.

.2 Apply acoustical sealant around partition cutouts including, but not limited to, gaps between wall stud plates and subfloor, electrical outlets and boxes, plumbing and duct outlets, air ducts and boots, doors, windows and other miscellaneous wall and floor penetrations or gaps.

.3 Apply sealant between track or runner, walls, floors and ceiling; areas may require premoulded, loose-cell filler between tracks and drywall at top and bottom edges to meet design requirements.

.4 Apply minimum 13 mm (1/2") diameter bead of acoustic sealant continuously around periphery of each face of partition to seal gypsum board/structure junction where partitions abut fixed building components in accordance with recommendations of “CGC Drywall/Steel Framed Systems, Folder SA923 09250".

.10 Joint designation in preceding paragraphs and fact that *Drawings* do not show all locations to be sealed does not limit responsibility of this Section to seal all locations except those indicated in other Sections of work, required to create and ensure continuous enclosure.

.11 Firestopping and Smoke Seal: Sealants part of firestopping systems and smoke seals provided within fire rated assemblies shall be part of work of Section 07 84 00 and shall be carried out under supervision of this Section.

3.4 FIELD QUALITY CONTROL

.1 Independent inspection and testing company may be appointed and paid for by *Owner* to carry out inspection and testing as directed by *Consultant*.

.2 Inspect joints for complete fill, for absence of voids and for joint configuration complying with specified requirements. Record results in a manner acceptable to *Consultant*.

.3 Tests may include sampling of installed *Product* where adhesion, cohesion or reversion failure is suspected.

.4 Where work or materials fail to meet requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.

3.5 CLEANING

.1 Immediately clean adjacent surfaces which have been soiled and leave work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use recommended cleaners and solvents. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.

3.6 PROTECTION

.1 *Provide* approved, non-staining means of protection for completed joint sealant installations where required to protect work from mechanical, thermal, chemical and other damage by construction operations and traffic.

.2 Maintain protection securely in place until completion of Work. Remove protection when so directed by *Consultant*.

.3 Repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the ***Contract;***
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: ***Provide*** steel doors and frames including but not limited to following:
  .1 interior hollow metal doors, swing flush type.
  .2 exterior insulated hollow metal doors, swing flush type.
  .3 fire rated doors
  .4 interior and exterior specialty doors including but not limited to: temperature rise rated doors.
  .5 hollow metal door frames, transoms and sidelites frames including thermally broken types.
  .6 hollow metal transom panels.
  .7 glazing stops.
  .8 dutch doors, shelves on bottom leaves.
  .9 preparation of hollow metal doors and frames for CSA approved wiring system and conduits for electronic hardware.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Abbreviations and Acronyms:
  .1 HM: Standard Duty Doors;
  .2 PS: Pressed Steel Frames

.2 Definitions:
  .1 Minimum base steel thicknesses for gauges: in accordance with Appendix 1 of CSDMA "Recommended Specifications for Commercial Steel Door and Frame Products". Steel sheet thicknesses specified herein are base metal thicknesses prior to galvanizing.
  .2 CSDMA: Canadian Steel Door Manufacturers Association
  .3 NAAMM: National Association of Architectural Metal Manufacturers
  .4 HMMA: Hollow Metal Manufacturer's Association.

.3 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
- .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
  - .1 environmental procedure requirements,
  - .2 health, safety and emergency response procedure and policy requirements,
  - .3 and security requirements;
- .2 Pre-construction Site Meeting:
  - .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
  - .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
    - .1 work included,
    - .2 materials to be used,
    - .3 storage and handling of materials,
    - .4 installation of materials,
    - .5 sequence and quality control,
    - .6 Project staffing,
    - .7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
- .1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
- .2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
- .3 Co-operate with other Sections for application of all miscellaneous specialties.
- .4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
- .5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as

maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and as other materials designated later by *Consultant*.

.3 *Shop Drawings*: Submit Shop Drawings or catalogue sheets fully illustrating work of this Section in accordance with Division 01.

.1 Ensure Shop Drawings or manufacturer's catalogue sheets contain detailed description, and bear item numbers, marked to show quantity, colour, model numbers, fabrication details and installation instructions. Ensure Shop Drawings show following:

.1 detailed elevations of all doors and frames,
.2 jamb and head details for all frame types,
.3 meeting and style details on pairs of doors,
.4 materials used,
.5 core thicknesses,
.6 mortises, reinforcements,
.7 location of exposed fasteners,
.8 glazed openings,
.9 arrangement of hardware,
.10 fire ratings,
.11 methods of anchorage.

.2 For each door and frame scheduled for electrical hardware, show following items in addition to minimum requirements (Coordinate with division 26):

.1 location and size of junction boxes and conduit for electrical hardware and wiring.
.2 conduit cut-outs,
.3 other information related to electrical hardware or interrelated systems such as fire alarm and security systems/controls.

.3 Schedules: Submit a schedule indicating each door and frame related to Door Schedule. Identify each unit with door marks and numbers relating to numbering on Drawings and in Door Schedules.

.4 Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication to ensure proper fitting of work. Do not fabricate work until Shop Drawings and hardware schedules have been reviewed.

.4 Samples: Submit 1 cut-away corner sample for each of the following items of work in accordance with Division 01 and in dimension indicated:

.1 One 300 x 300 mm (12” x 12”) corner sample of each type door. Show following:

.1 core.
.2 reinforcing.
.3 facing.
.4 frame.
.5 insulation (if applicable)
.6 glazing (if applicable)

.7 factory applied finishes (if applicable).

.2 One 300 x 300 mm (12” x 12”) corner sample of each type of frame. Show following:
.1 frame profile,
.2 corner joints,
.3 floor and wall anchors,
.4 silencers.

.5 Test and Evaluation Reports:
.1 Submit following test reports:
.1 Reports substantiating that steel door and frame assemblies supplied under this Section meet acceptance criteria of ANSI A250.10 and ANSI A250.4, Level “A”.
.2 Reports substantiating that insulated door cores and thermally broken frames supplied for exterior door work of this Section meet or exceed specified thermal resistance rating and requirements of CAN/CGSB-82.5-M.
.2 Ensure reports include name of testing authority, date of test, location of test facility, descriptions of test specimens, procedures used in testing and compliance with acceptance criteria of test.
.3 If requested by Consultant or authorities having jurisdiction, Submit in addition to fire label, certificates substantiating design and construction of fire-rated screen assemblies.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications:
.1 Execute work of this Section by a manufacturer who is a member of CSDMA.
.2 Ensure Products supplied are manufactured by a firm experienced in
.1 design and production of standard and custom commercial steel door and frame assemblies;
.2 integration of builders’ or electronic hardware, glazing assemblies and other items affecting work.
.3 Upon request, submit manufacturer’s evidence of minimum 5 years continuous experience in type of work specified under this Section for Projects of similar size and scope.
.4 Ensure manufacturer has personnel and plant equipment capable of fabricating steel door and frame Products of types specified with written quality control and system in place.

.2 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,

.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.
.8 Submit certificate validating seismic assessment and field review of this part of the *Work*

.3 Supplier Qualifications: Ensure Product Supplier has Architectural Hardware Consultant (AHC) or person of equivalent experience, available at reasonable times to consult with Consultant, Contractor and Owner.

.4 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.5 *Mock-ups:* Provide *Mock-ups* in locations designated by *Consultant* and as required to demonstrate quality of workmanship. Maintain *Mock-ups* during construction in an undisturbed condition as a standard for judging completed work.

.6 Installer Qualifications:
.1 Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of Product manufacturers.
.2 Ensure retained installers are familiar with Product manufacturers specified herein and with NFPA 80 requirements for installation of labeled fire rated steel doors, frames and hardware.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Be responsible for supply of Products specified herein to site in timely manner, so as not to delay progress of other trades.
.2 Protect doors and frames during shipping and storage.
.3 Inspect materials thoroughly upon receipt and report discrepancies, deficiencies and damages immediately in writing to Consultant. Note damages on carrier’s Bill of Lading.
.4 Notify Supplier in writing of errors or deficiencies inherent to materials prior to initiating corrective work.

.2 Storage and Handling Requirements:
.1 Provide site storage and protection of materials in accordance with NAAMM-HMMA 840 and coordinate requirements with Section 06 90 00 for installation of doors.
.2 Immediately Make Good any damage acquired during shipping or handling. Clean scratches and touch up with rust-inhibitive primer. Replace damaged work which cannot be repaired, restored or cleaned.
.3 Store items in dry, secure location on planks or dunnage. Store Door and frame Products in vertical position, spaced with blocking. Cover materials to protect them from damage but in such a manner as to permit air circulation.

1.8 WARRANTY

.1 Warrant Work of this Section for period of 10 years against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to: buckling, opening of seams, defective welding and extensive colour fading.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 ***Products*** of following manufacturers are acceptable subject to conformance to requirements of ***Drawings***, Schedules and ***Specifications***:
- .1 Group LMT; www.mtremblay.com/en/
- .2 Artek Door Limited; www.artekdoor.com
- .3 Baron Metal; www.baronmetal.com
- .4 Daybar Industries Limited; www.daybar.com
- .5 Fleming Door ***Products*** Limited; www.flemingdoor.com
- .6 Gensteel Doors; www.gensteeldoors.com

.2 Substitution Limitations: This Specification is based on Fleming's Products. Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Label and list fire rated doors and frames for ratings specified and noted by organization accredited by the Standard Council of Canada in conformance with CAN/ULC S104and CAN/ULC S105, NFPA 80 and NFPA 252.
  - .1 ***Install*** labels on doors and frames at manufacturing plant by means of metal tags or embossing. Site applied and stamped fire-labelling is not acceptable
- .2 Ensure Product quality meets standards set by Canadian Steel Door Manufacturers Association (CSDMA).
- .3 Include in submitted Contract Price, cost associated with replacement of two (2) doors selected at random by Consultant for inspection of construction and compliance with Specifications.
- .4 Steel door and frame Products not in compliance with this Specification may be grounds to reject entire shipment, Supplier or manufacturer. Replace rejected Product at no cost to Owner. Extensions of time or additions to Contract Price due to rejection of Product will not be considered.

.2 Design and Performance Requirements:
- .1 Ensure door and frame Products are fabricated in strict accordance with reviewed Shop Drawings. Ensure steel is free of scale, pitting, coil breaks, surface blemishes, buckles, waves and other defects.

.2 Ensure core materials for exterior doors attain thermal resistance of specified herein when tested in accordance with ASTM C177 or ASTM C518

.3 ***Provide*** thermally broken assemblies as indicated on ***Drawings*** and noted on Door Schedule tested in accordance with requirements of CAN/CGSB-82.5-M.

.4 Physical Endurance Performance Test for Steel Doors: in accordance with ANSI A250.4 Cycle and Twist Test procedures. Test 914 mm (3′ – 0″) x 2134 mm (7′ – 0″) x 45 mm (1-3/4") thick nominal size door, representative of construction and materials provided:

.1 Acceptance Criteria for doors specified with 1.2 mm (18 ga) face sheets and lighter:

.1 Minimum No. of Cycles: 1,000,000 cycles.

.2 Maximum deflection under 1.33 kN (300 lbs) load: ≤ 31.75mm (1.25″)

.3 Maximum permanent deflection: ≤ 3.18mm (0.125″).

.2 Acceptance Criteria for doors specified with 1.52 mm (16 ga) face sheets and heavier:

.1 Minimum No. of Cycles: 4,000,000 cycles.

.2 Maximum deflection under 1.33 kN (300 lbs) load: ≤ 15.88mm (0.625″).

.3 Maximum permanent deflection: ≤ 0.062″ (1.57 mm).

.5 Labeled Fire-Rated and Temperature Rise Rated Doors and Frames:

.1 Provide label of recognized testing agency having factory inspection service, and constructed as listed or classified for labeling.

.2 Temperature Rise Rated Doors: ***Provide*** fire and temperature rise rated steel doors for those openings as determined and scheduled by ***Consultant.***

.1 As a minimum, ***Provide*** fire and temperature rise rated steel doors and frames at following locations and as indicated on Drawings and schedules:

.1 between dead end corridor and adjacent occupied spaces;

.2 between exit enclosures (stairs) and remainder of floor areas;

.3 in firewalls and other specific locations noted on Drawings or Schedules.

.3 ***Provide*** label of a recognized testing agency having factory inspection service, and constructed as listed or classified for labeling.

.4 Test doors provided for openings requiring fire rating only, or fire and temperature rise rating in accordance with CAN/ULC S104

.5 Test frames, transom and sidelight assemblies provided for openings requiring fire-rating, in accordance with CAN/ULC S104.

.6 Label in accordance with NFPA 80, listing organization's policies and Follow-Up Service Procedures/Manuals.

.7 Fire rated door or frame component , not qualifying for labeling due to design, hardware or any other reason, shall be noted in

submittal documents, or prior to manufacture of ***Product*** if hardware, glazing or other options affecting fire-rating are not available at time of submittal ***Shop Drawings*** preparation.

2.3 MATERIALS

.1 Base Material for steel door faces sheets and frame profiles. Ensure steel provided for work of this Section is free of scale, pitting, coil breaks, surface blemishes, buckles, waves and other defects.
- .1 Galvannealed Sheet Steel: Commercial grade steel (CS) to ASTM A568/A568M, with zinc hot-dip galvanized coating (commercially known as "Galvanneal") in accordance with ASTM A653/A653M. Coating Designation: ZF120 (A40).
- .2 Galvanized Sheet Steel: Commercial grade steel (CS) to ASTM A568/A568Mwith hot-dip galvanized coating in accordance with ASTM A653/A653M. Coating Designation: Z275 (G90).

.2 Door Cores: Refer to individual door types for applicability of cores specified herein.
- .1 Honeycomb: Structural small cell (25 mm (1") maximum), kraft paper "honeycomb"; weight: 36 kg (80 lb) per ream (minimum), density: 16.5 kg/m^3 (1.03 lbs/cu ft) minimum. Provide items sanded to required thickness.
- .2 Insulated core: Rigid insulated panel core of required thickness needed to achieve thermal resistance rating as indicated after door panel fabrication.
  - .1 Polyurethane: CAN/ULC-S702, Rigid, polyurethane, board with a density of 32 kg/m^3 (2.0 lbs/cu ft) and minimum thermal resistance rating of RSI 1.92 (R11)
- .3 Steel Stiffened Core: Internally reinforced cores with 0.91 mm (20ga) interlocking steel stiffeners, at 150 mm (6") on center, securely welded to each face sheet at 150 mm (6") on center maximum. Fill voids between stiffeners with fiberglass (interior) or polyurethane insulation (exterior) as specified herein.
  - .1 Glass Fibre: Density 24 kg/m^3 (1.5 lbs/cu ft) minimum consisting of durable fibrous material processed from rock, slag or glass, bound with deterioration resistant binders, CAN/ULC-S702, Type 1.
  - .2 Polyurethane: CAN/ULC-S702, Rigid, polyurethane, board with a density of 32 kg/m^3 (2.0 lbs/cu ft) and minimum thermal resistance rating of RSI 1.92 (R11)
- .4 Temperature Rise Rated (TRR) Core: Ensure core composition provides fire protection rating and limits temperature rise on unexposed side of door to 121 deg C (250 deg F) above ambient temperature after 30 minutes and 250 deg C (421 deg F) after 60 minutes, as determined by National Building Code Of Canada requirements. Test core as part of complete door assembly in accordance with CAN4-S104-M or NFPA 252, and ensure materials are listed by nationally recognized testing agency having factory inspection service.

.3 Adhesives: Provide UL/WH approved, heat resistant, adhesives for applications indicated:

.1 Laminated Cores and Steel Components: Heat resistant, single component. polyurethane reactive (water) hot melt, thermoset.

.4 Primer: Rust inhibitive touch-up only.

.5 Door Silencers (Bumpers): Single stud rubber/neoprene type.

.6 Exterior Top Caps:
.1 Rigid polyvinyl-chloride (PVC) extrusion conforming to CGSB 41-GP-19Ma.

.7 Frame Thermal Breaks: Rigid polyvinyl-chloride (PVC) extrusion conforming to CGSB 41-GP-19Ma.

.8 Fasteners for Stops: Cadmium plated steel, counter sunk flat or oval head sheet metal Phillips screws.

.9 Fasteners: expansion bolts, galvanized, approved design, to ASTM A307

.10 Anchors:
.1 Frame Anchors: ***Provide*** Frame anchor ***Products*** with anchorage appropriate to floor, wall and frame construction.
.2 Floor Anchors: ***Provide*** each jamb with 1.52 mm (16 ga) steel floor anchors where frame ***Product*** is installed prior to construction of adjacent wall. ***Provide*** each anchor with 2 (two) holes for mounting to floor and securely weld to inside of jamb profile.
.3 Wall Anchors:
.1 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
.2 ***Provide*** 2 anchors for rebate opening heights up to and including 1500 mm (5') and 1 additional anchor for each additional 760 mm (30") of height or fraction thereof, except as noted below. For frames in previously placed structural steel ***Provide*** anchors located not more than 150 mm (6") from top and bottom of each jamb and intermediate anchors at 660 mm (26") on center maximum.
.3 ***Provide*** frame ***Products*** installed in steel stud and drywall partitions with 20 gauge steel snap-in or "Z" stud type anchors. ***Supply*** frame anchors to gypsum board installers with directions for installing steel door frames in gypsum board partitions.
.4 Punch and dimple jambs of frames in previously placed structural steel to accept machine bolt anchors, .25" (6.4mm) diameter, located not more than 6" (150mm) from the top and bottom of each jamb.
.5 Locate anchor preparations and guides immediately above or below intermediate hinge reinforcing and directly opposite on strike jamb. ***Provide*** each preparation with 16 gauge anchor bolt guides.
.6 ***Provide*** anchor bolts and expansion shell anchors for above preparations by ***Subcontractor*** responsible for installation.
.7 ***Provide*** channel extensions from top of frame assembly to underside of structure above on sidelights or windows exceeding

9'-10" (3m) in width when installed in stud partitions. Fabricate extensions from 2.66 mm (12 ga) steel formed channels, mounting angles and adjusting brackets, with mounting angles welded to inside of frame head. Deliver loose formed adjusting brackets and fasteners. Connect channels mechanically to mounting angles and adjusting brackets with supplied fasteners, on site, by ***Subcontractor*** responsible for installation.

.11 Door weatherstripping: In accordance with requirements of Section 08 71 00.
- .1 ***Provide*** door window weatherstripping and seals as per manufacturer's installation guidelines.
- .2 Provide door weatherstripping and sealing of exterior doors and doors drawing air from outside, i.e. mechanical room door, fire door, elevator room door, vestibule door or similar type door.
- .3 Ensure use of proper type of weatherstripping to provide appropriate levels of durability, expandable and appearance without impeding use of doors and windows.
- .4 ***Install*** weatherstripping/seals plumb, square and level, wherever possible. Adjust weatherstripping for correct function and to form weathertight seal.

2.4 FABRICATION

.1 Inspection: Permit access by approved inspection and testing company for purposes of inspection of doors under fabrication.

.2 Welding: CSA W59-M. Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arises and profiles and sand down to smooth, true, uniform finish.

.3 Doors:
- .1 Fabricate doors to be swing type flush with 1 continuous face free from joints, tool markings and abrasions and with provisions for glazed openings as indicated on Door Schedule and Drawings.
- .2 Fabricate door faces of steel doors without visible seams, free of scale, pitting, coil brakes, buckles and waves.
- .3 ***Provide*** formed edges true and straight with minimum radius for thickness of steel used.
- .4 Coordinate louvre openings with Divisions 21, 22 and 23.
- .5 Fabricate exterior doors using polyurethane steel stiffened (R11) insulated construction.
- .6 Fabricate face sheet for standard interior door using sheet steel laminated under pressure to honeycomb core; unless door is indicated as steel stiffened, temperature rise rated or of other specialty construction.
- .7 Where indicated for security requirements, fabricate exterior doors with steel stiffened construction filled with glass fibre insulation as indicted. Refer to Schedules for locations.
- .8 Fabricate interior doors using honeycomb construction or steel stiffened construction where required for security or abuse requirements. Refer to Schedules for locations.

.9 For acoustic doors, use manufacturer's proprietary door core to achieve required STC rating determined and scheduled by ***Consultant***.

.10 Fabricate doors with top and bottom inverted recessed spot welded channels. ***Provide*** inverted, recessed, 1.5 mm thick (16 ga) steel end channels, welded to each face sheet at 50 mm (2") on center maximum.

.11 ***Provide*** flush PVC or steel top cap as specified herein on exterior doors. Fire labeled exterior doors to be provided with factory installed flush steel top caps.

.12 Reinforce, blank, drill and tap doors for mortised, templated hardware.

.13 Reinforce doors for surface mounted hardware.

.14 Undercut 19 mm (3/4") for air intake at washrooms and other doors indicated on Door Schedule.

.15 Factory prepare holes 13 mm (1/2") diameter and larger. Factory prepare holes less than 13 mm (1/2") when required for function of device for knob, lever, cylinder, turn pieces or when these holes overlap function holes.

.16 Lock and hinge edges to be beveled 3 mm in 50 mm (1/8" in 2") unless required otherwise to suit finish hardware or door swings.

.17 Fabricate fire rated door assemblies as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by nationally recognized listing agency to individual manufacturer and tested in conformance with CAN/ULC S104-M. ***Provide*** labels for fire rated doors.

.18 Fabricate fire rated doors where indicated in Door Schedule or ***Drawings***, to meet required maximum temperature rise on unexposed side of door in accordance with National Building Code Of Canada and ULC requirements.

.19 Fabricate non-rated doors in accordance with following edge clearances unless otherwise indicated:

- .1 Between doors and frames at head and jambs: Not more than 3 mm (1/8").
- .2 Between meeting edges of pairs of doors: Not more than 3 mm (1/8").
- .3 At door bottom (non rated doors):
  - .1 Not more than 19 mm (3/4") to unfinished floor,
  - .2 Not more than 16 mm (5/8") to finished floor unless indicated to be undercut.

.20 Fabricate fire rated doors in accordance requirements of local Codes and NFPA 80; whichever is more stringent. Provide following maximum edge clearances unless otherwise indicated:

- .1 Door Bottoms: Not more than 6 mm (1/4")
- .2 Sides and Top: Not more than 3 mm (1/8") at the sides and top.

.4 Glazing: Conforming to requirements of Section 08 80 00.

.1 Where doors are scheduled to have glazing up to and including 8 mm (5/16") thick as noted in Door Finish Schedule and/or indicated on ***Drawings***, ***Provide*** doors with 0.91 mm (20 ga) steel glazing trim and snap in glazing stops.

.2 Where doors to have glazing more than 8 mm (5/16") thick as noted in Door Finish Schedule and/or indicated on ***Drawings***, ***Provide*** doors with 0.91 mm (20 ga) steel glazing trim and screw fixed glazing stops.

Screws shall be #6 x 1-1/4" oval head self drilling type at 300 mm (12") on center maximum.

.3 Glazing trims and stops shall be accurately fitted, butted at corners with removable glazing stops located on non-secure side of floor.

.4 Glazing for exterior doors and sidelites:

.1 Factory Sealed Insulating Glass Units: Provide insulated glazing units consisting of 2 panes of 6 mm (1/4”) thick tempered glazing separated by minimum 12 mm (1/2”) thick air space to match Consultant’s sample. Provide stainless steel edge spacers and low ‘e’ coating applied to specified surface of glass to ensure conformance with following performance criteria:

.1 Manufacture insulating glass units to requirements of CAN/CGSB -12.8-97 using dual seal as specified herein and utilizing high performance stainless steel spacer or approved alternative edge spacer. Edge seals to be dual seals of polyisobutylene and silicone.

.2 Low ‘E’ coating: Provide insulating glass units with high performance sputtered Low ‘E’ coating in accordance with requirements of the glass manufacturer as substantiated by the glass manufacturer's thermal stress analysis for this Project. Apply Low ‘E’ coating to 2nd surface unless otherwise indicated.

.5 Glazing for interior doors:

.1 Tempered Glass: Conforming to ASTM C1048, Kind FT, minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression not less than 10,000 psi.

.5 Prime Painting: Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

.6 Hardware Requirements and Preparations:

.1 Blank, reinforce, drill and tap door and frames at factory for fully templated hardware in accordance with approved hardware schedule and templates provided by hardware Supplier. Check hardware list for requirements.

.2 Door mortised hardware that is not fully templated: Only Provide factory blanking and reinforcing for doors and frames.

.3 Reinforce frame Products where surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges or non templated hardware apply. Drilling and tapping: By others in field.

.4 Templated holes 12.7mm (1/2") diameter and larger to be factory prepared except mounting and through bolts holes which are to be Provided by Subcontractor responsible for installation on site, at time of application. Templated holes less than 12.7mm (1/2") diameter to be factory prepared only when required for function of device (knobs, levers, cylinders, thumb or turn pieces) or when these holes overlap function holes.

.5 Reinforce frame ***Products*** where surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges or non templated hardware apply, with drilling and tapping done by others in field.

.6 Hinge reinforcing: 3.66 mm (7 ga) steel minimum, high frequency type.

.7 Reinforcing for continuous hinges: 2.66 mm (12 ga) minimum.

.8 Cylindrical lock, ASA strike and flush bolt reinforcing: 2.66 mm (12 ga) steel minimum. Provide 1.52 mm (16 ga) steel reinforcement for Mortise lock and surface mounted hardware.

.9 Provide grout for hardware mortises on perimeter frame members.

.10 Provide CSA approved system consisting of CSA approved conduit, junction boxes and 15 wire harnesses complete with modular plugs for coordinated connection directly to electrified hardware where electrified hardware is specified on approved Hardware Schedule. Refer to Section 08 71 00 for openings that require electrified hardware unless indicated otherwise.

.7 Frames:

.1 Frame Construction:

.1 Exterior Door Frames: Thermally broken.

.1 Fully set-up and welded

.2 Fabricate thermally broken door frames in accordance with Shop Drawings. Fabricate thermally broken exterior door frames with two piece steel core sections separated with closed cell polyvinyl chloride thermal breaks to CAN/CGSB-82.5-M88.

.3 Provide wall and floor anchors suitable for installation conditions. Anchoring devices must not permit thermal conductivity from exterior frames to interior frame sections. Provide thermal break to separate interior and exterior frame sections.

.4 Ensure welds do not cause thermal transfers between interior and exterior surfaces of frame sections. Separate interior and exterior sections of thermally broken frames by continuous thermal break.

.5 Do not assemble thermally broken sections by means of screws, grommets or other fasteners.

.6 Insulate closed sections such as mullions or center rails in shop with specified insulation.

.7 Install Insulation of open sections such as jambs, heads and sills.

.8 Incorporate head drips of same gauge material as frame and plug weld at 150 mm (6") on center. Fill and sand smooth.

.2 Interior Door Frames: Fully set-up and welded.

.3 Fire-Rated Door Frames:

.1 Construct door frames of labeled fire doors as detailed in follow-up service procedures and factory inspection manuals issued by nationally recognized listing agency to individual manufacturers and tested in conformance with CAN/ULC S104-M. Ensure ratings for frames match doors as minimum requirement. Locate label on frame jamb on hinge side, for total concealment when door is closed.

.2 Reinforce frame as required for surface mounted hardware. For door frames wider than 1500 mm (5'), reinforce door frame, head, jamb and mullions at junction of head.

.3 Where floor finishes allow, fabricate frames to extend 38 mm (1-1/2") below finished floor level.

.4 Prepare each door opening for single stud door silencers.
.1 Provide 3 for single door openings. Locate at opposite of hinges.
.2 Provide 2 for double door openings. Locate approximately 150 mm (6") on each side of centreline of head stop.
.5 ***Supply*** removable portion of stop and frame where required for overhead concealed door closers and properly connect to frame and prepare for attachment to closer prior to shipment.

.8 Welded Type Frames:
.1 Transom frames, sidelite and window assemblies shall be welded type frames.
.2 Mitre corners of frames. Cut frame mitres accurately and weld continuously on returns and inside of frame faces
.3 When required due to site access or due to shipping limitations, fabricate frame ***Product*** for large openings in sections, with splice joints for field assembly. Indicate joints for field assembly on ***Shop Drawings***.
.4 Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills. Grind welded joints to a smooth, uniform finish.
.5 Securely attach floor anchors to inside of each jamb profile.
.6 Weld in 2 temporary jamb spreaders at each frame to maintain alignment during shipment.
.7 Specify fire-rated glazing (wired, ceramic or intumescent) in Section 08 80 00.
.8 Use formed channel glazing stops, minimum 16 mm (5/8") in height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

2.5 PRODUCT TYPES

.1 Frames:
.1 Exterior Door Frames: Fabricate door, transom, sidelite and window frames to profiles indicated. Unless otherwise indicated, fabricate frame product as follows:
.1 Steel Gauge:
.1 Minimum 1.9 mm (14 ga) thick
.2 Coating designation: ***Provide*** galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.
.3 Basis-of-Design: Fleming TB-Series
.2 Interior Door Frames: Fabricate frames to profiles indicated. Unless otherwise indicated, fabricate frames as follows:
.1 Steel Gauge:
.1 Minimum 1.9 mm (14 ga) thick
.2 Coating designation:
.1 Regular interior locations: Provide galvanneal steel having ZF120 (A40) coating designation in accordance with ASTM A653/A653M.
.2 Interior locations subject to high moisture or environmental pollution (e.g. showers): Provide

galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.

.3 Basis-of-Design:

.1 ***Provide*** Fleming DW-Series for frames occurring in gypsum board construction.

.3 Interior Transom, Sidelite and Window Frame Assemblies: Fabricate to profiles indicated. Unless otherwise indicated, fabricate frames as follows:

.1 Steel Gauge: Minimum 1.52 mm (16 ga) thick.

.2 Coating designation:

.1 Regular Interior Locations: ***Provide*** galvanneal steel having ZF120 (A40) coating designation in accordance with ASTM A653/A653M.

.2 Interior locations subject to high moisture or environmental pollution (e.g. showers): Provide galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.

.3 Glazing Stops: Minimum 0.9 mm thick (20 ga) steel, formed, drilled and countersunk for fastenings.

.3 Basis-of-Design:

.1 ***Provide*** Fleming DW-Series for frames occurring in gypsum board construction.

.2 Doors:

.1 Exterior Doors:

.1 Extra Heavy Duty Insulated Doors (Steel Stiffened Construction): Unless otherwise indicated, fabricate doors as follows:

.1 Face Sheets: 1.5 mm thick (16 ga) minimum steel sheet.

.2 Coating designation: ***Provide*** galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.

.3 Core: Steel stiffened with thermally broken continuous vertical formed sections, 0.8 mm (0.32") minimum thickness, spaced 150 mm (6") apart. Fill voids between stiffeners with polyurethane insulation.

.4 Longitudinal edges: Continuously welded and ground smooth with no visible seams.

.5 Glazing Stops: 1.5 mm thick (16 ga) minimum steel sheet, formed, drilled and countersunk for fastenings.

.6 Fire-Ratings: Up to 3 hours. Refer to ***Drawings*** and Schedules for locations.

.7 Basis-of-Design: Fleming TRIO E Series.

.2 Interior Doors:

.1 Heavy Duty Doors: Unless otherwise indicated, fabricate doors as follows:

.1 Face Sheets: 1.5 mm thick (16 ga) minimum steel sheet.

.2 Coating designation:

.1 Regular Interior Locations: ***Provide*** galvanneal steel having ZF120 (A40) coating designation in accordance with ASTM A653/A653M.

.2 Interior locations subject to high moisture or environmental pollution (e.g showers): ***Provide*** galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.

.3 Core: Honeycomb

.4 Longitudinal edges:

.1 Mechanically interlocked, adhesive assisted and tack welded at top and bottom of door, 150 mm (6") on centre and above and below each edge cutout, filled and ground smooth with no visible seams (D Series).

.5 Glazing Stops: 1.5 mm thick (16 ga) minimum steel sheet, formed, drilled and countersunk for fastenings.

.6 Fire-Ratings: Up to 3 hours. Refer to ***Drawings*** and Schedules for locations.

.7 Basis-of-Design: Fleming D Series.

.2 Extra Heavy Duty Doors (Steel Stiffened Construction): Unless otherwise indicated, fabricate doors as follows:

.1 Face Sheets: 1.5 mm thick (16 ga) minimum steel sheet.

.2 Coating designation:

.1 Regular Interior Locations: ***Provide*** galvanneal steel having ZF120 (A40) coating designation in accordance with ASTM A653/A653M.

.2 Interior locations subject to high moisture or environmental pollution (e.g showers): ***Provide*** galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M.

.3 Core: Steel stiffened with continuous vertical formed sections, 0.8 mm (0.32") minimum thickness, spaced 150 mm (6") apart, welded to each face sheet at 150 mm (6") on center. Fill voids between stiffeners with glass fibre insulating core.

.4 Longitudinal edges: Continuously welded and ground smooth with no visible seams.

.5 Glazing Stops: 1.5 mm thick (16 ga) minimum steel sheet, formed, drilled and countersunk for fastenings.

.6 Fire-Ratings: Up to 3 hours. Refer to ***Drawings*** and Schedules for locations.

.7 Basis-of-Design: Fleming H Series.

.3 Temperature Rise Rated Doors (TRR Doors):

.1 Face Sheets: 1.5 mm thick (16 ga) minimum steel sheet.

.2 Coating designation:

.1 Exterior Locations: Provide galvanized steel having Z275 (G90) coating designation in accordance with ASTM A653/A653M

.2 Regular Interior Locations: Provide galvanneal steel having ZF120 (A40) coating designation in accordance with ASTM A653/A653M.

.3 Interior locations subject to high moisture or environmental pollution (e.g showers): ***Provide*** galvanized steel having Z275 (G90) coating

designation in accordance with ASTM A653/A653M interior locations subject to high moisture or environmental pollution.

.3 Core: Manufacturer's proprietary core to limit radiant heat transfer from unprotected side of door to protected side of door to limits specified herein.

.4 Longitudinal edges: Continuously welded and ground smooth with no visible seams.

.5 Basis-of-Design: Fleming TR Series.

2.6 FINISHES

.1 Remove weld slag and spatter from exposed surfaces.

.2 Fill and sand tool marks, abrasions and surface imperfections to present smooth and uniform surfaces.

.3 On exposed surfaces where zinc has been removed during fabrication, ***Provide*** factory applied touch-up primer. Ensure primer is fully cured prior to shipment.

2.7 SOURCE QUALITY CONTROL

.1 Sizes and Tolerances: In accordance CSDMA - "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

.2 Hardware Locations

.1 Location of hardware on doors and frames ***Products*** to be per manufacturer's published standards.

.2 Ensure hardware preparation tolerances comply with ANSI A115 series standards.

PART 3 -EXECUTION

3.1 INSTALLATION

.1 ***Supply*** steel doors and frames to Section 06 90 00 for installation.

3.2 DOOR CONSTRUCTION SCHEDULE

.1 Main Entrance: 1.52 mm (16 ga) thick face, steel stiffened core (polyurethane insulated)

.2 Classroom : 1.52 mm (16 ga) thick face, steel stiffened core (fiberglass insulated)

.3 Stairwell: 1.52 mm (16 ga), steel stiffened core (fiberglass insulated)or temperature-rise rated core as required by Authorities Having Jurisdiction

.4 Corridors: 1.52 mm (16 ga) thick face, steel stiffened core (fiberglass insulated)

.5 Bathrooms: 1.52 mm (16 ga) thick face, steel stiffened core (fiberglass insulated)

.6 Closets (including mechanical and electrical rooms, communication rooms etc.): 1.52 mm (16 ga) thick face, honeycomb core

.7 Equipment and Boiler Rooms: 1.52 mm (16 ga) thick face, steel stiffened core (fiberglass insulated)

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the General Conditions and Supplementary Conditions of the *Contract*;
- .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* medium-duty interior aluminum glazed screens including but not limited to following:
- .1 glazed aluminum fixed screens.
- .2 heavy duty locked slider window
  - .1 complete with top hung heavy duty roller brackets, nylon wheel and ball bearing assembly;
  - .2 sliding in extruded aluminum track assembly.
  - .3 extruded aluminum door glides and retainer clips along bottom for positive guide no- sway operation of sliding panel.
  - .4 Hardware:
    - .1 Recessed pull handle on interior office side
    - .2 Cylinder –slam shut lock locking device;
    - .3 thumb turn on interior office side.
    - .4 Sobinco Spring loaded Transom Latch Model # 865
    - .5 Rubber faced door stop to restrict window movement at the maximum window opening.
- .3 through window complete with pass through and intercom port
- .4 aluminum profiled forms with stops.
- .5 wood blocking and shims.
- .6 glass and glazing.
- .7 two sided structural silicone glazing (vertical joints) at interior screens where indicated
- .8 glazing gaskets and glazing stops
- .9 sealant within aluminum work and between aluminum framing and adjacent construction.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
- .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
- .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced

herein.

.2 Pre-Installation Meetings:

.1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:

.1 environmental procedure requirements,

.2 safety and emergency response procedure and policy requirements,

.3 and security requirements;

.2 Pre-construction Site Meeting:

.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.

.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,

.2 materials to be used,

.3 storage and handling of materials,

.4 installation of materials,

.5 sequence and quality control,

.6 Project staffing,

.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01.

.2 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and

keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 Shop Drawings:

.1 Submit Shop Drawings for interior aluminum glazed screen work in accordance with requirements of Division 01 based on testing and engineering analysis.

.2 Ensure Shop Drawings indicate material characteristics, details of construction, connections and relationship with adjacent construction.

.3 In addition to minimum requirements, also show following information:

.1 construction and back-up,

.2 joint sealants locations,

.3 interior structure and reinforcements,

.4 glazing modules,

.5 extrusion sections,

.6 glazing and glass stop details,

.7 anchorage and assembly fixings,

.8 structural silicone sealants

.9 other pertinent data.

.4 Structural Sealant Data

.1 Submit *Product* information on sealants to be used, complete with all recommendations and installations instructions, including cleaning and priming procedures.

.2 Submit to sealant manufacturer, samples of each type of glass, gasket, glazing accessory and glass framing member that will contact or affect glazing sealants for compatibility and adhesion testing. Submit test samples in sufficient time for testing and analysis of result to prevent delay in progress of work.

.3 Submit sealant manufacturer’s test reports on adhesion to metal and glass production samples tested in accordance with ASTM C794, 7 *Day* cure and 7 *Day* water submersion, tensile strength at 100% elongation and bite size of sealants.

.4 Submit test report for tensile adhesion properties of structural silicone sealants in accordance with test method procedures conforming to ASTM C1135.

.5 Submit sealant manufacturer’s compatibility statement that all materials in contact with the sealants are compatible with the sealants in accordance with procedures of ASTM C1087.

.6 Submit sealant manufacturer’s statement and test data indicating that the stress on the sealants when exposed to the maximum load does not exceed 138kPa (20psi) and a safety factor of 5:1.

.7 Submit sealant manufacturer’s verification that sealants are suitable for purposes intended.

.8 *Provide* Quality control test in accordance with ASTM C1401, Standard Guide for Structural Sealants Glazing.

.5 Samples: Submit samples of materials and *Products* with their respective finish before fabrication. Samples shall fully represent the physical and chemical properties of the materials to be supplied. Submit to *Consultant*, duplicate sample sections of component parts of glass in specified finish. Samples of extruded shapes shall be 300 mm (12") long; samples of each type of glass shall be 300 mm (12") square.

.6 Test and Evaluation Reports:
- .1 Submit compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

.7 Certificates:
- .1 Submit signed certificate from sealant manufacturers prior to commencement of work stating the following:
  - .1 Verification that sealant materials selected are adequate for intended use, joint designs; as well as temperature, humidity and weather conditions at time of application.
  - .2 Surface preparation requirements are adequate;
  - .3 Priming and application procedures are adequate;
  - .4 Compatibility of sealants with other materials and Products with which they come in contact, including but not limited to:
    - .1 sealants provided under other Sections,
    - .2 insulation adhesives,
    - .3 metals and metal finishes
- .2 Submit certification from registered professional structural Engineer registered in the Territory of Nunavut, complete with seal and signature affixed to certificate, substantiating that structure is capable of supporting its own weight and specified design loads.

.8 Maintenance Instructions: Provide in form of a manual and in accordance with Division 01, maintenance instructions for aluminum glazed screens.

1.6 QUALITY ASSURANCE

.1 Qualifications: *Provide The Work* of this Section, executed by competent installers with minimum of 5 year experience in the application of *Products*, systems and assemblies specified, and with the approval and training of the *Product* manufacturers.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.3 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
- .1 design the components of the work of this Section requiring structural performance,

.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.

.4 Site *Mock-Up*:
.1 If requested, erect a full size panel of glazing screen assembly sample installation in on *Project* complete with finish and glazing. Sample installations shall show flashings, anchors, shims, brackets and other related items.
.2 Revise or replace sample installations at no additional cost as directed until accepted. Do not proceed with job fabrication until sample installations are approved.
.3 Accepted sample installations shall be standard for remainder of work of this Section and may form part of finished installation.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Transport materials to site storage in a manner to prevent in-transit damage. These measures include, but are not limited to, crating, polyethylene wrapping system, etc.

.2 Store in a dry, protected area on site, in original undamaged containers with manufacturer's labels and seals intact.

.3 Store and protect fabricated units from damage until required for actual building in. Replace damaged units.

.4 Remove damaged or unsatisfactory materials from the site and replace with new materials to satisfaction of *Consultant* at no cost to *Owner*.

.5 Protect *The Work* of this Section from damage. Protect work of other trades resulting from *The Work* of this Section.

.6 *Provide* at factory, strippable coatings on exposed surfaces of aluminum. This coating and protective wrappings shall remain on the surfaces through the period other trades' works proceed on the building, and removed by this trade on completion of building.

.7 Comply with unpacking procedures as recommended by framing and glass manufacturers.

.8 *Make Good* damaged work caused by failure and to *Provide* adequate protection. Remove unsatisfactory work and replace at no expense to *Owner*.

1.8 WARRANTY

.1 Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within

warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to; glass breakage due to structural deflection, anodized finish will be non fading, nonconvertible and permanently a part of the metal surface.

1.9 MAINTENANCE

.1 Maintenance Instructions: *Provide* in form of a manual, maintenance instructions for aluminum glazed screens and frames.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 Framing System:
  - .1 Alumicor Limited; www.alumicor.com
  - .2 Kawneer Company Canada Limited; www.kawneer.com
  - .3 Trulite Industries Limited; www.trulite.com
  - .4 US Aluminum; www.usalum.com
- .2 Glass and Glazing:
  - .1 AGC Glass Inc,; www.AGC.com
  - .2 Guardian Industries Corp.; www.guardian.com
  - .3 Pilkington Special Glass Limited; www.pilkington.com
  - .4 PPG Canada inc.; www.ppgglass.com
  - .5 Viracon; www.viracon.com

2.2 DESCRIPTION

.1 Design Requirements:
- .1 Architectural Drawings and details are diagrammatic and are only intended to show design concept, aesthetics, interfacing requirements, configuration, components and arrangements. They are not intended to identify or solve completely problems of thermal and structural movements, assembly framing, engineering design, fixings and anchorages
- .2 Have work of this Section designed by a professional engineer licensed to design structures and registered in the Territory of Nunavut.
- .3 Design members and their connections to withstand within acceptable deflection limitations their own weight, the weight of the glass, loads imposed by the motion of operable elements and the minimum design loads, and combinations of loads, in accordance with the applicable building code, and internal pressure changes.
- .4 Deflection limits for all members: A static air design uniform load of 20 psf shall be applied in positive and negative direction in accordance with ASTM E330.
  - .1 Limit maximum deflection of member to 1/175 of span or 12 mm (1/2") whichever is less, under full design loading.
  - .2 Ensure deflection of any member in direction parallel to wall plane under full design load, does not exceed 75% of design clearance dimension between given member and panel, glass or

other part immediately below it.

.3 Make provisions for structure deflection to ensure that structural loads are not transmitted to glazing and related work.

.4 Ensure glass, sealants and interior finishes do not contribute to framing member strength, stiffness or lateral stability

.5 Ensure no glass breakage or permanent set in framing members in excess of 0.2% of clear spans occurs when system is tested at design test load equal to 1.5 times specified design load.

.6 Design assemblies, their connections, glazing clearances and glazing and sealing details to accommodate a material temperature changes without overstressing materials or generating sound.

.7 Ensure glazing assemblies are capable of accommodating expansion and contraction without causing buckling, opening of joints, undue strain on fasteners or other detrimental effects. Make allowance for horizontal expansion in each vertical mullion.

.8 Secure components through concealed means unless otherwise indicated. Attach items in a manner which will permit replacement of components or units during construction and in subsequent usage of building without dismantling or disturbing adjoining components or units and without the use or addition of extra screws, splices, covers and similar items; that may alter original design features. Provide tamper-resistant fasteners unless otherwise indicated

.9 Glazing Performance Requirements:

.1 Provide glass for work of this Section free from bubbles, waves, discolouration and other defects, of types specified herein for locations indicated on Drawings or noted on Door Schedules. Ensure glass bears manufacturer’s label indicating quality and testing agency certifications. Leave labels in place until final cleaning.

.2 Design glass and glazing to requirements of these Specifications, CAN/CGSB-12.20-M, ASTM E1300, local Code requirements and regulations of authorities having jurisdiction. In case of conflict, comply with most stringent requirements.

.3 Perform work of this Section in accordance with GANA - Glazing Manual; www.glasswebsite.com and LSGASM - Standards Manual for laminated glazing installation methods.

.4 Ensure tempered glass is heat soaked in accordance with BS EN 14179

.5 Design units to accommodate live, dead, lateral, internal pressures, seismic, handling, transportation, and erection loads.

.6 Confirm glazing material thicknesses by analyzing Project loads and in-service conditions. Provide glazing material for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths required to meet or exceed performance criteria.

.7 Human Impact Load Resistance: Provide glazing materials listed and labeled as complying with testing requirements of ANSI Z97.1 - Class A.

.8 Attack Resistance: Where indicated, Provide glazing materials

capable of resisting attack in accordance with performance requirements specified herein.

.9 Ensure solvents and other volatile elements in glazing system do not affect properties and performance of materials used for edge seal and sealant glass bond.

.10 Ensure materials used for edge seals are compatible with other materials they come in contact within glazing system. If required, perform compatibility tests to ASTM C510, ASTM C794 and ASTM C1087, or others as applicable.

.11 Use sealants and other materials in glazing system which are unaffected by long term UV light exposure.

2.3 MATERIALS

.1 Aluminum sheet and plate: ASTM B209, alloy and temper suitable for purpose and finish required, special hardness for flat panel application, and resquared raw cut edges unless required otherwise.

.2 Extruded Aluminum: ASTM B221, Alcan 6063-T5 alloy, Thresholds of 6061-T6 alloy. Sheet and plate: 1100-H14 alloy, anodizing quality.

.3 Internal Steel Reinforcing: If necessary, Provide manufacturer's shapes and profiles conforming to requirements specified to meet security performance criteria stipulated herein complete with corrosion-resistant primer applied immediately after surface preparation and pretreatment. Prepare surfaces according to applicable SSPC standards.

.1 Zinc-Coated Steel Sheet: ASTM A653/A653M, CS, Type B; with Z275 (G90) galvanized coating designation.

.2 Steel Plates, Shapes, and Bars: ASTM A36/A36M.

.4 Treated wood blocking: at top and base of framing in accordance with requirements of Section 06 10 00.

.5 Interior Frames and Screens: Extruded aluminum sections having a minimum wall thickness of 2.4 mm (3/32") suitably reinforced to ensure proper rigidity. Provide cross-section dimensions of frames as detailed on Drawings, but with minimum dimensions of 44.4 mm x 114.3 mm (1-3/4" x 4-1/2").

.6 Screws, Bolts and Fasteners: Stainless steel 300 Series with not less than 12% chromium content to prevent galvanic action, and of sufficient strength for the purpose. Exposed screws or pop rivets are not acceptable. Provide tamper-resistant fasteners unless otherwise indicated. Acceptable manufacturers: Temper Pruf Screws Inc or Folger Adam Security Inc, or Sentry Security Fasteners, Inc or Temper proof Screw Co.

.7 Glass and Glazing: Conforming to requirements of Section 08 80 00 and Section 08 88 53 with following characteristics:

.1 Ensure compatibility between glazing materials, primers and cleaning solvents. Ensure glazing units bear manufacturer's labels, indicating quality and thickness.

.2 Float Glass (CGL): Conforming to ASTM C1036 or CAN/CGSB-12.3-M, clear transparent float glass, minimum 6 mm (1/4").

.3 Heat Strengthened Glass (HSGL): Conforming to ASTM C1048, Kind HS

minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression in range of 3,500 to 7500 psi, preferably no higher than 5000 psi.

.4 Safety (Tempered) Glass (TGL): Conforming to ASTM C1048, Kind FT or CAN/CGSB-12.1-M, Type 2 tempered, Class B float glass, Category II, minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression not less than 10,000 psi. Heat soak tempered glass in accordance with BS EN 14179.

.5 Dedicated Security Glazing: Refer to Section 08 88 53 for unit types and compositions. Refer to Drawings and Schedules for locations

.6 Wired Glass (WGL): Conforming to CAN/CGSB-12.11-M, minimum 6 mm (1/4") thick; Allow consultant to choose from Type 1 (Polished both sides transparent) or Type 2 (Figured translucent) and Wire mesh style 1(Diamond) or style 2 (Hexagonal) or style 3 (Square) or style 4 (Rectangular) at a later date.

.7 Miscellaneous Glazing Materials:

.1 Glazing tape: Extruded, unvulcanized, butyl rubber formulated to remain tacky and to adhere to clean, dry surfaces by finger pressure. Butyl tape shall be of an approved manufacture and shall be sufficiently wide and thick as to completely cover bite area of glazing unit when unit is pushed into place.

.2 Glazing tape: Extruded, ribbon shaped non-drying, non-skinning, non-oxidizing polybutene tape sufficiently wide and thick as to completely cover bite area of glazing unit when unit is pushed into place. Tape: Tremco 440 tape by Tremco (Canada) Ltd., Weatherban Ribbon Sealer by Minnesota Mining and Manufacturing of Canada Ltd., or other approved manufacture. Colour as selected by the *Consultant*.

.3 Shims, spacers and glass setting blocks: 45, 50 and 70 Durometer A hardness plus minus 5 respectively, neoprene rubber by Tremco (Canada) Ltd. or other approved manufacture. Resistance to sunlight, weathering, oxidization and permanent deformation under load shall be the prime essentials of shims, spacers and setting blocks.

.4 Gaskets and thermal barriers between metal components: Extruded neoprene for insertion in grooves in metal elements. Gaskets: Sized so that they will be under compression, when installed, and having a 13.8 MPa (2000 psi)tensile strength and minimum 200% elongation. Thermal barriers; of a size to conform to the extruded aluminum members.

.5 All glazing materials, primers and cleaning solvents: Compatible with each other.

.6 Colours for glazing materials: As selected later and not necessarily standard colours.

.7 Joint backing: To requirements of Section 07 92 00.

.8 Primers: As recommended by the sealant manufacturer to suit the various job conditions.

.8 Sealants: Non-bleeding and capable of supporting their own weight; meeting minimum requirements of Section 07 92 00. Provide tamper-resistant type at exposed locations.

.1 Ensure compatibility between sealant materials, primers and cleaning solvents

.2 Sealant: Multi-component conforming to CAN/CGSB-19.24-M, Type 2, Class "B" for sealant to be incorporated between aluminum framing and adjacent structures. Colours later selected by *Consultant* from standard colour selection. *Supply* non-hardening, non-skimming, non-sagging, non-bleeding polyisobutylene or partially vulcanized rubber base sealant for use in concealed-sealing of thin joints in metal work.

.3 Caulking compound: CGSB 19-GP-14M one component butyl rubber caulking compound or One component silicone base CAN/CGSB-19.13

.8 Sealant for Structural Glazing:

.1 Structural Sealant: Neutral-curing silicone formulation compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant, and approved by structural-sealant manufacturer for use in interior aluminum glazed screen systems indicated

.2 One component silicone based sealant, chemical curing conforming to CAN/CGSB-19.13-M, Classification MCG-2-25-A-N and ASTM C1184 unless otherwise approved and/or directed. Suitable for metal, concrete and glass, non-sagging for vertical joints, capable to resist 25% movement with total loss of bond as specified in Standard, suitable for glazing, resists UV through glass, normal temperature, minimum application temperature 5 deg C (41 deg F).

.3 Sealant shall be UV resistant, ozone resistant, non-bleeding, non-staining and capable of supporting their own weight, structural glass units and all specified or referenced loads to meet design criteria and in conformance of local Code requirements.

.1 Acceptable types for shop glazing; “Proglaze II Multi Component” by Tremco Canada; or “Ultraglaze 4400" (where recommended by manufacturer) by GE Silicones; or “DC-983" by Dow Corning Canada.

.2 Acceptable types for field glazing; “Spectrum® 2 or Proglaze SG” by Tremco Canada; or “Ultraglaze 4400" or “Ultraglaze 4000" by GE Silicones; or “DC-795" by Dow Corning Canada.

.9 Sealant, cleaning solvents, fillers and primers: Compatible with each other.

.10 Colours for sealant: As later selected and not necessarily from standard colours.

.11 Cleaning material: Xylol, Methyl-ethyl-ketone, Toluol or as recommended by the caulking and sealant manufacturer.

.12 Insulation for packing into frame cavities: Resilient, fibrous glass having a nominal density of 12 kg/m² (0.75 lbs/ft^3).

.13 Zinc Chromate Primer: CAN/CGSB-1.40.

.14 Touch-up paint: Zinc rich paint, 'Sealtight Galvafroid Zinc Rich Coating' by W.R. Meadows of Canada Ltd., 'Zinc Clad No. 7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd., or other approved manufacture.

.15 Bituminous Paint: Heavy bodied bituminous isolation coating to *Provide* acid

and alkali resistant separator. Isolation coating shall be acid and alkali resistant material.

2.4 FABRICATION

.1 General:

.1 Take field measurements and levels required to verify or supplement those shown on *Drawings* for proper layout and installation of work. Coordinate dimensional tolerances in adjacent building elements and confirm prior to commencement of work.

.2 Extruded form shall be true to detail, free from defects impairing appearance, strength and durability. Members possessing sharply defined profiles, straight, square and true with surfaces in proper planes and exposed finished surfaces and edges smooth and free from defects. Frames shall be tubular extruded shapes with sharp, well defined corners. Overall assembled profiles shall be as detailed on *Drawings*.

.3 Accurately machine file and fit and rigidly frame together joints, corners and mitres. Match components carefully to produce perfect continuity of line and design. Make joints weathertight. Metal in contact shall have hairline joints unless otherwise shown on reviewed *Shop Drawings*. Location of exposed joints shall be subject to the approval of the *Consultant*. No exposed fixings are permitted.

.4 Reinforce frames by concealed means as necessary to meet the specified design requirements and as shown. All reinforcing shall be hot-rolled mild steel and shall be securely anchored to horizontal and vertical members by positive mechanical means.

.5 *Provide* devices for anchoring the frame assemblies to the building structure with sufficient adjustment to permit correct and accurate alignment.

.6 Blast clean and galvanize reinforcing, brackets and other steel items supplied under this Section in accordance with CAN/CSA-G164, coating weight 380 g/m² (1.25 oz/ft²). Galvanize after fabrication where possible. Follow standard precautions to avoid embrittlement of the base metal by overpickling, or overheating during galvanizing.

.7 Do all fitting and assembly in factory. Trial fit units in shop if permanent shop assembly is not practical.

.8 Metal sections drilled, tapped, welded, holed or slotted as may be required for proper installation and fixing of all components and accessories and supplied complete with all necessary anchors, clips, bolts, screws, etc. Framing, bracing, reinforcing and anchors having structural properties adequate to safely sustain and withstand strains and stresses to which they will be subjected.

.9 Make provision for proper expansion and contraction.

.10 Joints and intersections accurately formed and tightly fitted; units water and weather tight. Bolts tight and threads nicked to prevent loosening of nuts; bolting made as inconspicuous as possible.

.11 Fabricate frames and prepare frames for proper glazing. Glaze with snap-in methods without the use of any metallic fasteners which could reduce the effectiveness of the thermal barrier.

.12 Corners of formed work must be mitred and closely fitted. Back-up sealants designed for this purpose, shall be applied on inside of

joints in aluminum work by this Section.

.2 Welding

.1 Carry out welding with argon shielded electric arcs to ensure complete fusion of the metal. Weld aluminum where required, with inert metal arc equipment by methods recommended by the Aluminum Co. of Canada. Welders shall qualify according to CSA W47.2. Make exposed welds continuous and flush with adjacent surface. Space intermittent welds as shown on the reviewed *Shop Drawings*. Do not mar surface finishes with welds in back of exposed aluminum. Do not deform the exposed metal and finish in any way by welding.

.2 Weld steel, where required, in accordance with CSA W59. Welded joints shall be of adequate strength and durability with jointing tight and flush. Welders shall be fully approved by the Canadian Welding Bureau and shall comply with CSA W47.1. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm (2") around weld. *Make Good* corrosion protection using 2 coats of touch-up paint.

.3 Welding of component members shall not in any way mar surface appearance of metal. Welded joints shall be made tight and in true planes, ground and sanded smooth, flush with surface of base metal.

.4 Weld only concealed surfaces in order that pitting-discolouration, weld halo and other surface imperfections will not be visible after finishing.

.3 Fixed Frames:

.1 Fasten frames to support framing specified under Section 05 50 00, Metal Fabrications. *Provide* slotted connections as required to accommodate deflection of opening components.

.2 Seal hairline joints at junctions of frame members. Gun-inject sealant from inside ensuring a continuous seal of the joint. Ensure that bead in the glazing space does not impair seating of glazing materials. Remove excess sealant which is forced onto face of frame assembly.

.3 *Provide* snap-on aluminum extrusion glazing stops for frames designed for inside glazing. No exposed fixings permitted.

.4 Fabricate frame systems designed for glazing complete with mullions, head and sill frames, spigots, and plugs for horizontals, spline gaskets, pressure plates, filler pieces, snap-on caps and other necessary components.

.5 Where frame assemblies exceed 6000 mm (20'-0") *Provide* one split frame expansion/contraction mullion per assembly unless other provision is indicated. Make width of the expansion/contraction mullion the same as that of the other mullions.

.6 *Provide* steel support brackets at 600 mm (2'-0") maximum o.c. to support screen assemblies at sills where an aluminum base occurs under the sill.

.7 Where mullions are extended and connected to the underside of the building structure above, *Provide* slotted connections to accommodate structure deflection.

.8 *Provide* continuous extruded aluminum angles to form a reveal at junctions of head frames and suspended ceilings where applicable and junctions of jamb frames and adjacent construction.

.9 Fabricate transoms where applicable, corner pieces, filler panels, bases, and vestibule fascias from 3 mm (1/8") thick aluminum plate to the profiles shown by welding. Make all planes true, and corners square and sharp. *Provide* concealed clips for fastening plate assemblies in place.

.4 Reception Counter Window Frames, Sliding Window, Pass Through Window complete with Speaking Port and and Glazing System:

.1 Counter barrier walls shall extend as indicated on Drawings.

.2 Counter Barrier Design:

.1 Aluminum frame window assembly consisting of three window panels, one of which can be a sliding panel (at the client's discretion).

.2 Provide open port on all fixed panels - maximum four inch opening.

.3 Speaker port is to be 120mm (4 ¾") complete with speaking disc

.4 Do not provide speaking port or any other opening on sliding panel.

.5 Provide recessed pull handle installed on office side; Cylinder -slam shut lock locking device;

.6 install thumb turn on interior office side.

.3 Counter Barrier Window frame :

.1 Aluminum extrusions minimum 3 mm wall thickness, 100 x 45 mm nominal size mullions, designed as channel or stop glazing for single pane interior glazing.

.4 Counter Barrier Glazing:

.1 Two sheets of 6 mm (1/4") laminated tempered glass, with bonded .75 mm (.03 inches) PVB interlayer.

.5 Caulking:

.1 Seal joints between window frame and other building components with clear silicone caulking.

.6 Horizontal Sliding Panel:

.1 Sliding frames shall be hung by two heavy duty roller brackets, each having self-lubricating nylon wheel and ball bearing assembly; running in an extruded aluminum track assembly.

.2 Provide extruded aluminum door glides and retainer clips along bottom for positive guide no- sway operation of sliding panel.

.3 Ensure there shall be no openings on sliding panel including a speaker port or pass-through to prevent unauthorized individual to reach through and release slam shut latch and open the sliding panel.

.4 Prevent unauthorized individual to breach secure perimeter and enter Operations Zone.

.7 Hardware

.1 Recessed pull handle (install on office side)

.2 Cylinder -slam shut lock locking device; install thumb turn on interior office side.

.3 Locks:

.4 Sobinco Spring loaded Transom Latch Model # 865 or approved equivalent;

.5 Rubber faced door stop to restrict window movement at the maximum window opening.

.6 All window components are to be heavy duty construction.

2.5 FINISHES

.1 All aluminum visible in the completed work shall have a finished matching finishes specified and as indicated to suit internal exposure. Verify with *Consultant* colour and sheen prior to matching finishes.

.2 Anodized Aluminum Finish: Aluminum finish shall be clear anodized in accordance with Aluminum Association Finish Designation AA-M12C22A31 Specular as fabricated -Fine Matte -Clear- Architectural Class II - 0.4 to 0.7 Mil thick for interior exposure.

.3 Exposed fastenings if occurring and where approved: Finished and coloured to match the finish and colour of the material in which they appear. The finish provided shall be permanent and durable.

.4 Painting:
- .1 Steel at building interior and not exposed to view or to exterior environmental conditions shall be primed with oil alkyd primer.
- .2 Concealed surfaces of aluminum and galvanized steel which would otherwise come in direct contact with structural steel, concrete, masonry shall be given a heavy coating of dielectric separator paint.
- .3 Paint welded, galvanized items where galvanizing has been removed for welding. Make Good corrosion protection using 2 coats of touch-up primer for galvanized steel. Make Good protection on steel primed with oil alkyd primer using same primer.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Ensure openings to receive The Work of this Section are within acceptable tolerances. Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Provide heavy protective coating of bituminous paint or zinc chromate primer prior to installation, to concealed surfaces of aluminum which would otherwise come in direct contact with structural steel, concrete, masonry, plaster or other dissimilar materials.

3.3 INSTALLATION

.1 Frames
- .1 *Provide* treated wood blocking and shims at top and bottom of frame. After alignment, positively lock anchorage devices to prevent movement other than that designed to accommodate deflection and thermal expansion and contraction.

.2 Set frames and screens plumb and true in openings securely wedged and held in alignment during construction and provided with suitable and adequate anchorage to adjoining work.

.3 Fasten fixed frames to support structural framing specified under Section 05 50 00. Provide slotted connections as required to accommodate deflection of opening components

.4 Erection tolerances for frame assemblies relate to the structural grid of the building, and apply to each individual assembly.

.1 Tolerances:

.1 vertical position; plus/minus 3 mm (1/8")

.2 horizontal position; plus/minus 3 mm (1/8")

.3 deviation from plumb; 3 mm (1/8") maximum each plane

.4 racking of face; 6 mm (1/4") maximum

.5 racking in elevation; nil.

.5 Erection tolerances for operable elements: Consistent with smooth operation and weatherproof performance.

.6 Perform necessary drilling of concrete, masonry and steel necessary to *Install The Work* of this Section. Site located fixings to the masonry and concrete shall be stainless steel lag screws and lead expansion shields. Bear cost of repair satisfactory to the *Consultant* of concrete chipped by drilling or fixing operations.

.7 Group components with coloured aluminum finish so that those which relate most closely to one another, with regard to colour, will be installed adjacent to each other.

.8 As erection progresses, pack cavities of frames and assemblies with low density fibrous glass insulation.

.9 Ensure completed installation remains free from objectionable noise, rattles, creak or noise due to thermal movement.

.10 Gun-apply 3 continuous beads of sealant under extruded aluminum thresholds. Make bead diameter sufficient to ensure a full-width seal. Remove excess sealant by acceptable means.

.2 Sliding Window Installation:

.1 Install sliding windows in accordance with manufacturer’s instructions.

.2 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.3 Anchor securely. Adjust operable parts for smooth friction free operation.

.3 Sealants

.1 Thoroughly clean joints and spaces to be sealed of foreign matter and keep them dry before applying gaskets, tapes and sealants. Apply gun grade sealants with an approved type of pressure gun having nozzles of proper size and shape to fit the various joints; drive sealants in with sufficient pressure to fill the joints full. Clean adjacent surfaces which have been soiled by tapes and sealants immediately before hardening. Apply surface primers, when used as per manufacturer's instructions.

.2 Seal joints between masonry or other adjacent material and frames and between frames, sills and other material. Use methods specified in Section 07 90 00, Sealants. Caulk inside and outside.

.4 Glazing:

.1 Perform glazing in accordance with Section 08 80 00, where greater requirements are not specified herein.

.2 Thoroughly wipe surfaces receiving glazing materials with a cloth dampened in xylol to assure a clean surface.

.3 Perform glazing associated with *The Work* of this Section. Leave labels on glass until it has been set and inspected and accepted. Leave glass whole and without cracks, scratches or other defects and with settings in perfect condition at completion, to the approval of the *Consultant*. Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with perfect materials. Units producing distorted vision shall be rejected and replaced at the reasonable discretion of the *Consultant*.

.4 Use spacers, setting blocks and shims of proper size to support and hold glass in position independent of the glazing materials. Place two setting blocks under each unit at the quarter points. Place spacers on edges of glass, directly opposite each other when on both sides of the glass, located at maximum 600 mm (24") from corners and uniformly spaced. Arrange spacers, setting blocks and shims so as to avoid blocking water transfer inside frames.

.5 *Install* preformed glazing tape to ensure complete contact on surface of glass and stops. Make joints only at corners of sash or frame. Cut tape to fit close around spacers. Fit tape accurately with tight joints, free from tension, gaps and cracks. After installation of the glass, the glazing tape shall not extend more than 3 mm (1/8") above the line of the fixed stop. Remove and reglaze units where tape exceeds this tolerance.

.6 Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress. Set glass with labels facing the interior wherever possible.

.7 Assess enameled ceramic frit glass units for colour and pattern uniformity and arrange to avoid abrupt variation in appearance.

.5 Structural Glazing:

.1 Structural silicone glazing shall incorporate support of edges of glass and method of fixing glass to structural framing system. Structural glazing shall utilize silicone sealant as means of attachment for support of one or more edges of glass.

.2 Two sided structural glazing where glass shall be structurally adhered as shown on *Drawings* and to metal backup vertical mullion complete with pressure plates and two sides shall be captured in horizontal pockets. Two sided structural glazing shall be shop glazed and shop adhered glass shall be transported to site, erected as unit and then weather sealed.

.3 Pay special and careful attention to all details of fabrication and installation of structural silicone glazing such as: use of proper structural sealant, joint size in consultation with sealant manufacturer, test structural sealant for compatibility with other sealants, accessory materials such as gasket, spacers, backer rods, weather seal, setting blocks, metal finishes, glass coatings and other similar items which will come in contact with structural sealants.

.4 Conform to ASTM C1087 test method or minor variation thereof for compatibility test.

.5 Structural sealant shall also be tested for adhesion to substrate in accordance with ASTM C793 or minor variation thereof.

.6 Prepare structural surface and properly apply structural sealant to avoid premature failure of system. Comply with proper quality control requirements, application procedures, adherence testing and other recommended quality control steps including tests to ensure structural sealant properties are developed.

.7 Follow structural sealants manufacturer’s recommendations for field glazing of temporary retainers to hold glass in place during sealant curing.

3.4 ADJUSTMENTS

.1 Upon completion of *The Work* and just prior to the handling over to the *Owner* or at a time as directed, inspect, test and adjust installation.

.2 Inspect all units for damage and correct same immediately.

.3 Test and adjust hardware and replace or repair faulty items.

.4 Test operable elements and ensure easy and smooth operation.

3.5 CLEANING

.1 Maintain aluminum work in a clean condition throughout construction period, so it will be without deterioration or damage at time of acceptance. Select methods of cleaning which will promote achievement of uniform appearance and stabilized colours and textures for anodized aluminum.

.2 Immediately before time of Substantial Performance, clean aluminum work thoroughly, inside and out. Demonstrate proper cleaning methods to *Owner* during this final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants, and glazing materials of *The Work* and submit 2 copies to *Consultant*.

.3 Remove protective covering and coating from aluminum surfaces, inside and out, and clean surfaces, remove labels, stripes and protective devices and polish glass surfaces, immediately prior to final acceptance of *The Work* by *Consultant*.

.4 Upon completion of *The Work*, remove all debris, equipment and excess material resulting from *The Work* of this Section from the site.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the General Conditions and Supplementary Conditions of the *Contract*;
- .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* flush wood core doors including but not limited to following:
- .1 solid core flush doors with plastic laminate faces
- .2 glass lites and stops
- .3 preparation of flush wood core doors for CSA approved wiring system and conduits for electronic hardware and automatic door operators.
- .4 openings to suit electronic and regular hardware.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
- .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
- .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
- .1 Regulatory Requirement Review Meeting: *Provide* pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
  - .1 environmental procedure requirements,
  - .2 health, safety and emergency response procedure and policy requirements,
  - .3 and security requirements;
- .2 Pre-construction Site Meeting:
  - .1 Prior to start of work, arrange for *Project* site meeting of parties associated with work of this Section, including non-exhaustively *Subcontractor* performing work of trade involved, testing company's representative and *Contractor*'s *Consultants* of applicable discipline. *Consultant* may attend.
  - .2 Review *Contract Documents* to permit compliance with intent of this Section for work included under this trade, and ensure

complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 *Project* staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with *Contractor* and *Consultant*, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other *Subcontractors* on *The Work* and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 *Supply* items to be built-in in ample time to be incorporated into work of other *Subcontractors*, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product Data*:

.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets Provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and other materials as designated later by *Consultant*.

.3 *Shop Drawings*: Submit *Shop Drawings* in accordance with Division 01 illustrating door opening criteria, elevations, sizes, types, swings, undercuts required, special bevelling, and special blocking for hardware. Identify cut outs for glazing and other openings.

.4 Samples: Submit samples in accordance with Division 01. Provide 1 cut-away corner sample minimum 300 mm (12") square for each type of door to indicate following:

.1 core.
.2 head rail and jamb stile blocking.

.3 cross band and facing layers.
.4 corner section with door faces, edges and core.

1.6 QUALITY ASSURANCE

.1 Qualifications:
.1 *Provide* Work of this Section executed by competent installers with minimum of 5 year experience in application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Do not deliver finished *Products* during rainy or damp weather.
.2 Do not deliver Work of this Section until the building and storage areas are sufficiently dry so *Products* will not be damaged by excessive changes in moisture content.
.3 Do not deliver and *Install* damaged *Products*. Replace in accordance with the requirements of this Section.

.2 Storage and Handling Requirements:
.1 Deliver, store and handle *Products* of this Section in accordance with AWS Section 2.
.2 Remove from the *Place of The Work*, doors having scratches or other blemishes which cannot be removed by sanding and replace with new unblemished doors.

.3 Waste Management and Disposal: Minimize construction waste sent to the landfill, separate and recycle materials as outlined in Division 01.

1.8 WARRANTY

.1 Warrant Work of this Section for period of 3 years against defects and deficiencies in accordance with General Conditions of the *Contract.* Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to: buckling, opening of seams, warping in excess of 6 mm (1/4"), delamination of facings, telegraphing of core construction, sagging or extensive colour fading.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Door Schedule and *Specifications*:

.1 Baillargeon Doors, www.baillargeondoors.com
.2 Lambton Doors, www.lambtondoors.com
.3 Marshfield Door Systems, Inc., www.marshfielddoors.com
.4 V.T. Industries, www.vtindustries.com

.2 Substitution Limitations: This Specification is based on Baillargeon's *Products*. Comparable *Products* from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Design and Performance Requirements:
.1 Construct doors specified herein in 5 ply construction for plastic laminate faces in accordance with AWS and ANSI/WDMA I.S 1A standards unless otherwise indicated.
.2 Ensure cores are bonded and sanded to stiles and rails. Floating cores are not acceptable.
.3 Sound Transmission Class: Where indicated, *Provide* door assemblies capable of attaining minimum sound transmission class (STC) rating of 45 as determined by testing in accordance with ASTM E90 methods. *Provide* accessories required for obtaining acoustical ratings.
.4 Performance Duty Levels:
.1 Typical Flush Wood Core Doors: Comply with WDMA I.S 1A, Section C-13, Flush Wood Door Minimum Performance Standards, Duty Level: Extra Heavy Duty unless otherwise indicated.

2.3 MATERIALS

.1 Standard Duty Non-Rated Flush Wood Core Doors: Unless otherwise indicated, fabricate doors as follows:
.1 Facing: Plastic Laminate as specified herein.
.2 Core:
.1 Particle Board: ANSI A208.1; 449 kg/m^3 – 513 kg/m^3 (28 lb/ft^3 – 32 lb/ft^3) density solid particle core, mat-formed sanded both sides, thickness as recommended by AWI/AWMAC for specified requirements. Ensure items are classified M2 in accordance with ASTM E1333.
.3 Stiles: Minimum 11 mm thick (7/16") thick hardwood laminated to 25 mm (1") thick structural composite lumber or laminated veneer lumber bonded to core with matching sealed hardwood edge strips. Total Thickness: Manufacturer's standard thickness required to meet performance requirements specified herein.
.4 Rails: Minimum 30 mm thick (1-3/16") thick hardwood, structural composite lumber or laminated veneer lumber bonded to core. Total Thickness: Manufacturer's standard thickness required to meet performance requirements specified herein.
.5 Vertical Edges: factory-painted or stained vertical edges in colour/stain selected by *Consultant* at a later date.
.6 Crossbands: *Provide* high-density composite crossbands in manufacturer's standard thicknesses required to meet performance requirements specified herein. Ensure crossbands extend full width

of door.

.7 Adhesive: Type I, Waterproof, as recommended by *Product* manufacturer for designated application and containing no added urea-formaldehyde.

.8 Basis-of-Design: “Model No. 8500-ME” by Baillargeon Doors or "5-PC-ME" by Lambton Door with factory-painted edges s or approved equivalent.

2.4 ACCESSORIES

.1 Glazing: Provided as part of *The Work* of Section 08 80 00.

.2 Hardware:

.1 Coordinate location of interior blocking with work of Section 08 71 00. Hardware is supplied by Section 08 71 00 for installation as part of *The Work* of Section 06 90 00.

.2 Coordinate electrical requirements for electronic hardware with Division 26.

.3 Edge Protection: Refer to Section 08 71 00.

2.5 FABRICATION

.1 Fabricate flush wood core doors 45 mm (1-3/4") thick, unless otherwise indicated.

.2 Factory machine doors for finish hardware in accordance with hardware requirements and dimensions.

.3 Factory cut glass lite openings. Ensure openings are square with internal corners slightly rounded. Ensure portion between cutout and door edge is not less than 125 mm (5") wide. Ensure cut out area is not greater than 40% of area of door face. Ensure cut out does not exceed half height of door.

.4 *Provide* hardwood glass stops, finished to match face veneer, for vision panels in unrated doors.

.5 Ensure glass size conforms to NATIONAL BUILDING CODE OF CANADA requirements.

.6 Fabricate flush wood core doors with necessary interior blocking to suit hardware installation.

.7 Fabricate following bevels at 1.5 mm (1/16") in 50 mm (2"):

.1 Single Doors: Bevel both stiles.

.2 Double Doors: Bevel hanging styles, and bevel and rebate meeting styles.

.8 Fabricate flush wood core doors with following edge clearances:

.1 3 mm (1/8") clearance at top and sides.

.2 6 mm (1/4") clearance at bottom to top of floor finish and thresholds unless doors are indicated in the Door Schedule to be undercut.

2.6 FINISHES

.1 Door Facings:
  .1 High Pressure, Paper Base, Decorative Laminate Facing (PLAM):
    .1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
      .1 Arborite; www.arborite.com
      .2 Formica Inc.; www.formica.com
      .3 Nevamar Company, LLC; www.nevamar.com
      .4 Wilsonart Canada; www.wilsonart.com
    .2 *Provide* types and thicknesses conforming to ANSI/NEMA LD3 and ANSI/NEMA LD3.1 for applications indicated.
    .3 Colours and Finishes: To be selected by *Consultant* at a later date from manufacturer's full colour range including solid and woodgrain patterns with ability to offer cross-grain patterns and printed patterns in suede or matte finishes. Maximum Number of Colours: 5.

.2 Factory Finishing System:
  .1 Defer only final touch up, cleaning, and polishing until after installation. As far as practical, ensure doors are factory finished unless otherwise indicated or unavoidable. Apply finishes in accordance with AWS Section 5.
  .2 Finishing System: AWS System – 9, UV Curable, Acrylated Epoxy, Polyester Or Urethane
  .3 Field Touch-Up:
    .1 Field touch-up is responsibility of installing trade. Flush wood core door manufacturer is responsible for factory finishing.
    .2 Field touch-up includes filling and touch-up of exposed job-made nail and screw holes, refinishing of raw surface resulting from job fitting, repair of job-inflicted scratches and mars and final cleaning up of finished surfaces.

PART 3 -EXECUTION

3.1 INSTALLATION

.1 Installation of doors and finish hardware forms part of *The Work* of Section 06 90 00.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: Provide floor, ceiling and wall access doors complete with frames including but not limited to following:
  .1 floor access doors and frames (ADR-1)
  .2 retractable access ladders where applicable.(ADR-2)

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 SUBMITTALS

.1 Product Data:
  .1 Manufacturer’s technical data for each type of access door and panel assembly including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices. Manufacturer’s Installation Instructions: Indicate installation requirements and rough-in dimensions.
  .2 Include complete schedule, type, locations, construction details, finishes, latching or locking provisions, and other pertinent data.

.2 Shop Drawings: Submit shop drawings in accordance with Division 01.
  .1 Door and Panel Units: Show types, elevations, thickness of metals, full size profiles of door members.
  .2 Hardware: Show materials, finishes locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.
  .3 General: Show connections of units and hardware to other work. Include schedules showing location of each type and size of door and panel units.

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide Work of this Section executed by competent

installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Protect doors and frames during shipping and storage.

.2 Note damage incurred during shipping.

.3 Exercise proper care in handling of Work so as not to injure finished surfaces. Protect Work from damage after it is in place.

.4 Store materials under cover in a dry and clean location off ground. Remove materials that are damaged or otherwise not suitable for installation from job site and replace with acceptable materials at no additional cost to Owner.

1.7 SEQUENCING

.1 Coordinate delivery with other work to avoid delay.

1.8 WARRANTY

.1 Warrant Work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to electric motors, fusible links, and special finishes.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and specifications:
- .1 Acudor Products Inc.; www.acudor.com
- .2 Nystrom Building Products; www.nystrom.com
- .3 Precision Ladders LLC; www.precisionladders.com
- .4 The Bilco Company; www.bilco.com

.2 Substitution Limitations: This Specification is based on “Access Door Type FR 4-Fire Rated” by Bilco and "Super Simplex Disappearing Stairway" by Precision Ladders LLC. Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Design and Performance Requirements:
- .1 Ensure Product is manufactured by a firm experienced in design and production of standard and custom commercial fire rated floor hatch and frame assemblies, integration of builders' or electronic hardware assemblies and other items affecting Work.
- .2 Fabricate fire rated floor hatch assemblies to support a live load of 150 psf.
- .3 Tested in accordance with ASTM E119, NFPA 251, NFPA 288, BS476 and UL-listed (File R15197) as having a 2-hour fire rating when exposed to fire from the underside. UL listed for a 2-hour fire rating.
- .4 Engineered with lift assistance for smooth, easy one-hand door operation, regardless of size
- .5 Automatic hold-open arm locks the cover in the open position to ensure safe egress
- .6 Heavy-duty construction and positive latching mechanism help to prevent unauthorized access

2.3 ASSEMBLIES

.1 Fire Rated Floor Access Door Assembly (ADR-1):
- .1 Size: 914 mm x 914 mm (36" x 36")
- .2 Clear Opening: 889 mm x 755 mm (35" x 29.75")
- .3 Weight: 148 kg (368 lbs)
- .4 Cover: Aluminum Diamond Tread Plate: ASTM B632-02, 6.35 mm 1/4" 6061-T1 aluminum with mill finish. Aluminum plate reinforced for 150 psf (732 kg/m2) live load. Intumescent fire coating applied to underside of cover. Designed with 1" (25.4mm) fillable pan for field installation of architectural flooring material to suit design requirements and remaining depth shall be filled with concrete to maintain fire rating of door assembly.
- .5 Frames: Aluminum Extrusion: 6061-T6 aluminum with protective paint finish to safeguard effects of concrete. Extruded aluminum frame with built in anchor flange around perimeter. Intumescent fire coating applied on interior surfaces of frame.
- .6 Anodized Aluminum: AAMA 611-92 clear and colored.
- .7 Fasteners: Type No. 316 stainless steel. ASTM F593 for bolts and ASTM F594 for nuts.
- .8 Hardware:
  - .1 Engineered composite compression spring tubes. Steel compression springs with electrocoated acrylic finish. Type 316 Stainless steel hinges.
  - .2 Latch: Type 316 stainless steel slam latch with inside lever handle and outside removable "L" handle fastened to door with tamper-resistant stainless steel bolts.
- .9 Locking and Latching:
  - .1 Mortise cylinder preparation to receive special mortise cylinder lock. Locks to be provided by Section 08 71 00 Finish Hardware.
  - .2 Hinge: Continuous heavy-duty type 316 stainless steel hinge.
  - .3 Springs: Compression Springs: ASTM 213, type No. 316 stainless

steel; stainless steel compression lift springs designed to counterbalance door weight and resist downward pressure when closing door. Design springs to not exceed 30 pounds of force to operate.

.4 Lift Assistance: Compression spring operators enclosed in telescopic tubes. Mechanical hold-open system with release button automatically holds cover in open position.

.10 Finishes:

.1 General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendation for applying and designating finishes.

.2 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.3 Aluminum: Mill finish with clear coat to seal aluminum.

.4 Steel: Manufacturer's standard factory-applied prime coat.

.11 Acceptable Products: "Type FR 4-Fire Rated" by Bilco or approved equivalent.

.2 Retractable Access Ladders (ADR-2): ANSI A14.9, Commercial Type,

.1 Ladder Capacity: 2.224 kN (500 lbs.)

.2 Stringer: 6005-T5 Extruded aluminum channel 127 mm x 25 mm x 3 mm(5" x 1" x 1/8"); tri-fold design; steel blade type hinges; adjustable feet.

.1 Pitch: 63°.

.3 Tread: 6005-T5 extruded aluminum channel 132 mm (5 3/16") by 31 mm (1 1/4") by 3 mm (1/8"). Depth: 132 mm (5 3/16") inches. Deeply serrated top surface

.1 Riser Height: 240 mm (9-1/2").

.2 Clear Tread Width for Standard Width: 495 mm (19-1/2").

.4 Railing: Aluminum bar handrail riveted to stringers, upper section only.

.5 Ceiling Opening: As indicated on reviewed Shop Drawings.

.1 At rooms with 3200 mm floor-to-ceiling height: 762 mm x 1626 mm

.2 At rooms with 4240 mm floor-to-ceiling height: 572 mm x 1830 mm

.6 Size and weight to suit floor and ceiling height.

.7 Acceptable Products: "Super Simplex Disappearing Stairway" by Precision Ladders LLC or approved equivalent.

.3 Hardware: Manufacturer's standard hardware including piano hinges, arms, springs cables and other items for complete assembly. Provide units complete with lock on door panels.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in

writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Advise installers of details relating to floor hatch installation, including rough opening dimensions, locations of supports, and anchoring methods.

3.3 INSTALLATION

.1 Follow manufacturer’s instructions for installing floor doors and hatches.

.2 Install frames plumb and level in opening, in proper alignment with floor surfaces for flush installation. Secure rigidly in place.

.3 Position units to Provide convenient access to concealed Work requiring access.

.4 Install safety net per manufacturer’s written instructions on units where specified or indicated on Drawings..

.5 Remove PVC protectant off of hatch coves and frames after installation.

3.4 CLEANING AND ADJUSTING

.1 Clean adjacent surfaces and remove unused Product and debris from site.

.2 Adjust doors for smooth operation.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 *Work* Included: *Provide* detention hollow metal doors and frames including but not limited to following:
  .1 sliding bullet resistant detention doors as required to meet design requirements
  .2 detention frames.
  .3 glazing panels and related accessories
  .4 Detention security hollow metal bullet resistant frames shall include food pass openings, sliding shutter and other features as indicated on *Drawings*.

.1 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

.2 REFERENCES

.3 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing:
  .1 Coordinate installation with related Sections referenced herein.
  .2 Coordinate installation of anchorages for detention frames. Furnish setting *Drawings*, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded to structural steel.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: *Provide* pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:

.1 Prior to start of work, arrange for *Project* site meeting of parties associated with work of this Section, including non-exhaustively *Subcontractor* performing work of trade involved, testing company's representative and *Contractor*'s *Consultants* of applicable discipline. *Consultant* may attend.

.2 Review *Contract Documents* to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 *Project* staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with *Contractor* and *Consultant*, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.

.2 Co-operate fully with other *Subcontractors* on *The Work* and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 *Supply* items to be built-in in ample time to be incorporated into work of other *Subcontractors*, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.4 SUBMITTALS

.1 *Product Data*: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00. Ensure data sheets *Provide* required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. *Provide* adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by *Consultant*.

.3 *Shop Drawings*: Submit *Shop Drawings* in accordance with Section 01 30 00; indicating following without limitations:

.1 elevations of each door design.
.2 direction of slide.

.3 secure and non-secure sides.
.4 details of doors, including vertical and horizontal edge details, and metal thicknesses.
.5 details of frames, including dimensioned profiles, and metal thicknesses.
.6 locations of reinforcement and preparations for hardware.
.7 details of anchorages, joints, field splices, and connections.
.8 details of food-pass openings .
.9 details of moldings, removable stops, and glazing.
.10 details of conduit, junction boxes, and preparations for door hardware.

.4 Samples: Submit samples in accordance with Section 01 30 00 for following items:
.1 Each type of exposed finish required, Minimum: 75 mm (3″) x 125 mm (5″)
.2 Detention Doors: Submit minimum 300 mm x 300 mm (12″ x 12″) sample, showing vertical-edge, top, and bottom construction; insulation; face stiffeners; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
.3 Detention Frames: Submit minimum 300 mm x 300 mm (12″ x 12″) sample, showing profile, welded corner joint, welded hinge reinforcement, grout-cover boxes, floor and wall anchors, and silencers. Include separate section showing fixed steel panels and glazing if applicable.

.5 *Product* Test Reports and Certificates:
.1 Submit test reports based on evaluation of comprehensive tests performed by a qualified testing agency for detention doors and frames. Indicate metal thickness of each component of tested assembly and *Provide* description of construction methods.
.2 Bullet Resistance Test:
.1 A sample door, frame, and hardware assembly shall be constructed, tested, and certified by a qualified independent testing laboratory in accordance with the test procedure outlined in ASTM F 1450, Section 6 “Specimen Preparation” and Section 7.1 “Bullet Penetration”. Test reports shall include complete descriptions of test procedure and results. Firearms and ammunition used shall be certified as being correct with respect to bullet caliber, weight, muzzle velocity, and muzzle energy.
.2 Test and certify to meet ANSI/NAAMM 863-04 Testing requirements and ASTM F1450-05 Testing requirements, which includes without limitations following tests:
.1 Static load
.2 Door edge crush test
.3 Impact load test
.4 Load test
.5 Rack test
.6 Removable glass stop test
.7 Bullet Resistance Test – ASTM F1450, ASTM F1592 and UL 752-Level 3

.3 Certificates:
.1 Obtain certificate from Professional Engineer responsible for design which includes seismic assessment and field review of this part of *The Work*, validating that work substantially complies with requirements of the NBC and that requisite field reviews have been completed

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications:
.1 Execute work of this Section by a manufacturer who is a member of CSDMA.
.2 Ensure *Products* supplied are manufactured by a firm experienced in:
.1 design and production of detention grade steel door and frame assemblies;
.2 integration of builders' or electronic hardware, glazing assemblies and other items affecting work.
.3 Upon request, submit manufacturer's evidence of minimum 5 years continuous experience in type of work specified under this Section for *Projects* of similar size and scope.
.4 Ensure manufacturer has personnel and plant equipment capable of fabricating steel door and frame *Products* of types specified with written quality control and system in place.

.2 *Supplier* Qualifications: Ensure *Product Supplier* has Architectural Hardware *Consultant* (AHC) or person of equivalent experience, available at reasonable times to consult with *Consultant*, *Contractor* and *Owner*.

.3 Installer Qualifications:
.1 *Provide* work of this Section executed by competent installers with minimum 5 years' experience in the application of *Products*, systems and assemblies specified and with approval and training of *Product* manufacturers.

.4 Welding: *Provide* welding in accordance with CSA W59-M performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau as specified herein. Welders employed on this *Project* may be asked by *Consultant* at any time for their welding certificate

.5 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.6 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of *The Work* of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading

of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect *The Work* of this Section during fabrication and erection,
.6 stamp and sign each *Shop Drawing*,
.7 *Provide* site administration and inspection of this part of *The Work*.

.7 Mock-ups: *Provide* Mock-ups in locations designated by *Consultant* and as required to demonstrate quality of workmanship. Maintain Mock-ups during construction in an undisturbed condition as a standard for judging completed work.
.1 Ensure steel door and frame *Product Supplier* allows in its bid replacement of 2 doors, as selected at random by *Consultant* for inspection of construction and compliance with this Specification.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver detention doors and frames palleted, wrapped, or crated to *Provide* protection during transit and Project-site storage. Do not use non-vented plastic.

.2 Deliver detention frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

.3 Inspect units, on delivery, for damage. Repair and refinish minor damages to match new work to satisfaction of *Consultant*; otherwise, remove and replace damaged items as directed.

.4 Store detention doors and frames under cover at building site. Place units in a vertical position with heads up, spaced by blocking, on minimum 102 mm (4”) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

1.7 MAINTENANCE

.1 Furnish extra materials matching installed *Products* packaged with protective covering identified with labels describing contents.
.1 Security Fasteners: *Supply* 1 box for each 50 boxes or fraction thereof, of each type and size of security fastener installed.
.2 Tool Kit: *Provide* sets of tools for use with security fasteners as directed by *Consultant*; each packaged in a compartmented kit configured for easy handling and storage.

1.8 WARRANTY

.1 Warrant *Work* of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*.

PART 2 -*PRODUCTS*

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
.1 Steelgate Security Products Ltd.; www.steelgatesecurity.com

2.2 DESCRIPTION

.1 Regulatory Requirements:
.1 *Install* doors and frames in accordance with HMMA standards, NFPA 80 standard and local authority having jurisdiction.

.2 Design and Performance Requirements:
.1 *Provide* flush detention doors of seamless hollow construction, with minimum nominal thickness of 50 mm (2″) and dimensions and grades as indicated on *Drawings* or specified herein. Construct detention doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges; with following requirements:
.1 Summary: Minimum requirements.
.1 Grade 3: 14 ga. (1.7mm) thick door and frame with lower impact resistance for door hardware.
.2 Impact Resistance: *Provide* detention doors and frames capable of providing adequate impact resistance when tested in accordance with ASTM F1450, Grade 3.
.3 Bullet Resistance: *Provide* detention doors and frames capable of providing adequate bullet and projectile resistance when tested in accordance UL 752, Level 3.
.4 Tool-Attack Resistance: *Provide* detention doors and frames capable of providing small-tool-attack-resistance when tested in accordance to UL 437 and UL 1034.

2.3 MATERIALS

.1 Base Material for steel door faces sheets and frame profiles. Ensure steel provided for work of this Section is free of scale, pitting, coil breaks, surface blemishes, buckles, waves and other defects.

.2 Hot-Rolled Steel Sheet: ASTM A1011/A1011M, CS, Type B; free of scale, pitting, or surface defects; pickled and oiled.

.3 Cold-Rolled Steel Sheet: ASTM A1008/A1008M, CS, Type B.

.4 Zinc-Coated Steel Sheet: ASTM A653/A653M, CS, Type B; with Z275 (G90) galvanized coating designation.

.5 Steel Plates, Shapes, and Bars: ASTM A36/A36M.

.6 Concealed Bolts: ASTM A307, Grade A unless otherwise indicated.

.7 Stainless-Steel Sheet: ASTM A240/A240M, austenitic stainless steel, Type 304 or 316.

.8 Anchors: *Supply* bolts, nuts and washers conforming to ASTM A325M. *Supply* each type and size of bolt and nut of same manufacture and of same lot.
.1 Masonry Anchors: Fabricated from same steel sheet as door face.

.2 Embedded Anchors: Fabricated from mild steel shapes and plates, hot-dip galvanized according to ASTM A153/A153M.

.3 Postinstalled Expansion Anchors: With capability to sustain, without failure, a load equal to 4 times load imposed, as determined by testing per ASTM E488.

.9 Glazing: *Provide* in accordance with requirements of Section 08 88 53, Security Glazing.

.10 Grout: ASTM C476, with slump of not more than 102 mm (4″) as measured according to ASTM C143/C143M.

.11 Insulation: Mineral wool insulation, density 24 kg/m^3 (1.5 lbs/cu ft) minimum consisting of durable fibrous material processed from rock, slag or glass, bound with deterioration resistant binders, CAN/ULC-S702, Type 1

2.4 COMPONENTS

.1 Sliding Detention Cell Doors:

.1 Minimum Door Thickness: 50 mm (2″)

.2 Core Construction: *Provide* steel-stiffened core construction consisting of same material as detention door face sheets, welded to both detention door faces. *Provide* adequate spacing between stiffeners so as to ensure gap between vertical interior webs does not exceed 102 mm (4″); and securely fastened to both face sheets by spot welds with maximum vertical spacing of 76 mm (3″). Fill spaces between stiffeners with insulation as specified herein. Steel Stiffener Thickness: 1.21 mm (18 ga – 0.0478″) thick

.3 Vertical Edge: 3.1 mm (0.123″) thick, continuous channel of same material as detention door face sheets, extending full-door height at each vertical edge. Ensure top and bottom edges are closed with continuous steel channel spot welded to face at maximum spacing of 102 mm (4″) o.c. Reinforce top edge of detention door with 1.3 mm (0.053″) thick closing channel, inverted and nesting in top channel; welded so channel web is flush with top door edges. *Provide* sealing at top closing channel where indicated to *Provide* weather resistance.

.4 Top Caps: *Provide* non-removable flush top caps with edges tack welded and seams filled (no visible seams).

.5 Hardware Reinforcement and preparations: Ensure doors and frames are mortised, reinforced, and tapped in shop for templated hardware in accordance with approved hardware schedule and templates. Minimum thicknesses for steel hardware reinforcements as follows:

.1 Full-Mortise Hinges and Pivots: 4.2 mm (0.167″)

.2 Maximum-Security Surface Hinges: 5.4 mm (0.25″).

.3 Strike Reinforcements: 4.2 mm(0.167″)

.4 Slide-Device Hanger Attachments: As recommended by device manufacturer.

.5 Lock Fronts, Concealed Holders, and Surface-Mounted Closers: 2.3 mm (0.093″) thick.

.6 All Other Surface-Mounted Hardware: 2.3 mm (0.093″) thick.

.6 Hardware Enclosures and Junction Boxes:

.1 Where indicated, *Provide* enclosures and junction boxes for electrically operated detention door hardware manufactured from same material as face sheets, interconnected using UL approved, 12 mm (1/2″) diameter conduit and connectors. Where required, *Provide* access plates manufactured from same material and thickness as face sheet to facilitate proper installation of wiring. Ensure access plates are fastened with 4 security fasters minimum spaced not more than 152 mm (6″) o.c

.7 Interior Detention Door Face Sheets: Security Grade 3, 1.7 mm (14 ga.) thick in accordance with ASTM F1450 fabricated from cold-rolled steel sheets to *Provide* adequate impact and abuse resistance.

.8 Exterior Detention Door Face Sheets: Security Grade 3 in accordance with ASTM F1450 fabricated from Fabricated from metallic-coated steel sheets to *Provide* adequate impact and abuse resistance.

.2 Detention Panels: *Provide* fixed detention panels manufactured from same material, construction, and finish specified for adjoining frames.

.3 Detention Frames: *Provide* fully welded detention frames with integral stops, of seamless construction without visible joints or seams. Fabricate detention frames with contact edges closed tight and corners mitered, reinforced, and continuously welded full depth and width of detention frame.

.1 Hardware Reinforcement and preparations: *Provide* reinforcements according to

.2 Glazing:

.1 Reinforce glazed openings with 12 ga. formed “Z” stiffeners welded to each face sheet at 125mm (5″) o.c maximum and in each corner. Ensure “Z” stiffeners form an integral, permanent glazing stop with minimum height of 19mm (0.75″) for non-security glazing and 25 mm (1″) minimum height for security glazing. Locate integral stop on secure side of door, as designated by the *Consultant*.

.2 Moldings and Stops: *Provide* fixed moldings on secure side of glazed openings and removable stops on non-secure side as recommended by door manufacturer and indicated on *Drawings* and schedules. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

.3 Jamb Anchors: Weld jamb anchors to detention frames near hinges and directly opposite on strike jamb or as required to secure detention frames to adjacent construction.

.1 Anchor Spacing:

.1 Door Frames: *Provide* 2 anchors per frame plus 1 additional anchor for each 457 mm (18″) or fraction thereof, above 1372 mm (54″) in height.

.2 Borrow Light Frame: *Provide* 2 anchors per frame plus 1 additional anchor for each 457 mm (18″) or fraction thereof, above 914 mm (36″) in height.

.2 Masonry Anchors: Adjustable, corrugated or perforated, strap-and-stirrup anchors to suit detention frame size; formed of same material and thickness as detention frame; with strap not less than 50 mm x 250 mm (2″ wide by 10″) long.

.3 Embedded Anchors: Where indicated, *Provide* detention frames with removable faces at jambs consisting of embedded plates, frame angles and connector angles in accordance with ANSI/NAMM ANSI/NAMM HMMA 863-04.

.4 Postinstalled Expansion Anchors: Minimum 12 mm (1/2″) diameter concealed bolts with expansion shields or inserts. *Provide* conduit spacer from detention frame to wall, welded to detention frame. Reinforce detention frames at anchor locations.

.4 Floor Anchors: *Provide* floor anchors for each jamb and mullion that extends to floor, formed of same material and thickness as detention frame suitable for installation conditions.

.5 Rubber Door Silencers: *Provide* as required to meet acoustic criteria stipulated. Keep holes clear during construction.

.6 Grout Guards: *Provide* factory-installed grout guards of same material as detention frame, and welded to detention frame.

.4 Door Accessories:

.1 Pass-Through Openings: Where indicated on schedules or details, construct doors with provision for operable pass-through openings. Fabricate flush openings using 2.3 mm (0.093″) thick continuous inverted interior channels of same material as detention door faces, Mount shutters on non-secure side of detention doors. Reinforce for locks and food-pass hinges.

.5 Fasteners: *Provide* security fasteners operable only by tools produced for use on specific type of fastener by manufacturer. *Provide* fasteners as required for assembly, installation, and strength indicated.

2.5 FABRICATION

.1 Fabricate detention doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at *Project* site, clearly identify work that cannot be permanently factory assembled before shipment.

.2 Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

.3 Tolerances: Fabricate detention doors and frames to comply with manufacturing tolerances indicated in ANSI/NAMM ANSI/NAMM HMMA 863.

.4 Fabricate multiple-opening detention frames with mullions that have closed tubular shapes and with no visible seams or joints.

.5 Hardware Preparation:

.1 Factory prepare detention doors and frames to receive mortised hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final door hardware schedule and templates

provided by detention door hardware *Supplier*.

.2 Reinforce detention doors and frames to receive surface-mounted door hardware.

.3 Locate door hardware as indicated on reviewed *Shop Drawings*.

2.6 FINISHES

.1 Cleaning and Shop Painting for Steel Sheet Finishes:

.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

.2 Shop prime steel with 1 coat of primer paint to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale or grease. Do not paint when temperature is lower than 7 deg C (45 deg F). Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Shop prime galvanized steel in accordance with CAN/CGSB-85.10.

.2 Hot Dip Galvanizing:

.1 After fabrication, hot dip galvanize specific miscellaneous steel items noted on *Drawings* and/or specified herein in accordance with CAN/CSA-G164-M. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with "Galvafroid" by W.R. Meadows in accordance with manufacturer's printed directions.

.2 Galvanize members exposed to elements when in final location; members embedded on exterior side of exterior walls; members imbedded in concrete; members specified in this Section or noted on *Drawings*.

.3 Zinc-rich touch-up primer for Zinc-clad surfaces: Ready, mixed, zinc-rich primer conforming to CAN/CGSB-1.181. Acceptable *Products:* Sealtight Galvafroid Zinc-Rich Coating by W. R. Meadows of Canada Limited, or Zinc Clad No.7 Organize Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.4 Stainless Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. *Provide* Directional Satin Finish No. 4.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention doors and frames.

.2 Examine roughing-in for embedded and built-in anchors to verify actual locations of detention frame connections before detention frame

installation.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Adjust detention frames prior to installation for squareness, alignment, twist, and plumbness to following tolerances:
- .1 Squareness: +/- 1.5mm (1/16 inch) measured at door rabbet on a line 90 deg from jamb, perpendicular to frame head.
- .2 Alignment: +/- 1.5 mm (1/16 inch) measured at jambs on horizontal line parallel to plane of face.
- .3 Twist: +/- 1.5 mm (1/16”), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of door rabbet.
- .4 Plumbness: +/- 1.5 mm (1/16”), measured at jambs on a perpendicular line from head to floor.

3.3 INSTALLATION

.1 *Install* detention doors and frames plumb, rigid, properly aligned, and securely fastened in place, complying with *Drawings*, schedules, and manufacturer's instructions.

.2 Anchorage: Set detention frame anchorage devices according to details on *Shop Drawings* and per anchorage device manufacturer's instructions.
- .1 Masonry Anchors: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- .2 Embedded Anchors: *Install* embedded plates in wall surrounding frame openings to match frame angle locations.
- .3 Postinstalled Expansion Anchors: Drill holes in existing construction at locations to match bolt locations and *Install* bolt expansion shields or inserts.

.3 Assemble detention frames fabricated in sections. *Install* angle splices at each corner, of same material and thickness as detention frame, and extend at least 100 mm (4”) on both sides of joint.
- .1 Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
- .2 Continuously weld and finish smooth joints between faces of abutted, multiple-opening, detention frame members.

.4 Field Welding: Comply with the following requirements:
- .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- .2 Obtain fusion without undercut or overlap.
- .3 Remove welding flux immediately.
- .4 At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

.5 Apply bituminous coating to backs of frames prior to filling with grout.

.6 Door Frames:
.1 *Install* detention frames of sizes and profiles indicated. Set detention frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
.2 *Install* embedded anchors and post-installed expansion anchors with security fasteners as necessary to meet assembly, installation, and strength requirements indicated.
.3 *Install* detention frames with removable stops located on non-secure side of opening.

.7 Grout: Fully grout detention frame jambs and heads. Hand trowel grout and take other precautions, including bracing detention frames, to ensure that frames are not deformed or damaged by grout forces.

.8 Detention Doors: Fit non-fire-rated detention doors accurately in their frames according to manufacturer's written instructions to ensure proper operation, with following minimum clearances:
.1 Between Doors and Frames at Jambs and Head: 4.7 mm (3/16″)
.2 Between Edges of Pairs of Doors: 4.7 mm (3/16″)
.3 At Door Sills with Threshold: 9.5 mm (3/8″)
.4 At Door Sills without Threshold: 19 mm (3/4″)
.5 Between Door Bottom and Nominal Surface of Floor Covering: 6 mm (1/2″)

.9 Smoke-Control Detention Doors: *Install* according to NFPA 105.

.10 Installation Tolerances: Comply with installation tolerances indicated in ANSI/NAMM HMMA 863.

.11 Glazing: Comply with installation requirements stipulated in Section 08 88 63, Security Glazing; unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

.1 Inspect installed *Products* in accordance with quality control methods listed in ANSI/NAMM HMMA 863 to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from *Contract Documents*. Where inspections indicate that work does not comply with specified requirements, remove and replace detention work at no cost to *Owner*.

.2 Perform additional inspections to determine compliance of replaced or additional *Work* and prepare inspection reports.

3.5 ADJUSTING AND CLEANING

.1 Check and readjust operating hardware items immediately before final inspection. Remove and replace defective work, including detention doors and frames that are warped, bowed, or otherwise unacceptable. Clean grout and other bonding material off detention doors and frames immediately after installation.

.2 Touch-ups: Immediately after erection clean and repair surfaces in accordance with manufacturer's written instructions.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* sectional overhead doors including but not limited to following:
  .1 insulated sectional overhead doors.
  .2 door guides, tracks and accessories.
  .3 counterweight and counterweight enclosures.
  .4 fender guards for overhead door tracks.
  .5 supplementary steel supports required for installation.
  .6 operators, motors, control panels, loop detectors, photo-electric devices, etc. and electrical work as specified.
  .7 shop priming.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 safety procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of

this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:

.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.

.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 Co-operate with other Sections for application of all miscellaneous specialties.

.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.

.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product* Data: Submit manufacturer's literature, data sheets for each type of material provided under this Section for *Project*. Data sheets shall provide all required information. Submit 3 copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials. Submit manufacturer's installation instructions.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by *Consultant*.

.3 *Shop Drawings*:

.1 Submit *Shop Drawings* for the work of this Section in accordance with Section 01 30 00.

.2 Clearly show and describe in detail, detailed door assemblies and adjacent construction, including elevations, sections and details of door, track, hardware and operating components, dimensions, gauges, finishes and of relationship of door, frames, track, hardware and operating components to adjacent construction. Submission includes detailed descriptions and catalog cuts of specified door controls.

.3 Submit complete electrical schematics with *Shop Drawings*.

.4 Submit complete engineering design data for doors to confirm doors

have been designed to meet design requirements specified. Ensure design calculations are prepared by a registered Professional Engineer experienced in industrial steel door design and registered to practice in the place of work. Ensure *Shop Drawings* bear his seal.

.4 Operation and Maintenance Data:
.1 Submit printed operation instructions and maintenance data for the doors, as follows:
.1 Wiring Diagrams: "As built" straight line wiring diagrams showing electrical connections and control circuitry.
.2 Instructions explaining operation.
.3 Lubrication chart indicating lubrication points and type of lubricant recommended for equipment.

1.6 QUALITY ASSURANCE

.1 Qualifications: *Provide* work of this Section executed by competent installers with minimum of 5 years' experience in application of *Products*, systems and assemblies specified and with approval and training of *Product* manufacturers.

.2 Licensed Professionals: Employ a full time professional structural engineer registered in the Territory of Nunavut, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.

.3 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in sequence to meet the installation schedule and arrange ahead for off-the-ground, undercover storage locations.

.2 Handle components with care. Protect against damage, dirt, disfigurement and weather.

.3 Protect other work resulting from work of this Section. Replace work which cannot be satisfactorily repaired or re-stored at no cost to *Owner*.

1.8 WARRANTY

.1 Warrant work of this Section for period of 3 years against defects and/or

deficiencies in accordance with General Conditions of the *Contract*. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to; buckling, opening of seams, bond failure and extensive colour fading.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 “Thermalex ®2000 Thermalex TX500, Polyurethane Insulated Steel Door” by Upwardor Corp.; www.upwardor.com
- .2 “596 Series Thermacore” by Overhead Door Corporation of Toronto; www.overheaddoor.com
- .3 “Therm-O-Dor TD-134" by Steel-Craft Door Products Ltd.; www.steel-craft.ca
- .4 “Garaga Industrial G-5000 Series” Garaga Inc.; www.garaga.com

.2 Substitution Limitations: This Specification is based on “Thermalex ®2000, Polyurethane Insulated Steel Door” by Upwardor Corp.; www.upwardor.com Comparable *Products* from manufacturers listed herein will be considered provided they meet the requirements of this Specification

2.2 DESCRIPTION

.1 Regulatory Requirements:
- .1 Ensure electrical components conform to requirements of Canadian Standards Association, Local Electrical Code and Local Utility Authority.

.2 Design and Performance Requirements:
- .1 Design exterior doors to withstand horizontal wind loads in closed position of 0.95 kN/m^2 (20 psf) positive, 0.57 kN/m^2 (12 psf) negative, with operators to function against 0.383 kPa (8 psf) wind load. Maximum deflection under full design load shall be 1/240 of the span.
- .2 Calculate properties of steel sections and allowable stresses used in determination of structural performance in accordance with CSA S136.
- .3 Operational Life: Design components to operate for not less than 20,000 cycles and for 10 cycles per day.
- .4 Electrical Components, Devices, and Accessories: Design electrical components for doors in accordance with CSA C22.1

2.3 MATERIALS

.1 Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.

.2 Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM A653/A653M, CS Type A, with Z275 zinc coating designation to ASTM A653/A653M.

.3 Steel Supports: Design, fabricate and *Install* the following to carry the overhead doors and tracks:
- .1 Galvanized steel jamb and head supports
- .2 Miscellaneous framing, not shown on structural *Drawings*, to support operators and tracks e.g. centre spring mount and motor anchorage plates.

.4 Overhead Sectional Doors:
- .1 Insulated Sections Description:
  - .1 Core: R-14 polyurethane
  - .2 Outer Face Sheet: Embossed and pebble textured, Z275 galvanized sheet steel or Galvalume.
  - .3 Finish: 1 prime coat and 1 white finish coat
  - .4 Inner Face Sheet:
    - .1 Finish: White primer
    - .2 Weight: 2.25lbs/sq.ft. + 40 lbs for the track
- .2 *Provide* air and weather seals in following locations:
  - .1 between door sections.
  - .2 at jambs and head.
  - .3 on the bottom sections.
- .3 Door Sections: All Panels: Insulated 525 mm (21").

.5 Track Description:
- .1 Material: Roll formed galvanized steel
- .2 Depth: 75 mm (3")
- .3 Curve Radius: Minimum 400 mm (16").
- .4 Thickness: 3 mm (1/8") core minimum
- .5 Overlap jambs and head minimum 25 mm (1").
- .6 Steel Framing, Supports, Hangers, Stiffeners and Bracing: Z275 galvanized steel minimized spangle.
- .7 Verify the track design and clearances and *Provide* suitable standard or low headroom track if necessary.
- .8 *Provide* sub-framing to support track hangers between the bottom chords of the roof trusses.
- .9 *Provide* diagonal and sufficient stiffeners to prevent distortion and sagging.
- .10 *Provide* continuoustrack mounting angles along tracks.
- .11 *Provide* right hand vertical track side lock
- .12 *Provide* double bar latch cylinder locks with electrical interlock.

.6 Rollers:
- .1 Bearings: Full floating, hardened steel
- .2 *Provide* industrial grade galvanized steel roller brackets and hinges.

.7 Lifting Cables: Galvanized multi-strand aircraft type, with an 8:1 safety factor.

.8 Electrical Components:
- .1 *Provide* CSA and ULC approved electrical components
- .2 *Provide* time delay timers adjustable from 0.5 to 180 seconds.

.9 Safety Edge System:
- .1 *Provide* a door bottom safety edge to stop downward travel of door when

it comes into contact with an obstruction.
.2 *Provide* a reversing time delay on the safety edge system operation.

.10 Manual Chain Hoist Operator: *Provide* a manual chain hoist operator with reduction unit as backup in case of electrical system failure.

.11 100,000 cycle oil tempered torsion springs counter balancing mechanism mounted on a 25 mm (1") keyed solid steel shaft.

.12 Electric Operators (Jack Shaft Side Mount):
.1 3/4 H.P. suitable for 208V / 3 phase/60-cycle power.
.2 *Provide* operators complete with magnetic brake, instant reversing motors and thermal overload.
.3 *Provide* 1 to 2 second delay timers in the reversing circuit and 1 to 5 minute timers in the close circuit.
.4 50,000 - 100,000 cycle oil tempered torsion springs counter balancing mechanism mounted on a 25 mm (1") keyed solid steel shaft.

.13 Push Button Controls: *Provide* an EEMAC 1 - 3 position push button control - momentary contact - "open-close-stop" located on the interior of each opening.

.14 Exterior Weatherproof Key Switch: *Provide* an exterior weatherproof key switch to be located by the *Consultant.*

2.4 FINISHES

.1 Steel Finish: Manufacturer's standard powder coating. Color and gloss to be selected from manufacturer's standard colors at a later date.

PART 3 -EXECUTION

3.1 INSTALLATION

.1 Employ manufacturer's qualified representatives to *Install* overhead doors in accordance with the manufacturer's printed installation instructions.

.2 *Provide* wiring and EMT conduit from the disconnect switch at each jamb to the operators and controls.

.3 *Provide* watertight operators, push buttons and wiring on the interior.

.4 On completion, adjust and lubricate moving parts in accordance with manufacturer's recommendations, check controls and demonstrate operation and controls of doors to *Owner*.

3.2 CONTROLS

.1 *Provide* 1 set of the following for each door:
.1 Controls.
.2 Adjustable timer.
.3 Automatic/Back-up switch.

.2 *Provide* following entrance controls:

.1 Automatic Activator: push button and key switch opens door and sets timer.
.2 Safety Control: Photo switch at opening verifies opening is clear and resets timer.
.3 Back-Up Control (Non-Timed): Push buttons located at the door jamb or alternatively the emergency chain operator.

.3 *Provide* following exit controls:
.1 Automatic Activator: Photo switch 900 mm (36") before door push button located at garage door jamb; in each case timer is set.
.2 Safety Control: Photo switch at opening verifies opening is clear and resets timer.
.3 Back-Up Control (Timer Deactivated): Push buttons located at door jamb or alternatively the emergency chain operator.

3.3 ADJUSTING

.1 Lubrication:
.1 Upon completion of erection of units and operating equipment, lubricate moving parts before operation.
.2 Grease sprockets, bearings, cables, link chains and guides. Use lubricant recommended by manufacturer.

3.4 DEMONSTRATION

.1 Test operate new doors and demonstrate operation of same to satisfaction of *Consultant* at time of acceptance of completed work.

.2 Demonstrate door operation for *Owner*'s personnel in accordance with requirements of Section 01 70 00.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* fiberglass windows and doors including but not limited to following:
  .1 fixed fiberglass windows including vision and spandrel units.
  .2 weatherstripping sash.
  .3 glass and glazing in work of this Section.
  .4 insulated exterior swing door. (FG)

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with requirements of Division 01. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and as other materials designated later by Consultant.

.3 Shop Drawings:
  .1 Submit Shop Drawings of fiberglass windows, components and accessories in accordance with Division 01.
  .2 Indicate head, jamb and sill, profiles of components, (interior and exterior trim), junction between combination units, elevations of unit and description of related components. Indicate relation to

adjoining work and location, construction and back-up, joint sealant, location of isolation coating, interior structure and/or details of reinforcements, glazing modules, head and frame details, mullions and details, glazing and glass stop details, thermal break sections and vinyl or neoprene mouldings (in 1/2 size), details of connections, anchorage, interfacing with adjacent work and assembly fixings. Clearly indicate materials used for every component on Shop Drawings.

.3 Clearly indicate how thermal expansion and contraction are to be accommodated and to what degree. Show connections to adjacent construction and provision made for structural deflections, contractions, expansion and other normal movement.

.4 Submit Shop Drawings bearing stamp of Professional Engineer registered in Territory of Nunavut experienced in this type of work. Show where anchors and shims are placed, type of anchors, shim thicknesses, widths, number of fasteners and edge clearances for fasteners.

.4 IGMAC Compliance Audit:

.1 Submit in accordance with Division 01.

.2 Submit written certification of successful completion of a Compliance Audit within last 6 months.

.5 Samples: Submit samples in accordance with Division 01. Submit following samples in the sizes indicated:

.1 Supply 1 complete full size sample of each window type and door type to Consultant for approval of general appearance and quality of Work.

.2 Submit sample sections of component parts of windows and door including frame, sash, sill, glazing and waterproofing method, surface and finish hardware, and glass finished in specified colours. Samples of extruded shapes shall be 300 mm (12") long; samples of each type of glass shall be 300 mm (12") square.

.6 Test Reports:

.1 Submit report from an independent testing laboratory completed within the last 3 years, indicating windows meet or exceed performance requirements of CAN/CSA-A440-M with respect to air infiltration, wind load resistance, water tightness, condensation resistance, thermal performance, forced entry resistance and mullion deflection (for combined and composite windows).

.7 Maintenance Data and Operating Instructions:

.1 Submit maintenance instructions in accordance with Division 01.

.2 *Provide* a demonstration with window manufacturer for building maintenance staff dealing with operation of windows, insert removal, re-glazing, cleaning and general maintenance.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Designers, fabricators and installers of the work of this Section: minimum of 10 years experience in the application of *Products*, systems and assemblies specified. Installer shall be acceptable to fiberglass

window manufacturer for installation of units required for this *Project*.

.2 Insulating glass unit fabricators: membership and certification in the Insulating Glass Manufacturer's Association of Canada (IGMAC).

.1 IGMAC members must participate in the certification program and successfully pass a Compliance Audit within the last 6 months.

.2 Structural Design and Inspection: Employ a professional structural engineer carry a minimum $2,000,000.00 professional liability insurance and is registered in the Territory of Nunavut to:

.1 design components for work of this Section requiring structural performance.

.2 be responsible for determining sizes, joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.

.3 be responsible for production and review of *Shop Drawings*.

.4 inspect work of this Section during fabrication and erection.

.5 stamp and sign each shop drawing.

.6 *Provide* site administration and inspection of this part of the *Work*.

.3 *Mock-Ups*:

.1 Conform to requirements of Division 01. Submit transportable *Mock-Ups* in accordance with following requirements:

.2 Build *Mock-Ups* in building envelope wall in locations indicted on *Drawings*:

.1 Minimum Size: 450 mm x 450 mm x 450 mm (18" x 18" x 18").

.2 Maximum Size: 600 mm x 600 mm x 600 mm (24" x 24" x 24").

.3 Include: Glazing and demonstrate airseal and anchorage systems.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Transport materials to site storage in a manner to prevent in-transit damage. These measures include, but are not limited to, crating, polyethylene wrapping system, etc.

.2 Store in a dry, protected area on site, in original undamaged containers with manufacturer's labels and seals intact.

.3 Brace frames to maintain squareness and rigidity during shipment and installation.

.4 *Provide* glass units with interlayer protection between lites. Keep glass and interleaving dry and store cases in clean, cool, dry areas with temperatures above dewpoint. Circulation of cool, dry air in storage areas is essential. Open cases and inspect units periodically for moisture accumulation. Do not store glass in direct sunlight without an opaque protective covering over same.

.5 Remove damaged or unsatisfactory materials from the site and replace with new materials to satisfaction of *Consultant* at no cost to *Owner*.

.6 Protect the work of this trade from damage. Protect work of other trades resulting from work of this Section.

.7 *Provide* at factory, strippable coatings on exposed surfaces of fiberglass windows. This coating and protective wrappings shall remain on the surfaces through the period other trades' works proceed on the building and removed by this trade on completion of building.

.8 Comply with unpacking procedures as recommended by framing and glass manufacturers.

.9 Make Good damaged work caused by failure and to provide adequate protection. Remove unsatisfactory work and replace at no expense to *Owner*.

1.7 WARRANTY

.1 Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the *Contract*. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of *Consultant* and at no expense to *Owner*. Defects include but are not limited to; buckling, opening of seams, bond failure and extensive colour fading.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
  .1 Accurate Dorwin Industries Ltd; www.accuratedorwin.com
  .2 Duxton Windows: www.duxtonwindows.com
  .3 Fibertec Windows and Doors Manufacturing; www.fibertec.com
  .4 Inline Fibreglass Ltd; www.inlinefiberglass.com

.2 Substitution Limitations:
  .1 Windows and Doors based on “658 Series” by Duxton Windows and Doors.
  .2 Comparable Products from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Design and Performance Requirements:
  .1 Fiberglass window design is established in details on Drawings and performance requirements in Specifications. Design requirements are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines, to one another, and to adjoining construction.
  .2 Performance characteristics and design criteria specified are subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance. Do not modify intended architectural design effects except with Consultant's approval.
  .3 Design fixed windows meeting or exceeding performance requirements of CAN/CSA A440/A440.1 with respect to air infiltration, wind load resistance, water tightness, condensation resistance, thermal

performance, forced entry resistance and mullion deflection as follows:

.1 Air Leakage:

.1 Fixed Windows: Class "Fixed"; maximum air leakage rate: 0.25 $m^3/h)(m^{-1})$

.2 Water Leakage: B7; minimum test pressure differential: 720 Pa.

.3 Wind Load Resistance: C4; There shall be no deflection in excess of L/175 of the span of any framing member. minimum test pressure differential: 2660 Pa.

.4 Resistance to Forced Entry: F20 per CAN/CSA A440/A440.1 or Grade 10 per according to ASTM F588.

.4 Condensation Resistance Test (CRF): When tested in accordance with AAMA Specification 1503 and CAN/CSA-A440, the condensation resistance factor (CFR) shall not be less than: 64 (50.2 I-frame).

.5 Thermal Resistance of Insulated Glazing Units: Provide insulated glazing units meeting or exceeding the following performance criteria.

.1 Thermal Transmittance (U-Factor): not more than 0.12 Btu/(hr x qft x ^oF)as determined in accordance with NFRC 100 and as required to meet NBCC requirements.

.2 Shading Coefficient: no greater than 0.26 as determined according to NFRC 200 and as required to meet NBCC requirements.

.3 Ensure glazing systems keep unit seals as dry as possible to prevent extended periods of exposure to liquid water.

.4 Visible Transmittance:

.1 Vision Panels: Minimum 49%

.2 Spandrel Panels: Maximum 15%

.6 Have work of this Section designed by a professional engineer licensed to design structures in the Territory of Nunavut.

.7 Comply with requirements of the National Building Code of Canada and regulations of authorities having jurisdiction, which shall be minimum, except where more stringent requirements are specified herein.

.8 Design glazing systems and framing to prevent thermal shock and fracture damage to glass. Design glass and glazing to meet CAN/CGSB-12.20. Comply with published recommendations of glass manufacturers and Glass Association of North America (GANA)'s "Glazing Manual" unless more stringent requirements are indicated.

.9 Design fiberglass work as shown to provide free and noiseless movement of all components of assembly without buckling of any component and/or transmitting of stresses to any members.

.10 Design fiberglass window system to accommodate and interface with work of other Sections as applicable.

.11 Locate sealants, gaskets, air/vapour seals, thermal separations, drainage slots and holes as shown or specified in this Section as required to obtain design requirements. Ensure components and assemblies exterior to air barrier drain to building exterior.

.12 Design, assemble and secure work in a manner that will keep any stresses on sealants within sealant manufacturer's recommended working range within factors of safety specified.

.13 Accurately shape members at intersecting joints to obtain hairline

joints, just wide enough to permit thermal expansion and contraction.

.14 Conceal securement devices unless otherwise specified.

.15 Design attachments which will permit replacement of individual units during construction or in subsequent usage of building without dismantling or disturbance to adjoining components or units. In addition, accomplish such replacement without use of extra fasteners, splices, covers and like that alter original design features.

.16 Provide accessories, closures, and trims required and necessary to complete work.

.17 Design window system on NRC recommended rain screen principles with pressure equalized and draining provisions. Maintain integrity of continuous air/vapour barrier system with adjacent surrounding air/vapour barrier.

.18 Design and detail controlled drainage path to actively discharge water, which may enter into or form within aluminum work, to exterior; prevent accumulation or storage of water within aluminum work. Prevent water from entering interior when tested in accordance with ASTM E331.

2.3 MATERIALS

.1 Basic Material: All frames and sash profiles shall be made from Pultruded Fiberglass, having a minimum thickness of 2.3mm (0.090") with minimum glass content of 60%. Non-structural accessory members are permitted to be in aluminum and are identified as such on *Drawings*.

.2 Aluminum Components: ASTM B209M, size accurately formed as shown on *Drawings*, extruded aluminum alloy AA-6063-T5 for all aluminum except surfaces receiving anodizing which shall be AA-6061-T6. Surfaces shall be free from defects impairing appearance, strength and durability.

.3 Screws, Bolts and Fasteners: Exposed stainless steel, ASTM A167, Series Type 304 or Type 300 or hardened aluminum.

.4 Miscellaneous and Sub-Frame Steel: CSA G40.21, Grade 300W, hot dipped galvanized after fabrication to CAN/CSA-G164-M, with additional zinc chromate coating to CAN/CGSB-1.132-M after fabrication. Steel reinforcements and anchors shall conform to Section 05 50 00 requirements.

.5 Shims: Alcan Utility sheet when not in contact with cementitious substances; stainless steel when in contact with cementitious substances or galvanized steel. Thicknesses as required per CSA A440.

.6 Window Hardware: Manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware shall not be permitted. Do not use aluminum in frictional contact with other metals. Where exposed, *Provide* nonmagnetic stainless steel.

.7 Compression-Type Weather Stripping: *Provide* compressible weather stripping designed for permanently resilient sealing and completely concealed when fiberglass window is closed. Weather-Stripping Material: Elastomeric

cellular preformed gaskets complying with ASTM C509. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C864.

.8 Sealant: Multi-component conforming to CAN/CGSB-19.24-M, Type 2, Class "B" for sealant to be incorporated between fiberglass framing and adjacent structures. Colours later selected by *Consultant* from standard colour selection. Furnish non-hardening, non-shrinking, non-migrating non-skimming, non-sagging, non-bleeding poly-isobutylene or partially vulcanized rubber base sealant for use in concealed-sealing of thin joints in metal work.

.9 Insulation within frame assemblies: Foamed-in-place type (INSUL-FOAM)as specified in Section 07 21 00 in locations indicated on Drawings.

.10 Glazing Materials:

.1 Design glass and glazing to meet CAN/CGSB-12.20-M, including Appendices and design requirements listed in herein as applicable. Glass thicknesses given in this Section are minimum. Ensure glass bears manufacturer's labels indicating quality. Leave labels in place until final cleaning.

.2 Tempered Glass (TGL): Conforming to ASTM C1048, CAN/CGSB-12.1-M, Type 2 tempered, Class B clear transparent float glass, Category II, minimum 6 mm (1/4") thick. Perform heat strengthening using horizontal tong free method; surface compression not less than 7500 psi.

.3 Ensure glazing supplied is compatible with contact surfaces of frames, other accessories used in glazing system and contact surfaces of compounds used on insulated glass units. *Provide* units complete with edge blocking, spacers, setting blocks, glazing tapes, neoprene gaskets and other materials as required for complete assemblies.

.4 Factory Sealed Insulating Glass Units:

.1 Provide factory sealed insulating glass units conforming to requirements of CAN/CGSB 12.8-M using dual seal and utilizing high performance thermally broken composite aluminum spacer “Warm-Light®” or approved alternative edge spacer. Edge seals to be dual seals of polyisobutylene and silicone.

.2 Vision Glass (DG-2): Provide vision glass unit composed of:

.1 Outer Lite:

.1 6 mm (1/8”) thick clear heat-strengthened glass (HSGL);

.2 2.3 mm (0.090”) thick clear or tinted ionoplast interlayer. "SentryGlas" or approved equivalent; Colour: as selected by Consultant at a later date.

.3 6 mm (1/8”) thick clear heat-strengthened glass (HSGL);

.4 Total Thickness: 14.3 mm (0.56”)

.5 Low-E coating: Applied on surface 4 (innermost surface of outer lite)

.1 Solarban® 70 XL by PPG

.2 LoE 366 by Cardinal Glass

.3 EnergySelect 28 by AGC.

.2 Middle Lite:

.1 Minimum 6 mm (1/4”) thick clear tempered glass
.2 Low-E coating: Applied on surface 6 (innermost surface of middle lite)
.1 Solarban® 70 XL by PPG
.2 LoE 366 by Cardinal Glass
.3 EnergySelect 36 by AGC.
.3 Inner Lite:
.1 6 mm (1/4”) thick clear tempered glass;
.4 Cavity: Maximum 12 mm (1/2”) per air space.
.1 Fill cavity with 95% argon gas.
.2 Tape system for argon gas retention and Provide thermally broken, isolating spacer to stop conduction through edge of glass
.5 Glass Colours and Substrates: To be Selected by Consultant at a later date from manufacturer’s full range.
.6 Maximum overall unit thickness: 50 mm (2”)

2.4 FABRICATION

.1 Fiberglass frame and sash corners shall be connected with molded reinforced polymer shearblocks and mechanically secured. All joints shall be factory sealed and neatly fitted together.

.2 *Provide* integral window components such as glazing perimeter airseal, frame perimeter air seal, metal clip anchors, sills and closures.

.3 Fabricate in accordance with CSA A440 requirements and manufacturer’s written instructions.

.4 Fabricate units square and true to detail with maximum tolerance of ± 1.5 mm (1/16") for units with diagonal measurement of 1800 mm (6'-0") or less than 3.00 mm (1/8") for units with diagonal measurement over 1800 mm (6'-0"), free from defects impairing appearance, strength and durability. Overall assembled profiles shall be as detailed on *Drawings*.

.5 Make provision at sealed horizontal members to lead moisture accumulation to exterior.

.6 Anchorages must be attached to warm side.

2.5 FINISHES

.1 Fiberglass: Manufacturer’s standard electrostatically applied finish. Colour to be selected by Consultant at a later date from manufacturer’s standard, select and premium ranges.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Verify fiberglass window

openings by field measurements before fabrication. Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

.1 Set window framing in its correct location, level, square and plumb and at proper elevations, with the nominal face of the framing aligned in a single vertical plane. Fasten and anchor framing in place in accordance with CSA A440.4. *Install* in accordance with reviewed *Shop Drawings*.

.2 Erection Tolerances:
- .1 Limit variations from plumb, level or dimensioned angle to the following:
  - .1 3 mm (1/8") maximum deviation in storey height, or in 3 m (10') vertical run, or in 6 m (20') horizontal run.
  - .2 6 mm (1/4") maximum deviation in 12 m (40') in any direction.
- .2 Limit variations from location (theoretical calculated positions in plan or evaluation based on established floor lines and column lines), including variations from plumb and level, to following:
  - .1 9 mm (3/8") total maximum deviation for member at any location.
  - .2 3 mm (1/8") maximum change in deviation for member for 3 m (10') run, any direction.
- .3 Limit offsets in end-to-end and edge-to-edge alignment of adjoining and consecutive members, which form planes, continuous runs and profiles to 1.5 mm (1/16") maximum offset in flush alignment, including those which are to be 13 mm (1/2") or less out-of-flush, and including those which are separated 50 mm (2") or less by a reveal or protrusion in plane or wall.

.3 Glazing:
- .1 Use glazing and bedding compounds of type compatible with secondary sealant in insulating glass unit.
- .2 Surfaces receiving glazing materials shall be thoroughly wiped with low-VOC cleaning substances recommended by manufacturer.
- .3 Windows to be inside glazed using exterior butyl tape with integral spacer. *Provide* heal bead at bottom of interior edge of sealed units and up the lower 75 mm (3") of each vertical to provide a vented glazing cavity. *Provide* punched louvres or holes through exterior glazing flange for venting and drainage. Snap-in glazing stop to be complete with elastomeric roll-in wedge to hold glass tight and separate glass from fiberglass frame.

.4 Caulking: At interior and exterior joints between fiberglass framing and adjacent work of others:
- .1 *Install* backer rod over compressible filler material or perimeter blocking to provide sealant joints of proper form, thickness to width ratios, and to provide bond break at back side of sealant. Where backer rod cannot be used or is not shown *Provide* bond breaker tape to back side of sealant joint substrate.
- .2 Clean substrate surfaces to which sealant is to bond and apply sealant primers as recommended by sealant manufacturer.

.3 Caulk joints continuous to produce weatherproof and visually acceptable joint installation.

3.3 FIELD QUALITY CONTROL

.1 Test window in the filed in accordance with requirements of Section 01 91 00.

3.4 CLEANING

.1 Maintain window framing in a clean condition throughout construction period, so it will be without deterioration or damage at time of acceptance. Select methods of cleaning which will promote achievement of uniform appearance and stabilized colours and textures for materials that weather or age with exposure.

.2 Immediately before time of Substantial Performance, clean windows thoroughly, inside and out. Demonstrate proper cleaning methods to *Owner* during this final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials of the work and submit 2 copies to *Owner*.

3.5 PROTECTION

.1 Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior adjacent surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

.2 Remove protective covering and coating from fibergalss surfaces, inside and out, and clean surfaces, remove labels, stripes and protective devices and polish glass surfaces, immediately prior to final acceptance of the work by *Consultant*.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Supply* finish hardware including but not limited to following:
  .1 hollow metal doors.
  .2 pressed steel frames.
  .3 wood doors.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,
    .2 health, safety and emergency response procedure and policy requirements,
    .3 and security requirements;
  .2 Pre-construction Site Meeting:
    .1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, and Contractor's consultants of applicable discipline. Consultant may attend.
    .2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
      .1 work included,
      .2 materials to be used,
      .3 storage and handling of materials,
      .4 installation of materials,
      .5 sequence and quality control,

.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 *Product Data*:
.1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for *Project.* Data sheets shall *Provide* all required information. Submit 3 copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials. Submit manufacturer's installation instructions.
.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by *Consultant*.

.2 *Shop Drawings*:
.1 Submit *Shop Drawings* for hardware installation in accordance with Section 01 30 00.
.2 Submit *Shop Drawings* in schedule form, prepared by an Architectural Hardware *Consultant* (AHC), indicating manufacturers' names, *Product* descriptions, makes, models, materials, finishes, functions, location of each item, complete keying schedule and other pertinent information. Repeat hardware item numbers used in Finish Hardware Schedule. Include list of abbreviations and finish symbols and their meaning. Include manufacturer's cut sheets for each hardware item.

.3 Samples:
.1 Submit samples in accordance with Section 01 30 00.
.2 Do not order hardware from manufacturer until samples have been approved by *Consultant*. Hardware and finishes supplied shall be identical to approved samples.
.3 *Supply* 1 of each item of hardware with specified finishes to *Consultant*. Label each sample as to manufacturer, type, finishes, size and location for use proposed. Approved samples will be retained for comparison and returned upon completion of *The Work*.
.4 Do not submit substitutions to accepted alternates.

1.6 QUALITY ASSURANCE

.1 *Supplier* Qualifications: A recognized architectural door hardware *Supplier* for exit devices, cylinders, power supply, magnetic holders and similar items that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this *Project* and employs an experienced AHC who is available to *Owner*, *Consultant* and *Contractor* at reasonable times during course of *The Work* for consultation.

.2 Supervision: *Provide* following *Project* services relative to *Project* co-ordination, supervision and inspection:

.1 *Provide* services of AHC familiar with type of work being performed, with type of *Project*, for preparation of hardware *Shop Drawings* (schedule), keying, coordination with other trades, consultation with *Owner* and *Consultant* and for performing on-site inspections

.2 Verify hardware listed in the Schedule is of proper selection for its apparent function and required fire rating or submit alternative proposals. Ensure hardware for fire-rated openings complies with requirements of authorities having jurisdiction, with door and frame manufacturer's tested and labelled assemblies and that hardware items bear certification labels.

.3 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada. Ensure door and hardware are tested as an assembly to maintain labelling requirements. Hardware for fire rated door and frame assemblies shall conform to CAN/ULC S104-M, CAN/ULC S105-M and NFPA 80. Electronic hardware such as magnetic locks, power supplies, key switches and alarm panic bolts shall be ULC labelled.

.4 Ensure Cylindrical locks, exit devices and door closers conform to both BMHA certified ANSI A156 Series Grade I classifications and to ADA (American Disabilities Act) standards.

.5 Inspect to verify hardware has been properly installed and is functioning satisfactorily.

.6 Recommend adjustments.

.7 Replace defective hardware.

.8 Check door closers after installation to ensure adjustment such as back check degree has been properly made and if not, make such adjustments or instruct those installing hardware to make these adjustments.

.9 Submit 6 copies of the finalized schedule to *Consultant* for acceptance. *Provide* additional copies as required for *Project* and office use.

1.7 DELIVERY, STORAGE AND HANDLING

.1 *Supply* scheduled hardware to the *Place of The Work*.

.2 Pack hardware in suitable wrappings and containers to protect from damage during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Pack screws, bolts and fastenings necessary for proper installation in same package. Mark packages for easy identification legibly indicating manufacturer's numbers, types, sizes. Markings must include floor, item number and door number.

.3 *Provide* templates, template information, installation instructions and details necessary for preparation and installation of hardware.

.4 *Provide* 3 copies of installation instructions for hardware supplied.

1.8 WARRANTY

.1 Warrant work of this Section for period of 2 years for general, 10 years for closers and lifetime for butt hinges against defects and/or deficiencies in accordance with General Conditions of the *Contract.* Promptly correct any defects or deficiencies which become apparent within warranty period including making good any work damaged by this work, to satisfaction of *Consultant* and at no expense to *Owner*.

1.9 MAINTENANCE

.1 Maintenance Instructions:
- .1 Instruct *Owner's* designated representative in proper care and preventative maintenance of hardware to assure longevity of operation.
- .2 *Provide* 3 copies of descriptive information, operating, adjustment and maintenance instructions, and "As-Built" record of location of each hardware group and other pertinent information.
- .3 *Provide* maintenance data, parts list and manufacturer's instructions for each type of door closer, lockset, fire exit hardware and door holder. *Provide* manufacturer's instructions for proper care of hardware, including lubrication, for incorporation into operation and maintenance instruction manual.
- .4 *Provide* this information in 3-ring binders suitably identified in accordance with requirements of Section 01 70 00.

.2 Tools for Maintenance: Prior to date of Substantial Performance, *Supply* a complete set of specialized tools as needed for *Owner's* continued adjustment, maintenance and removal and replacement of builders hardware.

PART 2 -PRODUCTS

2.1 DESCRIPTION

.1 Regulatory Requirements:
- .1 Conform to NBC requirements for barrier free design;
- .2 Fire Rated Openings: *Provide* hardware for fire-rated openings in compliance with current issue of NFPA 80. *Provide* only hardware which has been tested and listed by ULC for the types and sizes of doors required and complies with requirements of door and door frame labels

2.2 FINISH HARDWARE

.1 *Provide* door closers, locksets and latchsets meeting ANSI/BHMA Qualified *Products* List. *Provide* finish hardware in accordance with Finish Hardware Schedule appended to Document 00 01 20. No substitutions are allowed without written approval of *Consultant*.

.2 *Supply* door hardware for work of Sections 08 11 13, 08 14 00 and 08 15 00 for installation as part of *The Work* of Section 06 90 00.

2.3 FASTENINGS

.1 *Supply* screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Where pull is scheduled on 1 side of door and push plate on other side, *Supply* fastening devices and *Install* so pull can be secured through door from reverse side. *Install* push plate to cover fasteners. Prepare holes or cutouts for cylinders or deadlocks in pushplates where applicable.

.4 Use fasteners with material through which they pass.

.5 Only "3M" brand double sided tape for kickplates, armour plates and pushplates is acceptable, where specified.

2.4 KEYING

.1 Key locks to *Owner's* requirements (construction master keyed, grand master keyed, sub-master keyed, as directed).

.2 *Provide* interchangeable "BEST" cores to *Owner's* grand master key system. Number of keys to be determined by *Owner*. *Provide* a minimum of 2 cut keys per cylinder, but coordinate the “maximum” quantity per key group with *Owner* before ordering final amounts.

.3 *Provide* operational "BEST" brass construction cores for all locks and cylinders, NOT JUST exterior doors. Cores will be returned to manufacturer when permanent cores are provided.

.4 Include and *Provide* for cost of permanent cores

.5 *Provide* 10 construction keys for use by *Contractor*, as well as 4 construction control keys for use by *Owner*.

2.5 HARDWARE PRODUCTS

.1 Butt Hinges: *Provide* 3 or 5 knuckle, concealed bearing butt hinges, except where continuous hinges or pivots are specified. *Provide* heavy duty hinges for high traffic doors, doors over 900 mm (3'-0"), stair doors, corridor doors and doors where specified in Finish Hardware Schedule to have heavy duty hinges. *Provide* stainless steel hinges for exterior doors, tub rooms, showers, or doors in high humidity areas. Exterior doors shall have non-removable pins (NRP)
Basis-of-design: IVES

.2 Continuous Hinges: Prior to ordering verify compatibility with door thicknesses, specifically related to thermally broken doors. *Provide* continuous hinges on interior doors. *Provide* extruded heavy duty geared continuous hinges on exterior aluminum doors and any door that requires integral hinge guard. Hinges shall have no more than 12 mm (1/2") clearance at top and bottom of hinge in relation to door. All full height hinges shall be knuckle type with nylon bearings between each knuckle. Basis-of-design: IVES

.3 Cylinders: Rim and mortise cylinders shall be interchangeable "BEST" core type. Ensure proper cams or tailbars are specified and supplied correctly when used in locks other than manufacturers. Verify keying details. *Provide* factory masterkeyed interchangeable core permanent cylinders. *Provide* proper cylinder collars and blocking rings as required by lock application. Refer to Finish Hardware Schedule for details and quantities of blocking rings and cylinder collars. Cylinders shall be provided with a high security keyway which cannot be ordered without written authorization from *Owner* to manufacturer. Keyblanks shall only be obtainable from manufacturer with only proper authorization and only duplicated by authorized staff

on site or locally. Cut keys which require only to be cut by manufacturer shall not be acceptable. Where *Owner* requires their keys to be cut and minor key changes to cylinders on site and still have high security cylinders that cannot be duplicated by unauthorized staff or locksmiths.

.4 *Provide* key cabinet as shown on drawing 18/A600 and 8/A700.

.5 Locks and latches shall be mortise Cylindrical lever sets. Where lever trim is required, trim shall have concealed through bolt mounting and lever shall be solid cast or forged material with return to door face. Key all locksets to a registered factory system. When construction keying is listed, deliver permanent keys in individually marked envelopes with door numbers and keying information. When listed, *Supply* key cabinet with 2 tag control system. Basis-of-design: BEST

.6 Door Closers: Door closers shall have full adjustment features including back check, general speed, and latch speed control. All interior door closers shall have reduced opening force spring power to meet barrier free requirements of 22 N (5 lbs). *Provide* heavy duty door closers as specified. *Provide* mounting plates for door closers required to be mounted on special door and frame conditions. *Provide* options and arms for proper applications as specified in detailed Finish Hardware Schedule. *Provide* concealed closers for aluminum doors. Coordinate all dimensions, applications and related hardware compatibility with aluminum *Shop Drawings* before ordering hardware. Coordinate size and locations of cutouts for overhead stops where required. *Provide* magnetic hold open closers, complete with 24V transformers where specified. Coordinate electric requirements with electrical trades before ordering hardware. *Provide* heavy duty double acting closers concealed in head in special rooms such as scrub rooms. Coordinate degree of opening with wall and site conditions before ordering. Basis-of-design: LCN AS SPECIFIED

.7 Pushplates, Pulls, Kickplates, Armour Plates, Door Channels, Door Edges and Guard Bars: Basis-of-design: Gallery or Standard AS SPECIFIED

.1 *Provide* minimum 1.214 mm (18 ga) type 304 brushed stainless steel pushplates, kickplates, armour plates, door edges and channels unless specified otherwise, or as required by fire rating requirements in case of some armour plates and door channels. Kickplates and armour plates, except where specified otherwise shall be installed with 3M double sided tape. Pushplates (with lip on bottom) shall be minimum 3 mm (1/8") thick, and installed with fasteners suitable with door construction and have "lip" facing down.

.2 Be responsible to coordinate and confirm all dimensions, sizes and compatibility of above mentioned *Products*. Ensure proper cutouts are coordinated with other hardware items on same door. Generally leave 1.5 mm to 3 mm (1/16" to 1/8") of clearance around cutouts in door channels for deadlocks, lock and latch fronts, roller catches, flush bolts and strike plates where required.

.3 Ensure exposed edges are free from burrs and sharp edges and cutouts are smooth and straight. *Provide* flat or oval head screw type fastenings and ensure corresponding plate is countersunk correctly to suit fastening.

.4 Coordinate armour plate heights with *Owner* to ensure it is located in ideal location for door protection for beds and stretchers (generally top edge of "upper" plate is just below bottom of pushplate which is centred at 1150 mm (46")), if required. Door edges shall have no more than 6 mm to 12 mm (1/4" to 1/2") clearance at top and bottom of door after installation. Mount screws for door channels and door edges on door edge, not on door face. Supplied with #8 or #10 flat head wood screws. Ensure "edge mounted" screws are located to avoid butt hinges.

.5 Clearance between door edges, door channels or continuous hinges in relation

to kickplates and armour plates shall be between 6 mm to 12 mm (1/4" and 1/2") after installation. Door edges and channels with 19 mm (3/4") face (rather than 28 mm (1-1/4")) shall be preferred. Coordinate all sizes before ordering these *Products*. Guard bars shall be heavy duty 12 mm (1/2") thick by 38 mm (1-1/2") high by door width less required clearances.

.6 For locksets, latchsets and similar items *Provide* guard bar that sits flat against hinge side of face of door and gradually *Project* out approximately 12 mm (1/2") beyond outer most part of hardware it is intended to protect. *Provide* 75 mm (3") narrower than door from end to end. Guard bars for exit devices shall be straight in design and *Project* 12 mm (1/2") beyond full width of device. Coordinate width and projection with type of device specified. Dimension on devices specified shall correspond to exit devices specified. Ensure *Products* applied to fire rated doors are suitable for use with labelled doors and carry applicable labelling.

.8 Overhead Stops: *Provide* standard or heavy duty, concealed or exposed as specified in Finish Hardware Schedule. Ensure stops do not interfere with other hardware specified. Confirm degree of opening to assist in production of door, frames and installation. Doors shall not swing into wall or items in room and allow for approximately 5 degrees of "spring" beyond specified degree of opening. *Provide* "dead stop" on overhead stop if door "must" stop at chosen angle. Stops whether concealed or surface shall be stainless steel or brushed chrome. Electro magnetic door holders will be supplied tri-voltage and be connected to fire alarm system to release door when signaled. Do not use powder coated finishes for this application. Confirm stop sizes with *Shop Drawings* and door schedules before ordering. Verify sizes where substitutions are accepted. Ensure door closers and accessories are compatible with specified overhead stops. *Provide* drop plates where required in order for door closer mounting to avoid hitting concealed overhead stops. Basis-of-design: Glynn Johnson AS SPECIFIED

.9 Wall Stops or Floor Stops: Wall stops shall only be used on proper wall conditions such as concrete or masonry surfaces. Floor stops shall have sufficient height suit floor conditions and undercut doors. Basis-of-design: Gallery or Standard AS SPECIFIED

.10 Seals, Thresholds: *Provide* perimeter seals to fully cover gaps between door, frame, and floor condition to seal against weather, sound and smoke. Frame gasket shall be closed "SILICONE". Aluminum frames shall be equipped with felt inserts by frame *Suppliers*. *Provide* appropriate drop insert for carpet where required. *Install* threshold to ensure door bottom makes full contact. *Provide* thermally broken thresholds for exterior doors. *Provide* heavy duty "solid" jamb and head seals for high traffic, exterior and high cart traffic doors. Ensure seals are acceptable on fire rated doors where required. *Provide* "brush type" sweeps and seals where required. *Provide* heavy duty adjustable seals for sound doors and light, along with stop mounted silicon seals for extra sound and light protection. Basis-of-design: KN Crowder AS SPECIFIED.

.11 Maglocks and Maglock Power Supplies: Maglocks shall be a minimum 1200 lb holding force units, provided with 24VDC 2 amp ULC rated power supplies from same manufacturer where applicable. *Provide* holding force sensor (dry contact version) to indicate proper door locking to security system (by others). *Provide* separate door contacts where specified to indicate door position. *Provide* maglock filler bars or angle brackets as required and determined by frame details. Coordinate these parts with aluminum or hollow metal *Shop Drawings* as required. *Provide* acceptable signage for door to indicate "DOOR UNLOCKED BY FIRE ALARM" as local building codes dictate. Coordinate signs with *Owner* and/or *Consultant* before ordering. Maglock

permits shall be provided by the security division. Basis-of-design: SECURITRON AS SPECIFIED

.12 Power Door Operators: *Provide* heavy duty low energy surface mounted devices used for "slow" traffic wheelchair access. *Provide* 113 mm (diameter heavy duty stainless steel push buttons where specified. Logo (handicap symbol) or wording (push to open) as specified. *Provide* weatherproofing as required. *Provide* heavy duty stainless steel flush mount push button units as specified for all 113 mm (push buttons. *Provide* low energy mode units for Aluminum entrance doors and where specifically specified. *Provide* high energy, with all related specified safety equipment. All units shall be ULC, cUL, or CSA approved as required. Basis-of-design: HUNTER AS SPECIFIED

.13 Key Control Security:
- .1 Manufacturer and Product: DWT250 Diplomat Table Key Cabinet by Telkee Incorporated,
- .2 Key Capacity: 250.
- .3 *Provide* 1 key cabinet complete with change keys for all locks.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Before supplying any hardware and installation instructions, carefully check *Drawings* for work requiring hardware, verify door swings, door and frame materials and operating conditions and assure hardware will fit work to be attached.

.2 Check *Shop Drawings* and frame and door lists affecting hardware type and installation, and verify to correctness thereof, or advise of required revisions. Ensure doors, frames and panels requiring additional support are reinforced.

.3 Point out special requirements to installer and ensure final adjustment of hardware, in particular closer arms, valves and locksets has all been done properly.

.4 Be responsible to check and confirm dimensions for all hardware for this *Project*, including door protection, overhead stop sizes, exit devices, power door operators and other related hardware items that may require coordination for sizing.

.5 Be responsible to coordinate and confirm all electric hardware requirements with related trades and *Consultants*.

.6 Electric Hardware Responsibilities: Hardware *Supplier* is responsible for following:
- .1 Coordinate and confirm all block diagrams with related trades and *Consultants* for electrical hardware applications, including but not limited to, electric latch retraction exit devices, power transfers, electric strikes, power door operators and associated accessories, maglocks, electrically operated door equipment, power supplies and key switches for operators.
- .2 Performing low voltage connections for equipment listed herein and ensuring equipment functions in intended manner. Commission equipment supplied in this Section and test each item. Coordinate to ensure related trades have performed their work in order for equipment provided in this Section to function correctly.

.3 Ensure installation trades have installed equipment supplied in this Section correctly. Report any incorrect installation. Do not wire or commission equipment that has been incorrectly installed.

.4 *Install*, adjust and test all mechanical operations of electric hardware. For example, electric strikes shall be adjusted to allow locks or exit devices to latch correctly taking into account seals, wind pressures, or any other issues affecting normal operation of door and hardware while electric hardware is not activated.

.5 Ensure electric action of electric hardware supplied under this Section performs correctly.

.6 Where applicable, arrange to either remove item in order to make wire connections, or make connections during initial installation. Do not inhibit other trades from performing their work as a result of electrical connections.

.7 Maglock installation shall be by security system provider. Ensure mechanical operation of door and hardware is not impeded by maglock installation.

.8 Be responsible to ensure related trades with respect to electric hardware is provided. Consult *Owner* to ensure proper coordination and commissioning of electric hardware.

.9

.10 Conduit, junction boxes, 120V connections and wire, including low voltage wire, shall be provided by Division 26. Coordinate and confirm Division 26 has applicable information from this Section in order to perform their work correctly.

.11 *Provide* low voltage connections for push button actuators, motion detectors, presence sensors and key switches related to power door operators. Coordinate fire alarm, 120VAC connections, security system connections and any other related connections for power door operators with related trades. After all connections are made, commission equipment, test and adjust to suit requirements of hardware and operator applications.

.7 *Provide* ULC or UL approved hardware where labelled doors are specified. *Provide* CSA approved electrical devices where required.

3.2 INSTALLATION

.1 *Supply* finish hardware to *The Work* of Section 06 90 00.

.2 Hardware Schedule: Refer to Section 00 01 20.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included:
  .1 *Provide* glass and glazing including, but not limited to following:
    .1 float glass.
    .2 laminated glass.
    .3 tempered glass.
    .4 wired glass.
    .5 security film
    .6 insulated glazing units
  .2 Provide glass and glazing for applications including, but not limited to following:
    .1 glazing for architectural woodwork.
    .2 glazing for hollow metal doors.
    .3 glazing for borrowed lites and screens.
    .4 glazing for flush wood core doors.
  .3 miscellaneous gaskets, tapes and glazing materials.
  .4 film types including decorative types and custom films with graphics and special colours.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 United Inches: Total of 1 width and 1 height of glass panels in inches.
  .2 Optic Distortion: Optic distortion is a form of optical aberration, which deforms the image of an object as a whole when it is viewed through a glass assembly. Optical distortion renders straight lines in the object to appear curved when it is viewed through the glass assembly.

.2 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing:

.1 Coordinate installation with related Sections referenced herein.
.2 Coordinate and verify with tempered glass manufacturer criteria for roll wave factor (RW) to ensure optimal flatness in the glass assemblies;

.2 Pre-Installation Meetings:
.1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
.1 environmental procedure requirements,
.2 health, safety and emergency response procedure and policy requirements,
.3 and security requirements;
.2 Pre-construction Site Meeting:
.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for Project in accordance with

requirements of Division 01. Ensure data sheets Provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and as other materials designated later by *Consultant*.

.3 Samples: Submit samples of materials identifying quality and type of glass if required by Consultant before commencing work. Ensure samples are clearly labelled with manufacturer's name and type. Submit following samples:
- .1 fire rated glass,
- .2 tempered glass,
- .3 laminated glass,
- .4 security glass.
- .5 film types including decorative types and custom films with graphics and special colours.

.4 Test and Evaluation Reports:
- .1 *Provide* adhesion test reports on metal and glass tested in accordance with ASTM C794, 14 *Day* cure and 7 *Day* submersion.
- .2 Submit test report for tensile adhesion properties of structural silicone sealants in accordance with test method procedures conforming to ASTM C1135.
- .3 Submit compatibility test reports on gaskets, spacers, setting blocks materials in contact with structural sealants to ensure compatibility with sealant in accordance with ASTM C1087.
- .4 Submit test data substantiating that stress on silicone sealants when exposed to maximum specified wind load does not exceed 20 psi and provides minimum safety factor of 2-1/2:1.
- .5 *Provide* to sealant manufacturer, *Shop Drawings* showing size of lites, design loads and sealant dimensions for sealant manufacturer's evaluation and statement on stress.

.5 *Shop Drawings:* Submit *Shop Drawings* in accordance with Division 01. Ensure *Shop Drawings* indicate material characteristics, details of construction, connections and relationship with adjacent construction. Where required, ensure *Shop Drawings* are prepared and stamped by a professional engineer licensed in the Territory of Nunavut.

.6 Product Certificates:
- .1 Submit certificates signed by manufacturers of glass and glazing Products certifying that Products furnished comply with requirements of this Section. In particular, submit data substantiating that tempered, laminated and insulated glazing units are tested in accordance with applicable standards specified herein.
- .2 Adhesion and Compatibility: *Provide* compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturers interpretation of test results

relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

.7 Maintenance Data: Provide maintenance data indicating cleaning instructions for inclusion into Maintenance Manual in accordance with requirements of Division 01.

1.6 QUALITY ASSURANCE

.1 Installer’s Qualifications:
- .1 Ensure work of this Section is performed by an experienced installer trained, experienced and familiar with glass and glazing methods and standards specified herein.
- .2 *Provide* work of this Section executed by competent installers with minimum 5 years experience in the application of *Products*, systems and assemblies specified and with approval and training of the *Product* manufacturers.
- .3 Insulating glass unit fabricators: membership and certification in the Insulating Glass Manufacturer's Association of Canada (IGMAC).
  - .1 IGMAC members must participate in the certification program and successfully pass a Compliance Audit within the last 6 months.

.2 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.3 Preconstruction Testing: Submit to sealant manufacturer, samples of each type of glass, gasket, glazing accessory and glass framing member that will contact or affect glazing sealants for compatibility and adhesion testing. Submit test samples in sufficient time for testing and analysis of results to prevent delay in progress of work.

.4 Mock-ups:
- .1 Provide Mock-ups in locations designated by Consultant and as specified in individual Sections for glazed systems and assemblies to demonstrate quality of workmanship.
- .2 Prior to full production and final installation of tempered glass, submit full-size mock ups of glass assemblies; Ensure roll wave in glass assemblies are placed parallel to window sill. Allow *Consultant* to view the assemblies in conditions similar to project locations under various light exposures and times of day to establish acceptable optical distortion.
- .3 Maintain Mock-ups during construction in an undisturbed condition as a standard for judging the completed work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver glass and associated materials to site in original crates and containers with manufacturer's name and brand distinctly marked thereon and with glass labelled as to types. Do not remove labels on glass until after work is accepted by *Consultant*.

.2 Storage and Handling Requirements: Store materials within the building, in a clean, dry location, acceptable or as designated by *Consultant*. Fully protect materials from damage of any kind until ready for use.

1.8 PROJECT CONDITIONS

.1 Environmental Requirements: No glazing done when temperature is less than 7 deg C (44 deg F) or sash or frames are wet, damp or frosted.

.2 Protect work of other trades from damage resulting from work of this Section.

.3 Identify glazed openings immediately following glass installation. Use coloured tapes or flags suspended near, but not in contact with glass. Attach to frames or surround with suitable non-staining strippable adhesives or tapes.

1.9 WARRANTY

.1 Warrant laminated glass for period of 5 years against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no additional expense. Defects include but are not limited to: deterioration, edge separation, delamination, material obstructing vision glass and blemishes exceeding those allowed by GANA (LGSA) standards. Upon notification of such deterioration within the warranty period, Provide full replacement of glass units showing defects at no additional cost to *Owner*.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
  .1 Glass and Glazing:
    .1 AGC Flat Glass North America, Ltd.; www.na.agc-flatglass.com
    .2 Guardian Industries Corp.; www.guardian.com
    .3 Pilkington Special Glass Limited; www.pilkington.com
    .4 PPG Canada Inc.; www.ppgglass.com
    .5 Schott North America Inc.; www.us.schott.com
    .6 Trulite Industries Limited; www.trulite.com
    .7 Viracon; www.viracon.com
    .8 TGP; www.fireglass.com
  .2 Glazing Sealants and Gaskets:
    .1 Dow Corning; www.dowcorning.com
    .2 GE Silicones; www.gesilicones.com
    .3 Tremco Canada; www.tremcosealants.com
  .3 Glazing Films:
    .1 3M Films; www.3m.com
    .2 Llumar; www.llumar.com
    .3 EurOptimum; www.europtimum.com

2.2 DESCRIPTION

.1 Design and Performance Requirements:

.1 Provide glass for work of this Section free from bubbles, waves, discolouration and other defects, of types specified herein for locations indicated on Drawings or noted on Door Schedules. Ensure glass bears manufacturer's label indicating quality and testing agency certifications. Leave labels in place until final cleaning.

.2 Design glass and glazing to requirements of these Specifications, CAN/CGSB-12.20-M, the National Building Code of Canada and regulations of authorities having jurisdiction. In case of conflict, comply with most stringent requirements.

.3 Perform work of this Section in accordance with GANA - Glazing Manual; www.glasswebsite.com and LSGASM - Standards Manual for laminated glazing installation methods.

.4 Determine optical distortion in accordance with ASTM C1652 requirements of fully tempered glass substrates which have been processed in a heat controlled continuous or oscillating conveyance oven; Measure the wavelength and amplitude of the roll wave factor (RW) of glass panel using planer grid, a digital camera and other software that meets ASTM C1652 requirements.

.5 Deflection: Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.6 Design units to accommodate live, dead, lateral, handling, transportation, and erection loads.

.7 Confirm glazing material thicknesses by analyzing Project loads and in-service conditions. Provide glazing material for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths required to meet or exceed performance criteria.

.8 Human Impact Load Resistance: Provide glazing materials listed and labeled as complying with testing requirements of ANSI Z97.1 - Class A.

.9 Fire-Resistance Characteristics: *Provide* fire rated glass tested in accordance with CAN/ULC S104-M and CAN4 S106-M as applicable and acceptable to authorities having jurisdiction for specific application.

.10 Ensure solvents and/or other volatile elements in glazing system do not affect properties and performance of materials used for edge seal and sealant glass bond.

.11 Ensure materials used for edge seals are compatible with other materials they come in contact within glazing system. If required, perform compatibility tests to ASTM C510, ASTM C794 and ASTM C1087, or others as applicable.

.12 Use sealants and other materials in glazing system which are unaffected by long term UV light exposure.

.13 Thermal Resistance of Insulated Glazing Units: Provide insulated glazing units meeting or exceeding the following performance criteria.

.1 Thermal Transmittance (U-Factor): not more than 0.11 Btu/(hr

x qft x ^{o}F)as determined in accordance with NFRC 100 and as required to meet NBCC requirements.

.2 Shading Coefficient: no greater than 0.29 as determined according to NFRC 200 and as required to meet NBCC requirements.

.3 Ensure glazing systems keep unit seals as dry as possible to prevent extended periods of exposure to liquid water.

.4 Visible Transmittance: Minimum 54%

2.3 MATERIALS

.1 General Glazing Materials:

.1 Annealed (Float) Glass (GL): Conforming to ASTM C1036 or CAN/CGSB-12.3-M, clear transparent annealed (float) glass, minimum 6 mm (1/4").

.2 Heat Strengthened Glass (HSGL): Conforming to ASTM C1048, Kind HS minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression in range of 3,500 to 7500 psi, preferably no higher than 5000 psi.

.3 Tempered Glass (TGL): Conforming to ASTM C1048, Kind FT or CAN/CGSB-12.1-M, Type 2 tempered, Class B float glass, Category II, minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression not less than 10,000 psi.

.1 Visual Distortion: Ensure glass is tempered by the horizontal toughening process only and conforms to the following roll wave factor (RW) limits measured in accordance with ASTM C1652 requirements:

.1 Roller Wave: +/– 0.15 mm over 300 mm.

.2 Edge Dip: 0.25 mm maximum.

.3 Laminated Glass (LGL): *Provide* glass laminated to interlayers to produce laminated lites free of foreign substances, air and glass pockets.

.1 General Composition: Multiple sheets of Tempered glass conforming to ASTM C1172; Kind LT or CAN/CGSB-12.3-M. Minimum unit thickness: 6 mm (1/4");

.1 Interlayer: clear PVB interlayer of 1.52 mm (0.060”) thickness as indicated in specific assemblies.

.2 Laminated Glass Types:

.1 LGL-1: 3 mm (1/8”) thick heat-strengthened glass (HSGL); 1.52 mm (0.060") thick clear PVB interlayer; 3 mm (1/8”) thick heat-strengthened glass (HSGL). Total Unit Thickness: 6 mm (1/4”).

.2 LGL-2: 3 mm (1/8”) thick tempered glass (TGL); 1.52 mm (0.060") thick clear PVB interlayer; 3 mm (1/8”) thick tempered glass (TGL). Total Unit Thickness: 6 mm (1/4”).

.2 Fire-Rated Glazing Materials:

.1 Wired Glass (WGL): Conforming to CAN/CGSB-12.11-M, minimum 6 mm (1/4"). Allow consultant to choose from Type 1 (Polished both sides transparent) or Type 2 (Figured translucent) and Wire mesh style 1(Diamond) or style 2 (Hexagonal) or style 3 (Square) or style 4 (Rectangular) at a later date.

.3 Mirrors (MIR): Refer to Section 10 28 00.

.4 Thermally Insulated Glazing Materials: Provide factory sealed insulating glass units conforming to requirements of CAN/CGSB 12.8-M using dual seal and utilizing high performance thermally broken composite aluminum spacer “Warm-Light®” or approved alternative edge spacer. Edge seals to be dual seals of polyisobutylene and silicone.

.1 DG-1: Not Used.

.2 Vision Units at exterior hollow metal doors and screens (DG-2): Provide insulated glazing units “Superglass® Single Film/Dual Cavity” by Southwall Technologies or approved equivalent consisting of 2 panes of glazing as indicated herein separated by air space and complete with heat reflecting mirror to match Consultant’s sample. Provide edge spacers and Low ‘E’ coating applied to specified surface of glass to ensure conformance with following performance criteria:

.1 Outer Lite:

.1 6 mm (1/8”) thick clear heat-strengthened glass (HSGL);

.2 2.3 mm (0.090”) thick clear or tinted ionoplast interlayer. "SentryGlas" or approved equivalent; Colour: as selected by Consultant at a later date.

.3 6 mm (1/8”) thick clear heat-strengthened glass (HSGL);

.4 Total Thickness: 14.3 mm (0.56”)

.5 Low-E coating: Applied on surface 4 (innermost surface of outer lite)

.1 Solarban® 70 XL by PPG

.2 LoE 366 by Cardinal Glass

.3 EnergySelect 28 by AGC.

.2 Middle Lite:

.1 Minimum 6 mm (1/4”) thick clear tempered glass

.2 Low-E coating: Applied on surface 6 (innermost surface of middle lite)

.1 Solarban® 70 XL by PPG

.2 LoE 366 by Cardinal Glass

.3 EnergySelect 36 by AGC.

.3 Inner Lite:

.1 6 mm (1/4”) thick clear tempered glass;

.4 Cavity: Maximum 12 mm (1/2”) per air space.

.1 Fill cavity with 95% argon gas.

.2 Tape system for argon gas retention and Provide thermally broken, isolating spacer to stop conduction through edge of glass

.5 Glass Colours and Substrates: To be Selected by Consultant at a later date from manufacturer’s full range.

.6 Maximum overall unit thickness: 50 mm (2”)

.5 Glazing Films (GF):

.1 Provide window films by 3M; www.3m.com or approved equivalent matching approved samples. Apply films in sizes, extents and cutouts to suit design requirements. Locate films on glass doors and other glazed areas indicated on Drawings and Schedules to meet code

requirements.

.2 Film to have factory edge with a maximum tolerance of 1.5 mm (1/16") gap between film edge and glass stop. Provide tamper-resistant clear sealant at edges of film at glass stops.

.3 Apply film to non-public side of glass unless noted otherwise.

.4 Film Colours and Graphics: to be determined at a later date by Consultant from manufacturer’s full range including custom colours.

.5 Tamper-Resistant Sealants for Films: Provide “Edge Sealer 3950 and 4150S” and “Edge Sealer Tape 8914” by 3M or approved equivalent.

.6 Security Films: Provide security Film “Ultra S600 Series” by 3M or approved equivalent by Ace Security Laminates. Provide film conforming to CPSC 16 CFR Category II (400 ft/lb) and ANSI Z97.1. Colour: As selected by Consultant at later date.

.6 Glazing, Sealing Compounds and Accessories:

.1 Ensure glazing, sealing compounds and accessories are compatible with all contact surfaces of frames, accessories used in glazing system and contact surfaces of compounds used in glazing systems. Wood or other organic materials are not acceptable for use in glazing systems.

.2 Glazing Compound: Non-hardening modified oil type. Colour to match adjacent surfaces unless indicated otherwise.

.3 Sealant Compound: In accordance with Section 07 92 00. Provide One component type, elastomeric chemical curing, CAN/CGSB-19.13-M, Class G-2-25-A-N or ASTM C920, Type S, Grade NS Class 25 or One component, silicone base solvent curing. Colour: to match adjacent surfaces unless indicated otherwise.

.4 Elastomeric Joint Sealants: In accordance with Section 07 92 00 and ASTM C920.

.5 Sealant for Interior Non-Structural Glass-to-Glass Butt Glazing Installation: Translucent 1 part silicone sealant conforming to CAN/CGSB-19.13-M and ASTM C920, "Tremsil 200" by Tremco Canada or "DC 999" by Dow Corning Canada.

.6 Cellular Gaskets for Compression Glazing: ASTM C509 cellular, elastomeric, preformed, black. Closed cell neoprene or EPDM extrusions including molded corners where applicable by Tremco Canada or approved equivalent.

.7 Dense Gaskets for Compression Glazing: ASTM C864, Option II or ASTM C1115, Type C, dense neoprene or EPDM extrusions, 60 and 70 Durometer density including molded corners where applicable by Tremco Canada or approved equivalent.

.8 Glazing Splines: Neoprene or EPDM manufacturer's standard dry glazing splines to suit aluminum extrusions. Colour to match adjacent surfaces unless indicated otherwise.

.9 Glazing Points and Wire Spring Clips: Corrosion resistant, manufacturer's standards.

.10 Edge Blocking for Glass: 60 - 70 Durometer neoprene, silicone or EPDM, channel shaped, 100 mm - 150 mm (4" - 6") long.

.11 Setting Blocks: 7 mm x 100 mm (5/16 x 4") EPDM or extruded 80-90 Durometer neoprene. Width: 1.6 mm to 3 mm (1/16" to 1/8") less than design glazing pocket width.

.1 Only use EPDM at insulating glass units.

.2 At fire-rated glazed doors and partitions, use similar sized fire-rated silicone as recommended by fire-rated glass manufacturer and identical to Product used in test assembly to obtain rating.

.12 Lateral Shims: Neoprene, silicone or EPDM, 40 - 60 Durometer, 100 mm (4") long or as required.

.13 Compression Glazing Gaskets for interior aluminum frame glazing: EPDM, neoprene, thermoplastic or other acceptable material with Shore A Durometer of 35 (± 5). Ensure material has sufficient thickness to allow 25% compression when installed. Provide "VISIONstrip®" by Tremco Canada or approved equivalent by Armet, Dow Corning or PTI having following characteristics:

.1 Resistance to permanent set: 30% maximum

.2 Tensile Strength: 2000 psi (1500 psi for silicone) minimum

.3 Minimum elongation at break: 300% (700% for silicone)

.14 Compression Glazing Tape: "Polyshim II Tape" by Tremco Canada or approved equivalent with 60 durometer hardness. Ensure tape is sufficiently wide and thick to completely cover bite area of glazing unit when unit is pushed into place.

.7 Primer Sealers and Cleaners: To glass and plastic glazing manufacturer's standards.

2.4 FABRICATION

.1 Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of Product manufacturer and referenced glazing standard, to comply with system performance requirements.

.2 Label each lite of glazing with registered name of Product and weight and quality.

.3 Check dimensions on job site before cutting materials.

.4 Grind and chamfer edges of unframed glass and mirrors. Grind and chamfer edges of glass shelves and sliding doors.

.5 Ensure minimum bite or lap of glazing on stops and rabbets as recommended by glazing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions:

.1 Verify actual site dimensions and location of adjacent materials prior to commencing work.

.2 Obtain glass dimensions on the job site. Ensure glass is not more than 4 mm (3/16") less than rebate size in either dimension, with allowance for edge spacers, shims and setting blocks as required.

.3 Ensure framing to be glazed is plumb, secure and permanently fixed in position.

.4 Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Thoroughly clean glass rebates and glass of dust, dirt, mortar and other foreign materials prior to glazing. Remove oils and grease with non-staining solvents such as Xycol or Methyl Ethyl Ketone solutions.

.2 Properly prime, before glazing, glazing rebates in wood doors.

3.3 INSTALLATION

.1 If required, thoroughly mix glazing compound as recommended by manufacturer. Thinning of glazing compound will not be permitted.

.2 Carefully remove glazing stops and replace after glazing. Take care to prevent damage to stops.

.3 Doors, Screens, Sidelites and Interior Windows:

.1 Place setting blocks on sill at 1/4 points from each corner unless otherwise directed by glazing manufacturer.

.2 Place continuous glazing gaskets on edges of glass.

.3 Centre and space each piece of glass with spacers located and installed according to manufacturer's directions.

.4 Place glass so no voids occur between glass and glazing material, and glazing stops.

.5 Secure glass in place with stops, secured in place with screws.

.4 Glazing Sealant:

.1 Compatibility: Select sealants with proven compatibility with surfaces contacted in installation and under service conditions indicated, as demonstrated by testing and field experience.

.2 Apply glazing sealant to clean, dry, grease and oil free surfaces. *Provide* exposed glazing sealant smooth, free from ridges, wrinkles, air pockets and embedded foreign materials.

.3 Prime surfaces if required by glazing sealant manufacturer.

.4 Trim glazing sealant flush with tops of stops and glazing channels.

.5 Remove excess glazing sealant or droppings which would set up or become difficult to remove from finished surfaces. Remove excess sealant immediately. Do not use chemicals, scrapers, or other tools which would affect finished surfaces.

.5 Interior Glazing:

.1 Fire Rated Hollow Metal Doors and Screens:

.1 Set glass in fire rated metals doors and screens on continuous setting block with 3 mm (1/8") gap between glazing stop glass and embed in glazing compound in accordance with NFPA 80 and National Building Code of Canada requirements. Strike and point

exposed joints between metal and glass or *Install* glass in accordance to ULC tested proprietary methods of installation.

.2 Tape/Tape Method:
  .1 Cut glazing tape to proper length and *Install* against permanent stop projecting 1.5 mm (1/16") above sightline.
  .2 Place glazing tape on free perimeter of glass projecting 1.5 mm (1/16") above sightline.
  .3 Trim off excess tape to sightline.

.3 Combination Method-Tape/Sealant:
  .1 Cut glazing tape to proper length and *Install* against permanent stop projecting 1.5 mm (1/16") above sightline.
  .2 Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
  .3 Trim off excess tape to sightline.

.4 Compound/Compound Method:
  .1 Apply sealant to back and bottom of rabbet.
  .2 Bed glass in position with non hardening compound sealant.
  .3 Position and secure glass of smaller dimension only using spring wire or glaziers' clips. Apply face compound and trim sealant to slope away from light.
  .4 Fill gaps between glass and stops with compound until flush with sightline and tool to smooth straight line.

.5 Dry Method (Gaskets):
  .1 Place gasket against permanent stop and position glass, acrylic or polycarbonate sheet.
  .2 Apply removable stops. *Install* gaskets in frame channels.

.6 Combination Method-Tape/Gasket for intermediate and large acrylic or polycarbonate lights over 600 mm x 600 mm (24" x 24"):
  .1 Cut glazing tape to proper length and *Install* against permanent stop.
  .2 Position glass.
  .3 Apply removable stops and *Install* gaskets in frame channel.

.7 Two Sided Butt - Joint Glazing:
  .1 2 side glazing at head and sill use wet, dry, or wet/dry glazing systems.
  .2 Position glazing so that vertical edges are spaced slightly apart and seal with silicone sealant.
  .3 Grind vertical joint with slight kerf and polish for aesthetics.

.8 Window Film:
  .1 *Install* window film in accordance with manufacturer’s printed instructions by experienced film applicators as recommended by glass film manufacturer.
  .2 Ensure glass surfaces are clean and ambient temperature is between 16 deg C and 38 deg C (61 deg F and 100 deg F).
  .3 Whenever 2 or more pieces of same colour translucent film are seamed together as a continuous band of colour, they shall be matched to assure uniform reflected *Day*time colour and transmitted night appearance.

3.4 PROTECTION

.1 *Provide* and maintain necessary protection of completed work against damage.

.2 Do not mark or attach anything directly to exposed glass and framing surfaces.

.3 If welding is to take place above or near completed glazing work, protect glass with plywood or other suitable means to reduce likelihood of weld spatter damaging glass surfaces.

.4 Protect glass from other trades, workers, tools and other similar materials.

.5 Replace cracked, broken, or defective glass at no additional cost to the *Owner* and to *Consultant's* satisfaction.

.6 Identification of Glazing: Mark glass lites with temporary, easily removable, large safety markings, immediately after glass installation. Maintain safety markings until final clean-up.

3.5 CLEANING

.1 Clean installed glass and metal frequently during construction. Avoid etching and staining glass and metal during construction.

.2 Clean and polish glass. Remove labels.

.3 Remove sealant and compound droppings from finished surface.

.4 Periodically clean installed glass during construction to avoid permanent etching and staining.

.5 Remove markings at time of final clean-up. Final clean-up shall be carried out in accordance with glass and sealant manufacturer’s recommendations to *Consultant’s* satisfaction.

.6 Avoid storing materials adjacent to glass.

.7 Protect glass from other trades.

.8 At completion of work, replace any damaged (includes scratches) or broken glass provided under this Section with similar glass.

.9 Wash glazing units on both exposed surfaces in each area of Project prior to scheduled inspections. Wash glazing units as recommended by glazing unit manufacturer

3.6 INTERIOR GLAZING SCHEDULE

.1 Refer to *Drawings* and Door Schedule.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
- .1 the *Contract* CCDC 2-2008, Stipulated Price Contract as amended in the *Contract Documents*;
- .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included: *Provide* control vision glass including but not limited to following:
- .1 Subject to compliance with design requirements, provide double insulated glass panels with integral louvers, including all operating components and accessories;
- .2 Vision control glass with adjustable cordless louvers between sealed insulating glass units.
- .3 Manual operators.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Reference Standards:
- .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
- .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Pre-installation Regulatory Requirement Review Meeting: *Provide* pre-start environmental procedure requirements, health, safety, emergency response hospital procedure and policy requirements, infection prevention and control requirements and security requirements to all parties associated with work of this Section;
- .2 Prior to start of work, arrange for *Project* site meeting of all parties associated with work of this Section, including *Consultant* who may attend. Include *Subcontractor* performing work of this Section, Testing Company's Representative (if applicable) and *Contractor*'s *Consultants* of applicable discipline.
- .3 Review *Contract Documents* for work included under trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, *Project* staffing, restrictions on areas of work and other matters affecting construction; to permit compliance with intent of this

Section.

.2 Sequencing: Coordinate installation with other related Sections.

.3 Scheduling:

.1 Prior to commencing work of this Section arrange for manufacturer's technical representative to review with *Contractor* and *Consultant*, procedures to be adopted and conditions under which work is to be performed. Inspect surfaces to determine adequacy of existing and proposed conditions.

.2 Cooperate fully with other *Subcontractors* on *The Work* and promptly proceed with work of this Section as rapidly as job conditions permit.

.3 *Supply* items to be built-in in ample time to be incorporated into work of other *Subcontractors*, together with measurements and other information required for location thereof.

.4 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data: Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Section 01 30 00. Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 *Shop Drawings*: Submit *Shop Drawings* for work of this Section in accordance with Section 01 30 00 indicating complete installation details.

.4 Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in size indicated:

.1 *Supply* 1 complete full size operating sample of vision control glass panel to *Consultant* for approval of general appearance and quality of work within 30 *Days* after *Contract* award. Reclaim approved sample on acceptance and incorporate in work. Ensure remainder of work equals or exceeds standard of approved vision control glass sample.

.5 Closeout Submittals: Maintenance Instructions: Manufacturer's printed instructions for cleaning and maintenance of glazed units, including operators.

1.6 QUALITY ASSURANCE

.1 Qualifications: *Provide* work of this Section executed by competent installers with minimum 5 years' experience in the application of *Products,* systems and assemblies specified and with approval and training of the *Product* manufacturers.

.2 Framing members, mullions, and similar members shall be designed to accept vision control panels shall have adequate structural strength to support weight of glass and louvers. Frames shall be level, plumb, square, and in plane.

.3 Provisions in frames shall be made to receive required hardware and accessories

.4 Polycarbonate clearance and edge bite, heights, setting blocks, spacers, and sealing materials shall meet manufacturer's requirements. When glazing gaskets are used, they shall be of sufficient size and depth to cover and protect secondary sealant.

.5 Regulatory Requirements: Provide tempered safety glass for locations subject to human impact as required by Code.

.6 Perform Work in accordance with GANA Glazing Manual.

.7 Electrical Components: Listed by ULC.

.8 *Mock-ups*:
.1 Provide *Mock-up* of vision control glass unit at designated location. Approved mockup may remain as part of the *Work*.

.9 Licensed Professionals: Employ a full time professional structural engineer registered in the province of Ontario, carrying minimum $2,000,000.00 professional liability insurance to:
.1 design the components of the work of this Section requiring structural performance,
.2 be responsible for full assemblies and connections
.3 be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations,
.4 be responsible for production and review of *Shop Drawings*,
.5 inspect the work of this Section during fabrication and erection,
.6 stamp and sign each shop drawing,
.7 *Provide* site administration and inspection of this part of the *Work*.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Comply with material manufacturer’s ordering instructions and lead time requirements to avoid delays.

.2 Deliver and store glass units in upright position, on blocks, in dry and safe location.

.3 Do not place units in direct sunlight.

.4 Handle units using corner protectors

1.8 WARRANTY

.1 Warrant work of this Section for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within

warranty period, to satisfaction of *Consultant* and at no expense to *Owner.* Defects include but are not limited to; coverage against material obstruction of glass units by dust or film formation due to failure of hermetic seal.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:
- .1 Between Glass Blinds: www.betweenglassblinds.com
- .2 Greenlite Glass Systems Inc.; www.greenliteglass.com
- .3 Unicel Architectural, www.unicelarchitectural.com .
- .4 Oem Shades Inc; www.oemshades.com
- .5 Design is based on 'Vision Control Insulated Glass Unit' by Unicel Architectural, Quebec.

2.2 DESCRIPTION

.1 Design Requirements:
- .1 Design vision control glazed assemblies with rotating horizontal louvers with rotation controlled manually. Rotation of louvers shall provide reduction in or elimination of vision through glazed assemblies.

2.3 MATERIALS

.1 Polycarbonate Sheet:
- .1 Type: ANSI Z97.1; plastic compound, ultraviolet stabilized, non-yellowing abrasion resistant coated.
- .2 Color: Clear.

.2 Mechanism:
- .1 All pivots, pinions, and racks shall be made of UV stabilized materials to ensure dimensional stability, durability, and maintenance-free service never needing lubrication.
- .2 Manual Operation:
  - .1 Rotation of blades shall be controlled through a standard white or black PVC crank handle. Blades shall rotate 180 degrees in a continuous cycle. For units with horizontal blades, axle of mechanism shall be positioned at 6 3/8" (162 mm) from bottom or top of panel, on left or right side.
  - .2 For units with vertical blades, axle of mechanism shall be positioned at 6 3/8" (162 mm) from left or right corner of unit, at top or bottom of panel.
- .3 Accessories:
  - .1 Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 70 to 90 Shore A durometer hardness.
  - .2 Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 50 to 60 Shore A durometer hardness.
  - .3 Glazing Gaskets: ASTM C864, neoprene or EPDM, or ASTM C1115,

silicone or thermoplastic polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot.

.3 Glazing Sealant:

.1 ASTM C920, Type S, Grade NS, Class 25; single component polysulfide or silicone type, low modulus, non sag. Compressed polyisobutylene shall be used as a primary seal and high quality polysulfide as a secondary seal. Contact of both sealants shall provide perfect adhesion as well as insurance against moisture, vapor penetration, resistance to effects of solvents and oils, and infiltration of any substance.

.2 Sealant backing: ASTM C1330, Type O, size and density to control glazing sealant depth and produce optimum glazing sealant performance.

.3 Desiccant : Air space between two glass panes shall be dehydrated with desiccant contained in precise proportions in spacers. Drying agent shall provide a minimum dew point of -73 F deg. and a moisture-free air space.

.4 Louvers:

.1 Each panel shall be fabricated according to a whole number of louvers, offering a choice of predetermined sizes resulting in a variation of 1 5/16" (33 mm) between each subsequent size.

.2 1 3/8" (35 mm) louvers shall be made of extruded aluminum, hollow-chambered profile with overlap, alloy 6063 T-5. L louvers shall be secured at both ends with molded pivots and shall operate without cords or strings. Louvers shall be mounted horizontally or vertically.

.5 Spacers:

.1 Corrosion-resistant aluminum spacers of 2" (50.8 mm) shall be chemically cleaned and shall contain a sufficient quantity of desiccant. They shall be turned into frames by mechanically locked corner keys.

.2 Finish of aluminum: Finish of louvers and spacers shall be baked-enameled in approved colour.

.6 Isolation Coating: Bituminous paint, alkali-resistant bituminous paint or epoxy resin solution to provide dielectric separation which will dry to be tack-free and withstand high temperatures. Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers. Carboline Bitumastic 50 by Carboline Canada, or Copper Creek Top Service 760 Black by Sherwin Williams Company, 410-02 by Bakor Inc. or other *Product* and manufacturer acceptable to *Consultant*.

2.4 FABRICATION

.1 Unit Configurations:

.1 Interior Lite: Nominally 10 mm thick clear, scratch resistant polycarbonate.

.2 Airspace: 63.5 mm.

.3 Exterior Lite: Nominally 10 mm thick clear, scratch resistant polycarbonate.

.2 Blades: Regular interlock 6.35 mm thick Duracon glossy white K-1285.

.3 Stops: 19 mm x 28.6 mm Duracon glossy white K-1285.

.4 Operator: White removable zinc hand crank, operable on both sides.

.5 Framing: as recommended by Manufacturer to suit glazing and blades.

.6 Fabrication Tolerances: In accordance with manufacturer’s recommendations to suit design requirements.

2.5 FINISHES

.1 Clear Anodized Finish (System 5): Aluminum finish shall be clear anodized in accordance with Aluminum Association Finish Designation AA-M12C22A41 for exterior exposure, and AA-M12C22A31 for interior exposure. Also acceptable are "Acrodize Hardcoat" by The Valspar Corporation and "Permadize" by Kawneer Corporation.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify *Consultant* in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Clean glazing rabbets; remove loose and foreign matter.

.2 Remove protective coatings on metal surfaces.

.3 Clean glass just prior to installation.

3.3 INSTALLATION

.1 Install unit in accordance with glass manufacturer's instructions.

.2 Maintain manufacturer's recommended edge and face clearances between glass and frame members.

.3 Installation: Gasket Glazing Method
- .1 Fabricate gaskets to fit openings; allow for stretching of gaskets during installation.
- .2 Set soft compression gasket against fixed stop or frame with bonded miter cut joints at corners.
- .3 Set glass centered in openings on setting blocks.
- .4 Install removable stops and insert dense compression gaskets at corners, working toward centers of glass, compressing glass against soft compression gaskets to produce weathertight seal.
- .5 Seal joints in gaskets.

.4 Sealant Glazing Method:
  .1 Apply sealant to full depth of permanent stops.
  .2 Press glass into sealant with slight lateral movement to ensure adhesion.
  .3 Apply sealant to full depth of removable stops. Secure stops in position, forcing contact with sealant bead and completely filling joint.

3.4 ADJUSTING

.1 Adjust units for proper operation.

3.5 PROTECTION

.1 After installation, mark glass with an 'X' using removable plastic tape.

END OF SECTION

PART 1 -GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Read and conform to:
  .1 the General Conditions and Supplementary Conditions of the *Contract*;
  .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

.1 Work Included:
  .1 *Provide* security glazing including, but not limited to following:
    .1 laminated glass.
    .2 fire-rated laminated security glass.
  .2 Provide security glazing for applications including, but not limited to following:
    .1 Security glazing for hollow metal doors.
    .2 Security glazing for borrowed lites and screens.
    .3 Security glazing for interior aluminum screens.
    .4 Miscellaneous security glazing to suit design requirements.
  .3 Miscellaneous tamper-resistant gaskets, tapes and glazing materials.

.2 Related Requirements: Specifications throughout entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCES

.1 Definitions:
  .1 Threat Side: Side of the glazing assembly from which threat is anticipated.
  .2 Secured Side: Side of the glazing assembly intended to be protected from anticipated threat.
  .3 Forced Entry Glass: Multiple laminations of glass or glass and plastic that is designed to resist penetration from physical attack.

.2 Reference Standards:
  .1 Latest published edition of reference standards listed herein are applicable to this Project unless otherwise indicated.
  .2 Reference amendments adopted prior to the effective date of this Project are applicable unless otherwise indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Coordinate installation with related Sections referenced herein.

.2 Pre-Installation Meetings:
  .1 Regulatory Requirement Review Meeting: Provide pre-start regulatory requirement review meeting to parties associated with work of this Section. As a minimum, discuss following:
    .1 environmental procedure requirements,

.2 health, safety and emergency response procedure and policy requirements,
.3 and security requirements;

.2 Pre-construction Site Meeting:
.1 Prior to start of work, arrange for Project site meeting of parties associated with work of this Section, including non-exhaustively Subcontractor performing work of trade involved, testing company's representative and Contractor's consultants of applicable discipline. Consultant may attend.
.2 Review Contract Documents to permit compliance with intent of this Section for work included under this trade, and ensure complete understanding of requirements and responsibilities relative to:
.1 work included,
.2 materials to be used,
.3 storage and handling of materials,
.4 installation of materials,
.5 sequence and quality control,
.6 Project staffing,
.7 restrictions on areas of work and other matters affecting construction.

.3 Scheduling:
.1 Prior to commencing work of this Section arrange for manufacturer’s technical representative to review with Contractor and Consultant, procedures to be adopted and conditions under which work shall be performed. Inspect surfaces to determine adequacy of proposed conditions.
.2 Co-operate fully with other Subcontractors on the Work and promptly proceed with work of this Section as rapidly as job conditions permit.
.3 Co-operate with other Sections for application of all miscellaneous specialties.
.4 Supply items to be built-in in ample time to be incorporated into work of other Subcontractors, together with measurements and other information required for location of it.
.5 Ensure work which may create dust does not proceed during work related to painting and final finishing.

1.5 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's literature and data sheets for each type of material provided under this Section for *Project* in accordance with requirements of Division 01.
.2 Ensure data sheets provide required information including detailed instructions for installing as well as maintaining, preserving and keeping materials in clean and safe conditions. Provide adequate warning of maintenance practices or cleaning agents detrimental to specified materials.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants and any other material later designated by Consultant.

.3 Samples: Submit samples of materials identifying quality and type of glass if required by Consultant before commencing work. Ensure samples are clearly labelled with manufacturer's name and type. Submit following samples:
.1 Laminated glass
.2 Fire-rated security glass
.3 Security window film types.

.4 *Shop Drawings:*
.1 Submit *Shop Drawings* in accordance with Division 01.
.2 Ensure *Shop Drawings* indicate material characteristics, details of construction, connections and relationship with adjacent construction.
.3 Where required, ensure *Shop Drawings* are prepared and stamped by a professional engineer licensed in the Territory of Nunavut.

.5 Product Certificates:
.1 Submit certificates signed by manufacturers of security glazing Products certifying that Products furnished comply with requirements of this Section. In particular, submit data substantiating that tempered, laminated and insulated glazing units are tested in accordance with applicable standards specified herein.
.2 Heat Soaking: Submit test report from an independent testing agency that tempered glass was manufactured at plant which performs in house full heat soaking in accordance with requirements of this Section.
.3 Adhesion and Compatibility:
.1 *Provide* compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturers interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion. *Provide* to sealant manufacturer, *Shop Drawings* showing size of lites, design loads and sealant dimensions for sealant manufacturer's evaluation and statement on stress.
.4 Attack Resistance Testing:
.1 For type of security glazing product, submit test reports conducted by a recognized testing agency substantiating that glazing units can withstand attack resistance loads specified in accordance with performance requirements specified herein.

.6 Maintenance Data: Provide maintenance data indicating cleaning instructions for inclusion into Maintenance Manual in accordance with requirements of Division 01.

1.6 QUALITY ASSURANCE

.1 Installer’s Qualifications:
.1 Ensure work of this Section is performed by an experienced installer trained, experienced and familiar with security glazing methods and standards specified herein.
.2 *Provide* work of this Section executed by competent installers with minimum 5 years’ experience in the application of *Products*, systems and assemblies specified and with approval and training of the *Product*

manufacturers.

.2 Fabricator's Qualifications: Firm experienced in manufacturing security glass, types as specified, with a minimum documented 5 years of successful in-service performance.

.3 Single Source Responsibility: Ensure primary materials provided in this Section are obtained from 1 source by a single manufacturer and secondary materials are obtained from sources recommended by primary materials manufacturers.

.4 Preconstruction Testing:

.1 Submit to sealant manufacturer, samples of each type of glass, gasket, glazing accessory and glass framing member that will contact or affect glazing sealants for compatibility and adhesion testing. Submit test samples in sufficient time for testing and analysis of results to prevent delay in progress of work.

.5 Mock-ups:

.1 Pre-construction Factory Mock-up: Retain services of qualified independent testing agency to test security glazing assemblies for compliance with requirements specified herein. Arrange and pay costs of fabrication, shipping, erection, demolition and disposal of following test units representative of proposed materials and construction:

.1 Erect at factory 1 full size panel unit of glazing assembly for destructive testing purposes with following characteristics:

.1 Glass Type: Security glazing units: SGL-AR1 as specified herein.

.2 Framing: Glazed decorative metal framing system as specified herein.

.3 Mock-up Size: As recommended by manufacturer but not less than 1170 mm x full height (4'-10" x full height).

.2 Provide units complete with finish framing and glazing installed to demonstrate compliance of glazing assemblies with impact and attack resistance requirements specified herein.

.3 Revise or replace Mock-up at no additional cost and as directed until accepted. Do not proceed with job fabrication until Mock-ups have been approved.

.4 Notify Consultant 7 in advance of the dates and times when assemblies will be tested.

.5 Test each Mock-up erected in accordance with following procedure:

.1 General Requirements:

.1 Conduct both tests on same test specimen. Ensure Hard Body Impact Test follows Soft Body Test.

.2 For each test the impact, suspend weight by a rope having minimum length of 1525 mm (5'-0") tied to roof rafters, fork truck or other elevated point. Raise impactor to required drop height and release such that impactor swings in a pendulum arc and strikes the test piece.

.2 Soft-Body Impact Test:

.1 Secure test specimen into test frame constructed in accordance with BS 6206 Appendix A.

.2 Conduct soft-body impact test using a 100 kg (220 lbs) sandbag dropped from maximum drop height of 1219 mm (48″). Subject glass lite to a single impact at the geometric centre of the lite. Perform test on the threat side of security glazing assembly only.

.3 Hard-body Impact Test:

.1 Use same testing assembly and methodology as Soft-Body impact test but impact glass with a 15 kg (33 lbs) 200 mm (8″) diameter cylindrical metal object. Subject glass lite to 20 impacts at the geometric centre of the lite. Perform test on the threat side of security glazing assembly only.

.4 Evaluation of Results: Mock-up assemblies are deemed to be compliant if:

.1 The glass does not fail and remains in the frame assembly, or

.2 The glass breaks but due to the laminate, remains intact with holes no larger than 100 mm (4″) in diameter, and the pane remains in the frame assembly.

.3 In case of glass failure, no shards with any dimension greater than 100 mm (4″) are separated from laminated pane.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver glass and associated materials to site in original crates and containers with manufacturer's name and brand distinctly marked thereon and with glass labelled as to types. Do not remove labels on glass until after work is accepted by *Consultant*.

.2 Storage and Handling Requirements: Store materials within the building, in a clean, dry location, acceptable or as designated by *Consultant*. Fully protect materials from damage of any kind until ready for use.

1.8 PROJECT CONDITIONS

.1 Environmental Requirements: No glazing done when temperature is less than 7 deg C (44 deg F) or sash or frames are wet, damp or frosted.

.2 Protect work of other trades from damage resulting from work of this Section.

.3 Identify glazed openings immediately following glass installation. Use coloured tapes or flags suspended near, but not in contact with glass. Attach to frames or surround with suitable non-staining strippable adhesives or tapes.

1.9 WARRANTY

.1 Warrant laminated glass for period of 5 years against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within

warranty period, to satisfaction of Consultant and at no additional expense. Defects include but are not limited to: deterioration, edge separation, delamination, material obstructing vision glass and blemishes exceeding those allowed by GANA (LGSA) standards.

.2 Upon notification of such deterioration within the warranty period, Provide full replacement of glass units showing defects at no additional cost to *Owner*.

.3 Warrant polycarbonate sheets for period of 5 years against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no additional expense. Defects include but are not limited to: yellowing and loss of light transmission.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

.1 *Products* of following manufacturers are acceptable subject to conformance to requirements of *Drawings*, Schedules and *Specifications*:

- .1 Security glazing:
  - .1 Dlubak Corporation; www.dlubakglass.com
  - .2 Global Security Glazing; www.security-glazing.com
  - .3 OldCastle Glass; www.oldcastleglass.com
  - .4 Pilkington Special Glass Limited; www.pilkington.com
  - .5 PPG Canada Inc.; www.ppgglass.com
  - .6 Prelco Inc.; www.prelco.ca
  - .7 Schott North America Inc.; www.us.schott.com
  - .8 TGP; www.fireglass.com
  - .9 Viracon; www.viracon.com
- .2 Polycarbonate:
  - .1 Plaskolite, Inc; www.plaskolite.com
  - .2 Curbell Plastics, Inc; www.curbellplastics.com
- .3 Glazing Sealants and Gaskets:
  - .1 Dow Corning; www.dowcorning.com
  - .2 GE Silicones; www.gesilicones.com
  - .3 Tremco Canada; www.tremcosealants.com

.2 Substitution Limitations: This Specification is based on Global Security Glazing *Products*. Comparable *Products* from manufacturers listed herein will be considered provided they meet the requirements of this Specification.

2.2 DESCRIPTION

.1 Design and Performance Requirements:

- .1 Architectural *Drawings* and details are diagrammatic and are only intended to show design concept, aesthetics, interfacing requirements, configuration, components and arrangements. They are not intended to identify or solve completely problems of thermal and structural movements, assembly framing, engineering design, fixings

and anchorages.

.2 Unit compositions specified herein are only intended to be suggestions. These shall not be interpreted as justification to waive manufacturer's responsibility to *Provide* tested items that are fully compliant with security performance requirements specified herein. Clearly indicate deviations from nominal thicknesses specified herein on reviewed Shop *Drawings* for *Consultant*'s review.

.3 Provide glass for work of this Section free from bubbles, waves, discolouration and other defects, of types specified herein for locations indicated on Drawings or noted on Door Schedules. Ensure glass bears manufacturer's label indicating quality and testing agency certifications. Leave labels in place until final cleaning.

.4 Design security glazing in thicknesses and strengths to requirements of these Specifications, CAN/CGSB-12.20-M , the NBC and regulations of authorities having jurisdiction. In case of conflict, comply with most stringent requirements.

.5 Perform work of this Section in accordance with GANA - Publications; www.glasswebsite.com and LSGASM - Standards Manual for laminated glazing installation methods.

.6 Ensure tempered glass is heat soaked in accordance with BS EN 14179.

.7 Deflection: Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.8 Confirm glazing material thicknesses by analyzing Project loads and in-service conditions. Provide glazing material for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths required to meet or exceed performance criteria.

.9 Human Impact Load Resistance: Provide glazing materials listed and labeled as complying with testing requirements of ANSI Z97.1 - Class A.

.10 Security Glazing Criteria: Where indicated, Provide glazing materials capable of resisting attack, forced entry or ballistic impact in accordance with performance requirements specified herein.

.11 Fire-Resistance Characteristics: *Provide* fire-rated glass tested in accordance with CAN/ULC S104-M and CAN4 S106-M as applicable and acceptable to authorities having jurisdiction for specific application.

.12 Ensure solvents and/or other volatile elements in glazing system do not affect properties and performance of materials used for edge seal and sealant glass bond.

.13 Ensure materials used for edge seals are compatible with other materials they come in contact within glazing system. If required, perform compatibility tests to ASTM C510, ASTM C794 and ASTM C1087, or others as applicable.

.14 Use sealants and other materials in glazing system which are unaffected by long term UV light exposure.

2.3 MATERIALS

.1 General Glazing Materials:

.1 Annealed (Float) Glass (CGL): Conforming to ASTM C1036 or CAN/CGSB-12.3-M, clear transparent annealed (float) glass, minimum

6 mm (1/4").

.2 Heat Strengthened Glass (HSGL): Conforming to ASTM C1048, Kind HS minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression in range of 3,500 to 7500 psi, preferably no higher than 5000 psi.

.3 Tempered Glass (TGL): Conforming to ASTM C1048, Kind FT or CAN/CGSB-12.1-M, Type 2 tempered, Class B float glass, Category II, minimum 6 mm (1/4"). Perform heat strengthening using horizontal tong free method; surface compression not less than 10,000 psi. Heat soak tempered glass in accordance with BS EN 14179.

.4 Laminated Glass (LGL): *Provide* glass laminated to interlayers to produce laminated lites free of foreign substances, air and glass pockets.

.1 General Composition: Multiple sheets of heat strengthened glass conforming to ASTM C1172; Kind LHS or CAN/CGSB-12.3-M. Minimum unit thickness: 6 mm (1/4");

.1 Interlayer: clear PVB interlayer of 2.28 mm (0.090") thickness as indicated in specific assemblies.

.2 Interlayer: clear ionoplast interlayer of 2.28 mm (0.090")thickness as indicated in specific assemblies.

.5 Glass-Clad Polycarbonate:

.1 ASTM C1349, glass clad polycarbonate unit complete with aliphatic urethane interlayers in configuration indicated herein or recommended by Product manufacturer. Ensure units are listed and labeled as capable of resisting attack when tested in accordance with performance requirements specified herein.

.6 High Impact Polycarbonate Sheet:

.1 High impoact, abrasion and UV resistant, flame retardance,chemical resistant, light weight with clarity and light transmission,clear coated polycarbonste “MARGARD” Coated Sheet, by Lexan, by GE.

.2 Thickness to suit design requirements and as recommended by manufacturer to suit application.

.7 Security Films:

.1 Provide security Film "Ultra S600 Series" by 3M or approved equivalent by Ace Security Laminates.

.2 Provide film conforming to CPSC 16 CFR Category II (400 ft/lb) and ANSI Z97.1.

.3 Colour: As selected by Consultant at later date.

.2 Glazing, Sealing Compounds and Accessories:

.1 Ensure glazing, sealing compounds and accessories are compatible with all contact surfaces of frames, accessories used in glazing system and contact surfaces of compounds used in glazing systems. Wood or other organic materials are not acceptable for use in glazing systems.

.2 Silicone sealants: Single non-sag component elastomeric silicone complying with ASTM C920 (Type S, Grade NS class 25) and Section 07 92 00. Use Type G for high modulus silicone applications.

.1 Acceptable *Products*: "Dow Corning 795" or "GE Silpruf SC2000" as recommended by glazing fabricator and approved by *Consultant.* Colour: Black unless otherwise indicated.

.3 Glazing tapes: 3 mm x 12 mm (1/8″ x 1/2″) preformed butyl tape, 100% solids, "Tremco 440" or approved equivalent. *Provide* tape shimmed or unshimmed as required.

.4 Blocking: EPDM, Neoprene or silicone tested to be compatible with specified security glazing *Product*.

.5 Setting blocks: 6 mm (1/4″) thick; 80-90 shore A durometer hardness.

.6 Edge blocks: 3 mm (1/8″) thick; 80-90 shore A durometer hardness.

.7 Primer Sealers and Cleaners: As recommended by Security Glazing manufacturer.

2.4 ASSEMBLIES

.1 Refer to Drawings for extent and locations of specific security glazing types.

.2 Attack Resistant Security Glazing:

.1 All Glass Laminate (SGL-AR1):

.1 Suggested Unit Composition:

.1 3 mm (1/8″) thick heat-strengthened glass (HSGL);

.2 2.3 mm (0.090″) thick clear PVB interlayer;

.3 3 mm (1/8″) thick heat-strengthened glass (HSGL);

.4 2.3 mm (0.090″) thick clear PVB interlayer;

.5 3 mm (1/8″) thick heat-strengthened glass (HSGL).

.6 Total Unit Nominal Thickness: 14.3 mm (9/16″)

.2 Minimum Attack Resistance:

.1 UL 972

.2 ASTM F1233 – Class 1

.3 Acceptable *Products*:

.1 "Secur-Term 3" by Global Security Glazing

.2 "ArmorProtect #111000" by OldCastle Glass

.3 Approved equivalent by Prelco.

2.5 FABRICATION

.1 Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of Product manufacturer and referenced glazing standard, to comply with system performance requirements.

.2 Label each lite of glazing with registered name of Product and weight and quality.

.3 Check dimensions on job site before cutting materials.

.4 Ensure minimum bite or lap of glazing on stops and rabbets as recommended by glazing manufacturer.

PART 3 -EXECUTION

3.1 EXAMINATION

.1 Site Verification of Conditions:

.1 Verify actual site dimensions and location of adjacent materials prior to commencing work.
.2 Obtain glass dimensions on the job site.
.3 Ensure minimum required face and edge clearances are provided.
.4 Ensure framing to be glazed is plumb, secure and permanently fixed in position within tolerance.
.5 Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 PREPARATION

.1 Thoroughly clean glass rebates and glass of dust, dirt, mortar and other foreign materials prior to glazing. Remove oils and grease with Low-VOC non-staining solvents as recommended by manufacturer

.2 Properly prime, before glazing, glazing rebates in wood doors.

3.3 INSTALLATION

.1 Ensure security glazing installation and fabrication complies with manufacturer’s written instructions and GANA Glazing Manual.

.2 Provide bite on glass, minimum edge and face clearances and glazing material tolerances recommended by manufacturer and GANA Glazing Manual.

.3 Protect glass from edge damage during handling and installation.

.4 Ensure silicone cap beads are provided on exterior glazing tape and lites (interior or exterior) in prisoner areas. Refer to *Drawings* and Schedules for locations.

.5 Carefully remove glazing stops and replace after glazing .Take care to prevent damage to stops.

.6 Prevent glass from contact with contaminating substances that result from construction operations, such as weld spatter, fireproofing or plaster.

.7 Security Window Film:
.1 Install security window film in accordance with manufacturer's printed instructions by experienced film applicators as recommended by glass film manufacturer.
.2 Ensure glass surfaces are clean and ambient temperature is between 16 deg C and 38 deg C (61 deg F and 100 deg F).
.3 Whenever 2 or more pieces of same colour translucent film are seamed together as a continuous band of colour, they shall be matched to assure uniform reflected Daytime colour and transmitted night appearance.

3.4 PROTECTION

.1 *Provide* and maintain necessary protection of completed work against damage.

.2 Do not mark or attach anything directly to exposed glass and framing

surfaces.

.3 If welding is to take place above or near completed glazing work, protect glass with plywood or other suitable means to reduce likelihood of weld spatter damaging glass surfaces.

.4 Replace cracked, broken, or defective glass at no additional cost to the *Owner* and to *Consultant's* satisfaction.

.5 Identification of Glazing: Mark glass lites with temporary, easily removable, large safety markings, immediately after glass installation. Maintain safety markings until final clean-up.

3.5 CLEANING

.1 Clean installed glass and metal frequently during construction. Avoid etching and staining glass and metal during construction.

.2 Clean and polish glass. Remove labels.

.3 Clean glass in accordance with requirements of:
- .1 GANA Glass Informational Bulletin GANA 01-0300 - Proper Procedures for Cleaning Architectural Glass Products.
- .2 GANA Glass Information Bulletin GANA TD-02-0402 – Heat-Treated Glass Surfaces Are Different

.4 Remove sealant and compound droppings from finished surface.

.5 Periodically clean installed glass during construction to avoid permanent etching and staining.

.6 Remove markings at time of final clean-up. Final clean-up shall be carried out in accordance with glass and sealant manufacturer’s recommendations to *Consultant’s* satisfaction.

.7 Avoid storing materials adjacent to glass.

.8 At completion of work, replace any damaged (includes scratches) or broken glass provided under this Section with similar glass.

.9 Wash glazing units on both exposed surfaces in each area of Project prior to scheduled inspections. Wash glazing units as recommended by glazing unit manufacturer

3.6 SECURTITY GLAZING SCHEDULE

.1 Refer to *Drawings* and Door Schedule.

END OF SECTION